1st Annual Report
EXPReS
Express Production Real-Time e-VLBI Service

Integrating Activity
implemented as
Integrated Infrastructure Initiative

Contract number:	026642
Project Co-ordinator:	Huib Jan van Langevelde
Project website:	http://www.expres-eu.org/
Reporting period:	from 01 March 2006 to 28 February 2007

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Document Log

Version	Date	Summary of Changes	Authors
1.0	12 Apr	Final Form C's, Audit Certificates	EXPReS Project Office
0.9	03 Apr	Approved by board to send to EC	EXPReS Project Office
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Project Information

Project Acronym	EXPReS
Project Full Title Proposal/Contract number	Express Production Real-Time e-VLBI Service DG-INFSO #026642

JIVE

AARNET

DANTE

PSNC

SURFnet

ASTRON

CNIG-IGN

CSIRO

NRF

INAF

MPG

TKK

NAIC/Arecibo

UMK

OSO

ShAO

UdeC

UniMAN

VeA/VIRAC

Quick Table of Contents

Detailed Table of Contents

List of Figures

Section A. Annual Activity Report

1. PROGRESS REPORT

1.1a Executive Summary

EXPReS, Express Production Real-time e-VLBI Service, is a three-year project funded via the European Commission's Sixth Framework Program (FP6) with the objective of creating a distributed astronomical instrument of continental and intercontinental dimensions using a technique called electronic Very Long Baseline Interferometery (e-VLBI). Using high-speed communication networks, EXPReS connects some of the largest and most sensitive radio telescopes on the planet to operate in real time with the central correlator. Connecting the correlator to telescopes provides astronomers with the ability to study transient phenomena such as active stars, supernovae and Gamma-Ray bursts. The overall objective is to create a production-level e-VLBI service in which astronomers can expect reliable and rapid results.

With an aggregate data flow of up to 16 Gbps into JIVE, we aim to create a unique e-VLBI infrastructure that is open to the international scientific community, one in which access is based solely on scientific merit. EXPReS creates a unique facility, providing astronomers with the most sensitive images of the universe available today. The rapid results service is also expected to be of practical interest to the geodetic VLBI and precision spacecraft navigation communities.

EXPReS builds on decades of collaboration between radio-astronomers, pushing state of the art technology to make their VLBI network more sensitive to weak radio signals. Modern computer technology has replaced the fragile tape recorders with disk recording, not only boosting the sensitivity but also the robustness. Disk recording also allowed small data packages to be sent ahead of the disk shipments to diagnose the network performance. In collaboration with network providers a proof-of-concept program showed in 2004 that real-time VLBI, albeit with limited bandwidth, can be done successfully. Future increase of the sensitivity for long baseline interferometry will certainly be implemented by direct transport of the sampled radio-signal.

EXPReS is comprised of 19 radio astronomy institutes and research networks and is coordinated by JIVE, the Joint Institute for VLBI in Europe. The project started in March 2006 and has completed its first year of activity.

1.1b Foreword

The first year of EXPReS resulted in an impressive burst of activity. Admittedly the peak of the burst occurred in the second half of the year, when new positions had been filled around the partner institutes, often bringing new expertise to the radio-astronomy community. The management structure was instituted and the EXPReS kick-off could be organized after key personnel in the EXPReS office had settled in.

But the ramping up during the first year has been truly impressive. Plans were established for the connectivity of all the involved telescopes and as a first result the Medicina (I) telescope joined the operational network, later followed by Metsähovi (FI). Tests are being performed to various remote sites, and it is interesting to follow the progress with places like Chile, China and Australia.

Amazing progress was also achieved with the sustained bandwidth that can be obtained on the available links. The starting situation was 64 Mb/s, but by the end of the year an image with 512 Mb/s data rate was obtained in one of the test runs. Combined with the dramatic increase in the robustness of the central correlator operational system the e-VLBI system has become an interesting scientific facility, as demonstrated by the first results which have made it into the astronomy literature.

As predicted, the new service needs new thinking in the astronomy community. The established proposal review process for use of the VLBI network is not tailored to the rapid response science that e-VLBI can offer. Within the Network Activity concerned with this topic, lively discussions are addressing this issue. And clearly more is to follow in the next years, as the current observational capabilities are only the start.

There is an equal amount of activity in the interaction with the network community. There are abundant options for EXPReS staff to discuss options and requirements at various network and Grid meetings. The FABRIC application is starting to make connections to Grid computing in its attempt to exercise distributed correlation. In this area good progress was made towards deploying the correlator, originally developed for spacecraft tracking, on standard Grid nodes. Technology was identified to develop high capacity data acquisition. This aspect of the project, which has elements in common with the interface to the eMERLIN network, can now progress according to plan.

Additionally, EXPReS had to adapt to Mike Garrett's departure as JIVE Director and Project Coordinator to become ASTRON's General Director. It feels a bit strange that the EXPReS train is now running without its original engine driver. But indeed, most are aboard and the momentum is there, so just follow the tracks that have been laid out across the planet!

Huib Jan van Langevelde, coordinator

1.2 Summary of Major Activities and Achievements

The overall objective of EXPReS is to create a production-level e-VLBI (electronic Very Long Baseline Inteferometry) service in which radio telescopes are reliably connected to the central data correlator at JIVE via high-speed, fiber-optic communications networks. EXPReS aims to create a robust and distributed e-VLBI infrastructure capable of generating high-resolution images of cosmic radio sources in real time. To do so, EXPReS also seeks to design and prototype elements of the hardware, software and data transport services required to support future e-VLBI facilities in which the net data flows will be hundreds of Gbps, with a central data processing environment possibly based on distributed (Grid-based) computing resources.

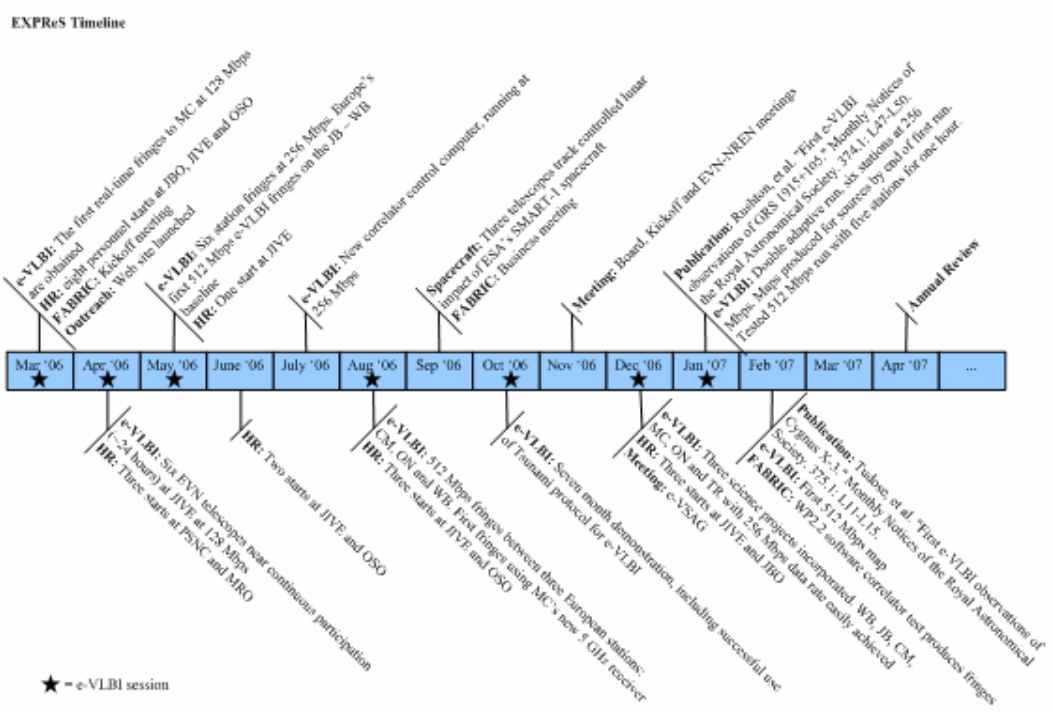


Figure NA1-1: Timeline of major EXPReS events over the past year

Over the past year, EXPReS has made significant and measurable improvements in the operational use of e-VLBI. In the timeline you can see the progress being made in stability, connectivity and science. Interesting tests such as the ESA's SMART-1 Lunar Impact in late August proved that e-VLBI could be used for space craft tracking. First publications in January and February 2007 confirmed the scientific usefulness of our efforts.

The figure NA1-2 below shows the general trend to larger volume network usage over time. The significance of the information is in the trends; one sees an increase in the utilization of higher bandwidth data connections and larger aggregate data rates over time. Early in e-VLBI's history, 32 Mbps between a few stations was considered a success. Today, we operationally connect at 256 Mbps and will soon advertise 512 Mbps capabilities.

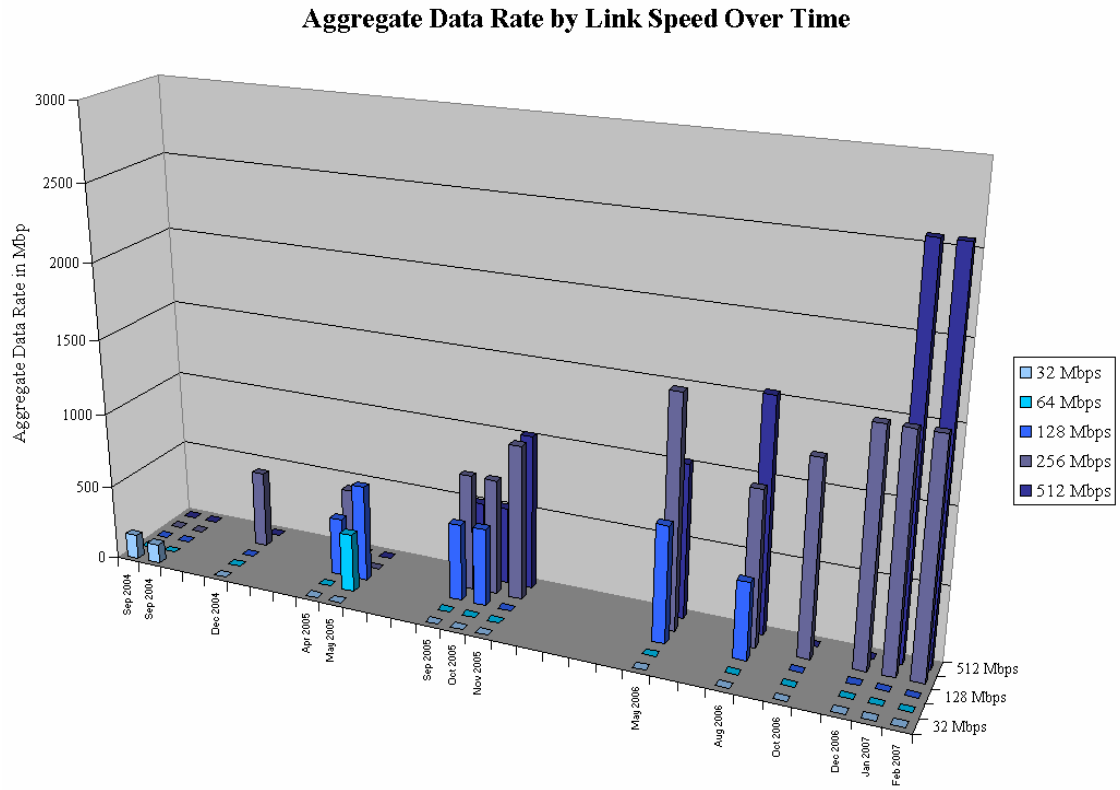


Figure NA1-2: Aggregate Data Rate by Link Speed Over Time

The steady increase in reliability and bandwidth comes as a result of regular e-VLBI sessions. EXPReS provides astronomers with regularly scheduled, monthly sessions from which results are obtained almost immediately after observations. The e-VLBI pipeline is reliable enough to offer back-to-back sessions supporting target of opportunity (ToO) observations. The first of the ToO sessions was held at the end of January 2007 with additional related sessions scheduled for later this year. The system is not just a technology test bed. Real science is being conducted as is shown through published papers.

1.3 Management Activity

1.3.1 NA1- Management of I3

1.3.1.1 NA1 Activity and Status

EXPReS is managed by the EXPReS Board of Directors. The board is comprised of the director of each participating institution (or delegate). The board has a Chairman and Vice-Chairman as well as a representative from JIVE, the coordinating institution. The First Board Meeting was held 1 November 2006 in Zaandam, the Netherlands. At this meeting, the board selected Ari Mujunen as the Chairman and Tasso Tzioumis as the Vice-Chairman.

#	Institution	Board Member's Name <email address>
1	JIVE	**Huib Jan van Langevelde** <langevelde@jive.nl>, **Coordinator**
2	AARNET	Chris Hancock <chris.hancock@aarnet.edu.au>
3	DANTE	John Chevers <john.chevers@dante.org.uk>
4	PSNC	Norbert Meyer <meyer@man.poznan.pl>
5	SURFnet	Kees Neggers <kees.neggers@surfnet.nl>
6	ASTRON	Marco De Vos <devos@astron.nl>
7	CNIG-IGN	Rafael Bachiller <r.bachiller@oan.es>
8	CSIRO	**Tasso Tzioumis** <tasso.tzioumis@csiro.au>, **Vice-Chair**
9	HARTRAO	Roy Booth <roy@hartrao.ac.za>
10	INAF	Piero Benvenuti <benvenuti@inaf.it>
11	MPIfR	Anton Zensus <azensus@mpifr-bonn.mpg.de>
12	MRO/TKK	**Ari Mujunen** <amujunen@cc.hut.fi>, **Chairman**
13	NAIC/Cornell	Robert Brown <bbrown@astro.cornell.edu>
14	NCU/UMK	Andrzej Kus <ajk@astro.uni.torun.pl>
15	OSO	John Conway <jconway@oso.chalmers.se>
16	ShAO	Xiaoyu Hong <xhong@center.shao.ac.cn>
17	TIGO/UDEC	Hayo Hase <hayo.hase@tigo.cl>
18	UniMan	Ralph E. Spencer <res@jb.man.ac.uk>
19	VIRAC	Juris Zagars <yzh@venta.lv>

At the First Board Meeting, Michael Garrett represented JIVE on the Board and was approved as Project Coordinator. As reported earlier, Garrett left his position as Director of JIVE to become the General Director of ASTRON. Huib Jan van Langevelde is currently Director of JIVE and has taken the responsibility as EXPReS Project Coordinator. You will see this change reflected in the management diagram below.

At the meeting, the board also discussed modifications to the Consortium Agreement. As a result of the document, the Board agreed on the wording for "Amendment 1 to the EXPReS Consortium Agreement." This document was distributed and signed by all participants and is now in force. A copy of the amended text is available in Section E: Appendices.

EXPReS is composed to three activities, two of which are further subdivided. The Networking Activities (NA), Specific Support Activities (SA) and Joint Research Activity (JRA) are shown in the management diagram with the four NA's, two SA's and one JRA. Each sub-activity has a corresponding Activity Leader (see the table below). The EXPReS Management Team (EMT) is comprised of the leaders of each of the activities and the Project Coordinator. The members of the EMT are highlighted in the diagram of the management structure below.

#	Activity Name	Activity Leader's Name
PC	Program Coordinator	Huib Jan van Langevelde
NA1	Management	T. Charles Yun

SA1	Production e-VLBI Services	Arpad Szomoru
SA2	Network Provisioning for Global e-VLBI Arrays	Francisco (Paco) Colomer
JRA1	FABRIC	Huib Jan van Langevelde

The majority of the EMT members were on staff at their respective institutions at the start of the project. At JIVE, this is also true of the administrative assistant position. The position was filled during the first project month and the benefits of the immediate start are evident in the documentation of communications between project members and with the EC. The project manager position was not filled until month 6. This late start had ramifications for project planning in a variety of places.

Over the past six months the project manager has organized and established project controls. The monthly reporting process was the first to be addressed and has improved. Activity leaders were first told that the monthly reports were expected and then a schedule was established for submitting information. Activity leaders understand the need for monthly reporting and now submit their reports without unnecessary harassment. In the second half the project, six monthly reports have been submitted compared to one report in the first half of the project.

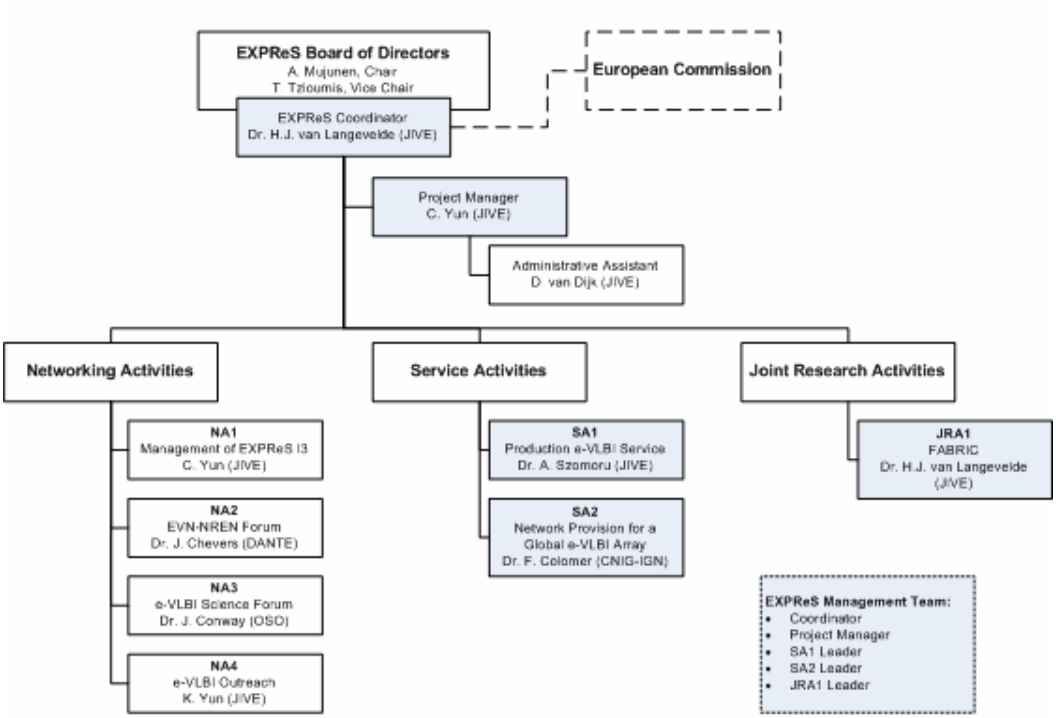


Figure NA1-3: Schematic diagram of the EXPReS management structure

Distribution of the first year's funding was completed. Based on the financial schedule, each institution received their expected first 18 month distribution (less 15% withheld by the Project Coordinator). At the outset, there were some communication problems with participants unaware that funding had been distributed. Some partners allowed money to sit in accounts for short periods of time. However, this confusion was easily addressed and all participants have confirmed receipt of the first 18 month distribution.

The remaining 15% will be distributed once all of the partners have submitted estimates from their Form C. The distribution will take place at the beginning of the second project year and is in progress.

During the first Board and Kickoff meetings, all participants were told that audited financial reports were expected for the first annual report. As partners arranged for audits, many learned that the audit cost would be a significant fraction of (if not more than) their first year funding total. We have thus decided against requiring audited financials from all sites. All partners with significant spending have submitted audited Form C's.

Funding across the 19 partners is unbalanced, with the coordinating institution receiving a particularly large proportion of the funding. This is due to several factors. First, four activities (NA1, NA4, SA1, JRA1) are centered at JIVE. Additionally, JIVE accepted the administrative burden of organizing and paying for meeting costs for several activities (NA2, NA3) based at partner sites.

Looking at the same information slightly differently, one sees that the activities are more evenly distributed. The NA's (all four combined for this example) are understandably funded at lower levels considering the research, manpower, equipment and connectivity needs of the other activities.

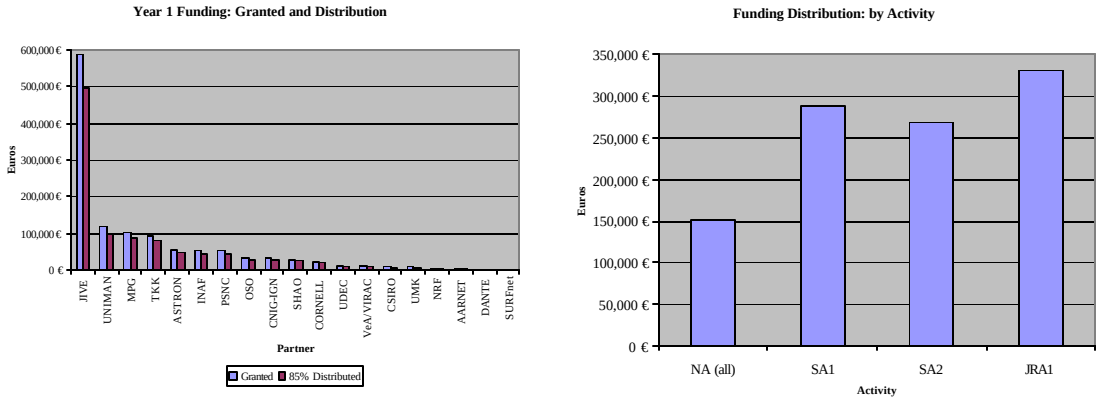


Figure NA1-4: Distribution of Funding over the first 18 months shown by Partner and Activity.

As expected collecting financial information for the Annual Report was a time intensive process. Many of our partners are based in non-EU countries and required extensive support to complete the financial documentation. Additionally, the audit process required equivalent levels of interaction, with some sites requiring substantial changes to their book keeping system to satisfy the auditors. The project appreciates the fact that the Commission recommended first year audits as identifying these problems during the project's final year could be disastrous.

1.3.1.2 NA1 Participating Institutions[1]

All institutions have received funding to be applied to NA1 related activities. JIVE holds a majority of the funding to cover costs of the project office, organization and hosting of meetings, and support of audits. These costs have held true with variations as expected from early estimates.

For all partners, NA1 funding was provided to cover travel for the board meeting. As expected, certain sites required additional funding to participate in the board meeting. Our Australian and Chilean partners required significantly more travel support than our Dutch partners. This discrepancy is not evident from the initial budget.

[1] Participation is based on those institutions who have received funding for the activity. The amount listed under "Months 1-18" is the 85% distribution value. The Participating Institution Table assumes the following abbreviations:
P # - Participant Number

Please note that the original Description of Work (DOW) contained inconsistencies and errors in the financial calculations. These are addressed and corrected in the 18 month plan. Briefly, the calculation in "Table 3 - Summary table of expected budget and of the Community contribution requested." incorrectly sums the NA sub-total for partner 18 (UniMan). This error is carried to the Total Expected Budget value.

P #	Short Name	Funded Amount (Euros)	
		3 year total	Month 1-18
1	JIVE	212,100	59,500
2	AARNET	3,100	850
3	DANTE	4,700	850
4	PSNC	3,100	850
5	SURFnet	3,100	850
6	ASTRON	3,100	850
7	CNIG-IGN	3,100	850
8	CSIRO	3,100	850
9	NRF	3,100	850
10	INAF	3,100	850
11	MPG	3,100	850
12	TKK	3,100	850
13	CORNELL	3,100	850
14	UMK	3,100	850
15	OSO	4,700	1,275
16	SHAO	3,100	850
17	UDEC	3,100	680
18	UNIMAN	3,100	680
19	VeA/VIRAC	3,100	680

1.3.1.3 NA1 Deliverables and Milestones Tables

NA1's full list of deliverables formally requires just the Annual Report in the first year. In reality, this (and each of the annual reports) will be delivered the month after the planned month as listed. We do not feel that this requires a formal change in the deliverables table.

D#	AD#	Deliverable Description	Lead	Delivery month		Status[2]
				Planned	Actual	
D32	NA1.01	Annual report (incl. Financial information) to EC	JIVE	12	13	4
D81	NA1.02	Annual report (incl. Financial information) to EC	JIVE	24		
D111	NA1.03	Annual report (incl. Financial information) to EC	JIVE	36		
D112	NA1.04	Final Report to Board and EC	JIVE	36		
D113	NA1.05	Final Plan for using and disseminating knowledge	JIVE	36		
D114	NA1.06	Implementation of the Gender Action Plan	JIVE	36		
D115	NA1.07	Raising public participation and awareness	JIVE	36		

NA1 has an associated set of milestones. Each of the milestones has been met and no additional milestones are outlined in the DOW for the remainder of the project.

[2] The status of the deliverable on a sliding scale,
x = Ongoing effort
0 to 4 = No progress to Deliverable completed and presented to Project Manager
➔ = Deliverable has been identified as actively delayed

Milestone #	Description	Expected Completion	Actual Completion
MN1.1	Conclusion of the Cons. Agreement	-3	9
MN1.2	Appointment of the project manager	0	6
MN1.3	Appointment of the administrative assistant	0	1

Note that the conclusion of the Consortium Agreement seems particularly late due to the additional time required to create the amendment document and then to obtain signed copies.

1.3.1.4 NA1 Human Resource Overview

NA1 has two associated positions, both located at JIVE. The Administrative Assistant position is funded at 0.5 FTE and was filled during the first month by Diana van Dijk. The second position is a 1.0 FTE position and was filled in the sixth month by T. Charles Yun.

Position Title	Position Location (Short Name)	Position Description	Start Month
Project Manager	JIVE	Project management @ 1.0 FTE	6
Administrative Assistant	JIVE	Project support @ 0.5 FTE	1

1.3.1.5 NA1 Meetings and Workshops

Through NA1, JIVE organized and hosted the First Board Meeting and the Kickoff Meeting for EXPReS. The two meetings were held on consecutive days in Zaandam, the Netherlands. Representatives from almost all of the participating institutions were present for the meetings. Due to the fact that many members of EXPReS would be present, several additional meetings were held in conjunction with these meetings, notably, the EVN-NREN meeting.

The second EXPReS Board Meeting has been scheduled for May 2007 and will be hosted by Metsahovi, the home institution for the EXPReS Board Chairman.

Date Location	Meeting Title / Subject / Website Address	Number of Attendees
2006 Nov 01 Zaandam, the Netherlands	EXPReS Board Meeting Meeting of the EXPReS Board http://www.jive.nl/dokuwiki/doku.php/kickoff:expres_board_meeting	19
2006 Oct 31 Zaandam, the Netherlands	EXPReS Kickoff Meeting Project Kickoff meeting http://www.jive.nl/dokuwiki/doku.php/expres:kickoff	29

1.3.1.6 NA1 Participation in External Events

NA1 participated in a variety of events over the first year of the project. Participation was by the Project Manager directly presenting on EXPReS's activities, or via funding for events in which supporting the travel of others was logistically and economically more effective (specifically for Interwork 2006 in Chile where our Chilean partner traveled locally).

In addition to formal presentations, the Project Manager and several EXPReS partners have been highlighted in less formal media, such as local newspaper articles, radio interviews and highlights in partners' outreach material. We do not identify these appearances individually except to note that this type of dissemination exists.

Date (month)	Meeting Title	Location
2007 January	Interwork 2006 (local and remote presentations)	Santiago, Chile
2006 December	TERENA Private meeting, Introduction to EXPReS	Amsterdam, Netherlands

2006 November	ICT 2006	Helsinki, Finland
2006 November	"SURFnet and JIVE GigaPort seminar for astronomers," SURFnet GigaPort Seminar.	Utrecht, Netherlands.
2006 November	EXPReS Kickoff meeting	Zaandam, Netherlands
2006 September	FABRIC Business Meeting	Poznan, Poland
2006 September	8th EVN Symposium	Torun, Poland
2006 September	5th International e-VLBI Workshop, Haystack Observatory, MIT	Westford, MA, USA

1.4 Networking Activities

1.4.1 NA2 - EVN-NREN Forum

The EVN-NREN forum consists of both a physical meeting, held annually, and a virtual forum by way of an email list. The list is subscribed to by 38 members of the networking and radio astronomy communities. Regular discussion takes place on issues of interest to these individuals specifically on topics relating to network implementation to telescopes and performance experienced by e-VLBI traffic.

1.4.1.1 NA2 Activity and Status

NREN Participants

EXPReS is not purely an astronomical activity. In order that the computing and astronomical aspects of the project are work appropriately over the infrastructures which join the telescopes, EXPReS includes in its partners four networking organisations.

DANTE is the operator of a number of regional research network backbones:

- In Europe GÉANT2 connects 34 countries in Europe with a high-bandwidth IP network and also offers dedicated circuits of between 1Gbps and 10Gbps for data-intensive research projects. In addition, GÉANT2 provides connectivity to other world regions, with connections to the USA, South Africa and India. All European telescopes are connected to the Netherlands via GÉANT2.

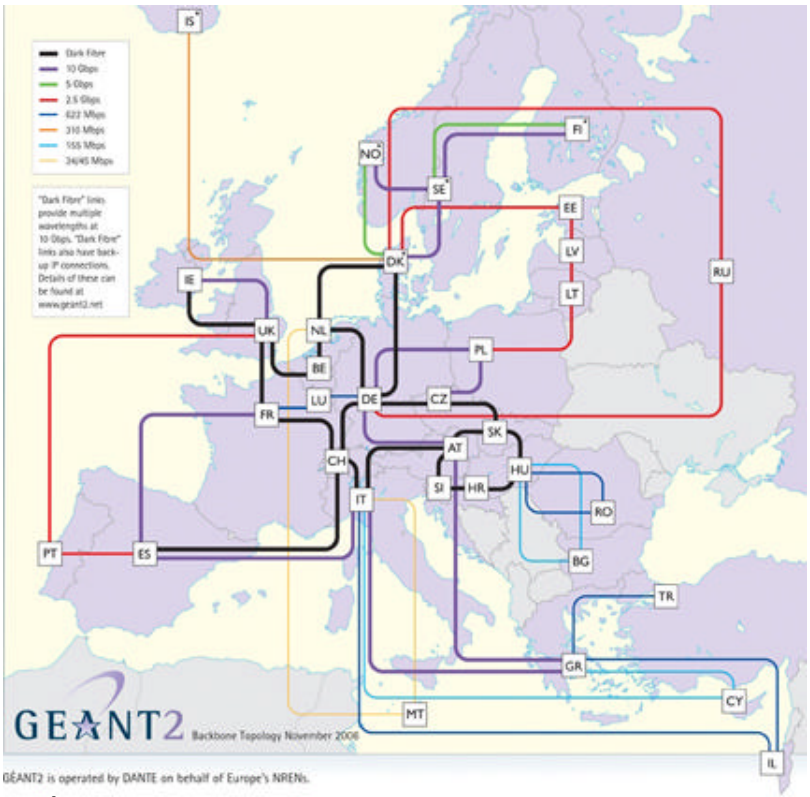


Figure NA2-1: GÉANT2 Network Map

- ALICE is the project which created the RedCLARA network in Latin America. This network connects 14 national networks in the region and provides a link to GÉANT2 in Europe. In the context of EXPReS, RedCLARA provides connectivity to the TIGO telescope in Chile.
- ORIENT is a project dedicated to providing a high bandwidth connection between research networks in Europe and China. It is hoped that the Shanghai Astronomical Observatory will be connected us ing this circuit.
- TEIN2, a network connecting Asia-Pacific countries and EUMEDCONNECT, a network connecting Mediterranean and North African countries. These networks are available to EXPReS for data distribution or the connection of new telescopes.

SURFn et is the national research and education network of the Netherlands and provides connectivity via their SURFnet6 for access inside the Netherlands and from the Netherlands to international networks. SURFnet is a member of the GÉANT2 consortium and a partner in the TEIN2 project. In 2006, SURFnet organised a workshop dedicated to networking aspects of e-VLBI. SURFnet connects both JIVE and ASTRON.

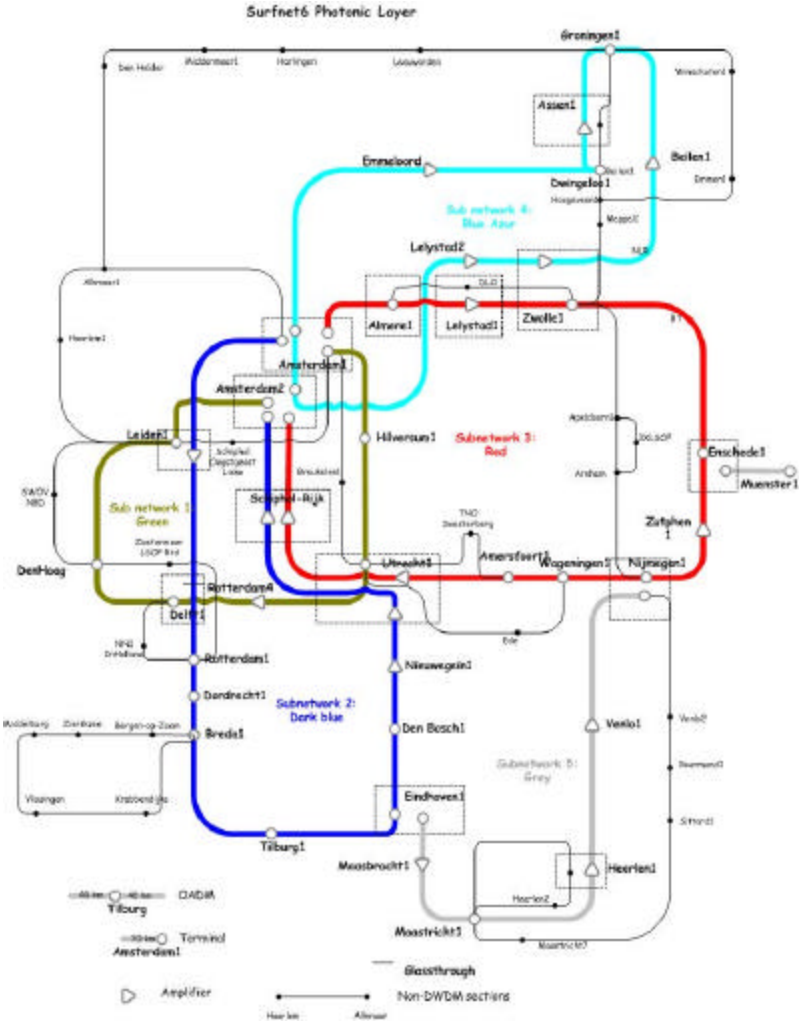


Figure NA2-2: SURFNet 6 Network Map, Photonic Layer

AARNET is the national research and education network of Austrailia which provides high-capacity Internet services to Australia's universities, research institutions and related cultural and education organizations. AARNET is actively participating in the TEIN2 project and connects the CSIRO telescopes through a 10 gigabit per second backbone and a dedicated optical network passing over 80 major regional centers throughout Australia.

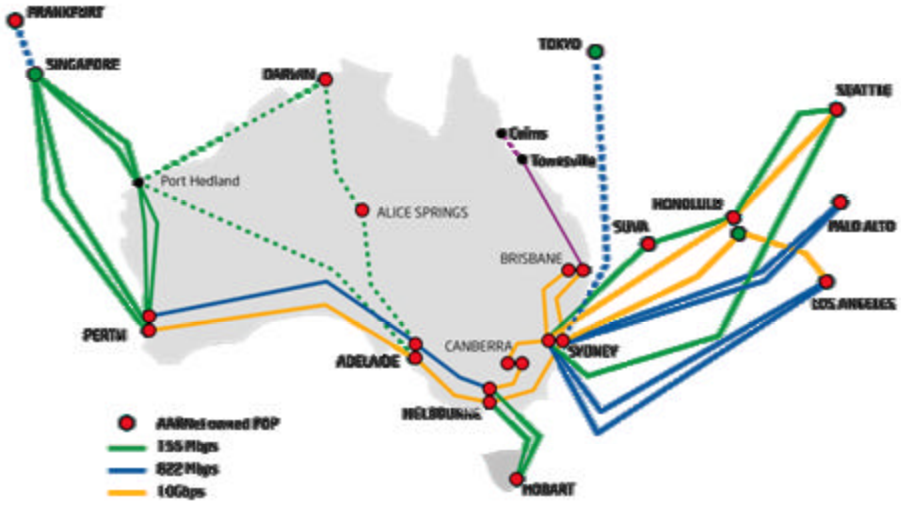


Figure NA2.3: AARNet Network Map

PSNC is responsible for the development and management of PIONIER, the national research network in Poland – which is connected to the GÉANT2 network with the speed of 10Gbit/s. The PIONIER itself is an advanced optical network based on its own fibers, own DWDM transmission equipment and own 10 Gigabit Ethernet communication channels. There is one channel dedicated for connecting the radio telescope at Torun with the GÉANT network.

Figure NA2.4: PIONEER Network Map

EVN-NREN Meeting - 2006 Nov - Zaandam, the Netherlands

This meeting was held in conjunction with the EXPReS Kick-off Meeting. Minutes of the meeting may be found at <http://www.jive.nl/dokuwiki/doku.php/expres:evn-nren>. The agenda:

Time	Description
09:00	Welcome and Introduction: John Chevers (DANTE)
09:15	Summary of e-VLBI activity from 2006: Arpad Szomuru (JIVE)
09:45	Summary of GÉANT2 activity from 2006 and wavelength service processes: John Chevers (DANTE)
10:00	Rundown of SMART-1 PERT case history: Pekka Savola (CSC-FUNET/SWITCH)
10:15	Round Table update of telescope connectivity (All)
10:45	Coffee and exciting biscuits
11:00	Connection of Medicina Telescope: Marco Marletta (GARR)
11:15 11:30	FABRIC-4 project presentation: Richard Hughes-Jones (University of Manchester) A Simulation model for e-VLBI traffic on network links in the Netherlands: Julianne Sansa Otim
11:45	Summary of forthcoming e-VLBI activity in 2006/2007: Charles Yun (JIVE) -including wavelength services
12:00	AOB and discussion

TIGO discussions and output

Following a request from the VLBI centre, JIVE, DANTE instigated a series of measures to resolve data-transfer rate issues between TIGO (Chile) and JIVE (Netherlands). The effort was coordinated by DANTE and the GÉANT2 PERT and involved input from GÉANT2, RedCLARA, REUNA, SURFnet, TIGO and JIVE engineers. Despite very significant effort from all parties, the issue was not resolved by the date of the VLBI tracking of the SMART-1 spacecraft. This report outlines the direction of the investigation and the practical steps taken to diagnose and resolve performance issues.

Principal outcomes are that:

- The PERT procedures were proven to work well in addressing complex problems over multiple domains
- No faults were detected in the international backbones
- Respectable data transfer rates of 20-30 Mbps were shown to be possible end-to-end, but this was not reflected in the actual transfers
- Problems seem likely to be at the application level and in local packet loss
- The timescale available did not allow full investigation and testing of the application
- The PERT case has now been closed as significant improvements were made in the transfer rate and the upgrading of the REUNA network is imminent

A paper based upon this work, authored by Pekka Savola and John Chevers has been accepted for the TNC2007 conference.

1.4.1.2 NA2 Participating Institutions[3]

The EVN-NREN forum has included contributions from all the partner organisations in EXPReS but also engages with the networking community more generally. Many NRENs who are not EXPReS partners (for example GARR, NORDUnet, DFN, UKERNA) have made significant contributions to the project at their own expense.

Funding is primarily provided for travel to the EVN-NREN meetings. JIVE is provided a larger proportion to handle costs associated with meeting venue, organization and logistics.

P #	Short Name	Funded Amount (Euros)	
		3 year total	Months 1-18
1	JIVE	28,300	7,650
2	AARNET	4,000	1,020
3	DANTE	10,100	1,700
4	PSNC	2,600	680
5	SURFnet	2,600	680
6	ASTRON	1,600	434
7	CNIG-IGN	1,600	425
8	CSIRO	3,000	850
9	NRF	3,000	850
10	INAF	1,600	425
11	MPG	1,600	425
12	TKK	1,600	425
13	CORNELL	3,000	850
14	UMK	1,600	425
15	OSO	1,600	425
16	SHAO	3,000	850
17	UDEC	3,000	680
18	UNIMAN	1,600	425
19	VeA/VIRAC	1,600	423

1.4.1.3 NA2 Deliverables and Milestones Tables

NA2's deliverables for the first year are the execution of the EVN-NREN meeting and work to contribute to the annual report.

Note that the original Description of Work (DOW) contained inconsistencies in the deliverables tables. The two instances of deliverables were in the beginning of the DOW (the large list with deliverables from all activities) and the smaller list inside of the NA2 section. The differences will be corrected in the 18 month report section of the report.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D4	NA2.01	EVN-NREN meeting No. 1 (under auspices of EXPReS)	DANTE	3	8	
D31	n/a	NA2 annual report No. 2 (as part of EXPReS Ann. Rep No. 2)	JIVE	24		

[3] Participation is based on those institutions who have received funding for the activity. The amount listed under "Months 1-18" is the 85% distribution value. The Participating Institution Table assumes the following abbreviations:
P # - Participant Number

D33	NA2.02	NA2 annual report No. 1 (as part of EXPReS Ann. Rep No. 1)	JIVE	12	12	
D48	NA2.03	EVN-NREN meeting No. 2	JIVE	18		
D82	NA2.04	NA2 annual report No. 2 (as part of EXPReS Ann. Rep No. 2)	JIVE	24		
D88	NA2.05	EVN-NREN meeting No. 3	DANTE	26		
D89	NA2.06	EVN-NREN representatives present EXPReS networking results at the e-VLBI Science & Technology Workshop	DANTE	26		
D90	n/a	EVN-NREN meeting	DANTE			
D116	NA2.07	NA2 annual & Final reports	JIVE	36		

1.4.1.4 NA2 Human Resource Overview

Manpower is not claimed under NA2; hence no formal reporting of human resources is given. Twenty-one NREN engineers and observatory staff (not all project partners) attended the EVN-NREN meeting, whilst significant effort from the GÉANT2 PERT team and others was expended on the improvement of connectivity to the TIGO telescope in Chile.

Position Title	Position Location (Short Name)	Position Description	Start Month
n/a	n/a	n/a	n/a

1.4.1.5 NA2 Meetings and Workshops

Date Location	Meeting Title / Subject / Website Address	Number of Attendees
31 Oct 2006 Zaandam, the Netherlands	EVN-NREN Meeting European VLBI Network and National Research Education Network discussion forum http://www.jive.nl/dokuwiki/doku.php/expres:evn-nren	21

1.4.1.6 NA2 Participation in External Events

NA2 activities have been represented at the following events by members of EXPReS presenting work that was related to or resultant from efforts in NA2.

Date (month)	Event Description / Location
2007 Jan	Interwork 2006 -presentation by Hayo Hase on e-VLBI between Chile and Europe Santiago, Chile
2006 Nov	IST 2006, show floor, e-VLBI video footage shown Helsinki, Finland
2006 Sep	EVN-NREN 2006 Torun, Poland
2006 May	TNC2006 GÉANT2 video (including e-VLBI footage shown) Catania, Sicily, Italy

1.4.2 NA3 - E-VLBI Science Forum

1.4.2.1 NA3 Activity and Status

The purpose of NA3 is to be a forum to discuss the science use of e-VLBI, give a user perspective on the relative priorities for technical development and give science-based policy advice to other parts of EXPReS or the EVN in general. During the first project year the main activities within NA3 have been:

1) setting up and first meeting of the eVSAG (e-VLBI Science Advisory Group)
2) via the eVSAG chairman the organization of the e-VLBI observing runs.

eVSAG activity

The purpose of this committee is to advise the rest of the project on scientific issues from the end user perspective and to discuss the best policies for the e-VLBI runs to maximize scientific return. During the reporting period the eVSAG was involved in a number of intensive email discussions on issues of organization of e-VLBI, proposal policy and technical matters such as amplitude calibration and source detection strategies. The eVSAG also had its first face-to-face meeting in November 2007.

The eVSAG chairman (John Conway) has also provided reports on e-VLBI progress and strategy to the EVN board of directors meetings in Florence, Italy (May 18th 2006) and in Dwingeloo, the Netherlands (Nov 29th 2006). The eVSAG chairman also attended the EXPReS kick-off meeting in Zaandam, the Netherlands on 31 Oct 31 2006 and the EXPReS board meeting at the same place on 1 Nov 2006.

The eVSAG consists of a total of 25 people. There are 15 representatives of the radio astronomy observatories that participate in EXPReS. The additional 10 people include the eVSAG chair, heads of SA1, SA2, etc., representative of non-astronomical users (geodesy, spacecraft navigation etc). The full membership of the eVSAG is as follows.

Name	Representation	Address
J. Conway	Chairman	Onsala Space Obs, Sweden
P. Charlot	EVN PC Chair	Bordeaux Obs, France
R. Porcas	EVN scheduler	MPI, Bonn, Germany
H. van Langevelde	EXPReS coordinator	JIVE, Netherlands
C. Yun	FABRIC lead/Proj Manager	JIVE, Netherlands
A. Szomuru P. Colomer	SA1 lead SA2 lead	JIVE Netherlands CNIG-IGN, Spain
R. Haas	Geodesy	Onsala Space Obs, Sweden
M. Avruch	Spacecraft Navigation	JIVE, Netherlands
R. Campbell	Correlator	JIVE, Netherlands
Z. Paragi	Secretary/JIVE	JIVE, Netherlands
R. Strom	ASTRON	ASTRON, Netherlands
J. Alcolea	CNIG-IGN Rep	CNIG-IGN, Spain
C. Philips	CSIRO	CSIRO, Australia
J. Quick	Hartebeestock	South Africa
T. Venturi A. Lobanov	INAF MPIfR	Italy Germany
A. Lahteenmaki	MRO	Finland
C. Salter	Princeton/NAIC	Puerto Rico, USA
E. Pazderski	NCU	NCU, Poland
M. Lindquist	Onsala Space Observatory	Onsala, Sweden

D. Jiang	Shanghai Observatory	China
H. Hase	TIGO	Chile
S. Garrington	Jodrell Bank	Manchester, UK
I. Smelds	VIRAC	Latvia

Close connections between the eVSAG and other parts of EXPReS and the EVN is accomplished informally by a large degree of overlap between the above eVSAG membership and members of other committees. For instance the network coordinator and leads of SA1, SA2, and JRA1 are all members of the eVSAG. Most telescope representatives of the eVSAG also fulfill the same role on the EVN PC which reviews user observing proposals. On a more formal level the chair of the eVSAG also gives regular reports and attends meeting of the EVN directors and the overall EXPReS project.

The first face-to-face meeting of the eVSAG was held on November 28th 2007 in Westerbork, the Netherlands. A total of 16 people were present, 3 joined by telephone. There were updates on e-VLBI capabilities, reports on data reduction tool development, and reports from e-VLBI use by geodetic VLBI. There was lively debate on a draft document on 'e-VLBI Science Uses' and on the best strategy for organizing future e-VLBI runs.

- e-VLBI observing runs

The eVSAG in general has responsibility for proposing the optimum strategy to make the best use of scheduled e-VLBI runs. These recommendations are passed to the EVN program committee and EVN board of directors who agree on the final policy. The observing strategy includes the best length and spacing of e-VLBI runs, the allowed observing modes (frequency bands, continuum or spectral line modes, etc.) and guidelines for evaluating e-VLBI proposals. After agreement on policy the eVSAG chairman writes an e-VLBI 'Call for proposals'. This call is widely circulated to the astronomical community. Like all EVN proposals, user proposals for e-VLBI are submitted to the EVN Program Committee (EVN PC) for scientific evaluation and consideration for scheduling.

During the first project year the e-VLBI hour runs consisted of 24 hour slots placed approximately 6 weeks between the EVN disk based sessions. Zsolt Paragi (eVSAG secretary) coordinated with participating radio telescopes to set up observing dates well in advance (approximately 6 months). All runs used the six radio telescopes at Westerbork (NL), Onsala (SW), Torun (PL), Medicina (IT), Jodrell Bank (UK) and Cambridge (UK) [except for the first run where Medicina was not yet connected]. All runs used a bit rate of 256 Mbps, again except for the first. Technical testing shows that 512 Mbps is achievable to all of the above stations except Torun and this higher bit rate on the partial set of telescopes will be advertised in the second year of the project.

For each run a deadline for proposals was set two weeks before the date of observation. A summary of the e-VLBI sessions within the reporting period is given below; with the number of proposals and number of projects scheduled for each session indicated. The project(s) that are observed is determined solely on the basis of scientific merit as evaluated by the EVN PC. In some cases where proposals request less than 24 hours observing time, several user proposals can be observed within the same slot. A total of 15 proposals were received, of which 11 were scheduled, and all but one was a technical success. To put this in perspective e-VLBI received during the reporting period approximately one-third of the total number of EVN proposals (disk and e-VLBI combined). Considering that the number of telescopes and bandwidth for e-VLBI during this initial period were both less than for disk recording. This shows a considerable user demand for e-VLBI.

The successful scheduled proposals spanned a wide range. Three of the projects were of flaring stellar sources (two observations of star Cyg X-3 and one of GRS1915+105); these observations led to the first refereed publications using e-VLBI (see below). Three projects searched for compact structures in either targets or calibrators and were 'precursor' observations to subsequent large proposals. Three projects were part of a larger multi-wavelength campaign (two times Algol, LSI +61.303). The final

project involved a survey of 16 X-ray binary stars scheduled for the 29 Jan /1 Feb 2007 'adaptive' run. For this double run, projects were requested which observed a group of variable sources on the first day with rapid reduction of the data. The detailed schedule for the second run was then to be created on the basis of results from the first run, concentrating on one or two sources which showed activity. This mode of observing is unique to real time e-VLBI and cannot be done using disk recording. The project observing 16 X-Ray binaries (close binaries in which matter flows from one star onto another) was selected. The first run was a great technical success with data from each source being reduced within one hour of observation of that source. Unfortunately none of the target stars was found to be active and so the second follow-up run was cancelled. Further double runs of this type will be organized within the second year of EXPReS.

Date	Submissions / scheduled	Mbps/antennas	Comments
2006 Mar 16	3/1	128/5	Technical failures, no useful data
2006 Apr 20	3/2	256/6	Gave published observations (Tudose et al 2007 and Rushton et al 2007)
2006 May 20	0/1	256/6	Planned Technical only run, not advertised, but was used to observe a previously submitted proposal. Part of published observations of Tudose et al (2007)
2006 Jun 26	0/0	256/6	
2006 Oct 26	4/2	256/6	
2006 Dec 14	3/3	256/6	
2007 Jan 29/Feb 1 2007 Feb 20	1/1 1/1	256/6 256/6	First adaptive, 'double header' observation. Technical success but no active sources.

- e-VLBI Publications

Observations during the reporting period led to the first two refereed publications for e-VLBI. These were Rushton et al (2007), Monthly Notices of the Royal Astronomical Society Vol 374, p 47 'First e-VLBI observations of GRS 1915+105' and Tudose et al (2007), Monthly Notices of the Royal Astronomical Society, Vol 375, p11 'First e-VLBI observations of Cygus X-3'. Images taken from the first page of each of these papers are shown below. Both papers concern compact radio emission from active stars. Such stars often emit jets of material traveling at high speed (the physical mechanism that accelerates the matter is not well understood). The published observations of these two sources give important constraints on the jet geometry and flow speed which can help constrain jet models.

Figure NA3-1: First refereed journal publications from e-VLBI

1.4.2.2 NA3 Participating Institutions[4]

Since the subject matter of NA3 is the (principally astronomical) end user science of EXPReS, the participants in this network activity are exclusively the radio astronomical institutes within EXPReS. The participant list and budgets are given below. The budget for all participants (except Onsala) only covers travel to face-to-face meetings. There are no salary or hardware costs. The Onsala budget includes a contribution to cover the organization of a user workshop on e-VLBI science results in project month 30 and the subsequent publication of the proceedings.

P #	Short Name	Funded Amount (Euros) 3 year total	Months 1-18
1	JIVE	18,400	5100
6	ASTRON	2,400	680
7	CNIG-IGN	2,400	680
8	CSIRO	4,000	850
9	NRF	4,000	850
10	INAF	2,400	680
11	MPG	2,400	680
12	TKK	2,400	680
13	CORNELL	4,000	850

[4] Participation is based on those institutions who have received funding for the activity. The amount listed under "Months 1-18" is the 85% distribution value. The Participating Institution Table assumes the following abbreviations:
P # - Participant Number

14	UMK	2,400	680
15	OSO	10,400	680
16	SHAO	4,000	850
17	UDEC	4,000	850
18	UNIMAN	2,400	680
19	VeA/VIRAC	2,400	680

1.4.2.3 NA3 Deliverables and Milestones Tables

The principle deliverables of NA3 are the face-to-face meetings of the eVSAG and a workshop to be held toward the end of the project. The deliverable 'First eVSAG meeting' was late because of the difficulty of organizing the full membership and then finding a common time to meet before the summer of 2006. Based on discussions in September it was eventually agreed to delay the meeting to the next large EVN meeting (Board of Directors + RadioNet meeting) in November. This enabled the advice of the eVSAG on e-VLBI policy issues within EVN operations be given immediately to the EVN board of directors at their meeting the following day.

Note that the original Description of Work (DOW) contained inconsistencies in the deliverables tables. The two instances of deliverables were in the beginning of the DOW (the large list with deliverables from all activities) and the smaller list inside of the NA2 section. The differences will be corrected in the 18 month report section of the report.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D6	NA3.1	First meeting of eVSAG under auspices of EXPReS	OSO	4	9	
D46	NA3.2	eVSAG meeting No. 2	OSO	16		
D91	NA3.3	eVSAG meeting No. 3	OSO	26		
D94	NA3.4	e-VLBI Workshop held in Onsala		30		
D107	NA3.5	Publication of e-VLBI Workshop proceedings	OSO	32		

1.4.2.4 NA3 Human Resource Overview

There is no requested salary support for NA3, hence no human resources issues. It should be noted however that a considerable amount of manpower is freely contributed by the eVSAG members and its chairman to discussing the business of the committee. The contribution by the chair and the chair's institute are listed below as contributions to the proejct.

Position Title	Position Location (Short Name)	Position Description
John Conway	Onsala	University Lecturer
Michael Lindquist	Onsala	Reseach Engineer

1.4.2.5 NA3 Meetings and Workshops

The first face to face meeting of the eVSAG was conducted as described below. The full minutes of this meeting can be found at the URL below.

Date Location	Meeting Title / Subject / Website Address	Number of Attendees
2006 Nov 28 Westerbork, the Netherlands	eVSAG Meeting Gathering of the VLBI Science Advisory Group http://www.jive.nl/dokuwiki/doku.php/expres:science	19

As described above, the eVSAG meeting was deliberately scheduled so that a progress report on e-VLBI operations and advice on future policy could be given to the EVN board of directors that met the next day.

1.4.2.6 NA3 Participation in External Events

The eVSAG chairman keeps the rest of the project and the EVN generally informed about eVSAG discussions by regular attendance at meetings of other parts of EXPReS or the EVN. Additionally several eVSAG members attended the 5th International VLBI Workshop at MIT in September 2006.

Date (month)	Event Description / Location
2006 May 18 2006 Oct 31	Florence Italy, eVSAG Chairman attends and reports to the EVN Board of Directors meeting Zaandam, Netherlands, eVSAG Chairman reports to EXPReS kick-off meeting
2006 Nov 1	Zaandam, Netherlands, eVSAG Chairman attends EXPReS board meeting
2006 Sep	Westford, MA, USA, 5th International e-VLBI Workshop, Haystack Observatory, MIT. Several eVSAG members attend.
2006 Nov 29	Dwingeloo, Netherlands, eVSAG Chairman attends and reports to EVN Board of Directors meeting

1.4.3 NA4 - Public Outreach, Dissemination and Communication

1.4.3.1 NA4 Activity and Status

- Public Outreach Officer Hired

Kristine Yun was hired as EXPReS Public Outreach Officer and started 1 August 2006. As Public Outreach Officer and leader of NA4, she is responsible for: maintaining the EXPReS web site; communicating EXPReS and e-VLBI developments to the astronomy and network communities and general public via press releases and the EXPReS web site; producing a brochure, display board and other PR materials; presenting e-VLBI to the general public at JIVE Open Days and assisting member organizations with similar events; and assisting EXPReS project members with communication and document-sharing through maintenance of the project Wiki. Kristine's background is in information management and organization of complex web sites. Her professional experience includes work with a technology news organization and marketing/communications.

- Web Site Launched

The EXPReS web site, <http://www.expres-eu.org/>, launched ahead of schedule with basic information in March 2006 and additional project information in August 2006. For the general public, the site currently includes content about the activities, management, objectives, participating organizations and potential impact of the EXPReS project. It also includes regularly updated content about ongoing e-VLBI tests, upcoming meetings and events either hosted by EXPReS or at which an EXPReS member will be speaking, and papers and presentations. For project team members, there is a document archive with the EXPReS contract, description of work, consortium agreement, logo and posters for general use, plus links to other sites such as the EXPReS wiki.

Tools for tracking site traffic were added in late January 2007. The site currently receives 100-140 visits with 200-240 page views per week, with 49% coming to the site directly, 21% coming via Google, 18% from the JIVE web site, 11% from other sites like MSN and 1% from the CORDIS site. Most visitors referred from search engines were searching explicitly for "expres" (58%) or variations such as "expres eu", "expres jive" or "expres vlbi".

Plans for 2007 include reorganization of the public site to improve usefulness and usability for external users, add public outreach content and edit existing content for comprehensibility and

improved search engine rankings. Additionally, we expect to implement a basic content management system which should also aid these objectives.

- *Wiki Launched and In Use*

Dokuwiki was chosen and implemented in June 2006 as a web-based management tool for communication and document sharing. It has been used by project members, particularly NA1, NA4, JRA1, SA1 and SA2 activities, for sharing meeting minutes, report templates, report revision and publication and strategic and architectural documentation.

