Agility Care
Integrity
Excellence
Collaboration
Trust Respect

Operational Excellence through Automation

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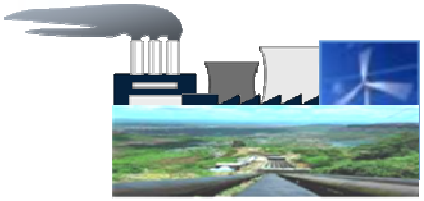
02nd Nov 2012
CII conference, New Delhi

TATA POWER
Lighting up Lives!

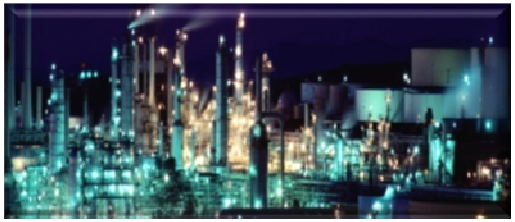
Outline

- Brief Introduction of Tata Power
- Automation in Tata Power
- Automation in Transmission
- Automation in Distribution
- Power System Control Centre
- Automatic Meter Reading
- Communication Infrastructure
- Performance Monitoring & Operational Excellence
- Summary

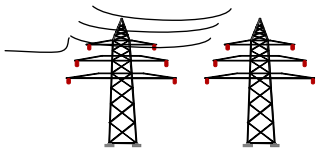
Tata Power | Business Portfolio



6900 MW Generation

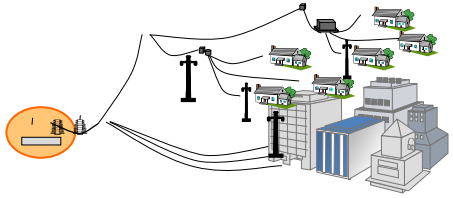


15,240 MUs Energy Served



1200 Kms Transmission Network

3,50,000 Consumers



1900 Kms Distribution Network

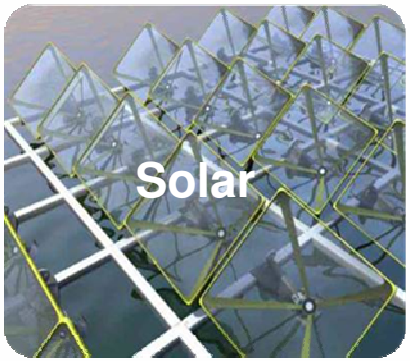
20 RSS **19 DSS** **540 CSS**

19,000 MW Projects in various stages

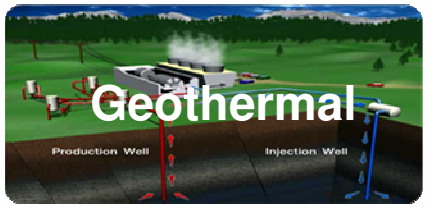
Power Services & Power Trading

Renewable Energy

- Leading private utility with 375 MW of installed wind capacity
- India's first 2 MW turbine installed at Visapur, India
- 70 MW plant in project stage in Maharashtra
- Plans to add 500 MW over the next 3 years
- Aspire to have a 2 GW installed wind capacity by 2017



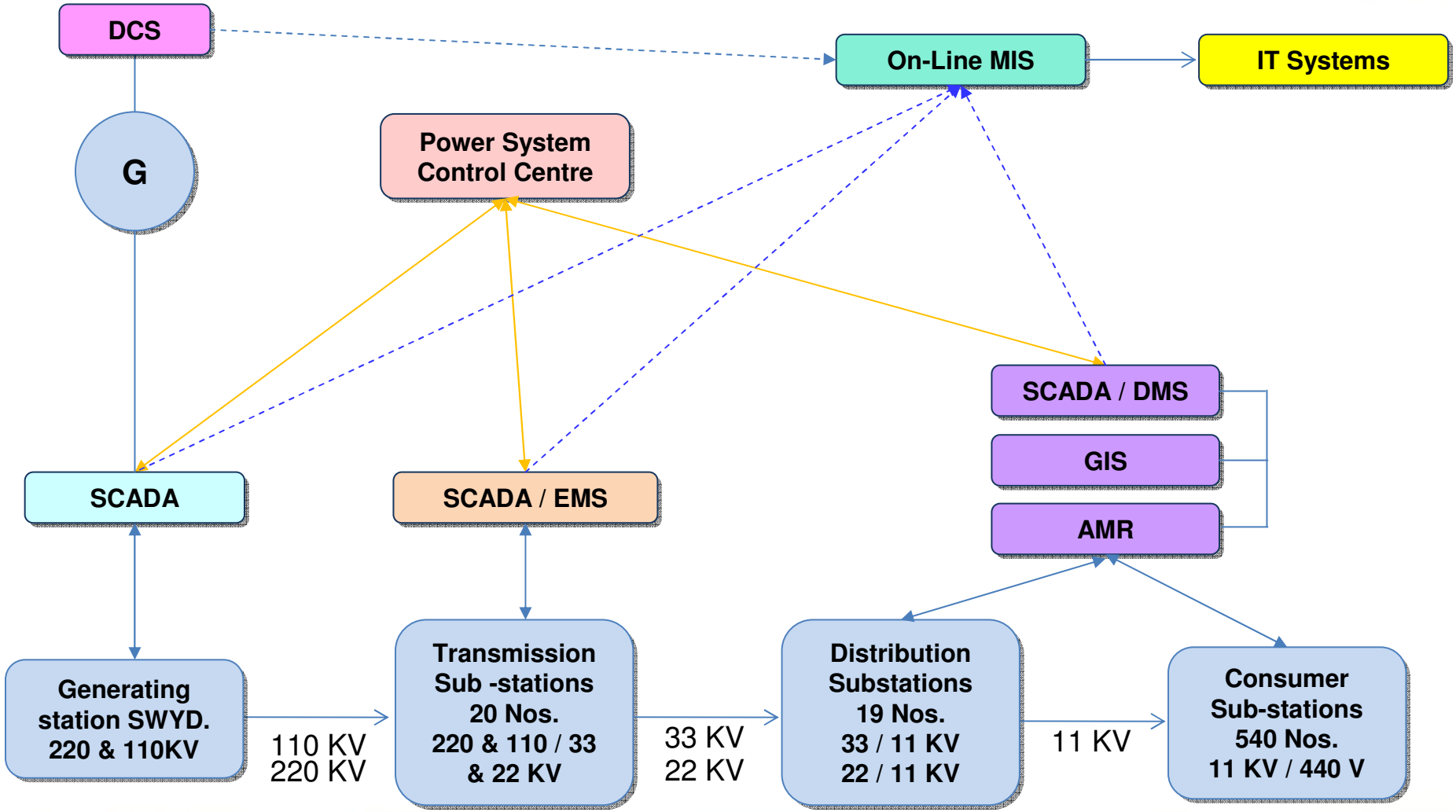
- 3 MW grid connected Solar Power Plant at Mulshi
- 25 MW grid connected Solar Power Plant at Mithapur
- 75 MW Solar Power Plant in project stage at Maharashtra & Gujrat
- Actively pursuing Concentrated Solar, Solar Thermal & Rooftop Solar
- Exploring opportunities up to 300 MW based on solar technology
- Floating PV Solar



- Equity stake in Geodynamics for enhanced geothermal technology
- 240 MW Indonesian geothermal MOU
- 500 MW Inaminka-Australian geothermal MOU
- MOU with Gujarat Govt. (India) to explore geothermal potential

