

Session : **SESSION 4**

PRESENTATION TOPIC

Digitalization of MV Switchgear & Its Installation

Presented By

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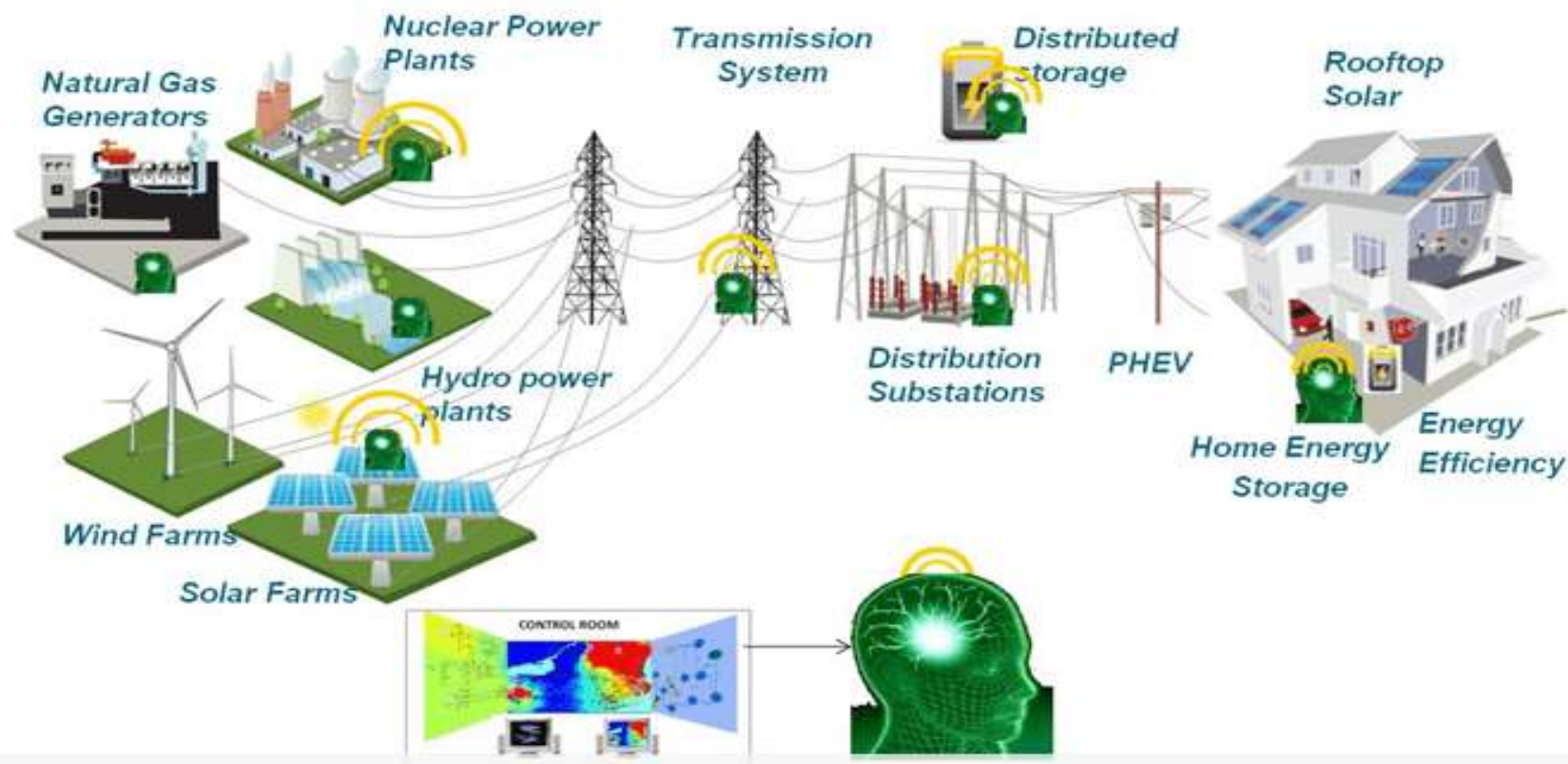
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- **Stelmec Ltd company is manufacturing MV switchgear for past two decades**
- **Stelmec has two plant in outskirts of Mumbai and one is in Ahmedabad**
- **Stelmec Product's ranges are up to 36KV VCB panel of Indoor & outdoor & C&R panels.**
- **Stelmec represent in pan India & exports**
- **Our CCD (customer care Dept.) team is not only provides for post order support but contributes installation & commissioning support including continuous training to the end users.**
- **Our dedicated R&D team works continuously to update & Upgrade the Products & its Technology to meet the customer needs.**

