# 12th Annual Plan Meeting

Telemetry Lab

OUTLINE

- New MCM Hardware Development

- New MCM Software Development

- Interfacing New MCM with 15M Dish Antenna Systems

- Various New MCM Testing Methods
  - MCM software testing with Serial link
  - MCM software testing with Ethernet link
  - MCM Software for RFI testing

- USB – RS485 program for Old MCM Testing

New MCM Hardware Development

New Monitoring and Controlling Module is a general purpose card, designed using RCM4300 core module as processing unit. It has a motherboard, on which hardware for Multiplexing, Signal conditioning and Digital data latching is placed. On top of the motherboard, RCM4300 as daughter-board is placed.

New MCM will be used to Set the system level parameters like LO, Attenuation or Gain, Bandwidth etc., as well as monitoring of the same via higher level application like Online.
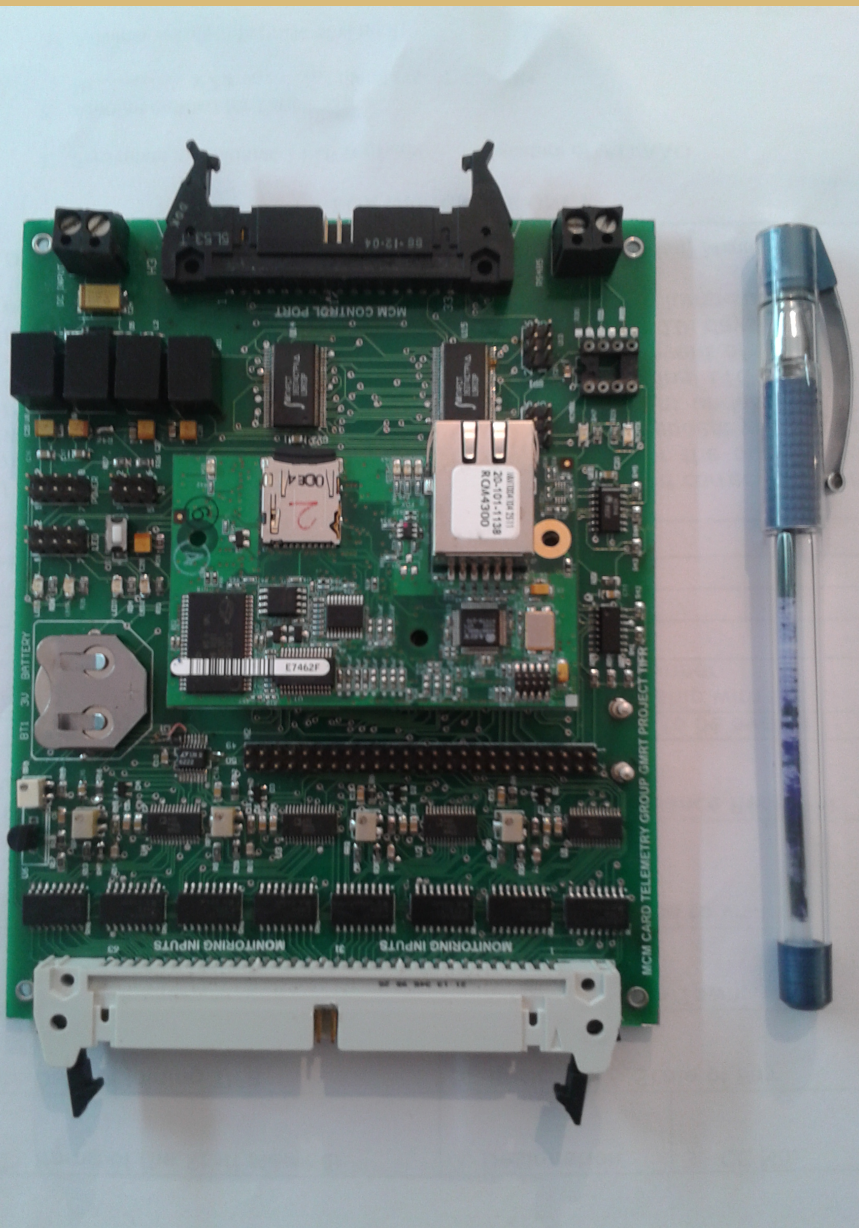
Currently New MCM card will be used in Broadband OF, Analog Backend and Sentinel.
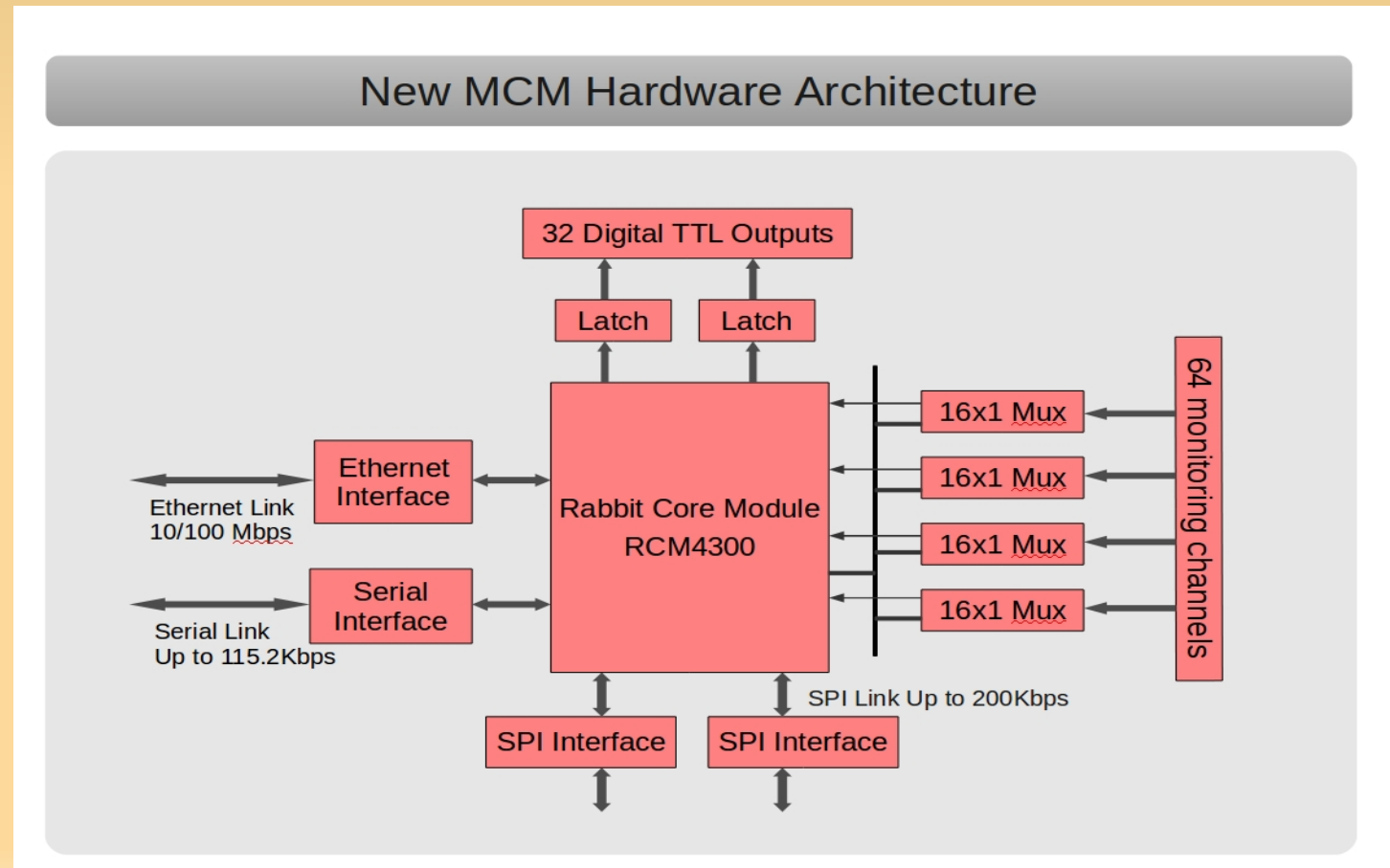
New MCM Hardware Development

