Interactive session on

"Smart Grids for Smart Cities"

30th October 2018

India Habitat Centre, New Delhi

Value Proposition of Distribution Automation for Smart Cities

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Jointly Organized by

National Smart Grid Mission
Ministry of Power
Government of India

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IEEMA Smart Grid Division

Vision :

“Evolve as the reliable partner in the nation building roadmap of Government of India to ensure comprehensive and structured deployment of nation wide smart grid infrastructure to address the current challenges like ‘energy security’, ‘Electricity for all’, and ‘financial health of distribution utilities’ along with ‘Modernization of the Grid’ in a holistic and sustainable manner. “

IEEMA Smart Grid Division
Value for Indian Utilities

- More than 50 years of experience with the Indian Utility customers
- Width and depth of understanding of the pain areas of the utilities
- Technical competency to provide the solution from the grass root requirement to the epitome of technology
- Familiar with the operational requirement of the utilities and can designed the solution and product to suite their requirement
- IEEMA Smart Grid division comprises of organizations who can in individual capacity or as a team support the target of effective transformation of utility from a traditional to Smart utility

Distribution Automation (DA)

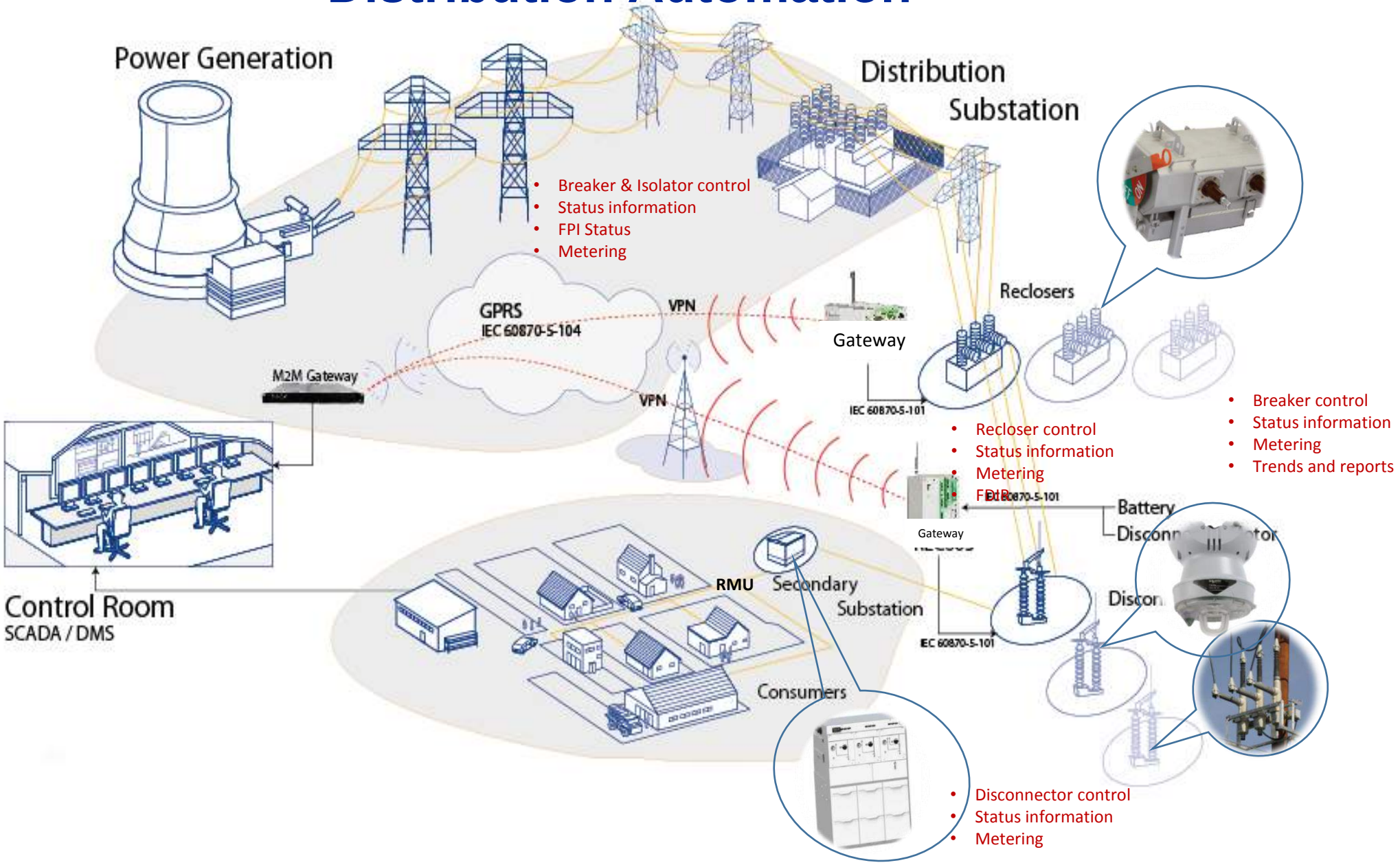
Need of DA - Today INDIA being a Power Surplus Country, but Indian Distribution Segment are still facing