The site is available online at <http://www.jive.nl/dokuwiki/doku.php?id=expres:expres> and consists of two sections. The public section is available via the URL just listed. In addition, there is a secure section requiring username and password where participants can share sensitive information or communication otherwise not ready for public distribution.

Unfortunately, there are significant security shortcomings to the toolwhich we hope to correct by replacing Dokuwiki with a basic content management system in 2007.

- *Presentations and Participation*

EXPReS project members have attended and presented at numerous meetings and events in the past year. 22 presentations from 17 events (incomplete) are posted on the public web site at <http://www.expres-eu.org/papers.html/>. Additional presentations and papers are listed on the wiki in the sections for each activity.

- *Publicity materials: Project logo, brochure, press releases*

The EXPReS project logo was created in March 2006 and is available for download from the public web site at <http://www.expres-eu.org/docs.html>.

Figure NA4-1: EXPReS Logo

The EXPReS brochure was published in March 2007. Aimed at a semi-technical lay audience, it provides an introduction to VLBI technique, the improvements and benefits to be achieved through e-VLBI, goals and objectives of the EXPReS project, a list of participating organizations, and funding and contact information. The brochure also includes a world map depicting the locations of 20 radio telescopes operated by EXPReS member institutions; this graphic is also intended for use in EXPReS presentations and other publicity materials. The brochure will be distributed to member organizations for use at astronomy and networking events, business meetings and open days and for general availability at member visitors' centers.

Figure NA4-2: EXPReS brochure, pre-press thumbnail view of inside of the tri-fold

Press releases noting two milestones in the EXPReS project, tracking of ESA's SMART-1 lunar impact and publication of the first science papers resulting from e-VLBI observation in a refereed journal, were issued in September 2006 and January 2007 respectively. Press releases were distributed to astronomy publications and web sites, press offices and the Dutch media as appropriate. One Dutch newspaper and another Dutch radio program interviewed EXPReS coordinator Mike Garrett about the SMART-1 observation.

- *Open Day 2006*

JIVE and ASTRON hosted an Open Day on 22 October 2006. Approximately 3000 people attended, including many schoolchildren and their families. Most visitors toured the correlator room and learned about the JIVE correlator and e-VLBI technique. Numerous staff were also present with posters describing e-VLBI science, the benefits of e-VLBI over traditional VLBI and women in astronomy. A film was also shown describing the role of e-VLBI observation of the Huygens space probe's descent through Titan's atmosphere. Photos from the event can be viewed at <http://www.expres-eu.org/openday_2006.html>.

1.4.3.2 NA4 Participating Institutions[5]

The majority of NA4 activity takes place at JIVE with the employment of the EXPReS Public Outreach Officer, and production of publicity materials. Some NA4 responsibilities will also be handled by Dr. Alastair Gunn of University of Manchester; additional details about this work are described in 1.4.3.4 NA4 Human Resource Overview.

P #	Short Name	Funded Amount (Euros) 3 year total	Months 1-18
1	JIVE	160,900	34,000
18	UniMAN	37,500	8,500

[5] Participation is based on those institutions who have received funding for the activity. The amount listed under "Months 1-18" is the 85% distribution value. The Participating Institution Table assumes the following abbreviations:
P # - Participant Number

1.4.3.3 NA4 Deliverables and Milestones Tables

Deliverables for NA4 have emerged on time and to schedule. There was some modification early in the project with the realization that certain items (web site, PR materials) were ongoing tasks without specific end dates. The online deliverables table[6] was modified to list a new status indicator of "x" which was to indicate an item completed, but with ongoing work.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D1	NA4.01	Creation of Public EXPReS web-site	JIVE	2	1	4
D7	NA4.02	Creation of EXPReS web-based management tools	JIVE	4	4	4
D10	NA4.03	Generation of PR material (phase 1)		6	1	X
D34	NA4.04	e-VLBI Demonstration and attendance at Network events.	JIVE	12	12	X
D49	NA4.05	Generation of new PR material (phase 2)	DANTE	18		
D83	NA4.06	e-VLBI Demonstration and attendance at Network events.		24		
D117	NA4.07	e-VLBI Demonstration and attendance at network events.	JIVE	36		

Deliverables such as D10 "Generation of PR material (phase 1)" have specific elements (e.g., brochure and presentation templates) that are described in detail via the online deliverables table.

M#	AM#	Milestones Description	Lead	Delivery month		Status
				Planned	Actual	
MN4.1	i	The EXPReS web-site goes public and on-line	JIVE		1	4
MN4.2	ii	Management tools are added to the web-site and used effectively for Project management	JIVE		6	4
MN4.3	iii	the first PR material is produced and presented at the first iGRID networking event 6) 7)	JIVE		n/a	n/a
MN4.4	iv	EXPReS participates in annual public open-days at JIVE and the other partner institutes involved in such outreach activities 8)	JIVE		8	4
MN4.5	v	Press release announcing the EXPReS e-VLBI facility as an open, production-level facility open to all astronomers. Other milestones include: the appointment of the EXPReS Outreach Officer.	JIVE			

1.4.3.4 NA4 Human Resource Overview

The EXPReS Public Outreach Officer is a half-time position located at JIVE. This person is responsible for creating and maintaining the EXPReS web site and the web-based management tools required to meet NA4 objectives. This person also writes press releases and generates all promotional material.

Alastair Gunn of the University of Manchester and RadioNet Public Outreach Office will create an EXPReS display for the D49 deliverable/NA4.05 milestone. Alastair's work is already funded as part of NA4 (see 1.4.3.2 NA4 Participating Institutions).

[6] The deliverables table is located online via the url: http://www.jive.nl/dokuwiki/doku.php/expres:management:deliverables2

Position Title	Position Location (Short Name)	Position Description	Start Month
Public Outreach Officer	JIVE	Manage EXPReS web site and project wiki, write and distribute press releases and produce promotional materials	6
Dr Alastair Gunn	UniMan	outreach officer	1

1.4.3.5 NA4 Meetings and Workshops

No NA4 meetings or workshops were scheduled for the first 12 months. None are anticipated for the duration of the project but will be added if deemed necessary.

Date Location	Meeting Title / Subject / Website Address	Number of Attendees
n/a	n/a	n/a

1.4.3.6 NA4 Participation in External Events

Date (month)	Participant / Event Description / Location
2006 Nov	Kristine Yun (JIVE) I3 Science and Society Workshop London, UK Workshop for I3 project managers and public outreach officers about bridging the gap between scientific research & development projects and the general public. Speakers presented ideas on ways to utilisenew media (wikis, blogs, online videos, etc.) for public outreach, and how to work with the media to publish press releases and avoid manipulation on potentially controversial topics.

1.5 Service Activities

1.5.1 SA1 - Production e-VLBI Services

1.5.1.1 SA1 Activity and Status: JIVE

1.5.1.1.1 Recruitment

Recruiting new staff for SA1 proved to be more of a challenge than expected. Zsolt Paragi, the e-VLBI support scientist, was hired on the first of March 2006, two software engineers, Bob Eldering and Des Small, started work in May and June of 2006. On the first of December 2006 Paul Boven, a network/Linux specialist and Jonathan Hargreaves, a digital engineer, started work at JIVE and Jodrell Bank, UK, respectively, filling the last two SA1 positions.

Because of the complexity of the existing correlator system, which consists of nearly 500,000 lines of control code, a large number of post-processing software modules and both off-the-shelf and custom-made hardware, the software engineers were set to work on projects specifically aimed at familiarizing them with the system. Efforts from regular JIVE employees were diverted towards EXPReS goals as well to make up for the late start of the actual work. As a result, SA1 is on track regarding deliverables, although they are not necessarily reached in the order listed in the original project plan.

1.5.1.1.2 e-VLBI tests and science runs: first results

The most important aim in this first year was to set up an e-VLBI service, reliable and robust enough to be used by astronomers in an operational mode. After an initially shaky start (loss of all data in the first e-VLBI run of March 2006), JIVE and the EVN gradually got to grips with this completely new way of operating, and the most recent runs have been exemplary in terms of ease of operation and reliability.

With the start of the EXPReS project, the previously rather ad-hoc manner of doing e-VLBI was set on a firm base through a schedule of (roughly) six-weekly 24 hour e-VLBI sessions. These runs were to be divided into test and science parts, depending on proposal pressure and the need for test time. In addition to these scheduled runs, many off-line tests were conducted as well.

- *Summary of results*

In the first year of EXPReS 12 e-VLBI science projects were accepted for observing. The first two projects in March 2006 failed. Of the remaining 10 projects, three were Target-of-Opportunity observations (Cygnus X-3, GRS1915+105), three aimed to determine the compactness of either science targets or calibrators, and three were part of a multi-wavelength campaign (Algol, LSI +61.303). The tenth project was set up as an adaptive e-VLBI run of 16 X-ray binaries in January 2007. However, the second epoch (planned two days after the first) was not conducted as none of the sources were detected.

Clearly, users benefited most from e-VLBI because of the rapid access to the EVN it provides (particularly important for calibrator/multi-wavelength projects). At the same time, follow up e-VLBI observations of bursting transients were only moderately successful. The main reason for this is that the current delay of two weeks between proposal deadline and actual observations is simply too long; in two cases the targets had already faded by the time of the observations.

Operational developments continued throughout the year. The overall robustness increased greatly, and although some data still are lost during correlation job re-starts, a careful strategy of carrying these out during regularly scheduled fringe-finder scans minimized data loss on the targets. The production data-rate increased from 128 Mbps to 256 Mbps, and we were able to produce fringes at

512 Mbps from most telescopes. The two main disadvantages of the current e-EVN, relatively low sensitivity and low resolution, will disappear when Effelsberg, the most sensitive telescope of the EVN, and Shanghai, providing the longest baselines, are added in 2007; sensitivity will further increase when 512 Mbps becomes the operational data rate.

Fast feedback to the observers is an essential part of e-VLBI operations. Considerable improvements were made in the processing of e-VLBI data; currently the PIs can start processing the data while observations are still in progress. On several occasions, complete data sets were produced within hours of the end of the observations.

- *Details of individual runs:*

The first run on **16 March 2006** involved the Cambridge, Jodrell Bank (UK), Torun (PL), Onsala (SE), Westerbork (NL) and, for the very first time, Medicina (IT) telescopes. Because of a combination of problems, such as the re-appearance of a software bug in the online system and very poor connectivity to Torun and Medicina, most of the run was lost. On the positive side, the first real-time fringes to Medicina at 128 Mbps were obtained, and the actual data transfer went flawlessly, with GÉANT reporting zero packet loss across their network.

The second run, **20 April 2006**, was a completely different story, with the same six EVN telescopes participating nearly continuously for the full duration of the observations (~24 hours), transferring more than 5 TB of data in real-time to the correlator at JIVE at 128 Mbps. During the setup/test phase, some new software interfaces intended to facilitate access from JIVE to the Mark5A recorder (data transfer) units at the telescopes were tested (remotely monitoring, stopping and re-starting the Mark5A control software, and even remotely re-booting the units). These were partly successful. During this phase Arecibo (Puerto Rico) joined the network, but we were unable to get fringes, even at 32 Mbps. The science observations started at 2100UT. As the two accepted proposals covered more or less the same hour angle range, the observations were scheduled in alternating blocks of about 1 hour. Very early into the science run, we found that connectivity to Torun was not as good as it had been during the day. Additionally, we also had problems reaching the control interface of the Mark5A at Torun, a problem very similar to the one experienced in the past to Medicina. Not wanting to lose five telescopes to debugging the problems with one, we ran the schedule anyway. From about 2400UT onwards connectivity to Torun improved enough to join the network again, and from that moment on all telescopes transferred data continuously. Aside from some minor glitches (temporary loss of connectivity, mainly from Torun and surprisingly, Jodrell Bank, and some occasional correlator problems forcing system re-starts) the whole system worked remarkably well.

On **18 May 2006** we achieved the first six station fringes at 256 Mbps with Cambridge, Jodrell Bank, Medicina, Onsala, Torun, and Westerbork. There were first ever European 512 Mbps e-VLBI fringes on the Jodrell Bank - Westerbork baseline. The data rate was too low for Arecibo to get fringes even at 32 Mbps. We tested remote restart of Mark5As at the telescopes. After the test, there was a 13-hours science project at 128 Mbps during which no major problems were encountered.

Cambridge, Medicina, Onsala and Westerbork participated in the **21 August 2006** test. The test objective of restarting and rebooting Mk5A units was successful, although we found it is not possible to do this during a run and recover the station without restarting the run. We had the first 512 Mbps fringes between three European stations: Cambridge, Onsala and Westerbork. We also got fringes for the first time between Cambridge, Medicina and Westerbork using Medicina's new 5 GHz receiver.

The **26 October 2006** test was carried out using a new correlator control computer, which greatly reduced the (re)starting-up time of the correlator. Some initial network problems to Medicina and Torun were solved before the start of the observations. During the test phase long correlation jobs were run to see how long a data rate of 256 Mbps could be maintained. As this turned out to work well, it was decided to run the science experiments at this data rate. Two projects were scheduled, targeting the X-ray binary LSI +61.303 and the eclipsing binary system Algol. Unfortunately, the Onsala telescope had to be stowed because of a storm. Due to various Mark5A related problems, a

significant amount of observing time was lost during the night (30% and 20% for the two projects, respectively). Moreover, Cambridge stopped producing fringes after a couple of hours because of a failing power supply unit in the MkIV formatter. The increase from 128 Mbps to 256 Mbps partly compensated for these losses. Both of the targets were detected in near real-time in the data analysis pipeline.

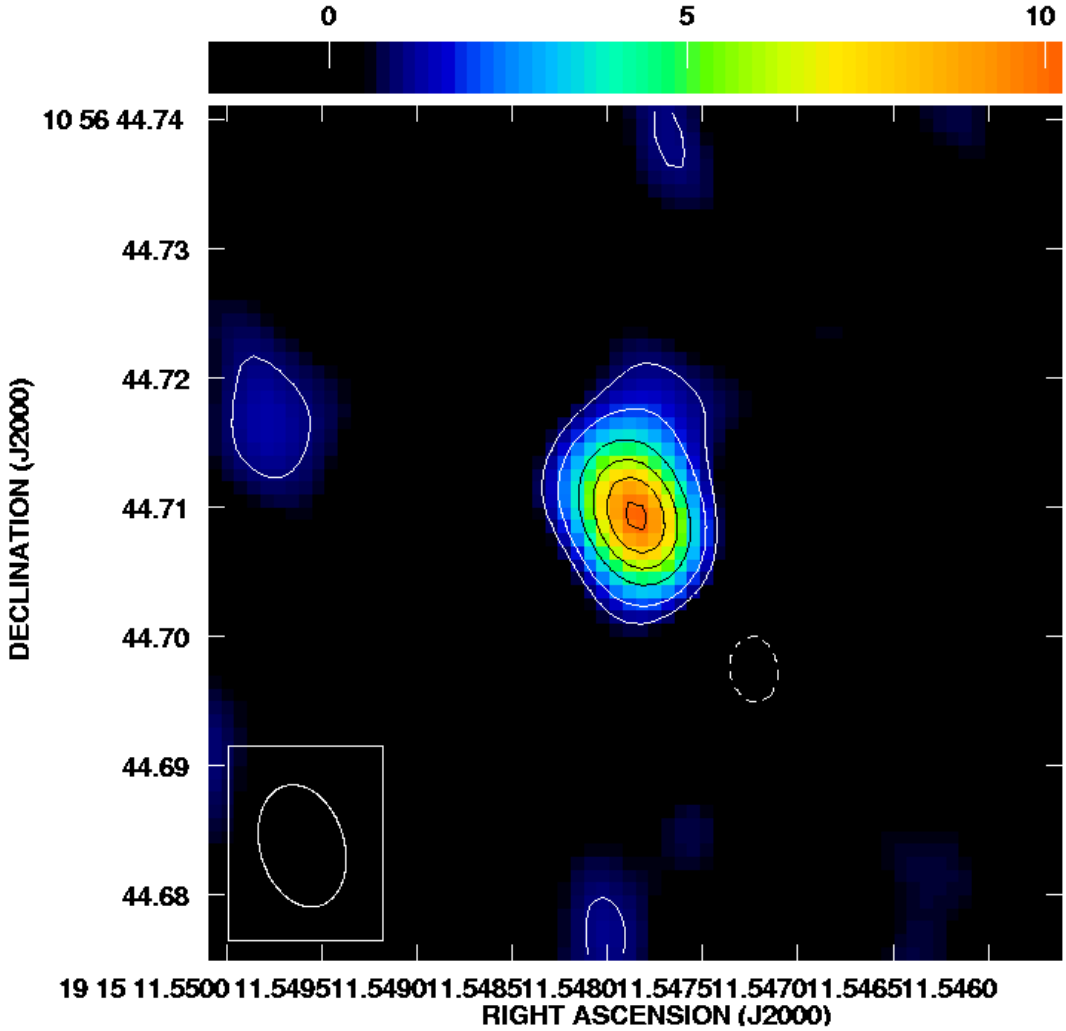


Figure SA1-1: e-VLBI image of GRS1915 from the April observing run.

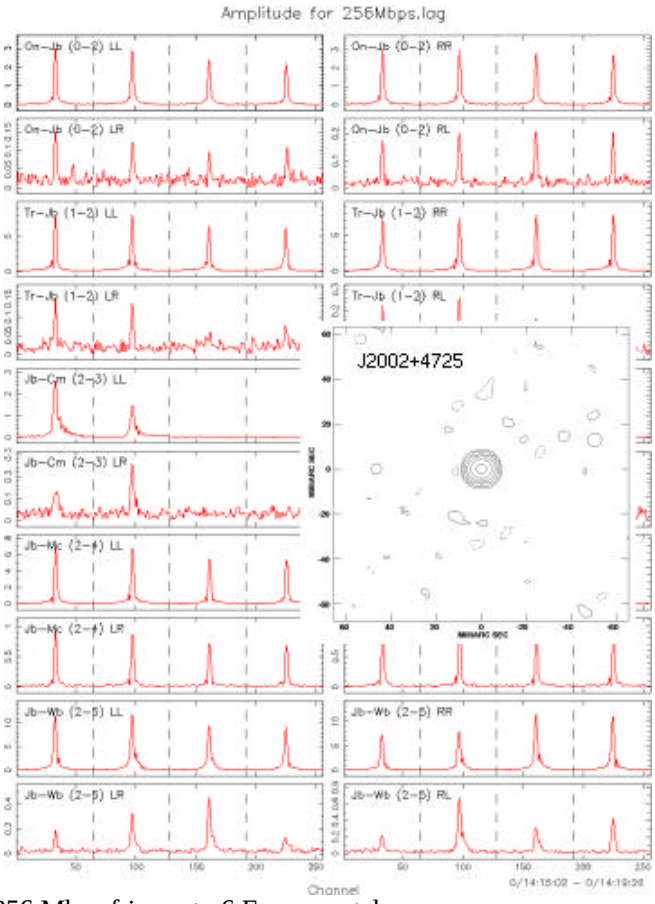


Figure SA1-2: first 256 Mbps fringes to 6 European telescopes

The **14 December 2006** test went extremely smoothly with three science projects incorporated. Participating stations were Westerbork, Jodrell Bank, Cambridge, Medicina, Onsala and Torun, with a 256 Mbps data rate easily achieved from all stations. During a short period we experienced problems with connections to Torun and Medicina, but these were resolved without losing significant amounts of data. Problems at the correlator were few and quickly corrected, again without losing much time or data.

The **29 January 2007** run was set up as a double adaptive run (29 January - 1 February), in which the first run was to be used to select targets for the second run. For this reason it was essential for the data of the first run be reduced as quickly as possible. The usual six stations participated: Westerbork, Cambridge, Jodrell Bank, Torun, Onsala and Medicina, at a data rate of 256 Mbps. A few problems were encountered, but at a technical and operational level the observations went extremely well. No serious problems were encountered, and restarts of the correlator and Mark5A units were few. The reduction strategy also worked well, and pipeline maps were produced for 14 out of 16 sources by the end of the first run. Unfortunately, none of the sources were found to be in an active state and the second run was cancelled. We did, however, reserve four hours of test time with all telescopes on 2 February. During this test, in which we observed a strong calibrator source, we were able to achieve a one hour 512 Mbps run with five stations (excluding Torun).

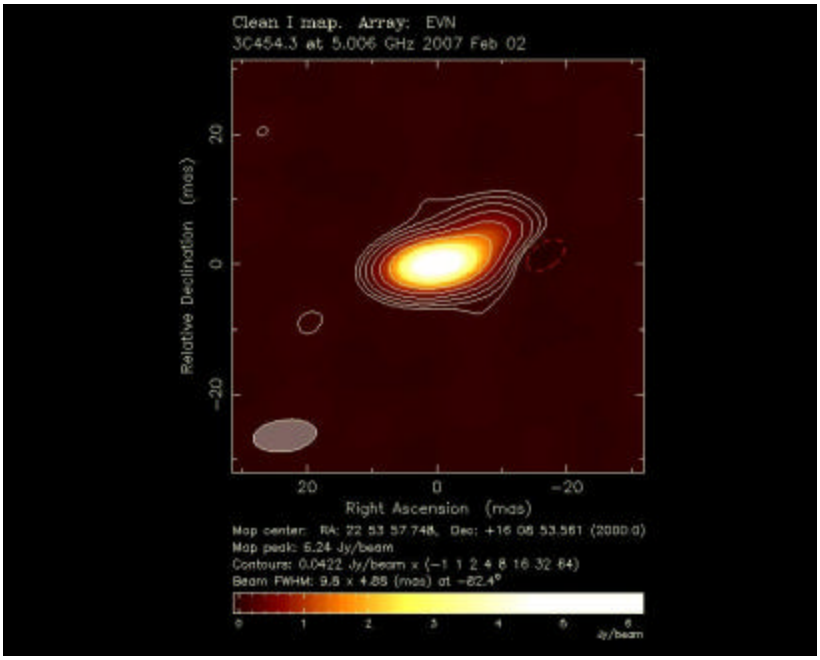


Figure SA1-3: first 512 Mbps map using 5 EVN telescopes

Two e-VLBI science papers, Tudose, et al and Rushton, et al, were written within weeks of the observations and accepted for publication in 2006. This illustrates the rapid turnaround made possible by real-time observing. Images of the first page from each paper are shown in the NA3 section of this report.

1.5.1.1.3 Connectivity improvements: Europe

At the start of EXPReS JIVE was connected to SURFnet, the Dutch NREN, through 6 * 1 Gbps lightpaths, while the Westerbork telescope had its own dedicated fiber. The two UK telescopes (Cambridge and Jodrell Bank) had direct lightpath connections (UKLight to Netherlight), and the connections from the other European telescopes (at that time, Torun in Poland and Onsala in Sweden) to JIVE led through their local NRENs, GÉANT, the European backbone, and SURFnet.

Several developments were instrumental in improving connectivity to JIVE:

- The roll-out of SURFnet6, a hybrid network providing both lightpaths and IP switched connectivity in the Netherlands
- The roll-out of GÉANT2, the seventh generation pan-European research and education network, connecting 34 countries through 30 national research and education networks (NRENs), using multiple 10 Gbps wavelengths. Like SURFnet6, GÉANT2 is a fully hybrid network.
- The completion of the last-mile connection from the Medicina radio telescope to the PoP of GARR in Bologna
- The completion of the last mile connection from the Metsahovi radio telescope to the PoP of FUnet in Espoo
- The re-routing of traffic between Poznan and Gdansk, freeing up bandwidth to Torun and making 256 Mbps transfers possible

- The replacement of the aging motherboards in the Mark5A units at telescopes and correlator by high-end server quality boards. This has enabled 512 Mbps transfers from the UK telescopes and, more recently, from Medicina as well

The effect has been a steady increase in e-VLBI throughput. This development is illustrated in Figures 5 and 6, showing the number of telescopes capable of a certain data rate versus time, and the aggregate data rate into JIVE during e-VLBI runs since 2004.

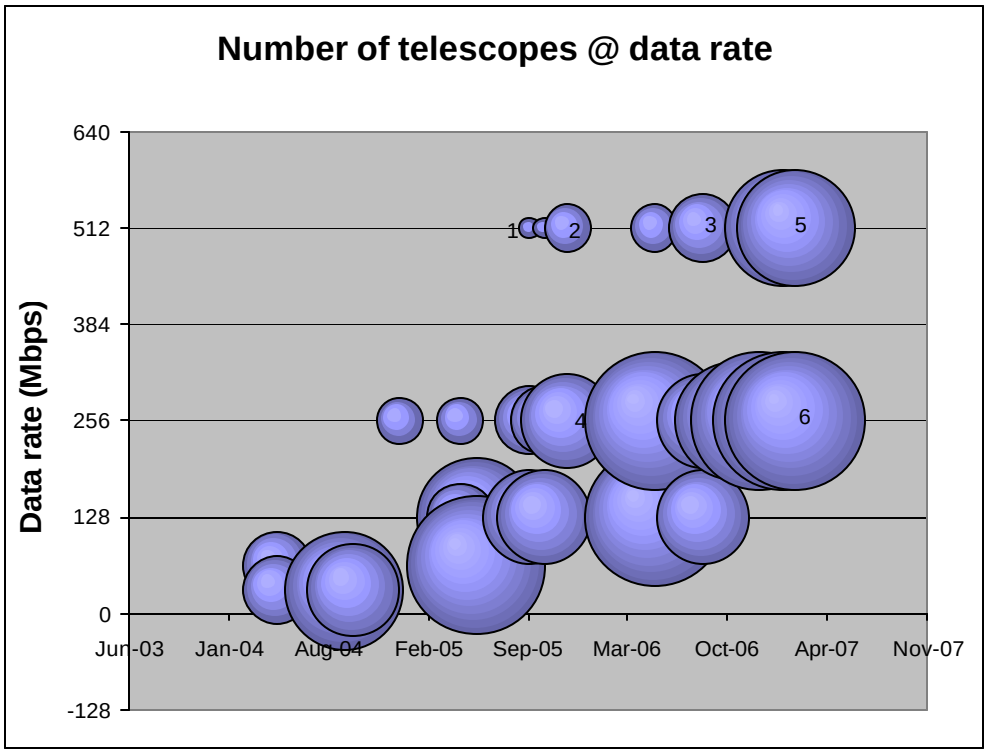


Figure SA1-4: Number of telescopes capable of sustaining a specific data rate vs time

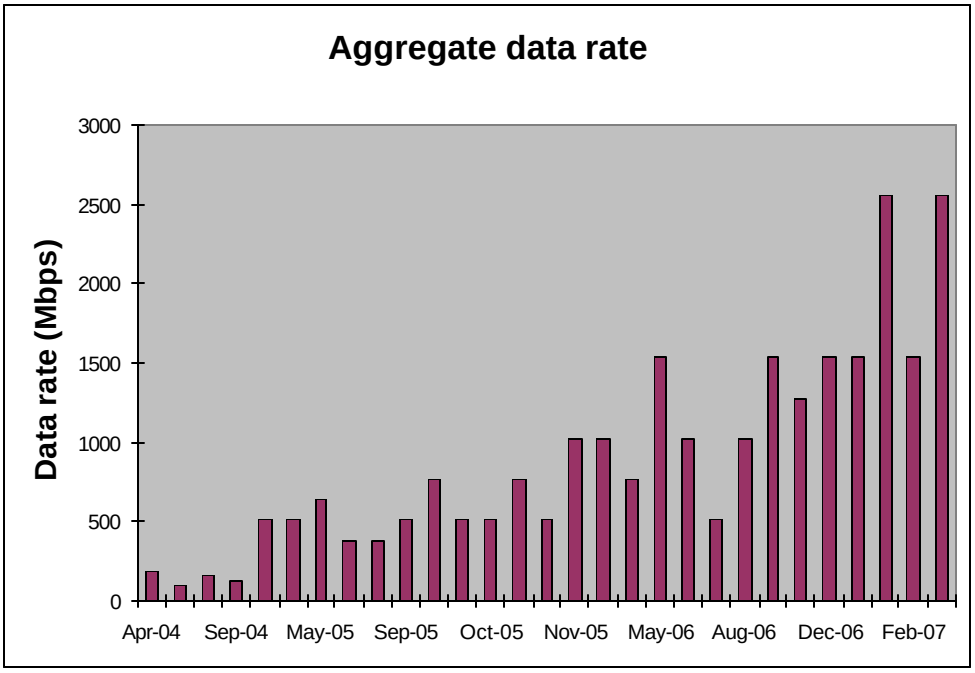


Figure SA1-5: Aggregate data rate into JIVE during e-VLBI experiments

1.5.1.1.4 Connectivity improvements: the Americas, Australia, China

In the two years before 2006, connectivity to the Arecibo radio telescope in Puerto Rico was sufficient for it to participate in e-VLBI tests at 32 and even 64 Mbps (32 Mbps being the minimum acceptable data rate for correlation of VLBI data). By the start of the EXPReS project however this connectivity had deteriorated to such a degree that not even this minimum data rate could be reached. Arecibo telescope shares a 155 Mbps connection to the North American mainland with the University of Puerto Rico. It is not clear whether this constitutes the main throughput bottleneck, as connectivity tests between the telescope, the university and the mainland yield much higher data rates. Additional complicating factors are the long path to JIVE (~150 ms roundtrip time) and the large number of intervening networks, which make it practically impossible to unambiguously identify network bottlenecks, let alone resolve them. Networking in the Caribbean region is still very expensive, but we hope that Arecibo will be able to take advantage of new submarine cable facilities in the near future. Even at low data rates its phenomenal sensitivity makes Arecibo an invaluable addition to e-VLBI observations.

The controlled crash-landing of the European Space Agency's SMART-1 lunar probe in September of 2006 provided an opportunity to exercise connectivity to South America. A network of radio telescopes, led by a team of radio astronomers from JIVE, observed SMART-1 and recorded key data during its final moments and impact. Using e-VLBI, astronomers at JIVE received an important 10 seconds of data concerning the precise time and velocity at impact from Chile and Australia in a matter of seconds, and additional data were transferred and processed in a matter of hours. With these data astronomers were able to determine the time of impact within 10 microseconds, equivalent to two centimeters along the spacecraft's trajectory.

In order to make this possible, extensive network tests were conducted by the PERT rapid response team of GÉANT, in which the entire network path from the TIGO radio telescope, located near Concepcion in Chile, and JIVE was investigated. This investigation, the full report of which is

available on the EXPReS web pages[7], has helped to identify the bottlenecks, determine the actual capacity of the link and suggest possible improvements. Local network improvements in Chile are planned and we expect to be able to include the TIGO radio telescope in a real-time e-VLBI experiment in the course of 2007.

In parallel to the e-VLBI efforts in Europe, four of the telescopes of the Australian Long Baseline Array, a continent-wide VLBI instrument, were connected via optical fibers. While primarily intended for Australian e-VLBI, this has opened the exciting possibility to connect these telescopes in real-time to the data processor at JIVE. Because of differences in recording and processing equipment, efforts so far have concentrated on issues like data format conversion and creating software control interfaces. Transfer tests are already being conducted, exercising various routes from Australia to Europe, and the first e-VLBI tests are planned for the second year of EXPReS.

Two EVN radio telescopes are located in China, in Seshan near Shanghai and Urumqi. Two more Chinese telescopes are being built right now, near Kunming in the south of China and in Miyun, near Beijing, and will be operational soon. These four telescopes will be instrumental in the tracking of the Chinese lunar mission, to be launched later this year, and will operate in near real-time e-VLBI mode. Although connectivity to Urumqi is not expected to be sufficient in the near future for EVN e-VLBI operations, Seshan, and soon Miyun, are in an excellent position to be included. For a variety of reasons it is still unclear whether the new EC-sponsored ORIENT network through Siberia can be used for data transfers. However CSTNET, one of the two Chinese NRENs, has offered a lightpath between the Hong Kong Open Exchange Point and SURFnet in the Netherlands for test purposes.

1.5.1.1.5 Software developments at JIVE

Traditionally, VLBI astronomy has had only very few time-critical elements. The process leading from the review and acceptance of a science proposal, the actual observations, transport of media and data processing to the shipping of the final product to the observer would always take many months. As a result the correlator control system and the setup and scheduling of observations and processing were designed without even taking the possibility of real-time operations into account. In addition, this delay made an effective and timely feedback in case of technical problems very difficult. And although a policy for Target-of-Opportunity (ToO) observations with the EVN was formulated, such observations were always very challenging. Not only because of the design of the system, but also because the EVN is a collaboration of independent scientific institutes, with their own scientific programs. The operational and technical status of the EVN was not really known outside of the scheduled sessions and in fact could not really be known. Obviously, this poses serious problems for real-time e-VLBI.

To address these problems, software development in SA1 is focusing on a number of areas:

1. *Real-time control code modifications, centralized control of recording equipment.*

During normal VLBI observations, data are recorded at the stations on magnetic media. Using highly accurate atomic clocks time tags are inserted in the data, which are used at the correlator to re-create the original data streams. To do this, the whole system must run in an experiment-specific reference time-frame called the Reconstituted Observing Time (ROT). For e-VLBI, this ROT has to be replaced by wall-clock time, while taking small delays caused by the control system and by the travel time of the signals from different telescopes into account.

[7] The report "Report Describing Research Network Support for eVLBI Tracking of the SMART-1 Spacecraft" is available on the EXPReS Wiki at: <http://www.jive.nl/dokuwiki/doku.php/expres:report_describing_research_network_support_for_evlbi_tracking_of_the_smart-1_spacecraft>

In early e-VLBI experiments these corrections were done manually. Starting and stopping of observations and transfers and the setting of parameters were done in teleconferencing mode, which means that the stations joined JIVE in a teleconference and people would shout at each other. Obviously, some serious streamlining was needed.

As a first step, a real-time correlator mode was created. Although simple in principle, the complexity of the system made this a non-trivial task. After this, remote control of the Mark5A recording units at the stations was enabled, so that the correlator control computer itself could steer and time the whole process. Finally, a tool was created to enable remote querying, re-starting and even re-booting of the Mark5As at the stations by the operators at JIVE <http://www.jive.nl/~jive_cc/sin/sin5.pdf>. This last tool has proven to be very important during nighttime observations, leaving the telescope operators free to deal with the functioning of the telescope itself rather than with data transport issues. As a result of these efforts e-VLBI with the EVN has become a true operational mode, in which observations can be started and stopped with the press of one button.

2. Real-time monitoring of the status of data transport and data quality.

Because the EVN correlator was designed for off-line processing, no provisions were made for real-time monitoring of either data quality or telescope status. Status information was and still is provided in the form of station log files, which are downloaded after the observations have ended. During correlation data quality is monitored to a certain degree, but the decision to re-do a correlation job is mostly only taken after inspection of the final product. Network Monitoring Experiments and short fringe tests are conducted before and in between scheduled sessions. One of the first successes of e-VLBI was the electronic transfer of the data of these tests immediately after the observations. This has greatly improved the timely identification of configuration problems and with it the reliability of the EVN network.

Real-time operations demand real-time diagnostics. A data status monitor was developed to provide continuous information on the general data quality and overall data rate, and to obtain detailed diagnostics <http://www.jive.nl/~jive_cc/sin/sin3.pdf>. This tool enables operators to view the status of a session at one glance and immediately identify problems.

3. Near-real-time processing tools for rapid data inspection/target selection.

For detection experiments, in which short observations are used to select targets, or in ToO observations, a fast turnaround is essential. The somewhat cumbersome method of post-correlation data processing at JIVE was partly re-written, streamlined and combined in a web-based tool <http://www.jive.nl/~jive_cc/sin/sin7.pdf>. This tool has greatly sped up and simplified post-processing, and in fact during the past few e-VLBI sessions most of the data reduction had been finished before the end of the observations. Another small but very powerful tool is the integrating fringe display <http://www.jive.nl/~jive_cc/sin/sin2.pdf> which makes it possible to detect weak sources in real time.

4. Use of WSRT synthesis data.

The Westerbork Synthesis Radio Telescope array (WSRT) is part of the European VLBI Network. When used in VLBI experiments, the data from the 14 telescopes are "phased up" to act like a single dish of 93 meters in diameter, making the WSRT one of the most sensitive elements of the EVN. The synthesis array data (the normal interferometer mode of the 14 telescopes) are also recorded during a VLBI run, but are rarely used by the astronomers.

These synthesis data can be of great value for e-VLBI astronomy. In VLBI it is hard to measure source fluxes accurately, because the telescope gains (the sensitivity) are not known well enough. Moreover there are no good flux calibrator sources, as the most compact sources one can observe with VLBI are variable. This means that external information is needed to properly set the flux scale. This information is normally obtained through special flux calibration sessions during which flux calibration diodes are themselves calibrated. These sessions however are very labor-intensive and are

only held prior to regular EVN sessions. As a result, e-VLBI observations mostly suffer from poorer-than-usual flux determinations. With the WSRT as a connected interferometer not only the flux densities, but also linear and circular polarizations of the sources can be determined easily and accurately.

The WSRT could also be used as a trigger instrument for the e-VLBI array, if a rapid data analysis pipeline existed. A sample of sources could be observed with the WSRT immediately preceding an e-VLBI run, to select a currently active source for e-VLBI observations. In case a new transient source appeared, its position could also be refined using the WSRT data up to an accuracy sufficient for e-VLBI observations.

As a first step towards a WSRT data analysis pipeline a measurement set - IDI FITS converter program was written. This IDI FITS format is well suited for the AIPS data reduction package that will be used by the pipeline. This work should ultimately lead to a fully integrated pipeline, enabling e-VLBI astronomers to make use of the WSRT synthesis data on-the-fly.

5. Adaptive scheduling of observations.

Currently there is no method to change EVN observations in any way after the observations have begun. Schedules are made well ahead of the observations to specifications of the observing astronomers, checked by JIVE staff, and sent off to the stations. There they are processed to create telescope-specific observing files, which are fed to a telescope control computer called the field system. This fairly rigidly organized system is needed to ensure all telescopes are configured correctly, and to guard against potentially damaging inconsistencies in the schedule.

Work has started to implement methods to interactively change observing specifications. A daemon-based approach will be followed, in which the local field system will autonomously check for updates of the observing schedule, process the update and re-start the observation. As a first step this will be only for certain pre-approved sources and frequencies. One possible application will be observing potential flare candidates and selecting the most promising of these sources for longer observations.

Creating this adaptive observing mode will be a challenge, considering how different the EVN telescopes and their equipment are. It will however turn the EVN into a truly flexible instrument, capable of responding on a timescale of hours rather than weeks to unexpected events.

6. Station feedback

It is essential for the coherence of the e-EVN that all monitoring information gathered at the correlator is made available in real-time to the operators of the various telescopes, allowing them to compare the performance of their instrument to the rest of the netw ork and respond in a timely manner to possible problems. All monitoring tools that were/are being developed at JIVE are made with this in mind and have (partly interactive) web-based interfaces allowing easy access to all relevant information.

7. Transport protocols

Using the extremely reliable standard TCP for real-time long-haul transport of astronomical data is not necessarily the best solution. The signal collected by the telescopes is broad-band Gaussian noise, and error rates as high as 1 bit in 10^5 or even occasionally 1 in 10^4 are acceptable. The transport protocol should favor data flow over data integrity. However, it is not always possible to use more aggressive protocols like UDP or modified TCP stacks on public networks.

A large amount of research has been done at the University of Manchester on developing an e-VLBI tailored UDP protocol and on the effect of network-generated packet loss on the correlation process itself (an extensive description of this work is given in the report on EXPReS JRA1). JIVE has of course contributed to this research by providing test machines and correlation time as needed.

Some research has been done in-house as well. Julianne Sansa, a PhD student at the University of Groningen, the Netherlands, has been working on modifications of TCP stacks and their effect on e-

VLBI data transport <http://www.jive.nl/dokuwiki/doku.php/expres:sa1, WP2, DSA1.5>. She is currently working on network simulations to characterize e-VLBI data flows. Mark Kettenis, one of the JIVE staff members, investigated the use of TCP with slow-start and congestion avoidance mechanisms disabled (see http://www.jive.nl/dokuwiki/doku.php/expres:sa1, "UDP-like TCP") on the connection Medicina-JIVE. While yielding promising results in test setups, realistic testing will have to wait until the Mark5A hardware and software have been upgraded to support the use of newer Linux kernels.

1.5.1.1.6 Hardware developments at JIVE

Network and lightpaths

In order to enable connecting up to 16 telescopes simultaneously to the correlator at JIVE, and support other activities related to distributed GRID correlation (such as FABRIC, the EXPReS JRA), the connectivity of JIVE would need a complete restructuring. With EXPReS partner SURFnet, the Dutch NREN, the current and future connectivity needs of JIVE were analyzed. The report, "Towards e-EVN: e-VLBI and the use of lightpaths", can be found on <http://www.jive.nl/dokuwiki/doku.php/expres:sa1>.

Several years ago it was recognized by SURFnet that a traditional IP-routed network would not suffice to combine the extremely large data streams that a few (mostly scientific) applications generate, with an undisrupted internet service to a large number of low-bandwidth users. Because of this, SURFnet6 was designed as a hybrid network, providing both normal IP-routed traffic and point-to-point lightpath connections. Likewise, the GÉANT2 network is also designed as a hybrid network.

With the new possibility of providing direct lightpath connectivity, a superior alternative to the IP routed network exists. Trying to achieve the above connectivity through the IP network would place a tremendous load on SURFnet and cause congestion on the GÉANT2 network.

Perhaps as important, the use of IP-routed transport causes e-VLBI to suffer from competing traffic; this may become an important issue once the LHC[8] comes online.

The final configuration is illustrated in figure below. In this configuration, a router at JIVE will be connected to SURFnet via 16 x 1 Gbps lightpaths. These lightpaths will continue (un-routed) across GÉANT2 to the local NRENs, and possibly all the way to the telescopes. In addition, JIVE will still have ample IP routed connectivity through a 10 Gbps lambda (possibly capped at 5 Gbps).

One of the first tasks, in December of 2006, of the EXPReS network/linux engineer was to design the new JIVE network topology and select the appropriate hardware <http://www.jive.nl/techinfo/evlbi/Network-upgrade.pdf>. The new network equipment has been selected with future growth in mind: the connectivity to JIVE can be upgraded to 11 x 10 Gbps or 16 x 5 Gbps, when and if such connections to the telescopes become available. To fully utilize the correlator at JIVE (1024 Mbps/station) lightpaths may have to be set up in a different way. SURFnet suggests it may be possible to provide sub-rates (like 2 or 4 Gbps) through the use of 10 Gbps EPL cards. With the design phase finished and all needed equipment in-house, the implementation of the network conversion is about to begin.

[8] LHC- the Large Hadron Collider is a particle accelerator/collider located at CERN. Additional information is available at various locations including <http://en.wikipedia.org/wiki/Large_Hadron_Collider>.

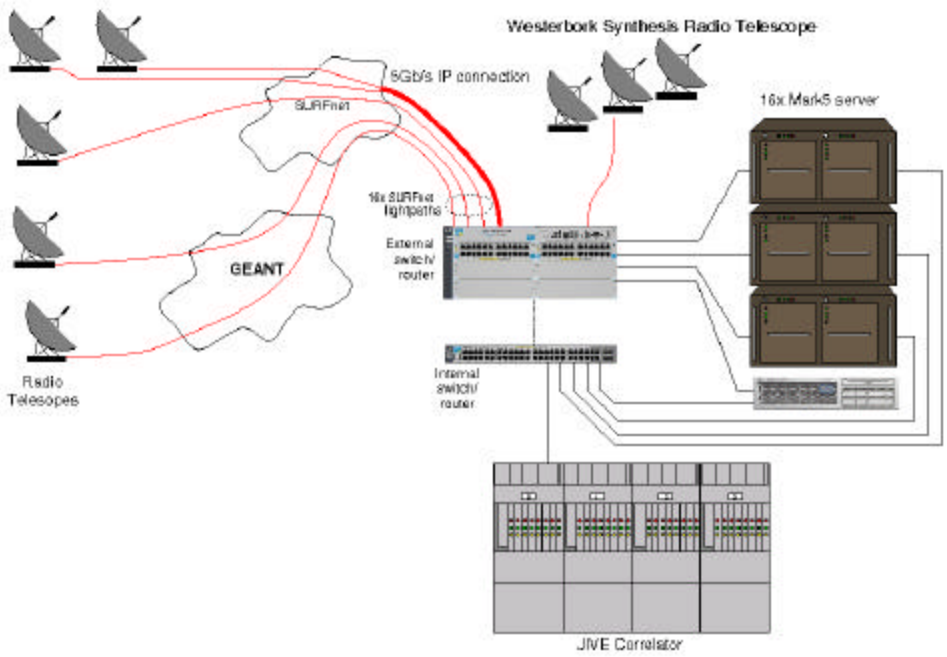


Figure SA1-6: e-EVN network configuration

Two dedicated PCs were purchased for monitoring and testing purposes. One is used to investigate the performance of different transport protocols with various, simulated, delays between the endpoints, while the second will provide continuous network monitoring information.

Mark5A hardware upgrade

The Mark5A units in use at JIVE and the EVN stations are PC-based recording and playback systems. They were developed at MIT as a replacement of the MarkIV and VLBA tape recorder/playback systems used in VLBI until a few years ago. When used for e-VLBI, instead of recording on disk packs, the data are sent over the internet through a standard Gb Ethernet interface using the TCP protocol.

These units have proven to be very reliable over the past few years, and have greatly increased the operational ease and the data quality of VLBI observations. However, the hardware is clearly not adequate for real-time high-rate data transport. After measurements had shown the available CPU power (Pentium III 1.26 GHz) to be a bottleneck at data rates well below 1 Gbps, the two recording units at Jodrell Bank (UK) which process the data from the Lovell and Mark II telescopes at Jodrell Bank and the Cambridge telescope (via micro wave link) were upgraded with new motherboards (described in detail in http://newton.jb.man.ac.uk/Mark5A/m5ug06/ugidx.htm). After this upgrade, regular 512 Mbps e-VLBI transfers became possible from both telescopes, where 256 Mbps had been the limit.

At JIVE one Mark5A unit was initially outfitted with a new server-class motherboard with dual Xeon processors. Using this unit made 512 Mbps data transfer possible from Medicina for the first time (although the Mark5A unit at Medicina had not been upgraded). As all further tests were satisfactory, upgrades were ordered for all 16 units at JIVE (including motherboards, CPUs, memory and power supplies). Detailed technical instructions on the upgrade will be made available to the EVN community, and we expect all stations to follow suit.

Mark5A to B conversion

The international VLBI community decided several years ago upon a standard interface for future VLBI data transport systems called “VSI” (VLBI Standard Interface). The Mark5A system currently

used by the EVN and the VLBA was designed as a drop-in replacement for tape recorders, preserving all quirks and peculiarities of handling tape-based data formats. The Mark5B however marks a clean break with the relics of tape technology and is fully VSI-compliant.

Upgrading to Mark5B offers a number of advantages for the EVN. First of all, the VSI standard will make it possible to effortlessly interface to other VLBI arrays like e-MERLIN in the UK. But another important advantage is that it will allow JIVE to phase out some pieces of custom-built hardware called the Station Units (SUs).

The function of these SUs is to re-create the originally observed data stream from the recording, apply a geometrical delay model and pass the synchronized data streams to the correlator. Operations like multiplexing/de-multiplexing, checking of validities and stripping of time-codes are all done inside the SU.

While the SUs function well enough in a regular operational mode, they have proven to be one of the main obstacles for reaching reliable, high data-rate real-time e-VLBI. The hardware is end-of-life, spare parts are few and replacements unavailable. Using data in VSI format will make a large part of the SU functionality redundant. The Mark5B will accept VSI data streams, apply geometrical delays and present the data streams in a simple tape-format to the correlator, completely bypassing the SUs. A few of these units are already in use at the Haystack Observatory correlator (which is based on the same hardware as the EVN correlator), and have proven to function very reliably.

As a preparation to the Mk5A to Mk5B conversion new serial links were designed by ASTRON engineers and made to specification at the MPIfR in Bonn, Mark5 upgrade kits were ordered at Conduant, the manufacturer of the Mark5 units, and Correlator Interface Boards were purchased from MIT's Haystack Observatory. Nearly all hardware has been tested and delivered and the conversion is planned for the second year of EXPReS.

1.5.1.1.6 e-VLBI related activities, recognition

The SA1 project leader, Arpad Szomoru, was invited to be on the program committee of the 5th International e-VLBI Workshop at MIT Haystack Observatory, in September of 2006 (http://www.haystack.edu/geo/vlbi_td/meeting.html).

This international meeting was to explore the current state of high-speed astronomy data transmission, concentrating on e-VLBI, but recognizing the synergy with other geodesy/astronomy applications requiring real-time or near-real-time high-speed data transmissions. The topics that were addressed included the development of e-VLBI facilities, high-performance e-VLBI demonstrations, reports on current and projected e-VLBI and related efforts, networking protocols for real-time data transmission, shared versus dedicated networks and VSI-E standard for e-VLBI data transfer. Two days of tutorials on networking and e-VLBI, presented by Internet2 and e-VLBI experts, were offered immediately preceding the main meeting.

At the Spring 2006 Internet2 Member Meeting the e-VLBI project, led at JIVE by Arpad Szomoru, received a prestigious award for its progress in high speed data transfer at the inaugural IDEA awards ceremony held on April 21st 2006. The winning team comprised Arpad Szomoru (JIVE), Alan Whitney (MIT Haystack Observatory), Yasuhiro Koyama (NICT) and Hisao Uose (NTT Laboratories GEMnet2/GALAXY Project).

The Internet2 IDEA Awards program encourages innovative advanced network applications that have had the most positive impact within the research and education community. The IDEA committee concluded that the winners represented applied advanced networking at its best, and held the promise to increase the impact of next-generation networks around the world. The four winning applications, announced on 21 April, were judged on the depth of their positive impact on their primary users, the technical merit of the application, and the likelihood the application would be more broadly adopted.

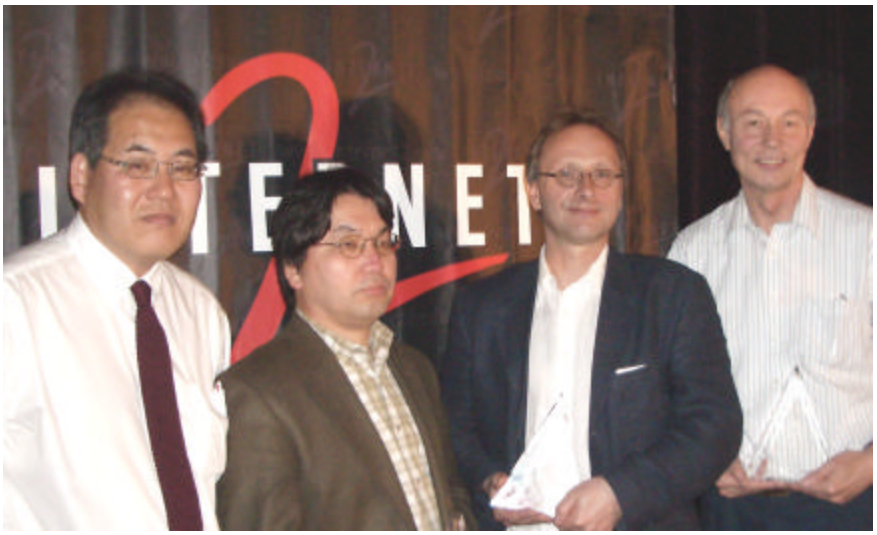


Figure SA1-7: From left to right, Masaki Hirabaru of NICT accepting on behalf of Yasuhiro Koyama, Hisao Uose of NTT Laboratories, Arpad Szomoru of JIVE and Alan Whitney of the MIT Haystack Observatory

1.5.1.2 SA1 Activity and Status at the University of Manchester

1.5.1.2.1 WP6 addition of MERLIN telescopes

This project is for e-MERLIN enhancements enabling MERLIN telescopes to be added to the e-VLBI array, allowing connection of 4 telescopes at data rates up to 1 Gbps per telescope.

1.5.1.2.2 Progress

The design of the hardware for this part of the project changed considerably from our initial considerations, now some 3 years ago. The e-MERLIN data is in the form of a proprietary protocol on 3 x 10 Gbps optical channels from each telescope, resulting in a total data rate of 210 Gbps into the e-MERLIN correlator at Jodrell Bank. This is incompatible with the typical 512 Mbps data streams required by VLBI and therefore format changing and data loss (via fewer digitization bits and less bandwidth) is required to fit into e-VLBI requirements. It became clear that the optimum way to achieve this was by use of the two ancillary input/output chips on the e-MERLIN WIDAR correlator station boards in order to send data from e-MERLIN telescopes to the outside world. These FPGAs are known as the "VSI Chips" but are in fact not restricted to VSI-H standards i.e. they can operate at higher data rates. The same chip can be used to bring data into the correlator, and the work required is very similar. For that reason the engineering time spent on SA1 and the JRA is necessarily split 50/50.

During 2006 it became clear that the optimum way to proceed was to make use of the Internet break-out board (iBOB) designed by the University of Berkeley CASPER group (Prof. Dan Werthimer). This board has in-built serial I/O capability for driving 10 GE and hence the Internet, and can easily interface to the correlator VSI chips. Use of this board saves considerable hardware design effort. The remaining work is to configure the FPGA on the iBOB to allow for data output using VSI-E at rates up to 1 Gbps, including packetisation etc. Work is also required on the VSI chips: geometric delay removal and nx10 KHz offset removal, necessary for the WIDAR correlator approach, and bit dropping and channelisation in order to fit the e-VLBI data rate requirements. This way is now well underway following the appointment of the digital engineer - Jonathan Hargreaves - on 1 Dec 2006. A block diagram of the system (figure 1) shows how the external connections to the Internet, and to Mark5B recorders will interface to the correlator.

Some aspects of the design were completed and published as documents on the wiki <http://www.jive.nl/dokuwiki/doku.php/fabric:wp1> under scalable connectivity by B. Anderson, which partially fulfils the requirements of deliverable D27 (DSA1.4) -eMERLIN VSI Interface design. We were not able to produce a prototype device for the following reasons:

1) It was not possible to finalize the overall system design until after discussion with the Metsahovi and Onsala groups (further explain ed below in the Section 1.6 Joint Research Activities)
2) Delivery of the iBOBs is not expected until April 2007
3) The e-MERLIN correlator is being built by NRC, Canada. They have an approximately 6 month delay in the construction project with the delivery of the first set of station boards, now expected towards the end of 2007.
4) Due to bureaucratic delays the new digital engineer was not appointed until Dec 2006.

These delays inevitably lead to delays in the deliverables. Partner University of Manchester provided updates that are included in the next 18 months' plan. However there has been considerable progress:

1) The prototype stat ion board VSI chip has been tested by the Canadians and a report is available (see <http://www.drao-ofr.hia-iha.nrc-cnrc.gc.ca/science/widar/private/Station_Board.html> under Station Board VSI Test FPGA)

2) Prototype iBOBs have been produced and tested for a variety of functionalities by Dan Werthimer's team at the University of Berkeley. <http://seti.berkeley.edu/casper/>

We plan to produce code over the next year, with simulations taking place before implementation. Part of the iBOB code will be implemented before the end of the year, the VSI-chip code will be implemented in 2008. This scheme should enable us to undertake tests on up to 4 MERLIN telescopes with EVN in month 24 as in the or iginal plan.