Salient Features of New MCM

- *64 Monitoring Channels*

- *32 Controlling Channels*

- *2 SPI Channels for Controlling*

- *Ethernet Communication*

- *RS 485 Serial Communication*

- *Upto 1Gb Data Storage*

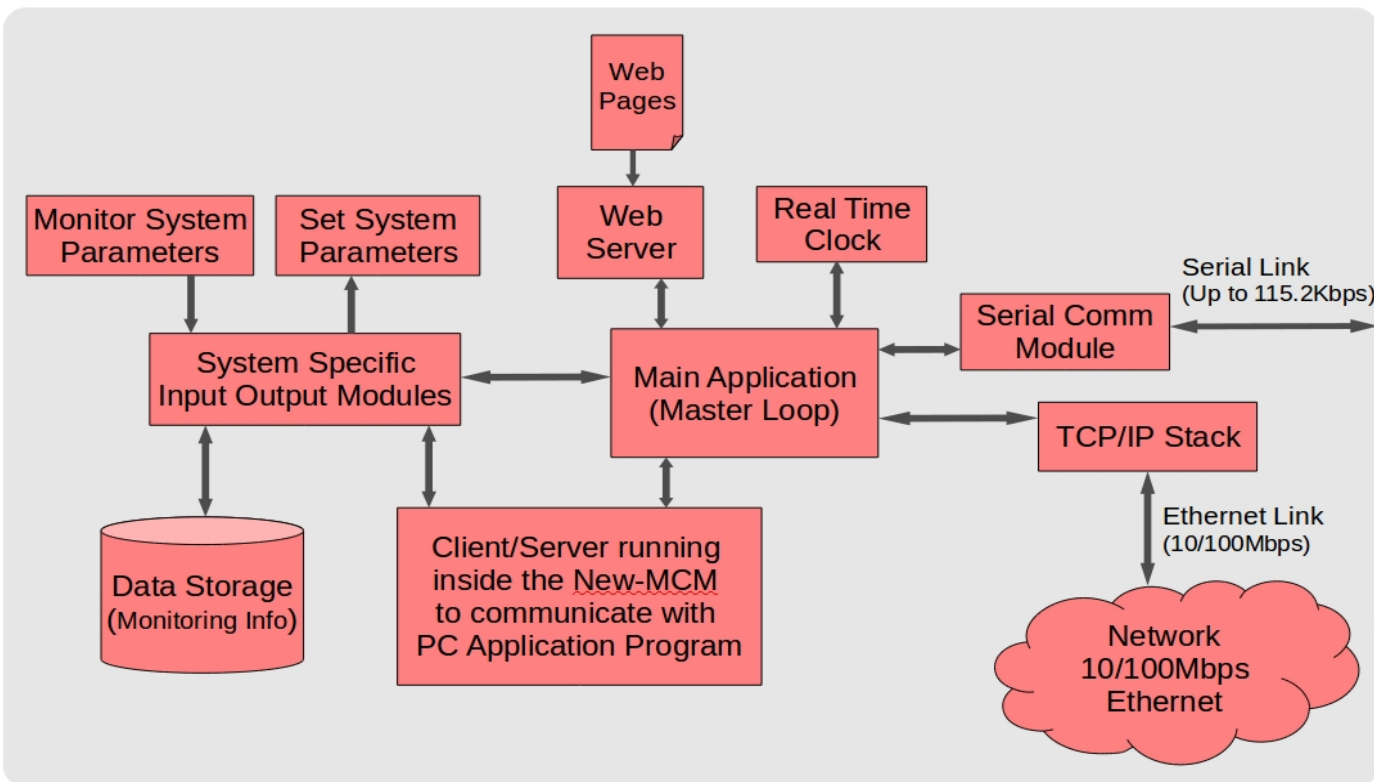- *Real Time Clock*

- *3.3 V Battery Back-up*

New MCM Hardware Development

- Operating clock frequency of New MCM is 60MHz.

- New MCM has 12 bit ADC and Monitoring voltage range is $\pm$5V.

- Scaning of all 64 monitoring channels takes 15mS.

- All 32 bits can be set within ~50uS.

- PCB layout of New MCM card has been designed using Altium Designer Software.

- Monitoring, Controlling and Communication part of PCB has been tested by running various programs.

- Present Status :

  - Job work order for PCB fabrication of New MCM card is in process.

  - Job work order for assembly and soldering of 120 MCM PCBs is in process. By end of June or early July we are expecting all 120 fully assembled New MCM cards.

- RFI Performance : Range : 100 to 500MHz;

  - Without shielded box : -88dBm; With shielded box : -105dBm;

New MCM Software Development

New MCM software has been developed from the scratch using dynamic C, which supports co-operative multitasking. It uses the infinite while loop approach instead of using the OS. Moreover, New MCM software has been designed carefully, so it can include all necessary features and exhibit good performance.

New MCM Software Architecture

Software architecture of New MCM will support : Communication over the Ethernet as well as Serial link,64 channel monitoring, 32 bit controlling, upto 1Gb data storage using FAT-16 file system. Furthermore, it will have Real Time Clock and Web server running inside.

New MCM Software Development

- Running parellel tasks like :

    - Listening over socket for command from higher level application.

    - Doing background monitoring.

    - Running web server.

- Accepts ASCII based command structure like; IF SET BW xx xx,

    IF MON SUM / RAW

- On the board monitoring and raw data decoding.

- Monitoring data storage upto 1Gb.

- Alarm generation with level (Info, Critical).