- Power Outages
  - Planned Outages (Load shed)
  - Unplanned Outages (Breakdown)
- Huge AT&C Losses
- Unhealthy DISCOMS

Benefits of Distribution Automation

- Improvement of SAIDI and SAIFI
- Reduction of AT&C Losses
- Reliability and Outage Management

Distribution Automation



Components of DA

- Substation Automation
- Feeder Automation
- DT Monitoring
- Advanced Distribution Management System

Substation Automation

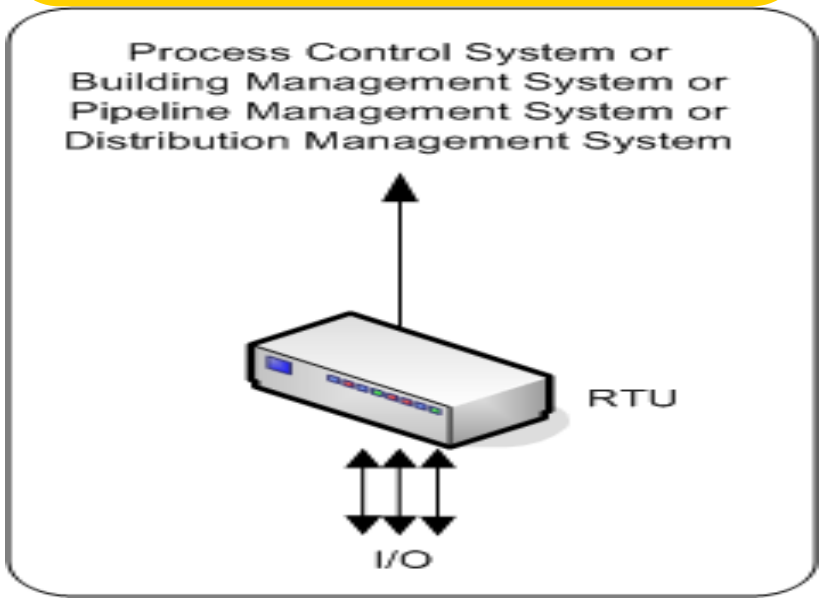
Need

- Health monitoring of Substation Equipment
- Improved Protection Coordination
- Remote Control
- Maintain Grid Stability
- Effective fault disturbance analysis

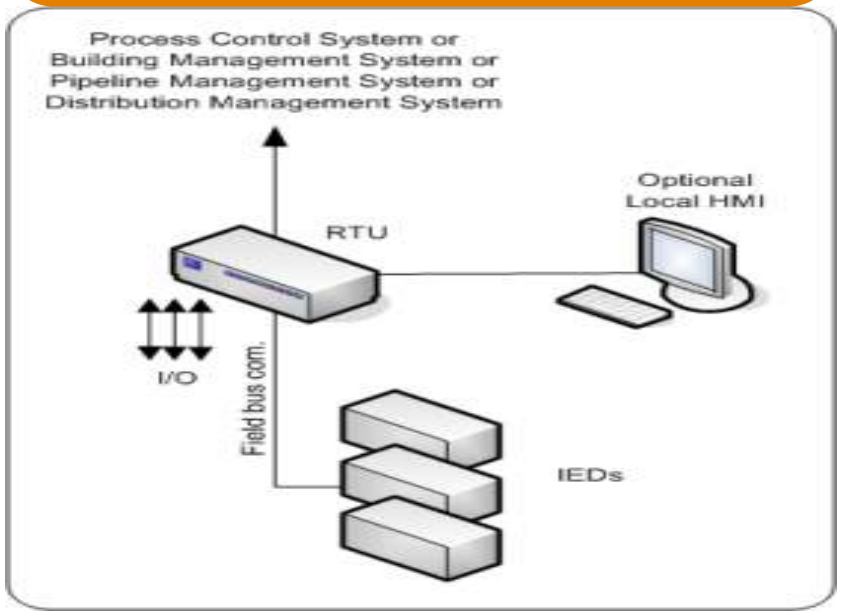
SUBSTATION AUTOMATION (SAS) Technologies

