

Conference on  
**Telecom Needs of Power Sector**  
Strategies & Solutions, Technologies & Applications

May 29-30, 2012

**Recap of Day 1**

# POSOCO Perspective

## Issues and Way Ahead

- At the system operator level, exceptional events such as natural calamities test the limits of communication infrastructure. In its absence, it becomes a losing battle of network management.
- No clear roadmap/regulation for telecom in power sector. This will be a challenge as utilities deploy a complex portfolio of ICT technologies, where data management is crucial.
  - Communication needs to be parallel (instead of an 'add on') to transmission planning.
  - Retrofitting communication infrastructure will be costlier than incorporating it right at the planning stage of transmission and distribution.
- Need to have our own standards for the communication infrastructure. This will form the basis for other developments such as interoperability, cyber security, etc.
- At the system operator level, strong communication will be critical for key factors such as
  - Choice of technology – to what extent can latency be tolerated in the system
  - Route Redundancy: Operator needs to have system visibility even if one link fails.
  - Self-healing property: Control system should have capability to address system problems
  - RE integration: To handle contingency and gain situational awareness associated with RE
  - PMUs: Communication posed a bottleneck in recent PMU installation project.
  - Substation automation: Remotely monitored substations are increasing in interstate network
- Regulatory position needs to be clarified. IEGC refers to communication in general terms. CERC can take a lead in this.
  - Key issues wrt communication in tariff mechanism – equipment life, depreciation, software
  - Regulators are of late supporting communication technology upgradation. This is done through allowing higher depreciation on control centre equipment.
  - A comprehensive staff paper on such issues is in the process.

# Utility Perspective

## Distribution

- Vendors generally not keen to share protocol. This inhibits interoperability. Utilities do not want to be stuck with a single vendor. MSEDCL developed protocol in-house and ordered supply from manufacturers based on it
- Reliability is an issue in case of telecom service provider. Generally, customer locations are such that operators are unable to cater to technology needs such as wireless, etc.
- Utilities can optimise telecom infrastructure through common data centres and the CIM model.
- Two-way communication is the emerging trend for utilities. In this scenario, data will be shared with consumer segments for demand side management.
- Key technologies – RF, GPRS, CDMA, leased line, etc. BSES experience shows CDMA as a proven technology. Wireless technologies, under MSEDCL experience has had almost two-third failure rates.

## Transmission

- Cost of communication infrastructure deployment has reduced over time. Now it accounts for only 0.2 % of transmission line cost.
- FO backbone (25,000 km) being laid on POWERGRID and STU lines. By 2014, approx 55,000 km FO network will come up
- PMU installation, under WAMS project, entails high network communication requirement. PMUs generate data every 40 milliseconds. As the PMU pilot project is scaled up, it will necessitate a robust communication system.

# Smart Grid Requirements

## Key drivers

- Green power generation through RE and storage-based systems
- Smart bulk power transfer to enable load mgmt at different times of day
- IT-based automation in power distribution systems
- Distributed generation – rural electrification provides the max scope
- Grid management – micro-manage power flow in networks

## Twelfth Plan

- National Power MIS centre – for aggregation of power sys data to enable planning & monitoring
- S/S automation – GIS wherever feasible, numerical relays, bay controllers, transformer monitors
- Fibre connectivity – for all S/S at 33 kV & above. About 250,000 panchayats to be connected
- Smart or smart-ready meters for new connections

## Issues in focus

- Interoperability – towards integration of diverse technologies and achieve vendor-neutral technology solutions
- Standardisation – for optimisation across utilities & projects
- Technical stds – need to identify and establish the standards relevant to Indian conditions
- Last-mile connectivity – issue where infrastructural improvement scope is huge

# Technology Options and Choices

## POWERGRID Perspective

- **Types of communication media:**

- Wire Lines (Copper & Co-axial Cables)
- Wireless (Microwave Radio & VSAT)
- Through Power Transmission Lines (PLCC & Digital PLCC)
- Optical Fibre Cables (Underground/Aerial OFC, ADSS, OPGW & Wrap Around)

- **Equipment:** Depending on media, various types of end equipments (transmitters / receivers) are deployed for collection / transmission of voice, data & video (**SDH** (Synchronous Digital Hierarchy), **DWDM** (Dense Wave Digital Multiplexing) & **MPLS** (Multi Protocol Label Switching)).