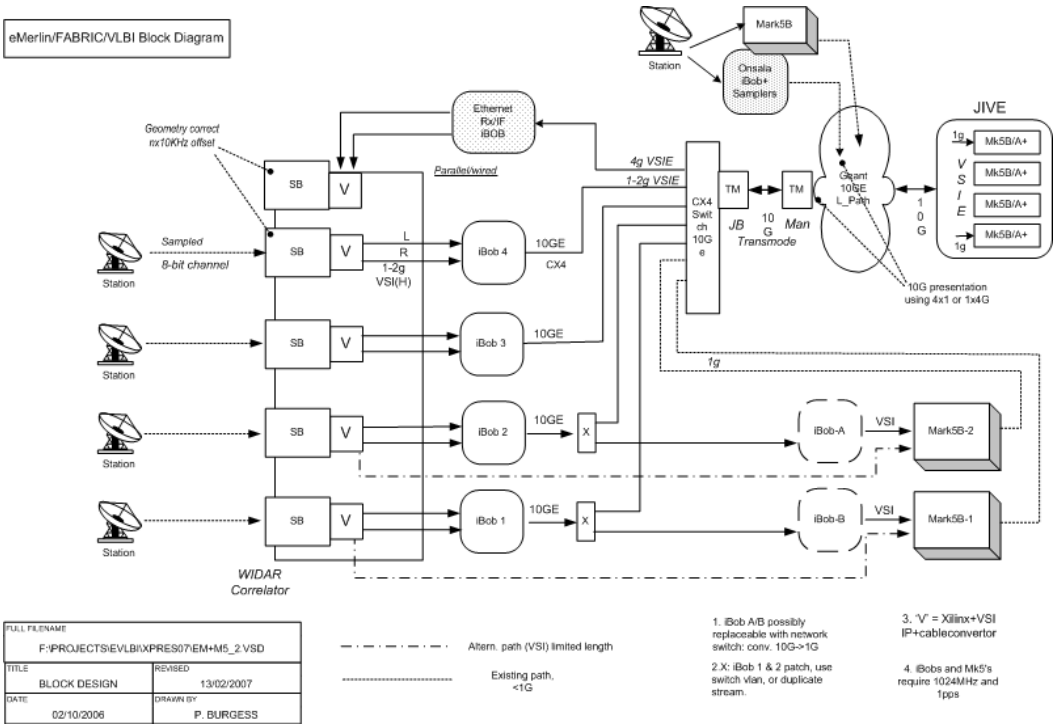


Figure SA1-8: Block diagram of the e-MERLIN – Internet interface

1.5.1.2 SA1 Participating Institutions[9]

P #	Short Name	Funded Amount (Euros)	
		3 year total	Months 1-18
1	JIVE	1,084,000	255,000
18	UniMAN	148,500	34,000

1.5.1.3 SA1 Deliverables and Milestones Tables

Note that the original Description of Work (DOW) contained inconsistencies in the deliverables tables. The differences will be corrected in the 18 month report section of the report.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D5	SA1.1	Central data link control	JIVE	3	7	4
D11	SA1.2	Job preparation utilities	JIVE	6		2
D12	SA1.3	Fast/adaptive scheduling tools	JIVE	6		1
D27	SA1.4	eMERLIN VSI interfaces design	UniMan	9		1
D28	SA1.5	Network protocol decision	JIVE	9		2
D35	SA1.6	Selective data processor controls	JIVE	12	9	4
D36	SA1.7	Monitored information handling modules	JIVE	12		->
D40	SA1.8	Monitoring processes	JIVE	12	7	4
D44	SA1.10	Real-time data processor control software	JIVE	15	4	4
D45	SA1.9	Tests using local Jodrell Bank home e-MERLIN telescope	UniMan	15		->
D47	SA1.11	Real-time Pipeline	JIVE	16	9	4
D50	SA1.12	Visibility monitor	JIVE	18	4	4
D51	SA1.13	Tested software for operational improvements	JIVE	18		
D52	SA1.14	Test using remote e-MERLIN telescope	UniMan	18		->
D53	SA1.16	VSI support software	JIVE	18		0
D54	SA1.15	VSI Interfaces	JIVE	18		2
D71	SA1.17	Flexible local GE network	JIVE	21		1
D84	SA1.18	Network monitoring tools	JIVE	24		0
D85	SA1.19	Multiple e-MERLIN telescope tests	UniMan	24		->
D95	SA1.20	Improved network applications	JIVE	30		0
D96	SA1.21	Monitoring user interfaces	JIVE	30	7	4

1.5.1.4 SA1 Human Resource Overview

Staff funded by EXPReS:

Name	Position Title	Position Location (Short Name)	Position Description	Start Month
Zsolt Paragi	e-VLBI support scientist	JIVE	Scientific support, scheduling, testing of new capabilities	1
Bob Eldering	Scientific software engineer	JIVE	Correlator control & monitoring software	3
Des Small	Scientific software engineer	JIVE	Data reduction and scheduling software	4

[9] Participation is based on those institutions who have received funding for the activity. The amount listed under "Months 1-18" is the 85% distribution value. The Participating Institution Table assumes the following abbreviations:
P # - Participant Number

Paul Boven	Network/Linux Specialist	JIVE	Hardware upgrades and network design, internet protocol investigation	10
Jonathan Hargreaves	Digital engineer	UniMan	Interface e-MERLIN – e-EVN	10

Contributions not funded by EXPReS:

Name	Position Location (Short Name)	Position Title
Arpad Szomoru	JIVE	Planning, representation, outreach
Friso Olnon	JIVE	Correlator control software
Mark Kettenis	JIVE	Real-time correlator code, transport protocol modifications
Julianne Sansa	Kapteyn Institute / JIVE	Protocol investigations, network simulations
Michael Lindquist	Onsala	Reseach Engineer
Roger Hammagren	Onsala	Senior Technician/Chief telescope Operator
Phil Diamond	UniMan	Director, signing authority
Simon Garrington	UniMan	Project Scientist
Ralph Spencer	UniMan	Project Manager
Bryan Anderson	UniMan	Digital design
Richard Hughes-Jones	UniMan	Network scientist
Matt Strong	UniMan	VLBI post-doctoral research assistant left Jan 2007
Paul Burgess	UniMan	VLBI engineer
Althea Wilkinson	UniMan	administration assistant

1.5.1.5 SA1 Meetings and Workshops

No meetings or workshops were organized by SA1, apart from local workgroup meetings.

1.5.1.6 SA1 Participation in External Events

Date	Participant	Title of presentation	Event Description / Location
24 Mar 2006	A. Szomoru	e-VLBI Status @ JIVE	Technical Operations Group meeting, Dwingeloo, the Netherlands
4 May 2006.	M. Strong	ESLEA and eVLBI Developments	presentation at an international e-VLBI meeting organised by ESLEA project, University College London
24-31 May 2006	A. Szomoru	VLBI in Transition	SPIE Conference "Ground-based and Airborne Telescopes", Orlando, USA
11-24 Jun 2006	Z. Paragi	Constraining the black hole mass in M82 X-1 with VLBI	The multicoloured landscape of compact objects and their explosive origins, Cefalu, Sicily
27-29 Jun 2006	A. Szomoru	New Use of an Old Correlator	Next Generation Correlators for Radio Astronomy and Geodesy, Groningen, the Netherlands
6 Jul 2006	R.E. Spencer	eVLBI in Europe, presentation at NRAO Colloquium	Socorro, NM, USA

21 Aug 2006	A.P. Rushton, R.E. Spencer, M. Strong, S. Casey, R. Fender, M. Garrett, Z. Paragi, V. Tudose,C. Reynolds and G. Pooley	The First e-VLBI science production of GRS1915+105, International Astronomical Union Symposium 238	Prague, Czech Republic
31 Aug 2006	A. Szomoru	Status of e-VLBI @ JIVE	Bits & Bytes Meeting, Jodrell Bank, UK
1 Sep 2006.	A.P. Rushton,	The First eVLBI Observations of GRS1915, e-VLBI journal paper submitted to MNRAS (Monthly Notices of the Royal Astronomical Society)	
8 Sep 2006	A.P. Rushton	eVLBI Observations of GRS1915, presentation and poster at VIth Microquasar Conference	Como, Italy
17 Sep 06	M. Strong	The development of eVLBI as part of the ESLEA project	presentation at 5th Annual e-VLBI Workshop, Haystack Observatory, USA
17-20 Sep 2006	M.A. Garrett	e-EVN - an open, real-time VLBI Array - first Science.	5th International e-VLBI Workshop, MIT Haystack Observatory, USA
17-20 Sep 2006	M. Kettenis	Pluggable TCP Congestion Avoidance Modules for e-VLBI	5th International e-VLBI Workshop, MIT Haystack Observatory, USA
17-20 Sep 2006	J. Sansa	A Simulation model for e-VLBI traffic on network links in the Netherlands	5th International e-VLBI Workshop, MIT Haystack Observatory, USA
17-20 Sep 2006	A. Szomoru	e-VLBI Developments at JIVE	5th International e-VLBI Workshop, MIT Haystack Observatory, USA
18-22 Sep 2006	Z. Paragi	Observing ULXs with VLBI	VI Microquasar Workshop: Microquasars and Beyond, Como, Italy
26-29 Sep 2006	Z. Paragi	Constraining IMBH black hole masses with VLBI	8th EVN Symposium, Torun, Poland
26-29 Sep 2006	A. Szomoru	Recent e-EVN Developments	8th EVN Symposium, Torun, Poland
27 Oct 2006.	R.E. Spencer and M. Strong,	the 3rd Open Call e-VLBI - the first sustained 256 Mbit/s e-VLBI science run utilises UKLight	
31 Oct 2006	J. Sansa	A Simulation model for e-VLBI traffic on network links in the Netherlands	5th EVN-NREN Meeting, Zaandam, the Netherlands

31 Oct 2006	P. Savola	A rundown of the Smart-1 PERT case history	5th EVN-NREN Meeting, Zaandam, the Netherlands
31 Oct 2006	A. Szomoru	e-EVN developments in 2006	5th EVN-NREN Meeting, Zaandam, the Netherlands
31 Oct 2006	A. Szomoru	SA1: overview, first results	EXPReS Kickoff Meeting, Zaandam, the Netherlands
2 Nov 2006	A. Szomoru	SMART-1: using e-VLBI to track satellites	SURFnet Gigaport Seminar, Utrecht, the Netherlands
10 Nov 2006	A. Szomoru	Recent e-EVN Developments	Shanghai Observatory, Shanghai, China
13 Nov 2006	A. Szomoru	EVN and e-VLBI	China Science and Technology Network (CSTNET), Beijing, China
27 Nov 2006	R.E. Spencer	SJ5 and high rate data transfer for VLBI, presentation at NNW SJ5 Launch	Manchester
28-29 Nov 2006	A. Szomoru	e-EVN: practical considerations	e-VLBI Science Advisory Committee Meeting, Westerbork, the Netherlands & EVN Board Meeting, Dwingeloo, the Netherlands
4-6 Dec 2006	A. Szomoru	e-EVN: practical considerations	Technical Operations Group meeting, Noto, Italy & Bits & Bytes meeting, Manchester, UK

1.5.2 SA2 - Network Provision for a Global e-VLBI Array

1.5.2.1 SA2 Activity and Status

To participate in e-VLBI, telescopes must transmit data over the network to the correlator. Most radio astronomy partners within EXPReS already participate in traditional VLBI observations by sending data via post. SA2 intends to establish a program of network provisioning that will allow radio telescopes across Europe and the rest of the world to obtain last mile connections to high-speed communication networks.

The connectivity will provide access to national research and education networks (NRENs) and international communication networks, in particular GÉANT. SA2 aims to expand the number of radio telescopes with direct access to GÉANT, and thus the EVN data processor at JIVE, by stimulating "last mile" connections. These telescopes include some of the largest and most sensitive radio telescopes in the world. In some cases, the SA2 efforts will improve and enhance existing communication services to these telescopes.

SA2 aims to create links to radio telescope facilities in Europe, Asia, Australia, South Africa, South America and the USA. The funds requested from the Commission – in many cases a very small fraction of the total connection cost - are acting as a significant catalyst, encouraging commercially fair, affordable and competitive quotations, and releasing substantial sources of local and national funding.

During the first year, we have experienced that:

a) SA2 developments are very different between each EXPReS partner
b) SA2 expenditures are not flat in time, but uneven and somewhat unpredictable.
c) Several of the most expensive infrastructures will be constructed in the second year of the project (March 2007 to February 2008).
d) Several participants have been very successful in obtaining good deals for their high capacity data connections[10], while others have been able to get the service partially financed by their local governments. The effective negotiations reduce the total cost of last-mile connections the participants must undertake.

The objectives of SA2 are realized through three work packages:

- WP1 (Dynamic status report & EXPReS support of the last-mile telescope connections to the nearest NREN node)
- WP2 (Construction and procurement of equipment for the last-mile infrastructure)
- WP3 (Testing of the link and verification of e-VLBI capability)

The first step is to define the extent of the last-mile problem at each radio telescope, which requires the establishment of good communications between aspiring e-VLBI radio telescopes and their appropriate NRENs. Several institutions participating in SA2 have made good progress regarding this issue in the first year of EXPReS, and have completed the study of feasibility for their last-mile connection (CNIG-IGN, MPIfR, VIRAC, INAF-for Medicina), while others with established local connections are investigating the international leg to GÉANT (TIGO, ShAO, HRAO, CSIRO). They are described in detail in the next subsections.

The figure below identifies the 19 organizations participating in EXPReS. There are astronomy institutes as well as NRENs (national research and education networks) involved. This logical diagram shows the flow of data from each of the telescopes to the correlator at JIVE. Note that each

[10] Note: The cost associated to SA2 are those of the “last-mile” connections, understanding as such not only the needed equipment and infrastructures from the nearest NREN/GÉANT nodes to the telescopes, but also any other cost related to the transfer of the data to the e-EVN correlator at JIVE.

telescope sends data over the network, most through several long distance connections, often spanning different administrative domains. More detailed network maps for our partners DANTE (via their GÉANT2 network) and SURFnet (their SURFnet 6 network) are available in the NA2 section of the report.

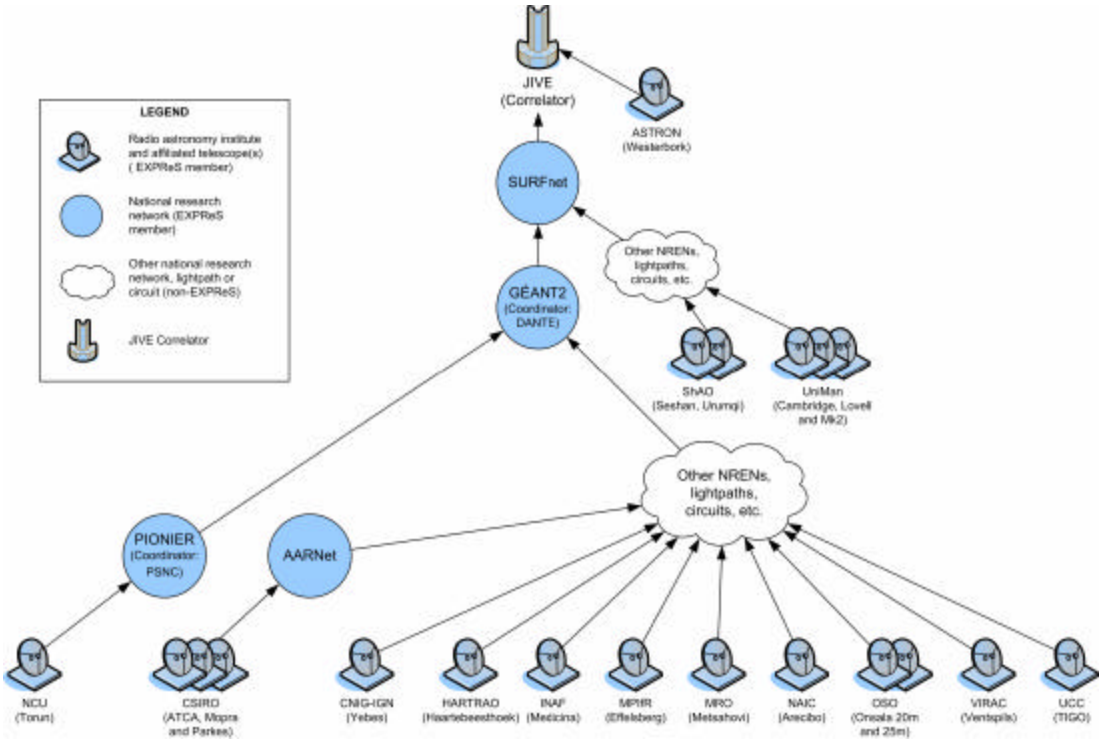


Figure SA2-1: Logical Overview - EXPReS Participating Telescopes and Network Organizations. Note that the Westerbork array is shown as one dish for clarity.

The following table summarizes the network connectivity for EXPReS participants.

Telescope	Current BW	Expected BW	Year	Notes
JIVE correlator	7 x 1 Gbps	16 x 1 Gbps	2007/8	connected
WSRT (14x25m)	1 Gbps			connected
Onsala (20+25m)	1 Gbps	10 Gbps	2007	connected
Jodrell Bank (76m)	1 Gbps	10 Gbps		connected
Cambridge (32m)	1 Gbps			connected
Torun (32m)	1 Gbps			connected
Metsähovi (14m)	10 Gbps			connected
CNIG-Yebes (40m)	2 Mbps	1 Gbps	2007	
Effelsberg (100m)	2 Mbps	1 Gbps	2007	
Medicina (32m)	1 Gbps			connected
Noto (32m)			unknown	
Sardinia (64m)		2,5 / 10 Gbps	2009	
Shanghai (25m)	100 Mbps	1 Gbps	2007	
Urumqi (25m)		1 Gbps	2007	
Miyun (50m)		1 Gbps	2007	
Yunnan (10m)		1 Gbps	2007	
VIRAC (32m)		1 Gbps	in progress	still needs RA receiver
Hartebeesthoek (26m)		1 Gbps	unknown	
Tigo (6m)	1 - 7 Mbps	64 Mbps		

Arecibo (305m)	< 32 Mbps	1 Gbps	2007	
ATNF/CSIRO (Parkes, Mopra, ATCA)	1 Gbps (local)	2 Gbps (to JIVE)		

1.5.2.1.1 SA2 Activity and Status for participant JIVE

JIVE is funded by the major Research Councils and Radio Astronomy national facilities in Europe. Its role is to develop and operate the EVN MkIV VLBI Data Processor and provide both end-user and network support to the EVN (European VLBI Network – a recognized large-scale, distributed radio astronomy facility). JIVE is currently connected by SURFnet to the global network at 7 x 1 Gbps. Connections exist to GÉANT2 and via NetherLight to the GLIF. SURFnet plans to increase the connectivity, including an additional 10 Gbps IP-switched lambda, in the following months as additional sites come online. SURFnet believes that the amount of bandwidth provided to JIVE will need to double in 2007.

1.5.2.1.2 SA2 Activity and Status for participant AARNet

Australia's Academic and Research Network (AARNet) is providing some network services for use by Australia Telescope National Facility (ATNF/CSIRO) for the EXPReS project. CSIRO and AARNet have completed the construction of fiber optic tail circuits from the three telescope facilities to connection points on the AARNet Optical Network.

AARNet has commissioned a gigabit ethernet link to CSIRO's Riverside Corporate Park site in North Ryde, Sydney from each of the telescope facilities at Parkes Observatory; Australia Telescope Compact Array, Narrabri; and Mopra. CSIRO have connected these links to their corporate network. That corporate network has a 1 Gbps link in Sydney to the AARNet3 routed IP network. CSIRO have requested AARNet to install a second set of gigabit ethernet links especially for astronomy science traffic. This will connect Mopra to Narrabri; Parkes to Narrabri; and Narrabri to Australia Telescope National Facility's headquarters in Marsfield, Sydney. AARNet expect to commission these links by May 2007.

The international connection to JIVE are being investigated (see Section D of this report).

1.5.2.1.3 SA2 Activity and Status for participant ASTRON

The 1 Gbps link is already operational, and successful e-VLBI observations have been performed.

1.5.2.1.4 SA2 Activity and Status for participant CNIG-IGN

The CNIG-IGN telescope is located in the town of Yebes, 75 km NE of Madrid (Spain). A feasibility study has been conducted to investigate ways to transport the data from the new 40-meter radio telescope to the GÉANT national node at RedIRIS.

This feasibility study has shown that the use of serviced commercial lines is the best option. At least two companies offer a solution in the form of fiber optics placed in high voltage electricity transport infrastructures (REE/Albura, now Deutsche Telecom, and Telefónica de España, the largest telecommunications company in Spain). The Call for Tender is being finalized and will be issued shortly. The start of construction is planned for the middle of 2007.

Recently, RedIRIS has moved the GÉANT node infrastructure to the city of Alcobendas, north of Madrid and 94 km to Yebes (via Madrid). Permission has been obtained from RedIRIS to install the needed equipment at their premises.

1.5.2.1.5 SA2 Activity and Status for participant CSIRO

The "last-mile" connections of the ATNF antennas (Parkes, Mopra, ATCA) to the AARNet began in late 2005 and were completed by March 2006, after the official start of EXPReS. Legal agreements were completed by June 2006 and services were provided from July 2006. The AARNet backbone operates at multiple 10 Gbps wavelengths and each ATNF antenna has 2 x 1 Gbps services. The first 1 Gbps from the antennas to ATNF headquarters in Sydney started operation in July 2006. The second 1 Gbps service will operate between the observatories. AARNet has provisioned this service but connection awaits routing changes in the CSIRO network, likely to be completed in 2007.

CSIRO requests the whole EC funding (€20,000) to be delivered at this stage in the project. An additional €5000 will be assigned by the EXPReS project in the next years.

The international connectivity to JIVE is to be handled by AARNET, also part of the EXPReS team.

1.5.2.1.6 SA2 Activity and Status for participant HartRAO (NRF)

The last mile connection for the 26 m radiotelescope at Hartebeesthoek Radio Astronomy Observatory (HartRAO) consists of a 3 km dark fiber circuit from the telescope to the proposed SANReN (South African Research Network) which will provide gigabit connectivity within SA. This will be installed in the next months. At this moment, connectivity is limited to 300 Kbps.

The total (shared) international bandwidth for the whole Tertiary Education network to which HRAO attaches is currently 180.5 Mbps, of which some 40 – 75 Mbps is utilized depending on the time of day.

The real bottleneck is a reasonable cost and bandwidth connection from the SANReN to GÉANT. This will probably be implemented by a new cable from SA to Europe via the Atlantic. Negotiations for this cable are underway, and a two- to three-year time scale is envisaged. Other alternatives are discussed in Section D of this report.

1.5.2.1.7 SA2 Activity and Status for participant INAF

The connection of the Medicina radio telescope to the GARR/GÉANT network via a (temporary) long route of 120 km became available at the end of January 2006. It was a great success that the connection, estimated in the EXPReS proposal to be completely financed by INAF, could actually be accomplished much earlier than expected and at a minimum cost, thanks to the agreement achieved with the local government (Emiglia-Romana region).

The first e-VLBI observations took place in March 2006, and Medicina has participated in all e-VLBI sessions since then.

While waiting for a shorter fiber path (40 km), to be provided by the local government, improvements are being made to the Mark5 hardware. Furthermore a fiber bypass is being laid in the fields around the antenna and new equipment will be set up to enable 10 Gbps transfers on this new path. This will be sponsored by the local government <http://www.ira.inaf.it/foto/2005-Fibra/index.html>.

The connection of the new 64-m telescope under construction in Sardinia is progressing but not yet finalized in the feasibility study.

The connection of the telescope at Noto (Sicily) cannot be completed within the timeframe of EXPReS, and consequently has been removed from the project deliverables.

1.5.2.1.8 SA2 Activity and Status for participant MPIfR

The venture to build an optical fiber to connect the radio telescope in Effelsberg to the institute in Bonn and further to the next core node of the German NREN (DFN) at Birlinghoven, close to Bonn,

was already initiated before the official start of the EXPReS project. The feasibility and the financial dimension of the "Effelsberg fiber" had also been previously verified. During the first 12 months of EXPReS, detailed project planning and negotiations about the rights to cross land were conducted, which led to the final decision of the exact path for the fiber. As a result the "Haushaltsunterlage Bau" (HU-BAU) document was prepared and submitted to the Max-Planck Gesellschaft in autumn 2006. All required steps for allocating the money had been accomplished by the end of January 2007. The tender document is being prepared during February 2007. The first part - the fiber between the telescope and the institute in Bonn – has been put out to tender, and closing date is March 13, 2007. Present best estimate for start of operation of the fiber between Effelsberg and the MPI is October 19, 2007.

Network equipment from FOUNDRY will be used, some of which has been purchased already. This includes 10 Gbps-Modules, GBICs, redundant management engines, etc. Also, LAN switches are needed to connect the VLBI Division in Bonn and Effelsberg to MPI's internal backbone. The modalities for forwarding data via the German and European backbone or fiber are under discussion with DFN/GÉANT. We seek a perspective to use the European network free of charge or at low cost in the next years for experimental (non profit) data. Expected costs are: €2.1 million for the dark fiber from Effelsberg to Bonn (48 fibers/cable), €150,000 for internal network upgrades to support 1-10 Gbps to the VLBI division in Effelsberg and Bonn, including test equipment to test special frames, monitoring, storing/caching datas, 10Gbit-network cards, etc. Costs for rent are not yet available, but may be on the order of €200,000 over the course of the EXPReS project.

A LOFAR station at Effelsberg is being installed, which will need a 10 Gbps line to Groningen (traffic at ~3 Gbps). EXPReS e-VLBI traffic will be sent through the same line, as one fiber can be used to get from Groningen to JIVE/Dwingeloo.

1.5.2.1.9 SA2 Activity and Status for participant MRO (TKK)

Metsähovi Radio Observatory (MRO) initiated the process of acquiring a dark fiber connection directly from the observatory site to the CSC/Funet (Finnish University and Research Network) central hub location in November 2005. The tender process resulted in the local telecom operator offering a five-year fiber lease at reasonable cost. New fiber was laid in the ground during January and February 2006, and the lease term started in March 2006.

At this time, during the tender process for the active fiber optic networking equipment, it became clear that 10 Gbps Ethernet technology prices had dropped dramatically, and thus the original plan to have a 1 Gbps connection was quickly revised and 10 Gbps Ethernet substituted. The EXPReS SA2 contract catalyzed additional funding at both the Helsinki University of Technology TKK and internal funding at CSC/Funet, which eventually made it possible to acquire 10GBASE-ZR-based 10GE end equipment at both Metsähovi and CSC/Funet. Thus, in July 2006 Metsähovi was connected to Funet (and from there to NORDunet and GÉANT2) at 10 Gbps. Indeed, MRO has been the first EVN telescope to connect to GÉANT at this very high data transfer rate.

The early acquisition of "last mile" connectivity at Metsähovi was a key enabler in the JRA1 "Month 7 Demo," and it additionally allowed SA2 deliverables SA2.011 (equipment) and SA2.15 (e-VLBI test observations at Metsähovi) to be completed several months earlier than originally planned.

1.5.2.1.10 SA2 Activity and Status for participant NAIC (Cornell)

Arecibo 305-m radiotelescope has participated in EVN e-VLBI observations at 32 Mbps (very occasionally at 64 Mbps). However, even 32 Mbps has not been recently sustainable.

The present plan is to connect via the Miami NAP (NAP of the Americas) and the Abilene Internet2 backbone pathway to GÉANT. The Miami NAP is operated by AMPATH/CLARA (Florida International University). The trans-Caribbean circuit is leased from Centennial Puerto Rico, jointly with the University of Puerto Rico.

Parties involved in the "last-mile to JIVE" from Arecibo include Cornell University, the University of Puerto Rico, Florida International University, possibly UCAID (Internet2/Abilene) and GÉANT. As such there will be administrative costs at several levels, some of which will be absorbed into the operating costs of the respective institutions.

In theory, a maximum of 155 Mbps should be possible at present. However, in practice it is difficult to sustain 32 Mbps, even at night.

Subject to vendor confirmation and availability of funding, the aim is to achieve sustained 1 Gbps rates over two to three hours per month. The circuit and the switching equipment together will be leased from the telecom provider(s). In early March 2007 a proposal was received from Centennial de Puerto Rico, currently the provider for the Observatory's 155 Mbps ATM-based "last mile" link to the NAP of the Americas, to upgrade the link to support coordinated burst rates of 512 Mbps using gigabit Ethernet. Recurring costs of this upgrade are substantial and will need to be absorbed into the operating costs of the Observatory and University of Puerto Rico networking partners. The proposal is under review and a joint decision is expected by mid-April 2007, following which Centennial PR will install the facility. A further upgrade to 1 Gbps rates is expected to become feasible in May 2007 following Centennial's lighting of a new high-capacity submarine fiber system.

1.5.2.1.11 SA2 Activity and Status for participant NCU (UMK)

The 1 Gbps link is already operational, and successful e-VLBI observations have been performed.

1.5.2.1.12 SA2 Activity and Status for participant OSO

The 1 Gbps link is already operational, and successful e-VLBI observations have been performed.

1.5.2.1.13 SA2 Activity and Status for participant ShAO

The CAS radio telescopes have been connected by fiber links to their nearby cities, and data transfer is already possible at a cost. At the moment, the fiber link is rented for data rates of 34 Mbps.

Routes to bring the data to Europe are currently being investigated. CSTNET plans to connect from Shanghai to Beijing and then to JIVE via Hong Kong and Amsterdam, via a 2.5 Gbps lightpath. A teleconference meeting on this issue was held on January 26, 2007. Some delay occurred because of a break in a trans-Pacific submarine cable during an earthquake in December 2006, but this cable has since been repaired.

Another option would be to use fiber optics network through Siberia (e.g. ORIENT). However, this is not being pursued at this time, as the telescopes are connected with CSTNET while the trans-Siberia network has an agreement with the Chinese Education Network.

1.5.2.1.14 SA2 Activity and Status for participant TIGO

Three different parts of the connection are to be considered:

a) TIGO-UdeC/DTI, already connected at 1 Gbps.
b) UdeC/DTI-REUNA, 155Mbps, limited by switch and rented service
c) REUNA-world/GÉANT, 90Mbps, limited by rented service

The University of Concepción (UdeC) is connected by the national academic network REUNA (Red Universitaria Nacional). This connection offers 155 Mbps capacity, of which approximately 100 Mbps are used during business hours (6:00-23:00). At the moment this line does allow for data transmissions above 50 Mbps, but only on weekends or during a few morning hours. This problem is subject to change, presumably during the second half of this year to allow for the proposal to EXPReS: 24 times 24h with 64 Mbps for e-VLBI. Note that UdeC rents only a fraction of the total

bandwidth of 155 Mbps and that for the test purposes of EXPReS the limit will be adapted to the needs.

REUNA is connected with 90 Mbps to GÉANT. Currently about 25 Mbps are used, indicating that about 64 Mbps will be available for EXPReS upon special request. If necessary the bandwidth can be increased.

1.5.2.1.15 SA2 Activity and Status for participant UniMAN

The University of Manchester operates the MERLIN radio telescope array in the UK, including the 76-m Lovell, 32-m Cambridge and 25-m Mk2 VLBI radio telescopes. The 1 Gbps link is already operational, and successful e-VLBI observations have been performed.

Net North West are to install 10 Gbps capable hardware for the link later in 2007.

1.5.2.1.16 SA2 Activity and Status for participant VIRAC

The construction of the last mile dark optical fiber from Irbene to Ventspils International Radioastronomy Center (at a distance of about 30 km) has been completed.

The fiber will be in place and operational in 2007. Participation of VIRAC in e-VLBI observations depends on other issues, such as radiotelescope calibration and receiver availability. Tests are in progress.

1.5.2.1.17 SA2 Support from Networking Partners

Both DANTE (via GÉANT2) and SURFnet (via SURFnet6) are EXPReS partners, but they have no formal participation in SA2. However, not to mention them in this section would be a considerable slight.

Both organizations have provided a great deal of support, technological and otherwise, to the project since its inception. They most obvious areas of assistance are with international and national networking as we bring astronomy partners online. The amount of work and effort that both organizations invest into these activities is significant.

1.5.2.2 SA2 Participating Institutions[11]

P #	Short Name	Funded Amount (Euros)	
		3 year total	Months 1-18
1	JIVE	40,000	8,500
2	AARNET	10,000	1,700
6	ASTRON	10,000	2,550
7	CNIG-IGN	100,000	25,500
8	CSIRO	10,000	4,250
9	NRF	10,000	1,700
10	INAF	110,000	42,500
11	MPG	210,000	85,000
12	TKK	38,000	25,500
13	CORNELL	50,000	17,000

[11] Participation is based on those institutions who have received funding for the activity. The amount listed under "Months 1-18" is the 85% distribution value. The Participating Institution Table assumes the following abbreviations:
P # - Participant Number

14	UMK	25,000	4,250
15	OSO	30,000	8,500
16	SHAO	75,000	21,250
17	UDEC	30,000	8,500
18	UNIMAN	12,000	4,250
19	VeA/VIRAC	40,000	8,500

1.5.2.3 SA2 Deliverables and Milestones Tables

Note that the original Description of Work (DOW) contained inconsistencies in the deliverables tables. The two instances of deliverables were in the beginning of the DOW (the large list with deliverables from all activities) and the smaller list inside of the NA2 section. The differences will be corrected in the 18 month report section of the report.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D13	SA2.01	Feasibility study of the last-mile connection to the nearest GÉANT node for participant CNIG-IGN	CNIG-IGN	6	10	4
D14	SA2.02	Feasibility study of the last-mile connection to the nearest GÉANT node for participant MPIfR	MPIfR	6	10	4
D15	SA2.03	Equipment of the last-mile infrastructure for participant INAF (telescope in Medicina)	INAF	6	10	4
D16	SA2.04	Feasibility study of the last-mile connections to the nearest GÉANT node for participant CAS (Shanghai, Urumqi, Miyun, Yunnan)	CAS	6	10	4
D17	SA2.05	Feasibility study of the last-mile connection to the nearest GÉANT node for participant VIRAC	VIRAC	6	10	4
D18	SA2.06	Feasibility study of the last-mile connection to the nearest GÉANT node for participant HRAO	HRAO	6	10	4
D19	SA2.07	Feasibility study of the last-mile connection to the nearest GÉANT node for participant NAIC (Arecibo)	NAIC	6	10	4
D20	SA2.08	Feasibility study of the last-mile connection to the nearest GÉANT node for participant TIGO	TIGO	6	10	4
D21	SA2.09	Feasibility study of the last-mile connection to AARNET for participant CSIRO	AARNET	6	10	4
D29	SA2.10	e-VLBI test observations, Medicina	INAF	10	3	4
D37	SA2.011	Equipment of the last-mile infrastructure for participant MRO	MRO	12	5	4
D38	SA2.12	Construction and equipment of the last-mile infrastructure for participant CNIG-IGN	CNIG-IGN	12		
D39	SA2.13	Construction and equipment of the last-mile infrastructure for participant MPIfR	MPIfR	12		
D55	SA2.14	10 Gbps link upgrade between MERLIN and JIVE	MERLIN, JIVE	18		
D56	SA2.15	e-VLBI test observations, Metsahovi	MRO	18	13	4
D57	SA2.16	Construction and equipment of the last-mile infrastructure for participant Shanghai	CAS	18		
D58	SA2.17	Construction and equipment of the last-mile infrastructure in AARNET to allow connection of participant CSIRO	AARNET, CSIRO	18		
D59	SA2.18	Construction and equipment of the last-mile infrastructure for participant Urumqi	CAS	18		
D60	SA2.19	Construction and equipment of the last-mile infrastructure for participant Miyun	CAS	18		
D61	SA2.20	Construction and equipment of the last-mile infrastructure for participant Kunming	CAS	18		
D62	SA2.21	Construction and equipment of the last-mile infrastructure for participant VIRAC	VIRAC	18		

D63	SA2.22	Equipment of the last-mile infrastructure for participant NAIC	NAIC	18		
D64	SA2.23	Construction and equipment of the last-mile infrastructure for participant TIGO	TIGO	18		
D65	SA2.24	AARNET connectivity enhancements	AARNET	18		
D69	SA2.25	Feasibility study of the last-mile connection to the nearest GÉANT node for participant INAF (Sardinia)	INAF	20		
D70	SA2.26	10 Gbps link between UniMan and OSO for ultra-VLBI tests	UniMan, OSO	20		
D72	SA2.27	e-VLBI test observations, Effelsberg	MPIfR	21		
D73	SA2.28	e-VLBI test observations, Metsahovi	CSIRO	22		
D74	SA2.29	e-VLBI test observations, Yebes	OAN	22		
D86	SA2.30	Construction and equipment of the last-mile infrastructure for participant HartRAO	HRAO	24		
D97	SA2.31	e-VLBI test observations, Urunqi	CAS	30		
D98	SA2.32	e-VLBI test observations, Mijun	CAS	30		
D99 D100	SA2.33 SA2.34	e-VLBI test observations, Kunming e-VLBI test observations, VIRAC	CAS VIRAC	30 30		
D101	SA2.35	e-VLBI test observations, HRAO	HRAO	30		
D102	SA2.36	e-VLBI test observations, NAIC, Arecibo	NAIC	30		
D103	SA2.37	e-VLBI test observations, TIGO	TIGO	30		
D104	SA2.38	Construction and equipment of the last-mile infrastructure for participant INAF (Sardinia)	INAF	30		

1.5.2.4 SA2 Human Resource Overview

Manpower is not claimed under SA2, hence no formal reporting of human resources is given.

Position Title	Position Location (Short Name)	Position Description	Start Month
n/a	n/a	n/a	n/a

1.5.2.5 SA2 Meetings and Workshops

SA2 did not host any meetings during the first project year.

Date Location	Meeting Title / Subject / Website Address	Number of Attendees
n/a	n/a	n/a

1.5.2.6 SA2 Participation in External Events

Date (month)	Event Description / Location
2006 Sep	F. Colomer "EXPReS SA2: Network Provision for a Global e-VLBI Array" . VIII EVN Symposium Torun (Poland)

1.6 Joint Research Activities

1.6.1 JRA1 - Future Arrays of Broadband Radio Telescopes on Internet Computing

The FABRIC (Future Arrays of Broadband Radio-telescopes on Internet Computing) project researches future technology relevant for the e-VLBI application. It has two major aims, the first being the development of a prototype data-acquisition system that will work with 10Gb/s connectivity, the second to exercise the deployment of the algorithm of VLBI correlation on Grid computing.

In the first part of the project the team at Metsähovi has the responsibility to research options for a new data acquisition prototype that can work at 4Gbps, as the current MK5 systems are limited to 1 Gbps. Based on the previous experience with the PCEVN system, this system should be ideally based on off-the-shelf components. Next, a work-package (at MPIfR) considers integrating this prototype into the operational field system available at the telescopes. The Onsala telescope is the designated location for testing this prototype. Here high speed connectivity is planned to be available. Because other correlators are not capable of receiving such high bandwidth signals, the e-MERLIN correlator will be used in the final demonstration. The Jodrell team is also researching the protocol issues which are required for optimal transport of such high bandwidth data. A similar interface problem as the e-MERLIN one presents itself for the E-LOFAR project. A research component here is the distribution of clock signals to the telescopes.

The distributed correlator project, which forms the second part of FABRIC, builds on the expertise at JIVE and PSNC. A software correlator was developed for tracking the Huygens descent through Titan's atmosphere. Maintaining the narrow-band capabilities, this algorithm can be deployed on standard computing to implement high precision wide-band correlation. If this application can be ported to Grid computing, there is the possibility that it can be used for operational correlation in the future, certainly for a limited range of special applications (e.g. pulsar gating). The work-packages aim at adopting the workflow management systems from Virtual Lab applications for this purpose. The challenge will be to setup the routing to cluster computers in such a way that the network can keep up with the incoming data rates.

FABRIC started in March 2006 with a kick-off meeting in Dwingeloo. It was recognized that there were considerable design hurdles to overcome, especially making a decision on the data acquisition development. There were some boundary conditions for this decision. It was discussed how the existing efforts on the PC-EVN system could be used in FABRIC. Also the EVN effort to develop so-called Digital Baseband Converters was reviewed. Other input came from the need to establish an e-MERLIN interface at the same time. During the summer it was decided to do this project on so called iBOBs (internet Breakout Boards, Univ of Berkeley). However, the delivery time of these boards and learning to work with this equipment meant delays to the original project plan. Work at Metsähovi, Jodrell Bank, Onsala and MPIfR is partly dependent on this. The work on protocols and the work at ASTRON are also dependent to a lesser extent, but some minor personnel issues further reduced progress.

In such projects a major challenge is always to find the right personnel. This has delayed some of the work at JIVE on the astronomical evaluation of the software correlator. This has resulted in the need to reshuffle of some of the work-packages, in particular delaying the visualization. The correlator design document has been drafted after several meetings between JIVE and PSNC, but the final version has not been issued, as it is still subject to changes. In the meantime good progress has been made to connect the existing workflow software to the rudimentary correlator core, which in turn has been ported successfully to standard computing environments.

Overall, many of the design issues have been addressed successfully and the important technological decisions have been made. Unfortunately the write-up of the integrated project design has not been completed. Besides the slippage mentioned above, this is attributed to the FABRIC project leader's inavailability since December 2006, as Huib van Langevelde was asked to act as interim JIVE director.

1.6.1.1 JRA1 Activity and Status

WP 0 System analysis (JIVE)

The necessary design issues were addressed in the work-packages (below) and satisfactory decisions were made in all cases. After the business meeting in Poznan all interfaces had been established at a high level. But the actual document was delayed further as the FABRIC project leader is effectively not available for the project.

WP 1.1.1 Data acquisition architecture (MRO)

This workpackage was finished in this reporting period. Metsähovi Radio Observatory of Helsinki University of Technology TKK concentrated on refining the requirements and design of high-speed and scalable VLBI data acquisition based as much as possible on commodity off-the-shelf hardware and networking technology. The requirements document was delivered with a tight schedule (planned project month 2) in month 3. The key characteristics of the system include multi-Gbps per VLBI station, maximal utilization of 10 Gbps networking (both locally and across stations and correlators), and flexible mixing and matching of COTS processing and storage nodes in this network.

The work continued to demonstrate the applicability of a COTS Linux computer-based data acquisition architecture with the Metsähovi-developed "PCEVN" acquisition system. In October 2006, Metsähovi, Jodrell Bank, Onsala, and JIVE teamed to show remote Internet disk recording and near-realtime Internet UDP-based "Tsunami" data transfers (see WP 1.2.3. below). Metsähovi played a key role in facilitating the experiment and writing the report.

Since this "Month 7 Demo" had so successfully demonstrated the performance of one UDP-based transfer protocol, Tsunami, over 1 Gbps links, two weeks after the demo Metsähovi decided to try to apply it to streaming 896 Mbps real-time data over a 1 Gbps Ethernet link. This would be valuable for e-VLBI since it would increase the sensitivity by a factor of 1.32 compared to the 512 Mbps speed. Additionally this could be accomplished at virtually no cost. The key in breaking the traditional VLBI "power of two" barriers lies in the COTS architecture of PCEVN and Tsunami software. Before transmitting VLBI data acquired at 1 Gbps, it can be easily software manipulated to omit just a small fraction of data (one or two BBC channels) to fit the stream into a standard 1 Gbps network pipe. No expensive hardware modifications to existing 512/1024 Mbps VLBI samplers are required.

Another important discovery regarding combining multiple UDP transmissions into one network path was made in this 896 Mbps test. It is very common that standard computers sending data over a network link at a rate lower than the nominal rate do send in "microbursts" of packets. If several sending computers like this are connected to a switch or router with limited amount of data packet buffer, the trailing parts of these microbursts are prone to disappear. We received very valuable support on this from the GÉANT2 PERT team and thus we were able to circumvent the problem by using the flexibility offered by the COTS Linux platform: a pair of PCEVN Linux computers was configured in cascade mode using Linux router and packet forwarding features in one two-1GE-port PC.

Additional tests along the lines of the "Month 7 Demo" process were conducted with MPIfR where the special focus was on interfacing the PCEVN process with the standard VLBI flow of data from the observing station to the correlator. These trials "piggybacked" on geodetic VLBI experiments run at Onsala and Metsähovi and used Tsunami to transfer the data to the Bonn correlator with the experimental VIOLA network connections in Germany. Interfacing scripts were developed which

allow both the legacy Mark5A and PCEVN observations at the station, with PCEVN providing the near-real-time Tsunami network transfers and Mark5 the conventional disk-based backup of the data.

WP 1.1.2. Data acquisition prototype (MRO)

During the pilot networking trials described above, which utilized Metsähovi's 10 Gbps connection established in the framework of SA2, the importance of being able to maximally take advantage of 10GE COTS networking technology in the data acquisition design became very clear. Suitable COTS 10GE platforms were identified, and in addition to PCI Express based 10GE network interface boards for general-purpose computers, the low-cost iBOB FPGA board developed by University of California, Berkeley, was deemed to be a very applicable hardware platform for the data acquisition prototype. In meetings at Poznan and Manchester, the data acquisition interoperability requirements were discussed and coordinated with partners from Onsala and Jodrell Bank to ensure that the design can be used in both providing e-MERLIN connections and in distributing the acquired VLBI data to the grid-based prototype software correlator, both of which are major elements of FABRIC. The design document was progressing well, although a little behind the schedule, since substantial material about the e-MERLIN connections had to be integrated with Jodrell Bank.

In early January, Jodrell Bank, Onsala, and Metsähovi established an order for prototype iBOB boards from Berkeley and joined the Xilinx University Program to make the required FPGA development tools available, together with the large FPGA chips of which we received a substantial donation in the XUP, further lowering the cost of prototype boards.

WP 1.1.3. Data acquisition control (MPIfR)

Even though MPIfR only began its activities in FABRIC in March 2007, MPI personnel have participated in FABRIC meetings and e-mail exchanges. The aim was to stay close to the hardware decisions and developments in FABRIC, so that we will have a smooth start in year 2 of EXPReS. Effort has started to identify an appropriate candidate for the FABRIC position.

WP 1.2.1. Broadband protocols & multicast (UniMan)

Suitable internet protocols for high speed data transfer are being investigated in depth at the University of Manchester in conjunction with the ESLEA application project. The complementary nature of these projects implies that the available manpower will be transferred to the EXPReS budget in July 2007, when the focus will shift towards more FABRIC specific activities.

A protocol strategic document (DJ1.2) was delivered in time in May 2006.

Unlike most other users of digital recorders, in e-VLBI the value of a single bit is negligible. The signal collected by the telescopes is broadband Gaussian noise. Useful information is extracted by correlating data from two telescopes to locate and characterise the signal that is common to both, thus limited data, or packet, loss can be tolerated. However, reliable operation is only possible when the correlator can continually process data with identical timestamps, leading to constraints on the data transport and end-host systems. The e-VLBI application has similar requirements to multimedia streaming applications, as the occasional loss of a few data packets is not as detrimental as a departure from timely arrival of the data from each of the telescopes.

Currently, the reliable Transmission Control Protocol (TCP) is used to transport the data in order to operate in a fair manner over shared and potentially congested academic production networks. However, the bursty, congestion-aware behaviour of TCP/IP may not be ideal for the application.

CBR Data

To measure and analyse the effects of moving Constant bit-rate, CBR, data using TCP/IP, an instrumented test program suite, tcpdelay, has been developed. tcpdelay uses a TCP/IP stream to send carefully spaced messages between two hosts in order to measure the delay of individual messages. This tool has been used to test transfer over a variety of distances and study the effects of packet loss. The figure below shows the message arrival times for a variety of packet loss statistics.

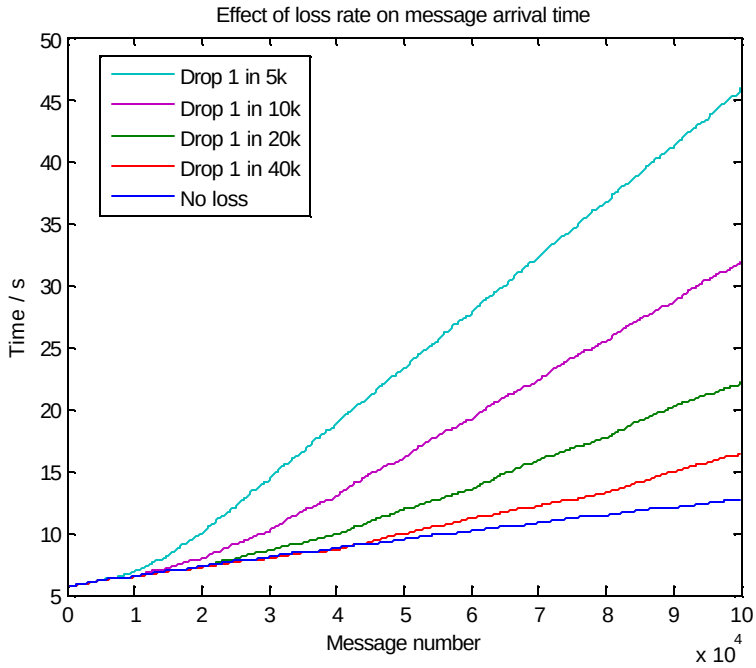


Figure JRA1-1: The effect of loss rate on message arrival times on a CBR 525 Mbps flow over a path from Jodrell Bank to Manchester via Amsterdam with a rtt of ~27 ms. The TCP buffers were set to the delay bandwidth product of 1.8 Mbytes. The lowest curve is without any packet loss and shows the case of timely arrival of the data, and the other curves show the effect of packet loss. The greater the packet loss rate, the more delayed the messages become.

So far our work has indicated that if the sending host can store the incoming CBR data in the TCP buffer during the drop in the TCP Cwnd and there is uncommitted bandwidth on the link above the CBR rate so that TCP can transmit buffered data faster than the CBR rate, then it is possible for the message arrival times to "catch up" with that expected with no loss.

Additionally, test networks have been set up using UKLight lightpaths between Manchester and JIVE, and Manchester and Chicago to test the performance of advanced TCP stacks. Suitable high performance PCs have been installed and work on characterising these links with very long memory to memory TCP flows using iperf has shown unexpected large fluctuations. Tests with UDP packets have also indicated problems with the end systems. It is thought that these effects may be related to scheduling, but this is still under investigation.

VLBI UDP

Building on the experience gained from the VLBI demonstration at the GÉANT2 Launch, investigations are being carried out to determine the performance and stability of multiple 1 Gigabit/s UDP/IP flows across the hybrid European National Research Networks linked by the GÉANT2 infrastructure. The main paths, together with the type of network, packet switches or lightpath involved in the tests were:

- Onsala SE to JIVE NL – packet switched network
- Metsahovi FI to JIVE – packet switched network
- Jodrell Bank UK to JIVE – lightpath from UKLight and the ESLEA project.
- Torun PL to JIVE – lightpath over PIONER then packet switched

Server quality PCs with 1 gigabit Ethernet interfaces were used to send and receive the data streams. In order to test and characterise the network paths between the end hosts, udpmon was used to send

streams of UDP packets at carefully spaced intervals. The data rates, packet loss, packet re-ordering and relative one-way delay are measured at the receiver as a function of packet size and inter-packet interval. To move VLBI data using UDP/IP, a suite of programs called vlbi_udp is in development. This tool can send data from disk, memory, or a VLBI specific interface, in sequentially numbered UDP packets.

The figure below shows the data rates achieved when characterising the lightpath connection from UKLight between Manchester and JIVE. And figure JRA1-3 shows about 45 minutes of extended testing of a single 1 Gbps flow between Jodrell and Manchester. The throughput was 998 Mbps stable to 1 Mbps. There was no packet loss during this period.

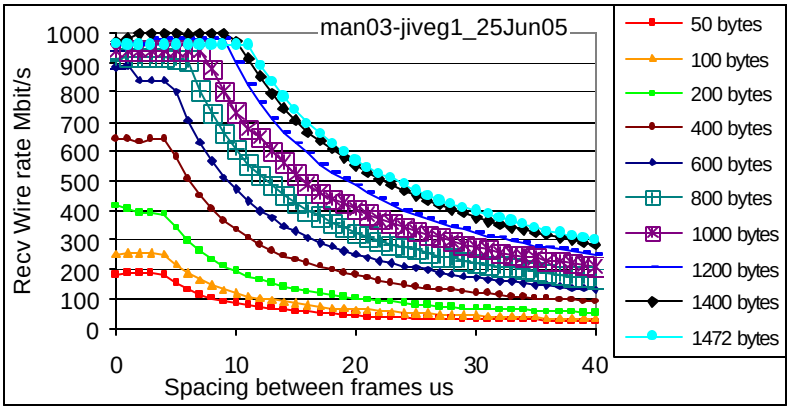


Figure JRA1-2: Tests on the UKLight switched lightpath connection between Manchester and Dwingeloo, showing the UDP achievable throughput as a function of the inter-packet spacing. A dual Xeon 2 GHz machine was used at Manchester and a similar machine in Dwingeloo. The plot shows the results for a number of different packet lengths, the curves for packet sizes of 1472 bytes are the most relevant for VLBI. Maximum size packets can reach full line rates with no loss. The throughput limitation for packets smaller than 600 bytes is due to the time to move the data over the PCI bus in the end host. Packet loss (at the 0.003% level) was only observed for packets of 200 bytes and less with packet spacing closer then 4 µs. Note that there was no packet re-ordering on this link. This behaviour was typical of a well behaved end-to-end path with adequate available bandwidth.

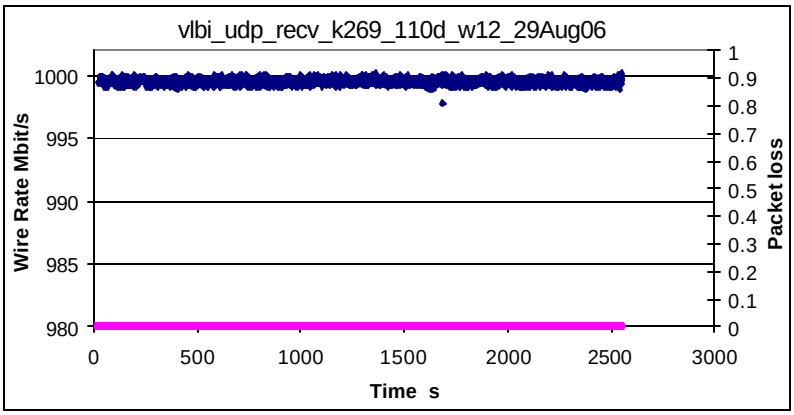


Figure JRA1-3: Testing of a single 1 gigabit flow across the Manchester campus

VSI-E

To send data from the e-MERLIN telescopes via the iBOBs to the Mark5 B systems at the JIVE correlator, the iBOBs will use the VSI-E protocol on the network. Useful discussions have taken place with the VSI-E implementers at Haystack, and we hope to receive an early version of their protocol libraries so that testing can begin in the next month.

DCCP

There have been tests with the current implementations of DCCP with limited success. Data may be transferred for a limited time on 32-bit kernels, but with 64-bit kernels a system crash is almost immediate. It appears there is sensitivity to buffer allocation or memory management within the DCCP stack. Details of these tests have been fed back to the implementers.

We have also had discussions with members of AARNet, Australia's Academic and Research Network, the IRTF, and members of the PFLDnet community about producing a DCCP specification for "SafeUDP". With "SafeUDP" data would be transmitted just like UDP, but possible network congestion would be detected and reported. If the application did not reduce the transmission rate, DCCP would protect the network by dropping the data, i.e. not placing it on the network. It is anticipated that this work could result in a suitable RFC.

Gigabit Network Performance

As part of the investigations for the FABRIC JRA1 of EXPReS, collaboration between DANTE and EXPReS has been established to measure the performance of UDP and TCP flows up to 4 Gbps over the GÉANT2 Core. High performance PCs with 10 Gigabit Ethernet are under test in Manchester. Udpmon was used to characterise the performance of these end systems. Figure JRA1-4 shows the throughput at a maximum of 9.4 Gbps. For packet spacing less than 8 us, almost an entire CPU of the dual core processors was devoted to sending the packets, while the receive process consumed only about 75% of a CPU. It appears that the packets that were lost (~0.005%) were lost in the receiving CPU between the UDP/IP stack and the application, although there should have been sufficient CPU power. This is currently being investigated. These initial tests indicate that these end systems should be suitable for the 4Gigabit tests over the GÉANT2 Core.

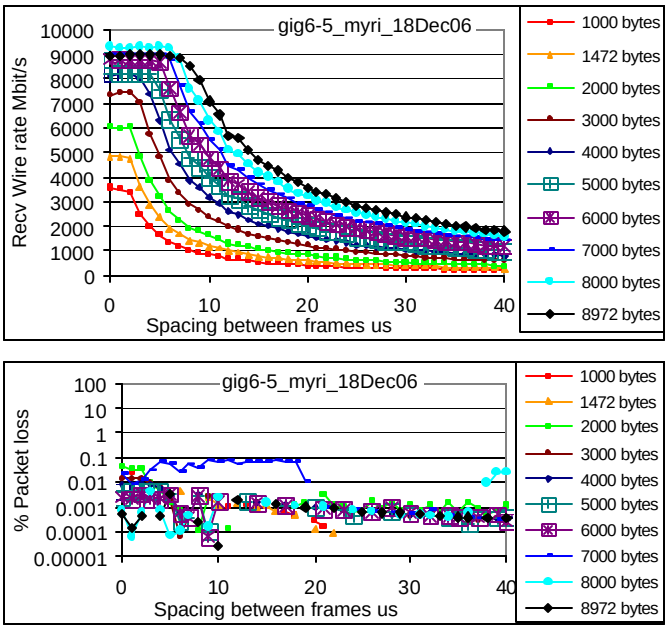


Figure JRA1-4: UDP achievable throughput and the associated packet loss for two systems with Supermicro X7DBE motherboards connected back to back.

WP 1.2.2. Broadband e-MERLIN correlator interface (UniMan)
The primary goal of this workpackage is to enable the e-MERLIN correlator to receive data from 'foreign' telescopes, in particular the Onsala telescope in Sweden. Besides its role in the demonstration of new 4 Gbps VLBI equipment, this has interesting astronomical applications. The interface uses the same iBOB hardware as SA1 (see above, Section 1.5.1 SA1 Production Services) and WP1.1.2, but configured for 4 Gbps input to a single station board. The personality of the iBOB and the VSI chip are therefore different to the ones in these other applications. There has been considerable progress after the hire of Jonathan Hargreaves at JBO.

Discussions with Metsähovi and Onsala have clarified the system design – a wide band ADC and an iBOB at Onsala will be used to transmit data over the internet to JBO. VSI-E will be used, using UDP over 10 GE. The transmitter design is very similar to that needed to send e-MERLIN data out for SA2, and so JBO is designing the transmitter as well as the receiver. A design document has been placed on the wiki <http://www.jive.nl/dokuwiki/doku.php/fabric:wp1_scalable_connectivity> under data acquisition architecture.

Correlator interface: Development Software and Intellectual Property

A range of software is needed to program the Field Programmable Gate Array (FPGA) chips on the eMERLIN correlator Station Board and iBOBs. The iBOBs are supplied with libraries for a range of signal processing and networking modules. These require Matlab/Simulink, Xilinx System Generator, and ISE to generate netlists which can be simulated and compile bit files for the FPGAs. All the above have been installed on a PC under existing JBO licenses. The Xilinx Embedded Systems Development Kit (EDK) is needed to connect to and program the PowerPC processors contained within the iBOB's FPGA. This is now on order from Europractice with delivery expected in early March.

Additional intellectual property is required to implement standard 10/100 Ethernet connections on the FPGA – there is a full version which the iBOB libraries support under Linux, and a cheaper 'lite' version which is currently only supported under Tiny/SH. The EDK will include demonstration versions of both so we should be able to make an informed decision about which to purchase by April.

