Jaipur Metro Rail Corporation(JMRC)

- MASTER CLOCK

{PRESENTATION}

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MASTER CLOCK SYSTEM

The proposed master clock system synchronized on GPS time reference provides an accurate, centralized time to all locations, ensures synchronization of equipment's, sub systems, which are connected on network (via Network Time Protocol).

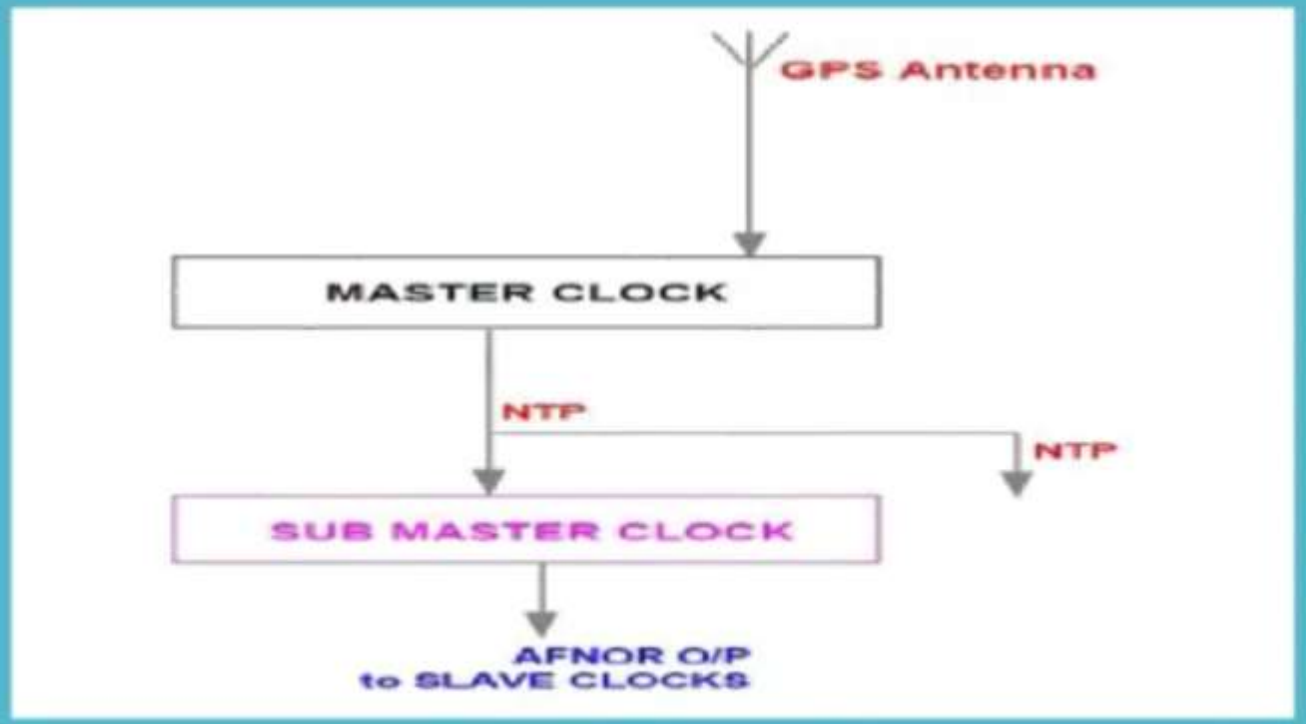
MASTER CLOCK SYSTEM-

The master clock system is a time server system and compiled as per ITU-TG.811.BI

The Master Clock/ Sub master Clock system is IP enabled. Slave clocks are synchronized using AFNOR protocol.

AFNOR- ASSOCIATION FRENCH NORMAL ORGANIZATION REGULATIONS.

ARCHITECTURE BLOCK DIAGRAM FOR MCS-



EQUIPMENT LIST FOR MCS-

- ✓ GPS Antenna
- ✓ Master Clock
- ✓ Sub-master Clock
- ✓ Analog Clock
- ✓ Indoor digital clock
- ✓ Outdoor digital clock

MASTER CLOCK-

- ✓ The main master clock consists of 1 unit of LEDI NETWORK ITS v2
- ✓ It is synchronized on GPS signal and delivers NTP time signal to synchronize sub master clocks via Network.
- ✓ LEDI NETWORK ITS v2 at BCC can be used as a Primary Reference Clock
- ✓ Under normal conditions, the master clocks in BCC are synchronized with their GPS source. In case of failure of GPS reception, the internal quartz of LEDI NETWORK ITS v2 Time base (OCXO) will maintain a high accuracy (free run accuracy) with a holdover stability of 1.10-8 / day (0°to 60°C).