Different methods achieving Substation Automation

RTU



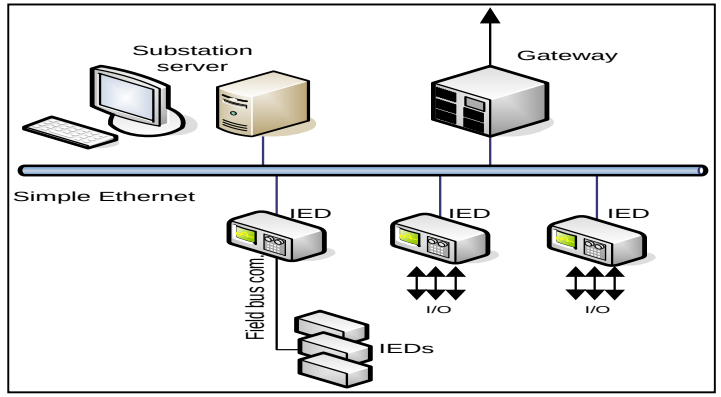
Smart RTU



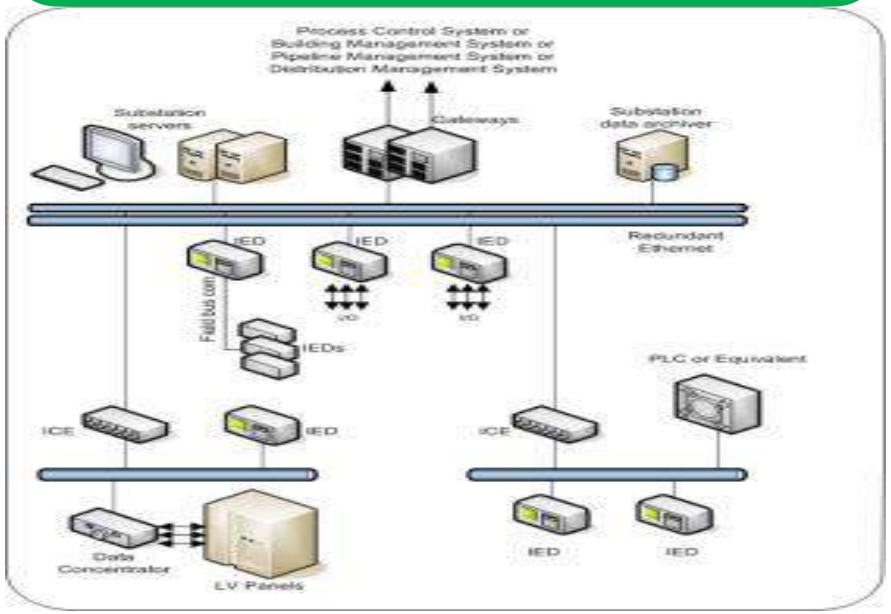
SUBSTATION AUTOMATION (SAS) Technologies

Different methods achieving Substation Automation

Medium Level SAS



Big Level SAS



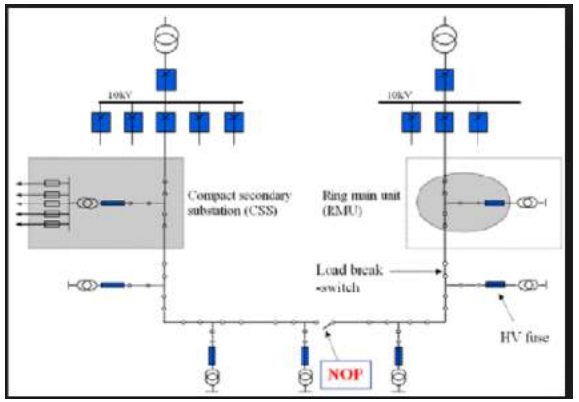
Package Substation

- No Outdoor operations,
- 50% Space saving in all substations (balance land can be utilized for City open spaces)
- Smart Technology –Gas Insulated Switchgears – high life, no Maintenance,
- No outages,
- Safe to work compared to manual operation