Correlator interface

Ten iBOBs were ordered in late 2006 and are now in production. We expect to receive them in April 2007. Each iBOB requires a Xilinx Virtex 2P FPGA, of which seven were donated by Xilinx (5 to JBO and 2 via Metsahovi). The remaining three are available from a US distributor for approximately 1,700 EUR each.

The libraries supplied with the iBOB are not fully documented, and it has been useful to read through their underlying VHDL code to determine exactly how they function. Some of the library modules which can be used without modification are:

- Transceiver to transmit and receive UDP data packets on 10Gbps networks (but note that UDP checksums are not done – this will have to be coded at JBO if needed)
- Interface to the 8 bit, 1024Msps analog to digital converter cards
- Interface to the on-board SRAM

New code has been written to perform the following:

- Form RTP frames and pass them in 64 bit wide words to the library transceiver
- Translate incoming data from the station board from differential (LVDS) to single ended (TTL) and re-clock it

Provisional block diagrams showing the overall data flows JB? JIVE and ON? JB have been created, showing what tasks might be done in the iBOBs and station board 'VSI' chip.

WP 1.2.3. Broadband test (OSO)

The major activity over the past year has been the successful PC-EVN test conducted on 20th October 2006 (so called 'Month 7 test', or EXPReS deliverable (D24)). During the summer Onsala procured an operational PC-EVN system consisting of a high end PC and data formatting card from Metsähovi. Local staff assembled and conducted extensive readiness tests with Metsähovi staff. On October 20th Onsala together with Jodrell Bank observed jointly at a wavelength of 6cm, sending their VLBI data by PC-EVN to Metsähovi and JIVE. The test was almost completely successful. Among the firsts demonstrated by this test was 'remote recording' of data at 512 Mbps streamed from Onsala and Jodrell Bank to Metsahovi where it was recorded on computer disk. These data were later (at lower bit rate) transferred to JIVE where fringes were produced. Data was also sent from the two telescopes directly to JIVE at lower bit rate (256 Mbps and 512 Mbps) where near real time fringes were produced. This test showed the versatility and performance of a commercial off the shelf (COTS) e-VLBI technology which can be used for various test purposes within the FABRIC project. This test bed also allows the easier use of non-standard data transmission formats. A report (edited by John Conway, Onsala) was written describing the test and documenting the real time Tsunami protocol used.

The other ongoing work during the first year was discussion and design of the best means of achieving the goal of demonstrating 4Gbps fringes from Onsala into the eMERLIN correlator. During a series of meetings (FABRIC kickoff in March 2006, Jodrell Bank, 'Bits and Bytes' in August 2006, Poznan Poland in September 2006 and a telephone meeting in early January 2007) a plan has been finalised between Onsala, Jodrell Bank, Metsähovi and the FABRIC leader.

WP 1.2.4. Public to dedicated network interface (ASTRON)

In this work-package ASTRON addresses the issues involved in connecting international (E-LOFAR) stations over public networks to the LOFAR proprietary network. In the past year the following topics have been addressed:

Description and initial design of the E-LOFAR data transfer system. For this purpose the E-LOFAR system needs and requirements were inventoried. In addition a COTS active equipment inventory was performed which provided information on the currently available active equipment that can be used within the E-LOFAR links. The results of this activity are described in the deliverable: LOFAR Connection Strategic Document.

In addition, attention was paid to experimental 1GbE and 10GbE tests with commercial available active equipment. These tests were performed in the lab and in the field.

The link that is to be established within this project will consist of a lightpath that is to be provided by a number of NREN's. The negotiations with some relevant NREN's for providing the lightpath are started. These experiment and negotiation activities are ongoing.

WP 2.1.1. Grid – VLBI collaboration (PSNC)

This work-package focuses on the conceptual work for the VLBI application on Grid computing. Work was able to start in April and this work-package is almost completed. The PSNC staff has learned about the VLBI scientific domain, together with e-VLBI aspects, in order to fully understand the complex nature of this problem. Having done that, the work has begun on the conceptual design, as defined in the Technical Annex project timeline. There were two face-to-face meetings between PSNC and JIVE staff, one in Dwingeloo on July 4-6, and the second in Poznan, after the FABRIC meeting, on 26th of September. During those meetings, several design aspects were discussed and a number of problems identified. The most significant problem is related to the Mk5 system data format, incompatible with UNIX file system. This made the direct reading from the telescope data stream by the Grid software impossible to achieve in the straightforward way. A solution/workaround was designed, involving creating additional translating modules, which will convert the Mk5 data to the UNIX and Grid-friendly Mk4 file format in real-time. This additional effort has to be done by the

JIVE staff and will surely affect the overall timeline of this work-package, at this point by to an unknown extent.

For the development of GRID system and e-VLBI data transmissions between different geographically distributed partners, PSNC analyzed network monitoring solutions as well as several approaches towards QoS in order to allow for automatic resource distribution and QoS provisioning. Based on the initial analysis and e-VLBI requirements, PSNC finally proposed European perfSONAR, which may be adopted for GRID resource management and QoS provisioning. The measurement framework will exchange monitoring data with other Grid environment components through a standardised interface. e-VLBI partners could deploy monitoring nodes within their domains to provide necessary measurement data which can then be used by the Grid resource brokers.

All of the design effort resulted in two released deliverables, both according to project schedule:

DJ 1.6 - e-VLBI -- Grid Design Document
DJ1.10 - e-VLBI -- Grid interface document

The first one (DJ. 1.6) describes the conceptual system design, giving the overall view of the proposed system architecture. The second one (DJ 1.10) addresses more specific issues of selected technologies, inter-module communication and interfaces to the external systems.

WP 2.1.2. Grid Workflow management (PSNC)

A prototype version of the Workflow Manager Application was created, in order to present it to the user community and collect feedback about graphical user interface and proposed system logic. In the meantime, PSNC has received the first version of the software correlator. It has been successfully embedded in the local Grid environment and a number of performance tests have been successfully performed, using sample test data as an input. Those tests proved that PSNC has the necessary infrastructure to correlate the experiment data in an efficient manner. The benchmark results will be used by JIVE to further optimize the correlator.

Based on the set-up of the e-VLBI network and initial requirements, PSNC identified the highlights of the monitoring architecture which needed to include the following:

- inter-domain and end-to-end system
- flexible enough to accommodate different types of metrics
- encompass different existing monitoring tools to measure various metrics
- standardise interfaces between various architecture components and provide a defined interface to integrate GRID resource brokers or QoS provisioning systems

PSNC analyzed state-of-the-art network monitoring architectures out of the existing worldwide projects and considered two solutions: E2E Performance Initiative from Internet2 and the European perfSONAR.

End-to-End Performance Initiative (E2E piPEs) is a framework designed for the Internet2 network. Currently a subset of it called piPEs is implemented and used in Internet2 enabling BWCTL and OWAMP measurements. The main objective of the piPEs project is to enable end-users and network operators to determine end-to-end (E2E) performance capabilities and locate E2E problems.

The second architecture considered was perfSONAR (developed within IST GN2 project) which supports end-to-end network monitoring across geographically distributed domains. It is a framework based on distributed services providing a common interface for applications to interact with different monitoring tools and enables the users to obtain and manipulate measurement data. The measurement framework receives requests for monitoring tests or archived data from the data visualisation tool (the monitoring application) or user tools e.g. QoS provisioning systems or resource brokers.

WP 2.1.3 Grid routing (PSNC)
No activity in this period.

WP 2.2.1 Correlator Algorithm design (JIVE)

Work in this area started directly in March 2006 when Ruud Oerlemans was transferred from the Huygens Spacecraft tracking to the FABRIC project. Matching expertise is available from the Dutch SCARIe project, but it proved challenging to fill this position and the remaining FABRIC position. Finally people with the right skills were identified in France and the US. The postdoctoral researchers hired for Grid correlator activities started working in October and December. The parts of this project that they have been hired for are the software cluster correlation and the evaluation of the correlator data product. Some delay for DJ1.13 and DJ1.17 will almost certainly occur. Deliverables further down the timeline will probably suffer from this delay too and there is the possibility that this activity will not be completed in the formal three year window.

Additional complications were associated with the change of directorship at JIVE, causing the FABRIC PI and WP2.2 leader Huib van Langevelde to rotate off the responsibility and causing some delay of WP2.2 in late 2006/early 2007. Meanwhile the issue has been sorted out and the new leadership of Mark Kettenis (JIVE) has energetically addressed the progress of WP2.2.

Several design issues for WP2 have been discussed at two PSNC-JIVE meetings, the first associated with the kick-off meeting in Dwingeloo (March 2006), followed by another one in Dwingeloo (July 2006) and one in Poznan (September 2006). The major outcome was the high level design of the distributed correlation, describing the processes, data flows, involved parties and the relations between them.

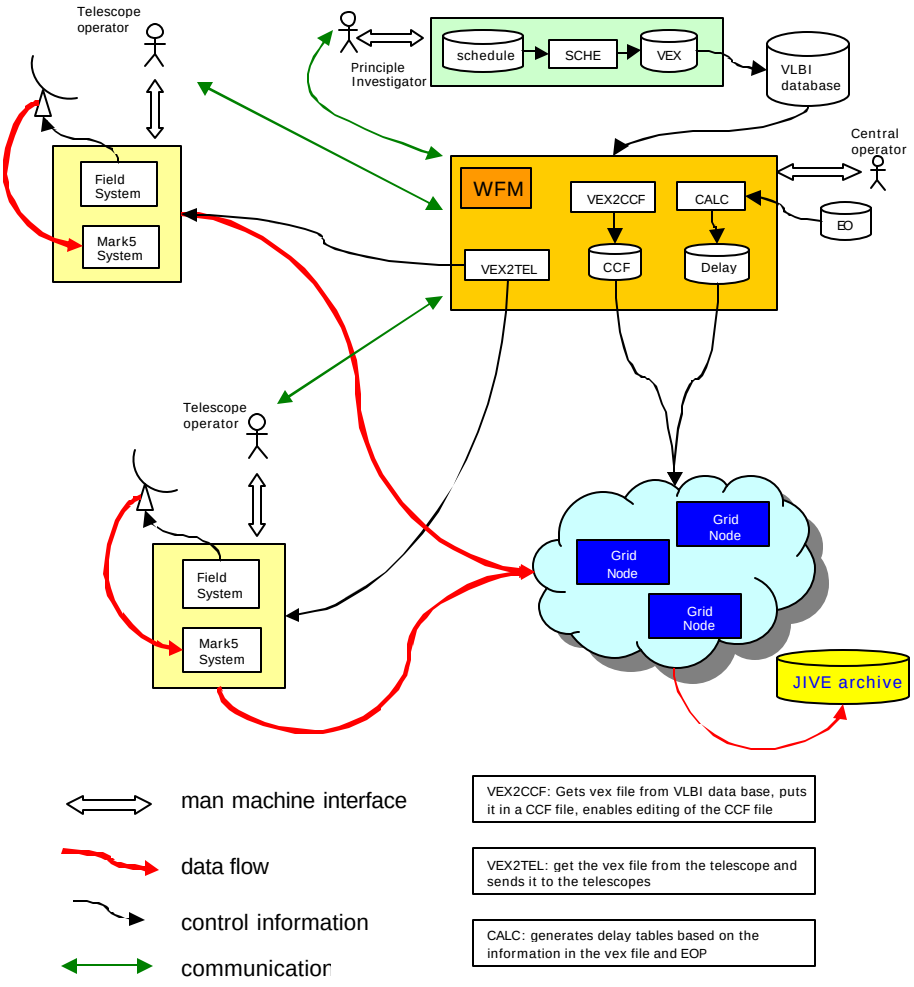


Figure JRA1-5: High level distributed correlator design

During the summer the team profited very much from a visit by Adam Deller (Swinburne University, Australia) linked to the Next Generation Correlator Workshop in Groningen. This led to an exchange of ideas on system architecture and parallelization, which is now being exercised in the SFXC (software FX correlator) code.

Work in WP2.2.1 is largely complete, but the final version of the document is still subject to changes.

WP 2.2.2. Correlator computational core (JIVE)

The more detailed correlator algorithm design is based on experiences with the software correlator from the ESA Huygens project which was used very successfully to track the space-craft during its descent in the Titan atmosphere. This algorithm has some unique features for spacecraft tracking (some of which are useful for astronomical research too) but some modifications had to be made to scale up processing for astronomy needs. Starting from March 2006 work focused on porting the code from a very specialized Mathcad implementation to more generally deployable compiled code. The essential parts of the algorithm have been identified and implemented.

In November 2006 the first version of the multi-process SFXC was delivered to PSNC. The whole correlation job is divided into as many time slices as there are processors available. Benchmarks have been run using this version of the software to determine the scalability of it. On a four processor machine the correlation job ran about 3.5 times faster than on one processor.

Shortly after November 2006 work started on a multi-process SFXC version using continuous data streams rather than files as input. This version should be able to handle live incoming data-flows and should be flexible with respect to the data format. MPI was chosen to communicate data and information between the processes. A working test version is expected to be ready for the May/June 2007 EVN session to monitor the fringes for one of the VLBI fringe test experiments.

In the mean time, SFXC has been run on a small part of an earlier network monitoring observation (N06C2) with the following processing characteristics:

- 4 EVN telescopes were included
- single 8 MHz IF
- 256 frequency channels
- integration time of 0.2 seconds
- total of 15 time slices of data (of 0.2 s each) were processed

This produced the first fringes on astronomical VLBI data in February 2007, shown in the figure below. A first evaluation of these results shows agreement with results obtained from the existing hardware-based EVN data processor at JIVE.

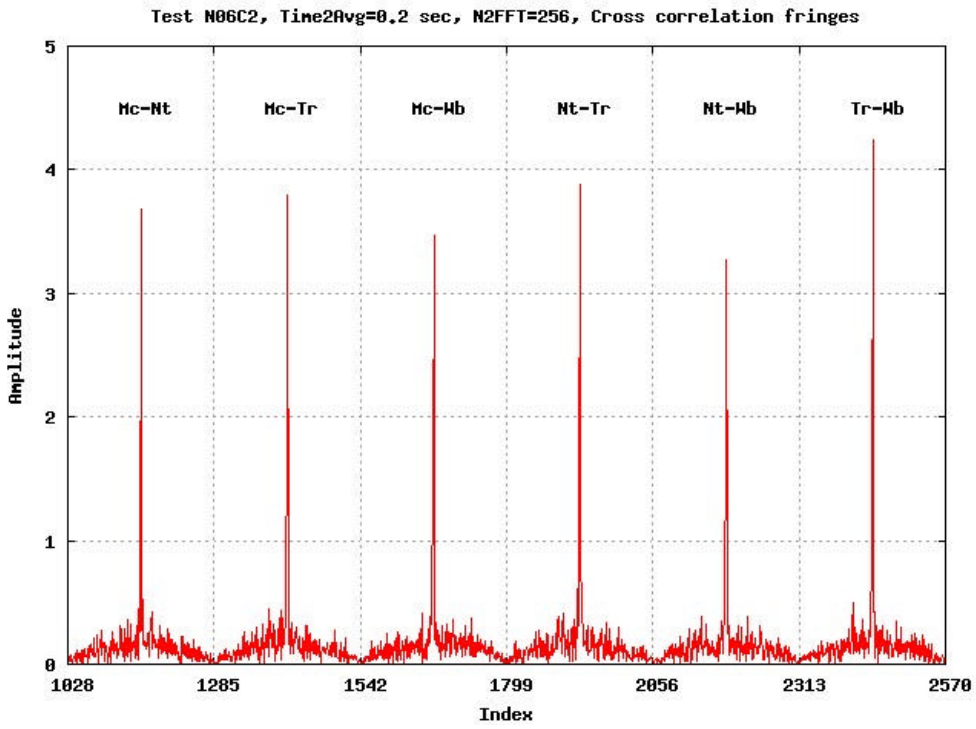


Figure JRA1-6: Detections (a.k.a. fringes) for all 6 processed baselines. The fact that the fringes are centred on the central lag shows the delay model and clock offsets are being applied correctly by SFXC.

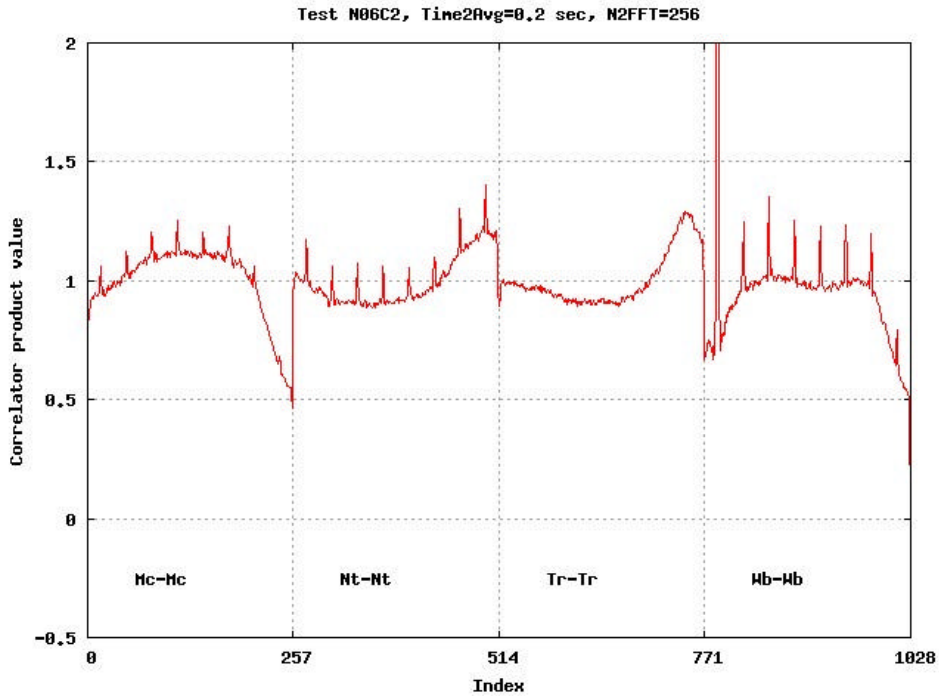


Figure JRA1-7: The right figures display the self spectra of the 4 antenna, showing convincingly the tones inserted with 1 MHz spacing for calibration purpose.

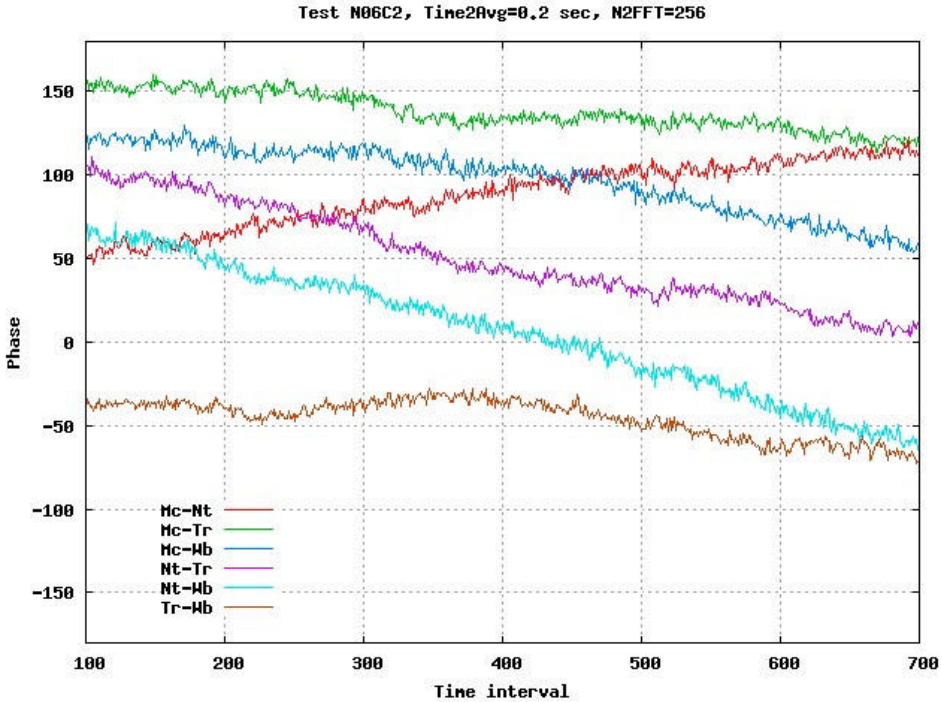


Figure JRA1-8: The phase response on all baselines as a function of time. The relatively flat phase response is the most important indication that the correlator is properly functioning and compensating all the terms in the VLBI system.

WP 2.2.3. Scaled up version for clusters (JIVE)
Initial work on this has started and is reported in the previous section.

WP 2.2.5. Interactive visualization (JIVE)
The position associated with this work package was only filled in month 9. It was then decided that focus should be on WP 2.2.6 first.

WP 2.2.6. Output definition (JIVE)
Work started in December 2006, when Yurii Pidopryhora joined the team. The initial work focuses on converting the output of the software correlator to the same format as the operational EVN correlator. This entails a conversion into the aips++ MS format and a careful analysis of the information content.

WP 2.2.7. Output merge (JIVE)
No activity in this period.

Tests and science demo
JIVE staff was heavily involved in the PC-EVN test conducted on 20th October 2006 (so called 'Month 7 test', WP1.2.3.). Tools to transfer data from Mk5 units were tested and the data was converted to the hardware correlator to successfully produce detections. Figures showing the positive outcome of the test were provided for the final report of the demo.

1.6.1.2 JRA1 Participating Institutions[12]

P #	Short Name	Funded Amount (Euros)	
		3 year total	Months 1-18
1	JIVE	474,000	127,500
4	PSNC	158,000	42,500
6	ASTRON	77,000	42,500
11	MPIfR	79,000	
12	TKK	188,000	51,000
15	OSO	89,000	17,000
18	UNIMAN	188,000	51,000

1.6.1.3 JRA1 Deliverables and Milestones Tables

Note that the original Description of Work (DOW) contained inconsistencies in the deliverables tables. The two instances of deliverables were in the beginning of the DOW (the large list with deliverables from all activities) and the smaller list inside of the NA2 section. The differences will be corrected in the 18 month report section of the report.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D2	J1.1	Data acquisition requirements document	MRO	2	3	
D3	J1.2	Protocols strategic document	JBO	2	2	
D8	J1.3	Visualization software	JIVE	4	–>	
D9	J1.4	Correlator design specification	JIVE	5		
D22	J1.5	Overall design document	ALL	6		
D23	J1.6	e-VLBI-Grid design document	PSNC	6	9	

[12] Participation is based on those institutions who have received funding for the activity. The amount listed under "Months 1-18" is the 85% distribution value. The Participating Institution Table assumes the following abbreviations:
P # - Participant Number

D24	J1.7	e-VLBI fringes PC-EVN	OSO	7	7	
D25	J1.8	LOFAR connection strategic document	ASTRON	7	11	
D26	J1.9	Data acquisition design document	MRO	8	11	
D30	J1.10	e-VLBI-Grid interface document	PSNC	10		
D41	J1.11	Protocols performance report	JBO	13		
D42	J1.12	Software correlator core	JIVE	14	6	
D43	J1.13	Software data product	JIVE	15		
D66	J1.14	Data acquisition interface document	MPI	18		
D67	J1.15	LOFAR station interface report	ASTRON	18		
D68	J1.16	Software for workflow management	PSNC	18		
D75	J1.17	Software for correlation on cluster	JIVE	23		
D76	J1.18	Data acquisition test report	MPI	23		
D77	J1.19	Data acquisition prototype at telescope	OSO	23		
D78	J1.20	Overall broadband demonstration	JIVE	23		
D79	J1.21	Software cluster correlation	JIVE	23		
D80	J1.22	First fringes software correlator	JIVE	23		
D87	J1.23	Software to collect distributed output	JIVE	24		
D92	J1.24	Software to create data product from distributed correlation	JIVE	27		
D93	J1.25	Software routing	PSNC	29		
D105	J1.26	eMERLIN interface available	JBO	30		
D106	J1.27	Fringes with new routing	JIVE	31		
D108	J1.28	Software distributed correlation	JIVE	33		
D109	J1.29	First fringes Grid correlator	JIVE	34		
D110	J1.30	First fringes on FABRIC	JIVE	35		
D118	J1.31	Final report	JIVE	36		

During the first 12 month period, there are two specific deliverables that have not been completed. The deliverables are DJ1.3 and DJ1.4, described below.

DJ1.3 Visualization software

This milestone has to be moved until DJ1.13 is complete.

Progress on visualization software has been made within SA1, since there was much more urgency for visualisation there. We plan to reuse parts of the code developed in that effort. This can be more efficiently done towards the end of both projects.

DJ1.4 Correlator design specification

A first draft of the design document is there, but has not been made public yet, because some final details have not yet been decided upon. This is directly connected to the personnel issues identified above. With all these issues resolved, the document can be finalized in the next two months.

1.6.1.4 JRA1 Human Resource Overview

Position Title	Position Location (Short Name)	Position Description	Start Month
Ruud Oerlmaans	JIVE	Software developer, SFXC core development	1
Yurii Pidopryhora	JIVE	Postdoctoral Researcher (Astronomy), Data Quality	10
Charles Yun	JIVE	Project Manager, JIVE/EXPReS; EXPReS project management/Interim FABRIC PI	6
Marcin Okon	PSNC	IT System Analyst (0.5 FTE)	2
Dominik Stoklosa	PSNC	IT System Analyst (0.5 FTE)	2
Dr Jonathan Hargreaves	UniMan	digital engineer	10
Wagner, Jan Florian	Metsahovi	Researcher (PCEVN VSIB driver, Tsunami, Cell processor)	1

Molera Calvés, Guifré	Metsahovi	Researcher (networking, protocols)	2
Ritakari, Jouko Juhani	Metsahovi	Researcher (PCEVN VSIB, iBOB FPGA, networking architecture)	1
Mujunen, Ari Petteri	Metsahovi	Laboratory manager, Board Chairman	1

In addition to staff supported through EXPReS, additional personnel from different institutions participate at varying levels and are not funded by the project.

Name	Position Location (Short Name)	Position Description
Prof Phil Diamond	UniMan	director, signing authority
Dr Simon Garrington	UniMan	Project Scientist
Dr Ralph Spencer	UniMan	Project Manager
Dr Bryan Anderson	UniMan	digital design
Dr Richard Hughes-Jones	UniMan	network scientist
Dr Matt Strong	UniMan	VLBI post-doctoral research assistant left Jan 2007
Paul Burgess	UniMan	VLBI engineer
Stephen Kershaw	UniMan	protocol research assistant
Althea Wilkinson	UniMan	administration assistant
Mark Kettenis	JIVE	Scientific software engineer, WP 2.2 leader
Nico Kruithof	JIVE	Postdoctoral Researcher (Computer Science); SFXC grid development
Huib Jan van Langevelde	JIVE	Head of Software Development/Interim Director; PI of FABRIC/EXPReS coordinator
Sergei Pogrebenko	JIVE	Development engineer; Algorithm development
Alan Roy	MPIfR	Support scientist in VLBI technical department
Walter Alef	MPIfR	Department manager VLBI technique
David Graham	MPIfR	Staff scientist
Bartosz Belter	PSNC	Researcher Networking Technology
Artur Binczewski Marcin Garstka	PSNC PSNC	Senior Scientist, Networking Technology Researcher Networking Technology
Damian Kaliszan	PSNC	Researcher Grid Technology
Marcin Lawenda	PSNC	Specialist in IT Technology
Norbert Meyer	PSNC	Ph.D. Distributed Computing
Tomasz Rajtar	PSNC	Researcher Grid Technology
Szymon Trocha	PSNC	Researcher Networking Technology
Jan Weglarz	PSNC	Resource Management
John Conway	Onsala	University Lecturer
Michael Lindquist	Onsala	Research Engineer
Michael Olberg	Onsala	Research Engineer
Miroslav Pantaleev	Onsala	Head of Laboratory

1.6.1.5 JRA1 Meetings and Workshops

Date Location	Meeting Title / Subject / Website Address	Number of Attendees
2006 Oct 31 Zaandam, Netherlands	EXPReS Kickoff Meeting Project Business http://www.jive.nl/dokuwiki/doku.php/expres:kickoff	29

2006 Sep 27 Poznan, Poland	FABRIC: Business Meeting Project Business http://www.jive.nl/dokuwiki/doku.php/fabric:poznan	10
2006 Mar 22 Dwingeloo, Netherlands	FABRIC Kickoff Meeting Project Kickoff http://www.jive.nl/dokuwiki/doku.php/fabric:kick_off	18

In addition to the meetings directly supported by EXPReS, University of Manchester arranged several e-VLBI Bits and Bytes meetings in 2006, funded by the ESLEA project and attended by a variety of EXPReS partners. To supplement the more formal meetings, regular (monthly) internal EXPReS meetings are also held at JBO.

1.6.1.6 JRA1 Participation in External Events

Date (month)	Event Description / Location
2006 Apr 4	R. Hughes-Jones, l Bandwidth Challenges or How fast can we really drive a Network?; UKERNA Networkshop 34, The University of Hertfordshire
2006 May 4	R. Hughes-Jones, VLBI Data Transfer Tests: Recent and Current Work; presentation at an international e-VLBI meeting organised by ESLEA project, University College London
2006 May 4	R.E. Spencer, EXPReS/FABRIC at Jodrell Bank Observatory; presentation at an international e-VLBI meeting organised by ESLEA project, University College London
2006 May 4	S. Casey, VLBI_UDP, e-VLBI meeting organised by ESLEA project, University College London
2006 May 10	SCARIe kickoff Amsterdam, The Netherlands
2006 May	M. Strong, R. Spencer, R. Hughes-Jones, S.Casey, EXPReS/FABRIC Strategic Document: Protocol Investigation for eVLBI Data Transfer; Document FABRIC-1.2.1.001v1 for EU Project Number 026642 (DJ1.2)
2006 May	Marcin Okon, "High bandwidth demands in eInfrastructure supported by Virtual Laboratory" Current trends and increasing demands for high bandwidth networks, on example of EXPReS and FABRIC. ENGINE Workshop, Prague, Czech Republic
2006 May 19	Finnish Annual Astronomical Days ("Tähtitieteilijäpäivät"), Helsinki University http://www.astro.helsinki.fi/tt-seura/ttpaivat_06_ohjelma.html
2006 Jun 27-29	Next Generation Correlator workshop Groningen, The Netherlands http://www.radionet-eu.org/rnwiki/NextGenerationCorrelator
2006 Jun	R. Hughes-Jones, Network Performance for ATLAS Real-Time Remote Computing Farm Study Alberta; CERN Cracow, Manchester, NBI, ATLAS Poster, Manchester Grants Visit
2006 Jun 28	National Research Initiative on Computing brainstorming session Utrecht, The Netherlands
2006 Jun 7	R. Hughes-Jones, Essential Components in Moving Physics Data at Gigabit Speeds for e-Science; ESLEA Poster, Manchester Grants Visit
2006 Aug 31	R. Hughes-Jones, VLBI_UDP: Throughput Performance and Stability; presentation at an international e-VLBI meeting organized by ESLEA project, Jodrell Bank Observatory
2006 Aug 31	ESLEA VLBI Bits and Bytes Meeting, , Schuster Laboratory, University of Manchester, UK Practical e-VLBI developments (status update, protocol tests) http://www.eslea.uklight.ac.uk/documents.php

2006 Aug 31	S. Kershaw, TCPDelay; presentation at an international e-VLBI meeting organised by ESLEA project, Jodrell Bank Observatory
2006 Aug 31	A. Bittau, DCCP and Gigabit Hand Shakes, presentation at international e-VLBI meeting organized by ESLEA project, Jodrell Bank Observatory
2006 Sep 1	R. Hughes-Jones, Multi-Gigabit Trials on GÉANT : Collaboration with Dante; presentation at ESLEA-FABRIC Technical Meeting , Jodrell Bank Observatory
2006 Sep 12	XXXVI Young European Radio Astronomers' Conference (YERAC 2006), Conference Centre "De Bron", Dalfsen, the Netherlands http://www.astron.nl/wsrt/Yerac2006/
2006 Sep 12	R. Hughes-Jones, Agenda Network Measurements Working Group; presentation at OGF Network Measurements Working Group, Washington, USA
2006 Sep 12	R. Hughes-Jones, Summary of the Version 2 Schemata; presentation at OGF Network Measurements Working Group, Washington, USA
2006 Sep 12	R. Hughes-Jones, A History of the NMWG Characteristics and Schemata; presentation at OGF Network Measurements Working Group, Washington, USA
2006 Sep 17	S. Casey, The development of VLBI_UDP and the effect of packet loss; presentation at 5th Annual e-VLBI Workshop, Haystack Observatory, USA
2006 Sep 17	5th International e-VLBI Workshop at MIT Haystack Observatory, Westford, Massachusetts, USA FABRIC coordination meeting (current status, division of tasks) http://www.haystack.edu/geo/vlbi_td/meeting.html
2006 Sep 17	R. Hughes-Jones, The Network Transport Layer and the Application or TCP/IP and VLBI Data; presentation at 5th Annual e-VLBI Workshop, Haystack Observatory, USA
2006 Sep 17	R. Hughes-Jones, TCP/IP on High Bandwidth Long Distance Paths or So TCP works... but still the users ask: Where is my throughput?; presentation at 5th Annual e-VLBI Workshop, Haystack Observatory, USA
2006 Sep 26-28	8th EVN Symposium 2006 Torun, Poland http://www.astro.uni.torun.pl/evn2006/
2006 Sep 29	EVN Users meeting Torun, Poland
2006 Oct 11	R. Hughes-Jones, Update on Remote Real-Time Computing Farms For ATLAS TDAQ; presentation at T2UK Meeting, Royal Holloway
2006 Oct 12	SIREN 2006 Utrecht, The Netherlands http://www.informaticaplatform.nl/?m=194
2006 Oct 31	R. Hughes-Jones, FABRIC 4 Gigabit Work & VLBI-UDP Performance and Stability; presentation at EVN-NREN Meeting, Zaandan, Netherlands
2006 Nov 2	GiGaPort seminar for astronomers Utrecht, The Netherlands
2006 December	Damian Kaliszan, "Mobile aspects in remote instrumentation" Location-independent access to very rare and expensive equipment, in the context of next generation broadband networks and grid infrastructure based on the specific implementation analyzed in RINGrid & EXPReS projects. <http://www.beliefproject.org/events/IndiaConference/Session_B4/> Infrastructures 2006 conference, New Delhi, India
2006 Dec 7	ESLEA VLBI Bits and Bytes Meeting, Schuster Laboratory, University of Manchester, UK Practical e-VLBI developments (status update, protocol tests, iBOB FPGA overall plans) http://www.eslea.uklight.ac.uk/documents.php

2006 Dec 7	S. Kershaw, TCPDelay; presentation at an international e-VLBI meeting organised by ESLEA project, The University of Manchester
2006 Dec 7	R. Hughes-Jones, VLBI_UDP Multiple Flow Tests; presentation at an international e-VLBI meeting organised by ESLEA project, The University of Manchester
2006 Dec 8	A. Bittau, Congestion Control without Reliability, presentation at international e-VLBI meeting organised by ESLEA project, The University of Manchester
2006 Dec 8	A. Bittau, Local vs Network Congestion, presentation at international e-VLBI meeting organised by ESLEA project, The University of Manchester
2006 Dec 8	R. Hughes-Jones, DCCP and DCCPmon; presentation at an international e-VLBI meeting organised by ESLEA project, The University of Manchester
2006 December	Marcin Okon, "Virtual Laboratory as a Remote and Interactive Access to the Scientific Instrumentation Embedded in Grid Environment" The description of Virtual Laboratory at PSNC. Lessons learned, current architecture and latest developments, on example of FABRIC. <http://www.escience-meeting.org/eScience2006> eScience 2006 conference, Amsterdam, The Netherlands
2007 Jan	R. Hughes-Jones , EXPReS/FABRIC: eMERLIN IO View from the Network; Richard Hughes-Jones, EXPReS Technical Note
2007 Jan 29	R. Hughes-Jones, A Review of the NMWG Characteristics Document; OGF Network Measurements Working Group, Chapel Hill

2. LIST OF DELIVERABLES FROM THE DOW

As noted previously, the List of Deliverables has some inconsistencies. There are two sources of deliverable information: the table as listed on page 22 of the DOW and the deliverables described in each activity's section of the report. The inconsistencies are generally minor. The following table combines all deliverables as presented in the DOW; a corrected list with the new deliverables is presented in the 18 Month Plan.

D#	A	Deliverable	Contractor	Plan	Actual	Nature	Dissem. Level
D1	NA4	Creation of Public EXPReS web-site	JIVE	2	1	O	PU
D2	JRA1	Data acquisition requirements document	MRO	2	3	R	PU
D3	JRA1	Protocols strategic document	JBO	2	2	R	PU
D4	NA2	EVN-NREN meeting No. 1 (under auspices of EXPReS)	DANTE	3	6	R	PP
D5	SA1	Central data link control	JIVE	3	7	D	PU
D6	NA3	First meeting of eVSAG under auspices of EXPReS	OSO	4	9	R	PP
D7	NA4	Creation of EXPReS web-based management tools	JIVE	4	4	O	PP
D8	JRA1	Visualization software	JIVE	4	-->	P	PU
D9	JRA1	Correlator design specification	JIVE	5		R	PU
D10	NA4	Generation of PR material (phase 1)		6	x	O	PU
D11	SA1	Job preparation utilities	JIVE	6		D	PU
D12	SA1	Fast/adaptive scheduling tools	JIVE	6		D	PU
D13	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant CNIG-IGN	CNIG-IGN	6	9	R	PU
D14	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant MPIfR	MPIfR	6	9	R	PU
D15	SA2	Equipment of the last-mile infrastructure for participant INAF (telescope in Medicina)	INAF	6	9	O	PU
D16	SA2	Feasibility study of the last-mile connections to the nearest GÉANT node for participant CAS (Shanghai, Urumqi, Miyun, Yunnan)	CAS	6	9	R	PU
D17	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant VIRAC	VIRAC	6	9	R	PU

D#	A	Deliverable	Contractor	Plan	Actual	Nature	Dissem. Level
D18	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant HRAO	HRAO	6	9	R	PU
D19	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant NAIC (Arecibo)	NAIC	6	9	R	PU
D20	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant TIGO	TIGO	6	9	R	PU
D21	SA2	Feasibility study of the last-mile connection to AARNET for participant CSIRO	AARNET	6	9	R	PU
D22	JRA1	Overall design document	ALL	6		R	PU
D23	JRA1	e-VLBI-Grid design document	PSNC	6	9	R	PU
D24	JRA1	e-VLBI frin ges PC-EVN	OSO	7	7	D	PU
D25	JRA1	LOFAR connection strategic document	ASTRON	7	11	R	PU
D26	JRA1	Data acquisition design document	MRO	8	11	R	PU
D27	SA1	eMERLIN VSI interfaces design	UniMan	9		P	PU
D28	SA1	Selective data processor controls	JIVE	9	9	D	PU
D29	SA2	e-VLBI test observations, Medicina	INAF	10	3	R	PU
D30	JRA1	e-VLBI-Grid interface document	OSNC	10	10	R	PU
D31	NA2	NA2 annual report No. 2 (as part of EXPReS Ann. Rep No. 2)	JIVE	24			
D32	NA1	Annual report (incl. Financial information) to EC	JIVE	12	13	R	PP
D33	NA2	NA2 annual report No. 1 (as part of EXPReS Ann. Rep No. 1)	JIVE	12	12	R	PP
D34	NA4	e-VLBI Demonstration and attendance at Network events.	JIVE	12	12	O	PU
D35	SA1	Network protocol decision	JIVE	12		D	PU
D36	SA1	Monitored information handling modules	JIVE	12	-->	D	PU
D37	SA2	Equipment of the last-mile infrastructure for participant MRO	MRO	12	5	O	PU
D38	SA2	Construction and equipment of the last-mile infrastructure for participant CNIG-IGN	CNIG-IGN	12		O	PU
D39	SA2	Construction and equipment of the last-mile infrastructure for participant MPIfR	MPIfR	12		O	PU
D40	SA1	Monitoring processes	JIVE	12	7	D	PU
D41	JRA1	Protocols performance report	JBO	13		R	PU
D42	JRA1	Software correlator core	JIVE	14	6	P	PU

D#	A	Deliverable	Contractor	Plan	Actual	Nature	Dissem. Level
D43	JRA1	Software data product	JIVE	15		P	PU
D44	SA1	Real-time data processor control software	JIVE	15	4	P	PU
D45	SA1	Tests using local Jodrell Bank home e-MERLIN telescope	UniMan	15	-->	D	PU
D46	NA3	eVSAG meeting No. 2	OSO	16		R	PP
D47	SA1	Real-time Pipeline	JIVE	16	9	D	PU
D48	NA2	EVN-NREN meeting No. 2	JIVE	18		R	PP
D49	NA4	Generation of new PR material (phase 2)	DANTE	18		O	PU
D50	SA1	Visibility monitor	JIVE	18	4	D	PU
D51	SA1	Tested software for operational improvements	JIVE	18		D	PU
D52	SA1	Test using remote e-MERLIN telescope	UniMan	18	-->	D	PU
D53	SA1	VSI support software	JIVE	18		D	PU
D54	SA1	VSI Interfaces	JIVE	12		D	PU
D55	SA2	10 Gbps link upgrade between MERLIN and JIVE	MERLIN, JIVE	18		O	PU
D56	SA2	e-VLBI test observations, Metsahovi	MRO	18	13	R	PU
D57	SA2	Construction and equipment of the last-mile infrastructure for participant Shanghai	CAS	18		O	PU
D58	SA2	Construction and equipment of the last-mile infrastructure in AARNET to allow connection of participant CSIRO	AARNET, CSIRO	18		O	PU
D59	SA2	Construction and equipment of the last-mile infrastructure for participant Urumqi	CAS	18		O	PU
D60	SA2	Construction and equipment of the last-mile infrastructure for participant Miyun	CAS	18		O	PU
D61	SA2	Construction and equipment of the last-mile infrastructure for participant Kunming	CAS	18		O	PU
D62	SA2	Construction and equipment of the last-mile infrastructure for participant VIRAC	VIRAC	18		O	PU
D63	SA2	Equipment of the last-mile infrastructure for participant NAIC	NAIC	18		O	PU
D64	SA2	Construction and equipment of the last-mile infrastructure for participant TIGO	TIGO	18		O	PU
D65	SA2	AARNET connectivity enhancements	AARNET	18		O	PU
D66	JRA1	Data acquisition interface document	MPI	18		R	PU
D67	JRA1	LOFAR station interface report	ASTRON	18		R	PU

D#	A	Deliverable	Contractor	Plan	Actual	Nature	Dissem. Level
D68	JRA1	Software for workflow management	PSNC	18		P	PU
D69	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant INAF (Sardinia)	INAF	20		R	PU
D70	SA2	10 Gbps link between UniMan and OSO for ultra-VLBI tests	UniMan, OSO	20		O	PU
D71	SA1	Flexible local GE network	JIVE	21		D	PU
D72	SA2	e-VLBI test observations, Effelsberg	MPIfR	21		R	PU
D73	SA2	e-VLBI test observations, Metsahovi / CSIRO	CSIRO, MRO	22		R	PU
D74	SA2	e-VLBI test observations, Yebes	OAN	22		R	PU
D75	JRA1	Software for correlation on cluster	JIVE	23		P	PU
D76	JRA1	Data acquisition test report	MPI	23		R	PU
D77	JRA1	Data acquisitio n prototype at telescope	OSO	23		P	PU
D78	JRA1	Overall broadband demonstration	JIVE	23		D	PU
D79	JRA1	Software cluster correlation	JIVE	23		P	PU
D80	JRA1	First fringes software correlator	JIVE	23		D	PU
D81	NA1	Annual report (incl. Financial information) to EC	JIVE	24		R	PP
D82	NA2	NA2 annual report No. 2 (as part of EXPReS Ann. Rep No. 2)	JIVE	24		R	PP
D83	NA4	e-VLBI Demonstration and attendance at Network events.		24		O	PU
D84	SA1	Network monitoring tools	JIVE	24		D	PU
D85	SA1	Multiple e-MERLIN telescope tests	UniMan	24		D	PU
D86	SA2	Construction and equipment of the last-mile infrastructure for participant HartRAO	HRAO	24		O	PU
D87	JRA1	Software to collect distributed output	JIVE	24		P	PU
D88	NA2	EVN-NREN meeting No. 3	DANTE	26		R	PP
D89	NA2	EVN-NREN representatives present EXPReS networking results at the e-VLBI Science & Technology Workshop	DANTE	26		R	PU
D90	NA2	EVN-NREN meeting	DANTE				
D91	NA3	eVSAG meeting No. 3	OSO	26		R	PP

D#	A	Deliverable	Contractor	Plan	Actual	Nature	Dissem. Level
D92	JRA1	Software to create data product from distributed correlation	JIVE	27		P	PU
D93	JRA1	Software routing	PSNC	29		P	PU
D94	NA3	e-VLBI Workshop held in Onsala		30		O	PU
D95	SA1	Improved network applications	JIVE	30		D	PU
D96	SA1	Monitoring user interfaces	JIVE	30	7	D	PU
D97	SA2	e-VLBI test observations, Urunqi	CAS	30		R	PU
D98	SA2	e-VLBI test observations, Mijun	CAS	30		R	PU
D99	SA2	e-VLBI test observations, Kunming	CAS	30		R	PU
D100	SA2	e-VLBI test observations, VIRAC	VIRAC	30		R	PU
D101	SA2	e-VLBI test observations, HRAO	HRAO	30		R	PU
D102	SA2	e-VLBI test observations, NAIC, Arecibo	NAIC	30		R	PU
D103	SA2	e-VLBI test observations, TIGO	TIGO	30		R	PU
D104	SA2	Construction and equipment of the last-mile infrastructure for participant INAF (Sardinia)	INAF	30		O	PU
D105	JRA1	eMERLIN interface available	JBO	30		P	PU
D106	JRA1	Fringes with new routing	JIVE	31		D	PU
D107	NA3	Publication of e-VLBI Workshop proceedings	OSO	32		R	PU
D108	JRA1	Software distributed correlation	JIVE	33		P	PU
D109	JRA1	First fringes Grid correlator	JIVE	34		D	PU
D110	JRA1	First fringes on FABRIC	JIVE	35		D	PU
D111	NA1	Annual report (incl. Financial information) to EC	JIVE	36		R	PP
D112	NA1	Final Report to Board and EC	JIVE	36		R	PP
D113	NA1	Final Plan for using and disseminating knowledge	JIVE	36		R	PP
D114	NA1	Implementation of the Gender Action Plan	JIVE	36		R	PP
D115	NA1	Raising public participation and awareness	JIVE	36		R	PU

D#	A	Deliverable	Contractor	Plan	Actual	Nature	Dissem. Level
D116	NA2	NA2 annual & Final reports	JIVE	36		R	PP
D117	NA4	e-VLBI Demonstration and attendance at network events.	JIVE	36		O	PU
D118	JRA1	Final report	JIVE	36		R	PU

Table Headers:
D# = Deliverable Number
A = Activity
Deliverable = Deliverable Name
Contractor = Delivered by Contractor(s)
Plan = Planned Delivery Month
Actual = Achieved Delivery Month
Nature = Type of deliverable (see below)
Dissem. Level = Dissemination Level (see below)

Nature
R = Report
P = Prototype
D = Demonstrator
O = Other

Dissemination Level
PU = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

3. USE AND DISSEMINATION OF KNOWLEDGE

3.1 Activity Updates

3.1.1 NA Update (Combined)

The use and dissemination of knowledge is fundamental to the ongoing success and impact of EXPReS. The NA sections have a particular responsibility as their primary focus is ensuring the wider use of EXPReS. In support of this, the NA's have organized a comprehensive set of avenues through which information about the project is shared.

The widest reaching tool used is the internet. EXPReS has set up a general project web site at <http://www.expres-eu.org/> to describe the project and highlight activities. In addition, more specific information is available from the project wiki at <http://www.jive.nl/dokuwiki/doku.php/expres:expres>. The wiki allows project participants to add and change information about the project's progress dynamically. Most of the wiki is freely viewable by the public (drafts and documents with sensitive information such as IP addresses are not publicly available). Only registered users are allowed to edit pages.

NA2 and NA3 have as their primary deliverables meetings which are designed to exchange information within the community. The EVN-NREN and eVSAG meetings have been held and will continue through the project's duration. Additionally, NA members participate in external meetings where they talk about and describe EXPReS. As the project matures, the talks should also change in tone from introductory overviews to more detailed descriptions of the project in progress.

Within the context of the NA's, conducting science is not a primary goal and thus do not generally participate in professional publication. However, NA4 is specifically tasked with publishing brochures and physical materials for the project as a whole. The first EXPReS brochure was published early in 2007 and copies were distributed to all partners for further dissemination at meetings and to the astronomy and network communities. Supporting materials are planned for the upcoming year.

EXPReS is spreading information and experience as the members are participating in various other astronomy bodies, most notably those of the EVN. Key EXPReS personnel have functions in the EVN PC, TOG and its board. Close links exists with other EC funded projects like RadioNet and SKADS, as well as MC training programs like ANGLES and ESTRELA. There is also participation in network centric projects such as ESLEA and RINGRID.

3.1.2 SA1 Update

SA1 has presented EXPReS and e-VLBI at a large number of conferences and workshops over the past 12 months. The success of this outreach is reflected in the fact that no fewer than 12 e-VLBI observing proposals were accepted during the first year of EXPReS. In this first year two papers (Tudose et al and Rushton et al) were accepted for publication, as highlighted in other sections of the report.

The ability to support e-VLBI science operations provides the most effective method to increase the awareness of the new capabilities and scientific opportunities that are being offered. Higher data rates, expanded operational modes and additional telescopes will increase the scientific potential of e-VLBI. Cooperation between NA3 and NA4 activities will be used to broaden communication of these new capacities to the astronomical community.

3.1.3 SA2 Update

SA2 has focused on coordinating and exchanging information between EXPReS partners as they prepare network provisioning for their sites. EC support for the SA2 Feasibility Study was crucial not only in initiating the pursuit of connectivity but encouraging partners to aggressively pursue a variety of connectivity options. Project members will be encouraged to give presentations to both the astronomy and network communities as the connectivity is finalized and tested.

3.1.4 JRA1 Update

The JRA1 FABRIC has a clear interdisciplinary nature. The various projects in FABRIC, from research in protocols to development of software correlators, have caught the attention in many different fields. Various scientists working in this JRA have been invited to give talks at both astronomy and networking conferences. Recently the distributed correlation project has also drawn the attention of the Grid community. With more young people joining the project with a variety of professional backgrounds, it will be much more feasible to present the EXPReS work at all the occasions in the future.

3.2 List of Publications

3.2.1 NA Publications (Combined)

None of the NA's report professional publications.

3.2.2 SA1 Publications

Pub #	Description
1	Szomoru, A., van Langevelde, H.J., Verkouter, H., Kettenis, M., Kramer, B., Olnon, F., Anderson, J., Reynolds, C., Paragi, Z., Garrett, M.A. (2006): VLBI in Transition, in: Stepp, Larry M. (ed.) Ground-based and Airborne Telescopes. Proceedings of the SPIE, Volume 6267, pp. 62673X
2	A. Rushton, R.E. Spencer, M. Strong, R.M. Campbell, S. Casey, R.P. Fender, M.A. Garrett, J.C.A. Miller-Jones, G.G. Pooley, C. Reynolds, A. Szomoru, V. Tudose and Z. Paragi, "First e-VLBI observations of GRS1915+105", 2007, Monthly Notices of the Royal Astronomical Society, 347, L47
3	A.P. Rushton, R.E. Spencer, M. Strong, S. Casey, R. Fender, M. Garrett, Z. Paragi, V. Tudose, C. Reynolds and G Pooley, "The First e-VLBI science production of GRS1915+105", paper and presentation at the International Astronomical Union Symposium, 238 Prague, 21-25 August 2006.
4	A. Rushton, R.E. Spencer, M. Strong, R.M. Campbell, S. Casey, R.P. Fender, M.A. Garrett, J.C.A. Miller-Jones, G.G. Pooley, C. Reynolds, A. Szomoru, V. Tudose and Z. Paragi, "First observations of GRS1915+105 with e-VLBI", paper and presentation at the VI Microquasar Workshop, Como, Italy, 18-22 September 2006. See Proceedings of Science (POS) MQW6 092 - http://pos.sissa.it
5	A. Rushton, "The first e-VLBI science production on GRS1915+105", paper and poster at the 8th EVN Symposium, Torun, Poland, 26-29 September 2006. See http://www.astro.uni.torun.pl/evn2006/ and in press at Proceedings of Science (POS) - http://pos.sissa.it.

6	V. Tudose, R.P. Fender, M.A. Garrett, J.C. Miller-Jones, Z. Paragi, A. Rushton, R.E. Spencer, G.G. Pooley, M. van der Klis, A. Rushton, and A. Szomoru, “First e-VLBI observations of Cygnus X-3”, Monthly Notices of the Royal Astronomical Society, in press.
7	V. Tudose, "e-VLBI observations of microquasars in outburst", paper and presentation at the 8th EVN Symposium, Torun, Poland, 26-29 September 2006. See http://www.astro.uni.torun.pl/evn2006/ and in press at Proceedings of Science (POS) - http://pos.sissa.it.

3.2.3 SA2 Publications

SA2 does not report any professional publications.

3.2.4 JRA1 Publications

Pub #	Description
1	Ari Mujunen, Jouko Ritakari "EXPReS JRA1 FABRIC Data Acquisition Requirements" EXPReS Wiki (http://www.jive.nl/dokuwiki/doku.php/fabric:wp1_scalable_connectivity section 1.1.1) 05-May-2006
2	Guifré Molera, Ari Mujunen, Jouko Ritakari, Jan Wagner "First 10 Gbps installed at Metsähovi Radio Observatory" European VLBI Network Newsletter Number 15 (http://www.ira.inaf.it/evnnews/archive/evnnews15.html) Sep-2006
3	John Conway, Jan Wagner, Jouko Ritakari, Ari Mujunen, Guifré Molera, Paul Burgess, Nico Kruithof, Huib Jan van Langevelde, Zsolt Paragi, Roger Hammargren, Michael Lindqvist "Report on FABRIC Month 7 Demonstration 'eVLBI Fringes with PCEVN'" EXPReS Wiki (http://www.jive.nl/dokuwiki/doku.php/fabric:wp1_scalable_connectivity section 1.2.3) 21-Dec-2006
4	Guifré Molera, Ari Mujunen, Jouko Ritakari, Jan Wagner, Bryan Anderson "EXPReS JRA1 FABRIC Data Acquisition Design" EXPReS Wiki (http://www.jive.nl/dokuwiki/doku.php/fabric:wp1_scalable_connectivity section 1.1.1) 01-Feb-2007
5	van Langevelde H.J., Szomoru A., Verkouter H., Kettenis M., Kramer B., Olnon F.P., Anderson J., Garrett M.A. “Transforming the way VLBI is done” ADASS XV, ASP Conf series, eds C. Gabriel, Arviset C., Ponz D., Solano E., p 649 2006
6	Szomoru A., van Langevelde H.J., Verkouter H., Kettenis M., Kramer B., Olnon F., Anderson J., Reynolds C., Paragi Z., Garrett M. “VLBI in transition” Proceedings of the SPIE, Vol 6267 2006

7	van Langevelde H.J. “Data processing software for radio astronomy” Proceedings of the 8th EVN symposium, Torun Poland", PoS (8thEVN) (in review)
8	Richard Hughes-Jones, Yufeng Xin, Gigi Karmous-Edwards, John Strand, “Network Performance Monitoring, Fault Detection, Recovery, and Restoration”. Chapter in “Grid Networks: Enabling Grids with Advanced Communication Technology”, Wiley, ISBN: 978-0-470-01748-7, Jul 2006.
9	A. Rushton, R.E. Spencer, M. Strong, R.M. Campbell, S. Casey, R.P. Fender, M.A. Garrett, J.C.A. Miller-Jones, G.G. Pooley, C. Reynolds, A. Szomoru, V. Tudose and Z. Paragi, “First e-VLBI observations of GRS1915+105”, 2007, Monthly Notices of the Royal Astronomical Society, 347, L47.
10	A.P. Rushton, R.E. Spencer, M. Strong, S. Casey, R. Fender, M. Garrett, Z. Paragi, V. Tudose, C. Reynolds and G Poole y, "The First e-VLBI science production of GRS1915+105", paper and presentation at the International Astronomical Union Symposium, 238 Prague, 21-25 August 2006.
11	A. Rushton, R.E. Spencer, M. Strong, R.M. Campbell, S. Casey, R.P. Fender, M.A. Garrett, J.C.A. Miller-Jones, G.G. Pooley, C. Reynolds, A. Szomoru, V. Tudose and Z. Paragi, “First observations of GRS1915+105 with e-VLBI”, paper and presentation at the VI Microquasar Workshop, Como, Italy, 18-22 September 2006. See Proceedings of Science (POS) MQW6 092 - http://pos.sissa.it
12	A. Rushton, "The first e-VLBI science production on GRS1915+105", paper and poster at the 8th EVN Symposium, Torun, Poland, 26-29 September 2006. See http://www.astro.uni.torun.pl/evn2006/ and in press at Proceedings of Science (POS) - http://pos.sissa.it.
13	V. Tudose, R.P. Fender, M.A. Garrett, J.C. Miller-Jones, Z. Paragi, A. Rushton, R.E. Spencer, G.G. Pooley, M. van der Klis, A. Rushton, and A. Szomoru, “First e-VLBI observations of Cygnus X-3”, Monthly Notices of the Royal Astronomical Society, in press.
14	V. Tudose, "e-VLBI observations of microquasars in outburst", paper and presentation at the 8th EVN Symposium, Torun, Poland, 26-29 September 2006. See http://www.astro.uni.torun.pl/evn2006/ and in press at Proceedings of Science (POS) - http://pos.sissa.it.

