



POWER GRID CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

A Presentation on

NTMC & RTMC : THE NEXT LEVEL

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GRID CONNECT - GRID SAFE - GRID WISE



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**NATIONAL
TRANSMISSION- ASSET
MANAGEMENT
CENTRE
(NTMC)**



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WHAT IS NTMC

**CENTRALISED CONTROL OF ENTIRE
TRANSMISSION SYSTEM FROM SINGLE POINT
WITH FULLY AUTOMATED REMOTE
CONTROLLED SUB-STATIONS**



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CHALLENGES TO MEET

- Competitive Environment
- Raising the bar by Central Regulator
- Requirement of System Reliability
- Close interaction with system operator
- International Benchmarks & Experience



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THE NEED

Exponential growth has changed the techno economics of transmission O&M Philosophy

	2005	2010	2012
•Sub Station	100	124	192
•T.Line ckt km	50000	75000	100000

With a whopping CAPEX of Rs. 10000 Crore/yr in current Five Year plan, the asset has risen @ 10000 cktkm & 30 s/s per year

Conventional system will be prohibitively **UNECONOMICAL**



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WHY NTMC - CHALLENGES

TECHNICAL :

- **With merging grids (N-E-W) & S, inter-regional power flow needs more co-ordination**
- **Long delays in layered system of manual operation.**
- **Delays in gathering & evaluating intelligence in stand alone s/s**

ECONOMIC

- **Huge Manpower Cost in Manned system**
- **No requirement of manning S/S operation in today's digital, automated control system**
- **Low technology cost in Automation & Remote Control**
- **Gearing up for competitive bidding regime of transmission assets**
- **Stringent demands by the regulator etc.**



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SOLUTION

Technological development in S/S Automation coupled with falling prices of communication system and IT provides the opportunity for VIRTUAL MANNING of the S/S thereby optimizing the requirement of skilled manpower and managing the asset with the reduced & quality manpower.



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NTMC & RTMC

**State of the art computerized control Centres
NTMC & RTMC are being set up by POWERGRID
with associated telecom system to enable**

- Remote operation of substation**
- Remote monitoring of assets through intelligent online devices.**



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OBJECTIVE

- Reduction of operation cost through remote operation
- Reduction of Maint. cost by Maintenance Service Hubs (MSH)
- Better condition monitoring through ONLINE devices

➤ **COMPETITIVE EDGE FOR POWERGRID**

- Reduction of downtime of network by centralized operation
- Better evaluation of situation through ONLINE intelligence
- Better coordination with RLDC.

➤ **SAFE & WISE GRID**



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PROJECT HIGHLIGHTS

ONE

National Transmission-Asset Management Centre (NTMC)

Nine

Regional Transmission-Asset Management Centres (RTMC)

