EVLA MONITOR & CONTROL CDR

MIB CAPABILITIES
Module Interface Board (MIB)

- Ethernet to Control Computer (Antenna Computer, Laptop, Correlator Control Computer)
- Timing Pulses
- SPI To Device
- Parallel To Device
- Misc. I/O To Device
- SYSTEM ON A CHIP Microcontroller Ethernet Controller Serial/Parallel I/O
- Internal Timing Capability
TC11IB Microprocessor

- System On A Chip
- 1.5M RAM
- Ethernet Controller
- Serial/Parallel IO
- On Board Timers
SERIAL PERIPHERAL INTERFACE (SPI)

Synchronous Serial Communications

Master

Slave 1

Slave 2

MOSI

MISO

Clock

SS

SS

With select lines, one master can communicate with more than one slave
SERIAL PERIPHERAL INTERFACE (SPI)

• Widely Used to Communicate With Many Devices (A/D & D/A Converters, Memory Chips, Temperature Sensors, Microprocessors, Etc.)
• Clock, MISO, MOSI, Chip Select are Idle When Not Used
• MIB Dedicates 16 Lines To Slave Select
General Purpose IO

- 32 IO Lines Available
- 4 Banks of Eight Lines Each
- Each Bank Is Input or Output
RS-232 Interface

• 2 Interfaces Available
• 1 Is For Hardware Use Such As Communicating With External Device
• 1 Is For Software Use, Such As Debugging
Timer Unit Interface

- Access is provided to GPTU1 on TC11IB
- The GPTU includes 3 32-bit timers
- Many features make the unit versatile
- 2 inputs to the timer unit
- 2 outputs from the timer unit
Interrupts

- Device Designers Have 8 Interrupts Available
- An Interrupt Is Dedicated To 19.2 Hz Heartbeat
- An Interrupt Is Dedicated To The Ethernet Controller
Ethernet Interface

- Ethernet Interface – 100 MBit/second
  - PHY – Intel LXT971A
  - Fiber Optic Transceiver – Agilent HFBR-5903
Serial Flash Memory

- 4K SPI Flash Device
- Used To Store MAC Address, MIB Serial Number, MIB Revision Level, and MIB Specific Parameters
Parallel Flash Memory

- 8M or 16M Flash Chip Can Be Used
- Used For Storage Of MIB Code
- Code Will Be Transferred On To TC11IB RAM At Boot-Up
Power Management

- TPS70351PWP Regulator
- +5V In, +3.3V and +1.8V Out
- Power Up Sequence - +3.3V First, Then +1.8V
- Reset Goes High When Proper Levels Reached
- If Overloaded, Shuts Down & Asserts Reset
Heartbeat Signal

- 19.2 Hz Heartbeat Interrupts MIB
- MIB Can Pass This Heartbeat Signal To The Devices That It Controls
Debug Capability

- OCDS1 Connector Available For Debugging/JTAG (Programming) Purposes
- OCDS2 Connector Available For Tracing Of Instructions
On Board Crystals

- 12 MHZ Crystal To Clock TC11IB, Multiplied To 48 And 96 MHZ Inside Chip
- 25 MHZ To Clock Intel LXT971A Ethernet PHY Chip
- Both Crystals Generate Sine Waves
MIB Per/Board Cost

- Present Cost Is Approximately $756
- $658 for Assembled Board, $70 for NRAO Supplied Components, $28 for Functional Test
- This Cost Is For An Outside Company To Procure The Parts, Assemble And Test The Boards
Number Of Required MIBS

- 964 MIBS Are Required For Antennas (34/Antenna)
- 12 MIBS Are Required For Master Rack
- 193 MIBS Are Needed For 20% Spares
- Total MIBS For Project = 1157
- 231 (20%) Spares Of Certain Key Components Such As TC11IB
MIB Construction Cost

- $874,692 For 1157 MIBS
- $14,784 For 20% Spares Of TC11IB
- $5,000 For Other Spare Components
- Total of $894,476 MIB Construction Costs
- WBS Has $902,100 Allocated
Lifetime Of MIBS

- We Do Not Have An Estimate Of MTBF
- We Could Not Find MTBF Information For TC11IB Chip
- It Is Expected That TC11IB Will Be Manufactured For At Least 3 More Years
- It Is Important To Acquire Plenty Of Spares
Manufacturability Of MIBS

• MIBS Will Be Built By Outside Company That Has Demonstrated Good Quality Work
• Bare Board Is A Complicated Board, However PC Houses Can Successfully Build It
• NRAO Has Complete Capability To Build And Repair Board In House