

# VEX2

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on behalf of the VEX2 committee

# VEX2 Committee

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# What is VEX

- A format for describing VLBI observations
- Used for both Astronomy and Geodesy
- At stations, correlators
- Emitted by popular scheduling software  
PC-SCHED and (NRAO) SCHED

# Why VEX2?

- VEX I isn't sufficient to describe current VLBI setups
- VEX I includes a lot of historic baggage

# VEX2 Changes

- VEX\_rev = 2.0
- Adds new blocks  
\$BITSTREAMS, \$DATASTREAMS, \$EXTENSIONS
- Adds new parameters in existing blocks  
(too many to mention here)
- Adds fields to existing parameters  
e.g. IF sample rate in if\_def
- Removes obsolete blocks  
\$HEAD\_PASS, \$PASS\_ORDER, \$ROLL
- Removes obsolete parameters  
e.g. tape\_length

# What doesn't change?

- Basic syntax
- Description of what was observed:  
\$FREQ, \$IF, \$BBC, \$SCHED, \$SOURCE

# Full VSI-H support

- Through new \$BITSTREAMS block

```
def MK5B.8Ch2bit;
  stream_def = &CH01 : sign : 16 : 8;
  stream_def = &CH01 : mag : 17 : 9;
  stream_def = &CH02 : sign : 18 : 10;
  stream_def = &CH02 : mag : 19 : 11;
  stream_def = &CH03 : sign : 0 : 0;
  stream_def = &CH03 : mag : 1 : 1;
  stream_def = &CH04 : sign : 2 : 2;
  stream_def = &CH04 : mag : 3 : 3;
  stream_def = &CH05 : sign : 20 : 12;
  stream_def = &CH05 : mag : 21 : 13;
  stream_def = &CH06 : sign : 22 : 14;
  stream_def = &CH06 : mag : 23 : 15;
  stream_def = &CH07 : sign : 4 : 4;
  stream_def = &CH07 : mag : 5 : 5;
  stream_def = &CH08 : sign : 6 : 6;
  stream_def = &CH08 : mag : 7 : 7;
  stream_sample_rate = 4 Ms/s;
enddef;
```

# VDIF support

- Through new \$DATASTREAMS block

```
def DS1;
  datastream= &DS1      : VDIF      : X      ;
  thread=      &DS1 : &thread0 : 0 : 4 : 64 Ms/sec : 2 : real : 8000 ;
  thread=      &DS1 : &thread1 : 1 : 4 : 64 Ms/sec : 2 : real : 8000 ;
  channel=     &DS1  : &thread0 : &CH-XR0 : 0 ;
  channel=     &DS1  : &thread0 : &CH-XR1 : 1 ;
  channel=     &DS1  : &thread0 : &CH-XR2 : 2 ;
  channel=     &DS1  : &thread0 : &CH-XR3 : 3 ;
  channel=     &DS1  : &thread1 : &CH-XL0 : 0 ;
  channel=     &DS1  : &thread1 : &CH-XL1 : 1 ;
  channel=     &DS1  : &thread1 : &CH-XL2 : 2 ;
  channel=     &DS1  : &thread1 : &CH-XL3 : 3 ;
enddef ;
```



# Equipment support

- Major overhaul of \$DAS block
- **equip** parameter describes rack/recorder
- **equip\_set** parameter describes equipment-specific settings
- **connection** parameter describes how equipment is connected
- other parameters have been renamed or deleted