Automation in TATA POWER

Tata Power OT Systems



Agility Care

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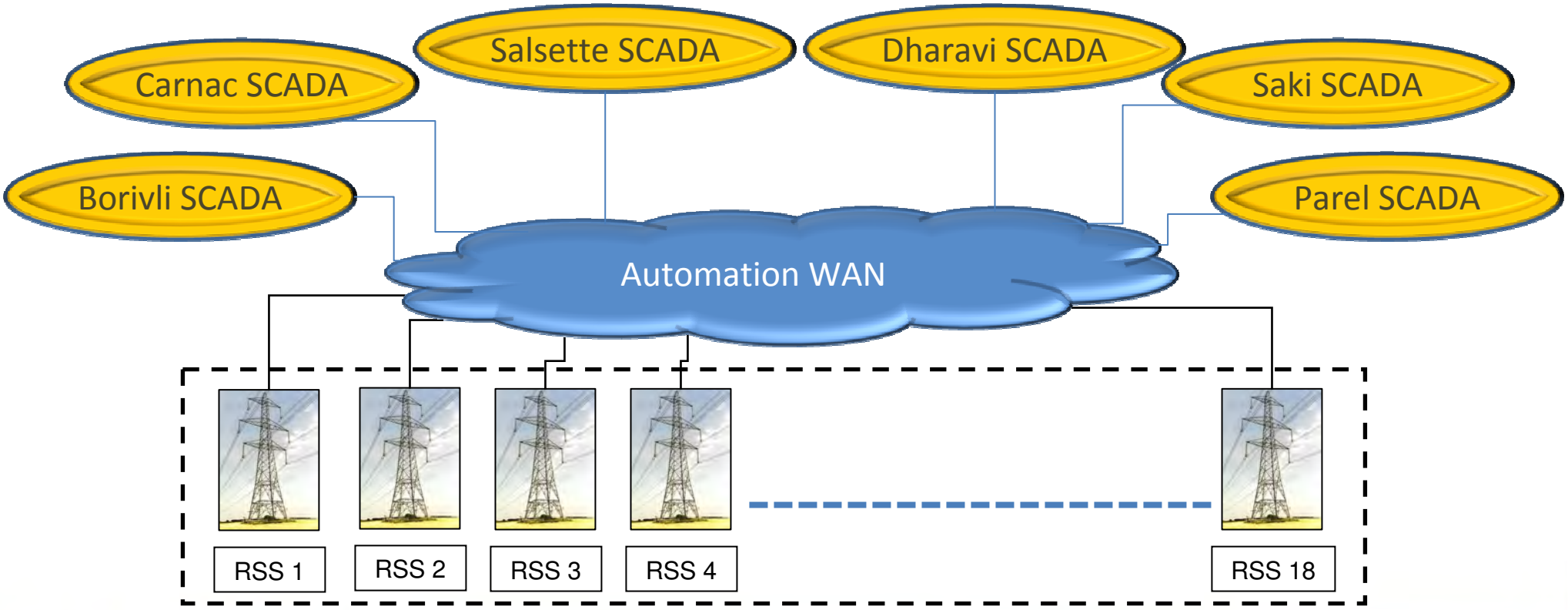
Automation in Transmission

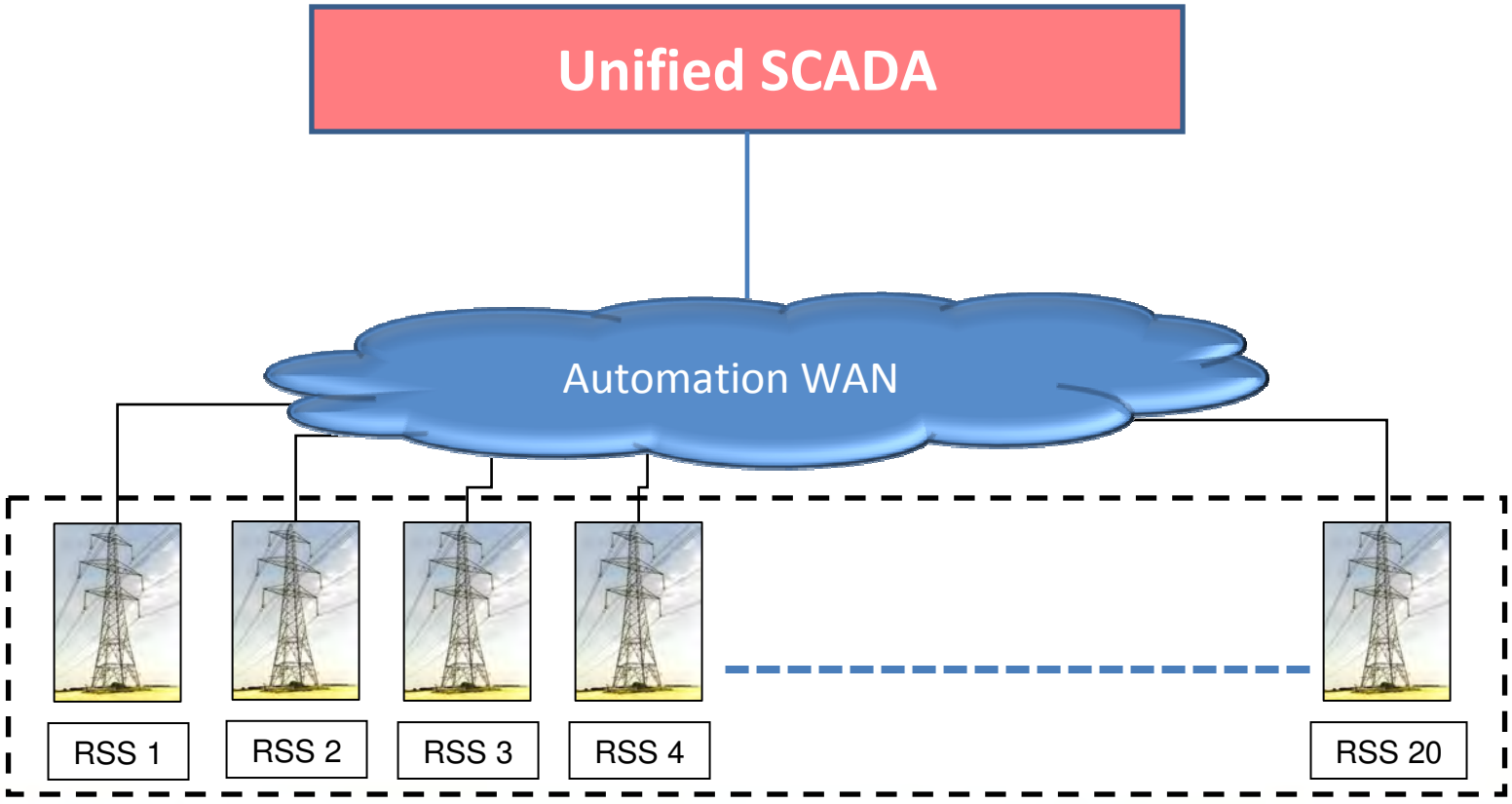
Automation for Transmission - Past

- The 18 RSS were segregated & operated from the zone-wise 06 SCADA systems
- Decentralized SCADA operations with Distributed architecture



Automation for Transmission - Today

- Unified SCADA
- Centralized SCADA operations with Distributed architecture



Automation for Transmission

Benefits accrued

- Centralized operations enabled better handling of the power system during critical grid conditions
- Effective occurrence analysis and quick restoration of power supply
- Same look and feel of the network
- Unmanned Sub-stations
- Optimized O&M resources
- Better planning and adherence to maintenance schedule
- Minimizing human error in operations
- Improved security and safety by built-in security features such as interlocks, safety tagging
- Operator training simulator for enhancing operators efficiency
- Power system wide Energy balancing for reduced losses and grid stability

