

Time and Frequency Distribution Session Summary



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Atacama Large Millimeter/submillimeter Array
Karl G. Jansky Very Large Array
Robert C. Byrd Green Bank Telescope
Very Long Baseline Array



Requirements & Parameter Space

- It's technically feasible.
 - Phase Noise $\sim 180\text{-}200$ fsec in 1 second interval.
 - Phase Stability ~ 1 psec in 30 minute interval.
 - Environmental Stability
 - Depends on fiber topology.
 - Time Accuracy ~ 10 nsec.
 - GPS-III or VVR

Lessons Learned

- Distribution
 - Favor SOA over repeaters, since OEO transition introduces jitter.
 - With improved PLL, a WR-like system may meet the project needs.
 - Need to put thought into the fiber topology.
 - (cost vs performance)
- References
 - Sapphire resonators should be investigated for references.
 - May want to use higher frequencies than EVLA experience (10GHz)
 - Distributed references (satellite) should be assessed.

Lessons Learned

- Technical Risks:
 - Need to be mindful of the negative effects of polarization mode dispersion, since this will scale with array size/distance.
 - Don't introduce more bit depth than required, since in combination with bandwidth, this could drive the phase noise specifications of the sampler clock.
- Architectures
 - Fixed LO architectures are feasible, and may lend themselves to integrated designs
 - (some small N number of LOs plus sampler clock)

Next Steps

- Use the Science Working Group high-level technical requirements to derive (a first draft of) the NGVLA System Requirements.
- Start an Architectural Block Diagram for the NGVLA - both Hardware & Software elements.
- Start the process of allocation and derivation of System-level requirements to key sub-systems within the architecture, such as the Time & Frequency distribution systems.