Feeder Automation

Need

- Early fault identification & reporting
- Faster feeder restoration
- Outage reduction
  - Frequency
  - Duration
- Higher power availability



Feeder automation

- high cost x benefit proposal
- easy to install, configure and maintain
- flexible and modular approach

1. Autoreclosures
2. Sectionalizes
3. Fault Passage Indicator
4. Smart RMU (with Inbuilt FRTU)

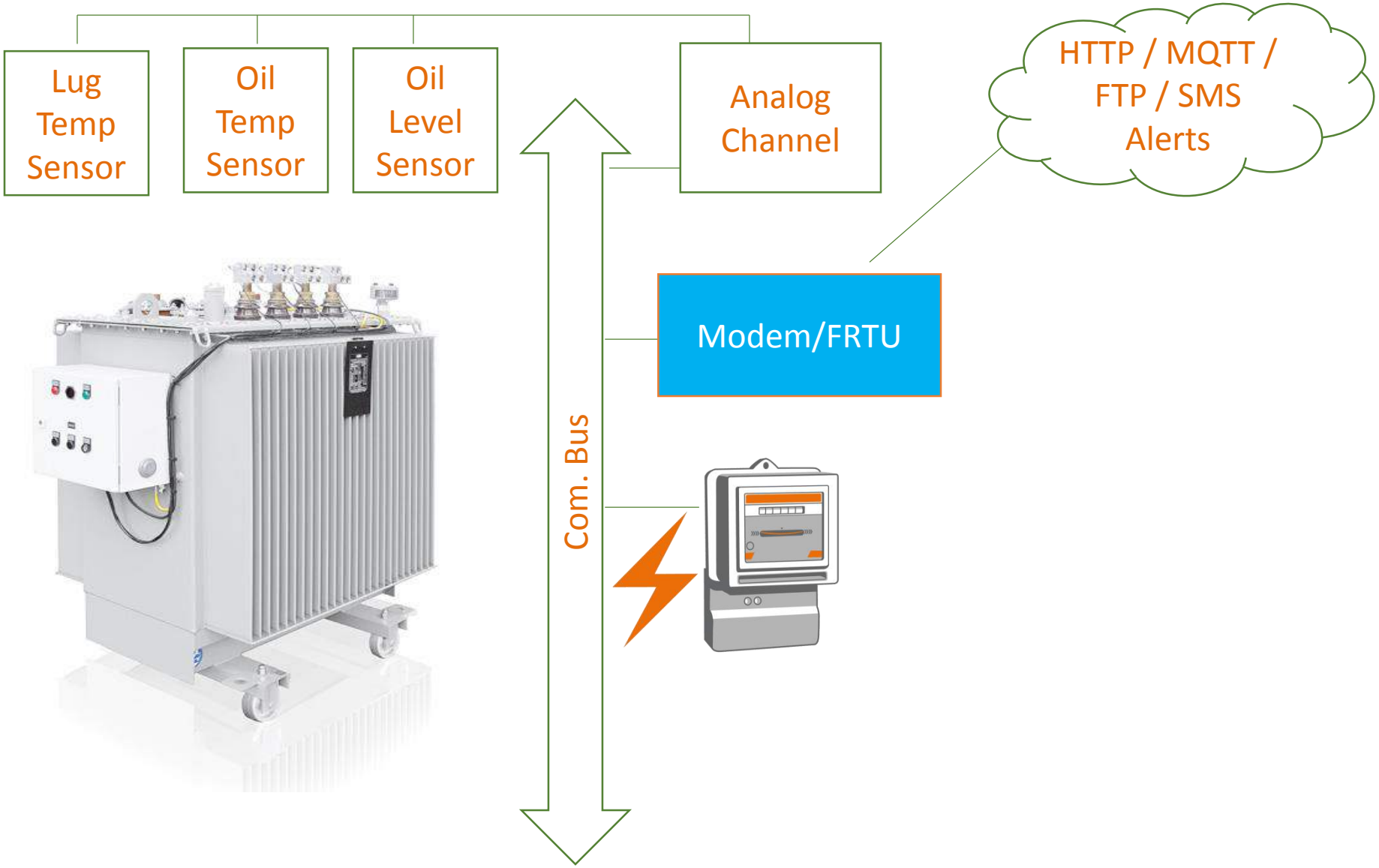
Device	Technology
Fault Indicator	• Local and Remote Fault Indication • Integrated current measurement and voltage sensing • Lightweight & robust • Self-powered and Battery for Indication
Auto Recloser	• Circuit Breaker with Vacuum Switching • SIS/GIS Insulation • Integrated current & voltage measurement • Lightweight & robust
Sectionalizer	• Load Break Switch Vacuum/SF6 Switching • SIS/GIS Insulation • Integrated current & voltage measurement • Lightweight & robust
RMU	• Pad mounted • Self Powered through current source • Gas Insulation • Multiple Configuration (3/4/5 way)
FRTU / Gateway shall be an integral part of above devices to make them communicable	