Automation for Transmission

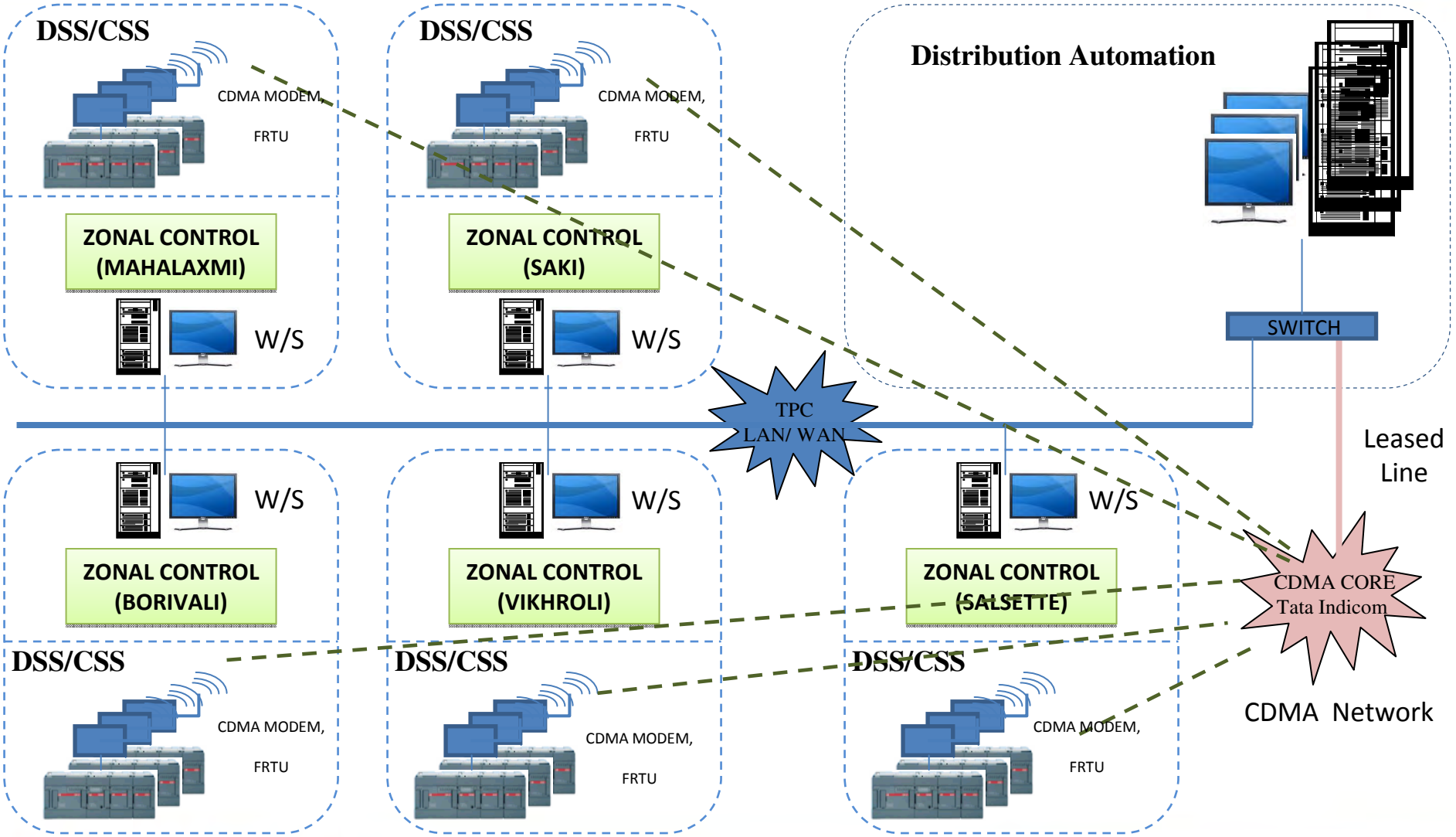
Plans Ahead

TATA

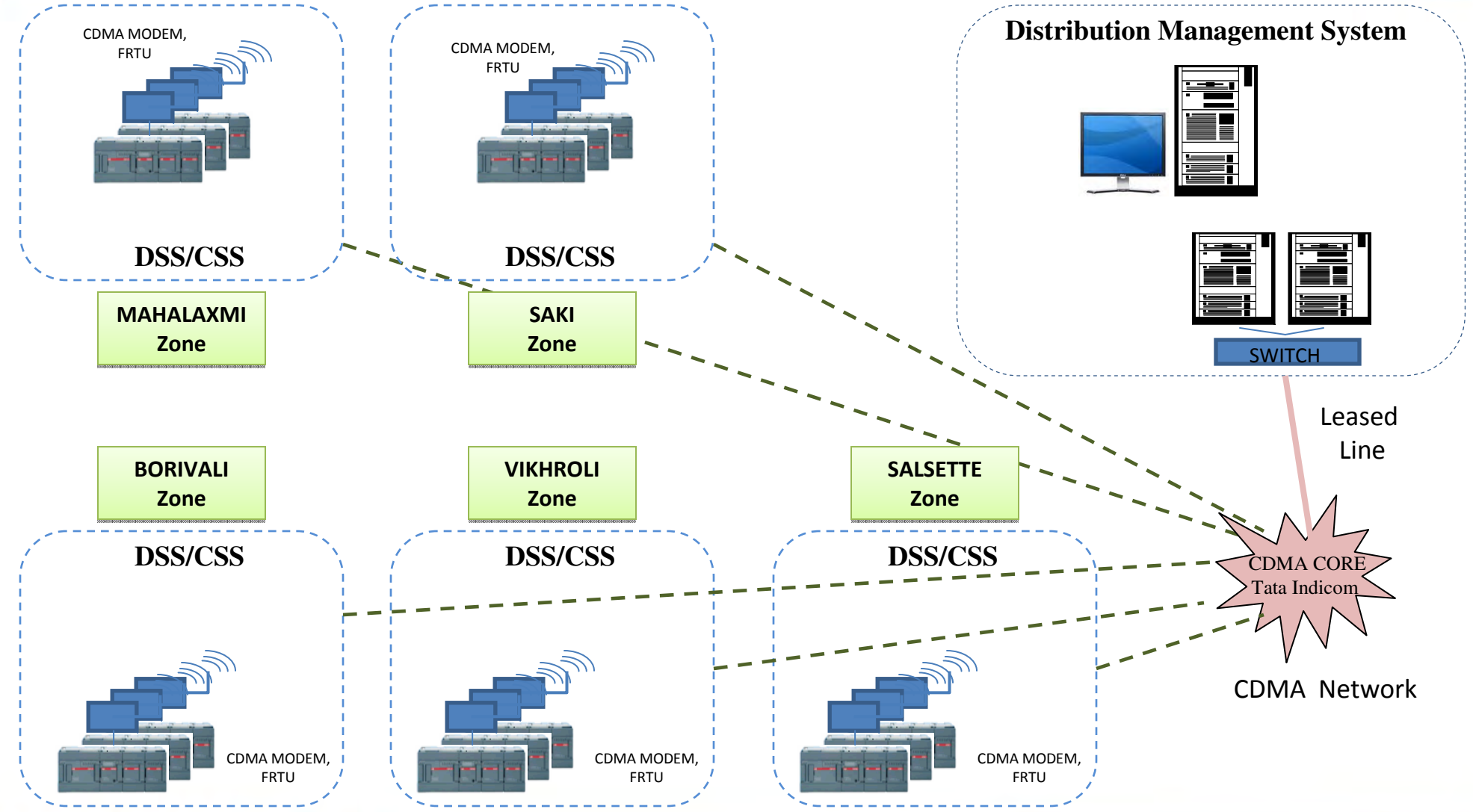
- Digital Substation
- Wide Area Measurement System (WAMS)
- Hi-speed information processing
- Advanced protection and control (WAPS)
- Modelling, simulation and visualization tools
- Advanced grid components for transmission
- Centralized Condition Monitoring

