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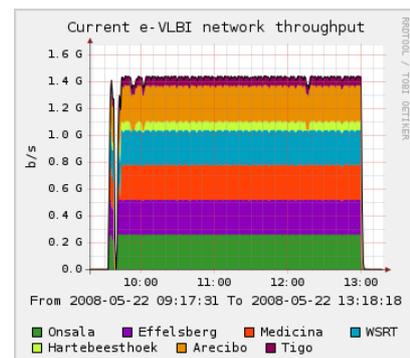
Networks create 11,000km real-time virtual telescope

Dwingeloo, the Netherlands (23 May 2008) - For the first time yesterday, members of the EXPReS project (Express Production Real-time e-VLBI Service) simultaneously linked telescopes in Africa, Europe, North America and South America to the central data correlator in the Netherlands, simulating a telescope almost 11,000 kilometers in diameter.

Telescopes in Chile, Germany, Italy, the Netherlands, Puerto Rico, South Africa and Sweden simultaneously observed quasar 3C454.3 and additional targets and streamed data to the Joint Institute for VLBI in Europe (JIVE). There the data was correlated in real-time, and results were transmitted to Bruges, Belgium, as part of a live demonstration at the TERENA Networking Conference 2008.



The recent additions of Arecibo (Puerto Rico), Effelsberg (Germany), Hartebeesthoek (South Africa) and TIGO (Chile) telescopes to e-VLBI capabilities of the European VLBI Network means a tremendous improvement in sensitivity for detecting the faintest cosmological sources. Image: JIVE



Plot showing throughput from all telescopes. Data was streamed at 256 Mbps from five stations and 64 Mbps from two stations for a total of 1.44 Gbps. Image: JIVE

Arpad Szomoru, head of technical operations and R&D at JIVE, said, "Connecting telescopes across such large distances across many different domains poses some unique challenges. Transport via TCP/IP is not suitable, but the use of UDP can

cause serious disturbances in connectivity for other users. For this demo we have applied a number of methods, like the use of 1 Gbps lightpaths with guaranteed bandwidth, VLANs and plain IP-routed connections. The success of this test demonstrates that global e-VLBI has become an operational reality."

Data from all seven telescopes was routed across numerous networks, including: AtlanticWave, AMPATH, Centennial, DFN, GARR, GÉANT2 (operated by EXPRéS project member DANTE), Internet2, Netherlight (operated by EXPRéS project member SURFnet), NGIX, NORDUnet, RedCLARA, Reuna, SANReN, StarLight, SUNET and TENET.

Using a technique called Very Long Baseline Interferometry (VLBI), astronomers use multiple radio telescopes to simultaneously observe the same region of sky. The data collected by each telescope is sampled, synchronized and correlated for every possible pair of telescopes. Using very widely distributed telescopes sampling data at very high rates, this technique can generate images of cosmic radio sources with up to one hundred times better resolution than images from the best optical telescopes.

JIVE director Huib Jan van Langevelde noted the global reach of this observation and e-VLBI's contribution to science. "It is very significant that we have shown that we can connect telescopes distributed over all continents. Real-time connectivity between telescopes at such distances is literally going to resolve the most energetic radio sources in the universe."

EXPRéS, a three-year project funded by the European Commission, is networking the telescopes to send the data electronically and correlate it in real-time. Called e-VLBI, this process eliminates the shipping of disks and provides astronomers with correlated data in a timely fashion, allowing them to exploit transient astronomical events such as supernovae and gamma ray bursts. EXPRéS aims to connect up to 16 of the world's most powerful radio telescopes to the data correlator at JIVE with an aggregate data flow of up to 16 Gbps by September 2009.

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About EXPReS

Express Production Real-time e-VLBI Service (EXPReS, www.expres-eu.org) is a three-year project funded by the European Commission with the objective of creating a real-time distributed astronomical instrument of intercontinental dimensions. This electronic Very Long Baseline Interferometer (e-VLBI) is achieved using high-speed communication networks and connecting together some of the largest and most sensitive radio telescopes on the planet. EXPReS is a collaboration of 19 radio astronomy institutes and national research networks in 14 countries and is coordinated by the Joint Institute for VLBI in Europe (JIVE).

About JIVE

The Joint Institute for VLBI in Europe (JIVE, www.jive.nl) is a scientific foundation with a mandate to support the operations of the European VLBI Network (EVN). For this purpose it maintains, operates and develops the MKIV EVN Data Processor, a powerful supercomputer that combines the signals from radio telescopes located across the planet. Through this technique, called Very Long Baseline Interferometry (VLBI), astronomers can make detailed images of cosmic radio sources, providing astronomers with the clearest, highest resolution view of some of the most distant and energetic objects in the Universe.

Contact:

Arpad Szomoru, Head Technical Operations and R&D
Express Production Real-time e VLBI Service (EXPReS)
Joint Institute for VLBI in Europe
+31 521 596 509
szomoru@jive.nl
www.expres-eu.org

Kristine Yun, Public Outreach Officer
Express Production Real-time e VLBI Service (EXPReS)
Joint Institute for VLBI in Europe
+31 521 596 500
kyun@jive.nl
www.expres-eu.org