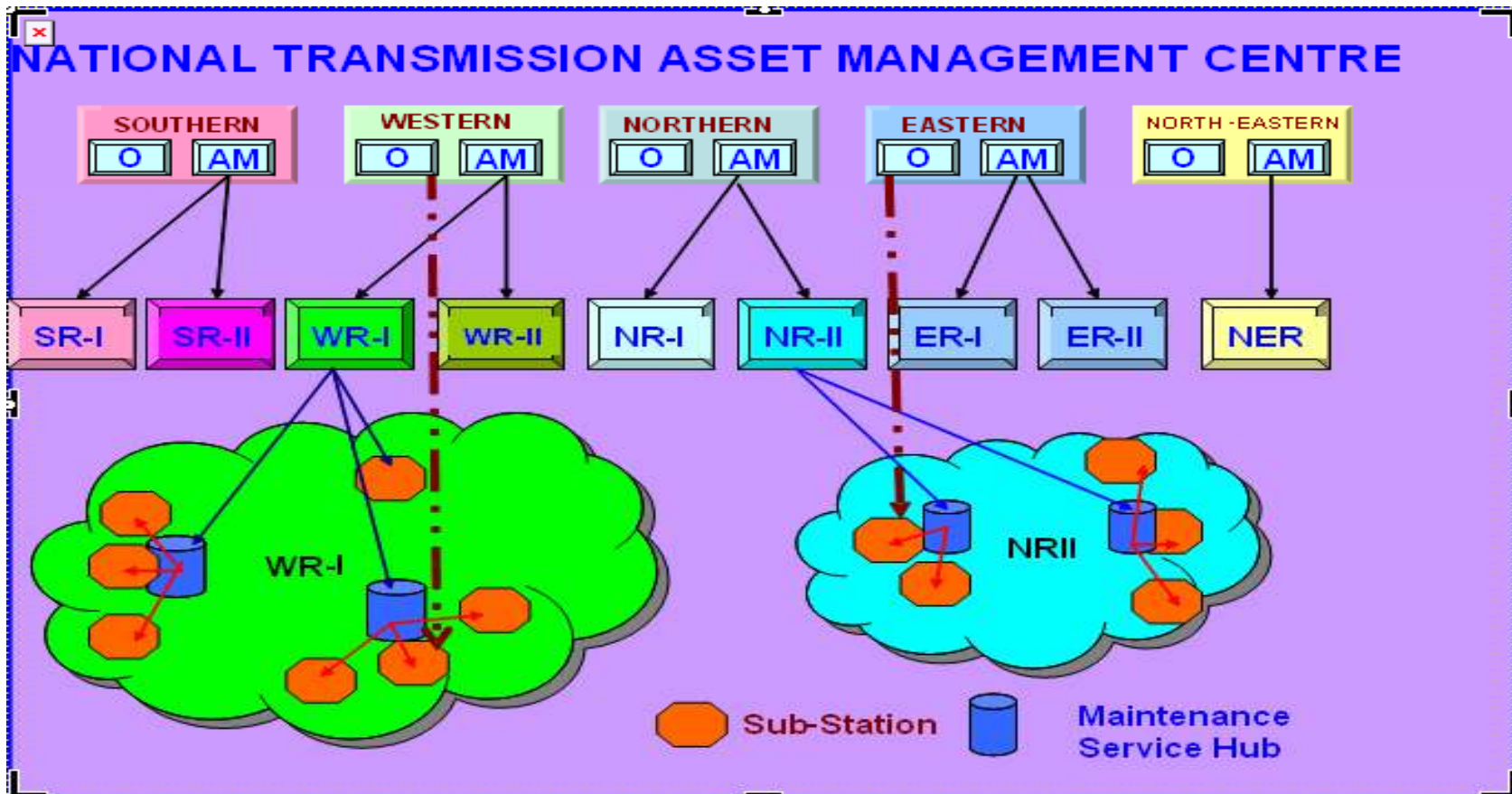
(One for each region)

A Back Up NTAMC & Disaster Recovery Centre
at BANGALORE



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STRUCTURE OF NTMC





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OPERATIONAL PHILOSOPHY

NTMC shall carry out Remote Operations of all the substations from its own regional desks

RTMC will co-ordinate maintenance aspect of substations from a Regional HQ and will act as backup to NTMC for Operation.

MSH (Maintenance Service Hub) shall carry out maintenance from one central S/S also catering to the requirements of 3-4 satellite substations in vicinity (100-150 KM) in coordination with RTMC



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MANPOWER

NTAMC/RTAMC shall be manned round the clock by qualified and skilled staff.

Total manpower requirement for NTAMC/RTAMC shall be around 412 executives.

Ploughed back through unmanning the S/S Operation.



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MANPOWER

Each NTMC Shift will be headed by a very experienced and senior level executive with 10 personnel (Two for each of the 5 regional desks, one for taking care of the operation & control part and other one for Asset management.)



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COMPUTER SYSTEM & HARDWARE

- **The hardware & software at control centers shall consist of SCADA system, Power system Applications, Historical data storage , Interface with ERP system, GPS based image processing application, Web servers etc.**
- **In addition to the above, the Operator Training Simulator is also to be provided at Backup NTMC.**