3.3 List of Presentations

3.3.1 NA Presentations (Combined)

Date	Description
2007 Jan 15	Yun, T. Charles. “Introduction to EXPReS: Beyond Production Services,” Interwork 2006. Remote presentation to S antiago, Chile.
2007 Jan 15	Hase, Hayo. “HighSpeed Networking for Astronomy and Geodetic Applications: Connecting VLBI Radiotelescopes to one Global Instrument The Chilean Part,” Interwork 2006. Santiago, Chile.
2006 Dec 13	Yun, T. Charles. “Introduction to EXPReS,” TERENA. Amsterdam, the Netherlands.
2006 Nov 29	Conway, John. “Report to EVN Board of Directors meeting,” Dwingeloo, Netherlands
2006 Nov 22	Yun, T. Charles. “Introduction to EXPReS,” ICT 2006. Helsinki, Finland
2006 Nov 22	Chevers, John. IST 2006, show floor, e-VLBI video footage shown, Helsinki, Finland

2006 Nov 2	Yun, T. Charles. "Introduction to EXPReS - SURFnet and JIVE GigaPort seminar for astronomers," SURFnet GigaPort Seminar. Utrecht, the Netherlands.
2006 Nov 1	All NA Activity Leaders. EXPReS Board Meeting. Zaandam, Netherlands
2006 Oct 31	All NA Activity Leaders. EXPReS Kickoff meeting. Zaandam, Netherlands
2006 Sep 25	Yun, T. Charles. "Presentation for FABRIC," FABRIC Business Meeting. Poznan, Poland
2006 Sep 15	Yun, T. Charles. "Convergence of New Technologies with e-VLBI Goals," 5th International e-VLBI Workshop, Haystack Observatory, MIT. Westford, MA, USA
2006 Sep 15	Yun, T. Charles. "Production services over Networks," 5th International e-VLBI Workshop, Haystack Observatory, MIT. Westford, MA, USA
2006 Sep 2006 May	Chevers, John. EVN-NREN 2006, Torun, Poland Chevers, John. TNC2006 GÉANT2 video (including e-VLBI footage shown), Catania, Sicily, Italy
2006 May 18	Conway, John. "Report to the EVN Board of Directors meeting," Florence Italy

3.3.2 SA1 Presentations

Date	Description
20 Mar 2006	A. Szomoru. "e-VLBI Status @ JIVE," Technical Operations Group meeting, Dwingeloo, the Netherlands
24 May 2006	A. Szomoru. "VLBI in Transition," SPIE Conference "Ground-based and Airborne Telescopes", Orlando, USA
11 Jun 2006	Z. Paragi. "Constraining the black hole mass in M82 X-1 with VLBI," The multicoloured landscape of compact objects and their explosiveorigins, Cefalu, Sicily
27 Jun 2006	A. Szomoru. "New Use of an Old Correlator," Next Generation Correlators for Radio Astronomy and Geodesy, Groningen, the Netherlands
19 Aug 2006	A. Szomoru. "Status of e-VLBI @ JIVE," Bits & Bytes Meeting, Jodrell Bank, UK
17 Sep 2006	M.A. Garrett. "e-EVN - an open, real-time VLBI Array - first Science.," 5th International e-VLBI Workshop, MIT Haystack Observatory, USA
17 Sep 2006	M. Kettenis. "Pluggable TCP Congestion Avoidance Modules for eVLBI," 5th International e-VLBI Workshop, MIT Haystack Observatory, USA
17 Sep 2006	J. Sansa. "A Simulation model for e-VLBI traffic on network links in the Netherlands," 5th International e-VLBI Workshop, MIT Haystack Observatory, USA
17 Sep 2006	A. Szomoru. "e-VLBI Developments at JIVE," 5th International e-VLBI Workshop, MIT Haystack Observatory, USA
18 Sep 2006	Z. Paragi. "Observing ULXs with VLBI," VI Microquasar Workshop: Microquasars and Beyond, Como, Italy
26 Sep 2006	Z. Paragi. "Constraining IMBH black hole masses with VLBI," 8th EVN Symposium, Torun, Poland
26 Sep 2006	A. Szomoru. "Recent e-EVN Developments," 8th EVN Symposium, Torun, Poland
19 Oct 2006	J. Sansa. "A Simulation model for e-VLBI traffic on network links in the Netherlands," 5th EVN-NREN Meeting, Zaandam, the Netherlands
19 Oct 2006	P. Savola. "A rundown of the Smart-1 PERT case history," 5th EVN-NREN Meeting, Zaandam, the Netherlands
19 Oct 2006	A. Szomoru. "e-EVN developments in 2006," 5th EVN-NREN Meeting, Zaandam, the Netherlands

19 Oct 2006	A. Szomoru. "SA1: overview, first results," EXPReS Kickoff Meeting, Zaandam, the Netherlands
20 Nov 2006	A. Szomoru. "SMART-1: using e-VLBI to track satellites," SURFnet Gigaport Seminar, Utrecht, the Netherlands
20 Nov 2006	A. Szomoru. "Recent e-EVN Developments," Shanghai Observatory, Shanghai, China
20 Nov 2006	A. Szomoru. "EVN and e-VLBI," China Science and Technology Network (CSTNET), Beijing, China
28 Nov 2006	A. Szomoru. "e-EVN: practical considerations," e-VLBI Science Advisory Committee Meeting, Westerbork, the Netherlands & EVN Board Meeting, Dwingeloo, the Netherlands
6 Dec 2006	A. Szomoru. "e-EVN: practical considerations," Technical Operations Group meeting, Noto, Italy & Bits & Bytes meeting, Manchester, UK

3.3.3 SA2 Presentations

Date	Description
2006 Sep 25-29	F. Colomer "EXPReS SA2: Network Provision for a Global e-VLBI Array" . VIII EVN Symposium, Torun, Poland
2006 Oct 31	F. Colomer. "EXPReS Kickoff meeting", Zaandam, Netherlands
2006 Nov 1	F. Colomer. "EXPReS Board Meeting", Zaandam, Netherlands
2006 Nov 28	F. Colomer. "eVSAG Meeting", Gathering of the VLBI Science Advisory Group, Westerbork , The Netherlands

3.3.4 JRA1 Presentations

Date	Description
7 Feb 2007	R. Hughes-Jones, "How do transport protocols affect applications & The relative importance of different protocol properties", Panel Discussion, PFLDnet, Marina Del Rey
7 Feb 2007	van Langevelde H.J. "e-VLBI, a real-time radio telescope spanning Europe" "Leidse Fles" student association, Leiden, The Netherlands
2 Feb 2007	R. Hughes-Jones, "A Review of the NMWG Characteristics Document ", OGF Network Measurements Working Group, Chapel Hill, 29
Jan 2007	R. Hughes-Jones "EXPReS/FABRIC: eMERLIN IO View from the Network", Richard Hughes-Jones, EXPReS Technical Note
8 Dec 2006	A. Bittau, "Congestion Control without Reliability", presentation at international e-VLBI meeting organised by ESLEA project, The University of Manchester
8 Dec 2006	A. Bittau, "Local vs Network Congestion", presentation at international e-VLBI meeting organised by ESLEA project, The University of Manchester
8 Dec 2006	R. Hughes-Jones, "DCCP and DCCPmon" presentation at an international e-VLBI meeting organised by ESLEA project, The University of Manchester
07 Dec 2006	Month 7 demonstration, 896 Mbps real-time capability in Tsunami, software correlation with Cell processors, iBOB developments Jouko Ritakari "eVLBI Developments in Metsähovi" ESLEA VLBI Bits and Bytes Meeting, Schuster Laboratory, University of Manchester, UK

7 Dec 2006	R. Hughes-Jones, “VLBI_UDP Multiple Flow Tests” presentation at an international e-VLBI meeting organised by ESLEA project, The University of Manchester
7 Dec 2006	S. Kershaw, “TCPDelay” presentation at an international e-VLBI meeting organised by ESLEA project, The University of Manchester
29 Nov 2006	van Langevelde H.J. "FABRIC", EVN board, Dwingeloo, The Netherlands
27 Nov 2006	R.E. Spencer, "SJ5 and high rate data transfer for VLBI", presentation at NNW SJ5 Launch, Manchester
2 Nov 2006	van Langevelde H.J. "SCARIe FABRIC; a pilot study of distributed correlation" GiGaPort seminar for astronomers, Utrecht, The Netherlands
1 Nov 2006	van Langevelde H.J. "FABRIC management" EXPReS board meeting, Zaandam, The Netherlands
31 Oct 2006	R. Hughes-Jones, “FABRIC 4 Gigabit Work & VLBI-UDP Performance and Stability”, presentation at EVN-NREN Meeting, Zaandan, Netherlands
31 Oct 2006	van Langevelde H.J. "What is FABRIC?" EXPReS kick off meeting, Zaandam, The Netherlands
27 Oct 2006	R.E. Spencer and M. Strong, the 3rd Open Call e-VLBI - the first sustained 256 Mbit/s e-VLBI science run utilises UKLight.
11 Oct 2006	R. Hughes-Jones, “Update on Remote Real-Time Computing Farms For ATLAS TDAQ”, presentation at T2UK Meeting, Royal Holloway
27 Sep 2006 25 Sep 2006	van Langevelde H.J. "Data processing software for Radio Astronomy" 8th EVN Symposium 2006, Torun, Poland Comparing data acquisition implementation options, recommendation for iBOB-based FPGA Ari Mujunen "EXPReS/FABRIC Data Acquisition Systems" FABRIC: Business Meeting, PSNC (Polish Supercomputing and Networking Center), Poznan, Poland
25 Sep 2006	van Langevelde H.J. "FABRIC Management report" FABRIC project meeting, Poznan, Poland
17 Sep 2006	Abandoning the rules and restrictions of tape-age VLBI in the eVLBI era Jouko Ritakari "Usus modernus pandectarum" 5th International e-VLBI Workshop, MIT Haystack Observatory, Westford, MA, USA
17 Sep 2006	eVLBI Status Roy, A., Alef, W., Graham, D. “eVLBI Status @ MPIfR, Bonn” 5th International e-VLBI Workshop, MIT Haystack Observatory, Westford, MA, USA
17 Sep 2006	M. Strong, “The development of eVLBI as part of the ESLEA project” presentation at 5th Annual e-VLBI Workshop, Haystack Observatory, USA
17 Sep 2006	R. Hughes-Jones, “TCP/IP on High Bandwidth Long Distance Paths or So TCP works … but still the users ask: Where is my throughput?”, presentation at 5th Annual e-VLBI Workshop, Haystack Observatory, USA

17 Sep 2006	R. Hughes-Jones, “The Network Transport Layer and the Application or TCP/IP and VLBI Data” presentation at 5th Annual e-VLBI Workshop, Haystack Observatory, USA
17 Sep 2006	S. Casey, “The development of VLBI_UDP and the effect of packet loss”, presentation at 5th Annual e-VLBI Workshop, Haystack Observatory, USA
17 Sep 2006	The impact of wide availability of 10GE technology; guidelines and roadmap to future Ari Mujunen "Towards 10 Gbps e-VLBI" 5th International e-VLBI Workshop, MIT Haystack Observatory, Westford, MA, USA
12 Sep 2006	Presentation about real-time eVLBI protocols (Tsunami with PCEVN VSIB) being developed in Metsähovi Jan Wagner "Developments in Real-Time Electronic VLBI at Metsähovi" XXXVI Young European Radio Astronomers' Conference (YERAC 2006), Conference Centre "De Bron", Dalfsen, the Netherlands
12 Sep 2006	R. Hughes-Jones, “A History of the NMWG Characteristics and Schemata”, presentation at OGF Network Measurements Working Group, Washington, USA
12 Sep 2006	R. Hughes-Jones, “Agenda Network Measurements Working Group”, presentation at OGF Network Measurements Working Group, Washington, USA
12 Sep 2006	R. Hughes-Jones, “Summary of the Version 2 Schemata”, presentation at OGF Network Measurements Working Group, Washington, USA
8 Sep 2006	A.P. Rushton, " eVLBI Observations of GRS1915", presentation and poster at VIth Microquasar Conference, Como, Italy
1st Sep 2006	A.P. Rushton, "The First eVLBI Observations of GRS1915", e-VLBI journal paper submitted to MNRAS (Monthly Notices of the Royal Astronomical Society).
01 Sep 2006	An overview of components and interactions of the FABRIC data acquisition design Jouko Ritakari "EXPReS/FABRIC Data Acquisition System" FABRIC Get Together Meeting, University of Manchester, UK
1 Sep 2006	R. Hughes-Jones, “Multi-Gigabit Trials on GÉANT : Collaboration with Dante”, presentation at ESLEA-FABRIC Technical Meeting , Jodrell Bank Observatory
31 Aug 2006	10 Gbps connectivity, protocols for distributed grid correlation Jouko Ritakari "Current eVLBI Development at Metsähovi Radio Observatory" - ESLEA VLBI Bits and Bytes Meeting, Schuster Laboratory, University of Manchester, UK
31 Aug 2006	A. Bittau, “DCCP and Gigabit Hand Shakes”, presentation at international e-VLBI meeting organised by ESLEA project, Jodrell Bank Observatory
31 Aug 2006 31 Aug 2006	R. Hughes-Jones, “VLBI_UDP: Throughput Performance and Stability” presentation at an international e-VLBI meeting organised by ESLEA project, Jodrell Bank Observatory S. Casey, “VLBI_UDP and Packet Dropping” presentation at an international e-VLBI meeting organised by ESLEA project, Jodrell Bank Observatory
31 Aug 2006	S. Kershaw, “TCPDelay” presentation at an international e-VLBI meeting organised by ESLEA project, Jodrell Bank Observatory

21 Aug 2006	A.P. Rushton, R.E. Spencer, M. Strong, S. Casey, R. Fender, M. Garrett, Z. Paragi, V. Tudose,C. Reynolds and G. Pooley, "The First e-VLBI science production of GRS1915+105", International Astronomical Union Symposium 238, Prague, Czech Republic
6 Jul 2006	R.E. Spencer, "eVLBI in Europe", presentation at NRAO Colloquium, Socorro, NM, USA
29 Jun 2006	van Langevelde H.J. "FABRIC, a pilot study of distributed correlation" Next Generation Correlator workshop, Groningen, The Netherlands
28 Jun 2006	van Langevelde H.J. "Astronomy" National Research Initiative on Computing brainstorm, Utrecht, The Netherlands
Jun 2006	R. Hughes-Jones "Essential Components in Moving Physics Data at Gigabit Speeds for e-Science ", ESLEA Poster, Manchester Grants Visit
Jun 2006	R. Hughes-Jones "Network Performance for ATLAS Real-Time Remote Computing Farm Study Alberta, CERN Cracow, Manchester, NBI", ATLAS Poster, Manchester Grants Visit
19 May 2006	Presentation about UDP-based file transfers protocols being developed in Metsähovi for both eVLBI and AMS02 applications. Guifré Molera "Metsähovi: Antimatter Spectrometer" The annual Finnish astronomical days ("Tähtitieteilijäpäivät"), Helsinki University, Finland
10 May 2006	van Langevelde H.J. "SCARIe kickoff" SCARIe kickoff meeting, Amsterdam, The Netherlands
4 May 2006	M. Strong, “ESLEA and eVLBI Developments” presentation at an international e-VLBI meeting organised by ESLEA project, University College London.
4 May 2006	R. Hughes-Jones, “VLBI Data Transfer Tests: Recent and Current Work” presentation at an international e-VLBI meeting organised by ESLEA project, University College London
4 May 2006	R.E. Spencer, “EXPReS/FABRIC at Jodrell Bank Observatory” presentation at an international e-VLBI meeting organised by ESLEA project, University College London.
4 May 2006	S. Casey, “VLBI_UDP” presentation at an international e-VLBI meeting organised by ESLEA project, University College London
May 2006	M. Strong, R. Spencer, R. Hughes-Jones, S.Casey, “EXPReS/FABRIC Strategic Document: Protocol Investigation for eVLBI Data Transfer”, Document FABRIC-1.2.1.001v1 for EU Project Number 026642 (DJ1.2)
20 Apr 2006	R.E. Spencer and M. Strong participate on the2nd Open Call e-VLBI - the FIRST production science with eVLBI utilises UKLight, with data transfer rates of 128Mbit/s between 6 telescopes.
4 Apr 2006	R. Hughes-Jones, “l Bandwidth Challenges or How fast can we really drive a Network?", presentation at UKERNA Networkshop 34, The University of Hertfordshire
22 Mar 2006	High-speed COTS data acquisition, UDP-based protocols, emerging COTS technologies (10GE, SATA) "Expertise and Ambitions of Metsähovi Radio Observatory" EXPReS: Kick-off FABRIC, Joint Institute for VLBI in Europe, the Netherlands
22 Mar 2006	van Langevelde H.J. "Fabric kickoff" FABRIC kickoff meeting, Dwingeloo, The Netherlands

15 Mar 2006	R. Hughes-Jones, "ATLAS Networking & T2UK Mar 2006", presentation at T2UK Meeting, Rutherford Appleton Laboratory, UK
20 Feb 2006	R. Hughes-Jones, "10 Gigabit Ethernet Test Lab. PCI-X Motherboards Related work & Initial tests", presentation at CALICE DAQ Meeting, UCL
2 Feb 2006	R. Hughes-Jones, "Transport Benchmarking - Panel Discussion", PFLDnet, Nara, Japan
22 Jan 2006	van Langevelde H.J. "Scientific Software; data products & user access" ESF review of JIVE, Dwingeloo, The Netherlands
11 Jan 2006	R. Hughes-Jones, "TCP/IP Masterclass or So TCP works … but still the users ask: Where is my throughput?", presentation at GÉANT2 Network Performance Workshop, Cambridge, UK

3.4 Updated Plan for Use and Dissemination of Knowledge

A large number of presentations were made during the first year at various conferences and workshops around the world to enhance the visibility of e-VLBI in general and the EXPReS project in particular. In the next 18 months, the scientific results and possibilities will be presented and advertised at various astronomical conferences. Technical developments will be discussed with colleagues at e-VLBI-specific meetings but also presented at more general e-science meetings (e.g., ESLEA, TERENA, INGRID). The number of opportunities to present at non-astronomy meetings will need to be balanced with the core scientific goals of each of our partners. The development of online facilities will continue, with plans for several modifications to expand the capabilities of the site.

Large stand for presentation booth

A well-designed display board will be produced for use at meetings, conferences and open days. Visually stunning, it will easily attract attention and communicate a basic sense of the purpose and goals of EXPReS and give a lasting impression. It will also encourage its audience to learn more about the project from project members, the web site and/or brochures.

Udpated website

The EXPReS Web site could be a valuable outreach tool, not only in the traditional sense of educating the general public about e-VLBI, but also as a means of broadening awareness within the astronomy community to new science opportunities made possible by e-VLBI. The site will be reorganized in 2007 with an eye to keeping the astronomy community informed about the developments in e-VLBI during the remainder of the EXPReS project and, potentially in tandem with reorganization of the EVN web site, providing information required by astronomers interested in using the instrument upon completion of EXPReS.

Expand the distribution of e-VLBI calls

The eVSAG has been approached regarding the distribution for e-VLBI Calls for Proposals. In addition to the discussions regarding the process of accepting the calls, a separate discussion was (re-) initiated regarding expanding the distribution of the calls. This topic will be considered for the next eVSAG meeting.

4. ANNEXES

4.1 - Summaries and main conclusions of the General Meetings

4.1.1 First EXPReS Board Meeting

4.1.1.1 Location/Date

1st EXPReS Board meeting 1 November, 2006

Golden Tulip Inntel Hotel in Zaandam, (Netherlands)

4.1.1.2 Participants / Apologies / Delegation

Participants	Partner Institution
Brown, Robert	NAIC
Chevers, John	DANTE
Colomer, Paco	CNIG-IGN
Conway, John	OSO
Garrett, Mike	JIVE
Garstka, Marcin	PSNC
Hase, Hayo	TIGO
Langevelde van, Huib	JIVE
Mantovani, Franco	INAF
Mujunen, Ari	MRO
Mauro, Nanni	INAF
Neggers, Kees	Surfnet
Pazderski, Eugeniusz	UMK
Szomoru, Arpad	JIVE
Tzioumis, Tasso	CSIRO
Vos de, Marco	ASTRON
Yun, Charles	JIVE
Zagars, Juris	VIRAC
Zensus, Anton	MPIfR

Apologies	Institution
Diamond, Phil	UniMan
Hancock, Chris	AARNet
Kus, Andrzej	NCU
Hong, Xiaoyu	SHAO
Jonas, Justin	HARTRAO
Meyer, Norbert	PSNC

Represented	Name
UniMan	By Ralph Spencer, JB
AARNet	By Tasso Tzioumis, CSIRO
NCU	By Eugeniusz Pazderski, UMK
SHAO	By Paco Colomer, CNIG-IGN

HARTRAO	By Michael Garrett, JIVE
PSNC	By Marcin Garstka, PSNC
UniMan	By Ralph Spencer, JB

4.1.1.3 Summary

Note: The full minutes and links to presentations are available on the EXPReS Wiki.

Mike Garrett opened the Board meeting and welcomed the Board members in Zaandam, the Netherlands. Introductions of individuals were made around the room: board vs. proxy. Ari Mujunen wanted to bring up an amendment to the consortium agreement. “Discussion amendment” was added to the agenda.

Election of Chair (Chr) and Vice-Chair. Garrett suggested to have a chairman and a vice-chairman for today and for a period of 2 years. Mike suggested that Ari Mujunen would be a good candidate for chairman and Tasso Tzioumis for vice chairman. The board has approved unanimously Ari Mujunen as the chairman and Tasso Tzioumis as the vice chairman. The board has approved Mike Garrett as the Project Coordinator, Charles Yun as the Project Manager and Diana van Dijk as the Project Secretary.

Ari Mujunen handed out a form called: 1st amendment of the consortium agreement. Charles formally presented MRO’s document as an amendment and suggested to start the discussion. Charles Yun wil distribute the amendment to the board. The Board received the amendments and have each given preliminary approval for the suggested changes.

General items w/r/t Accounting: The funds have been contributed to each partner (85% of the amount that you were allocated for this year). Some money has to be in reserve as “slack” to address potential issues. As the project goes as planned the participants will receive the other 15 % at the end of the year. Monthly, Quarterly and Annual reports described with respect to content and frequency. Auditors also mentioned and suggested that preparations be made early. Deliverables table and the wiki were discussed as information dissemination tools.

There was a discussion about when and where the second board meeting should be held. A decision about the date for the next Board meeting should be made by mid-January 2007 at the latest (Action Garret, Zensus and Yun). Location second board meeting: Ari Mujunen offered Finland. Franco Mantovani remarked that this will be a good location, because another meeting (EVN CBD) can be combined with the EXPReS board meeting.

Mike Garrett asked for volunteers. Anton Zensus (MPIfR) offered to be host. There is not an exact date for the meeting yet, but it will be in the summer of 2007.

Arpad Szomoru gave a presentation titled: Proposal for an EXPReS MOU JIVE-Haystack observatory. The Board decided to keep Haystack under the umbrella of 50.000 euros for now. Because we want to have a good collaboration, JIVE is encouraged to pursue this.

Huib Jan van Langevelde gave a presentation. There is an issue on duration of the project (3 years). Huib van Langevelde mentioned that the first employee of FABRIC started on March the 1st, but that there will also be an employee starting on December the 1st of this year.

Garrett gave a presentation on the upcoming FP7 call. First call for proposals: the proposal has to be written at the end of March 2007. Mike pointed out that the deadline for the proposal is a bit of a worry.

4.1.2 EXPReS Kickoff Meeting

4.1.2.1 Location/Date

EXPReS Kickoff meeting 31 October 2006

Golden Tulip Inntel Hotel in Zaandam, (Netherlands)

4.1.2.2 Participants

Participants	Partner Institution
Alef, Walter	MPIfR
Brown, Robert	Cornell
Chevers, John	DANTE
Colomer, Paco	CNIG-IGN
Conway, John	Chalmers
Eldering, Bob	JIVE
Garrett, Mike	JIVE
Garstka, Marcin	Poznan
Gloudemans, Roel	ASTRON
Hase, Hayo	TIGO
Hughes-Jones, Richard	University of Manchester
Huisman, Wouter	Surfnet
Kruithof, Nico	
Langevelde van, Hub	JIVE
Maat, Peter	ASTRON
Mantovani, Franco	IRA INAF
Nanni, Mauro	IRA INAF
Neggers, Kees	SURFnet
Oerlemans, Ruud	JIVE
Paragi, Zsolt	JIVE
Pazderski, Eugeniusz	UMK
Ritakari, Jouko	Metsahovi
Small, Des	JIVE
Spencer, Ralph	Jodrell Bank
Szomoru, Arpad	JIVE
Tzioumis, Tasso	CSIRO
Yun, Charles	JIVE
Yun, Kristine	JIVE
Zagars, Juris	VIRAC

4.1.2.3 Summary

Note: The full minutes and links to presentations are available on the EXPReS Wiki.

Garrett welcomed all participants. He acknowledged e-VLBI progress made the past couple years (i.e. 256 Mbps transfer from five telescopes during the last science run). He introduced the new EXPReS Project Manager, Charles Yun, and stated that the purpose of the meeting was to bring the different activities together.

Report from the Project Manager. Yun gave an overview of the EXPReS project, goals, partners, activities, contact points and project dates. Yun stated that monthly reports, (unaudited) quarterly

reviews and audited annual reviews are part of our contract with the EC The EC uses the reports to measure progress. Yun described the preparation and contents of each of the reports (text, deliverables, finances, etc.). Mike clarified that the annual report also includes an annual review and some will have to go to Brussels to be interviewed by external people.

Overview by Activity Leaders.

Chevers reported completion of the first deliverable: a successful meeting this morning. Progress with GÉANT2 was reported, and the main conclusion was that telescopes should quickly speak to their NRENS. There was a PERT presentation: diagnostics didn't happen as they could have, but they had a useful test case and demonstrated that processes had been put into place. Lots of progress has been made with connectivity to different telescopes. NA2 will look at coordination of point-to-point circuits and upgrade of connectivity to telescopes via lightpaths. NA2 is also contracted to attend conferences and write papers, so John is keen to hear ideas on that.

Conway provided an update on NA3. NA3 is to organize a science conference in September 2008. NA3 organizes the e-VLBI Science Advisory Group (e-VSAG) in charge of maximizing science use of e-VLBI. The first meeting was supposed to be in Month 4 (June), but it will probably occur at the end of November. The second meeting is supposed to be Month 16 (June 2007) in Onsala. John said the group should also discuss observing opportunities. As an advisory group, e-VSAG doesn't allocate observing time to review proposals but instead tries to be a rallying/promotional group. The first science run in September 2004 demonstrated that we can in principle do a normal spectral line expt by e-VLBI. E-VLBI end use includes adaptive observing, "perishable" observing, automated observing, targets of opportunity and connection to real-time arrays.

Kristine Yun reported on NA4: e-VLBI Outreach, Dissemination and Communications. Kristine clarified that although her title is Public Outreach Officer, she is also responsible for making sure the EC is aware of our activities so that they will continue to fund us, and that she is also responsible for helping provide collaboration tools like the wiki to project members. The EXPReS web site, www.expres-eu.org, is online and includes general information about the project, news, documents for project members and a link to the wiki. The wiki has also been set up with space set aside for each activity.

Arpad Szomoru stated that SA1's goal is to have 16 telescopes connected in real-time. Three new hires have already begun, and one will start December 1. There have been practical constraints to the activity (hiring, hardware, e-MERLIN development, reality). Current status is that SA1 is practically on schedule, although not necessarily in the right order. Current capacity is six (actually five) station fringes at 256 Mbps and three station fringes at 512 Mbps. The group had to come up with interfaces for controlling things so that operators know immediately if something's gone wrong during an observation. They are also creating a web interface so that the stations can also watch. They are streamlining post-processing to near real-time, and Des Small has been working on this interface. Next steps are deliverables need to be reviewed and edited because they are currently "not sane." They also need to increase bandwidth, establish e-VLBI procedures and start design of an e-MERLIN interface. There will also be future hardware/network upgrades and software developments. Paul Burgess suggested that station monitoring would be good. Mike suggested feedback directly from the MarkV units.

Paco Colomer's update on SA2: Network Provision for a Global e-VLBI Array. SA2 is tasked with connecting the telescopes to JIVE using GÉANT. The EC is contributing a very small portion of the total cost with the intent to spur contribution from participating countries. The cost covers connection and equipment only. There are already six stations connected at 1 Gbps to JIVE. Nine more are expected in 2007 (six are non-European with caveats). The plan for these costs doesn't conform well for the 70% rule, but Garrett added that Fabianek had been warned.

Huib van Langevelde updated on JRA1: FABRIC (Future Arrays of Broadband Radio-telescopes on Internet Computing). JRA1 is an R&D project of two parts, work package to achieve 4 Gb/s data acquisition and transport and work package on distributed correlation. Part 1 covers data acquisition and broadband data path. Part 2 covers cistributed correlation (PSNC), grid resource allocation, and software correlation (JIVE). The iBOB and 10 GbE interfaces were discussed. The Seven Month Demo conducted on 20 October 2006 established a baseline of 512 Mb/s at Onsala and JBO and a transfer rate of 800 Mb/s to JIVE. Also streaming to Metsahovi with a 2.5 Gb/s connection and 2x512 Mb/s. Distributed correlation (to get CPU cycles from the Grid (pushing grid boundaries) and demo application) was also mentioned. JRA1 progress seems fair so far with a kickoff meeting in March, progress meeting in Poland in September, late start in hiring, still need to complete the design phase, passing milestones, spending money and updates on the wiki.

Charles said that he has asked e-MERLIN and e-LOFAR to present updates on their projects because they are of interest to EXPReS. Ralph Spencer presented on e-MERLIN and Peter Maat presented on e-LOFAR. Both presentations are available online.

4.7 - CD-ROM with the deliverables produced during the reporting period

A CD-ROM containing deliverables is attached with this report. Deliverables without sensitive information are also available from the EXPReS wiki, available online at:

http://www.jive.nl/dokuwiki/doku.php

Section B: Management Report

1. JUSTIFICATION OF THE RESOURCES DEPLOYED

The following pages contain the "Justification of Resources" forms for each of the 19 EXPReS partners.

JIVE
AARNET
DANTE
PSNC
SURFnet
ASTRON
CNIG-IGN
CSIRO
NRF
INAF
MPG
TKK
CORNELL
UMK
OSO
SHAO
UDEC
UNIMAN
VeA/VIRAC

Please note that final versions of the JOR's will be presented at the Annual Review; many partners required the full 45 day period to obtain their signed audit documents.

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	1	Participant short name	JIVE

		NA1- Management of I3	
		Total effort in person-months (1)	12 (6)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	59,922.68 €	Project Manager, Project Assistant. (100% PM, 50% Assistant)	
Cost item 2	5,673.63 €	travel (VAT removed): Groningen, Next Generation Correlator Workshop Edinburgh, Bits and Bytes meeting, Fabric Utrecht, SURFNET Boston, MIT/Haystack-5th eVLBI workshop Poznan, Fabric meeting Torun, EVN Brussel, meeting with Fabianek Utrecht, Gigaport meeting SURFNET Manchester, Bits & Bytes meeting Amsterdam, Terena Utrecht, SURFnet GigaPort presentation	
Cost item 3	12,180.95 €	Zaandam, Netherlands- Kickoff meeting, Board meeting, EVN NREN (facilities, equipment, refreshments) (VAT removed)	
Sub-Total	77,777.26 €		

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost	0.00 €	Not Claimed	
Cost item 2	0.00 €	Travel (calculated with the NA1 travel budget)	
Sub-Total	0.00 €		

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0.00 €	Not Claimed	
Cost item 2	0.00 €	Not Claimed	
Sub-Total	0.00 €		

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	3
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	15,208.65 €	Public Outreach Officer (Yun, 0.5 FTE)	
Cost item 2	384.21 €	Travel (London workshop) (VAT removed)	
Cost item 3	420.00 €	Graphic design	
Sub-Total	16,012.86 €		

Justification of resources deployed during reporting period

		SA1- Production e-VLBI Service	
		Total effort in person-months [1]	31 (10)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	128,279.96 €	Engineers (Paragi, Eldering, Small, Boven)	
Cost item 2	47,879.26 €	Travel (EVN meeting, bits-bytes meeting, e-VLBI Workshop) (VAT removed)	
Cost item 3	6,855.31 €	Meeting Support (VAT removed)	
Cost item 4	85,569.63 €	Hardware components (support equipment, cards, network switch, CPUs, Mk5 upgrade elements) (VAT removed)	
Cost item 5	45,136.36 €	MIT, Mark 5 VLBI contract for specific work	
Cost item 6	366.69 €	local office support hardware (VAT removed)	
Sub-Total	314,087.21 €		
		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0.00 €	Not Claimed	
Cost item 2	0.00 €	Not Claimed	
Sub-Total	0.00 €		
		JRA1- FABRIC	
		Total effort in person-months [1]	14 (11)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	63,675.90 €	Engineers (Oerlemans, Pidopryhora)	
Cost item 2	2,027.78 €	Travel (Fabric Kickoff, EVN meeting, FABRIC meeting Poland, etc.) (VAT removed)	
Cost item 3	5,691.79 €	Meeting Support (FABRIC business meeting facilities, equipment and related costs) (VAT removed)	
Cost item 4	3,426.33 €	Support hardware, research equipment (VAT removed)	
Sub-Total	74,821.80 €		

Total direct eligible costs	482,699.13 €		
Total indirect costs	96,539.83 €		
Total costs [2]	579,238.96 €	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only

[2] Totals should correspond to the respective figures on FORM C - Financial Statemen

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	2	Participant short name	AARNET PTY LTD

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA1- Production e-VLBI Service

Justification of resources deployed during reporting period

		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Total direct eligible costs	0		
Total indirect costs	0		
Total costs [2]	0	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only

[2] Totals should correspond to the respective figures on FORM C - Financial Statemen

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	3	Participant short name	DANTE

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost			
Cost item 2	€505.46	Travel and subsistence for attending EVN-NREN meeting 30.10.06 to 01.11.06 (our Ref. DEC06029 / TO342)	
Cost item 3			
…			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA1- Production e-VLBI Service

Justification of resources deployed during reporting period

		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Total direct eligible costs	€505.46		
Total indirect costs	€404.37		
Total costs [2]	€909.83	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only

[2] Totals should correspond to the respective figures on FORM C - Financial Statemen

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	4	Participant short name	PSNC

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Travel	844.45	NA2 Marcin Garstka - Amsterdam 30.10.2006-2.11.2006 EVN-NREN Meeting, Kick-of Meeting, Board Meeting	
Overheads	168.89	NA2	

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Justification of resources deployed during reporting period

		SA1- Production e-VLBI Service	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		JRA1- FABRIC	
		Total effort in person-months (1)	22,02 PM (11,02 PM)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	41,811.74 €	Analysis of requirements Conceptual work and design For the development of GRID system and eVLBI data transmissions between different geographically distributed partners PSNC analyzed network monitoring solutions as well as several approaches towards QoS in order to allow for automatic resource distribution and QoS provisioning. Analysis of the software correlator Building a local testbed in PSNC Identification of the monitoring architecture which included: inter-domain and end-to-end system All of the design effort resulted in two released deliverables, both according to project schedule: DJ 1.6 - eVLBI – Grid Design Document DJ1.10 - eVLBI – Grid interface document. A detailed activity description of PSNC was included in the annual report of Expres	
Equipment	2,288.01 €	1. Depreciation of equipments 2. Software purchase	
Travel	3,482.43 €	1. Norbert Meyer, 21-23.03.2006, Dwingeloo, Kick-off Meeting 2. Marcin Okoń, 21-23.03.2006, Dwingeloo, Kick-off Meeting 3. Marcin Garstka, 21-23.03.2006, Dwingeloo, Kick-off Meeting 4. Marcin Okoń, 4-7.07.2006, Amsterdam, EXPReS -Project Meeting 5. Dominik Stokłosa, 4-7.07.2006, Amsterdam, EXPreS - Project Meeting	
Overheads	9,516.44 €	JRA1- FABRIC	

Total direct eligible costs	48,426.63 €		
Total indirect costs	9,685.33 €		
Total costs (2)	**58,111.96 €**	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	108,146.00 €

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.

(2) Totals should correspond to the respective figures on FORM C - Financial Statemen

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	5	Participant short name	SURFnet

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

		SA1- Production e-VLBI Service

Justification of resources deployed during reporting period

		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

Total direct eligible costs	0		
Total indirect costs	0		
Total costs [2]	0	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only

[2] Totals should correspond to the respective figures on FORM C - Financial Statemen

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	6	Participant short name	ASTRON

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA1- Production e-VLBI Service	

Justification of resources deployed during reporting period

		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Total direct eligible costs	0		
Total indirect costs	0		
Total costs [2]	0	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only

[2] Totals should correspond to the respective figures on FORM C - Financial Statemen

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	7	Participant short name	CNIG-IGN

		NA2 – NREN forum	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2	678.58	Travel to NREN Forum and kick-off meetings	
Cost item 3			
…			

		SA2 – Network provisioning for a global VLBI array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost			
Cost item 2			
Cost item 3			
…			
Total direct eligible costs	678.58		
Total indirect costs			
Total costs [2]	678.58	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only
[2] Totals should correspond to the respective figures on FORM C - Financial Statemen

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	Nr. 8	Participant short name	CSIRO

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			
Cost item 3			
...			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost			
Cost item 2			
Cost item 3			
...			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			
Cost item 3			
...			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			
Cost item 3			
...			

		SA1- Production e-VLBI Service	

Justification of resources deployed during reporting period

		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			
Cost item 3			
...			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2	1,244,549.07 €	Internet connectivity and components	
Cost item 3	195,520.00 €	Annual service costs. Rental plus maintenance.	
...			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			
Cost item 3			
...			

Total direct eligible costs	1,440,069.07 €		
Total indirect costs			
Total costs [2]	1,440,069.07 €	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

Last-mile network connectivity costs to all antennas were incurred in this period.

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.

[2] Totals should correspond to the respective figures on FORM C - Financial Statement

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	9	Participant short name	NRF

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA1- Production e-VLBI Service

Justification of resources deployed during reporting period

		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Total direct eligible costs	0		
Total indirect costs	0		
Total costs [2]	0	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] Totals should correspond to the respective figures on FORM C - Financial Statement

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	10	Participant short name	INAF

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2	2,457.41	Travel (Kick-off meeting)	

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost			
Cost item 2			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			

		SA1- Production e-VLBI Service	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2	4,528.88	Fiber, Works for Fiber tunnels and MK-V upgrade	

Justification of resources deployed during reporting period

		JRA1- FABRIC	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			

Total direct eligible costs	6,986.29		
Total indirect costs	937.26		
Total costs [(2)]	7,923.55	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	179166,67

Justify any deviations with respect to the planned budget

[(1)] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[(2)] Totals should correspond to the respective figures on FORM C - Financial Statement

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	11	Participant short name	MPG

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	362.20	Managing-travel cost	
Cost item 3	5	Charges for the banktransfer of the first tranche	
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

Justification of resources deployed during reporting period

		SA1- Production e-VLBI Service	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [(1)]	0,75 person month (claimed 0 months)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	2104.06	LWL-Anbindung VLBI-Labor an Rechenzentrum	
Cost item 3	0		
…			

		JRA1- FABRIC	
		Total effort in person-months [(1)]	0,9 person month (claimed 0 months)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0		
Cost item 2	0		
Cost item 3	0		
…			

Total direct eligible costs	2471.26		
Total indirect costs	494.25		
Total costs [(2)]	2965.51	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	106332.41 (incl. own staff and equipment)

Justify any deviations with respect to the planned budget

[(1)] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[(2)] Totals should correspond to the respective figures on FORM C - Financial Statement

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	12	Participant short name	TKK

		"Task number - JRA1 FABRIC"	
		Total effort in person-months [(1)]	21.3 [9.9]
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	20,383.03	Data acquisition design work	
Cost item 2	1,577.59	Travel	
Cost item 3			
…			

		"Task number - SA2"	
		Total effort in person-months [(1)]	0 [0]
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost	0.00		
Cost item 2	11,070.00	50 % of fibre connection service cost	
Cost item 3	2,178.46	Fibre equipment depreciation	
…			

		"Task number - Consortium Management"	
		Total effort in person-months [(1)]	0.08 [0]
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0.00		
Cost item 2	423.24	Travel to Consortium Board meeting (as chairman of the Board)	
Cost item 3			
…			

Total direct eligible costs	35,632.32		
Total indirect costs	7,126.46		
Total costs [(2)]	42,758.78	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	215,226.34

Justify any deviations with respect to the planned budget

[(1)] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[(2)] Totals should correspond to the respective figures on FORM C - Financial Statement

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	13	Participant short name	CORNELL

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA1- Production e-VLBI Service

Justification of resources deployed during reporting period

		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Total direct eligible costs	0		
Total indirect costs	0		
Total costs [2]	0	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	026642	Project acronym	EXPReS
Participant N°	14	Participant short name	UMK

		NA1- Management of I3	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2	879.52	travelling cost to the Netherlands (EXPReS Board Meeting, Zaandam, 30Oct-01Nov 2007) - tickets, hotels, travellig allowances	
Cost item 3			
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA3- E-VLBI Science Forum	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA1- Production e-VLBI Service	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Total direct eligible costs	879.52		
Total indirect costs	175.90		
Total costs [2]	1055.42	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	026642	Project acronym	EXPReS
Participant N°	15	Participant short name	OSO

		NA1- Management of I3	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2	245.64	Travels expenses Amsterdam 071128 John Conway, 2006-11555	
Cost item 3	703.73	Flightticket Amsterdam , John Conway 061031-061101, VIA Travel 40341653	
Total cost, NA1	949.37		

		NA2- EVN-NREN Forum/ NA3-E-VBI Science Forum	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost			
Cost item 2	128.37	Flight ticket to Stockholm 060531, Michael Olberg, VIA Travel 40320466	
Cost item 3	22.96	Travel expenses for Michael Olberg 060531, 2006-06094	
Cost item 4	504.33	EVN directors meeting as eVSAG chair 17-19/5-06, Flight ticket Florence, John Conwa	
Cost item 5	453.99	Travel expenses in Florence 060519, John Conway, 2006-04765	
Cost item 6	720.33	Flight ticket to Amsterdam 061128, John Conway, VIA Travel 40341653	
Total costs, NA2,3	1,829.98		

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2	380.70	VLBI-computer for testing, Dustin 40326270	
Cost item 3	211.15	Allied Media Converter, Dustin 40333312	
Cost item 4	238.96	Travel expenses for kick off meeting 22-23/3-06, John Conway, 2006-03397	
Cost item 5	85.90	Train to Stockholm for Visa application, Miroslav Pantaleev, Broström 40330977	
Cost item 6	180.65	Travel expenses to Stockholm, Miroslav Pantaleev, 2006-07553	

Cost item 7	270.76	Flight ticket to Manchester 060831, John Conway, Broströms 40330209
Cost item 8	318.83	Travel expenses for meeting Bits and Bytes, Jodrell Bank, John Conway, 2006-08273
Cost item 9	699.85	Flight ticket to Manchester 060831, Miroslav Pantaleev, Broström 40332431
Cost item 10	296.73	Travel expenses meeting Bits and Bytes, Jodress Bank, Miroslav Pantaleev, 2006-08136
Cost item 11	311.61	Flight ticket to Poland 060924, John Conway, Broströms 40333187
Cost item 12	220.10	Travel expenses 2nd Face-to-Face meeting 060924, John Conway, 2006-08703
Total JRA	3,215.24	

Total direct eligible costs	5,994.59		
Total indirect costs	1,198.92		
Total costs [2]	7,193.51	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only

[2] Totals should correspond to the respective figures on FORM C - Financial Statemen

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	16	Participant short name	ShAO
		SA2	
		Total effort in person-months [1]	6.0 (0)

Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)
Personnel cost	3,600.00 €	Network engineers
Cost item 2	12,540.00 €	Network equipment- 2 swither,rooter,firewall,2 40Km SFP module
Cost item 3	15,115.52 €	Fiber rent costs(Sheshan-----Shanghai)
…		

Total direct eligible costs	23,697.76 €		
Total indirect costs			
Total costs [2]	23,697.76 €	Global estimate of the total costs for AC contractors (not only the eligible costs)	23,697.76 €

Justify any deviations with respect to the planned budget

EXAMPLE STATEMENTS:
- Personnel appointment was delayed by 6 months, costs and activities were subsequently delayed.
- Network connectivity was not possible during the first year, costs are not reported.
- Additional computer hardware was purchased and reported.

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] Totals should correspond to the respective figures on FORM C - Financial Statement

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	17	Participant short name	UDEC

		NA1- Management of I3	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA2- EVN-NREN Forum	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA3- E-VLBI Science Forum	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months [(1)]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Justification of resources deployed during reporting period

		SA1- Production e-VLBI Service	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	2
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2	8484.1	Internetaccess for special test runs	
Cost item 3	17304.91	Execution of EXPReS tests	
…			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Total direct eligible costs	25789.01		
Total indirect costs			
Total costs [2]	25789.01	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.

[2] Totals should correspond to the respective figures on FORM C - Financial Statement

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	18	Participant short name	UNIMAN

		NA1- Management of I3	
		Total effort in person-months [(1)]	0.51 (0.01)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0.00		
Cost item 2	542.92	Management meetings	
Subtotal direct costs	**542.92**		

		NA2- EVN-NREN Forum	
		Total effort in person-months [(1)]	0.1 (0)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost	0.00		
Cost item 2	732.37	Travel to NREN & Kick-off meeting 30/10-01/11/06	
Subtotal direct costs	**732.37**		

		NA3- E-VLBI Science Forum	
		Total effort in person-months [(1)]	0.1 (0)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2	0.00	3 day including 2 day visit for EVN-PC funded by UniMan	
…			

		NA4- e-VLBI Outreach	
		Total effort in person-months [(1)]	0 (0)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
…			

Justification of resources deployed during reporting period

		SA1- Production e-VLBI Service	
		Total effort in person-months [(1)]	14.1 (1.5)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	7,362.45	Digital Engineer, December 2006 - February 2007	
Cost item 2	506.18	Computer: monitor for CAD	
Cost item 3	983.88	Computer desktop for FPGA design	
Subtotal direct costs	**8,852.51**		
		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [(1)]	0.2 (0)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	0.00	Rental of fibre links (EUR 66,865.08 contributed)	
Cost item 2	0.00	Discussion with NetNorthWest on 10 Gbps capability. Rental for links paid.	
…	0.00	Further discussions with NetNorthWest and with UKERNA.	
		JRA1- FABRIC	
		Total effort in person-months [(1)]	15.35 (1.5)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost	7,362.45	Digital Engineer, December 2006 - February 2007	
Cost item 2	2,136.39	Travel to meetings	
Cost item 3	1,015.79	Hardware for E-VLBI	
Subtotal direct costs	**10,514.64**		

Total direct eligible costs	20,642.44		
Total indirect costs	4,128.49		
Total costs [(2)]	24,770.93	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	245,603.20

Justify any deviations with respect to the planned budget

The Digital Engineer was appointed in December 2006 (1 FTE); his personnel costs have been divided equally between SA1 and JRA1.

The Outreach Officer is due to commence contribution in 2007, with his personnel costs to be split over 2 years (2007-2008).

The ECB conversion rate used is 0.67365 GBP/Euro.

[(1)] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.

[(2)] Totals should correspond to the respective figures on FORM C - Financial Statement

Justification of resources deployed during reporting period

Contract N°	026642	Project acronym	EXPReS
Participant N°	19	Participant short name	VeA/VIRAC

		NA1- Management of I3	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			
Cost item 3			
...			

		NA2- EVN-NREN Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost		none	
Cost item 2			
Cost item 3			
...			

		NA3- E-VLBI Science Forum	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost		none	
Cost item 2	303	Travel ezpenses Ventspils - Dvingeloo - Ventspils. Attendance of eVSAG meeting	
Cost item 3			
...			

		NA4- e-VLBI Outreach	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost			
Cost item 2			
Cost item 3			
...			

Justification of resources deployed during reporting period

		SA1- Production e-VLBI Service	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

		SA2- Network Provision for Global e-VLBI Array	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost		none	
Cost item 2	209,662.00	Fiber installation Irbene - Ventspils (20 km)	
Cost item 3			
…			

		JRA1- FABRIC	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost			
Cost item 2			
Cost item 3			
…			

Total direct eligible costs	209,965.00		
Total indirect costs	41,993.00		
Total costs [2]	251,958.00	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] Totals should correspond to the respective figures on FORM C - Financial Statement

2. FORMS C - FINANCIAL STATEMENTS

The following pages contain the “Form C” financial statements for each of the 19 EXPReS partners.

JIVE
AARNET
DANTE
PSNC
SURFnet
ASTRON
CNIG-IGN
CSIRO
NRF
INAF
MPG
TKK
CORNELL
UMK
OSO
SHAO
UDEC
UNIMAN
VeA/VIRAC

Please note that final versions of the Form C's will be presented at the Annual Review; many partners required the full 45 day period to obtain their signed audit documents.

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	JOINT INSTITUTE FOR VERY LONG BASELINE INTERFEROMETRY (VLBI) IN EUROPE		
Legal Type	GOV(NAO)		
Contact Person	H.J. van Langevelde	Telephone	0031 521 596500
Telecopy	0031 521 596539	E-mail	langevelde@jive.nl

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat rate of 20%

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	2006 March 01	TO	2007 Feb 28

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	74,821.80 €				77,777.26 €		16,012.86 €				314,087.21 €		482,699.13 €	0.00 €
Of which subcontracting													0.00 €	0.00 €
Indirect costs	14,964.36 €				15,555.45 €		3,202.57 €				62,817.44 €		96,539.83 €	0.00 €
Adjustments to previous period(s)													0.00 €	0.00 €
Total costs	89,786.16 €	0.00 €	0.00 €	0.00 €	93,332.71 €	0.00 €	19,215.43 €	0.00 €	0.00 €	0.00 €	376,904.65 €	0.00 €	579,238.96 €	0.00 €

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing(in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			yes
If yes, please indicate the amount (in €)			25,109.90 €

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution requested is equal to (amount in€)			579,238.96 €

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			yes
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to	
What is the total cost of this(those) audit certificate(s) (in€) per independent auditor(s) ?			TBD

Audit certificate of the contractor (X)			
Legal name of the audit firm	Deloitte	Cost of the certificate	TBD
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	NO
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	NO
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	H.J. van Langevelde	**J. Wubs-Komdeur**
	Date	**Date**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	AARNET PTY LTD		
Legal Type	PRIV		
Contact Person	C. Hancock	Telephone	
Telecopy		E-mail	

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1, 2006	TO	February 28, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			NO
If Yes, please provide the following information			
Third Party 1 (Y1) Legal name		Cost model used	
Third Party 2 (Y2) Legal name		Cost model used	
Third Party 3 (Y3) Legal name		Cost model used	
Third Party 4 (Y4) Legal name		Cost model used	
If necessary add another Form C			

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs; do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs													0	
Of which subcontracting														
Indirect costs													0	
Adjustments to previous period(s)														
Total costs													0	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing(in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in€)

For this period, the FP6 Community financial contribution resuested is equal to (amount in€)		*0*

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			NO
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	C. Hancock	
	Date	**Date**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	DELIVERY OF ADVANCED NETWORK TECHNOLOGY TO EUROPE LIMITED		
Legal Type	PRIV		
Contact Person	DR JOHN CHEVERS	Telephone	
Telecopy		E-mail	John.Chevers@dante.org.uk

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	REAL

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1, 2006	TO	February 28, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			NO
If Yes, please provide the following information			
Third Party 1 (Y1) Legal name		Cost model used	
Third Party 2 (Y2) Legal name		Cost model used	
Third Party 3 (Y3) Legal name		Cost model used	
Third Party 4 (Y4) Legal name		Cost model used	
If necessary add another Form C			

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							505.46						505.46	
Of which subcontracting														
Indirect costs							404.37						404.37	
Adjustments to previous period(s)														
Total costs							909.83						909.83	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing(in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			NO
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in€)

For this period, the FP6 Community financial contribution resuested is equal to (amount in€)		*909.83*

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			NO
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	yes
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	no
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Date	**Date**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	INSTYTUT CHEMII BIOORGANICZNEJ PAN		
Legal Type			
Contact Person	Norbert Meyer	Telephone	+48 61 8582050
Telecopy	+48 61 852 59 54	E-mail	meyer@man.poznan.pl

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	1-03-2006	TO	28-02-2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name	Cost model used	
Third Party 2 (Y2)	Legal name	Cost model used	
Third Party 3 (Y3)	Legal name	Cost model used	
Third Party 4 (Y4)	Legal name	Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	47,582.18						844.45						48,426.63	
Of which subcontracting	0.00						0.00						0.00	
Indirect costs	9,516.44						168.89						9,685.33	
Adjustments to previous period(s)	0.00						0.00						0.00	
Total costs	57,098.62						1,013.34						58,111.96	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)		*58,111.96*

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			Yes
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	Zespół Biegłych Rewidentów "SALDO KREDYT" Sp. Z o.o.	**Cost of the certificate**	**309.91**
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	309.91

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	YES
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	NO
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	NORBERT MEYER	**MARIA SZUBIŃSKA**
	Date	**Date**
	20.03.2007	**20.03.2007**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	SURFnet bv		
Legal Type	PRIV N/C		
Contact Person	Willem-jan Verkleij	Telephone	030-2305313
Telecopy		E-mail	willem-jan.verkleij@surfnet.nl

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1, 2006	TO	February 28, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name	Cost model used	
Third Party 2 (Y2)	Legal name	Cost model used	
Third Party 3 (Y3)	Legal name	Cost model used	
Third Party 4 (Y4)	Legal name	Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs; do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs													0	
Of which subcontracting														
Indirect costs													0	
Adjustments to previous period(s)														
Total costs													0	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing(in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in€)

For this period, the FP6 Community financial contribution resuested is equal to (amount in€)		*0*

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			0

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	B. Nederkoorn	B. Nederkoorn
	Date	**Date**
	March 9, 2007	March 9, 2007
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	Stichting Astronomisch Onderzoek in Nederland (ASTRON)		
Legal Type	GOV (NAO)		
Contact Person	Dr. C.M. de Vos	Telephone	0031 521595100
Telecopy	0031 521595101	E-mail	Vos@astron.nl

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	2006 March 01	TO	2007 Feb 28

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	
If necessary add another Form C				

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	0.00						0.00				0.00		0.00	
Of which subcontracting														
Indirect costs	0.00						0.00				0.00		0.00	
Adjustments to previous period(s)														
Total costs	0.00						0.00				0.00		0.00	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)			0.00

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)					NO
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)					
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to			
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?					

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, i Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Dr. C.M. de Vos	**J. Wubs - Komdeur**
	Date	**Date**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	CENTRO NACIONAL DE INFORMACION GEOGRAFICA – INSTITUTO GEOGRAFICO NACIONAL		
Legal Type			
Contact Person	Rafael Bachiller	Telephone	34918855063
Telecopy	34918855062	E-mail	r.bachiller@oan.es

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1 2006	TO	February 28, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	
If necessary add another Form C				

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							678.58						678.58	
Of which subcontracting														
Indirect costs														
Adjustments to previous period(s)														
Total costs							678.58						678.58	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution requested is equal to (amount in €)			678.58

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)						No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)						
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to				
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?						

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Rafael Bachiller	**Alberto Sereno Álvarez**
	Date	**Date**
	March 1, 2007	**March 1, 2007**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	**Integrated Initiatives for Infrastructures**	**Type of Action (if necessary)**	**N.A.**
Project Title (or Acronym)	**EXPReS**	**Contract n°**	**026642**

Contractors's legal name	**CSIRO**		
Legal Type	**Government Agency**		
Contact Person	**A Tzioumis**	**Telephone**	(+)61 2 9372 4350
Telecopy		**E-mail**	Tasso.Tzioumis@csiro.au

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	**FC**	**Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)**	

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	**2006 March 01**	**TO**	**2007 Feb 28**

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			NO
If Yes, please provide the following information			
Third Party 1 (Y1) **Legal name**		**Cost model used**	
Third Party 2 (Y2) **Legal name**		**Cost model used**	
Third Party 3 (Y3) **Legal name**		**Cost model used**	
Third Party 4 (Y4) **Legal name**		**Cost model used**	
If necessary add another Form C			

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)

Direct costs									195,520.00 €		1,244,549.07 €		1,440,069.07 €	
Of which subcontracting														
Indirect costs														
Adjustments to previous period(s)														
Total costs									195,520.00 €		1,244,549.07 €		1,440,069.07 €	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+ (D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			NO
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)			20,000.00 €

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)						YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)						YES
If No, what are the periods covered by this(those) audit certificate(s) ?	2006 March 01	From -to	2007 February 28			
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?						

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	

If necessary add another Form C.	**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	NO
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	YES
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Anastasios Tzioumis	Neil Derwent
	Date	**Date**
	10-Apr-07	10-Apr-07
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	National Research Foundation		
Legal Type	NAO		
Contact Person	Dr Jonathan Quick	Telephone	+27 326 0742
Telecopy	+27 12 326 0756	E-mail	jon@hartrao.ac.za

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	2006 March 01	TO	2007 Feb 28

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			NO
If Yes, please provide the following information			
Third Party 1 (Y1)	Legal name	Cost model used	
Third Party 2 (Y2)	Legal name	Cost model used	
Third Party 3 (Y3)	Legal name	Cost model used	
Third Party 4 (Y4)	Legal name	Cost model used	
If necessary add another Form C			

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs														
Of which subcontracting														
Indirect costs														
Adjustments to previous period(s)														
Total costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes /			NO
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)			0

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)					
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)					
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to			
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?					

