EVLA Monitor and Control

M&C Network

Requirements

- Connectivity
- Performance (Predictability)
- Accessibility
- Security
- Configuration
- Costs

Connectivity

- 40+ modules\antenna
- 28 antennas
- 22Km range
- Test port(s)
- Antenna Ethernet switches should be in vertex room
  - Air quality
  - Temperature control

Performance (Predictability)

- No collision domain
  - No retransmits barring fiber error
- 3 million packets/sec/switch
- 100Mbit dedicated to each module
- Latency
  - Through Fiber ~10 us/3Km
  - Through switches ~20-30 us
  - 60-90 us aggregate through switches

Performance

- Antenna state change in < 100 us
- > 100 us elapsed time to most antennas
- Some buffering must be done on fast switching MIBs

Accessibility

- Direct Monitoring
  - From Antenna, test ports
  - From Monitor & Control Network
- Proxied Monitoring
  - From remote NRAO locations
    - AOC systems
    - GB, CV, etc
  - From non-NRAO locations via VPN system
- Multicast Monitor data to VLA/AOC networks

Security

- No direct remote access
  - Private address range 10.80.x.y
- Proxied access is controlled via access lists
  - Control access at all routers
  - Block all access, then mask in what's needed
- Intrusion detection
  - Mechanisms for detecting access
    - Egress filtering/logging
    - M&C system monitoring

Configuration

- Class C per antenna
  - Part of non-routable network class B
  - 10.80.xxx.yyy
- IPv4 and IPv6 support in all devices
- ICMP support at MIBs
- Multicast capability in all routers/switches/MIBS
  - From MIB to M&C and AOC networks
  - Time synchronization

Costs

- ~$660K total from Control Building to all 28 antennas at current costs
- Cost Drivers
  - 22Km drives costs
  - 48 100mbit fiber ports
  - 2 Gbit long haul interfaces/antenna
- Buy as late as possible

Funding

- $90K at control building
  - From WBS 6.10.10
- $323K for antennas
  - From WBS 6.10.10
  - $270K removed to balance budget 1/11/02
- Currently $413K is budgeted through 2010
- Cost reduction through 2010 should cover shortfall