- ✓ The Master Clock will derive Coordinated Universal Time (UTC), based on atomic frequency standards, from the received satellite signals and will convert this to local Indian time.

Information

Rack 19”1U

Input: GPS receiver

Output: 1x NTP/SNTP Ethernet 10/100 Base T output (RJ45)

The NTP protocol

NTP (Network Time Protocol) is a network protocol that allows the time synchronization of different equipments through an IP network. The communication is based on a client/ server dialog. The LEDI® Network ITS V2m acts as the server and all the equipment to be synchronized act as clients.

Each time a client needs to be synchronized, it asks the time to the server (LEDI® Network ITS V2m). The client application should integrate several computations to compensate the transmission delays over the network. Depending on the client software, the expected precision can be close to some microseconds.2

The accuracy of the NTP server is +/- 10 µSec in good network conditions.

ALARM CONDITIONS

When an alarm occurs, it is displayed on the third line. Then the LCD backlight blinks. The possible alarms are:

FREE RUNNING -The server has been forced in autonomous working mode. No Time input is used for synchronization. Useful for test purposes.

NO TIME CODE -The Time inputs of the server are not synchronized. (GPS signal not received, no NTP server available, remote IRIG generator failure . . .)

AUTONOMY CRITICAL -There is no synchronization source, and the server is about to switch the outputs OFF. (3 min autonomy left)

SERVER LOCKED -The time input has overran the security threshold, or the user has locked the server. No time will be distributed until unlocking.

SECURITY THRESHOLD -The security threshold has been overrun.

POWER ALARM -The alarm relay condition is met. See the *Alarms part of the Web Pages section.*

SYNC ALARM -The Sync relay condition is met. See the *Alarms part of the Web Pages section.*

NEVER SYNC -The server has been powered for 1 minute, and there is still no valid synchronization source available.

ETHERNET LINK ERROR -There is a problem with the connection of the network cable.

WORKING MODES OF THE LEDI:-

- Not synchronized: No available time input. The server has not a correct time and does not deliver time on its outputs.
- Autonomous: The server has been synchronized, but the input is not available anymore. It still has autonomy, and then keep distributing the time.
- Free Running: The server has been manually forced to run in autonomous mode (Time may have been set by the user). It delivers time on its outputs.
- Synchronized: The server is locked on a synchronization source. It delivers time on its outputs.

SUB MASTER CLOCK-

- ✓ LEDI NETWORK IN delivers NTP time to other electronic system.
- ✓ It delivers also AFNOR/IRIG B time signal to slave clocks.
- ✓ The NTP time reference input to LEDI NETWORK IN sub master clock is obtained from the main master clock LEDI NETWORK ITS v2 in BCC.
- ✓ When time reference from BCC becomes unavailable sub master clock will run on their internal quartz and ensure time keeping with a holdover stability of 1. 10-6 / day (0°to 60°C).

- ✓ The sub master clocks LEDI NETWORK IN shall receive NTP time code from master clock. Sub master clock shall be configured to get time from master clock by sending NTP requests on IP address of master clock.