Automation in Distribution

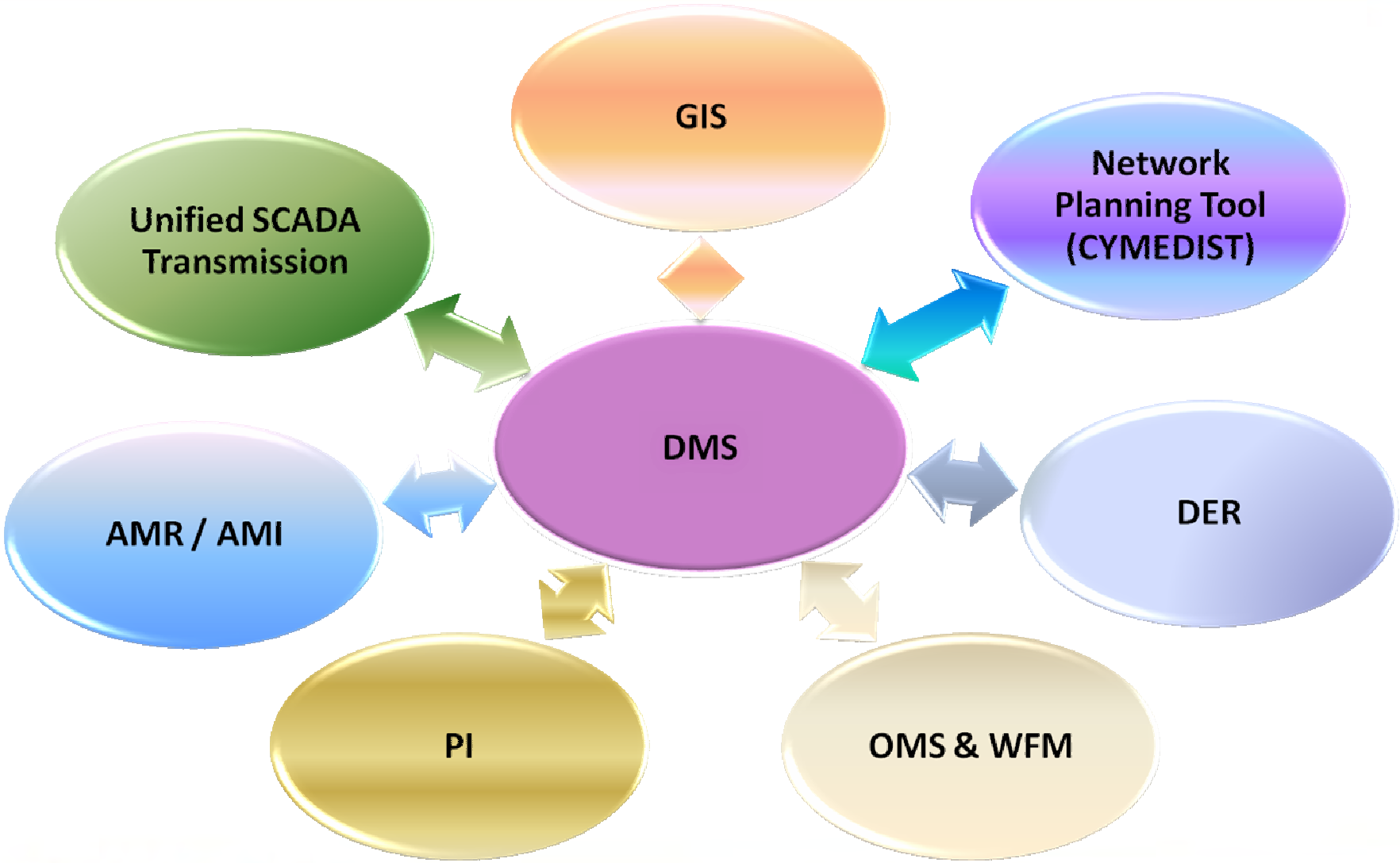
Automation for Distribution - Past



Automation for Distribution – Under Implementation



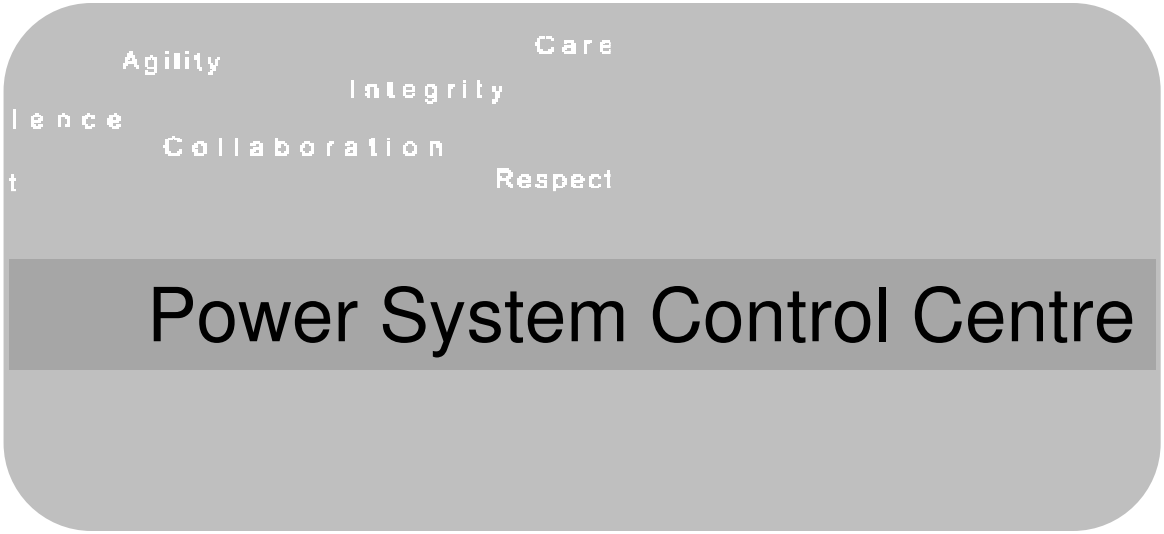
Applications Integrated with DMS



Automation for Distribution

Benefits accrued

- Efficient management of distribution network
- Expedites fault detection, fault location and service restoration
- Reduction in operating and maintenance costs
- Improvement in performance indices e.g. CAIDI, CAIFI, SAIDI etc.
- Improved demand, load, maintenance cycles, outage management
- Improved use of existing grid assets to reduce grid congestion and bottlenecks
- Extension of asset life
- Optimization of decision making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Power System Control Centre

Power System Control Centre

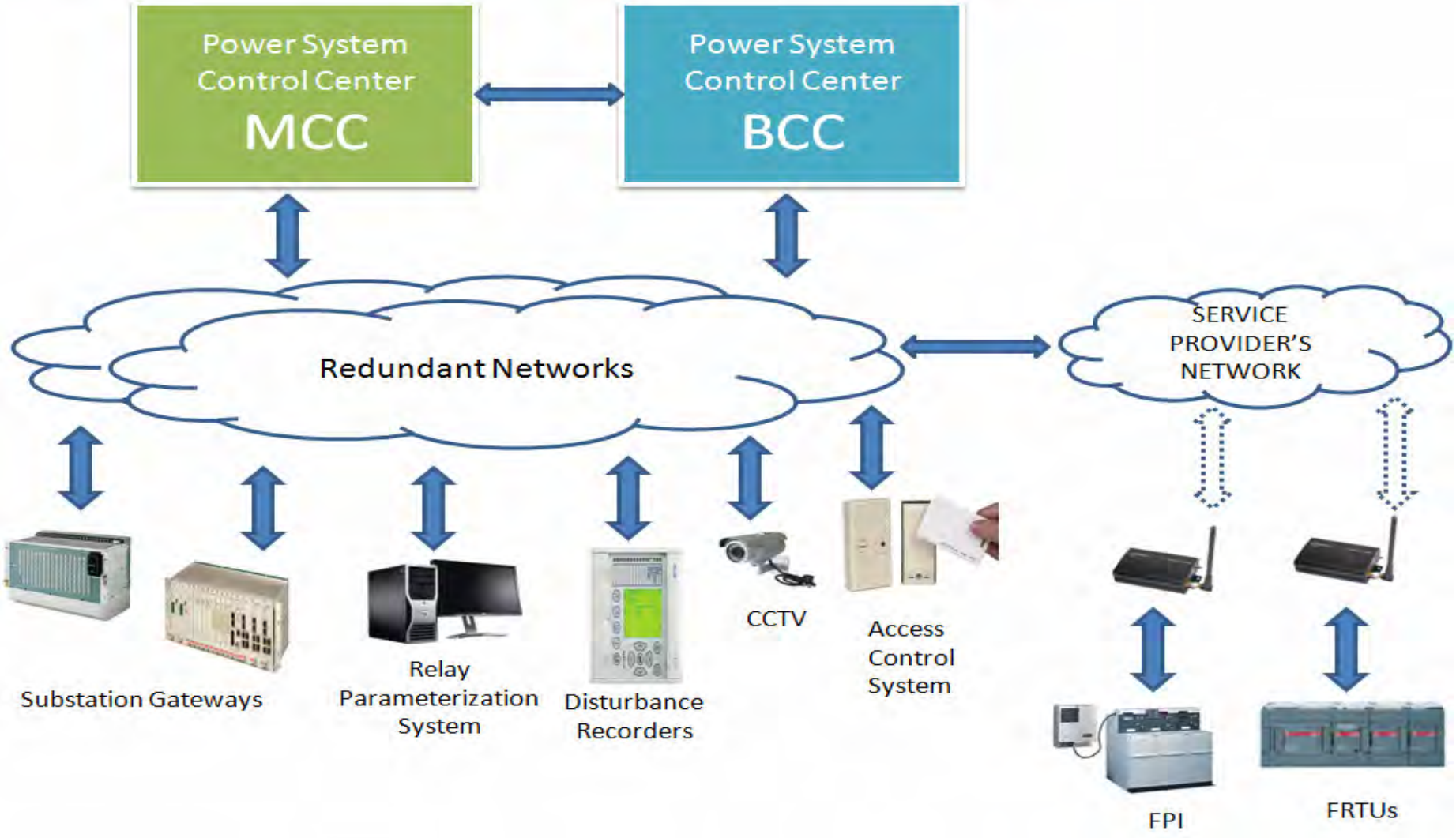
- Centralized monitoring and control of all Generating stations switchyard, Transmission & Distribution Sub-Stations
- Generation scheduling and load forecasting
- Outage Planning
- Power Purchase and Sales