Distribution Transformer Monitoring

Need

- Prevents over/under loading of Transformer
- Reduce unexpected failure and loss of supply
- Reduce operational cost
- Results in better reliability of the network
- Identified power theft losses

Functional Block Diagram

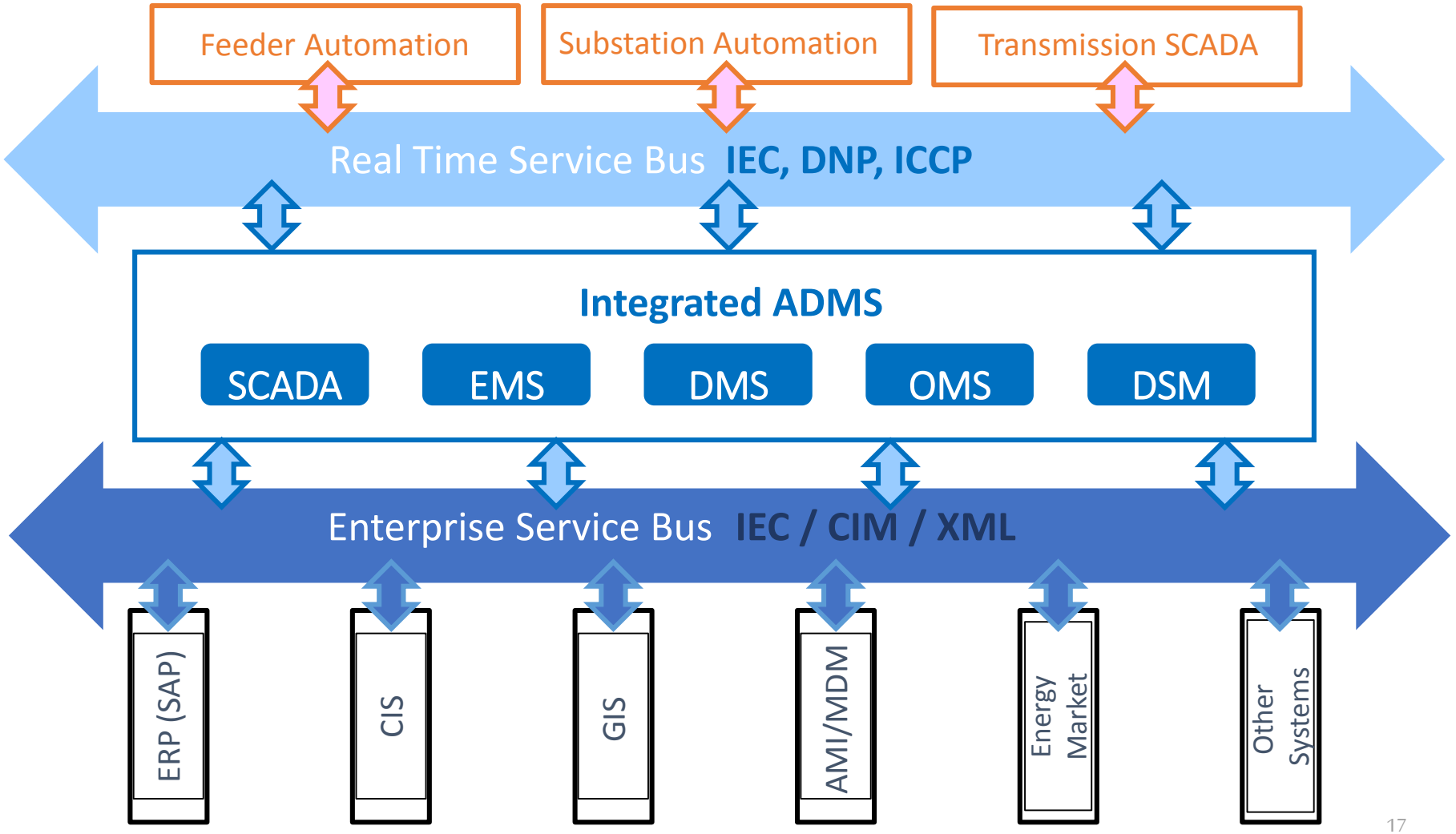


ADMS

Need

- Real-time monitoring of electrical grid and associated resources
- Cost effective network upgrades
- Improving power quality and reliability
- Improving customer satisfaction (SAIDI, SAIFI, CAIDI, CAIFI)
- Integrate with external systems such as GIS, ERP, MDM

Centralized Control Centre



ADMS

Functionality

- Network Connectivity Analysis
- State Estimation
- Unbalanced Power Flow
- Load Shed
- Volt Var Control
- Feeder Reconfiguration for Load Balancing and Loss Minimization
- Fault Management, Isolation and Restoration
- Load Forecasting
- Outage Management System

Case Study – MGVCL

Installation

Power to villages of DRUM Site at Umreth is supplyed through 18 11Kv feeders. 720 FPIs are installed on carefully selected strategic locations on these feeders. The installation procedure is simple and does not require shutdown of feeder. The work was completed in 15 days.