- Digital medium voltage (MV) switchgear adoption is on the rise in Globally & offering significant benefits for manufacturers and industrial setting that helps in the smart management of Power Supply systems to boost efficiency, reliability and safety , energy management, protecting the environment and reducing power bills.
- The intelligent switchgear industry is evolving at a rapid pace with continuous developments in infrastructure and production facilities which play a significant role in the distribution of electricity to industries and residential areas. The adoption of digital medium voltage (MV) switchgear is driven by several key growth drivers, including escalating industry demand, predictive maintenance capabilities, operational and maintenance cost reduction, and enhanced communication capabilities.
- **Thus, smart switchgear takes protection, monitoring and control to the next level, leading to improved efficiency of the installation in which these are deployed.**

Why we need Power System Protection?



Key functions for Digitalization of Switchgear

- Trip Coil in CB that operates by Local/**Remote**
- Close Coil in CB that operates by Local/**Remote**
- Spring Charge Motor operates to make Ready to close the CB
- Aux contacts are to know the status & Control of CB ON or Open
- **Digital Relay & TVM are connected via CT/PT**
- Motor operated Earth switches that can be operated by remote
- In case Draw out CB , Rack-IN-OUT by Motor that can be operated by remote.
- The above equipment's controls are connected to the Relay.
- Finally the **main Digital Relay & TVM** can be connected via IOT or RTU to the control centers in Digital Platform for continuous monitoring & control.
- Some more advanced sensors for Internal Arc, Humidity , Temperatures ,etc. are also can be digitalized to monitor & control
- **Hence Switchgear is Ready to the Digital platform**