Power System Control Centre

Systems and Applications for Centralized Operation planned

- SCADA - Control and Monitoring
- EMS – Transmission network management
- DMS, OMS, GIS, WFM – Distribution network management
- Automated MIS, Dashboard and Operational reports
- Visual Monitoring System to provide visibility of substation equipments
- Fault Analysis and Relay Parameterization System
- Access Control Monitoring
- Asset Management

Power System Control Centre



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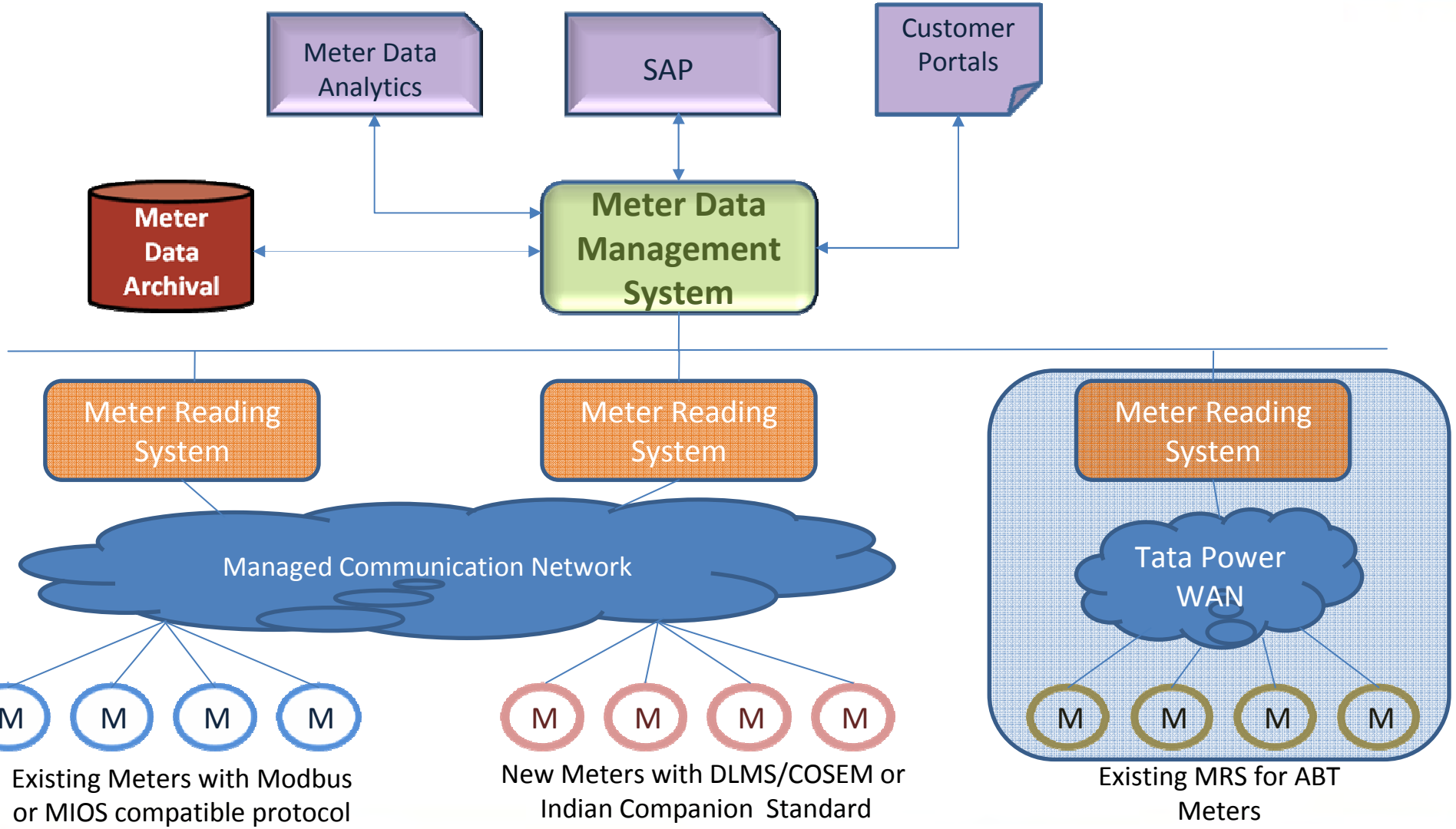
Automatic Meter Reading