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Dr Jonathan Quick	Katlego Makgabo
	Date	**Date**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	**Integrated Initiatives for Infrastructures**	**Type of Action (if necessary)**	**N.A.**
Project Title (or Acronym)	**EXPReS**	**Contract n°**	**026642**

Contractors's legal name	**Istituto di Radioastronomia (IRA) - INAF**		
Legal Type	**Public Research Institution**		
Contact Person	**Mauro Nanni**	**Telephone**	**0039 051 6399408**
Telecopy		**E-mail**	m.nanni@ira.inaf.it

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	**FCF**	**Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)**	**Flat Rate of 20%**

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	**2006 March 01**	**TO**	**2007 Feb 28**

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			NO
If Yes, please provide the following information			
Third Party 1 (Y1) **Legal name**		**Cost model used**	
Third Party 2 (Y2) **Legal name**		**Cost model used**	
Third Party 3 (Y3) **Legal name**		**Cost model used**	
Third Party 4 (Y4) **Legal name**		**Cost model used**	
If necessary add another Form C			

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)

Direct costs					2,457.41						4,528.88		6,986.29	
Of which subcontracting											2,300.00		2,300.00	
Indirect costs					491.48						445.78		937.26	
Adjustments to previous period(s)														
Total costs					2,948.89						4,974.66		7,923.55	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)			7,923.55

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)					NO
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)					
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to			
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?					

Studio Comm. Associato Cippitani & Di Gioacchino *€ 780,00*

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	

Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Dr. Mauro NANNI	**Dr.ssa Luigina FERETTI**
	Date	**Date**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	Max-Planck-Gesellschaft zur Förderung der Wissenschaften e.V.		
Legal Type	PRIV/NAO/NC		
Contact Person	Walter Alef	Telephone	49 228 525 289
Telecopy	49 228 525 229	E-mail	alef@mpifr-bonn.mpg.de

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flate Rate of 20% of Direct Costs, except subcontracting(*)

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1, 2006	TO	February 28, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			No
If Yes, please provide the following information			
Third Party 1 (Y1)	Legal name	Cost model used	
Third Party 2 (Y2)	Legal name	Cost model used	
Third Party 3 (Y3)	Legal name	Cost model used	
Third Party 4 (Y4)	Legal name	Cost model used	
If necessary add another Form C			

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs					367.2						2104.06		2471.26	
Of which subcontracting														
Indirect costs					73.44						420.81		494.25	
Adjustments to previous period(s)														
Total costs					440.64						2524.87		2965.51	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			No
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)		*2965.51*

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			Yes
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	MPG	**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	YES
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	NO
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Prof. Dr. Anton Zensus	**Gertrud Bilski**
	Date	**Date**
	2007 03 12	**2007 03 12**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	Teknillinen korkeakoulu		
Legal Type	Non-commercial		
Contact Person	Ari Mujunen	Telephone	+358-9-2564425
Telecopy	+358-9-2564531	E-mail	Ari.Mujunen@tkk.fi

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat rate of 20%

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	1.3.2006	TO	28.2.2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	
If necessary add another Form C				

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	21,960.62	0.00	0.00	0.00	423.24	0.00	0.00	0.00	0.00	0.00	13,248.46	0.00	35,632.32	0.00
Of which subcontracting														
Indirect costs	4,392.12	0.00	0.00	0.00	84.65	0.00	0.00	0.00	0.00	0.00	2,649.69	0.00	7,126.46	0.00
Adjustments to previous period(s)														
Total costs	26,352.74	0.00	0.00	0.00	507.89	0.00	0.00	0.00	0.00	0.00	15,898.15	0.00	42,758.78	0.00

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0.00	

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution requested is equal to (amount in €)			42758.78

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)					No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)					
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to			
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?					

Audit certificate of the contractor (X)			
Legal name of the audit firm	Ritva Weckström, CPF	**Cost of the certificate**	715.58
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	Yes
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	No
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Ari Mujunen	**Elise Kovanen**
	Date	**Date**
	March 6, 2007	March 6, 2007
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	Cornell University		
Legal Type			
Contact Person	Dianna Marsh	Telephone	6072550607
Telecopy	6072558803	E-mail	dmm20@cornell.edu

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)		Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	11% MTDC

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1, 2006	TO	February 28, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				NO
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	
If necessary add another Form C				

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs													0	0
Of which subcontracting													0	0
Indirect costs													0	0
Adjustments to previous period(s)													0	0
Total costs													0	0

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			NO
If yes, please indicate the amount (in €)			0

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)		*0*

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			NO
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Dr. Arun Venkataraman	Dianna Marsh
	Date	**Date**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	**Integrated Infrastructure Initiatives**	**Type of Action (if necessary)**	
Project Title (or Acronym)	**EXPReS**	**Contract n°**	026642
Contractors's legal name	**Uniwersitet Mikolaja Kopernika**		
Legal Type	**GOV (NAO)**		
Contact Person	**ANDRZEJ TRETYN**	**Telephone**	48-56-6114228
Telecopy	**56-6542944**	**E-mail**	prorektor-Tretyn@uni.torun.pl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	**AC/UF**	**Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)**	Flat Rate of 20%
Period from	**1ST MARCH 2006**	**TO**	**28 TH FEBRUARY 2007**

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	NO

If Yes, please provide the following information

Third Party 1 (Y1)	**Legal name**		**Cost model used**	
Third Party 2 (Y2)	**Legal name**		**Cost model used**	
Third Party 3 (Y3)	**Legal name**		**Cost model used**	
Third Party 4 (Y4)	**Legal name**		**Cost model used**	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	879.52												879.52	
Of which subcontracting														
Indirect costs	175.90												175.90	
Adjustments to previous period(s)														
Total costs	1,055.42												1,055.42	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	no
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	**1,055.42**

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			NO
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	YES
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Prof. dr Andrzej Kus	**Mgr S. Głowacki**
	Date	**Date**
	12 March 2007	**12 March 2007**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	Chalmers Tekniska Högskola AB		
Legal Type	Public body non commercial		
Contact Person	John Conway	Telephone	0046 31 7725503
Telecopy	0046 3 772 5590	E-mail	jconway@chalmers.se

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat rate of 20%

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1, 2006	TO	February 28, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs

The costs declared should distinguish between direct and indirect costs

If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	5045.22				949.37								5994.59	
Of which subcontracting													0	
Indirect costs	1009.04				189.87		0						1198.92	
Adjustments to previous period(s)													0	
Total costs	6054.26				1139.24		0						7193.51	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			No
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)			7193.51

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)						Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)						Yes
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to				
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?						

Audit certificate of the contractor (X)			
Legal name of the audit firm	Ernst & Young	Cost of the certificate	556.71
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	Yes
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	John Conway	Ingrid Eriksson
	Date	**Date**
	March 8, 2007	March 8, 2007
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	Shanghai Astronomical Observatory, Chinese Academy of Sciences, Shanghai, China		
Legal Type	GOV		
Contact Person	Xiaoyu Hong	Telephone	86 21 54901005
Telecopy	86 21 54592232	E-mail	xhong@shao.ac.cn

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	FCF	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1, 2006	TO	February 28, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	NO

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs											23,697.76 €		23697.8	0
Of which subcontracting													0	0
Indirect costs													0	0
Adjustments to previous period(s)													0	0
Total costs	0	0	0	0	0	0	0	0	0	0	23697.76	0	23697.8	0

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)			23697.76

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)						Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)						Yes
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to				
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?						100

Audit certificate of the contractor (X)			
Legal name of the audit firm	Shanghai Qiushi Audit Office	Cost of the certificate	100
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	yes
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	yes
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Date	**Date**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	Universidad de Concepcion		
Legal Type	PRIV		
Contact Person	Hayo Hase	Telephone	0056 41 2207030
Telecopy	0056 41 2207031	E-mail	hayo.hase@tigo.cl

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1, 2006	TO	March 13, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	
If necessary add another Form C				

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs									8484.1		17304.9		25789.04	
Of which subcontracting														
Indirect costs														
Adjustments to previous period(s)														
Total costs									8484.1		17304.9		25789.04	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts											0		0	

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution requested is equal to (amount in €)		*21546.99*

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			Yes
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to	March 1, 2006 – March 13, 2007
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			908.48

Audit certificate of the contractor (X)			
Legal name of the audit firm	BDO Auditores Ltda	Cost of the certificate	908.48
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	Yes
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	No
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Dr. Hayo Hase	**Sra. Teresa Tapia Brevis**
	Date	**Date**
	March 27, 2007	**March 27, 2007**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	UNIVERSITY OF MANCHESTER		
Legal Type	PUBLIC BODY		
Contact Person	PROF PHILIP DIAMOND	Telephone	44 (0)1477 572625
Telecopy	44 (0)1477 572649	E-mail	philip.j.diamond@manchester.ac.uk

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	March 1, 2006	TO	February 28, 2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	
If necessary add another Form C				

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	10514.64		0.00		542.92		732.37		8852.51		0.00		20642.44	
Of which subcontracting														
Indirect costs	2102.93		0.00		108.58		146.47		1770.50		0.00		4128.49	
Adjustments to previous period(s)														
Total costs	12617.56		0.00		651.51		878.84		10623.01		0.00		24770.93	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			No
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution requested is equal to (amount in €)		*24,770.93*

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			Yes
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			700

Audit certificate of the contractor (X)			
Legal name of the audit firm	UNIAC	Cost of the certificate	700
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	700

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	Yes
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	PROFESSOR PHILIP DIAMOND	**DR DAVID STANNARD**
	Date	**Date**
	Friday 23 March 2007	**Friday 23 March 2007**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	EXPReS	Contract n°	026642

Contractors's legal name	Ventspils University College		
Legal Type	GOV		
Contact Person	Ivars Smelds	Telephone	+371 26412683
Telecopy	+371 3629660	E-mail	shmeld@latnet.lv

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat rate 20%

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two costs models used (eg: FC / UF or FCF / UF or AC/UF)

Period from	2006 March 01	TO	2007 Feb 28

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	
If Yes, please provide the following information	

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							303.00				209,662.00		209,965.00	
Of which subcontracting														
Indirect costs							61.00				41,932.00		41,993.00	
Adjustments to previous period(s)														
Total costs							364.00				251,594.00		251,958.00	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Training (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E')		Other Specific Activities (F')		Total (G') = (A')+(B')+(C')+(D')+(E')	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.			
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)			
If yes, please indicate the amount (in €)			

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)			40,364.00

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)				YES	
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)				YES	
If No, what are the periods covered by this(those) audit certificate(s) ?		From -to			
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?					

Audit certificate of the contractor (X)			
Legal name of the audit firm	Capitals	Cost of the certificate	1000.-
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another ***Form C.***		Total (Z) = (X) + (Ys)	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO) NO	YES
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	NO
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Janis Vucans	**Inita Fridenberga**
	Date	Date
	10.04.2007.	10.04.2007.
	Signature	Signature

VENTSPILS AUGSTSKOLA
LATVIJAS REPUBLIKA

Summary Financial Report

Type of Instrument	I3	Project Title (or Acronym)	EXPReS	Contract N°	26642
Reporting period number	1	From (dd/mm/yyyy)	March 1, 2006	To (dd/mm/yyyy)	February 28, 2007	Page	1/1

Contractor n°	Organisation Short Name	Cost model used	Eligible costs (in €)	Type of activities: Research and Technological Development / Innovation (A)			Demonstration (B)			Management of the consortium (C)			Other specific activities: coordination/Networking (D)			Other Specific Activities: Transnational Access/Connectivity (E)			Other Specific Activities (F)			Total eligible costs (G)=(A)+(B)+(C)+(D)+(E)+(F)			requested EC contribution	Receipts		
				Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)		Contractor	AC Third party(ies)	FC/FCF Third party(ies)
1	JIVE	AC	Direct eligible costs	74,821.80						77,777.26			16,012.86						314,087.21			482,699.13	0.00	0.00	579,238.95			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs	14,964.36						15,555.45			3,202.57						62,817.44			96,539.82	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*89,786.16*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*93,332.71*	*0.00*	*0.00*	*19,215.43*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*376,904.65*	*0.00*	*0.00*	579,238.95	0.00	0.00				
2	AARNET PTY LTD	AC	Direct eligible costs																			0.00	0.00	0.00	0.00			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs																			0.00	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	0.00	0.00	0.00				
3	DANTE	FC	Direct eligible costs										505.46									505.46	0.00	0.00	909.83			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs										404.37									404.37	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*909.83*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	909.83	0.00	0.00				
4	PSNC	AC	Direct eligible costs	47,582.18									844.45									48,426.63	0.00	0.00	58,111.96			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs	9,516.44									168.89									9,685.33	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*57,098.62*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1,013.34*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	58,111.96	0.00	0.00				
5	SURFnet	FC	Direct eligible costs																			0.00	0.00	0.00	0.00			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs																			0.00	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	0.00	0.00	0.00				
6	ASTRON	FC	Direct eligible costs																			0.00	0.00	0.00	0.00			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs																			0.00	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	0.00	0.00	0.00				
7	CNIG-IGN	FC	Direct eligible costs										678.58									678.58	0.00	0.00	678.58			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs																			0.00	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*678.58*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	678.58	0.00	0.00				
8	CSIRO	FC	Direct eligible costs													133,063.33			1,244,549.07			1,377,612.40	0.00	0.00	20,000.00			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs																			0.00	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*133,063.33*	*0.00*	*0.00*	*1,244,549.07*	*0.00*	*0.00*	1,377,612.40	0.00	0.00				
9	NRF	FCF	Direct eligible costs																			0.00	0.00	0.00	0.00			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs																			0.00	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	0.00	0.00	0.00				

Summary Financial Report

Type of Instrument	I3	Project Title (or Acronym)	EXPReS	Contract N°	26642
Reporting period number	1	From (dd/mm/yyyy)	March 1, 2006	To (dd/mm/yyyy)	February 28, 2007	Page	1/1

Contractor n°	Organisation Short Name	Cost model used	Eligible costs (in €)	Type of activities: Research and Technological Development / Innovation (A)			Demonstration (B)			Management of the consortium (C)			Other specific activities: coordination/Networking (D)			Other Specific Activities: Transnational Access/Connectivity (E)			Other Specific Activities (F)			Total eligible costs (G)=(A)+(B)+(C)+(D)+(E)+(F)			requested EC contribution	Receipts		
				Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)		Contractor	AC Third party(ies)	FC/FCF Third party(ies)
10	INAF	FCF	Direct eligible costs							2,457.41									6,228.88			8,686.29	0.00	0.00	6,361.78			
			of which direct eligible costs of subcontracting																2,300.00			*2,300.00*	*0.00*	*0.00*				
			Indirect eligible costs							491.48									1,245.78			1,737.26	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2,948.89*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*9,774.66*	*0.00*	*0.00*	12,723.55	0.00	0.00				
11	MPG	AC	Direct eligible costs							367.20									2,104.06			2,471.26	0.00	0.00	2,965.51			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs							73.44									420.81			494.25	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*440.64*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2,524.87*	*0.00*	*0.00*	2,965.51	0.00	0.00				
12	TKK	AC	Direct eligible costs	21,960.62						423.24									13,248.46			35,632.32	0.00	0.00	42,758.78			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs	4,392.12						84.65									2,649.69			7,126.46	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*26,352.74*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*507.88*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*15,898.15*	*0.00*	*0.00*	42,758.78	0.00	0.00				
13	CORNELL	FC	Direct eligible costs																			0.00	0.00	0.00	0.00			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs																			0.00	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	0.00	0.00	0.00				
14	UMK	AC	Direct eligible costs	879.52																		879.52	0.00	0.00	1,055.42			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs	175.90																		175.90	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*1,055.42*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	1,055.42	0.00	0.00				
15	OSO	AC	Direct eligible costs	5,045.22						949.37												5,994.59	0.00	0.00	7,193.51			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs	1,009.04						189.87												1,198.92	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*6,054.26*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1,139.24*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	7,193.51	0.00	0.00				
16	SHAO	AC	Direct eligible costs																23,697.76			23,697.76	0.00	0.00	23,697.76			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs																			0.00	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*23,697.76*	*0.00*	*0.00*	23,697.76	0.00	0.00				
17	UDEC	FC	Direct eligible costs													8,484.10						8,484.10	0.00	0.00	12,894.52			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs																17,304.94			17,304.94	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*8,484.10*	*0.00*	*0.00*	*17,304.94*	*0.00*	*0.00*	25,789.04	0.00	0.00				
18	UNIMAN	AC	Direct eligible costs	10,514.64						542.92			732.37			8,852.51						20,642.44	0.00	0.00	24,770.93			
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs	2,102.93						108.59			146.47			1,770.50						4,128.48	0.00	0.00				
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*12,617.57*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*651.50*	*0.00*	*0.00*	*878.84*	*0.00*	*0.00*	*10,623.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	24,770.92	0.00	0.00				

Summary Financial Report

Type of Instrument	I3	Project Title (or Acronym)	EXPReS	Contract N°	26642	
Reporting period number	1	From (dd/mm/yyyy)	March 1, 2006	To (dd/mm/yyyy)	February 28, 2007	Page 1/1

Contractor n°	Organisation Short Name	Cost model used	Eligible costs (in €)	Type of activities: Research and Technological Development / Innovation (A)			Demonstration (B)			Management of the consortium (C)			Other specific activities: coordination/Networking (D)			Other Specific Activities: Transnational Access/Connectivity (E)			Other Specific Activities (F)			Total eligible costs (G)=(A)+(B)+(C)+(D)+(E)+(F)			requested EC contribution	Receipts		
				Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)		Contractor	AC Third party(ies)	FC/FCF Third party(ies)
19	VeA/VIRAC	AC	Direct eligible costs										303.00			209,662.00						209,965.00	0.00	0.00				
			of which direct eligible costs of subcontracting																			*0.00*	*0.00*	*0.00*				
			Indirect eligible costs										61.00			41,932.00						41,993.00	0.00	0.00	40,364.00			
			Adjustment on previous period(s)																			0.00	0.00	0.00				
			Total eligible costs	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*364.00*	*0.00*	*0.00*	*251,594.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	251,958.00	0.00	0.00				
Total eligible costs				192,964.77	0.00	0.00	0.00	0.00	0.00	99,020.87	0.00	0.00	23,060.02	0.00	0.00	403,764.44	0.00	0.00	1,690,654.10	0.00	0.00	2,409,464.21	0.00	0.00	821,001.53	0.00	0.00	0.00
				192,964.77			0.00			99,020.87			23,060.02			403,764.44			1,690,654.10			2,409,464.21						0.00

Requested EC contribution for the reporting period (in €) without taking into account receipts	192,964.77	0.00	0.00	0.00	0.00	0.00	99,020.87	0.00	0.00	23,060.02	0.00	0.00	403,764.44	0.00	0.00	1,690,654.10	0.00	0.00	2,409,464.21								
	192,964.77			0.00			99,020.87			23,060.02			403,764.44			1,690,654.10										
Requested EC contribution for the reporting period (in €) taking into account receipts [=Periodic Invoice]																			2,409,464.21								
Amount of the financial interests generated by the prefinancing																											

Report on the Distribution of the Community's contribution

Type of Instrument	I3	Project Title (or Acronym)	EXPReS	Contract N°	26642

Part I — Community's prefinancing (or payment) sent to the coordinator (1)

	Reporting Period 1 (2)		Reporting Period 2		Reporting Period 3 (2)		Reporting Period 4 (2)		Reporting Period 5 (2)		Reporting Period 6 (2)		Reporting Period 7 (2)		Final payment		Total Amount (I) (3)
	From	To	From	To	From	To	From	To	From	To	From	To	From	To			
	1/03/2006	1/02/2007															
	Date	Amount (A)	Date	Amount (B)	Date	Amount (C)	Date	Amount (D)	Date	Amount (E)	Date	Amount (F)	Date	Amount (G)	Date	Amount (H)	
Total (X)		1,572,000.00															1,572,000.00

Part II — Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) (4)

Contractor n°	Organisation Short Name	Country Code	Reporting Period 1		Reporting Period 2		Reporting Period 3		Reporting Period 4		Reporting Period 5		Reporting Period 6		Reporting Period 7		Final payment		Total Amount (I') (6)
			Date(s) (5)	Amount(s) (A') (5)	Date(s) (5)	Amount(s) (B') (5)	Date(s) (5)	Amount(s) (C') (5)	Date(s) (5)	Amount(s) (D') (5)	Date(s) (5)	Amount(s) (E') (5)	Date(s) (5)	Amount(s) (F') (5)	Date(s) (5)	Amount(s) (G') (5)	Date(s) (5)	Amount(s) (H') (5)	
1	JIVE		2006 oct 3	497250															497,250.00
																			0.00
																			0.00
																			0.00
			Total	497,250.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	497,250.00
2	AARNET PTY LTD		2006 oct 3	3570															3,570.00
																			0.00
																			0.00
																			0.00
			Total	3,570.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	3,570.00
3	DANTE		2006 oct 3	2550															2,550.00
																			0.00
																			0.00
																			0.00
			Total	2,550.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	2,550.00
4	PSNC		2006 oct 3	44030															44,030.00
																			0.00
																			0.00
																			0.00
			Total	44,030.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	44,030.00
5	SURFnet		2006 oct 3	1530															1,530.00
																			0.00
																			0.00
																			0.00
			Total	1,530.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	1,530.00
6	ASTRON		2006 oct 3	25755															25,755.00
																			0.00
																			0.00
																			0.00
			Total	25,755.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	25,755.00
7	CNIG-IGN		2006 oct 3	27455															27,455.00
																			0.00
																			0.00
																			0.00
			Total	27,455.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	27,455.00
8	CSIRO		2006 oct 3	6800															6,800.00
																			0.00
																			0.00
																			0.00
			Total	6,800.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	6,800.00
9	NRF		2006 oct 3	4250															4,250.00
																			0.00
																			0.00
																			0.00
			Total	4,250.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	4,250.00
10	INAF		2006 oct 3	44455															44,455.00
																			0.00
																			0.00
																			0.00
			Total	44,455.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	44,455.00

Report on the Distribution of the Community's contribution

Type of Instrument	I3	Project Title (or Acronym)	EXPReS	Contract N°	26642

Part II — Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) *(4)*

Contractor n°	Organisation Short Name	Country Code	Reporting Period 1		Reporting Period 2		Reporting Period 3		Reporting Period 4		Reporting Period 5		Reporting Period 6		Reporting Period 7		Final payment		Total Amount (I') *(6)*
			Date(s) *(5)*	Amount(s) (A') *(5)*	Date(s) *(5)*	Amount(s) (B') *(5)*	Date(s) *(5)*	Amount(s) (C') *(5)*	Date(s) *(5)*	Amount(s) (D') *(5)*	Date(s) *(5)*	Amount(s) (E') *(5)*	Date(s) *(5)*	Amount(s) (F') *(5)*	Date(s) *(5)*	Amount(s) (G') *(5)*	Date(s) *(5)*	Amount(s) (H') *(5)*	
11	MPG		2006 oct 3	86955															86,955.00
																			0.00
																			0.00
																			0.00
			Total	86,955.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	86,955.00
12	TKK		2006 oct 3	78455															78,455.00
																			0.00
																			0.00
																			0.00
			Total	78,455.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	78,455.00
13	CORNELL		2006 oct 3	19550															19,550.00
																			0.00
																			0.00
																			0.00
			Total	19,550.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	19,550.00
14	UMK		2006 oct 3	6205															6,205.00
																			0.00
																			0.00
																			0.00
			Total	6,205.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	6,205.00
15	OSO		2006 oct 3	27880															27,880.00
																			0.00
																			0.00
																			0.00
			Total	27,880.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	27,880.00
16	SHAO		2006 oct 3	23800															23,800.00
																			0.00
																			0.00
																			0.00
			Total	23,800.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	23,800.00
17	UDEC		2006 oct 3	10710															10,710.00
																			0.00
																			0.00
																			0.00
			Total	10,710.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	10,710.00
18	UNIMAN		2006 oct 3	99535															99,535.00
																			0.00
																			0.00
																			0.00
			Total	99,535.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	99,535.00
19	VeA/VIRAC		2006 oct 3	10285															10,285.00
																			0.00
																			0.00
																			0.00
			Total	10,285.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	10,285.00
																	Page n° /	2	3
Total (Y)			Total	1,021,020.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	Total	0.00	#REF!

Part III

Difference between Community's prefinancing (or payment) sent to the coordinator and Total Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) *(4)*

	Reporting Period 1	Reporting Period 2	Reporting Period 3	Reporting Period 4	Reporting Period 5	Reporting Period 6	Reporting Period 7	Final payment	Total Amount
Community's prefinancing (or payment) not yet distributed between contractors (Z) *(7)*	550980.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#REF!

I certify that the information set out in this(these) form(s) is accurate and correct and agreed by all contractors.

Name *(8)*	Surname *(8)*	Date (dd/mm/yyyy)	Signature of the administrative official authorised to commit the organisation of the coordinator *(8)*

Explanatory notes

(1): To be filled in only by the Commission services.
(2): Established in conformity with articles 4.2 and 6 of the contract.
(3): (I) = (A) + (B) + (C) + (D) + (E) + (F) + (G) + (H)
(4): To be filled in only by the coordinator.
(5): Insert the dates (dd/mm/yyyy) and the amounts (x,xxx.xx €) transferred to a contractor (including the coordinator) for a reporting period. If there are more than one transfer to a contractor during a reporting period, identify
(6): (I') = (A') + (B') + (C') + (D') + (E') + (F') + (G') + (H')
(7): (Z) = (X) - (Y)
(8): One the following persons : authorised contact person or first or second administrative official authorised to sign the contract, as mentioned in your Contract Preparation Form (Form A2b)

Section D. Detailed Implementation Plan for the Next 18 Months

1. IMPLEMENTATION PLAN

1.1 Management Activity

1.1.1 NA1: Management of I3

The 18 month plan (project month 13 to 31) for NA1 contains no radical changes or deviations from the original plan. No new deliverables have been added. The deliverable in the first 12 months for NA1 is this annual report. All milestones identified in the first 18 month plan have been addressed and no new milestones will be added.

There are several administrative elements to address. Each is detailed below with references to other sections of this report as several of the changes require longer supporting documentation.

- *Change in Project Coordinator*

Through the monthly reports, the EC. was notified of the change from Mike Garrett to Huib Jan van Langevelde. Through email discussions with EXPReS's new Science Officer Jean-Luc Dorel, the project office was informed that the notification in the monthly report was sufficient to initiate the formal changes necessary from the EC.'s point of view. However, the project office was asked to submit a C.V. for van Langevelde. The full document is included as an appendix in Section E.

- *Addendum to the Consortium Agreement*

The EXPReS Board discussed and agreed upon an addendum to the Consortium Agreement. The formal changes were distributed to our partners and all have signed and returned the document. The full text of the document is included as an appendix in Section E.

- *Errors in initial "A Forms"*

Early in the project, Michael Garrett notified our Science Officer that the amount of funding received for the first 18 months was larger than expected. The inconsistencies resulted from differences in the A Forms. At that time, the advice was to proceed with the project and correct the inconsistencies during the Annual Review.

Project communications were using the 18 month distribution as outlined in "Table 3 - Summary table of expected budget and of the Community contribution requested to 18 months" in *Annex 1 Description of Work and consistent with* A3.3. The total requested EC contribution for the first 18 months was expected to be 1,201,200 EUR. This is the figure that was used when funds were distributed to our partners.

A3.1 and A3.2 indicate that the total Requested EC. Contribution for the three years of the project is 3,900,000 EUR. Using the quantities listed, the 18 month distribution is 1,850,000 EUR. This sum is inconsistent with the amount in the A3.3 and Table 3.

The Project Office received 1,572,000 EUR to be distributed to the partners. The distribution of funding followed the figures listed in Table 3 and Form A3.3. The remaining funds and next distribution take into account the inconsistencies.

- *Errors in initial Deliverables and Milestone tables*

The Project Office noted to our Science Officer some typographical errors and inconsistencies in the Deliverables and Milestone tables early in the project. The errors were generally small and did not

involve major activities in the first 12 months of the project. The recommendation was to identify these items in the First Annual Report and correct the tables as appropriate. The tables have been identified in the historical review and are corrected in the next 18 month plan per activity.

- *Unexpected Travel Costs*

Over the first year, we learned a bit about the financial spending for our partners. One of the items we will need to address is the radically different cost of travel for our international partners. Specifically, the cost for our Chilean and Australian partners are particularly difficult. Both have been active in the project with Australia providing the Vice-Chair for our Board. In order to improve participation, we continue to schedule EXPReS meetings near other meetings that will draw our partners. We hope to provide some additional funding for our more distant partners.

1.1.1.1 NA1: Deliverables and Milestones Tables

Deliverables for the remainder of the project (months 13-36). NA1 has completed all milestones listed in the DOW and does not plan to add any additional.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D81	NA1.02	Annual report (incl. Financial information) to EC	JIVE	24		
D111	NA1.03	Annual report (incl. Financial information) to EC	JIVE	36		
D112	NA1.04	Final Report to Board and EC	JIVE	36		
D113	NA1.05	Final Plan for using and disseminating knowledge	JIVE	36		
D114	NA1.06	Implementation of the Gender Action Plan	JIVE	36		
D115	NA1.07	Raising public participation and awareness	JIVE	36		

1.1.1.2 NA1: Period 2 Distribution

P #	Short Name	Period 2 Requested Distribution
1	JIVE	106,575 €
2	AARNET	1,575 €
3	DANTE	2,775 €
4	PSNC	1,575 €
5	SURFnet	1,575 €
6	ASTRON	1,575 €
7	CNIG-IGN	1,575 €
8	CSIRO	1,575 €
9	NRF	1,575 €
10	INAF	1,575 €
11	MPG	1,575 €
12	TKK	1,575 €
13	CORNELL	1,575 €
14	UMK	1,575 €
15	OSO	2,400 €
16	SHAO	1,575 €
17	UDEC	1,725 €
18	UNIMAN	1,725 €
19	VeA/VIRAC	1,725 €

1.2 Networking Activity

1.2.1 NA2: EVN-NREN Forum

1.2.1.1 NA2: Deliverables and Milestones Table

Several minor errors were identified in the NA2 Deliverables. The errors and corrections are noted as:

- D82 is given activity deliverable number NA2.08. No number was associated
- D82 is listed as support for Annual Report 2 and should be listed as support for Annual Report 3. The description and planned delivery month are modified to reflect the changes.
- Activity D90 is given AD# NA2.09. Activity D90 is then immediately removed as it is redundant with D88.
- D31, D82 The lead for the annual report activity is identified as DANTE, the leader of the activity. Note that the overall responsibility for the Annual Report remains as a deliverable under JIVE.

The table below shows the errors in red with the corrections. D90 will remain in the table, but struck-out to indicate its cancellation.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D48	NA2.03	EVN-NREN meeting No. 2	JIVE	18		
D31	NA2.04	NA2 annual report No. 2 (as part of EXPReS Ann. Rep No. 2)	DANTE	24		
D82	NA2.08	NA2 annual report No. 3 (as part of EXPReS Ann. Rep No. 3)	DANTE	36		
D88	NA2.05	EVN-NREN meeting No. 3	DANTE	26		
D89	NA2.06	EVN-NREN representatives present EXPReS networking results at the e-VLBI Science & Technology Workshop	DANTE	26		
~~D90~~	~~NA2.09~~	~~EVN-NREN meeting~~	~~DANTE~~	~~n/a~~	~~n/a~~	~~n/a~~
D116	NA2.07	NA2 annual & Final reports	JIVE	36		

No changes are planned for the Milestones table.

M#	AM#	Milestones Description	Lead	Delivery month		Status
				Planned	Actual	
M4	MN2.1	EVN-NREN chair attends EXPReS Board Meeting No. 1	DANTE	2	6	complete
M5	MN2.2	EVN-NREN chair attends EXPReS Consortium Board Meeting No. 2	DANTE	14		
M6	MN2.3	EVN-NREN chair attends EXPReS Board Meeting No. 3	DANTE	26		

1.2.1.2 NA2: Period 2 Distribution

P #	Short Name	Period 2 Requested Distribution
1	JIVE	14,475 €
2	AARNET	2,100 €
3	DANTE	6,075 €
4	PSNC	1,350 €
5	SURFnet	1,350 €

6	ASTRON	818 €
7	CNIG-IGN	825 €
8	CSIRO	1,500 €
9	NRF	1,500 €
10	INAF	825 €
11	MPG	825 €
12	TKK	825 €
13	CORNELL	1,500 €
14	UMK	825 €
15	OSO	825 €
16	SHAO	1,500 €
17	UDEC	1,650 €
18	UNIMAN	825 €
19	VeA/VIRAC	827 €

1.2.2 NA3: e-VLBI Science Forum

Within NA3 the eVSAG (e-VLBI Science Advisory Group) will remain an active form for discussing policy to promote end-user science with the e-VLBI infrastructure. In the first year e-VLBI as been organized with one 24hr session every 5 weeks in between the EVN's disk based runs. Proposed observations for e-VLBI on these fixed dates are submitted 2 weeks before the observation date and are evaluated by the EVN PC. It is expected that this system will evolve in two ways:

1) In 2008 when the capability of e-VLBI will equal or exceed disk based VLBI it is possible that e-VLBI will replace a significant part of the disk based observations in the standard EVN sessions. In addition for time variable 'targets of opportunity' we will investigate moving to a system when e-VLBI runs can be set up at short (few days) notice

2) In the second half of 2007, where e-VLBI is still on fixed dates which are scheduled well in advance, we are planning to enhance the capabilities for science via a new proposal mechanism.

Within the eVSAG, a sub-group has been set up to investigate options within point 1 for e-VLBI use in 2008 (to be reported and discussed at the next eVSAG face-to-face meeting in June 2007).

Under the second point above there is extensive eVSAG discussions ongoing by email on an improved proposal system for e-VLBI; a final policy approved by the PC will be in place by early May when the next regular EVN call for proposals goes out. The essence of e-VLBI is speed and the challenge is to design a proposal system which allows users rapid access to new unpredicted and rapidly changing astronomical events while still ensuring a high scientific standard via peer-review. At present the discussion centers on allowing a new class of 'triggered' proposals. These proposals would be submitted for the usual EVN deadlines of 1st February, 1st June and 1st October and would be fully reviewed and rated by the EVN program committee. The proposals would contain a list of potential target sources together with a proposed 'trigger' criteria (perhaps becoming brighter than a certain level in radio monitoring with other telescopes or an X-ray flare occurring). Approved projects in this class would be activated if a trigger request with supporting evidence is submitted and approved by the PC chair up to three days before the e-VLBI run. In addition to this class of observations another class of general, non-time critical observations would be created which could be submitted by the normal deadlines. Observations in this class will be observed if no higher rated triggered proposals occur. Finally there would be mechanisms available for 'quick look' calibrator observations and to enable totally unpredicted (i.e., no source positions known beforehand), very high

priority observations to be observed in e-VLBI runs if they occur just before a scheduled observing opportunity.

1.2.2.1 NA3: Deliverables and Milestones Table

The next deliverable is the 3rd face to face meeting which is expected to be on time and be held in mid-June (perhaps connected to the EVN PC's next meeting). In the revised plan below the e-VLBI science workshop has (relative to the original DOW) been moved one month later (till October 2008) because of teaching commitments of the main organizer (eVSAG chair -John Conway). This will cause a one month shift in the date of publications form this workshop.

A minor error was identified in the original deliverables table with D94 lacking a Lead. OSO has been identified and added.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D46	NA3.2	eVSAG meeting No. 2	OSO	16		
D91	NA3.3	eVSAG meeting No. 3	OSO	26		
D94	NA3.4	e-VLBI Workshop held in Onsala	OSO	31		
D107	NA3.5	Publication of e-VLBI Workshop proceedings	OSO	32		

The eVSAG chair will continue to play an active role in informing the rest of the project of the views of the committee (and keep abreast of developments in other parts of the project). He will attend all future meetings of the EXPReS board (and most likely all meeting of the ECN board).

No changes are planned for the Milestones table.

M#	AM#	Milestones Description	Lead	Delivery month		Status
				Planned	Actual	
M8	MN3.2	eVSAG chair attends EXPReS Consortium Board Meeting	DANTE	14		
M9	MN3.3	eVSAG chair attends EXPReS Consortium Board Meeting	DANTE	26		

1.2.2.2 NA3: Period 2 Distribution

P #	Short Name	Period 2 Requested Distribution
1	JIVE	9,300 €
2	AARNET	0 €
3	DANTE	0 €
4	PSNC	0 €
5	SURFnet	0 €
6	ASTRON	1,200 €
7	CNIG-IGN	1,200 €
8	CSIRO	2,250 €
9	NRF	2,250 €
10	INAF	1,200 €
11	MPG	1,200 €
12	TKK	1,200 €
13	CORNELL	2,250 €
14	UMK	1,200 €
15	OSO	7,200 €
16	SHAO	2,250 €

17	UDEC	2,250 €
18	UNIMAN	1,200 €
19	VeA/VIRAC	1,200 €

1.2.3 NA4: E-VLBI Outreach, Dissemination & Communication

1.2.3.1 NA4: Deliverables and Milestones Table

As mentioned previously, NA4 milestones for the first 12 months were modified. Their planned due date was changed from a fixed date to an "ongoing activity" to reflect the true nature of the deliverable. Those deliverables are D10 and D34. For upcoming deliverables:

- D49 will maintain its focus on a display stand and will not be assumed to be an ongoing deliverable.

In addition, a few minor changes are identified for the deliverable and milestone tables.

- D49 will have JBO as the lead. This is a result of maternity leave for the public outreach officer and the official delegation of the task to Alastair Gunn at JBO/Manchester.
- D83 did not have an associated lead. JIVE is identified as the primary, but close cooperation with DANTE will continue to focus on the Network-centric events

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D49	NA4.05	Generation of new PR material (phase 2)	JBO	18		
D83	NA4.06	e-VLBI Demonstration and attendance at Network events.	JIVE	24		
D117	NA4.07	e-VLBI Demonstration and attendance at network events.	JIVE	36		

The remaining milestone for NA4 is listed below. Note that in the Description of Work, due dates were not identified. The M14 press release is expected at the end of the project and is listed as such.

M#	AM#	Milestones Description	Lead	Delivery month		Status
				Planned	Actual	
M14	MN4.5	Press release announcing the EXPReS e-VLBI facility as an open, production-level facility open to all astronomers. Other milestones include: the appointment of the EXPReS Outreach Officer	JIVE	36		

1.2.3.2 NA4: Period 2 Distribution

P #	Short Name	Period 2 Requested Distribution
1	JIVE	90,675 €
2	AARNET	0 €
3	DANTE	0 €
4	PSNC	0 €
5	SURFnet	0 €
6	ASTRON	0 €
7	CNIG-IGN	0 €
8	CSIRO	0 €
9	NRF	0 €

10	INAF	0 €
11	MPG	0 €
12	TKK	0 €
13	CORNELL	0 €
14	UMK	0 €
15	OSO	0 €
16	SHAO	0 €
17	UDEC	0 €
18	UNIMAN	20,625 €
19	VeA/VIRAC	0 €

1.3 Service Activities

1.3.1 SA1: Production e-VLBI Services

1.3.1.1 SA1: General Comments

Several factors have influenced the order in which work packages were tackled during the first year.

1. The difficulty in finding suitable candidates unavoidably caused delays.
2. Early on in the project we realized that the original plan did not sufficiently take the complexity of the correlator system into account. Because of this we decided to start the software engineers off on some specific well-defined elements of the work packages to give them a chance to familiarize themselves with the system.
3. In order to be able to offer an e-VLBI service to the astronomical community from the very first day of the EXPReS project on, we had to have an operational system in place. For this, a number of rigorous modifications to the control system had to be made by the regular JIVE staff, in part before the actual start of the EXPReS project.

As a result of this, several deliverables have been produced that were not due for many months, while other deliverables were delayed. But although the order of deliverables may have been altered, the project as a whole is well on schedule. Changes to the timeline will be addressed in the plan for the next 18 months. First we will concentrate on the delayed deliverables.

As an aside, it should be noted that D35 and D28 were both numbered as DSA1.5 in the original EXPReS Description of Work (page 102). Judging from the accompanying GANTT chart and the description of the work packages it seems clear that the planned delivery months were swapped as well. In the deliverables table in this section the numbering has been corrected accordingly.

1.3.1.2 Delayed deliverables

- *SA1.2: Job preparation utilities*

This is one of the deliverables that had to be delayed until our new software engineers were sufficiently up to speed to tackle it. The work package summary lists 1) the purging of utilities of non-relevant actions, and 2) optimization for real-time case. Much work has been spent on timing the system and identifying delays (http://www.jive.nl/~jive_cc/sin/sin9.pdf), which has already led to a considerable improvement in its real-time behavior by cutting down on start-up and configuration times. Some additional work is still in progress. The work package description further mentions purging utilities from irrelevant functions concerned with magnetic media, and changing the data entry path. At this point, it does not seem likely that this will actually happen. Magnetic media are

bound to be used for some time yet, and the EVN telescopes do not only participate in astronomical observations, but are also part of geodetic VLBI arrays. It does not seem feasible (or advisable), to one-sidedly change the way observations are scheduled. Rationaliz ing and streamlining the current scheduling process will be far more efficient.

- *SA1.3: Fast/adaptive scheduling tools*

Work on this deliverable had to be postponed as well to allow our new software engineers to familiarize themselves with the intricacies of VLBI. The first element, a field system based daemon, has been created, and further development will continue depending on the availability of field systems and test time.

- *SA1.4: eMERLIN VSI interfaces design*

This deliverable was partly fulfilled (http://www.jive.nl/dokuwiki/doku.php/fabric:wp1), but further development awaits the delivery of various parts of hardware. A detailed description of the status of SA1.4 is to be found in section 1.5.1.2.2 of this document.

- *SA1.5: Network protocol decision*

A lot of work has been done on network protocol research over the past years, both at JIVE and at the University of Manchester. A final decision however cannot be made until a number of hard- and software developments come together. Serious testing with different transport protocols at high data rates will only be possible when the Mark5A hardware upgrade is finished, and when the Mark5A software, developed and maintained at Haystack Observatory, has been upgraded to reliably function under new Linux kernels.

- *SA1.7: Monitored information handling modules*

Work on this package was delayed until most of the hardware changes have taken place, as the amount and nature of monitoring information will depend to some degree on the available hardware. It is not clear at this point of the project if it will be useful to store the monitoring information at all, and if a simple SQL database will not be sufficient.

1.3.1.3 Accelerated deliverables

- *SA1.10: Real-time data processor control software*

Completion of this deliverable was an absolute pre-condition for offering an e-VLBI service to the astronomical community. Work was started well before the EXPReS software engineers were hired, in fact even before the start of the project itself, and consisted of a rigorous re-writing of large parts of the correlator control code.

- *SA1.11: Real-time pipeline, SA1.12: Visibility monitor*

The real-time pipeline and the visibility monitor were perfect projects for the new software engineers to familiarize themselves with the correlator system and data format issues.

- *SA1.15: VSI Interfaces*

The move to VSI interfaces involves a variety of hardware components that had to be designed, ordered and produced at different locations. Serial links were manufactured at ASTRON in Dwingeloo and MPIfR at Bonn, Correlator Interface Boards at Haystack Observatory and Mark5B upgrade kits at Conduant, USA.

- *SA1.17: Flexible local GE network*

The expansion of the connectivity of JIVE to SURFnet needed to connect more telescopes to JIVE both through dedicated lightpaths and an IP routed connection forced us to move this deliverable forward.

- *SA1.21: Monitoring user interfaces*

This deliverable was treated as an integral part of SA1.7.

1.3.1.2 SA1: Workpackage Summary

The following table is roughly identical to table SA1.1: Work Package Summary, in the EXPReS Annex 1 – "description of work" (page 88). Finished deliverables have been removed, and the deliverable numbers (both project specific and general) have been added. The yellow entries are newly defined deliverables, the blue entries denote outsourced FTEs (under a contract with Haystack Observatory). Testing, as listed in the original table, is omitted from the table, as is WP7 (e-VLBI tests and demonstrations). Tests are being run nearly continuously, and demonstrations and science runs are scheduled and organized by the e-VLBI support scientist, as part of his general tasks (increasing awareness of e-VLBI in the astronomical community, researching new applications, supporting e-VLBI observers, testing of new capabilities, scheduling, and general outreach).

Work Package	D# AD#	Objectives	FTE	Deliverable
WP1: Operational Improvements for e-VLBI	Revise and augment observation/correlation software and associated utilities for real-time operation			
1.1 Job preparation utilities	D11 SA1.2	Purge utilities of non-relevant actions Optimize for real-time case	0.2	Real-time data processor control software
1.4 Use of WSRT synthesis data for e-VLBI calibration		Absolute flux calibration using WSRT synthesis data, obtained in parallel to phased array output	0.4	WSRT data processing pipeline
1.5 Space craft tracking correlator mode		Create correlator operating mode allowing rapid switching between real-time observations of calibrators and disk recording at JIVE, for subsequent processing on software correlator	0.1	Operational space craft tracking mode
1.6 On-the-fly fringe fitting		Perform fringe fitting on the fly, to improve rapid detection of faint sources	0.1	Fringe-fitting tool
1.7 Mark5A code modifications		Modifications to Mark5A code to support e-VLBI with new Linux kernels	0.1	Mark5A code modifications
1.8 Mark5B code modifications		Modifications to Mark5B code to support e-VLBI and compatibility with 64 BOCF operations	0.2	Mark5B code modifications
1.9 Automated correlator diagnostics		Create a tool that monitors all available system diagnostics and automatically issues specific fault warnings	0.4	Diagnostic tool
1.10 Removing/adding stations from		Modify control code to	0.1	Modified control code

the correlation process on the fly			allow removing and adding stations to a running correlator job without the need of a re-start		
WP2: Data transmission developments	Actions to improve the data rate and robustness of e-VLBI data transfers across the R&E networks				
2.2 Application layer improvements	D95	SA1.20	Re-arrange mapping of data to enable full use of available network bandwidth	0.2	Improved network applications
2.3 Transport protocol evaluation and selection	D28	SA1.5	Determine which of the available protocols is optimum for e-VLBI	0.2	Protocol decision
2.4 Network monitoring	D84	SA1.18	-Deploy monitoring clients across the network -Prepare tools for integration and presentations of network status information -Devise and implement strategies for optimum network utilization	0.6	Network monitoring tools
2.6 Investigating a 1024M sub-array			Investigate the possibility to connect up to 5 telescopes at >1Gbps in order to enable full 1024Mbps e-VLBI	0.1	Feasibility report
WP3: Target of Opportunity Support	Facilitate and allow dynamic scheduling of the observation				
3.2 Fast/adaptive re-scheduling	D12	SA1.3	Enable rapid and selective revision of observational objectives and parameters	0.9	Fast/adaptive scheduling tools
3.6 Enhancements & additions to real-time pipeline			Modifications based on user requests and operational considerations	0.4	Improved functionality of real-time pipeline
3.7 Real-time download and extraction of station information			Download station log files as they are written and extract both instantaneous telescope status and calibration information	0.2	Real-time station information display and calibration tools
WP4: Real-time monitoring functions	Provide feedback to telescopes and data processor enabling operators to achieve optimal performance and to isolate and correct faults during the observation				
4.2 Information handling	D36	SA1.7	Collection, manipulation and storage of information	0.2	Monitored information handling modules
4.5 Enhancements & additions to existing monitoring tools			Modifications based on user requests and operational considerations	0.4	Improved functionality of monitoring tools
WP5: Data processor upgrades	Data processor hardware upgrades to remove redundant, tape-media specific elements and otherwise optimize infrastructure for e-VLBI				
5.1 VSI hardware changes	D54	SA1.15	Upgrade disk/network interface to VSI standard	0.3	VSI interfaces
5.2 VSI software changes	D53	SA1.16	Adjust correlator control software to operate in VSI hardware environment	0.9	VSI support software
5.3 Flexible local GE network	D71	SA1.17	To allow flexible data processor/telescope mapping	0.2	Flexible local GE network

5.5 Mark5 hardware upgrade		Complete upgrade of Mark5 hardware (such as motherboards, memory, power supplies)	0.2	Upgraded Mark5 units
WP6: addition of MERLIN telescopes	e-MERLIN enhancements enabling MERLIN telescopes to be added transparently to the e-VLBI array			
6.1: e-MERLIN VSI interfaces	D27 SA1.4	Provide direct digital output from multiple e-MERLIN telescopes for transmission to JIVE using VSI protocol	0.9	e-MERLIN VSI interfaces

The focus of SA1 for the next 18 months will be on

1. adaptive scheduling
2. conversion of the Mark5A to Mark5B VSI-compatible units
3. increasing the operational data rate
4. improving the flexibility and robustness of the correlation process.

Of course, there is a considerable overlap in the work needed to obtain these goals. As can be seen in the previous table, quite a few new deliverables have been defined. During the first year we found that some deliverables required less effort than had been estimated, and that several others had been severely underestimated. Through running an actual e-VLBI service we also became aware of some important features that were missing from the original project plan. But, mainly because of the work effort put into the EXPReS project by the regular JIVE staff, we still have sufficient time and manpower left in the project to address these issues.

1.3.1.2.1 Outsourcing

Part of the work (0.5 FTE) was outsourced to Haystack Observatory. There are a number of reasons for this.

The Mark5 recording/playback system is based on off-the-shelf PC technology, combined with proprietary soft- and hardware from Conduant, the company that manufactures these units. Control code development and maintenance are done at Haystack Observatory, who also handles the contacts with Conduant.

Specific JIVE-related changes to the Mark5 control software are sometimes implemented by JIVE staff, after which they are communicated to Haystack and included in the "official" release. Large modifications however could easily lead to a split into supported and non-supported code versions, which, due to the international nature of VLBI, would be a very bad development. Moreover, the lack of direct access to Conduant would make it cumbersome to request or respond to upgrades in proprietary software libraries. Direct involvement of Haystack software engineers is essential to guarantee an effective and speedy implementation of modifications and bug fixes. Other modifications required by JIVE involve Haystack-developed FPGA code. There is no FPGA programming expertise at JIVE, and while it would certainly be possible to train one of the staff members, the learning curve is steep. Besides, the acquired skills would only be applicable for a very limited purpose. Another option would be to hire a local contractor, who then would face a learning curve in radio astronomy. Outsourcing this work to the people who actually designed the system was felt to be by far the most time-efficient solution.

1.3.1.2.2 Modifications of existing deliverables

The most important changes are to **WP3.2: fast/adaptive rescheduling** and to **WP5.2: VSI software changes**. Both packages are very important for the development of e-VLBI and both involve far more effort than originally estimated.

Adaptive scheduling is crucial to transform the EVN into a truly flexible instrument, capable of reacting to transient events on a time-scale of hours. But it also involves building a system enabling remote control of widely different telescope control systems while safeguarding local operational constraints.

VSI software changes will allow JIVE to phase out the Station Units, the main cause of operational instability, and at the same time enable seamless inclusion of other VSI-compliant telescopes. This will however involve a major re-write of the correlator control code.

1.3.1.2.2 Specifics of new deliverables

WP1.4: Use of WSRT synthesis data for e-VLBI calibration. This work package has been described in some detail in section 1.5.1.1.5 (Software developments at JIVE). It will provide immediate access to WSRT synthesis data (recorded simultaneously with the phased array output) and be of great value both for calibration and for target selection.

WP1.5: Space craft tracking correlator mode . This mode will allow rapid switching between real-time correlation of calibrator sources and recording streaming data on disk packs at JIVE, for later correlation with a purpose-built software correlator, with the spectral resolution needed for this type of observations.

WP1.6: On-the-fly fringe fitting. Fringe fitting is currently done after correlation. Doing it on-the-fly, with an improved algorithm, and immediately updating the delay polynomials (which will be possible once the Mark5A units have been upgraded to Mark5B) will greatly speed up the calibration process, but also improve the rapid detection of astronomical objects.

WP1.7: Mark5A code modifications. This package has been outsourced to Haystack Observatory. It includes modifications to the current Mark5A control code to enable reliable e-VLBI operations with new Linux kernels, thereby opening the possibility of switching between modified TCP stacks for more efficient data transport.

WP1.8: Mark5B code modifications. This package too has been outsourced to Haystack Observatory. It includes e-VLBI related modifications to the new Mark5B station and correlator control code, and changes for compatibility with JIVE-specific correlator modes.

WP1.9: Automated correlator diagnostics. Due to the complexity of the system, the correlation process can go wrong in many different and often obscure ways. In e-VLBI the time involved with tracking down the exact cause of a problem leads to irretrievable and unacceptable data loss. This work package will create a tool that gathers all diagnostic information produced by the various components of the system and generates a general alarm when anything goes wrong. The monitoring information will make it possible to provide a specific description of the problem at hand. This will greatly simplify trouble shooting and increase the operational efficiency of the system.

WP1.10: Removing/adding stations from the correlation process on the fly. When the transmission from one of the stations fails, for any reason (local correlator or local station problems, network problems), as a rule the station will have to be disconnected from the correlation job. After trouble shooting one can only reconnect this station by restarting the entire job, causing unnecessary loss of data. This work package will modify the control code to enable on-the-fly reconnecting of stations during correlation possible.

WP2.6: Investigating a 1024M sub-array. The EVN can operate at a maximum data rate of 1 Gbps per telescope. This data rate however cannot be accommodated by 1 Gbps networking technology because of the overhead involved (e.g. IP headers), currently limiting the maximum e-VLBI data rate to 512 Mbps. FABRIC, the EXPReS JRA1, deals with high-speed astronomical data transmission and will need a 4 to 10 Gbps connection between the radio telescope at Onsala (Sweden) and the e-MERLIN correlator at Jodrell Bank Observatory (UK). This high-speed connection very probably will pass through SURFnet, as will the planned 10 Gbps connection from Effelsberg (Germany). We want to investigate the use of these connections to stream 1024 Mbps of astronomical data from a few telescopes to JIVE. The WSRT at Westerbork (the Netherlands) could be added as well, by upgrading the current equipment to 10 Gbps. In this way it might be possible to provide a sub-array of some of the most sensitive telescopes of the EVN at the full possible bandwidth.

WP3.6: Enhancements & additions to real-time pipeline. This work package will deal with user- and technology driven modifications during the course of the project.

WP3.7: Real-time download and extraction of station information. Currently, all station-related information is written to log files at the stations, transferred to a central database after the observations and downloaded to JIVE for processing. A real-time download of these log files will provide not only status information but also system temperatures that can be used for immediate amplitude calibration.

WP4.5: Enhancements & additions to existing monitoring tools. Like WP3.6, this work package will deal with user- and technology driven modifications.

WP5.5: Mark5 hardware upgrade. To support the upgrade of Mark5A to B and improve data transmissions during e-VLBI, the outdated hardware in the Mark5 units has to brought up to speed. New motherboards, CPUs and power supplies are being purchased and will be installed during the coming months.

1.3.1.3 SA1: Deliverables and Milestones Table

Yellow entries in the deliverable table denote the newly defined deliverables. O/S stands for outsourced, as described in the report.

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
D11	SA1.2	Job preparation utilities	JIVE	16		2
		Mark5 hardware upgrade	JIVE	16		
D28	SA1.5	Network protocol decision	JIVE	16		2
		Use of WSRT synthesis data for e-VLBI calibration	JIVE	17		
		Mark5A code modifications	O/S	17		
		Mark5B code modifications	O/S	17		
D95	SA1.20	Improved network applications	O/S	17		
D51	SA1.13	Tested software for operational improvements	JIVE	18		
D71	SA1.17	Flexible local GE network	JIVE	18		1
		Investigating a 1024M sub-array	JIVE	20		
D27	SA1.4	eMERLIN VSI interfaces design	UniMan	22		1
D45	SA1.9	Tests using local Jodrell Bank home e-MERLIN telescope	UniMan	22		
D54	SA1.15	VSI Interfaces	JIVE	23		
D52	SA1.14	Test using remote e-MERLIN telescope	UniMan	24		
D85	SA1.19	Multiple e-MERLIN telescope tests	UniMan	24		
D53	SA1.16	VSI support software	JIVE	26		
		Space craft tracking correlator mode	JIVE	27		
D12	SA1.3	Fast/adaptive scheduling tools	JIVE	28		1
		On-the-fly fringe fitting	JIVE	28		
D84	SA1.18	Network monitoring tools	JIVE	30		

		Real-time download and extraction of station information	JIVE	30		
		Eighteen months boundary				
		Automated correlator diagnostics	JIVE	33		
		Removing/adding stations from the correlation process on the fly	JIVE	34		
		Enhancements & additions to real-time pipeline	JIVE	36		
		Enhancements & additions to existing monitoring tools	JIVE	36		
D36	SA1.7	Monitored information handling modules	JIVE	36		

The remaining milestones of SA1 have been re-ordered. Note that M23, 24 and 25 (marked in red) were numbered incorrectly in the original contract, and that M19 and M21 were identical. The first three milestones were renumbered, and only M19 has been kept in the following overview.