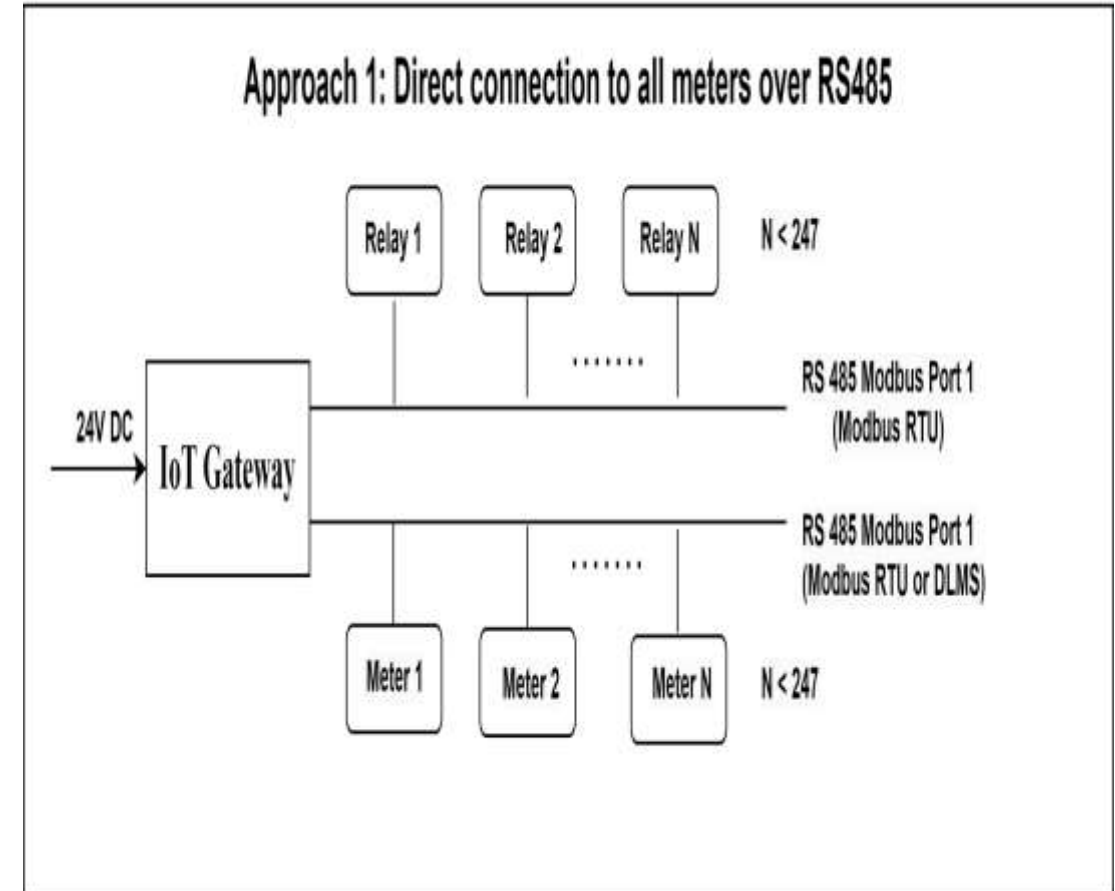
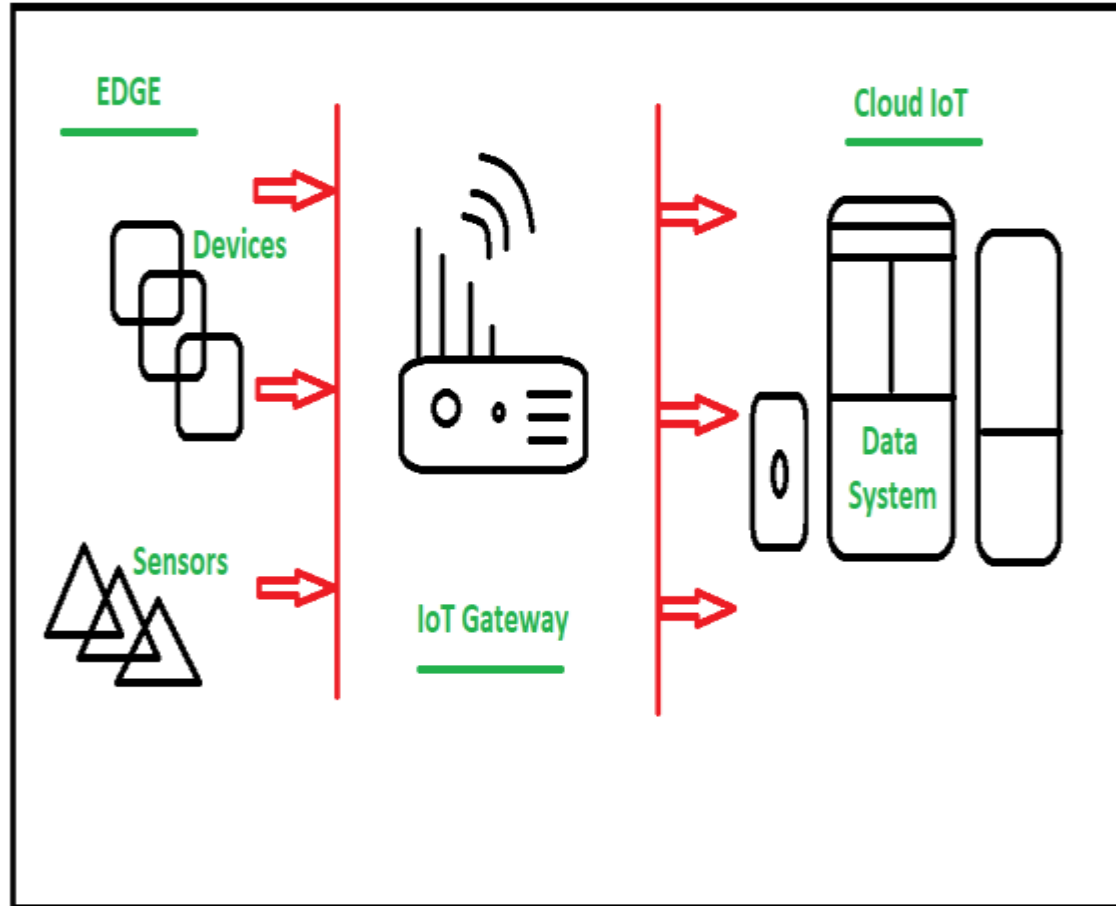
As the distribution network has become highly complicated nowadays, utilities need to look forward to automating substations to enhance their functionality and efficiency and improve power transmission quality.

A remote monitoring and controlling system is thus needed to reduce cost, time, labour and save energy for sustainable development.

