

Allen Telescope Array

Acknowledgements:

- Thanks to Mel Wright and Gerry Harps
- Allen Telescope Array Imaging
ATA Memo 52, Mel Wright 30 Oct 2002
- A System Level Description of the ATA
ATA Memo 23, David DeBoer and John Dreher, 6 April 2001

Hardware Summary

- 350 6-m antennas
- 0.5 – 11.2 GHz, dual polarization receivers
- Analog RF transmitted by optical fiber to central Bunker
- Diverse needs of potential users addressed by using multiple backends after downconversion and digitization
 - Imager
 - Beam-former
 - SETI detector
 - Pulsar Machine
 - Spectrometer
 - RFI monitor
 - RAID

▪ ATA APPROACH TO IMAGING TASK

- RF input = 350 antennas x 11 GHz x 2 polarizations
 - Nyquist equivalent bandwidth = **30 Tbits/s**
 - 350 antennas x 2 polarizations x 11 GHz x 2 x 2 bits)
 - **300,000 Tbytes/day** (>~ FASR)
- 8-bit Digitization into 4 dual-polarization 105 MHz wide bands
- FX correlator
 - 1024 frequency channels
 - 4-byte correlation function output
 - 10 ms time resolution capability
 - normal dump times 1 to 1024 s
 - Typical uv sample ~ 2 Gbytes
 - (Nyquist sampling ~ a few per minute)
- Imaging
 - Primary output seen as images
 - Snapshot image storage ~ 0.5 x size of uv storage
 - Imaging requirements are proposal-driven
 - Imaging implemented via MYRIAD running on PC's
 - Current science proposals suggest <~1 hour> integrations
 - Archival requirements of ~24 Gbytes/day (~FASR)

CONCLUSIONS

Many significant similarities

- Comparable receiver requirements
- Similar approach to RF transmission
- Comparable RF data rate
- Common need for interference mitigation
- Common goal of good quality, rapid imaging

Many significant differences

- FASR science requires wider frequency range, but less resolution
- ATA has more diverse data requirements for processing high-resolution correlator output
- FASR imaging requirements are determined post-facto, not a priori
- Time resolution for FASR imaging is shorter
- FASR requirements of producing high level data products to a broad community

ATA data system is a highly relevant example for FASR