M#	AM#	Milestones Description	Lead	Delivery month		Status
				Planned	Actual	
M15	MSA1.1	Call for Proposals for e-VLBI service	JIVE	1	1	4
M16	MSA1.2	Preliminary e-VLBI Service	JIVE	4	4	4
M17	MSA1.3	Basic data-link technology	JIVE	6	6	4
M18	MSA1.4	Basic VLBI elements adapted for e-VLBI	JIVE	6	6	4
M22	MSA1.8	Adaptive network utilization	JIVE	17		
M20	MSA1.6	Enhanced e-VLBI Service	JIVE	18		
M23	MSA1.9	Full bandwidth utilization	JIVE	26		
M19	MSA1.5	Enhanced ToO support	JIVE	28		
M24	MSA1.10	Live e-VLBI system monitoring	JIVE	30		
		Eighteen months boundary				
M25	MSA1.11	Full e-VLBI Service	JIVE	32		

1.3.1.4 SA1: Period 2 Distribution

P #	Short Name	Period 2 Requested Distribution
1	JIVE	588,000 €
2	AARNET	0 €
3	DANTE	0 €
4	PSNC	0 €
5	SURFnet	0 €
6	ASTRON	0 €
7	CNIG-IGN	0 €
8	CSIRO	0 €
9	NRF	0 €
10	INAF	0 €
11	MPG	0 €
12	TKK	0 €
13	CORNELL	0 €
14	UMK	0 €
15	OSO	0 €
16	SHAO	0 €
17	UDEC	0 €
18	UNIMAN	81,375 €
19	VeA/VIRAC	0 €

1.3.1.5 SA1: Gantt Overview

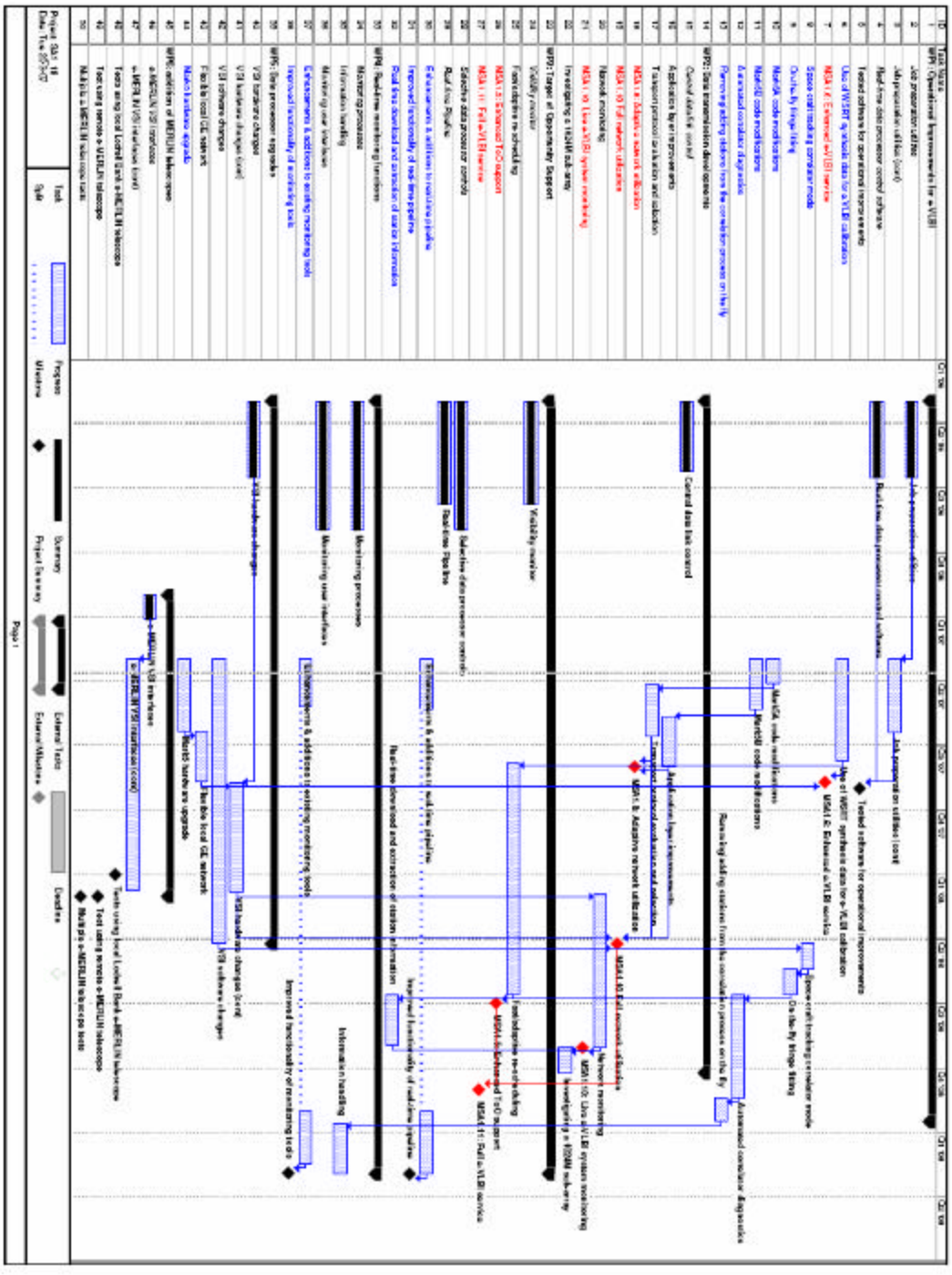


Figure SA1-9: Gantt Overview for Activity SA1

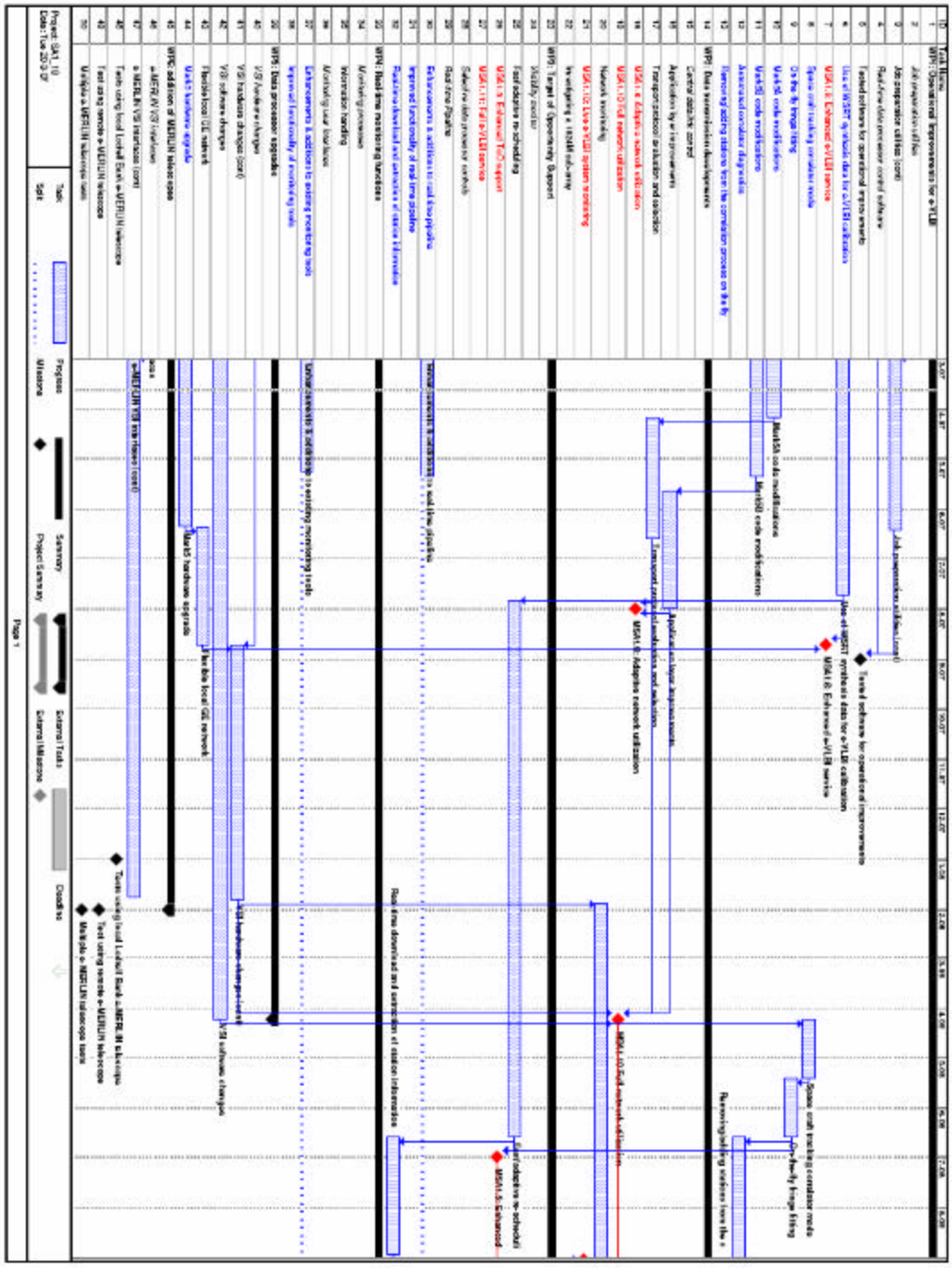


Figure SA1-10: Gantt Overview for Activity SA1, highlighting the next 18 months

1.3.2 SA2: Network Provision for a Global e-VLBI Array

1.3.2.1 SA2: Activity Introduction

As explained in Section A, this specific service activity aims to coordinate the various technical and logistical aspects that are required in order to achieve last-mile connections to the radio telescopes that will form the EXPReS e-VLBI infrastructure. Requesting partial funding from the Commission – in many cases a very small fraction of the total connection cost - it is acting as a significant **catalyst**, encouraging commercially fair, affordable and competitive quotations, and releasing substantial sources of local and national funding.

During the first year, we have experienced that:

- SA2 developments are very different for every partner in EXPReS.
- SA2 expenditures are not flat in time, but uneven and somewhat unpredictable.
- Most of the expensive infrastructure will be constructed in the second year (March 2007 to February 2008).
- Some participants have been very successful in obtaining *good deals* for their high capacity data connections, while others have been able to get the service partially financed by their local government. These activities affect the total cost of their connections, which will generally be lower than expected.
- The cost associated to SA2 are those of the "last-mile" connections, understanding as such not only the needed equipment and infrastructures from the nearest NREN/GÉANT nodes to the telescopes, but also any other cost related to the transfer of the data to the e-EVN correlator at JIVE.

Special cases are explained below:

a) JIVE

JIVE is currently connected by SURFnet to GEANT2 at 7 x 1 Gbps, and expects to increase connectivity to 16 x 1 Gbps in the following months. Additionally, a 10 Gbps connection will be made available for testing. Their connectivity costs, however, will be financed by SURFnet, who should also receive the EC contribution originally assigned to JIVE.

b) AARNet

Their progress is very much related to participant CSIRO, who could assume the financial commitments, as discussed below. The main contact, George McLaughlin, left in 2006 and a now conversations have resumed with the new CEO, Chris Hancock.

The ATNF/CSIRO telescopes are already linked to AARNet at 1 Gbps, as related in Section A of this report. The international part of the connection, to JIVE, is being investigated. There are two possible scenarios: IP-routing and lightpaths to JIVE.

There are two routed IP paths from ATNF to JIVE. The shortest path has a bottleneck capacity of 155Mbps per connection due to the Perth–Singapore link being four STM-1 undersea circuits. This path uses AARNet3 between Sydney–Perth; AARNet3 between Perth–Singapore; AARNet3 between Singapore–Frankfurt; GÉANT2 from Frankfurt–Amsterdam; and SURFnet between Amsterdam–JIVE. The Perth–Singapore and Singapore–Frankfurt links have been much less reliable than AARNet expected, with several multi-week outages within the last year.

The longer path has a bottleneck link of 1,000Mbps due to gigabit ethernet being used for the AARNet3–CSIRO Sydney customer access link and being used within CSIRO's network. This path

uses AARNet3 between Sydney–Seattle; Internet2's Abilene between Seattle–Chicago; GÉANT2 between Chicago–Amsterdam; and SURFnet between Amsterdam–JIVE. This path may alter slightly when Internet2 and NLR merge.

Testing by ATNF to date has mainly used the shorter, bandwidth-constrained path. AARNet has made some router configuration changes to allow different connections between the same machines to be shared across the four STM-1s; previously they would all be placed onto the same STM-1.

ATNF have requested that AARNet route their science traffic via the longer latency-constrained path. This has yet to be done.

Regarding lightpaths to JIVE, AARNet have installed eight gigabit ethernet light paths from its SYD-B point of presence in Rosebery, Sydney to Los Angeles. EXPReS partners on both sides of the connection are currently commissioning and testing these paths. The intent is to use CENIC to transport AARNet's light paths from Los Angeles to Seattle, but CENIC have yet to develop a policy for allocating light paths across their network. There are a number of options for paths from Seattle to JIVE but AARNet has yet to investigate these.

ATNF's equipment generates up to 600Mbps of traffic per telescope. It seems desirable to deliver this to JIVE as three gigabit ethernet circuits, one telescope exclusively using one circuit. A request by one research project for three concurrent trans-Pacific, trans-Atlantic gigabit light paths is unprecedented. How easy or difficult this will be to negotiate with each network operator on the Sydney-JIVE path is unknown yet. As AARNet does not have an automated control plane for light path provisioning, the light paths would be manually established.

c) SURFnet

SURFnet handles the connectivity of the partners in The Netherlands (JIVE and WSRT/ASTRON). In principle, it had no cost associated (and therefore no EC funding assigned). The connectivity of JIVE is however being provided by SURFnet as well as support for activities such as setup and testing support for lightpaths to our partners. SURFnet has provided this support since the beginning of the project and we propose to transfer JIVE's SA2 allocation in full to SURFnet.

d) ASTRON

ASTRON is currently connected directly to JIVE at 1 Gbps via fiber provided by SURFnet. As additional partners come online via lightpaths, ASTRON will consider upgrades to their connection and infrastructure that drives the connection to participate at higher bandwidths. ASTRON is in conversation with SURFnet regarding connectivity.

e) CNIG-IGN

The construction of the new 40-meter radiotelescope at Yebes is delayed from the original plan. First light is expected in June 2007. The fiber optics connection to GÉANT at 1 Gbps should not be ready before then, as it will be an expensive service payed on a monthly basis. The goal is to build the needed infrastructure in 2007, and start full operations in late 2007 or early 2008, which should continue well after the end of EXPReS. As a consequence of the EXPReS contract, e-VLBI has become a project in the strategic plan of CNIG-IGN, which ensures funding for the next years.

The latest offers from selected communication providers anticipate a cost of service much lower than originally expected, of the order of 50%. Final values will be known at the time of the request for bids call.

f) CSIRO

The mainland connection was expected to be built before the start of EXPReS, but indeed due to some delays it was finalized within the project. Now all telescopes are connected at 1 Gbps. The problem

still to solve, through AARNET, is the international connection and how to deliver the data to JIVE (mentioned above in the AARNet update). The cost of this participant is much higher than expected, and compensates lower costs for other participants, like INAF, MRO, and/or CNIG-IGN.

g) HartRAO

The total (shared) international bandwidth for the whole Tertiary Education network (TENET) to which HartRAO attaches is currently 180.5 Mbps, of which some 40 – 75 Mbps is utilized depending on the time of day. The Department of Public Enterprises is to setup a new company, "Infraco", who will open competition for the local connectivity market.

The availability of cables, current or future, into Europe is being investigated.

h) INAF

INAF operates three radiotelescopes, at Medicina (near Bologna), Noto (Sicily) and Sardinia (under construction). Medicina is already connected, and has participated in successful e-VLBI observations. Their fiber optics connection, expected to be built within EXPReS, was built by the Emiglia-Romana local government after very successful negotiations, which saved the project about 1.4 M€. Now, only relatively small rental costs and equipment is needed to ensure the expected deliverable.

The new Sardinia 64-meter radiotelescope (SRT) is under construction. Its fiber optics connection to Cagliari is now included in the "Sardinia Regional plan for network infrastructure", linked with a PON project (SyberSAR), which is expected to be operational in the summer of 2008. As in the case of Medicina, this comes at no cost for EXPReS therefore saving some 1.3 M€ to the project while ensuring the whole deliverable. There will be costs associated to equipment and the 1 Gbps international lightpath.

i) MPIfR

The feasibility study is finished and funds are available for the construction of a private fiber optics line from the 100-meter radiotelescope at Effelsberg to Bonn, and then to GÉANT. The expected new date is November 2007 (nine months delay from the original milestone), and will be provided within budget.

j) MRO

MRO's 14-m radiotelescope is connected and operating successfully at 10 Gbps. The total cost estimate for the connection for the committed 5-year fiber lease period rose slightly from the estimated 330ke, to 363ke. However, CSC/Funet agreed to completely absorb their PoP costs of 230,000 EUR, leaving 133,000 EUR to TKK, of which 89,000 EUR will be accumulated before the end of EXPReS contract. Additional equipment for 10 Gbps is being purchased which will be used for tests in the EXPReS JRA1 FABRIC.

k) NAIC

At present, data transfer from the 305-meter Arecibo radiotelescope is possible at 155 Mbps (in practice sometimes only 32 Mbps is reached). Subject to vendor confirmation and availability of funding, the aim is to achieve sustained 1 Gbps rates over 2-3 hours per month. The circuit together with switching equipment will be leased from the telecom provider(s). In early March 2007 a proposal was received from Centennial de Puerto Rico, currently the provider for the Observatory's 155 Mbps ATM-based "last mile" link to the NAP Of The Americas, to upgrade the link to support coordinated burst rates of 512 Mbps using gigabit Ethernet. Recurring costs of this upgrade are substantial and will need to be absorbed into the operating costs of the Observatory and University of Puerto Rico networking partners. The proposal is under review and a joint decision is expected by mid-April 2007, following which Centennial PR will install the facility. A further upgrade to 1 Gbps rates is

expected to become feasible in May 2007 following Centennial's lighting of a new high-capacity submarine fiber system.

l) NCU

The 32-meter radiotelescope in Torun is connected and participating in e-VLBI observations since the start of EXPReS. Their main cost is the rental of a 1 Gbps fiber optics line. No changes are expected in their contribution to the project.

m) ShAO

All four stations (Shanghai, Urumqi, Miyun, Yunnan) have been connect by fiber links from the telescopes to their nearby cities. The cost to EXPReS is the rental of the data transfer service. Discussions with CSTNET are ongoing, to schedule first e-VLBI test observations in 2007, after some delays caused by the breakage of the submarine international fiber optics cable in the December 2006 earthquake, now repaired.

n) TIGO

The TIGO telescope is connected to University of Concepción at 1 Gbps, and the needed equipment has been purchased. International connection is through REUNA, which increased its backbone from 155 Mbps to 310 Mbps between Concepción and Santiago de Chile, eliminating congestion. Despite its small budget, the participation of TIGO en EXPReS is very important and will provide essential data, as demonstrated by the observations of the SMART-1 satellite crash on the moon. However availability of local resources may limit the amount of observing days offered.

o) VIRAC

The construction of the last mile dark optical fiber from Irbene to Ventspils International Radioastronomy Center (at a distance of about 30 km) has been completed. The whole EC funding is requested in the first year, and no other commitments are planned in the rest of the project.

1.3.2.2 SA2: Workpackage Summary

WP#	Description of Workpackage	Lead
WP1	Dynamic status report & EXPReS support of the last-mile telescope connections to the nearest (GÉANT) NREN node	SA2 coord. and ALL
WP2	Construction and procurement of equipment for the last-mile infrastructure	All
WP3	Testing of the link and verification of real-time e-VLBI capability	SA2 coord., JIVE and ALL

1.3.2.3 SA2: Deliverables and Milestones Table

Deliverables for the remainder of the project (months 13-36) are listed below. Items completed from the first 12 months are not shown.

Five deliverables from the first 12 months are not completed. These have been identified previously and are the result of external delays. Additionally, there are modifications to the deliverables table that relate to the slow start for some or our participants. A delay factor has been added for the following participants:

ShAO - 3 months

HRAO - 3 months

NAIC - 6 months

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
	DSA2.06	Feasibility study of the last-mile connection to the nearest NREN node for participant HRAO	HRAO	18		ongoing
	DSA2.11	Equipment of the last -mile infrastructure for participant MRO	MRO	12		ongoing
	DSA2.12	Construction and equipment of the last -mile infrastructure for participant CNIG-IGN	CNIG-IGN	12		ongoing
	DSA2.13	Construction and equipment of the last -mile infrastructure for participant MPIfR	MPIfR	12		ongoing
	DSA2.14	10 Gbps link upgrade between MERLIN and JIVE	MERLIN JIVE	18		pendent
	DSA2.15	e-VLBI test observations, Metsähovi	MRO	18	13	
	DSA2.16	Construction and equipment of the last -mile infrastructure for participant Shanghai	ShAO	21		
	DSA2.17	Construction and equipment of the last -mile infrastructure in AARNET to allow connection of participant CSIRO	AARNET CSIRO	18		
	DSA2.18	Construction and equipment of the last -mile infrastructure for participant Urumqi	ShAO	21		
	DSA2.19	Construction and equipment of the last -mile infrastructure for participant Miyun	ShAO	21		
	DSA2.20	Construction and equipment of the last -mile infrastructure for participant Kunming	ShAO	21		
	DSA2.21	Construction and equipment of the last -mile infrastructure for participant VIRAC	VIRAC	18		
	DSA2.22	Equipment of the last -mile infrastructure for participant NAIC	NAIC	24		
	DSA2.23	Construction and equipment of the last -mile infrastructure for participant TIGO	TIGO	18		
	DSA2.24	AARNET connectivity enhancements	AARNET	18		
	DSA2.25	Feasibility study of the last-mile connection to the nearest GÉANT node for participant INAF (Sardinia)	INAF	20		
	DSA2.26	10 Gbps link between UniMan and OSO for ultra-VLBI tests	UniMan OSO	20		
	DSA2.27	e-VLBI test observations, Effelsberg	MPIfR	21		
	DSA2.28	e-VLBI test observations, Metsahovi / CSIRO	MRO CSIRO	22		
	DSA2.29	e-VLBI test observations, Yebes	OAN	22		
	DSA2.30	Construction and equipment of the last -mile infrastructure for participant HartRAO	HRAO	27		
	DSA2.31	e-VLBI test observations, Urunqi	ShAO	33		
	DSA2.32	e-VLBI test observations, Mijun	ShAO	33		
	DSA2.33	e-VLBI test observations, Kunming	ShAO	33		
	DSA2.34	e-VLBI test observations, VIRAC	VIRAC	30		
	DSA2.35	e-VLBI test observations, HRAO	HRAO	33		
	DSA2.36	e-VLBI test observations, NAIC, Arecibo	NAIC	36		
	DSA2.37	e-VLBI test observations, TIGO	TIGO	30		
	DSA2.38	Construction and equipment of the last -mile infrastructure for participant INAF (Sardinia)	INAF	30		

A summary of the milestones for the different participants is shown in the next table. MSA2.1 has been accomplished by almost all partners, as explained in Section A of this report. MS2.2 will be met in the second year of the project by several important telescopes (MPIfR and CNIG-IGN). MS2.3 has been accomplished by six telescopes till now, while works for the rest are ongoing.

M#	AM#	Milestones Description	Lead	Delivery month		Status
				Planned	Actual	
M26	MSA1.1	Feasibility study of the last-mile connection to the nearest GÉANT node.	ALL	6		
M27	MSA2.2	Construction and equipment of the last-mile infrastructure.	ALL	18		
M28	MSA2.3	e-VLBI Fringes (Detection).	JIVE and ALL	>10		

1.3.2.4 SA2: Period 2 Distribution

P #	Short Name	Period 2 Requested Distribution
1	JIVE	0 €
2	AARNET	6,000 €
3	DANTE	0 €
4	PSNC	0 €
5	SURFnet	21,000 €
6	ASTRON	3,750 €
7	CNIG-IGN	50,250 €
8	CSIRO	15,000 €
9	NRF	4,500 €
10	INAF	43,500 €
11	MPG	82,500 €
12	TKK	6,000 €
13	CORNELL	21,000 €
14	UMK	15,000 €
15	OSO	15,000 €
16	SHAO	36,000 €
17	UDEC	15,000 €
18	UNIMAN	5,250 €
19	VeA/VIRAC	22,500 €

1.3.2.5 SA2: Gantt Overview

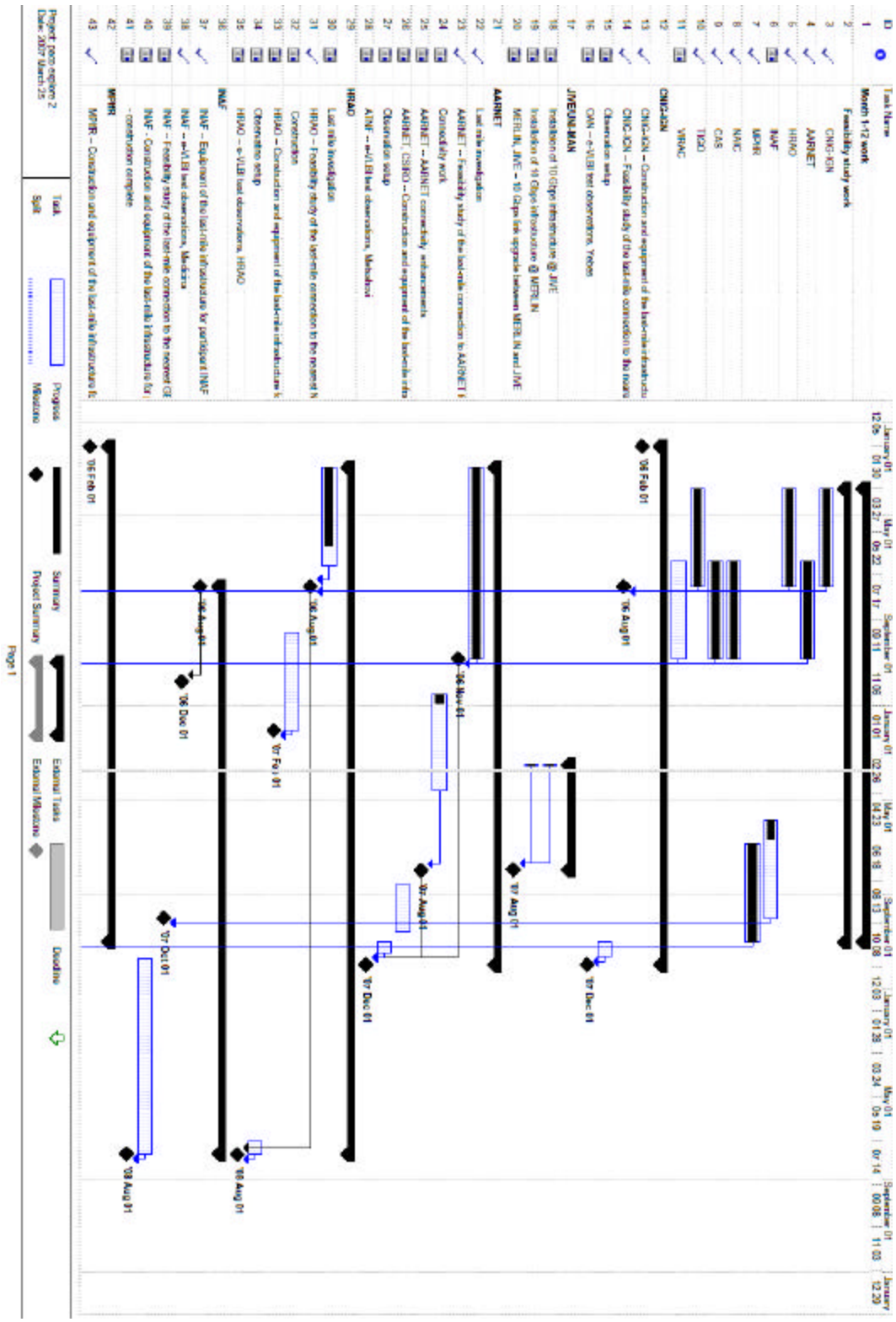


Figure SA2-2: SA2 Overview (1 of 2)

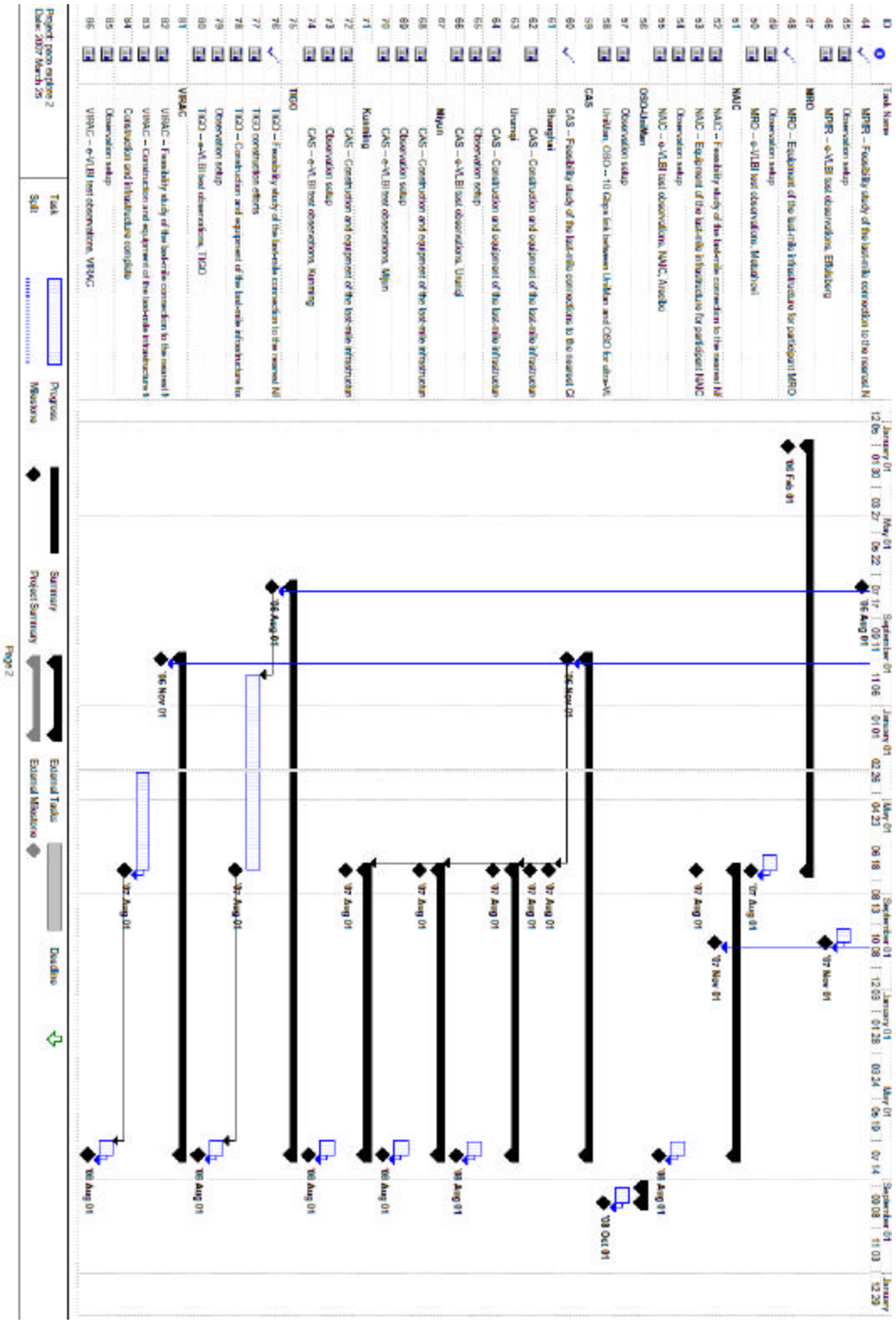


Figure SA2-3: SA2 Overview (2 of 2)

1.4 Joint Research Activities

1.4.1 JRA1 - FABRIC

1.4.1.1 JRA1: General Comments

The FABRIC (Future Arrays of Broadband Radio-telescopes on Internet Computing) project researches future technology relevant for the e-VLBI application. It has two major aims, the first being the development of a data-acquisition system that will work with 10 Gbps connectivity, the second to deploy the algorithm of VLBI correlation on Grid computing. After the first year, most of the requirements and design efforts have been completed and work on prototyping is ramping up.

As everywhere, there was some delay finding the right personnel, but the most serious delay originates from making a decision on the technology for the data acquisition development. Boundary conditions are the existing efforts on the PC-EVN system and the so-called Digital Baseband Converters, as well as the requirements from the eMERLIN interface. Finally it was decided to do this project on so called iBOBs (internet Breakout Boards, Univ of Berkeley). The delivery time of these boards and learning to work with this equipment represent delays with respect to the original project plan.

As a result there was also considerable slippage on the overall system analysis document. In October all interfaces had been established at a high level. But the actual document was delayed further as the FABRIC project leader is effectively not available for the project. This document must be delivered in 2007, but in the meantime the necessary interfaces have been agreed and work can progress.

Most of the work-packages can proceed as planned, but where the iBOB systems are required for prototype development, some of the tasks that depend on this are being rescheduled with a new start date.

In the area of the distributed correlator, a large fraction of the work packages were able to start right from the start date of the project. A correlator design document has been drafted but the final version has not been issued. It was decided that the writing of visualization software of the distributed correlator was best postponed until reliable operations were achieved. Moreover, this process can benefit from the effort in SA1.

Strong coordination between WP2.1 and WP2.2 is very important for the success of the distributed correlation effort. A next meeting between JIVE and PSNC staff is planned. The goal is a more detailed specification of the interfaces between workflow management and the distributed correlator core, including the data flow from the telescope sites.

1.4.1.2 JRA1: Workpackage Summary

WP0 System analysis

Deliver a FABRIC overall design and revised implementation plan (DJ1.5)

WP 1.1.1 Data acquisition architecture

Completed

WP 1.1.2. Data acquisition prototype

Once the prototype iBOB boards with their 10GE interfaces arrive, it is planned to setup a small-scale local testbed with a small COTS 10GE switch, some 10GE-equipped Linux computers, and a set of iBOB FPGA boards, all connected to each other and to the Metsähovi 10GE Internet connection. We plan to start with establishing the simplest 1/2/4 Gbps UDP-based iBOB FPGA transmitter/receiver

firmware first and compare that to the more advanced UDP-Tsunami protocol and determine what is the best implementation tradeoff (e.g. what advanced software features of Tsunami can be reasonably implemented in the FPGA). The transmitter part will be closely coordinated with Jodrell Bank and Onsala, to ensure that the design is directly applicable to the remote e-MERLIN tests. The performance levels of 10GE-equipped Linux computers are determined to assess their role and the potential applications for them in the iBOB-10GE data acquisition scheme.

WP 1.1.3. Data acquisition control

This activity can start when the WP 1.1.2 part: "software acquisition/transport" is finished. New manpower will need to be identified for this activity. The work package involves the following components:

- Identify modules to be added to field system to control new acquisition devices
- Generate requirements for phase-cal and stats
- Generate requirements for embedded TSYS calibration
- Write data acquisition interface document
- Write and integrate modules for software calibration flow
- Write and integrate Software performance monitor
- Test new control modules at telescope

WP 1.2.1. Broadband protocols & multicast

Important work in this area continues as a contributed effort. The work package will be boosted by the transfer of an already identified Research Assistant to this project in July 2007. It will be possible to produce an interim report in month 13, explicitly on the properties of TCP, TCP variants and non TCP protocols. Work on multicasting (strictly multi destination) and on VSI-E tests will be done following the appointment of the protocol person onto FABRIC in July. A final report is expected by the middle of 2008.

WP 1.2.2. Broadband eMERLIN correlator interface

Work in this area is concentrating on the application of iBOB systems, which are becoming available by spring 2007. This effort is closely linked to the engineering the reverse path out of e-MERLIN to e-VLBI in SA1. First fringes are planned with the e-MERLIN correlator for this workpackage in May 2008, but depend critically on the commissioning of that hardware, which is external to EXPReS.

The interface to the e-MERLIN correlator for both SA1 (eMERLIN out) and FABRIC (eMERLIN in) will be implemented using the University of Berkeley's Internet Break Out Boards (iBOB). This card has the functionality required to do both tasks (by changing the FPGA personality). The boards are expected to be completed in April 2007, with the firmware design expected to be completed by the end of 2007. Tests will take place in 2008 in conjunction with the eMERLIN station boards being produced by NRC Canada. VSI-E will be used for data transport for both input and output. The 4 Gbps iBOB transmitter for Onsala will also be designed, as the eMERLIN out design will be very similar.

Provided the e-MERLIN station boards are delivered on time we hope to make initial fringe tests in May 2008. At the moment the schedule is on track to achieve full operation as on the original plan.

WP 1.2.3. Broadband test

Connectivity at 10 Gbps is expected to be available out of Onsala by October 2007. Onsala is awaiting the delivery of a first iBOB board. This board will be used in conjunction with the Jodrell

Bank group in the period before the e-MERLIN correlator is finalized to conduct data transfer tests. These will exercise the data transfer route, test stability of transfer times etc and possibly test different data transfer protocols. Onsala intends to employ someone for 1 man-year funded by EXPReS starting in October 2007 to conduct these tests, deal with interfaces to local iBoBs and other local hardware and coordinate with NRENs the data path issues on the Onsala-Jodrell Bank route.

WP 1.2.4. Public to dedicated network interface

In the coming period the experiment and negotiation activities will be finalized, and the E-LOFAR link to Effelsberg will be ready and tested. Besides the transport of astronomy data, also network based LO signal distribution will be investigated in the upcoming period.

WP 2.1.1. Grid – VLBI collaboration

Completed.

WP 2.1.2. Grid Workflow management

Having the system design completed, work will begin on the implementation of the first prototype version of an e-VLBI system. According to the timeline agreed between JIVE and PSNC, the first prototype will have a somewhat limited functionality, in order to evaluate certain assumptions and proposed solutions. The prototype version will read the data from pre-recorded files, instead of live radio telescopes, creating so called “virtual radio telescopes”. This will be used to test the system feasibility and correlation performance without using valuable radio telescope time. Furthermore, the file servers and computational systems needed to perform a distributed correlation will not be dispersed over the wide-area network, but local PSNC resources will be used instead. This will allow us to complete the required functionality of the workflow management without the need to worry about various networking issues or different hardware/software configurations.

WP 2.1.3 Grid routing

Towards the end of 2007 work will start on deploying the workflow management on truly distributed computing. In this stage, the system will be dispersed among resources provided by the project participants.

WP 2.2.1 Correlator Algorithm design

A first version correlator design document should be finalized in the next few months. However, we foresee a need to continue updating the document as we learn more from the prototype implementations of the correlator.

WP 2.2.2. Correlator computational core

A large fraction of this work package seems finished, although the results of the software correlator still need to be verified. Additional work has been identified, as software for streaming data into a computational grid will need to be developed at JIVE, and at some point this will need to be deployed at the telescope sites. This will need to be done towards the end of the next 18 month period.

WP 2.2.3. Scaled up version for clusters

Development of the correlator software itself will be concentrated on scaling things up to compute on cluster computers during the second year (DJ1.21), and computational grids during the first half of the third year (DJ1.28). This entails making the correlator code portable to be deployable at different clusters in an automated sense. Middleware interfaces need to be implemented to allow working with the workflow management. An interesting exercise will be to make load estimates which are an important step in making distributed correlation a truly operational tool.

WP 2.2.5. Interactive visualization

Visualisation software for evaluating the correlator software output will be written when the correlator is able to deliver a complete enough data product. Critical steps that need to be completed before we can embark on writing that software are:

- Data emitted by the correlator core (DJ1.13), and
- Software that automates the generation of correlator delay model.

WP 2.2.6. Output definition

Work has started in this area, transforming the output of the software correlator into the standard product used for data validation of the EVN data processor at JIVE. It is planned that by the middle of 2007 this is sufficiently complete that focus can shift on interactive visualization.

WP 2.2.7. Output merge

By the end of 2008 effort should have started to combine data from multiple compute nodes back into a central data repository. This involves routing the output and sorting the incoming streams into the data archive.

Tests and science demo

First operational use of the software correlator is expected this year when it is to be used to verify interactively station performance connected to standard (disk based) observing sessions.

1.4.1.3 JRA1: Deliverables Table

D#	AD#	Deliverable Description	Lead	Delivery month		Status
				Planned	Actual	
	DJ1.3	Visualization software	JIVE	21		
	DJ1.4 DJ1.5	Correlator design specification Overall design document	JIVE JIVE	13 17		
~~D41~~	~~J1.11~~	~~Protocols performance report~~	~~JBO~~	~~13~~		
	DJ1.11 a	Interim Protocols performance report	JBO	13		
	DJ1.11 b	Final Protocols performance report	JBO	28		
D42	J1.12	Software correlator core	JIVE	15		
D43	J1.13	Software data product	JIVE	17		
D66	J1.14	Data acquisition interface document	MPI	22		
D67	J1.15	LOFAR station interface report	ASTRON	21		
D68 D75	J1.16 J1.17	Software for workflow management Software for correlation on cluster	PSNC JIVE	18 23		
D76	J1.18	Data acquisition test report	MPI	26		
D77	J1.19	Data acquisition prototype at telescope	MRO/ OSO	26		
D78	J1.20	Overall broadband demonstration	OSO	33		
D79	J1.21	Software cluster correlation	JIVE	23		
D80	J1.22	First fringes software correlator	JIVE	23		
D87	J1.23	Software to collect distributed output	JIVE	30		
D92	J1.24	Software to create data product from distributed correlation	JIVE	31		

D93	J1.25	Software routing	PSNC	29		
D105	J1.26	eMERLIN interface available	JBO	30		
D106	J1.27	Fringes with new routing	JIVE	31		
D108	J1.28	Software distributed correlation	JIVE	33		
D109	J1.29	First fringes Grid correlator	JIVE	34		
D110	J1.30	First fringes on FABRIC	JIVE	35		
D118	J1.31	Final report	JIVE	36		

1.4.1.4 JRA1: Period 2 Distribution

P #	Short Name	Period 2 Requested Distribution
1	JIVE	243,000 €
2	AARNET	0 €
3	DANTE	0 €
4	PSNC	81,000 €
5	SURFnet	0 €
6	ASTRON	20,250 €
7	CNIG-IGN	0 €
8	CSIRO	0 €
9	NRF	0 €
10	INAF	0 €
11	MPG	59,250 €
12	TKK	96,000 €
13	CORNELL	0 €
14	UMK	0 €
15	OSO	51,750 €
16	SHAO	0 €
17	UDEC	0 €
18	UNIMAN	96,000 €
19	VeA/VIRAC	0 €

1.4.1.5 JRA1: Gantt Overview

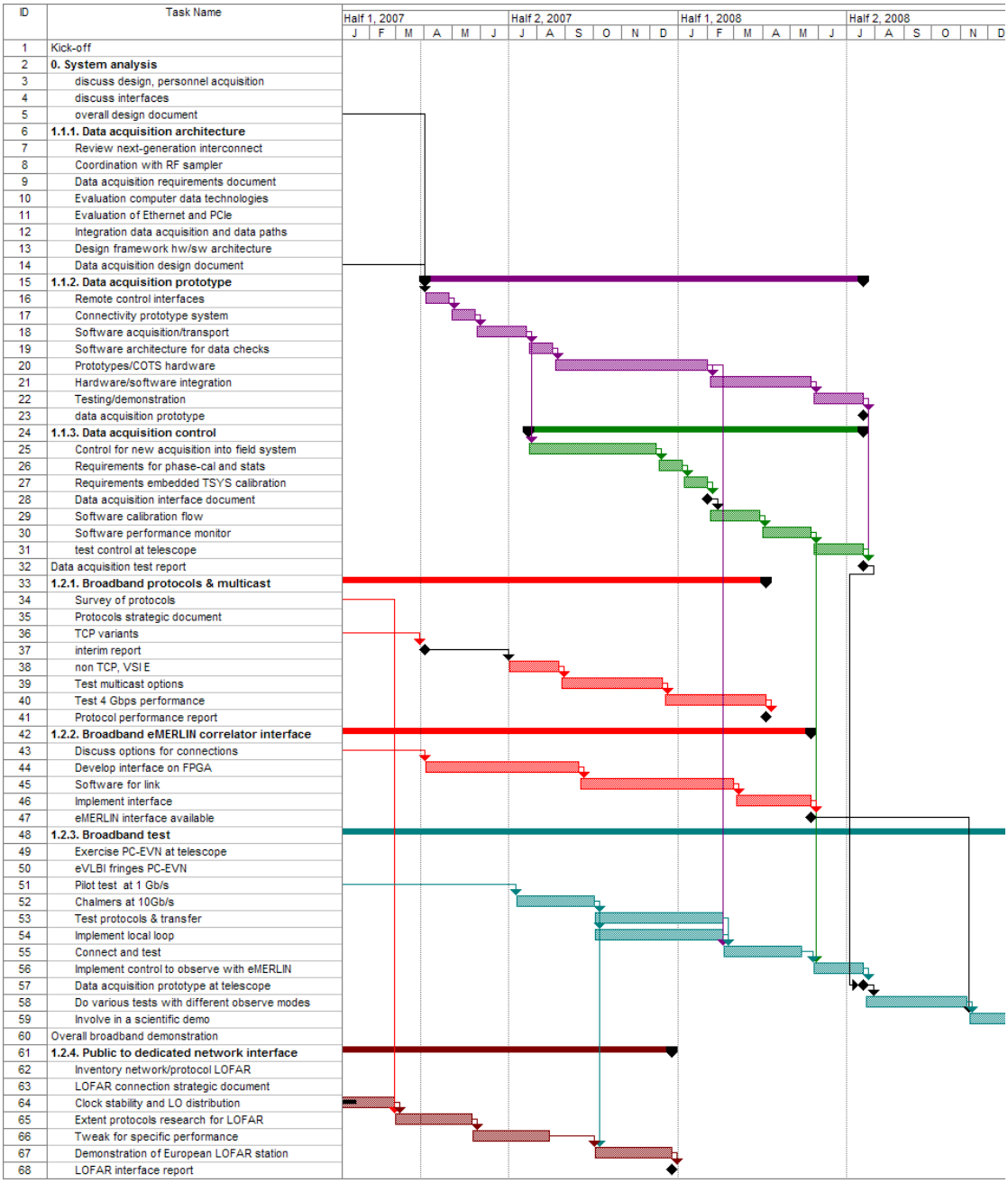


Figure JRA1-9: Gantt Overview for Activity FABRIC WP1.

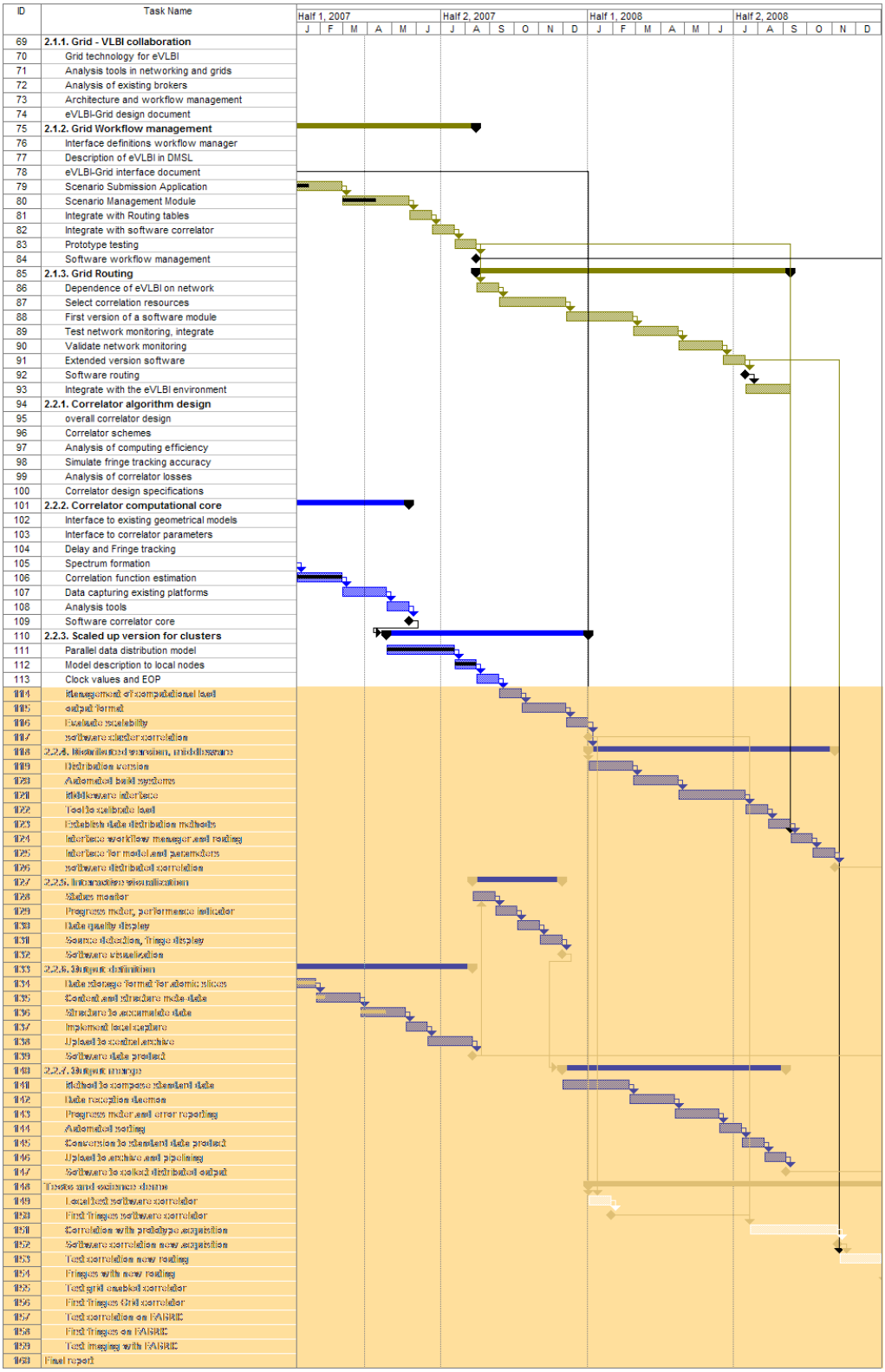


Figure JRA1-10: Gantt Overview for Activity FABRIC WP2.

Proposal number	026642	Proposal Acronym	EXPReS

Financial information - next 18 months

Participant no	Organisation short name	Cost model used	Estimated eligible costs (next 18 months)		Costs and EC contribution per type of activity				
					RTD activities (1)	Coordination/ Networking activities (2)	Specific service activities (3)	Consortium Management activities (4)	Total (5)=(1)+(2)+(3)+(4)
1	JIVE	AC	Eligible costs	direct costs (a)	202,500.00	95,375.00	490,000.00	88,812.50	876,687.50
				of wich subcontracting					0.00
				Indirect costs (b)	40,500.00	19,075.00	98,000.00	17,762.50	175,337.50
				Total Eligible costs (a)+(b)	243,000.00	114,450.00	588,000.00	106,575.00	1,052,025.00
				Requested EC contribution	243,000.00	114,450.00	588,000.00	106,575.00	1,052,025.00
2	AARNET PTY LTD	FC	Eligible costs	direct costs (a)	0.00	4,200.00	24,000.00	1,575.00	29,775.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	0.00	4,200.00	24,000.00	1,575.00	29,775.00
				Requested EC contribution	0.00	2,100.00	6,000.00	1,575.00	9,675.00
3	DANTE	FC	Eligible costs	direct costs (a)	0.00	12,150.00	0.00	2,775.00	14,925.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	0.00	12,150.00	0.00	2,775.00	14,925.00
				Requested EC contribution	0.00	6,075.00	0.00	2,775.00	8,850.00
4	PSNC	AC	Eligible costs	direct costs (a)	67,500.00	1,125.00	0.00	1,312.50	69,937.50
				of wich subcontracting					0.00
				Indirect costs (b)	13,500.00	225.00	0.00	262.50	13,987.50
				Total Eligible costs (a)+(b)	81,000.00	1,350.00	0.00	1,575.00	83,925.00
				Requested EC contribution	81,000.00	1,350.00	0.00	1,575.00	83,925.00
5	SURFnet	FC	Eligible costs	direct costs (a)	0.00	2,700.00	84,000.00	1,575.00	88,275.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	0.00	2,700.00	84,000.00	1,575.00	88,275.00
				Requested EC contribution	0.00	1,350.00	21,000.00	1,575.00	23,925.00
6	ASTRON	FC	Eligible costs	direct costs (a)	40,500.00	4,036.00	15,000.00	1,575.00	61,111.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	40,500.00	4,036.00	15,000.00	1,575.00	61,111.00
				Requested EC contribution	20,250.00	2,018.00	3,750.00	1,575.00	27,593.00
7	CNIG-IGN	FC	Eligible costs	direct costs (a)	0.00	4,050.00	155,775.00	1,575.00	161,400.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	0.00	4,050.00	155,775.00	1,575.00	161,400.00
				Requested EC contribution	0.00	2,025.00	50,250.00	1,575.00	53,850.00

Proposal number	026642	Proposal Acronym	EXPReS

Financial information - next 18 months

Participant no	Organisation short name	Cost model used	Estimated eligible costs (next 18 months)		Costs and EC contribution per type of activity				
					RTD activities (1)	Coordination/ Networking activities (2)	Specific service activities (3)	Consortium Management activities (4)	Total (5)=(1)+(2)+(3)+(4)
8	CSIRO	FC	Eligible costs	direct costs (a)	0.00	7,500.00	58,800.00	1,575.00	67,875.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	0.00	7,500.00	58,800.00	1,575.00	67,875.00
				Requested EC contribution	0.00	3,750.00	15,000.00	1,575.00	20,325.00
9	NRF	FCF	Eligible costs	direct costs (a)	0.00	7,500.00	18,000.00	1,575.00	27,075.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	0.00	7,500.00	18,000.00	1,575.00	27,075.00
				Requested EC contribution	0.00	3,750.00	4,500.00	1,575.00	9,825.00
10	INAF	FCF	Eligible costs	direct costs (a)	0.00	4,050.00	174,000.00	1,575.00	179,625.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	0.00	4,050.00	174,000.00	1,575.00	179,625.00
				Requested EC contribution	0.00	2,025.00	43,500.00	1,575.00	47,100.00
11	MPG	AC	Eligible costs	direct costs (a)	49,375.00	1,687.50	68,750.00	1,312.50	121,125.00
				of wich subcontracting					0.00
				Indirect costs (b)	9,875.00	337.50	13,750.00	262.50	24,225.00
				Total Eligible costs (a)+(b)	59,250.00	2,025.00	82,500.00	1,575.00	145,350.00
				Requested EC contribution	59,250.00	2,025.00	82,500.00	1,575.00	145,350.00
12	TKK	AC	Eligible costs	direct costs (a)	80,000.00	1,687.50	9,300.00	1,312.50	92,300.00
				of wich subcontracting					0.00
				Indirect costs (b)	16,000.00	337.50	1,860.00	262.50	18,460.00
				Total Eligible costs (a)+(b)	96,000.00	2,025.00	11,160.00	1,575.00	110,760.00
				Requested EC contribution	96,000.00	2,025.00	6,000.00	1,575.00	105,600.00
13	CORNELL	FC	Eligible costs	direct costs (a)	0.00	7,500.00	52,500.00	1,575.00	61,575.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	0.00	7,500.00	52,500.00	1,575.00	61,575.00
				Requested EC contribution	0.00	3,750.00	21,000.00	1,575.00	26,325.00
14	UMK	AC	Eligible costs	direct costs (a)	0.00	1,687.50	12,500.00	1,312.50	15,500.00
				of wich subcontracting					0.00
				Indirect costs (b)	0.00	337.50	2,500.00	262.50	3,100.00
				Total Eligible costs (a)+(b)	0.00	2,025.00	15,000.00	1,575.00	18,600.00
				Requested EC contribution	0.00	2,025.00	15,000.00	1,575.00	18,600.00

Proposal number	026642	Proposal Acronym	EXPReS

Financial information - next 18 months

Participant no	Organisation short name	Cost model used	Estimated eligible costs (next 18 months)		Costs and EC contribution per type of activity				
					RTD activities (1)	Coordination/ Networking activities (2)	Specific service activities (3)	Consortium Management activities (4)	Total (5)=(1)+(2)+(3)+(4)
15	OSO	AC	Eligible costs	direct costs (a)	43,125.00	6,687.50	12,500.00	2,000.00	64,312.50
				of wich subcontracting					0.00
				Indirect costs (b)	8,625.00	1,337.50	2,500.00	400.00	12,862.50
				Total Eligible costs (a)+(b)	51,750.00	8,025.00	15,000.00	2,400.00	77,175.00
				Requested EC contribution	51,750.00	8,025.00	15,000.00	2,400.00	77,175.00
16	SHAO	AC	Eligible costs	direct costs (a)	0.00	3,125.00	60,000.00	1,312.50	64,437.50
				of wich subcontracting					0.00
				Indirect costs (b)	0.00	625.00	12,000.00	262.50	12,887.50
				Total Eligible costs (a)+(b)	0.00	3,750.00	72,000.00	1,575.00	77,325.00
				Requested EC contribution	0.00	3,750.00	36,000.00	1,575.00	41,325.00
17	UDEC	FC	Eligible costs	direct costs (a)	0.00	7,800.00	60,000.00	1,725.00	69,525.00
				of wich subcontracting					0.00
				Indirect costs (b)					0.00
				Total Eligible costs (a)+(b)	0.00	7,800.00	60,000.00	1,725.00	69,525.00
				Requested EC contribution	0.00	3,900.00	15,000.00	1,725.00	20,625.00
18	UNIMAN	AC	Eligible costs	direct costs (a)	80,000.00	18,875.00	72,187.50	1,437.50	172,500.00
				of wich subcontracting					0.00
				Indirect costs (b)	16,000.00	3,775.00	14,437.50	287.50	34,500.00
				Total Eligible costs (a)+(b)	96,000.00	22,650.00	86,625.00	1,725.00	207,000.00
				Requested EC contribution	96,000.00	22,650.00	86,625.00	1,725.00	207,000.00
19	VeA/VIRAC	AC	Eligible costs	direct costs (a)	0.00	1,689.00	18,750.00	1,437.50	21,876.50
				of wich subcontracting					0.00
				Indirect costs (b)	0.00	338.00	3,750.00	287.50	4,375.50
				Total Eligible costs (a)+(b)	0.00	2,027.00	22,500.00	1,725.00	26,252.00
				Requested EC contribution	0.00	2,027.00	22,500.00	1,725.00	26,252.00
TOTAL			*Eligible costs*		**667,500.00**	**219,813.00**	**1,534,860.00**	**137,400.00**	**2,559,573.00**
			Requested EC contributrion		**647,250.00**	**189,070.00**	**1,031,625.00**	**137,400.00**	**2,005,345.00**

Section E. Appendices

1. APPENDICES

1.1 Appendix: Addendum to the Consortium Agreement

EXPReS partners have individually signed the addendum to the Consortium Agreement. Below, the core text of the document is provided and the first example of the signatory page. The remaining 18 pages of mostly empty documents have been omitted. The full, signed agreement is archived at the project office.