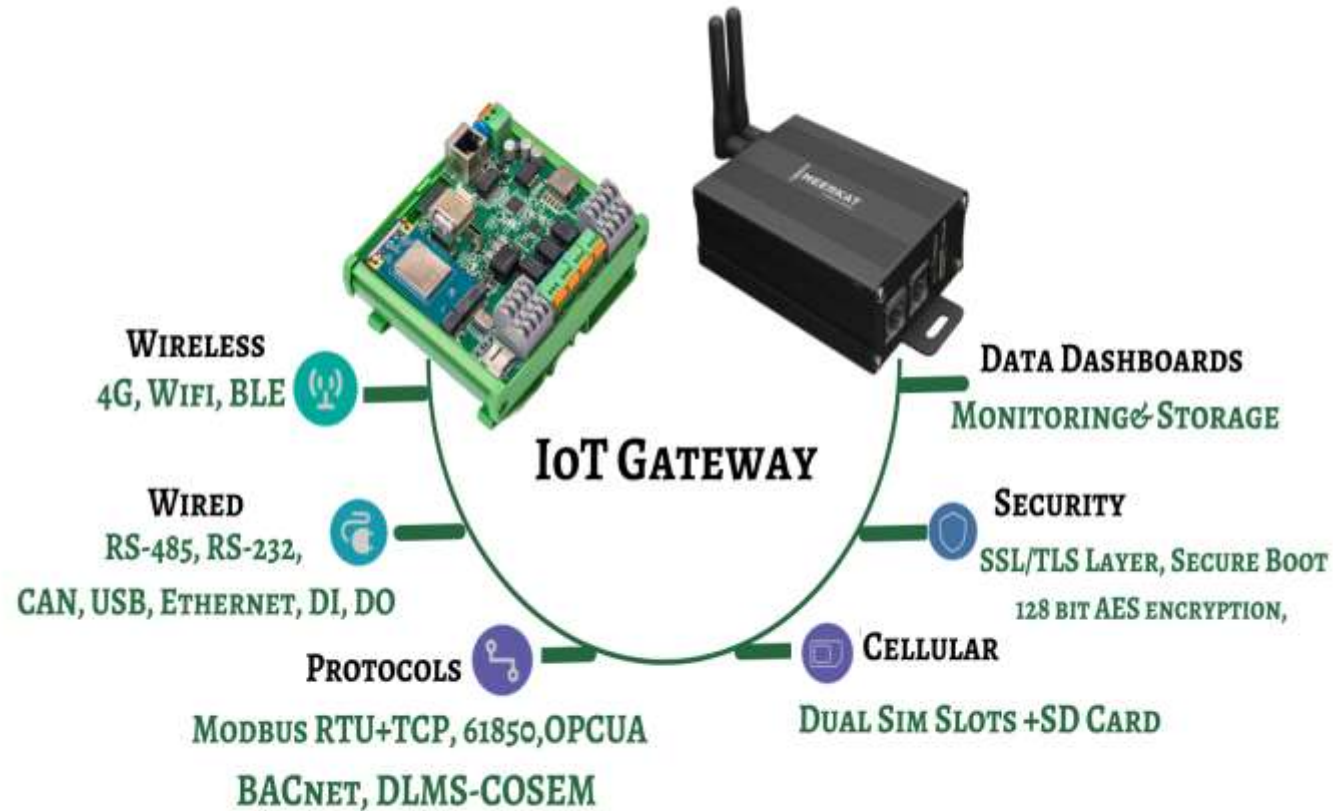
This chapter is based on the application of the Internet of Things (IoT) for substation monitoring and controlling. The monitoring of substations using IoT will assist the distribution network in diagnosing the local faults and displaying them on a web server for remote monitoring and a power station on an LCD. This will help prevent faults and damage to power system equipment from unfavourable conditions and thus maintain the power supply

Benefits of Substation Automation

Improved Reliability ,Increased Safety, Reduced Costs, Sustainability ,etc.