Automatic Meter Reading

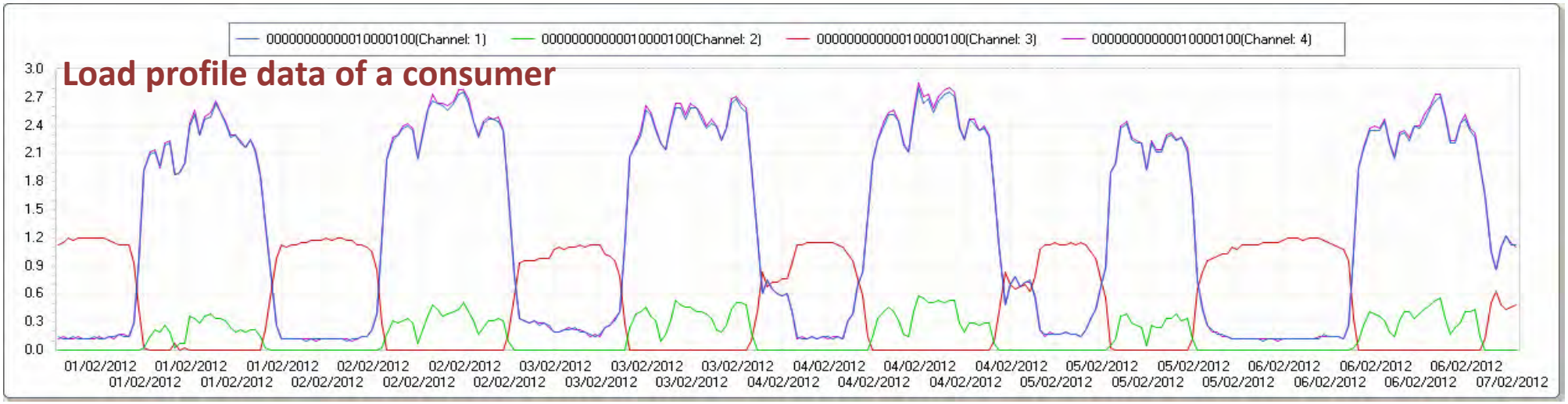


Automatic Meter Reading

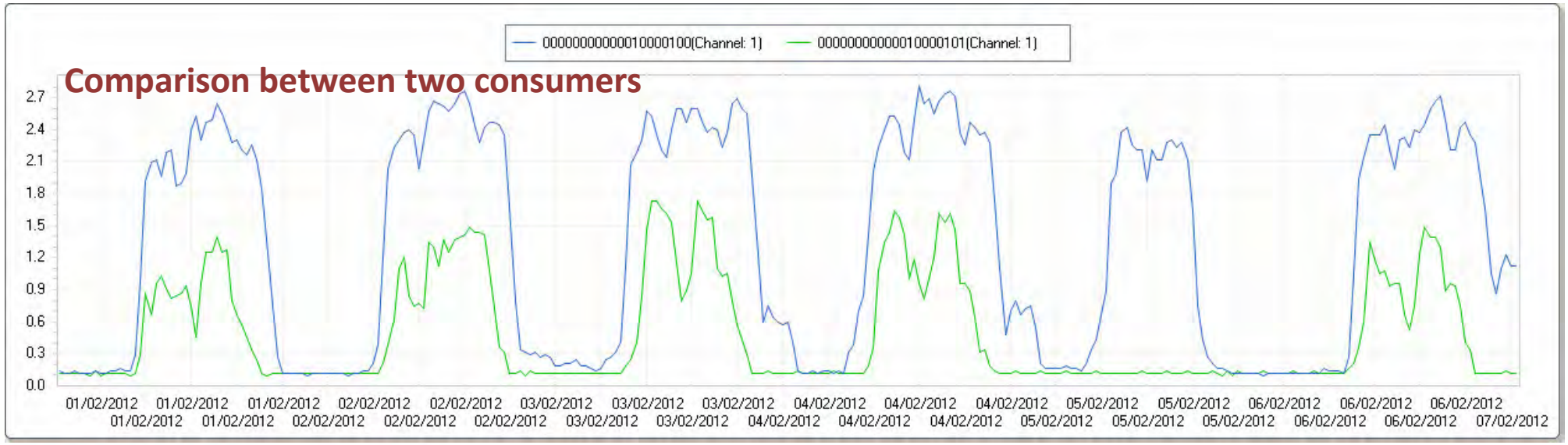
- AMR system has capability for Smart Metering applications viz, on line time of day tariff, remote connect / disconnect, load management etc.
- Customer Portal for load profile analysis
- Able to detect tamper events and outage occurrences, reduction in losses
- User defined data collection period, suitable for Time of Day tariff
- Demand Response Signaling (i.e. Communicating Price Information or Critical Peak Period Signals)
- Provision of Customer Energy Usage Information to In- Home Displays
- Pilot project of Home Area Network (HAN) with Energy Gateway underway

Automatic Meter Reading

Load profile data of a consumer



Comparison between two consumers



Automatic Meter Reading

Plans Ahead

TATA

- Upgrade and build **AMI** on AMR
- Use of Two way communicable Smart meters
- Create capable system to participate in Automated Demand Response Programmes

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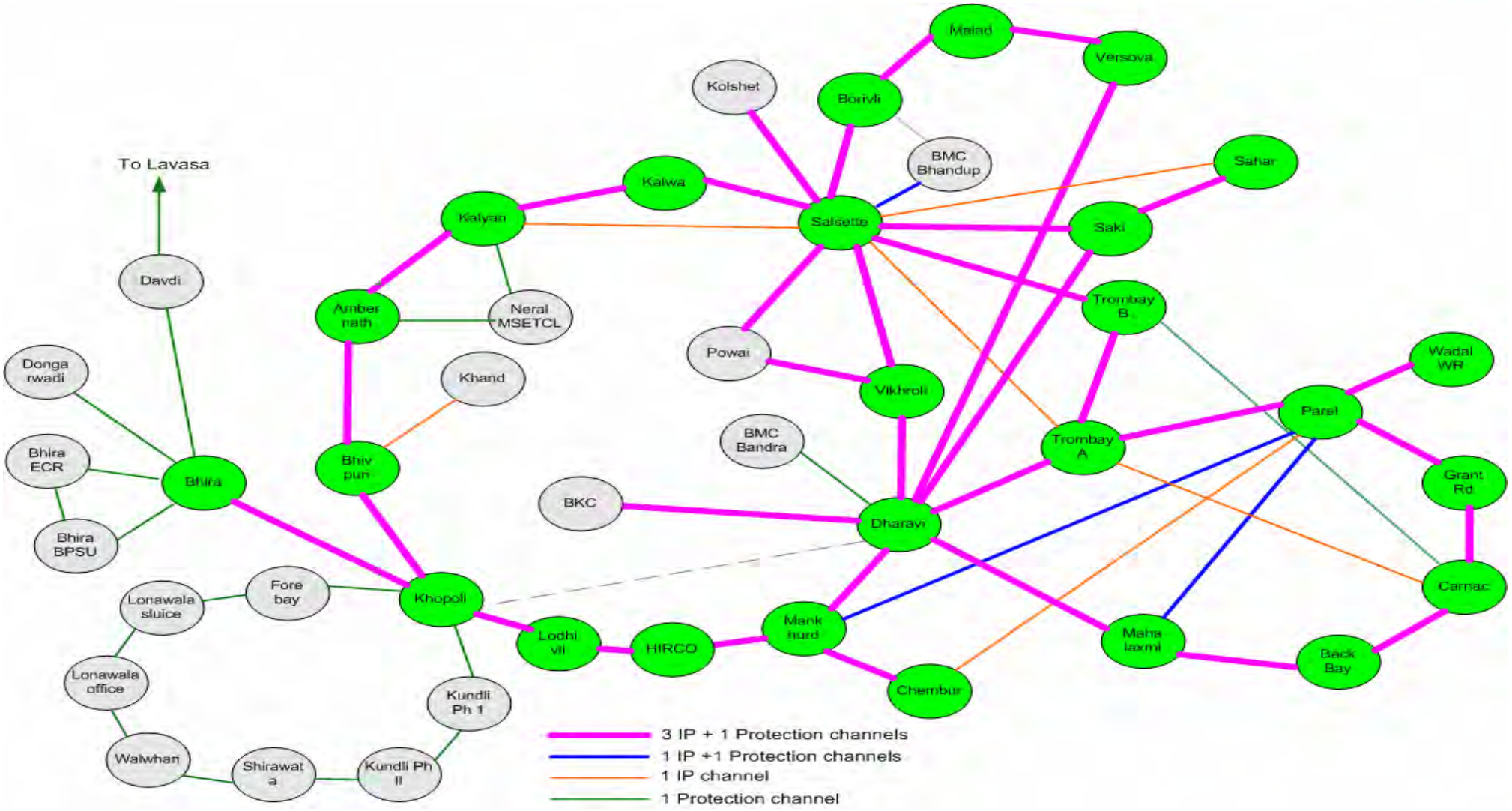
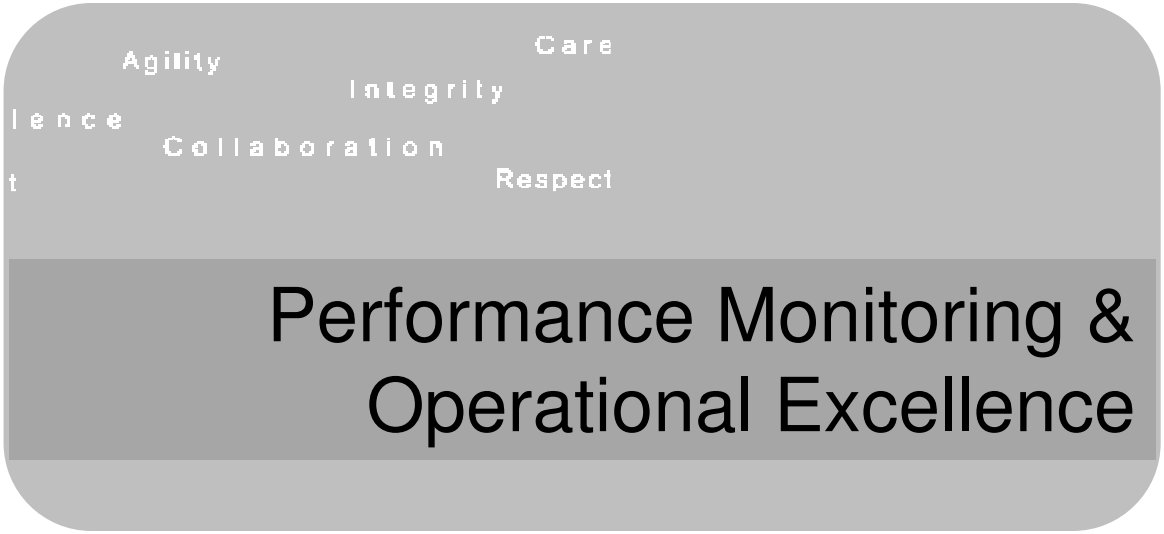
Communication Infrastructure