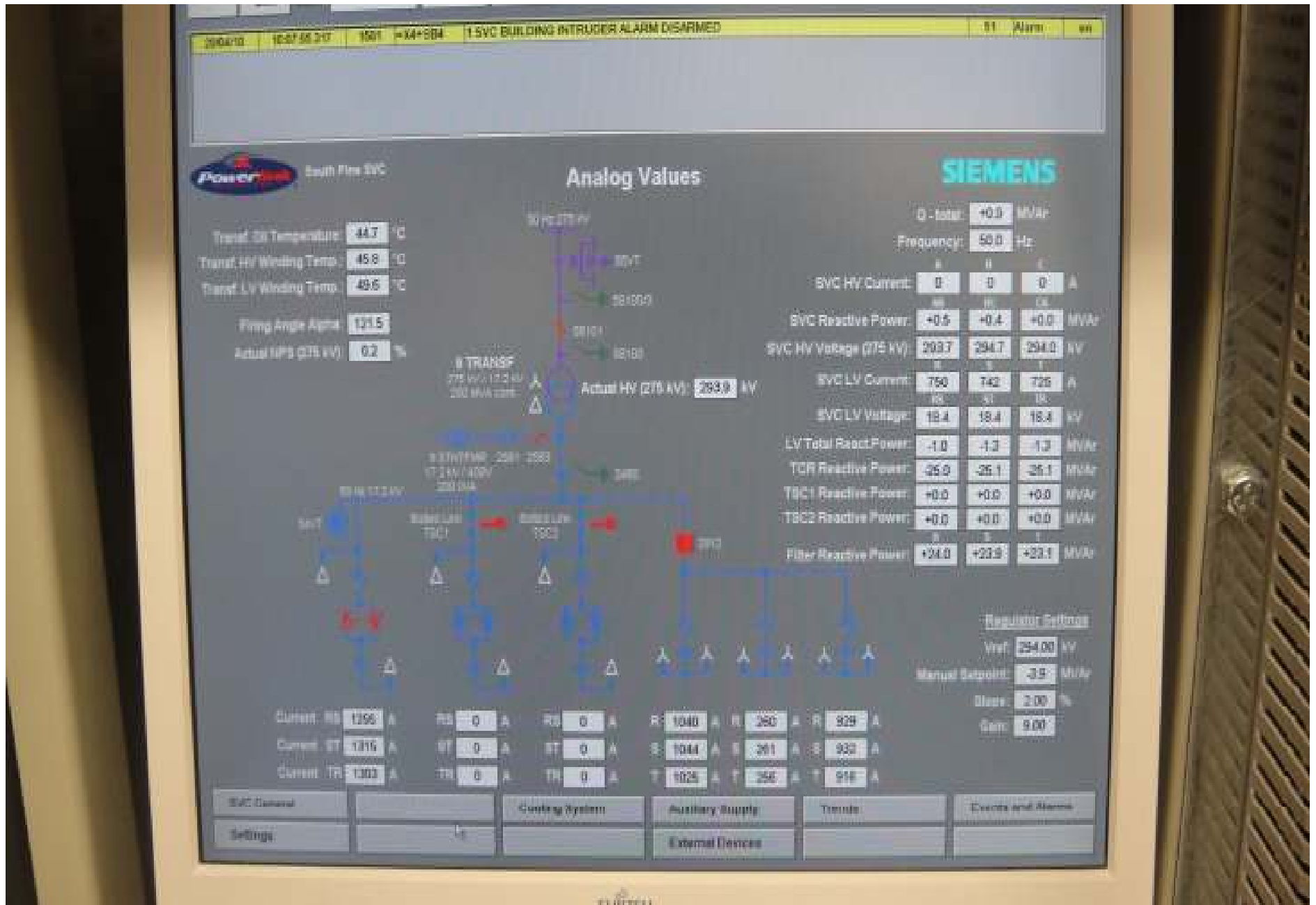


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REMOTE SUPERVISION AND CONTROL

For Remote Supervision and Control of the Substation from NTMC/RTMC, following functions are envisaged:

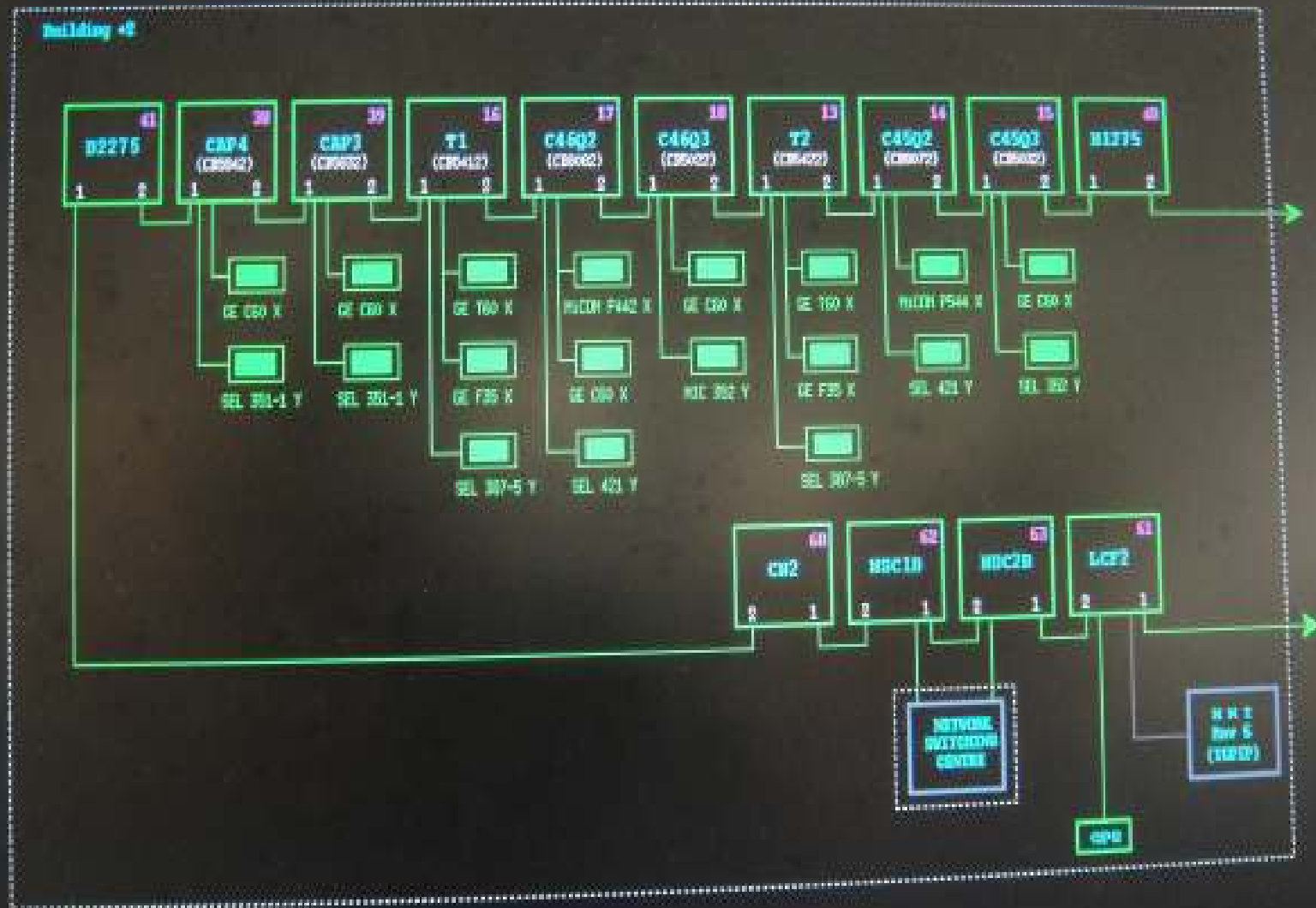
- Measurement
- Alarm
- Control
- Condition monitoring of the equipment
- Transmission Asset Management
- Video Surveillance System