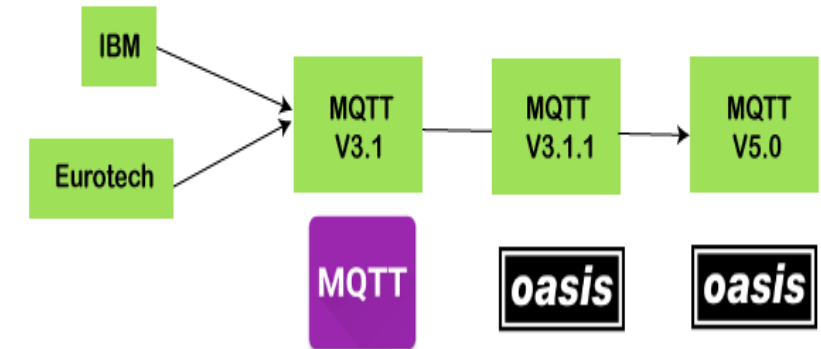


SUBSTATION AUTOMATION WITH IOT GATEWAYS



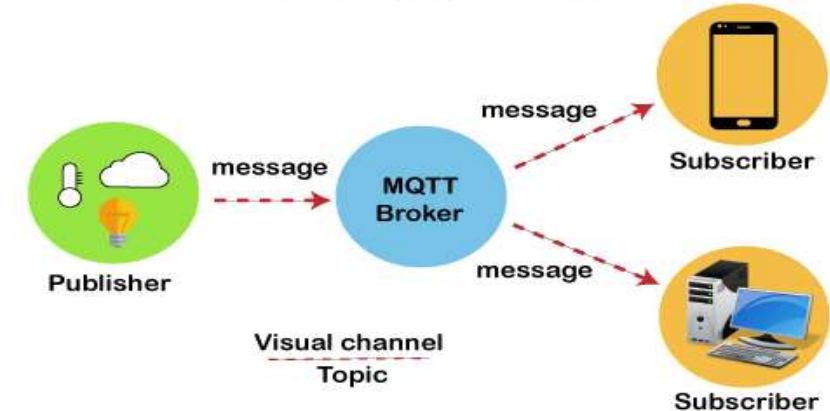
History of MQTT

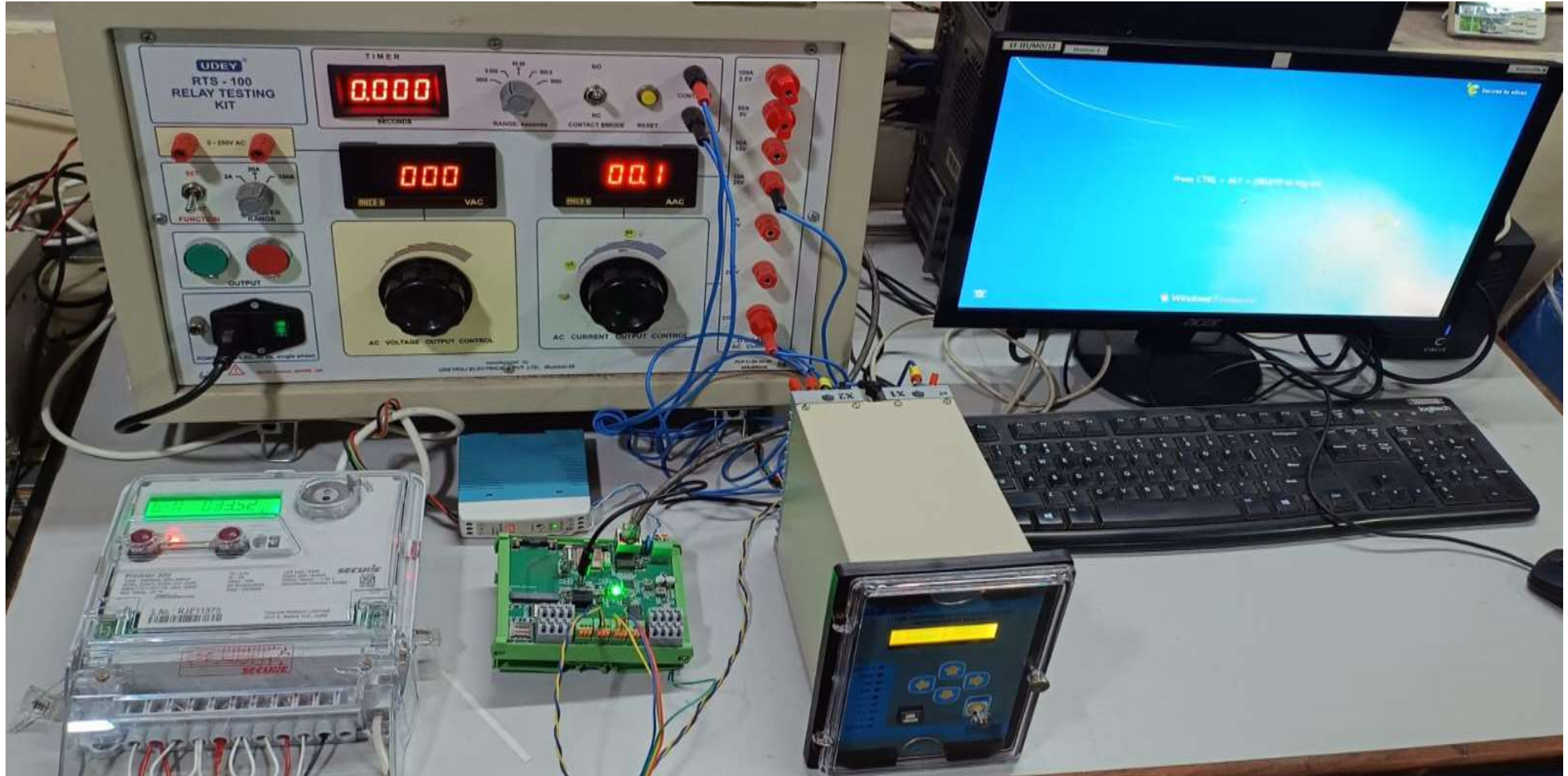
Brief Story of MQTT



Architecture of MQTT

MQTT Architecture





SCADA Substation & Automation in MV Switchgear

- Explore the integration of SCADA (Supervisory Control and Data Acquisition) systems and automation within medium voltage (MV) electrical switchgear, revolutionizing power grid management and enhancing reliability, efficiency, and safety.

