Antenna Monitor & Control Subsystem
Engineering Requirements

AMCS Engineering
Introduction

- Two ‘Real-Time’ M&C Systems
  - Correlator
  - Antennas
- This focus is on Antennas
- **AMCS** (Antenna Monitor & Control Subsystem)

AMCS Engineering
Introduction

- This is a brief summary of:

"Antenna M&C Preliminary Requirements Specification"

- Which can be found in the Computing Working Docs section of the EVLA web site:

http://www.aoc.nrao.edu/vla/EVLA/Computing/WorkingDocs/index.shtml

AMCS Engineering
System Overview

- One of the more lofty requirements of EVLA M&C is that it must be able to control more than one antenna type.
  - The hybrid array during transition phase
  - Future New Mexico Array (NMA) antennas
  - Existing VLBA antennas.

AMCS Engineering
System Overview (cont.)

- Past systems designed for 1 antenna type
  - Based on a single processor
  - Tight coupling between HW and high level SW
    - Hard-coded memory mapped data at UI levels
  - Low level changes trickled up to high levels

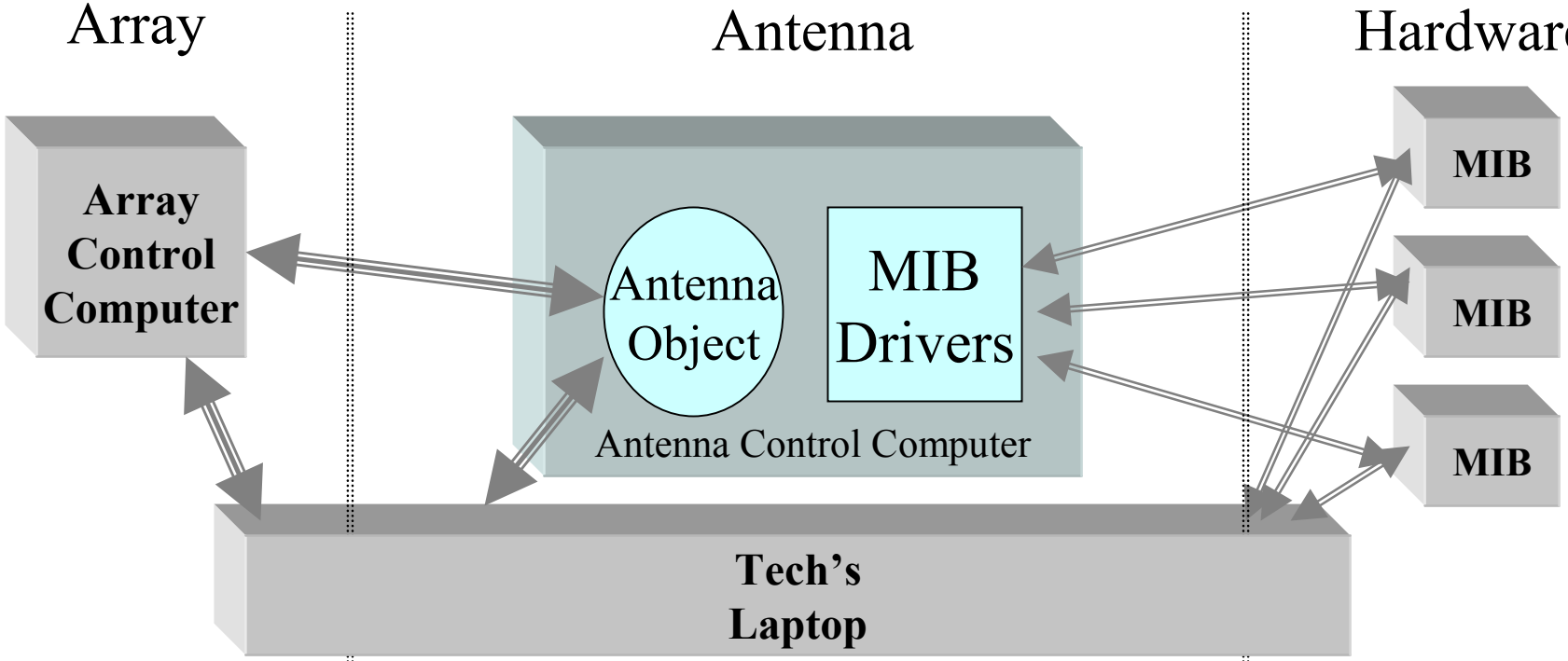
AMCS Engineering
System Overview (cont.)

- AMCS will be modularized for flexibility
  - Multiple processors
  - Implementation details will be contained at their appropriate levels
    - A higher level will not have to know *how* things are done at a lower level

AMCS Engineering
System Overview (cont.)

- AMCS will have 3 functional levels
  - **Low:** specific antenna hardware components
  - **Medium:** an antenna
  - **High:** an array of antennas

AMCS Engineering
System Overview (cont.)



Array Controller 'sees' an array of similar antennas

Antenna Object makes different Antenna types appear the same

MIB's encapsulate hardware details

Engineering Goals & Concerns

- COTS equipment will be used where possible.
  - This includes looking for 'here-to-stay' technology
    - E.g. Ethernet vs. other networking schemes.
- Standard software engineering practices
  - Standard compilers, version management, style sheets, etc – **good documentation**

AMCS Engineering
Engineering Goals & Concerns (cont.)

- Role of the MIBs will have to be well defined
  - Data interface (control/monitor points)
  - Responsibilities
- And done early in the design stage.
  - For the sake of both hardware and software engineering

AMCS Engineering
Engineering Goals & Concerns (cont.)

- Failure, Warning and Error Detection.
  - More complex over a modularized system
    - Alarms have to move across layers
  - Will also have to be carefully planned from the beginning
- Interfaces to E-to-E system have to be defined.

AMCS Engineering
Engineering Goals & Concerns (cont.)

- Built In Test (BIT) will be utilized but the extent of which is not yet known
- Hardware will be responsible for its own safety
  - Can't be commanded into a catastrophic condition by software.
  - Will fail-safe with loss of software control.

Known Performance Issues

- Source positioning to within sub-arcsecond level of accuracy
  - Will require AZ/EL updates at least every 50 milliseconds.
- 10 second 'Nodding' source change interval
- Continuous Scan Mosaicing
- 1 second freq switch (within band)

- 100 uSec between Scans
  - From when one scan ends to when the hardware has new scan's configuration information (not to when hardware completes configuration!)