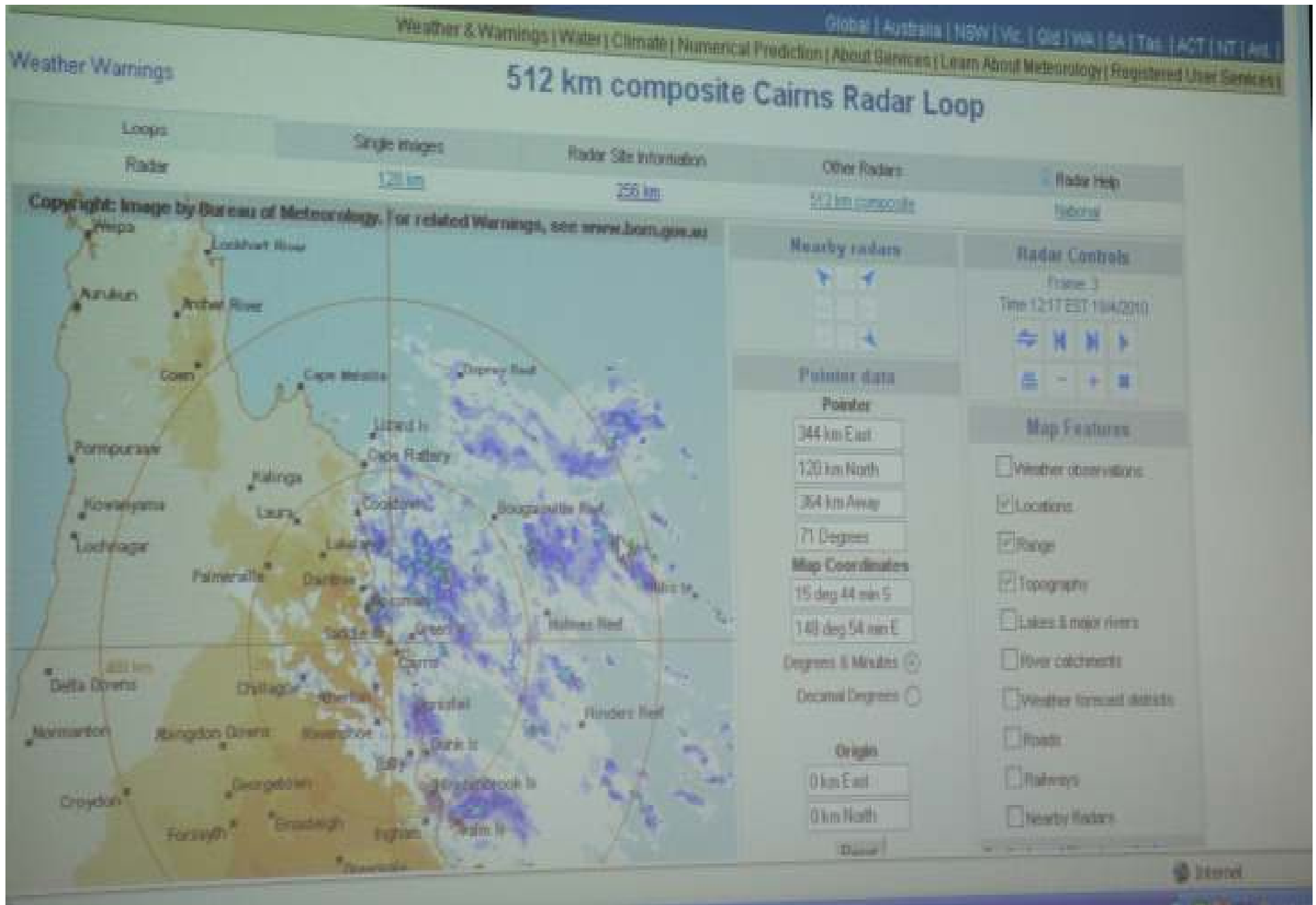
CONDITION MONITORING OF EQUIPMENT

275kV RTU OVERVIEW 1

(Left click on any item for Point Details)



REMOTE ACCESS OF PROTECTION RELAY DATA



WEATHER FEEDBACK SYSTEM



VIDEO SURVEILLANCE SYSTEM



TYPICAL NTMCF/RTMC DESK



**A TYPICAL
MAINTENANCE SERVICES HUB (MSH) SET UP**



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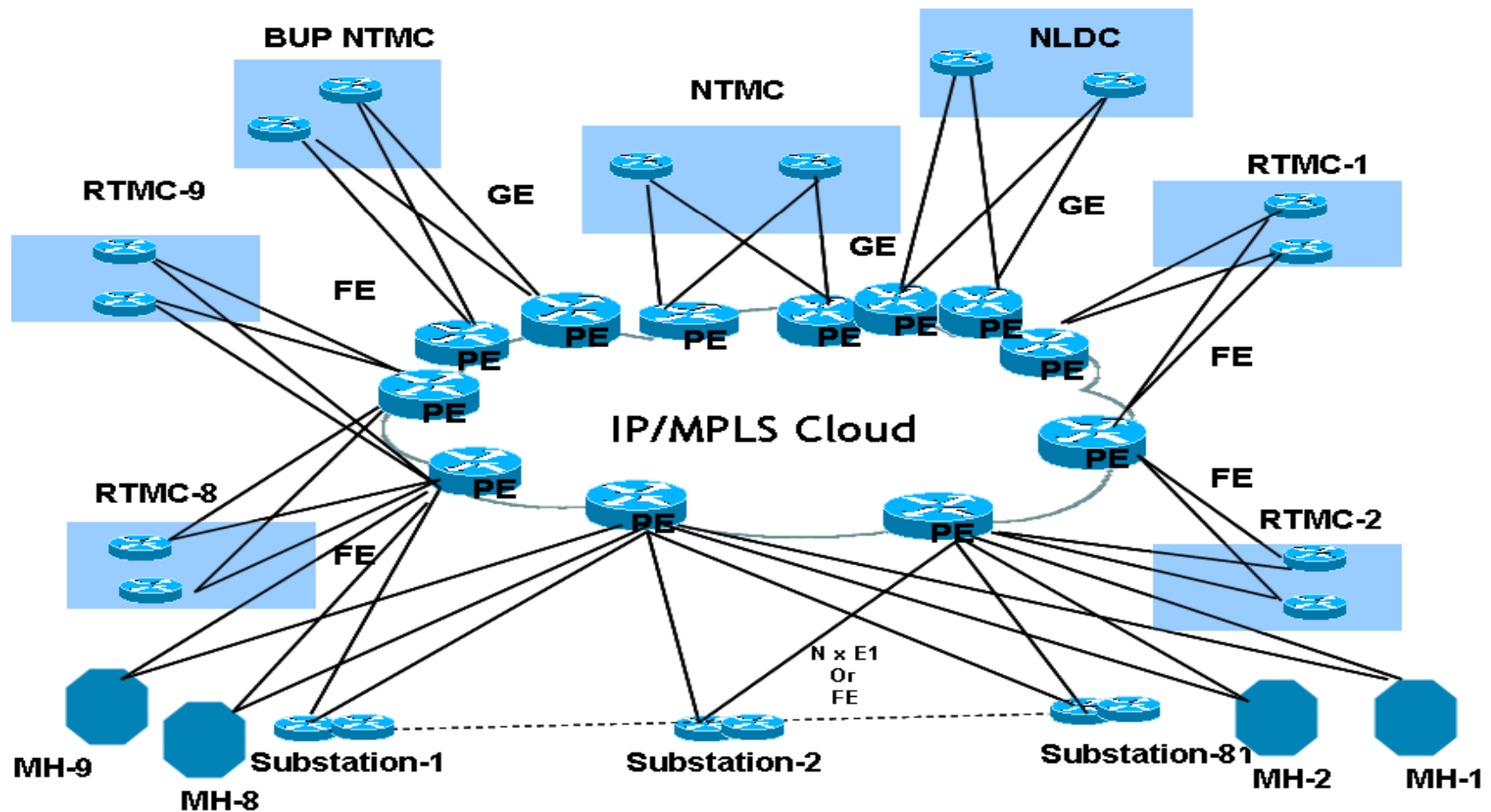
COMMUNICATION ARCHITECTURE