Express Production Real-time e-VLBI Service

EXPReS is funded by the European Commission (DG-INFSO),
Sixth Framework Programme, Contract #026642

The EXPReS Consortium Agreement, Contract No.026642, has been signed by the consortium members and came into force on 2006 November 20. This present document, Amendment no. 1 to the EXPReS Consortium Agreement, contains the amendments presented to the EXPReS Board on 2006 November 01. This Amendment modifies those clauses specifically mentioned therein. All other provisions of the Consortium Agreement remain unaltered and applicable.

This Amendment enters into force in accordance with Article 10.8 of the Agreement, when signed by all of the Consortium members.

Title:	Amendment 1 to the EXPReS Consortium Agreement
Date:	2006 January 08
Version:	1.0 - FINAL
Author:	Project Manager, EXPReS
Summary:	This document identifies amendments to the EXPReS Consortium Agreement as discussed during the Board Meeting on 2006 November 1. This document is to be signed and returned by each of the consortium members using the signature sheets that are part of this document.

Title: Amendment 1 to the EXPReS Consortium Agreement
Version: 1.0 - FINAL
Date: 2007 January 08

This document identifies the location of the text to be modified by section number as well as by citing the "Original text." In the Consortium Agreement, the modified text is replaced by the text identified as "New text". When the original text is permanently removed, the following phrase is shown:

[The original text is to be removed]

Where there is no original text to be replaced, the following phrase is shown:

[No original text to be replaced]

Amendment1:

Location: Article 4.1.1, the second paragraph under subtitle "Quorum requirements"
Original text: In case quorum is not met, the Governing Board will be convened once again within no more than three (3) weeks from this date, and may validly deliberate even in the absence of quorum.
New text: In case quorum is not met, the Governing Board will be convened once again within no more than three (3) weeks from this date.

Amendment 2:

Location: Article 4.2.2, the first paragraph under subtitle "Quorum requirements"
Original text: The Management Team may validly meet if 2/3 of its members are present or represented. In case quorum is not met, Management Team will be convened once again within no more than fifteen (15) days from this date, and may validly deliberate even in the absence of quorum.
New text: The Management Team may validly meet if 2/3 of its members are present or represented. In case quorum is not met, Management Team will be convened once again within no more than fifteen (15) days from this date.

Amendment 3:

Location: Article 4.2.2, the second and third paragraphs under subtitle "Concerning Intellectual Property"
Original text: Decide on terms and conditions of Access rights to Pre-Existing Know-How not listed prior to the signature of the EC Contract;

Decide on terms and conditions of access to Knowledge and Pre-Existing Know-How by Affiliates not listed prior to the signature of the EC Contract;
New text: [The original text is to be removed.]

Amendment 4:

Location: Article 8.1
Original text: The Funded Members, except for Funded Members who are Public Bodies, severally accept all liability for any loss or damage caused to them by any Consortium Member or any third party as a result of their participation in this Consortium Agreement.
New text: The Funded Members, except for Funded Members who are Public Bodies, severally accept all liability for any loss or damage caused to them by any Consortium Member or any third party as a result of their participation in this Consortium Agreement. The total limitation of liability of Consortium Members shall not exceed that Party's Project share.

Title: Amendment 1 to the EXPReS Consortium Agreement
Version: 1.0 - FINAL
Date: 2007 January 08

Amendment 5:

Location: ANNEX 3: List of Pre-Existing Know-How brought to the Project
ANNEX 4: List of excluded Pre-Existing Know-How
"New Text" to be added after entry for "Participant: ASTRON" and before ANNEX 5

Original text: [No original text to be replaced]

New text: Participant: Helsinki University of Technology

Helsinki University of Technology, FI-02015 TKK, Finland hereby explicitly excludes Pre-Existing Know-How that is or has been created outside the EXPReS project.

The EXPReS project activities will be located in Metsähovi Radio Observatory of Helsinki University of Technology TKK. All materials, software, results, data and tests from other departments and laboratories of TKK are fully excluded and no Access Rights are granted.

All commercial and third party software is excluded and no Access Rights are granted.

All the materials, results, data, tests, and deliverables resulting from other projects of Metsähovi Radio Observatory of TKK are excluded and all Access Rights are subject to separate written agreement with TKK.

For the avoidance of doubt, the following Pre-existing Know How is expressly excluded from the obligation to grant Access Rights to other EXPReS participants, both for carrying out the project and for use outside the project:

- The VHDL source code of VSIB FPGA board firmware.
- The VHDL source code of VSIC FPGA board firmware.

Amendment 6:

Location: Article 4.1.1, section "Role:"

Original text: The Governing Board is the arbitration body for all decisions of the Management Team. Thus, any Consortium Member may submit for arbitration by the Governing Board any decision by the Executive Committee it deems to be contrary to its interests;

New text: The Governing Board is the arbitration body for all decisions of the Management Team. Thus, any Consortium Member may submit for arbitration by the Governing Board any decision by the Management Team it deems to be contrary to its interests;

Amendment 7:

Location: Article 4.2.2, section "Meetings:"

Original text: The head of the Management Team will make sure that minutes of each meeting are drafted in order to formalise in writing all decisions taken and shall dispatch them to all the Executive Committee members within fifteen (15) calendar days of the concerned meeting.

New text: The head of the Management Team will make sure that minutes of each meeting are drafted in order to formalise in writing all decisions taken and shall dispatch them to all the Management Team members within fifteen (15) calendar days of the concerned meeting.

Title: Amendment 1 to the EXPReS Consortium Agreement
Version: 1.0 - FINAL
Date: 2007 January 08

Amendment 8:

Location: Article 4.2.2, section "Meetings:"

Original text: The minutes shall be considered as accepted by the Consortium Members if, within fifteen (15) calendar days from receipt thereof, no Consortium Member presented or represented at the said meeting has objected in writing to the head of the Executive Committee, provided that objection shall be either on such formalisation.

New text: The minutes shall be considered as accepted by the Consortium Members if, within fifteen (15) calendar days from receipt thereof, no Consortium Member present or represented at said meeting has objected in writing to the head of the Management Team.

Title: Amendment 1 to the EXPReS Consortium Agreement
Version: 1.0 - FINAL
Date: 2007 January 08

IN WITNESS WHEREOF, the Consortium Members have executed this modification to the Consortium Agreement in 19 (nineteen) original counterparts.

Authorised to sign on behalf of:

Joint Institute for VLBI in Europe (JIVE)
Oude Hoogeveensedijk 4
7991 PD Dwingeloo
The Netherlands

By (signature):

Name (block letters):

Position:

1.2 Appendix: M.I.T. Contract

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

OFFICE OF SPONSORED PROGRAMS

AGREEMENT (the "Agreement") between the Massachusetts Institute of Technology, hereinafter referred to as "M.I.T.," and Joint Institute for VLBI in Europe, represented by (insert here), hereinafter referred to as the "Sponsor."

This Agreement is entered into as of January 1, 2007 the "Effective Date."

WHEREAS, the effort contemplated by this Agreement is of mutual interest and benefit to M.I.T., the VLBI Community, and to the Sponsor, and will further the instructional and research objectives of M.I.T. in a manner consistent with its status as a non-profit, tax-exempt, educational institution,

NOW, THEREFORE, the parties hereto agree as follows:

1. **STATEMENT OF WORK.** M.I.T. agrees to use all reasonable efforts to perform the project as set forth in Exhibit A for the "Support and Development of Mark 5 VLBI Data Systems for e-VLBI Applications". M.I.T. shall provide Sponsor with any knowledge, insights and know-how which has been acquired in performance of the project and M.I.T. will, in an appropriate manner, continuously inform Sponsor of the results of the research work.

   After the completion of the research work, M.I.T. will submit a final written report to Sponsor. Sponsor is entitled to use the contents of the final report for its non-commercial research purposes. M.I.T. will endeavour to prepare and deliver the final report in a timely manner.

2. **PRINCIPAL INVESTIGATOR.** The project will be supervised by Dr. Alan Whitney, Haystack Observatory, the "Principal Investigator." If, for any reason, he is unable to continue to serve as Principal Investigator, and a successor acceptable to both M.I.T. and the Sponsor is not available, this Agreement shall be terminated as provided in Article 6.

3. **PERIOD OF PERFORMANCE.** The project shall be conducted during the period January 1, 2007 (the "Starting Date") through September 30, 2007 (the "Completion Date"). The Completion Date will be subject to extension only by mutual written agreement of the parties.

4. **REIMBURSEMENT OF COSTS.** In consideration of the foregoing, the Sponsor will reimburse M.I.T. for all direct and F&A (Facilities & Administrative, or indirect) costs incurred in the performance of the project, which shall not exceed the total estimated project cost of $66,200 without written authorization from the Sponsor.

5. PAYMENT. Payments shall be made to M.I.T. by the Sponsor as follows:
90 % in advance
10 % upon delivery of final report
in U.S. dollars, net of taxes or impost of any kind. A final financial accountin g of all costs incurred and all funds received by M.I.T. hereunder together with a check for the amount of the unexpended balance, if any shall be submitted to the Sponsor within ninety days following the Completion Date.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Laureen Augustine
Senior Contract Administrator
E19-750, OSP
Massachusetts Institute of Technology
77 Massachusetts Ave.
Cambridge, MA 02139 USA
laureena@mit.edu
Phone: (617) 253-3922
FAX : (617) 253-4734

SPO NSOR

(jnsert here)

6. TERMINATION. Performance under this Agreement may be terminated by the Sponsor upon sixty (60) days' prior written notice. Performance may be terminated by M.I.T. (1) if the Sponsor fails to make payment to M.I.T. in accordance with the payment schedule stated in Article 5 above and does not remedy the non-payment within thirty (30) days' written notice from M.I.T. or (2) if circumstances beyond M.I.T.'s reasonable control preclude continuation of the Research. Upon termination by either party, M.I.T. will be reimbursed as specified in Article 4 for all costs and non-cancelable commitments incurred in the performance of the Research up to and including the effective date of termination, such reimbursement not to exceed the total estimated project cost specified in Article 4.

7. PUBLICATIONS. M.I.T. will be free to publish the results of the Research after providing the Sponsor with a thirty (30) day period in which to review each publication to identify patentable subject matter and to identify any inadvertent disclosure of the Sponsor's proprietary information. If necessary to permit the preparation and filing of U.S. patent applications, the Principal Investigator may agree to an additional review period not to exceed sixty (60) days. Any further extension will require subsequent agreement between the Sponsor and M.I.T.

8. INTELLECTUAL PROPERTY.

A. Title to any invention conceived or first reduced to practice in the performance of the project shall remain with M.I.T., which shall have the sole right to determine the disposition of any inventions or other rights resulting therefrom, including the right to determine whether or not a patent application shall be filed. M.I.T., however, shall notify the Sponsor of its determination, and if a patent applicatin is filed on such invention, M.I.T. shall grant to the Sponsor a non-exclusive, non-commercial, non-transferable, royalty-free license to use such invention for internal research purposes only.

B. Title to and the right to determine the disposition of any copyrights or copyrightable material first produced or composed in the performance of this effort shall remain with M.I.T. M.I.T. shall grant to the Sponsor an irrevocable, royalty-free, non-transferable, non-exclusive right and license to use, reproduce, make derivative works, display, distribute, and perform all such copyrightable materials other than computer software and its documentation and/or informational databases. M.I.T. shall grant to the Sponsor an irrevocable, royalty-free, non-transferable, non-exclusive right and license to use, reproduce, make derivative works, display, and perform computer software and its documentation, and/or databases specified to be developed and delivered under the Statement of Work for Sponsor's internal (non-commercial) research purposes.

C. TITLE TO JOINT INVENTIONS. Inventions made jointly by employees and/or students of M.I.T. and employees of the Sponsor in the performance of the Research, or inventions made solely by employees of the Sponsor with use of M.I.T. facilities ("Joint Inventions") shall be jointly owned by the parties. The Sponsor shall be notified of any Joint Invention promptly after an invention disclosure is received by the M.I.T. Technology Licensing Office. Within ninty (90) days of M.I.T.'s written notification to the Sponsor of a Joint Invention disclosure, upon the Sponsor's written request to the M.I.T. Technology Licensing Office and M.I.T.'s approval thereof, the Sponsor shall have the first right to file patent applications on Joint Inventions in the names of both parties. All expenses incurred in obtaining and maintaining any patent on such invention shall be equally shared except that if one party declines to share in such expenses, the other party may take over the prosecution and maintenance thereof, at its own expense, provided that title to the patent remains in the names of both parties.

9. REPRESENTATIONS AND WARRANTIES. M.I.T. MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, CONCERNING THE RESEARCH OR ANY INTELLECTUAL PROPERTY RIGHTS, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT, VALIDITY OF ANY INTELLECTUAL PROPERTY RIGHTS OR CLAIMS, WHETHER ISSUED OR PENDING, AND THE ABSENCE OF LATENT OR OTHER DEFECTS, WHETHER OR NOT DISCOVERABLE. Specifically, and not to limit the foregoing, M.I.T. makes no warranty or representation (i) regarding the validity or scope of the Research or any intellectual property rights optioned or granted hereunder and (ii) that the exploitation of the Research or any intellectual property rights will not infringe any patents or other intellectual property rights of M.I.T. or of a third party.

IN NO EVENT SHALL M.I.T., ITS TRUSTEES, DIRECTORS, OFFICERS, EMPLOYEES, STUDENTS AND AFFILIATES, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, INCLUDING ECONOMIC DAMAGES OR INJURY TO PERSONS OR PROPERTY AND LOST PROFITS, REGARDLESS OF WHETHER M.I.T. SHALL BE ADVISED, SHALL HAVE OTHER REASON TO KNOW OR IN FACT SHALL KNOW OF THE POSSIBILITY

OF THE FOREGOING. THIS ARTICLE 11 SHALL SURVIVE THE EXPIRATION OR ANY EARLIER TERMINATION OF THIS AGREEMENT.

Each party hereto agrees to be responsible for its own negligent acts and omissions to the full extent required by law.

10. USE OF NAMES. Neither party will use the name of the other in any advertising or other form of publicity without the written permission of the other. As an example for M.I.T., the Sponsor shall not use the name of "Massachusetts Institute of Technology," "Lincoln Laboratory," Haystack Observatory or any variation, adaptation or abbreviation thereof, or that of any of its trustees, officers, faculty, students, employees or agents or any trademark owned by M.I.T. For M.I.T., the Director of the M.I.T. News Office has authority to grant to the Sponsor any approved use of the M.I.T. name.

11. ASSIGNMENT. This Agreement shall be binding upon and inure to the benefit of the parties hereto and the successors to substantially the entire business and assets of the respective parties hereto. This Agreement shall not be assignable by either party without the prior written consent of the other party; any attempted assignment is void.

12. GOVERNING LAW. The validity and interpretation of this Agreement and the legal relationship of the parties to it shall be governed by the laws of the Commonwealth of Massachusetts and the applicable U.S. Federal law.

13. GOVERNING LANGUAGE. In the event that a translation of this Agreement is prepared and signed by the parties for the convenience of the Contractor, this English language version shall be the official version and shall govern if there is a conflict between the two.

14. FORCE MAJEURE. Neither party shall be responsible to the other for failure to perform any of the obligations imposed by this Agreement, provided such failure shall be occasioned by fire, flood, explosion, lightning, windstorm, earthquake, subsidence of soil, failure or destruction, in whole or in part, of machinery or equipment or failure of supply of materials, discontinuity in the supply of power, governmental interference, civil commotion, riot, war, strikes, labor disturbance, transportation difficulties, labor shortage or any cause beyond its reasonable control.

15. EXPORT CONTROLS. It is understood that M.I.T. is subject to United States laws and regulations controlling the export of technical data, computer software, laboratory prototypes and other commodities, and that its obligations hereunder are contingent on compliance with applicable U.S. export laws and regulations (including the Arms Export Control Act, as amended, and the Export Administration Act of 1979). The transfer of certain technical data and commodities may require a license from the cognizant agency of the United States Government and/or written assurances by the Sponsor that the Sponsor will not re-export data or commodities to certain foreign countries without prior approval of the cognizant government agency. While M.I.T. agrees to cooperate in securing any license which the cognizant agency deems necessary in connection with this Agreement, M.I.T. cannot guarantee that such licenses will be granted.

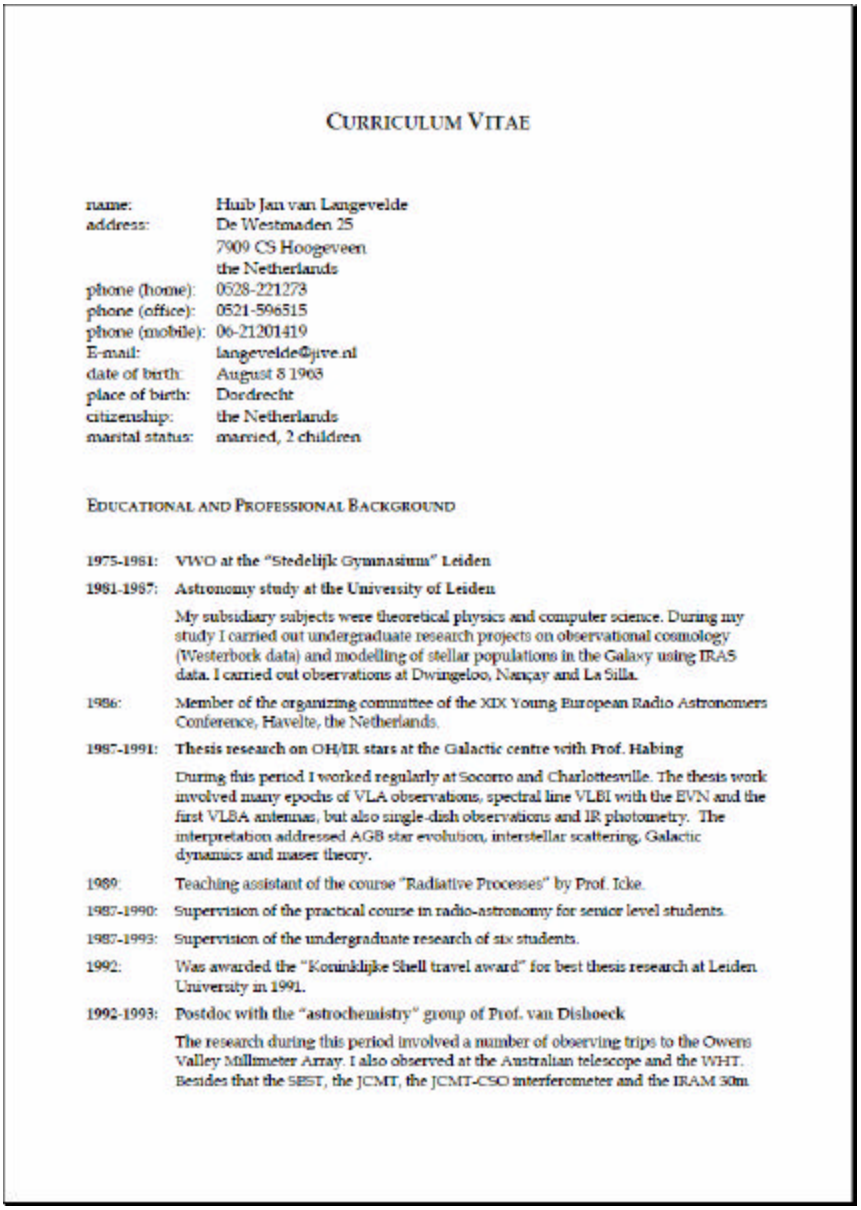
16. ENTIRE AGREEMENT. Unless otherwise specified, this Agreement and its Attachments embody the entire understanding between M.I.T. and the Sponsor for the project, and any prior or contemporaneous representations, either oral or written, are hereby superseded. No amendments or changes to this Agreement, including without limitation, changes in the

statement of work, total estimated cost, and period of performance, shall be effective unless made in writing and signed by authorized representatives of the parties.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY	**SPONSOR**
By Stephen J. McAlarney	By _____
Title Associate Director	Title _____
Date _____	Date _____

1.3 Appendix: Langevelde C.V.

Huib Jan van Langevelde's C.V. is included here as requested by the E.C.



CURRICULUM VITAE

name:	Huib Jan van Langevelde
address:	De Westmaden 25
	7909 CS Hoogeveen
	the Netherlands
phone (home):	0528-221273
phone (office):	0521-596515
phone (mobile):	06-21201419
E-mail:	langevelde@jive.nl
date of birth:	August 8 1968
place of birth:	Dordrecht
citizenship:	the Netherlands
marital status:	married, 2 children

EDUCATIONAL AND PROFESSIONAL BACKGROUND

1975-1981: VWO at the "Stedelijk Gymnasium" Leiden

1981-1987: Astronomy study at the University of Leiden

My subsidiary subjects were theoretical physics and computer science. During my study I carried out undergraduate research projects on observational cosmology (Westerbork data) and modelling of stellar populations in the Galaxy using IRAS data. I carried out observations at Dwingeloo, Nançay and La Silla.

1986: Member of the organizing committee of the XIX Young European Radio Astronomers Conference, Havelte, the Netherlands.

1987-1991: Thesis research on OH/IR stars at the Galactic centre with Prof. Habing

During this period I worked regularly at Socorro and Charlottesville. The thesis work involved many epochs of VLA observations, spectral line VLBI with the EVN and the first VLBA antennas, but also single-dish observations and IR photometry. The interpretation addressed AGB star evolution, interstellar scattering, Galactic dynamics and maser theory.

1989: Teaching assistant of the course "Radiative Processes" by Prof. Icke.

1987-1990: Supervision of the practical course in radio-astronomy for senior level students.

1987-1993: Supervision of the undergraduate research of six students.

1992: Was awarded the "Koninklijke Shell travel award" for best thesis research at Leiden University in 1991.

1992-1993: Postdoc with the "astrochemistry" group of Prof. van Dishoeck

The research during this period involved a number of observing trips to the Owens Valley Millimeter Array. I also observed at the Australian telescope and the WHT. Besides that the SEST, the JCMT, the JCMT-CSO interferometer and the IRAM 30m

were used. Most of the research focused on the small scale distribution of dust and different molecular species in YSOs, but the molecular absorption towards Centaurus A was also subject of research.

1994-1997: JIVE support scientist; from July 1994 at the Socorro VLBA correlator

I was responsible for the EVN data quality and support of European PIs using the new VLBA correlator. This implied debugging the VLBA with respect to global observations. I initiated several research projects with the VLBA. During this period I was also closely involved in the thesis research of 3 Leiden graduate students. The first study focused on circumstellar SiO and H_2O masers in the Galactic centre. Another subject of investigation was the Galactic bar, by surveying the inner Galaxy for OH masers. Both projects used the VLA, as well as the VLBA, applying a number of novel techniques. The third project was an extension of the work on YSOs. Prompted by the VSOP project I developed the extensions to SCHED for MkIV telescopes

1994-1997: Member of the EVN Technical and Operations Group.

1994-1996: Member of the International Mission Operations Group for Space VLBI.

1995-2001: Member of the Scientific Review Committee for VSOP.

1996-2002: Responsible for implementing and maintaining the MkIV extension to SCHED.

1997-2003: Manager Science Operations & Software for the EVN correlator at JIVE

In the assembly phase of the EVN data processor I was responsible for both the testing and the development of the astronomical software. After the dedication of the correlator this developed into the overall commissioning of the data processor. I was in charge of a team of up to 10 people in scientific, software and operational positions. At the same time I applied successfully for funding of an OIO position (in Leiden). This project concerned VLBI astrometry of circumstellar masers, as well as measurements of the Zeeman effect in H_2O masers.

1994-1999: Member of the EVN MkIV Upgrade team.

1996-2001: Member of the Scientific and Technical Advisory Committee for aips++, later the aips++ users group.

1997: Member of the JIVE Management Team, chairman of the Operations Meeting, the Planning Meeting, and Correlator Project Software meetings.

1998-2002: Completed several courses in computer science and management skills.

2001-2002: Member of the Scientific Organizing Committee of the workshop "Long Period Variable stars and their circumstellar matter", Sendai, Japan.

2002: Session convenor during the URSI General Assembly on "radio astronomy at high data rates".

2002-2003: Member of the organizing committee of the workshop "Future directions in AGB star research", honouring H.J. Habing.

2003- : Head Software group at JIVE

Besides the maintenance of the correlator software, this group was involved in several innovative software projects. This includes the Virtual Observatory effort for the EVN, as well as development of a massive parallel backend for the correlator. Moreover, through an EU supported project, we are now developing advanced user

processing techniques. In this context I took the initiative to develop a Python front-end for AIPS called ParselTongue. We started developing eVLBI in which telescopes communicate their data in real time over very wide-band fibre connections; I focused on working out the ideas to use the Grid as a means to identify the CPU power for the next generation correlator.

Through a Marie Curie training network (ESTRELA) JIVE has now one PhD student in Leiden working on methanol masers under my supervision. I share the responsibility for one more student, as well as two postdocs on ALMA and eSMA projects.

1997-2006: Member of the NOVA "onderwijscommissie".

1998-2005: Member of the EVN Program Committee.

2003-2004: Member of the LOC, co-chair of the SOC of the workshop "Dense Molecular Gas around Protostars and in Galactic Nuclei", February 2004, Zwolle.

2005- : Associate Professor at Leiden University for one day a week (nulaanstelling)

I am visiting the Sterrewacht Leiden for one day a week in order to participate in the research of the astrochemistry group, focusing on the millimetre interferometry efforts (ALMA, eSMA).

2003- : International project manager for ALBUS (``Advanced Long Baseline User Software''), part of the FP6 RadioNet effort, member of the RadioNet Executive Board.

2004- : Involved in the eSMA project which includes the JCMT in the SMA array.

2005- : Member of the committee overseeing the establishment of a Dutch node of the ALMA Regional Centre.

2005- : Member of the NOVA Instrument Steering Committee.

2005- : Local node manager for ESTRELA a Marie Curie Early Stage Training network for radio-astronomy.

2005- : International project manager for FABRIC "Future Arrays of Broadband Radio-telescopes on Internet Computing", part of the FP6 EXPReS effort.

2006: Teaching a radio-interferometry course aimed at all astronomy students in the Netherlands.

2006- : Member of the ESO STC, chairman of the VLTI overview committee.

2005-2006: Member of the LOFAR DCLA and calibration review committees.

2007- : Interim director JIVE

I was asked to fill in as director of JIVE starting February 1. During this period I restructured JIVE temporarily to deal with the interim period. I proceeded with the negotiations to renew the JIVE MOU.

2007-: Took over the international responsibilities of the JIVE director, including the membership of various boards: EVN, RadioNet, EXPReS, SKADS, prepSKA.

2007-: Acting as the EXPReS coordinator during its mid-term review.

Skills

teaching:	Vast experience and perfect track record in supervising undergraduate and graduate research projects. Regular experience in teaching classes in a wide range of technical and astrophysical topics.
management:	Experience with logistic and operational issues associated with running a large astronomical facility. Competent line manager with good people skills, experienced in steering both experts professionals and technicians. Successfully managed complex, distributed software projects. Familiar with budgetary issues, institute management and funding acquisition.
software:	Confident with a very large range of unix and windows software tools, including a variety of compilers, graphics libraries and data processing systems. Experience in writing and maintaining user applications in Fortran, C++, Python and Perl. Done overall system design for radio-astronomy software problems, including embedded and real-time applications.
languages:	Fluent in Dutch and English, moderate in French, German, Spanish.

Publication Record

My publications record contains 123 entries of which 45 are refereed papers. I have edited one conference proceeding and written several articles for popular science magazines. The list of papers can be found at http://www.jive.nl/~huib/publications.html.

Secondary occupations

1980-1982:	Member of the administration of a sports club.
1982-1986:	A number of organizational functions at a students' society of 600 members: editor of the journal, treasurer of the students' club, chairman of the advisory committee.
2001-:	Member of the local school "Medezeggenschapsraad", delegate to the "Gemeentelijke Medezeggenschapsraad", chairman of a ``Stichting'' for financial support. Treasurer of the "Gemeentelijke Bestuurscommissie Openbaar Primair Onderwijs", responsible for 14 schools in and around Hoogeveen.
hobbies:	Sports (volleyball, tennis, soccer, cricket), pop-music, cooking.

1.4 Appendix: Audit Certificates

The following pages contain the Audit Certificates for the following partners:

JIVE

PSNC

CSIRO

TKK

UDEC

UNIMAN

VeA/VIRAC

Deloitte.

Deloitte Accountants B.V.
Laan Corpus den Hoorn 102-4
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Joint Institute for Very Long Baseline
Interferometry (VLBI) in Europe
P.O. Box 2
7990 AA DWINGELOO

Date	From	Reference
April 13, 2007	P. Rienks RA	9104-LM/ma

Auditors' report

We Deloitte, established in Laan Corpus den Hoorn 102-4, Groningen, The Netherlands, represented for signature of this audit certificate by Piet Rienks RA, hereby certify that:

- we have conducted an audit relating to the cost declared in the Financial Statement per Activity of Stichting Joint Institute for VLBI in Europe (now mentioned as JIVE) hereinafter referred to as contractor, to which this audit certificate is attached, and which is to be presented to the Commission of the European Communities under contract No. 026642 for the following period covered by the EC contract: March 1, 2006 to February 28, 2007;
- we confirm that our audit was carried out in accordance with generally accepted auditing standards respecting ethical rules and on the basis of the relevant provisions of the above-referenced contract and its annexes. The above mentioned Financial Statement per Activity was examined and all tests of the supporting documentation and accounting records deemed necessary were carried out in order to obtain reasonable assurance that, in our opinion, based on our audit:
    - the amount of the total eligible costs € 579.238,96 (fivehundredseventyninethousand-twohundredandthirtyeight euro's and ninetysix cents) declared in Box 2 of the attached Financial Statement per Activity is complying with the following cumulative conditions:
        - they are actual and reflect the contractor's economic environment;
        - they are determined in accordance with the contractor's accounting principles;
        - they have been incurred during the periods covered by the Financial Statement per Activity concerned by this audit certificate;

- they are recorded in the accounts of the contractor at the date of the establishment of this audit certificate;
- they are exclusive of any non-eligible costs identified below which are established in the second paragraph of article II.19 of the above mentioned contract with the Commission of the European Communities:
  - any identifiable indirect taxes, including VAT or duties;
  - interest owed;
  - provisions for possible future losses or charges;
  - exchange losses;
  - costs declared, incurred or reimbursed in respect of another Community project;
  - return on capital;
  - debt and debt service charges;
  - excessive or reckless expenditure;
  - any cost which does not meet the conditions established in Article II.19.1. of your contract with the Commission of the European Communities.
- they have been claimed according to the following cost reporting model: AC which the contractor is eligible to use according to article II.22 of the above mentioned contract with the Commission of the European Communities;
  As such, they are also exclusive of any additional direct eligible costs covered by contributions from third parties defined in indents a) and b) of Article II.23 of the contract with the Commission of the European Communities;

- as declared in the Box 3 of the attached Financial Statement per Activity, the total amount of receipts for the periods covered by this Financial Statement per Activity is equal to 0 (nil);
- as declared in the Box 4 of the attached Financial Statement per Activity, the total amount of interest yielded by the pre-financing received from the Commission of the European Communities for the periods covered by this Financial Statement per Activity is equal to € 25.109,90 (twentyfivethousandonehundredandnine euro's and ninety cents);

Deloitte.

- accounting procedures used in the recording of eligible costs and receipts respect the accounting rules of the State in which the contractor is established and permit the direct reconciliation between the costs and receipts incurred for the implementation of the project covered by the EC contract and the overall statement of accounts relating to the contractor's overall business activity;
- our company is qualified to deliver this audit certificate in full compliance with the second and third paragraphs of article II.26 of the contract.
- As declared in the Box 6 the contractor paid for this audit certificate a price equal to € 2.937,50 (twothousandninehunderdthirtyseven euro's and fifty cents) in which VAT is equal to € 469 (fourhundredsixtynine euro's).

Deloitte Accountants B.V.

P. Rienks RA

Zespół Biegłych Rewidentów

> Saldo - Kredyt <®

Spółka z ograniczoną odpowiedzialnością
Podmiot uprawniony do badania sprawozdań finansowych
i wykonywania doradztwa podatkowego Nr 85

KRS 0000037342 **kapitał zakładowy (w całości opłacony): 51.000,00 złotych**

81-356 Gdynia, ul. Starowiejska 24/1
tel. 661-79-16; 661-30-20
tel./fax. 620-74-55

NORDEA BANK POLSKA I/O Gdynia
39 1440 1026 0000 0000 0289 5935
NIP 583-000-43-08

AUDIT CERTIFICATE
PROVIDED BY AN EXTERNAL AUDITOR

Instytut Chemii Bioorganicznej Polskiej Akademii Nauk
Noskowskiego 12/14
61-704 Poznań
P O L S K A

We *Zespół Biegłych Rewidentów "Saldo-Kredyt" Spółka z ograniczoną odpowiedzialnością*, established in Starowiejska 24, 81-356 Gdynia, Poland, represented for signature of this audit certificate by Ernest Podgórski - auditor, hereby certify that:

1. We have conducted an audit relating to cost declared in the Financial Statement per Activity of ***Instytut Chemii Bioorganicznej Polskiej Akademii Nauk*** hereinafter referred to as contractor, to which this audit certificate is attached, and which is to be presented to the Commission of the European Communities under contract "***EXPReS: A Production Astronomy e-VLBI Infrastructure***", contract No 026642 *(acronym*: **EXPReS***)* for the following period 01/01/2006-31/12/2006.

2. We confirm that our audit was carried out in accordance with generally accepted auditing standards respecting ethical rules and on the basis of the relevant provisions of the above referenced contract and its annexes.

The above mentioned Financial Statement per Activity was examined and all tests of the supporting documentation and accounting records deemed necessary were carried out in order to obtain reasonable assurance that, in our opinion, based on our audit:

The amount of the total eligible costs 58.111,96 EUR (*fifty eight thousand one hundred eleven euro 96/100*) you declared in the Box 2 of the attached Financial Statement per Activity are complying with the following cumulative conditions:

- they are actual and answers to your economic environment;
- they are determined in accordance with your usual accounting principles;
- they have been incurred during the periods covered by the Financial Statement per Activity concerned by this audit certificate;
- they are recorded in your accounts at the date of the establishment of this audit certificate;
- they are exclusive of any non-eligible costs which are, as established in the second paragraph of article II.19 of your above men tioned contract with the Commission of the European Communities:
  - any identifiable indirect taxes, including VAT or duties;
  - interest owed;
  - provisions for possible future losses or charges;
  - exchange losses;
  - costs declared, incurred or reimbursed in respect of another Community project;
  - return on capital;
  - debt and debt service charges;
  - excessive or reckless expenditure;
  - any cost which does not meet the conditions established in Article II.19.1. of your contract with the Commission of the European Communities;
- they are represented according to the following cost reporting model **AC** you are eligible to use according to article II.22 of your above mentioned contract with the Commission of the European Communities;

  As such, they are also exclusive of any additional direct eligible costs covered by contributions from third parties defined in indents a) and b) of Article II.23 of the contract with the Commission of the European Communities.
- they are represented according to the following basis for the conversion rate used of EURO: **conversion rate of the date of incurred actual costs;**

- as declared in the Box 3 of the attached Financial Statement per Activity, the total amount of receipts for the periods covered by this Financial Statement per Activity is equal to 0,00 *(zero euro 00/100)*;

- accounting procedures used in the recording of your eligible costs and receipts respect the accounting rules of the State in which you are established as well as permit the direct reconciliation between the costs and receipts incurred for the implementation of the project covered by the EC contract above mentioned and the overall statement of accounts relating to your overall business activity;

- our company is qualified to deliver this audit certificate in full compliance with the second and third paragraphs of article II.26 of the contract; relevant information establishing this qualification are attached to this audit certificate;

- as declared in the Box 6 of the attached Financial Statement per Activity, you have paid for this audit certificate a price equal to 378,09 EUR (*three hundred seventy eight euro 09/100)* in which VAT is equal to 68,18 EUR (*sixty eight euro 18/100).*

Poznań, 20.03.2007

ZESPÓŁ BIEGŁYCH REWIDENTÓW
»*SALDO-KREDYT*« Sp. z o.o.
81-363 Gdynia, ul. Starowiejska 24/1
tel. 661 30 20, NIP 583-000-43-08

PRESIDENT
AUDITOR
No 10237/7554

Ernest Podgórski

CSIRO

ICT Centre

PO Box 76
Epping NSW 1710

Telephone: 02 9372 4222
Facsimile: 02 9372 4585
www.csiro.au

12th April, 2007

Neil Derwent,
Finance Manager
CSIRO Australia Telescope National Facility
Epping, Australia

Subject: Integrated Initiatives for Infrastructures
Project: EXPReS
Contract Reference: 026642

I Warrren Bax CPA, hereby certify that:

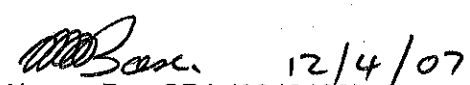
- We have conducted an audit relating to the cost declared in the Financial Statement(s) per Activity of CSIRO ATNF hereinafter referred to as contractor, to which this audit certificate is attached, and which is to be presented to the Commission of the European Communities under contract **026642 EXPReS Integrated Initiatives for Infrastuctures SA2- Network Provision for Global e-VLBI Array** for the following period(s) covered by the EC contract **2006 March 01 to 2007 February 28.**
- We confirm that our audit was carried out in accordance with generally accepted auditing standards respecting ethical rules and on the basis of the relevant provisions of the above-referenced contract and its annexes.
  The above mentioned Financial Statement per Activity was examined and all tests of the supporting documentation and accounting records deemed necessary were carried out in order to obtain reasonable assurance that, in our opinion, based on our audit:
  - The amount of the total eligible costs €1,440,069.07 One Million four Hundred and Forty Thousand and sixty nine .07 Euros declared in Box 2 of the attached Financial Statement(s) per Activity is complying with the following cumulative conditions
    - ✓ they are actual and reflect the contractor's economic environment
    - ✓ they are determined in accordance with the contractor's accounting principles
    - ✓ they have been incurred during the periods covered by the Financial Statement(s) per Activity concerned by this audit certificate
    - ✓ they are actual and reflect the contractor's economic environment
    - ✓ they are recorded in the accounts of the contractor [and/or the third party in the case of contributions to the contractor from third parties] at the date of the establishment of this audit certificate

- ✓ they are recorded in the accounts of the contractor [and/or the third party in the case of contributions to the contractor from third parties] at the date of the establishment of this audit certificate
- ✓ they are exclusive of any non-eligible costs identified below which are established in the second paragraph of article II.19 of the above mentioned contract with the Commission of the European Communities:
  - ❖ any identifiable indirect taxes, including VAT or duties
  - ❖ interest owed
  - ❖ provisions for possible future losses or charges
  - ❖ costs declared, incurred or reimbursed in respect of another Community project
  - ❖ return on capital
  - ❖ and debt service charges
  - ❖ excessive or reckless expenditure
  - ❖ any cost which does not meet the conditions established in Article II.19.1. of your contract with the Commission of the European Communities
- ✓ they have been claimed according to the following cost reporting model FC which the contractor is eligible to use according to article II.22 of the above mentioned contract with the Commission of the European communities; [As such, they are also exclusive of any additional direct eligible costs covered by contributions from third parties defined in indents a) and b) of Article II.23 of the contract with the Commission of the European Communities]
- ✓ [they have been claimed according to the following cost reporting model [insert the relevant cost reporting model] which the contractor is eligible to use in the specific activities aiming to provide transnational access according to article III.13 of the above mentioned contract with the Commission of the European Communities;] [As such, they are also exclusive of any additional direct eligible costs covered by contributions from third parties defined in indents a) and b) of Article II.23 of the contract with the Commission of the European Communities]
- ✓ [they are claimed according to the following basis for the conversion rate used of EURO:
  - ❖ the rate applicable on the first day of the month following the end of reporting period]

as declared in the Box 3 of the attached Financial Statement(s) per Activity, the total amount of receipts for the periods covered by this(those) Financial Statement(s) per Activity is equal to Nil.

- accounting procedures used in the recording of eligible costs and receipts respect the accounting rules of the State in which the contractor is established and permit the direct reconciliation between the costs and receipts incurred for the implementation of the project covered by the EC contract and the overall statement of accounts relating to the contractor's overall business activity
- I Warren Bax being a current member of ASCPA am duly qualified to deliver this audit certificate in accordance with my proposal of email dated Mrach 16, 2007.
- Relevant information establishing this qualification is included with this audit certificate
- as declared in the Box 6 of the attached Financial Statement(s) per Activity, the contractor paid for this audit certificate a price equal to Nil as services were provided from within CSIRO but with acceptable level of operational segregation in which VAT is equal to Nil.

Yours Sincerely,



12/4/07

Warren Bax CPA (2042162)
Finance Manager
CSIRO ICT Centre
Cnr Vimiera and Pembroke rds
Marsfield NSW Australia

Teknillinen korkeakoulu
Otakaari 1
02015 Espoo
FINLAND

AUDIT CERTIFICATE

I Ritva Weckström, CPFA (Chartered Public Finance Auditor), established in Pukkila represented for signature of this audit certificate by Teknillinen korkeakoulu, Internal Auditor, hereby certify that:

- I have conducted an audit relating to the cost declared in the Financial Statements per Activity of Teknillinen korkeakoulu hereinafter referred to as contractor, to which this audit certificate is attached, and which is to be presented to the Commission of the European Communities under the EC contract number 026642, EXPReS: A Production Astronomy e-VLBI Infrastructure, EXPReS, for the following period covered by the EC contract from 1st March 2006 to 28th February 2007.

- I confirm that my audit was carried out in accordance with generally accepted auditing standards respecting ethical rules and on the basis of the relevant provisions of the above referenced contract and its annexes.

  The above mentioned Financial Statements per Activity were examined and all tests of the supporting documentation and accounting records deemed necessary were carried out in order to obtain reasonable assurance that, in my opinion, based on my audit:

  - the amount of the total eligible costs was 42.758,78 euros (forty two thousand seven hundred fifty eight euros and seventy eight cents) declared in the Box 2 of the attached Financial Statement per Activity is complying with the following cumulative conditions:

    - ✓ they are actual and reflect the contractor's economic environment;

    - ✓ they are determined in accordance with the contractor's accounting principles;

    - ✓ they have been incurred during the periods covered by the Financial Statements per Activity concerned by this audit certificate;

    - ✓ they are recorded in the accounts of the contractor at the date of establishment of this audit certificate;

    - ✓ they are exclusive of any non-eligible costs identified below which are established in the second paragraph of article II.19 of the above mentioned contract with the Commission of the European Communities:

- ❖ any identifiable indirect taxes, including VAT or duties;
- ❖ interest owed;
- ❖ provisions for possible future losses or charges;
- ❖ exchange losses;
- ❖ costs declared, incurred or reimbursed in respect of another Community project;
- ❖ return on capital;
- ❖ debt and debt service charges;
- ❖ excessive or reckless expenditure;
- ❖ any cost which does not meet the conditions established in Article II.19.1 of your contract with the Commission of the European Communities.

✓ they have been claimed according to the following costs reporting model "the additional cost model" (AC) which the contractor is eligible to use according to article II.22 of the above mentioned contract with the Commission of the European Communities;

As such, they are also exclusive of any additional direct eligible costs covered by contributions from third parties defined in indents a) and b) of Article II.23 of the contract with the Commission of the European Communities.

▪ as declared in the Box 3 of the attached Financial Statements per Activity, the total amount of receipts for the periods covered by this Financial Statements per Activity is equal to 0,00 euros (zero euros);

- accounting procedures used in the recording of eligible costs and receipts respects the accounting rules of the State in which the contractor is established and permit the direct reconciliation between the costs and receipts incurred for the implementation of the project covered by the EC contract and the overall statement of accounts relating to the contractor´s overall business activity;

- I am qualified to deliver this audit certificate in full compliance with the second and third paragraphs of article II.26 of the contract;

- as declared in the Box 6 of the attached Financial Statement per Activity, the contractor have to pay for this audit certificate a price equal to 715,58 euros (seven hundred fifteen euros and fifty eight cents) in which VAT is equal to 0,00 (zero) euros.

Espoo 8.3.2007

Ritva Weckström
CPFA

Ritva Weckström
JHTT/CPFA

BDO Acender
Auditores & Consultores

Av.Vitacura 5093, Piso 5 - Vitacura
Santiago - Chile
Fono: (56-2) 290 8000
Fax: (56-2) 290 8094
E-mail: acender@bdochile.cl
www.bdochile.cl

REPORT OF THE INDEPENDENT AUDITORS

Messrs. Dirección de Investigaciones
Universidad de Concepción

1. We have reviewed the information on project No. 026642 A Production Astronomy e-VLBI Infrastructure, performed by the Universidad de Concepción in the period between March 01, 2006 and March 13, 2007, detailed in the attached appendixes. The preparation of the information on the expenses incurred into in the project is the responsibility of the management of Universidad de Concepción. Our responsibility is to issue a certification over their use, based on the revision we conducted.

2. The review was conducted in accordance with generally accepted review standards. To that end, planning an performance of the works has been required in order to attain a reasonable degree of certainty that the report on expenses incurred into in the project No. 026642 A Production Astronomy e-VLBI Infrastructure, is free from material misstatement. To comply with the commended review, we examined the expenses attributed to the project with the supporting documentation. We believe that our review provide a reasonable basis to support this report.

3. In our opinion, this Report on expenses and its respective Appendixes reasonably present the information on project No. 026642 A Production Astronomy e-VLBI Infrastructure of the Universidad de Concepción for the period between March 01, 2006 and March 13, 2007.

4. This report is delivered upon the Universidad de Concepción's request solely to be known and used by the Board of Directors and the European Community and, therefore, it is not intended to be a public document.

Heraldo Hetz Vorpahl

BDO Acender
Auditores & Consultores

Concepción, March 13, 2007

BDO

APPENDIX 1

PROJECT A PRODUCTION ASTRONOMY E-VLBI INFRASTRUCTURE
No. 026642

ACTUAL TOTAL EXPENSES

		Actual Expenses for the Period €
A)	COORDINATION	
1)	Coordination	2,527.00
2)	Coordination Secretary	117.59
	Coordination Sub-total	2.644.59
B)	DOCUMENTS	
1)	Production	-
2)	Translation	-
3)	Publication	-
	Documents Sub-total	-
C)	OTHER ELIGIBLE EXPENSES	
1)	Execution	1,055.90
2)	Others	497.31
	Other Eligible Expenses Sub-total	1.553.21
D)	TECHNOLOGY AND EQUIPMENT	
1)	Radiotelescope systems	9,800.00
2)	Hardware	2,435.24
3)	Connectivity and networks	8,484.10
	Technology and Equipment Sub-total	20.719.33
	TOTAL BEFORE ADMINISTRATIVE EXPENSES	24.917.13

APPENDIX 1

PROJECT A PRODUCTION ASTRONOMY E-VLBI INFRASTRUCTURE
No. 026642

ACTUAL TOTAL EXPENSES, Continued

	Actual expenses for the period €
E) ADMINISTRATIVE EXPENSES	
Communication: telephone, fax, internet	713.44
Office supplies	-
Mail	158.47
Photocopies	
Administrative Expenses Sub-total	871.91
GRAND TOTAL	25,789.04

BDO

APPENDIX 2

PROJECT A PRODUCTION ASTRONOMY E-VLBI INFRASTRUCTURE
No. 026642

EUROPEAN COMMUNITY FUNDING

		Actual expenses for the period €
A)	COORDINATION	
1)	Coordination	1,263.50
2)	Coordination Secretary	58,79
	Coordination Sub-total	1,322.29
B)	DOCUMENTS	
1)	Production	-
2)	Translation	-
3)	Publication	-
	Sub-total Documents	-
C)	OTHER ELIGIBLE EXPENSES	
1)	Execution	527.95
2)	Others	248,65
	Other Eligible Expenses Sub-total	776.60
D)	TECHNOLOGY AND EQUIPMENT	
1)	Radiotelescope systems	4,900.00
2)	Hardware	1,217.62
3)	Connectivity and networks	4,242.05
	Technology and Equipment Sub-total	10,359.67
	TOTAL BEFORE ADMINISTRATIVE EXPENSES	12,458.56

BDO

APPENDIX 2

PROJECT A PRODUCTION ASTRONOMY E-VLBI INFRASTRUCTURE
No. 026642

EUROPEAN COMMUNITY FUNDING, Continued

	Actual expenses for the period €
E) ADMINISTRATIVE EXPENSES	
Communication: telephone, fax, Internet	356.72
Office supplies	-
Mail	79.23
Photocopies	-
Administrative Expenses Sub-total	435.95
TOTAL EUROPEAN COMMUNITY FUNDING	12,894.52

APPENDIX 3

PROJECT A PRODUCTION ASTRONOMY E-VLBI INFRASTRUCTURE
No. 026642

UNIVERSIDAD DE CONCEPCIÓN FUNDING

		Actual expenses for the period €
A)	COORDINATION	
1)	Coordination	1,263.50
2)	Coordination Secretary	58.79
	Coordination Sub-total	1,322.29
B)	DOCUMENTS	
1)	Production	-
2)	Translation	-
3)	Publication	-
	Sub-total Documents	-
C)	OTHER ELIGIBLE EXPENSES	
1)	Execution	527.95
2)	Others	248.65
	Sub-total Other eligible expenses	776.60
D)	TECHNOLOGY AND EQUIPMENT	
1)	Radiotelescope systems	4,900.00
2)	Hardware	1,217.62
3)	Connectivity and networks	4,242.05
	Sub-total Technology and Equipment	10,359.67
	TOTAL BEFORE ADMINISTRATIVE EXPENSES	12,458.56

APPENDIX 3

PROJECT A PRODUCTION ASTRONOMY E-VLBI INFRASTRUCTURE
No. 026642

UNIVERSIDAD DE CONCEPCIÓN FUNDING, Continued

	Actual expenses for the period €
E) ADMINISTRATIVE EXPENSES	
Communication: telephone, fax, internet	356.72
Office supplies	-
Mail	79.23
Photocopies	-
Administrative Expenses Sub-total	435.95
TOTAL UNIVERSIDAD DE CONCEPCIÓN FUNDING	12,894.52

uniac

a refreshing approach to management support services

To: The University of Manchester
Oxford Road
Manchester M13 9QH
United Kingdom

30th March, 2007

Audit Certificate – Contract No. 026642 – EXPReS – INTEGRATED INFRASTRUCTURE INITIATIVE (Audited as per FP6 guidance issued in February 2005)

We Uniac, established in Suite 1D, Armstrong House, Oxford Road, Manchester M1 7ED, United Kingdom (Telephone 0161-247-2850, Fax 0161-247-1878) represented for signature of this audit certificate by Ian White, Audit Manager, hereby certify that:

1. We have conducted an audit relating to the cost declared in your Financial Statement per Activity of the University of Manchester hereinafter referred to as contractor, to this audit certificate is attached, and which is to be presented to the Commission of the European Communities under the "EXPReS: A Production Astronomy e-VLBI Infrastructure" contract, known as "EXPReS", Contract Number 026642 for the period from 1st March 2006 to 28th February 2007.

2. We confirm that our audit was carried out in accordance with generally accepted auditing standards respecting ethical rules and on the basis of the relevant provisions of the above-referenced contract and its annexes.

3. The above mentioned Financial Statement per Activity was examined and all tests of the supporting documentation and accounting records deemed necessary were carried out in order to obtain reasonable assurance that, in our opinion, based on our audit:

4.
- The amount of the total eligible costs €24,770.93, Twenty Four Thousand Seven Hundred and Seventy point Nine Three Euro you declared in the Box 2 of the attached Financial Statement per Activity is complying with the following cumulative conditions:
- they are actual and answers to your economic environment.
- they are determined in accordance with your usual accounting principles;
- they have been incurred during the periods covered by the Financial Statement per Activity concerned by this audit certificate;
- they are recorded in the accounts of the contractor at the date of the establishment of this audit certificate;
- they are exclusive of any non-eligible costs below which are established in the second paragraph of article II.19 of your above mentioned contract with the Commission of the European Communities:
  - any identifiable indirect taxes, including VAT or duties;
  - interest owed;

Signed.....
Ian White, Audit Manager

Date.30/3/07.....

- provisions for possible future losses or charges;
- exchange losses;
- costs declared, incurred or reimbursed in respect of another Community project;
- return on capital;
- debt and debt service charges;
- excessive or reckless expenditure;
- any cost which does not meet the conditions established in Article II.19.1. of your contract with the Commission of the European Communities.

5. They have been claimed according to the following cost reporting model - Additional direct costs with flat rate for indirect costs model (AC) which the contractor is eligible to use according to article II.22 of the above mentioned contract with the Commission of the European Communities;

6. As such, they are also exclusive of any additional direct eligible costs covered by contributions from third parties defined in indents a) and b) of Article II.23 of your contract with the Commission of the European Communities;

7. They are claimed according to the following basis for the conversion rate used of EURO:
   - the rate applicable on the first day of the month following the end of the reporting period.

8. As declared in Box 3 of the attached Financial Statement per Activity, the total amount of receipts for the period covered by this Financial Statement per Activity is equal to €0, €Nil.

9. As declared in Box 4 of the attached Financial Statement per Activity, the total amount of interests yielded by the pre-financing you received by the Commission of the European Communities for the period covered by this Financial Statement per Activity is equal to €0, €Nil (N/A – the University is not the project co-ordinator).

10. Accounting procedures used in the recording of your eligible costs and receipts respect the accounting rules of the State in which the contractor is established and permit the direct reconciliation between the costs and receipts incurred for the implementation of the project covered by the EC contract and the overall statement of accounts relating to the contractor's overall business activity;

11. Our company is qualified to deliver this audit certificate in full compliance with the second and third paragraphs of article II.26 of the contract;

12. As declared in the Box 6 of the attached Financial Statement per Activity, you have paid for this audit certificate a price equal to €700, Seven Hundred Euro in which VAT is equal to €0, €Nil. The audit fee will be included in next year's claim.

Signed.....
Ian White, Audit Manager

Date 20/3/07.....

Because the University of Manchester is a public body, UNIAC as their approved Internal Auditors, are competent public officers and have the legal capacity to carry out this audit. Evidence of this is available from the undersigned if required.

Signed.....
Ian White, Audit Manager

Date. 30/3/07.....

SIA Zvērinātu revidentu firma
Kapitāls
Reģ. Nr.42103010490
Graudu ielā 23, Liepājā, LV-3401
t:3422637,m:9259804; f:3407021
kapitals@e-liepaja.lv
sia_kapitals@e-liepaja.lv

AUDIT CERTIFICATE

provided by an external auditor

Ventspils University College
101a Inzenieru Street
Ventspils, LV- 3600 Latvia

We have carried out inspection of expenditures between the Central Finance and Contracting Agency and the Venstpils University College, which is the beneficiary of financing from the European Regional Development Fund (hereinafter referred to as the Beneficiary), Contract no.026642 EXPRES *(hereinafter referred to as the Commision)* for an Integrated Infrastructure Initiative entitled „Express Production Real- Time e-VLBI Service (EXPRESS)", *(hereinafter referred to as „the Project")*. The Beneficiary's management shall bear responsibility for the expenditures. We are responsible for rendering the acknowledgement, based on the inspection.

This acknowledgement task was made in accordance with the 3000. International assurance standard "Assurance engagements". The said standard determines, that we shall plan and carry out the assurance engagement to the extent that the object is evaluated against certain criteria, which, in this particular case, are as follows: have the expenditures been made and has the money been spent to establish the Internet connection.

We have received all the information and documents, we were requesting, and, in our opinion, the procedures, which have been carried out, are sufficient to prepare our acknowledgement.

In accordance with our acknowledgement:

- The expenditures were made, as follows:
- The sum of money 303 EUR has been spent as travel expenses Ventspils- Dvingeloo-Ventspils Attendance of eVSAG meeting.
- The sum of money 209662 EUR has been spent as fiber installation Irbene- Ventspils (20 km).

Marija Jansone, Sworn Auditor,
Certificate No.25,
Board Member,
„Sworn Auditor Company KAPITĀLS" Ltd.
Commercial company licence No 6

SIA „Zvērinātu revidentu firma KAPITĀLS" LATVIJAS REPUBLIKA

Jansone

April, 11th, 2007, Liepaja

Project Acronym	EXPReS
Project Full Title	Express Production Real-Time e-VLBI Service
Proposal/Contract number	DG-INFSO #026642