15m Development – JPK / RRU / NMS
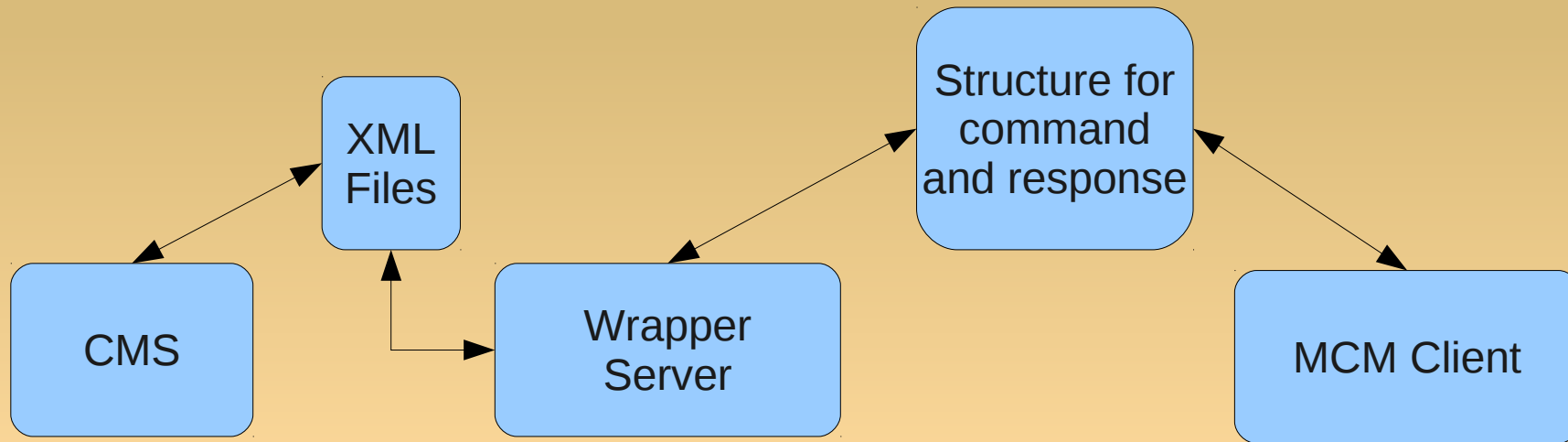
Wrapper uses libxml library to parse xml file coming from CMS to generate system level command and generate xml file for response coming from MCM.

All intelligence has been shifted to the MCM like command validation, decoding, acknowledgement, command execution, bit pattern generation and formation of final response.
MCM also sends alarm in critical condition and thresold hit.

Two fully assembled New MCM cards are tested for analog backend system and sentinel system for 15m Dish Antenna. It is ready for installation at antenna shell.

Various New MCM Testing

- MCM software with Serial link :

  - To support the existing system.

  - Commands are sent over serial port using RS-485 multi-drop protocol with 9.6kbps data rate.

  - Tested with TELESET-ABCCOM software chain.

- MCM software with Ethernet link :

  - Running Client on MCM and Server on PC.

  - Running Server on MCM and Client on PC.

  - Tested in individual lab with their test setup and at C04 antenna base for IF setting and monitoring.

  - Web based control and monitoring.

- MCM Software for RFI testing to vary the clock frequency and spectrum spreader.

USB–RS485 Program for Old MCM

- We developed this new program for MCM communication as now a days laptop doesn't come with serial port.

- Initially we started with prolific tech USB-Serial converter, which required change in device driver as MCM communication is 9-bit protocol.

- Later on we found FTDI USB-RS485 converter cable which can be programmed in user space for our specific application need.
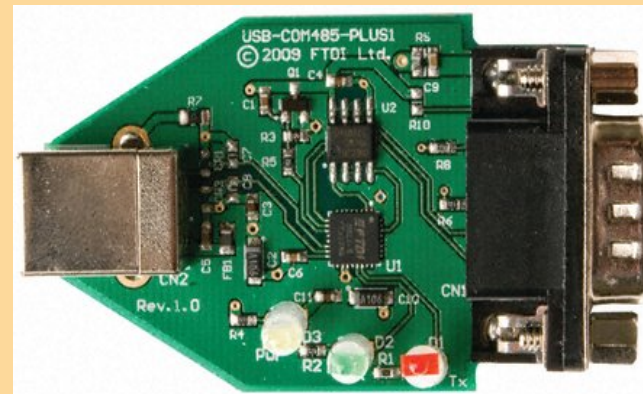
USB–RS485 Program for Old MCM

Application Program : As both product has support for mark and space parity, we donot need to go into the device driver level. An application program solved our purpose.

Application program using FTDI APIs

D2XX drivers

USB device

Actual hardware device

• Figure shows the software architecture for the New MCM program. On the top is the application program which communicated to the D2XX drivers using FTDI APIs. D2XX drivers allow direct access to the USB device through a DLL. Application software can access the USB device through a series of DLL function calls.

• FTDI provides *libftdi* library which we need to install on our PC to complie the program.

We have successfully deployed this program in Analog, Front End and Servo Lab. They are using it for their system testing and debugging.

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Thank You...