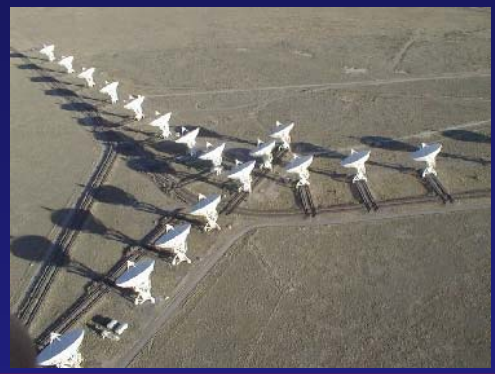

EVLA LO/IF

Central and Antenna Reference Generation

Reference Gen

GOALS

Frequency Multipliers and Dividers Phase Noise

- Design as close to 20log(f1/f0) as possible

Frequency Generators Spurious

- Harmonically related >25 dBc
- Non-harmonically related >40 dBc

Low peak-to-peak phase deviations

Reference Gen

Components Being Considered

Frequency Dividers

Wenzel LNFDs – Low Phase Noise
- 50 ohm devices
- Internal BPFs

ECL
- Low Propagation Delays
- Delays insensitive to Supply Variations
- Less sensitive to temp than CMOS/TTL

Reference Gen

Components Being Considered

Frequency Multipliers – COTS

Central Ref System

REQUIREMENTS

- Generate and Distribute all references required
- Provide adequate spare freq ports and monitors
- Provide amplitude comp as needed
- Spare master gen to be continuously checked by comparison to primary

Central Ref System

References provided by Frequency Standard

5 MHz -Will be used to generate 128 MHz

100 MHZ -Available, if necessary for PCAL

References provided by GPS

1PPS - To synchronize all EVLA Clocks to UTC

- To monitor time drift

Central Ref System

References generated

128 MHz – Generated from maser 5 MHz and used to generate all other references. Clock for the Transition Converter.

256 MHz – Clock for the IF Data Deformatters

512 MHz – Sent to the Offset Gen and transmitted to the antennas

32 MHz - Modulated with Timing Signals and then transmitted to the antennas

Central Ref System

References generated

128 Hz – Sent to Master Offset Generator and Round Trip Phase Receivers

19.2 Hz – Timing for Transition Period

N x10mSec – Timing when new hardware is on line

Central Ref System

Critical Units

- 128 MHz Gen – PLL Synth with loop BW set to take advantage of maser and VCXO phase noise
- 19.2 Hz Gen – DDS
- 128 Hz Gen – PLD
- Timing Modulator
- Nx10mSec Generator

Antenna Ref System

REQUIREMENTS

- Receive, generate, and distribute references
- Provide amplitude and phase comp as needed
- Generate a PCAL comb
- Monitor phase of 4.096 GHz vs 128 MHz
- Demodulate Timing Signals

Antenna Ref System

References Received

512 MHz – Cleaned up for RTP and gen of other antenna frequencies

100 MHz – Reference for PCAL Generator

32 MHz - Modulated with timing signals

Antenna Ref System

References Generated

256 MHz – Clock for FTS in 1rst and 2nd LO Synths, Ref for sampler modules and DTS modules

128 MHz Comb – Ref for 2nd LO Synth

512 MHz Comb – Ref for 1rst LO Synth

1.024 GHz - Ref for 4/P to L-Band Converter

Antenna Ref System

References Generated

- 2.048 GHz – Clock for LB Sampler Modules
- 4.096 GHz – Clock for HB Sampler Modules
- 19.2 Hz – Timing for Transition Period
- Nx10mSec – Timing when new hardware is on line

Antenna Ref System

PCAL Generator

- VLBA Compatibility
- Used on 3 Antennas
- Will require 5 or 100 MHz sent to antennas
- VLBA Tunnel Diode is now obsolete