Introduction to SCADA Systems

- Real-time Monitoring, Data Acquisition, Remote Control, Enhanced Security, etc.

The 3 main components of SCADA systems

- 1) Remote Terminal Units (RTUs) ,2) Programmable Logic Controllers (PLCs): ,3) Human-Machine Interface (HMI):

Importance of Automation in Switchgear

- Increased Reliability, Improved Efficiency, Enhanced Safety, etc.

Future Trends and Innovations

Cloud-based SCADA

Leveraging the cloud for scalable, cost-effective, and secure SCADA deployments.

AI-powered Analytics

Utilizing machine learning and artificial intelligence for predictive maintenance and optimization.

IoT Integration

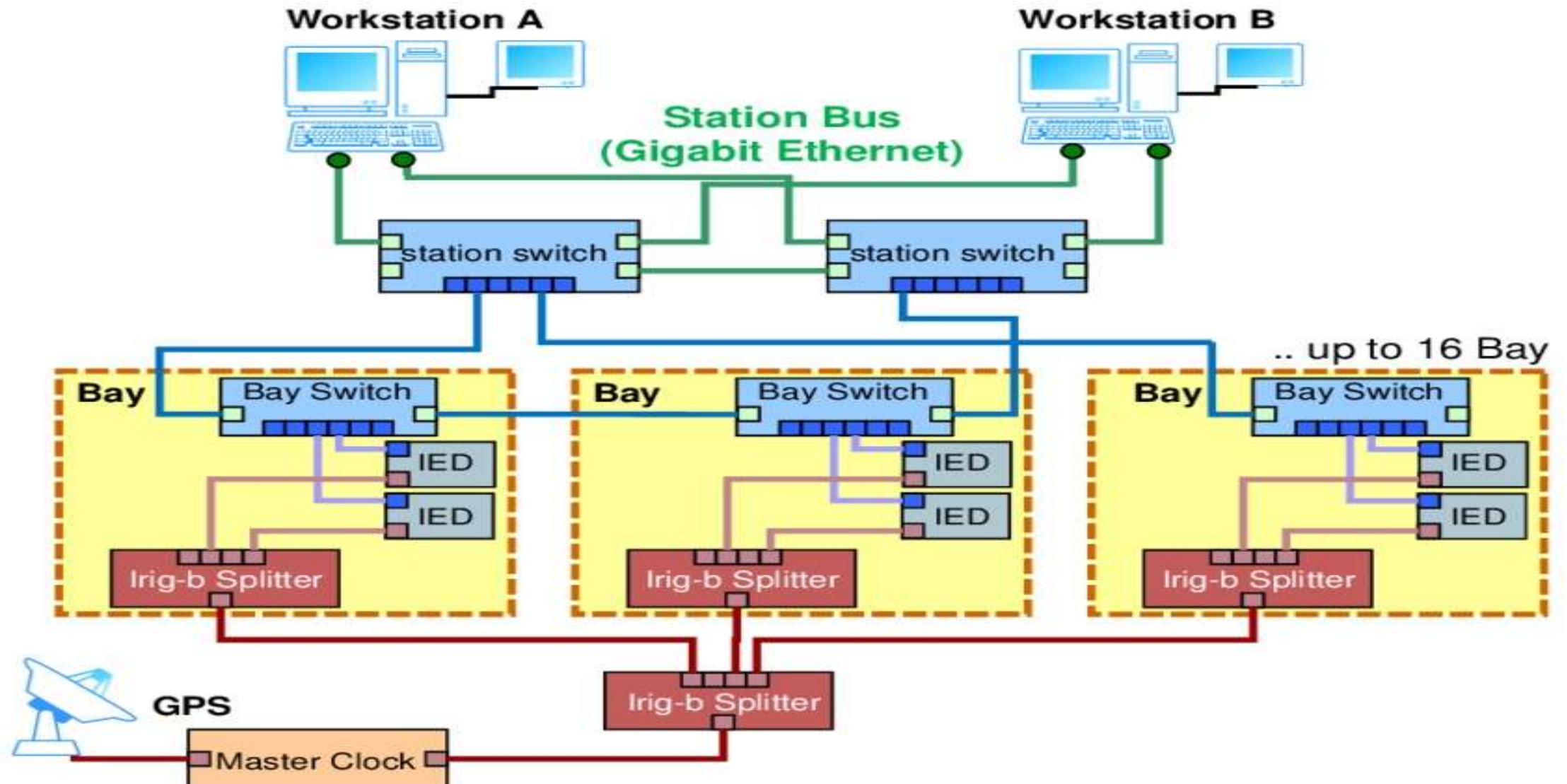
Integrating IoT devices to enhance data collection and enable smart grid applications.

