

IN-SNEC Command Ranging & Telemetry Unit (CORTEX^{NT})

Primary Functions and Features

The IN-SNEC Command Ranging & Telemetry Unit (CORTEX^{NT}) provides the Radio Frequency interface for the RTACTS. The equipment is PC based with radio frequency interfaces that input the nominal 70MHz intermediate frequency telemetry data and output the respective satellite command data. The primary RTACTS to COTEX interfaces are as follows:

- a. A 74 MHz Telemetry IF (Intermediate Frequency) signals from the CDA station's L- and S-band receive equipment (up to two simultaneously)..
- b. 74.0 - 74.4 MHz Command IF signal to the station's S-band transmit equipment.
- c. NASA-36 bit serial time code signal from the station's timing system.
- d. 5 MHz frequency reference signal from the station's timing system.

The features of the

CORTEX^{NT} main features are :

1. *PC-based Architecture with Windows NT Operating System*
2. *User-friendly and Intuitive Graphic User Interface*
3. *Wide Range of Configuration Parameters and Status*
4. *Extensive Use of Digital Signal Processing Techniques for Enhanced performances, Upgradability and Flexibility*
5. *High Integration with Drastically Reduced Hardware for Increased Availability*
6. *No Tuning, no Preventive Maintenance*
7. *Full Compatibility with the VME-based CORTEX Previous Generation*
8. *The CORTEX^{NT} supports all types of TT&C missions and standards :*
9. *Satellite Assembly, Integration and Testing, Pre-launch Testing,*
10. *Station Keeping, Launch & Early Orbit Operation Support (LEOP),*
11. *GEO or LEO, Three-axis or Spin-stabilized Satellites,*
12. *Low Rate (House Keeping Operations) or High Rate Data Processing.*

13. *Mountable in a standard 19" Rack Assembly with no more than 6U height*

Satellite Telemetry Functions

1. Low rate and high rate telemetry processing,
2. Video demodulation (FM or PM) for low rate applications,
3. PCM demodulation (PM/NRZ, BPSK, QPSK or OQPSK) for high rate applications,
4. Carrier identification: high or low index mode, automatic or manual acquisition,
5. Sub-carrier demodulation,
6. Bit synchronization. PSK and BP-L ambiguity resolution,
7. Viterbi and Reed Solomon decoding,
8. Frame synchronization,
9. Telemetry storage on disk,
10. Frame (or raw data) time-tagging,
11. On request or automatic data transmission to the Telemetry Clients,
12. Real-time decommutation with graphical display,
13. Compliance to CCSDS recommendations : CADU or VCDU decommutation,
14. Doppler measurement and time-tagging.

Satellite Tele-commanding Functions

1. Reception and checking of TCP-IP telecommand messages from the Telecommand Clients,
2. PCM encoding,

3. FSK or PSK modulation,
4. FM or PM modulation,
5. Support to synchronized telecommand protocol for spin-stabilized satellites,
6. Compliance to CCSDS recommendations (COP1),
7. Loopback demodulation/verification.

