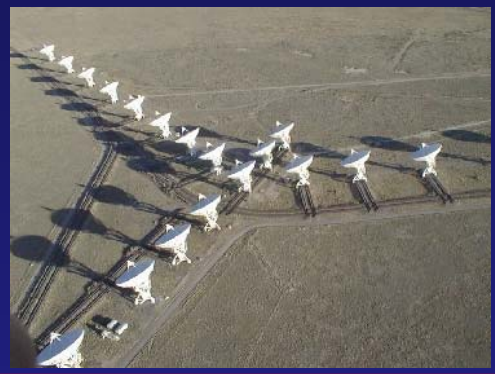

EVLA LO/IF SYSTEM

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LO/IF SYSTEM

SYSTEM REQUIREMENTS

- LO Phase Stability
- Phase Noise
- Deviation from linear phase
- Amplitude flatness and stability
- Fringe tracking
- Phase switching

LO/IF SYSTEM

LO Phase Stability

Short term: <0.5pS RMS for times <1s

Long term: Linear Slope over 30min <1.4ps

Peak to peak phase deviations over 30min <1.4ps -linear slope

Phase shift with pointing change:

<.7ps over whole sky

<.07ps per degree of slew for short slews at elevations under 60 degrees

LO/IF SYSTEM

Phase noise

Current systems 5MHz clean up oscillator specs vs new 512MHz

OFFSET Hz	OLD RATIO dBc	NEW RATIO dBc
1	-100 (-60)	-74
100	-145 (-105)	-105
1000	-165 (-125)	-135

Designing with low noise YIGS

LO/IF SYSTEM

Deviation from linear phase, amplitude flatness, and amplitude stability

Still working on specification

LO/IF SYSTEM

Fringe rotation and phase switching

Not needed for new correlator

But is needed for the transition phase of the project.

LO/IF SYSTEM

SYSTEM COMPONENTS

- Central reference system
- First LO system
- Second LO system
- Antenna reference system
- IF system

LO/IF SYSTEM

- Samplers
- Transition hardware
- Round trip phase measurement
- Other components

CENTRAL REF SYS

Generates and distributes all the references required by the system.

19.2Hz will be used for the transition period and changed after all the new hardware is on line.

CENTRAL REF SYS

References generated

512MHz, 128MHz, 256MHz, 32MHz,

19.2Hz, 5MHz, And low freq timing signals

1ST LO SYSTEM

1st LO Synthesizer

Freq range	12 to 20 GHz
Step size	512MHz+/-DDS

Freq offsets provided by the DDS

Fringe rotation and phase switching provided by the DDS

2ND LO SYSTEM

2nd LO Synthesizer

Freq range 10.8 to 14.8 GHz

Step size 128MHz+/-DDS

Freq offsets provided by the DDS

Fringe rotation and phase switching provided by the DDS

ANT REF SYSTEM

Generates and distributes all the references required by the antenna

References

128MHz, 256MHz, 512MHz, 1024MHz, 2048MHz, 4096MHz, 19.2Hz, 9.6Hz, and low freq timing signals

IF SYSTEM

The IF system is to provide the path for the IFs from the front end to the correlator.

It consists of frequency converters, switches and samplers.

IF SYSTEM

- 4 converters required
- 2 up converters
- 2 down converters
- 1st IF 8 to 12 GHz
- 2nd IF is either 2 to 4 or 1 to 2 GHz

IF SYSTEM

- Mechanical switches required to switch between front ends and to switch the 1st LO between converters/front ends

BASEBAND CONVERTER

- Baseband converter splits IFs into two 2 to 4 GHz sub IFs or
- Provides one 1 to 2 GHz IF for high resolution sampling
- Provides total power detection on each IF

SAMPLERS

- Eight wide band 3 bit samplers provided with 4096MHz clock for harmonic sampling
- Four high resolution 8 bit samplers provided with 2048MHz clock for harmonic sampling

TRANSITION HARDWARE

- Hardware is provided to make the new antennas compatible with the old correlator.
- Hardware consists of decimator, FIR filter, and an 8 bit D to A converter

ROUND TRIP PHASE

- Round trip phase measurement will be provided
- 512MHz sent to antenna and

  Put through clean up loop then sent back and compared with an offset 512MHz

ROUND TRIP PHASE

- Measurement of phase is necessary due to temperature effects on fiber
- Measurement may also be required due to mechanical stretching of fiber by antenna movement

OTHER COMPONENTS

- Other components that are required are the T4 IF filter and the T5 baseband driver. These are required for the transition only