Communication Infrastructure

- Fibre optic backbone mainly on OPGW
- Multiple optical channels using wavelength division multiplexers
- Four Independent communication networks
  - Tele-protection network - SDH Multiplexers
  - Automation WAN – Layer 3 IP network for control applications
  - IT WAN – Business applications & VOIP
  - Video WAN – Visual monitoring of electrical equipment
- Network Management System

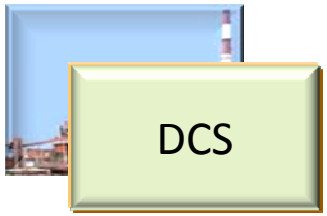
Communication Infrastructure





Performance Monitoring & Operational Excellence

Performance Monitoring & Operational Excellence



DCS

SCADA

Open Systems

OPC Connectivity

Dash Board

Central PI Server

RDBMS Connectivity

SAP Applications

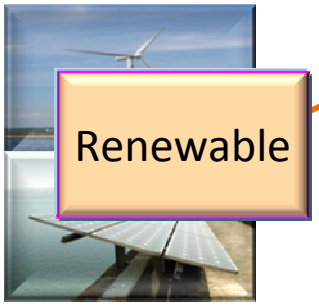
Staging Database/ Oracle

Other Enterprise Applications

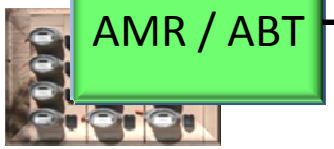
MIS

BSC

Dash Board



Renewable



AMR / ABT

Open Systems

OPC Connectivity

Metering Server (s)

Local Excel / web based applications used by Divisions

OT Systems

IT Systems

Performance Monitoring & Operational Excellence

- On-line data collection from DCS/SCADA using divisional PI server
- Integration of Assets and technologies of various vendors
- Aggregation of data for MIS on Central PI Server
- Integration of Central PI server with Enterprise IT system
- Make & check function for MIS Data flow
- Web based dashboard for real-time and historical data

PI system a single solution for all the MIS worries of the organization

Performance Monitoring & Operational Excellence

TATA POWER

OPMS DASHBOARD

TATA

Home | Performance Dashboard | 30-Oct-12 12:27:30

Trombay | Mundra | Maithon | Jojobera | Jojobera Unit 5 | PH6 | Haldia | Belgaum |

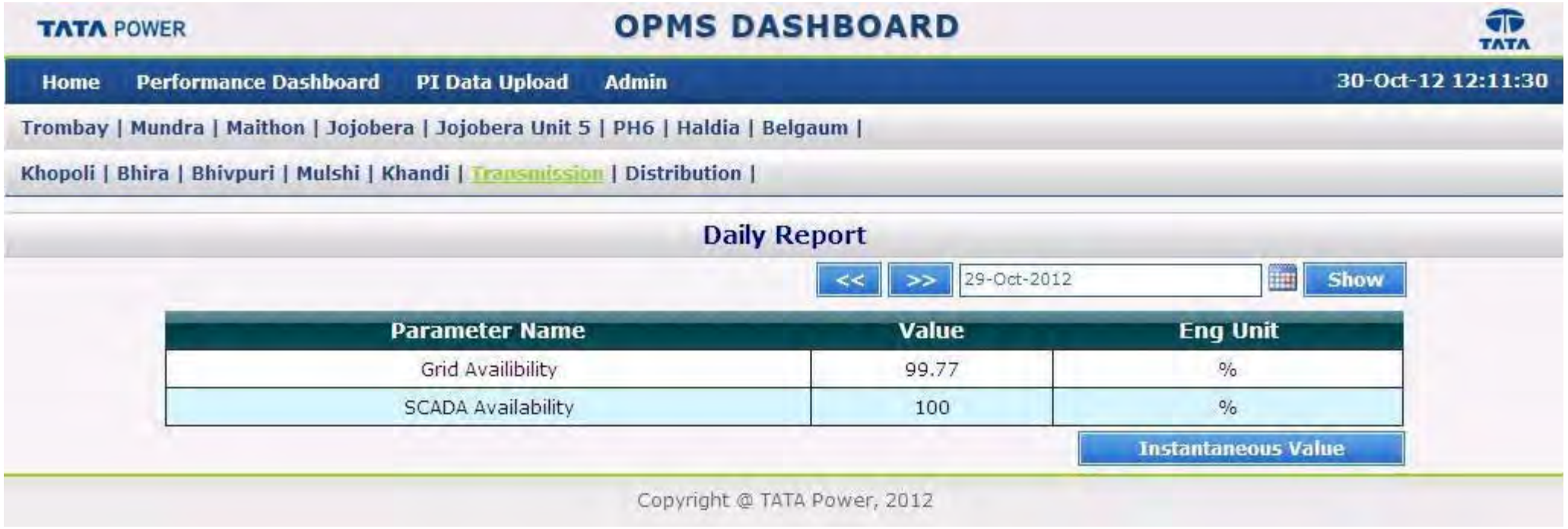
Khopoli | Bhira | Bhivpuri | Mulshi | Khandi | Transmission | Distribution |

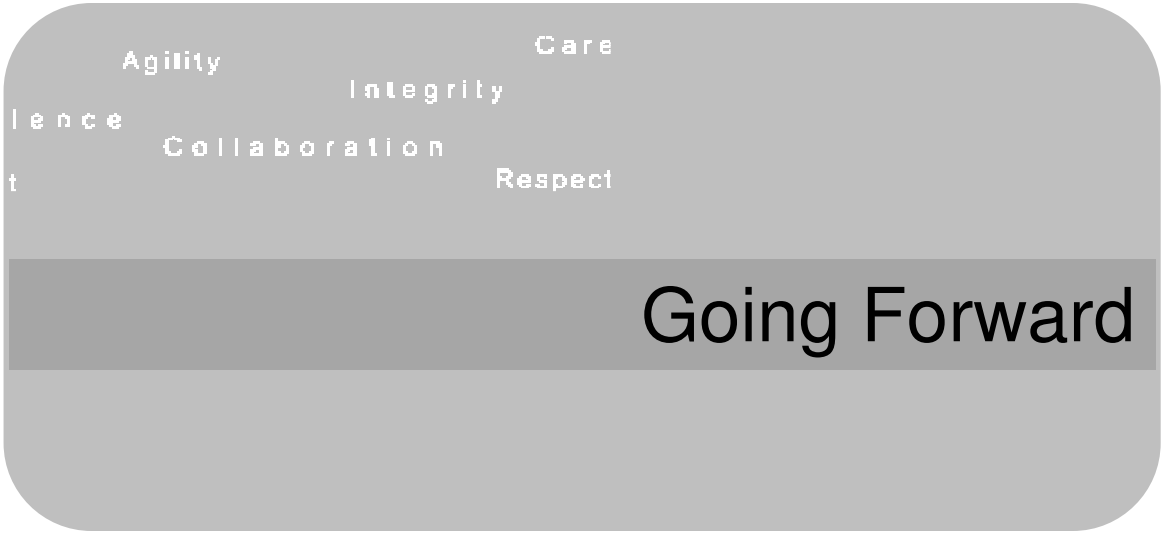
Instantaneous Value

Parameter Name	BEST	REL	MSEB	TPCD-RAIL	TPCD-DIR	Eng Unit
Ambernath Drawal	-	-	34	-	-	MW
Backbay Drawal	126	-	-	-	-	MW
Borivali Drawal	-	464	-	5	22	MW
Carnac Drawal	175	-	-	9	2	MW
Dharavi Drawal	-	#	-	-	#	MW
Grant Road Drawal	71	-	-	-	-	MW
Kalyan Drawal	-	-	69	43	-	MW
Kolshet Drawal	-	-	25	-	-	MW
Mahalakshmi Drawal	124	-	-	21	21	MW
Malad Drawal	-	66	-	7	16	MW
Mankhurd Drawal	-	1	-	1	2	MW
Parel Drawal	107	-	-	1	10	MW
Saki Drawal	-	64	16	-	67	MW
Salsette Drawal	-	-	62	-	13	MW
Versova Drawal	-	54	-	0	16	MW
Vikhroli Drawal	-	77	-	5	34	MW