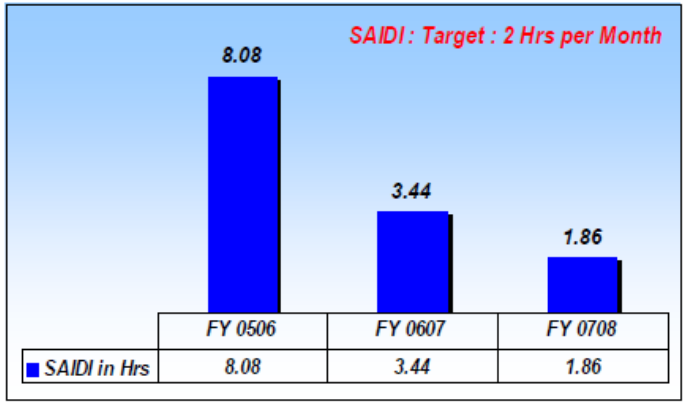
The operation of FPIs and different pattern of blinking was explained to the Field Staff through orientation training conducted at local office and the same was well received by the Field Staff.

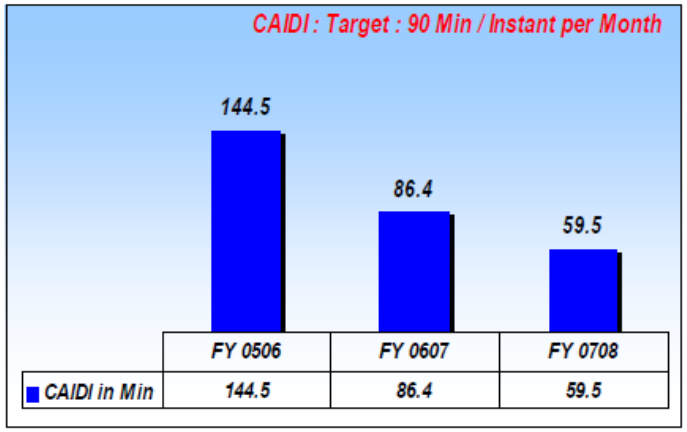
Efficient and effective communication between the Helpers located in the villages and the Sub-Division Office is very essential to communicate the blinking of FPIs as soon as the feeder is declared under Sustained Fault. This was achieved by providing mobile phones under C.U.G. Scheme of MGVCL. The running cost of this is marginal.

Benefits

It is observed that on an average, it was taking 2 to 6 hours to restore the supply depending on the length of the feeder, location of fault and available communication. On installation of FPIs and effective communication, this reduced to 30 minutes to 1 hour.

This has significantly improved the reliability of power supply to rural areas. The fallowing charts indicate the improvement achieved in CAIDI and SAIDI of the reliability indices.





Look and Feel of DA – Another Utility in INDIA