Information

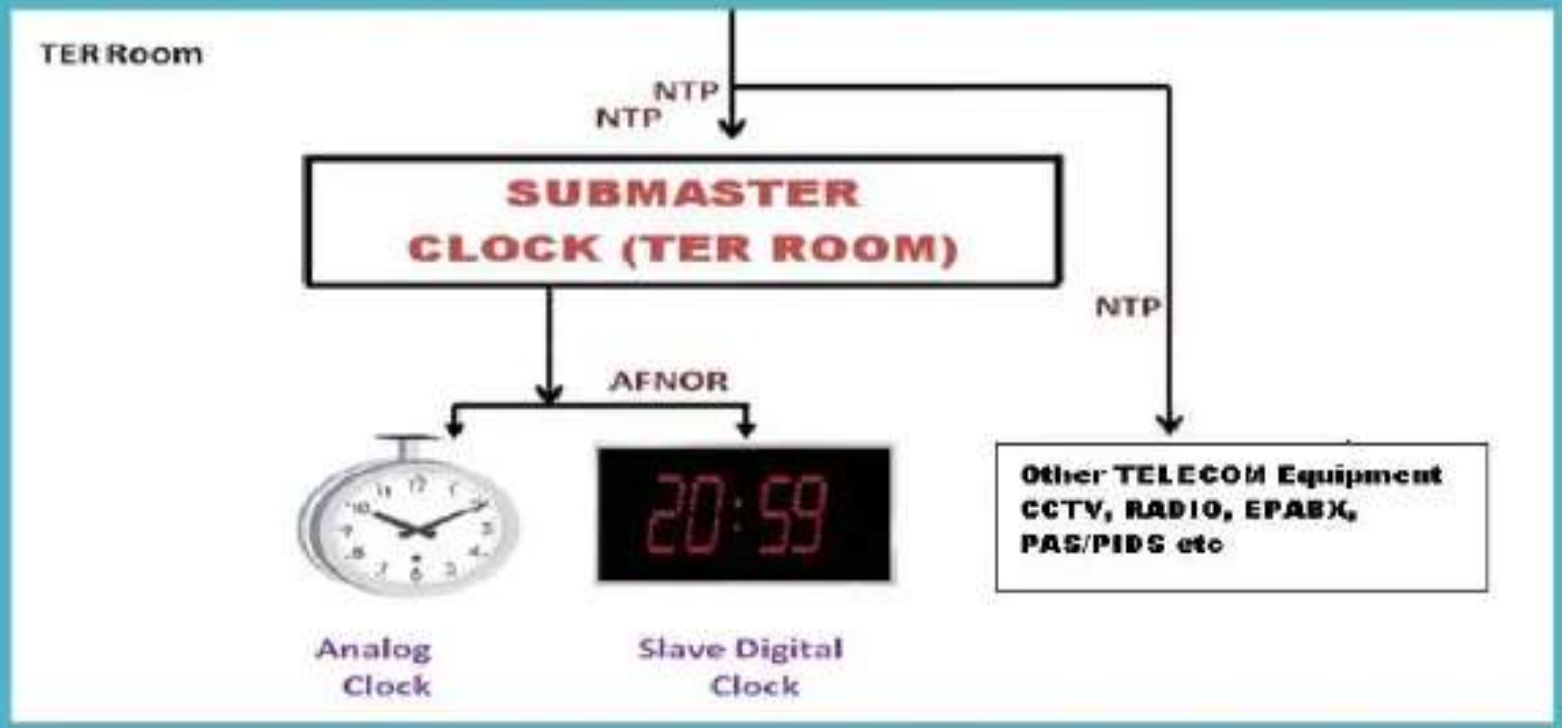
Rack 19"1U

Input: NTP

Output: 1x NTP/SNTP Ethernet 10/100 BaseT output (RJ45)

Output: 1 x AFNOR NFS 87500/IRIG B output (1Khz modulated)

SUB MASTER CLOCK ARCHITECTURE FOR TYPICAL STATION -



ANALOG CLOCK-

INDOOR DIGITAL CLOCK-

Indoor digital clock are wall mounted, LED type, single faced and shall be used in offices, equipment and plant rooms, The character height of the display is 65mm.

Digital outdoor clocks shall receive time synchronization from sub master clock LEDI NETWORK TS via AFNOR NFS 87500 time code, 2 wire AWG24 cable, no polarity.

In case of synchronization failure,it will run on its internal quartz time base to maintain time accuracy 0.1 sec/24h(20 to 30C)


18:43
ABST-SCR-IDC
Automotors Alliance Ltd

OUTDOOR DIGITAL CLOCK-

Outdoor digital clock are single face, LED type and shall be used at head end and tail end of each platform for the use of the train driver and commuters. The character height of the display is 65mm.

Digital outdoor clocks shall receive time synchronization from sub master clock LEDI NETWORK TS via AFNOR NFS 87500 time code, 2 wire AWG24 cable, no polarity.