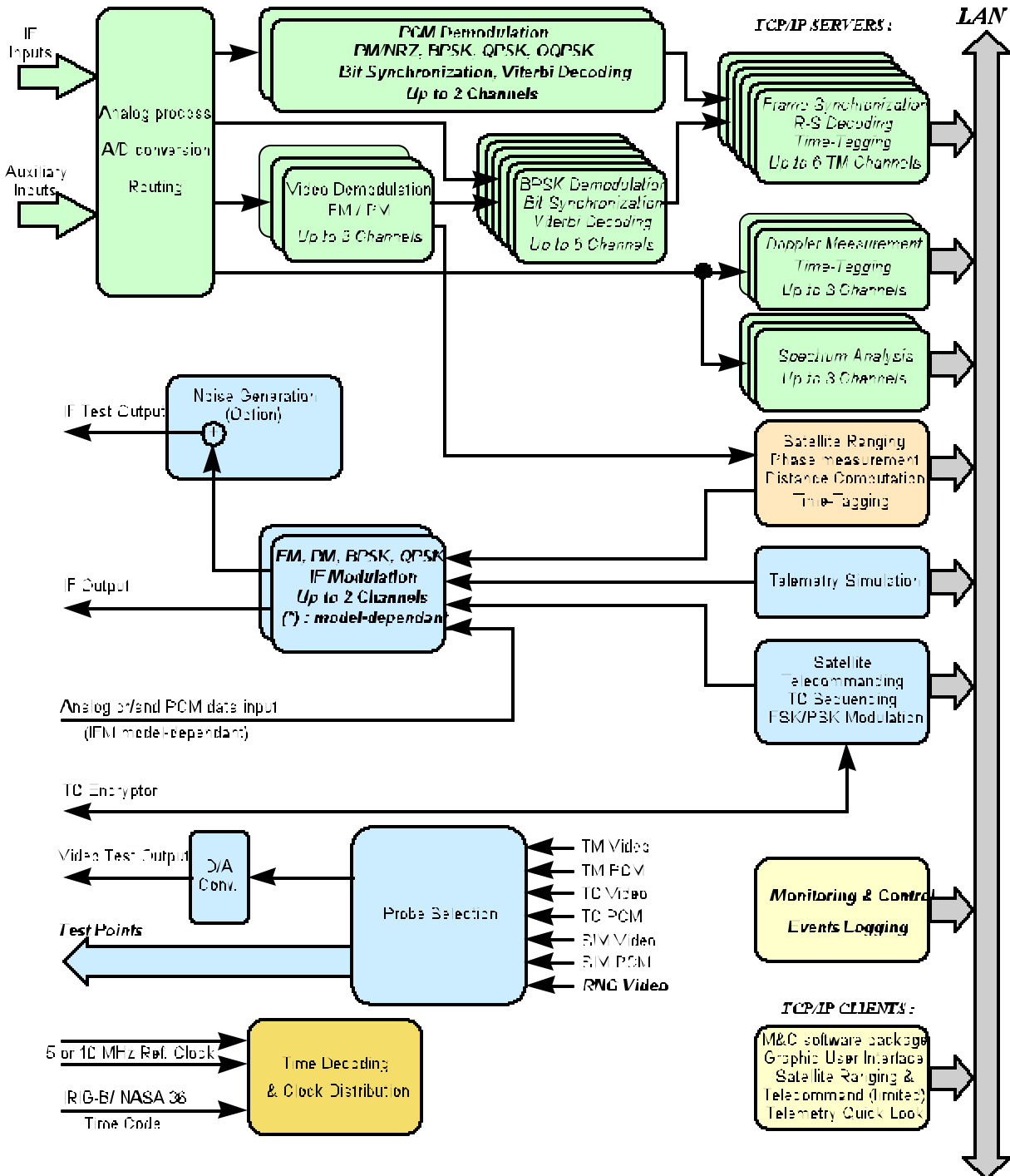
Satellite Ranging Functions

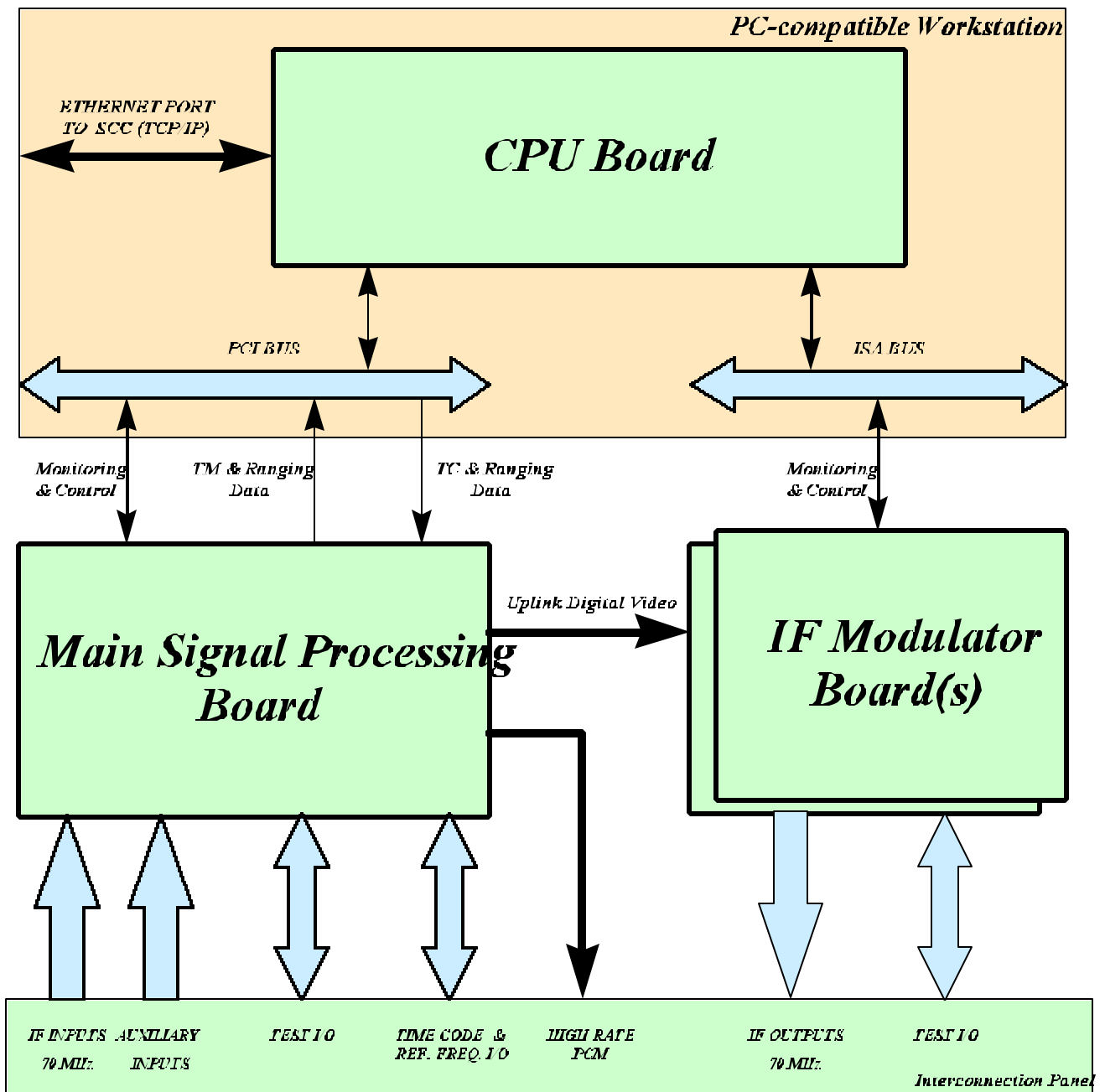
1. Reception and checking of TCP-IP ranging requests from the Ranging Clients,
2. Ranging tone generation,
3. IF modulation,
4. Ranging tone reception and demodulation,
5. Phase-shift measurement,
6. Ambiguity resolution and distance computation,
7. Ranging data time-tagging and transmission to the Ranging Clients.

Simulation & Testing Functions

1. The CORTEX^{NT} incorporates powerful built-in simulation capabilities for functional and performance test purposes :
2. Simulation of a PSK or PCM telemetry signal from TM formats stored on the hard disk or received over the ETHERNET LAN from a remote Simulation Client,
3. Automatic BER measurement,

4. Real time IF spectrum analysis,
5. Equipment self-testing at boot,
6. Noise generation (option).





CORTEX^{NT} Functional Block Diagram