# Equipment support

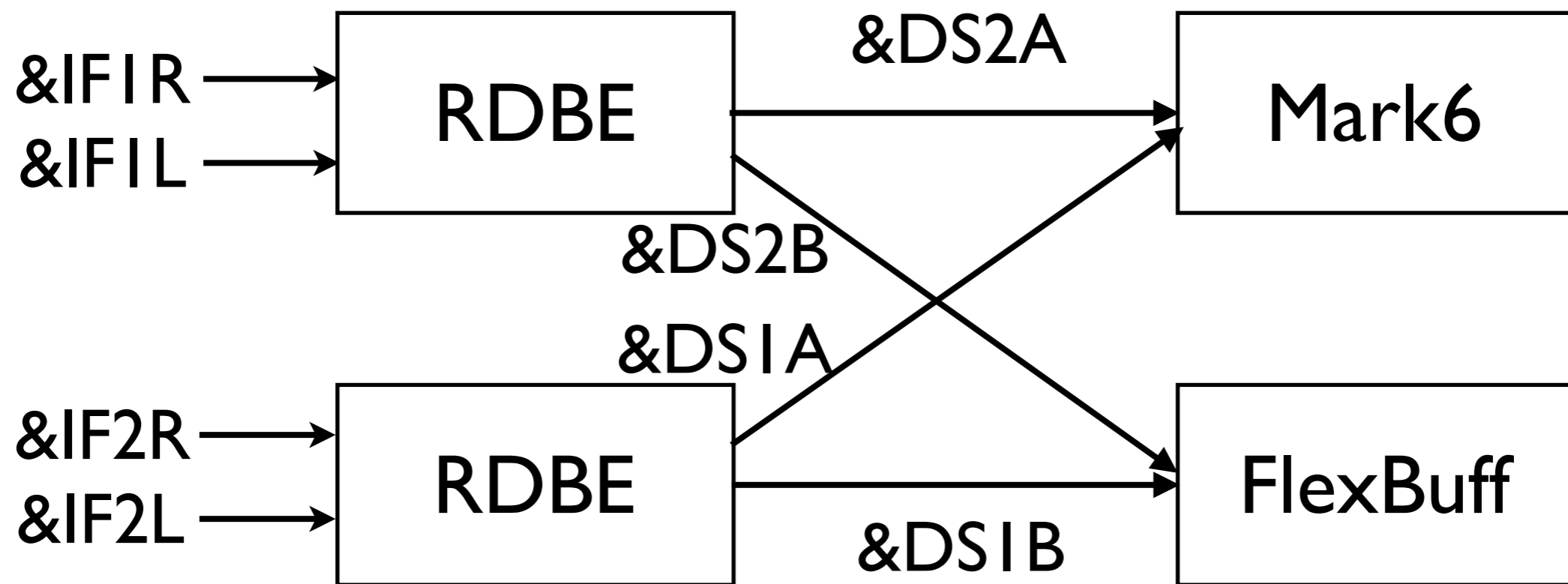
- Simple setup:

```
def DBBC;  
  equip = rack : DBBC : &DBBC-1;  
  equip = recorder : Mark5B : &MK5B-1;  
end;
```

- Slightly more explicit:

```
def DBBC;  
  equip = rack      : DBBC      : &DBBC-1 : A;  
  equip = recorder  : Mark5B    : &MK5B-1 : 1;  
  connection = &IF_1R : &DBBC-1 : inA    : in  : analog;  
  connection = &IF_1L : &DBBC-1 : inB    : in  : analog;  
  connection = &DS1   : &DBBC-1 : out1   : out  : VSI-H;  
  connection = &DS1   : &MK5B-1 : in     : in   : VSI-H;  
end;
```

# Complex Example



# Complex Example

```
def 2RDBE;
  equip = rack      : RDBE      : &RDBE-1 : 1;
  equip = rack      : RDBE      : &RDBE-2 : 2;
  equip = recorder  : Mark6     : &MK6-1 : 1;
  equip = recorder  : FlexBuff  : &FB-1   : 1;
  connection = &IF1R : &RDBE-1  : in1   : in   : analog;
  connection = &IF1L : &RDBE-1  : in2   : in   : analog;
  connection = &IF2R : &RDBE-2  : in1   : in   : analog;
  connection = &IF2L : &RDBE-2  : in2   : in   : analog;
  connection = &DS1A : &RDBE-1  : out1  : out  : ETH;
  connection = &DS1A : &MK6-1   : in    : in    : ETH;
  connection = &DS1B : &RDBE-1  : out2  : out  : ETH;
  connection = &DS1B : &FB-1    : in    : in    : ETH;
  connection = &DS2A : &RDBE-2  : out1  : out  : ETH;
  connection = &DS2A : &MK6-1   : in    : in    : ETH;
  connection = &DS2B : &RDBE-2  : out2  : out  : ETH;
  connection = &DS2B : &FB-1    : in    : in    : ETH;
end;
```

# Transition plan

- Test Phase
  - Implementation
  - Testing
  - Finalization of VEX2 standard
- Transition Phase
  - Use of VEX1 and VEX2 in parallel
  - Scheduling tools will emit both

# Where are we?

- Draft released in September  
<https://safe.nrao.edu/wiki/bin/view/VLBA/Vex2doc>
- Implementation started  
VDIF support in SFXC correlator

# Timeline

- Comment period closes November 21
- Community notepad for comments
- Necessary changes made by December 19
  - Larger/controversial issues probably have to wait for VEX 2.1
- Test phase starts

# Discussion?