- Substations and the various control centers will be connected by redundant broad band communication network of POWERTEL and ULDC communication links.
- At stations where this connectivity is not possible, **leased lines** will be hired from telecom operators up to the nearest connection point .



COMMUNICATION TOPOLOGY

Proposed Network Architecture – Physical Topology





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CONNECTIVITY STATUS

192 Substations :

- **Connectivity thro' POWERTEL Network: 78 Substations** (including planned implementation): Out of these 78 Substations, 51 substations are having dual connectivity whereas 27 Substations having only single connectivity.
- **Connectivity thro' under ULDC FO network: 47 Substations** including planned implementation under Micro Wave replacement (in NR, ER, NER, SR) and WR ULDC network. At 17 locations it is possible to connect through two different paths.
- **Connectivity thro' service provider network : 67 Substations:** 67 stations, not connected to either POWERTEL or ULDC network shall get connected through 10 Mbps lease line to the nearest MPLS (Multiprotocol Label Switching) node on POWERTEL network.

All the Locations shall have dual connectivity, to improve reliability of Communication system.



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VOICE COMMUNICATION

- Independent & Reliable VOIP Communication between NTMC, RTMCs, NLDC, RLDCs.
- The voice communication between control Centres and Maintenance Service Hubs (MSHs) / Substations shall be through the EPAX/Landline/Mobile phones etc



VIDEO SURVEILLANCE SYSTEM

- Real-time video surveillance of substations will be deployed by providing Camera Management Servers at various Control Centres to provide visibility of the substation and its equipment through strategically placed cameras. The visual images complemented with data from SCADA system and will strengthen Operating decision.
- The augmentation of the existing CCTV system will be carried out at respective S/Stns for effective utilization of the same for video surveillance system at Control Centres.



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PROJECT COST ESTIMATES

- Project Cost : Rs. 195 Crore
- Addl expenditure Rs **60.07** crore
for substation adaptation.
- The expenditure shall be less than envisaged cash inflow (on account of saving in O&M cost particularly employee cost) after accounting for the cash outflow towards additional O&M expenses like communication charges, R&M charges of Control Centres.



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PROMISE

- Meet International Benchmark
- Competitive & Economic Edge of POWERGRID
- Efficient, Reliable & Secured GRID

NTMC & RTMC in Synergy with with NLDC & RLDC set up of Grid Operator to ensure

A

CONNECTED , SAFE & WISE GRID

The image features three vibrant red tulips with green stems and leaves, set against a blue gradient background. The text 'THANK YOU' is written in a bold, light blue font across the middle of the flowers.

THANK YOU