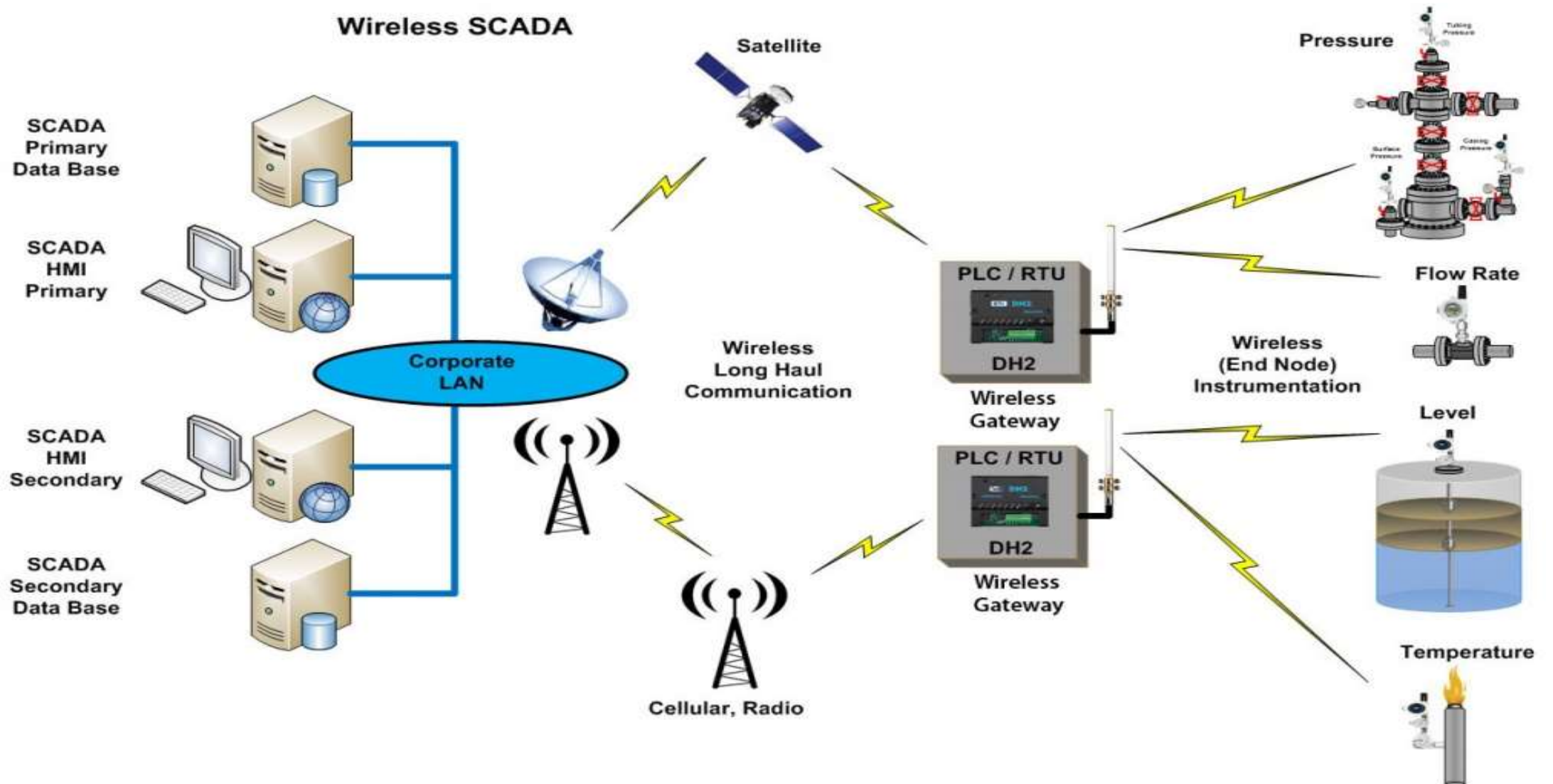
AR/VR Visualization

Leveraging augmented and virtual reality for improved situational awareness and remote operations.