In case of synchronization failure,it will run on its internal quartz time base to maintain time accuracy 0.1 sec/24h(20 to 30C)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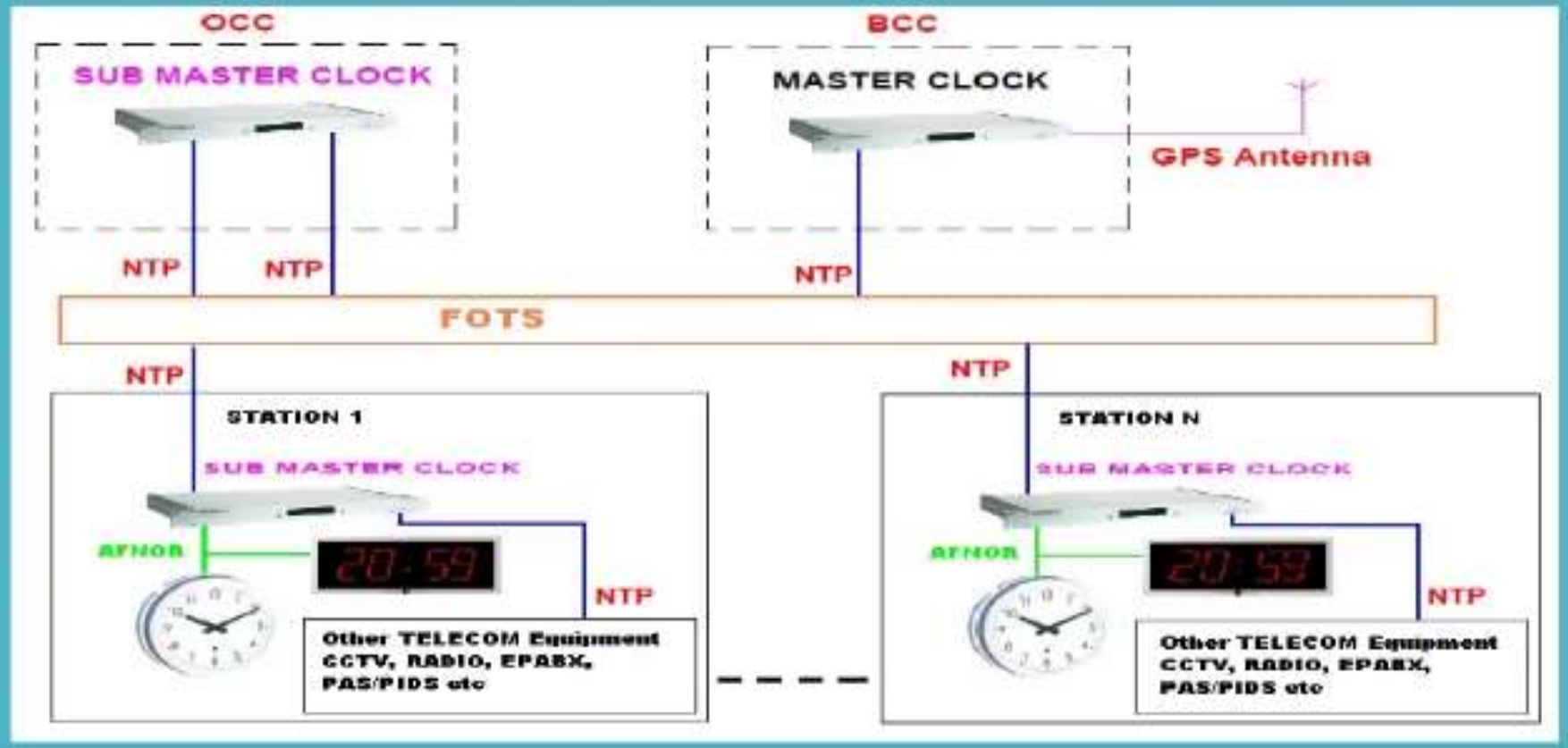
GENERAL ARCHITECTURE OF THE SYSTEM -



INTERFACE WITH OTHER SYSTEMS -

- ✓ FOTS
- ✓ PA/PIDS
- ✓ CDRS
- ✓ Signaling
- ✓ Radio
- ✓ CCTV
- ✓ AFC
- ✓ UPS
- ✓ SCADA

THANK YOU