- **Tower infrastructure:** Transmission towers could be leveraged for revenue by permitting mounting of Telecom Antennas. POWERGRID leased out towers in Punjab, HP & J&K on pilot basis. Tendering process for more towers will be taken up.

- Under ULDC projects, 187 microwave towers have been installed including 20 in CS & 7 within POWERGRID premises. Leasing of these towers in association with state utilities is also under process

- Vast Fiber Optic Backbone Network of over 25,000 km connecting over 200 towns & cities. Expansion by about 33,000Kms under various schemes in progress. Backbone links are mainly on OH OPGW. Adding value by implementing latest state-of-the-art MPLS network

# Communication Network and Cyber Security

## Security Concerns and Standards

- **Key security concerns:** identity management, information management, depth in authentication wrt control/config commands, security governance of distributed intelligence, privacy concerns of users, AMI/smart metering most vulnerable due to accessibility.
- **Security compliance standards & technologies:** most well known security standards include the IEC stds & CIPS. ISGF Work Group focuses on security & BIS LITD10 Workgroup on Security is developing security standards for India.
- **CIPS approach for handling security:** The CIP standards touch utilities' computers related operation of the grid, data collection and data dissemination throughout the enterprise.
- All CIP standards make it mandatory to document & review all procedures & policies every year. Utilities and other bulk power industry participants that violate any stds could face enforcement actions including fines of up to \$1 mn/day.
- However, CIPS should be used as guidelines to describe general approaches, considerations, practices and planning philosophies. CIPS should not be considered as cookbook for protection.

# Mobile Workforce Management

## Click Software

- **Integrated MWM lifecycle:** demand forecasting, resource planning, shift rostering, scheduling & optimising, MWM and service analytics
- **Applications:** Meter operations, meter reading, network maintenance, network faults & outages, construction, vigilance and project teams.
- **Value for field services organisations:** manage service costs, improve customer service, increase resource utilisation & productivity and visibility & control
- **Proven, real and achievable benefits:** increased revenues, reduced costs, improved services and visibility & control.

## TPDDL

- **Defining MWM:** extension of work management system; includes integrated processes & procedures; help efficient work schedule; meet consumers' needs; utilize assets; & evaluate field workforce performance
- **Applications:** Planned long-duration WO – inspection, maintenance/meter exchanges, audit & mapping; Planned short-duration WO – maintenance, meter reading, service connection/disconnections, payments; Unplanned WO – appointments, faults, searching
- **Choosing criteria:** communication technologies supported, connectivity supported, integration required, scalability/flexibility, multi-platform support, hosted vs deployed & security

# Focus on Transmission - I

## Progress so far

- **Indian Grid** - geographically vast and complex network. Managing such a grid requires ICT
  - information reqts met with innovative sensors & relays of modern electronics.
  - communications reqts met by emerging technologies like MW, fiber optic, wireless, etc.
- **Evolution** - Voice communication- PLCC- Independent control centre with voice-FO
- **Regulatory provisions:** IEGC provides for data & communications facilities for system operation & system security

## Upcoming projects

- **NTAMC** (centralised monitoring, O&M of S/S)
  - Architecture: NTAMC, back-up, RTAMC & MSHs
  - 10-100 mbps bandwidth reqt with redundancy
  - Procurement from POWERTEL; ULDC n/w & lease lines
- **URTDSM** (Monitor grid where no SCADA; after-effects of any event; unstable oscillatory modes )
  - Architecture: PDC at NLDC, back-up, RLDCs, SLDCs & S/Ss; Total latency: abt 100 ms; Approx 1TB data/month from 120 PMUs
- **Pilot Smart City**
  - Comprehensive communication
  - smart switching devises
  - sensors

## Communication Infrastructure Plan

- Replacement of microwave hops with FO
- Future transmissions lines earth wire to have FO i.e OPGW.
- All S/S to be connected with FO communication.
- 25,000 km OPGW existing & in use
- 20,000 km OPGW being installed for replacing MW
- 20,000 km OPGW planned for connecting substations
- 10,000 km planned under Phase-II of URTDSM project



**Thank You!**