IEC 61850 Relay and its SCADA Operation

IEC 61850 is a critical standard for substation automation, enabling seamless communication between intelligent electronic devices (IEDs) like protective relays and SCADA systems..





Digital substations represent a transformative shift in power grid management, offering enhanced efficiency, reliability, and resilience. As the industry continues to evolve, further advancements in artificial intelligence, IoT, and renewable energy integration will shape the future of these intelligent substations.

Digital switchgear revolutionizes how power is managed and distributed in three key areas: electrical distribution and control, protection and fault management, monitoring, data acquisition, and standards. As the industry focuses on advanced solutions, digital MV switchgear is gaining prominence, replacing conventional ones.

IoT-based substation automation represents a transformative shift in the management of electrical infrastructure. As technology continues to evolve, we can expect further advancements in areas like autonomous control, self-healing grids, and integrated renewable energy solutions, ultimately driving a more resilient and efficient power grid.

Instrument transformers are the foundation for digitalization in MV switchgear, providing the critical data inputs to unlock the full potential of smart grid technologies. As digitalization continues to evolve, the role of these transformers will only become more essential.

As the power industry continues to evolve towards a more intelligent, connected, and sustainable grid, the **IEC 61850 standard** will play an increasingly crucial role in enabling seamless integration between **IEDs, SCADA systems**, and advanced analytics. This will drive improved reliability, efficiency, and cyber security in electrical substations and power networks.

As the power industry continues to evolve towards a more intelligent, connected, and sustainable grid, the IEC 61850 standard will play an increasingly crucial role in enabling seamless integration between IEDs, SCADA systems, and advanced analytics. This will drive improved reliability, efficiency, and cyber security in electrical substations and power networks.



THANK YOU

For discussions/suggestions/queries email: dum@indiasmartgrid.org

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[Links/References \(If any\)](#)

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Area of Debate in customer's Specification.

- Current Transformer Rating
- Voltage Transformer Rating
- Numerical Relay Rating
- Switchgear Panel IA rating
- Bushing CT & Cable CT

Though it seems to be minor but cost of the components added in totality of switchgear and we shall see the causes of the same in the next slides.

MQTT in Action

MQTT is used in a wide variety of industries

Automotive



Logistics



Manufacturing



Smart Home



Consumer Products



Transportation



Energy

EMQ helps IoT innovation in the [petrochemical industry](#) [Energy company](#) maximizing MQTT for control
MQTT implementation on Celikler Holding's [power plant monitoring](#)

**12 KV Indoor
VCB panel**



12 /36 KV Outdoor VCB Kiosk



12/36 KV PCVCB



12KV RMU



Ring Type CT



Wound Type CT



Voltage Transformer



CBCT



CT Sensor



Rowoski CT



Combined CT/PT
sensor



PT sensor





Ullaria, Ahmedabad, Gujarat

Land Area: 1,49,895 sqft

Factory Area: 52,619 sqft

Products Manufactured: AIS, GIS, Kiosk & Compact Sub-stn.

Key Certifications: ISO 9001:2015, ISO 14001:2015, OHSAS 18001:2007

Highlights:

- Strong in-house manufacturing setup
- Complete in-house Test setup
- Dedicated R&D Team and Facility



Usgaon, Thane, Maharashtra

Land Area: 1,63,000 sqft

Factory Area: 40,000 sqft

Products Manufactured: Outdoor VCB, CRPs, RMU and Auto Recloser

Key Certifications: ISO 9001:2015, ISO 14001:2015, OHSAS 18001:2007

Highlights:

- Strong in-house manufacturing setup
- Complete in-house Test setup
- Dedicated R&D Team and Facility



Sativali, Thane, Maharashtra

Land Area: 24,000 sqft

Factory Area: 7,000 sqft

Products Manufactured: Relays, VI & Meters

Key Certifications: ISO 9001:2015, ISO 14001:2015, ISO27001:2022

Highlights:

- Strong in-house manufacturing setup
- Complete in-house Test setup
- Dedicated R&D Teams and Facility



Unit – I [Ahmedabad]

Lean line assembly of
Medium Voltage Indoor
Panels



Unit – II
[Usgaon, Mumbai]

Final assembly of
CRPs



Unit – I [Ahmedabad]

Lean line assembly of
Medium Voltage VCB
Kiosks



Unit – III
Sativali, Mumbai]

Relay Assembly
Plant