Daily Report

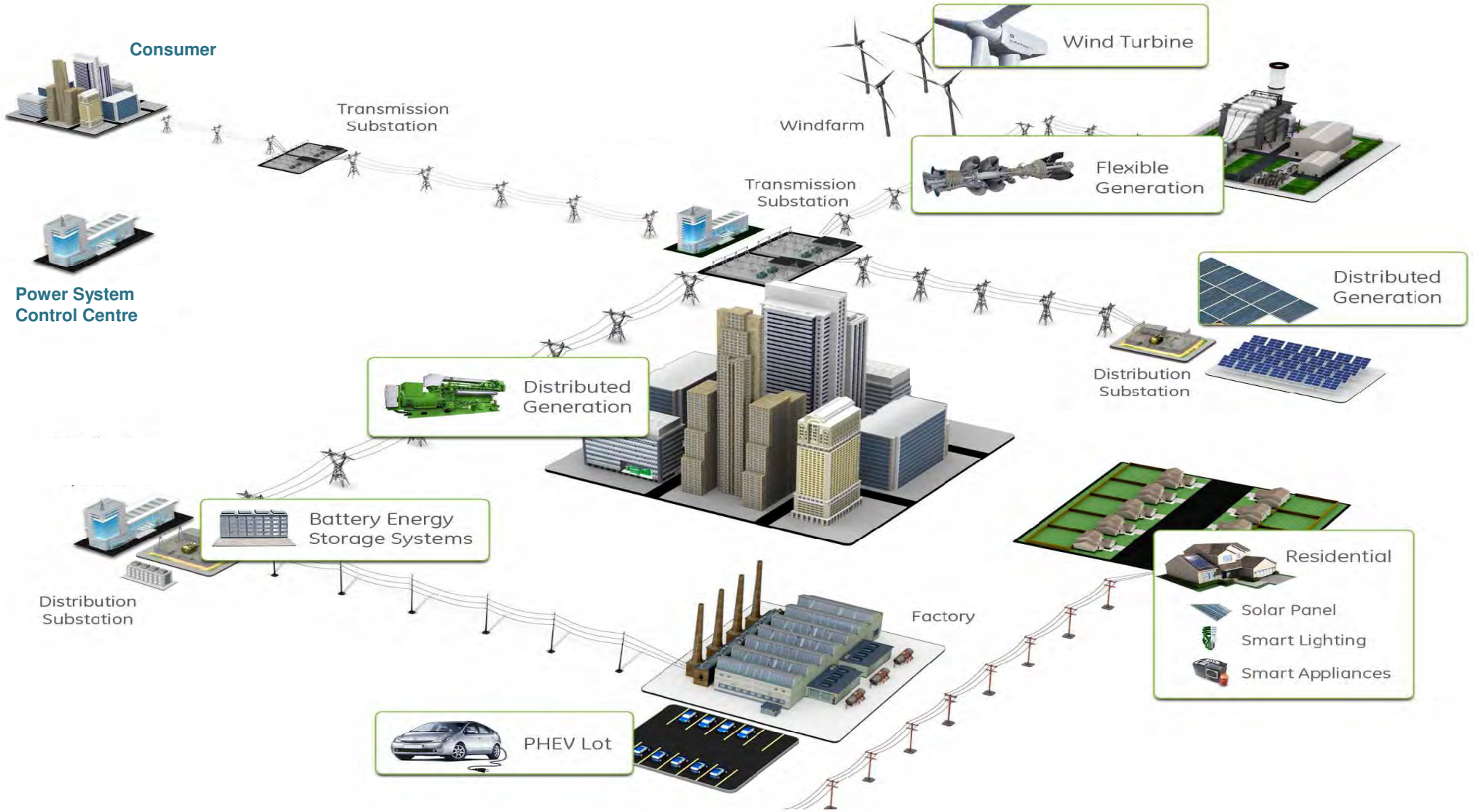
Performance Monitoring & Operational Excellence





Going Forward

The Grid is becoming more complex



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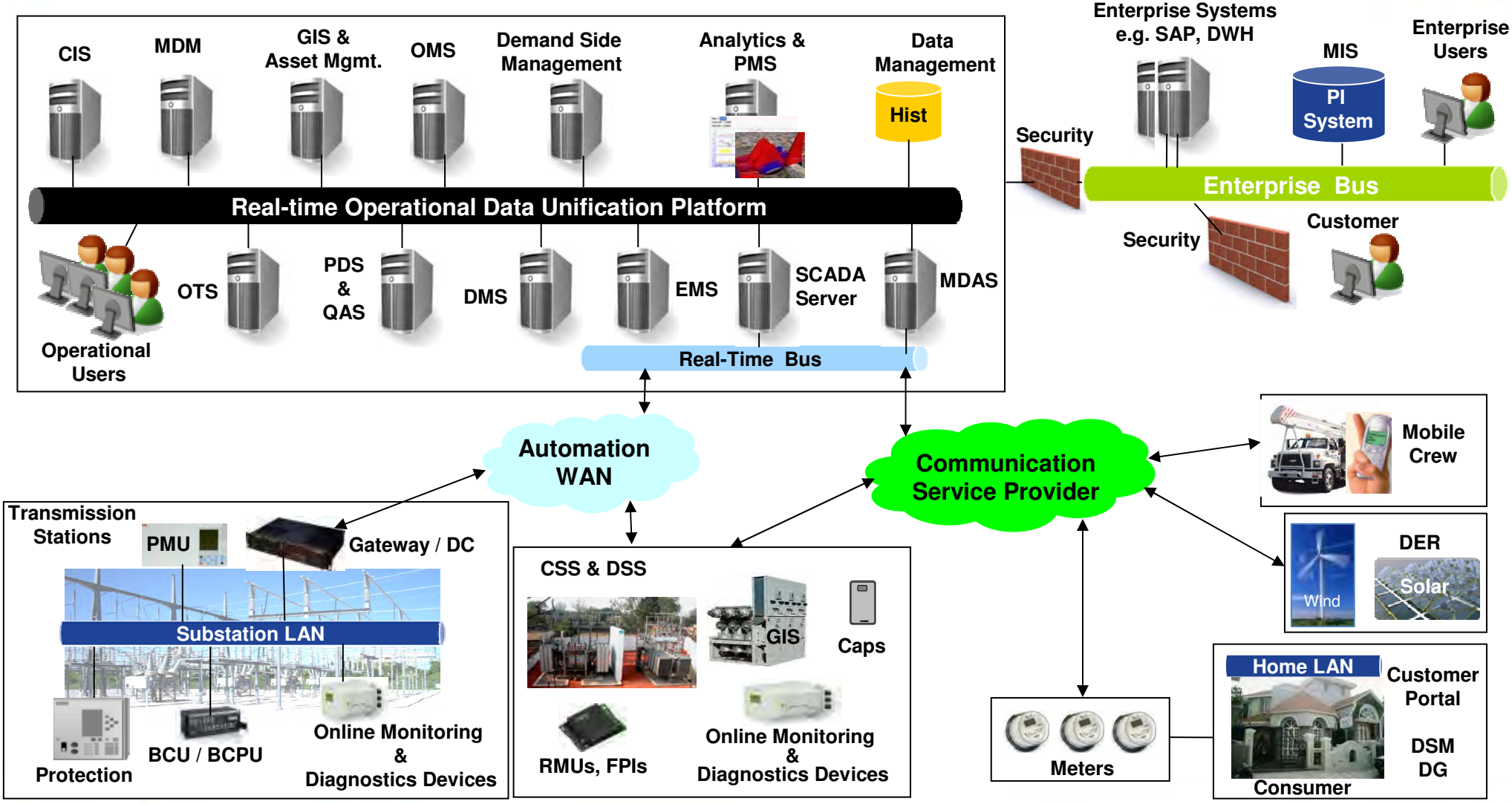
"Seamless control of the energy value chain to deliver clean, affordable and reliable power"

Integrated Automation Architecture



“Journey Continues..
We value your inputs, suggestions and critique.”

We take pride in Lighting up Lives!

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