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India Smart Grid Forum

India SMART UTILITY Week 2025

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CENTRAL ELECTRICITY AUTHORITY

Session - 1 : Emerging Smart Energy Technologies and Standardization Landscape

PRESENTATION TOPIC

Presented By

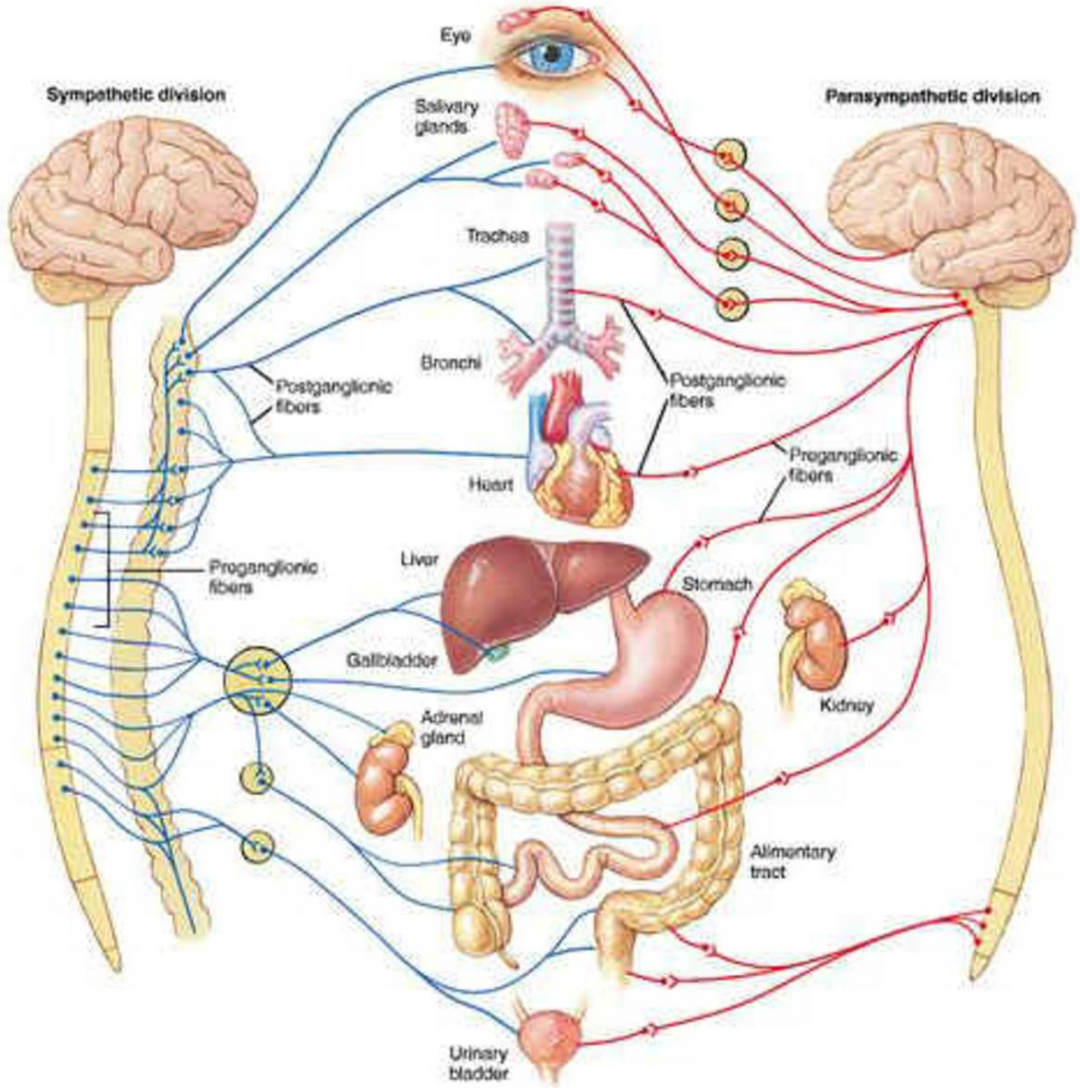
Amarjeet Kumar, Founder – CEO, Comminent Pvt Ltd

Content

- **Importance of Communication system and Cyber security**
- **IEEE 1547.3 for DER Cybersecurity.**
- **IEEE 2857 for Large Scale IoT Network.**

Importance of Communication system and Cyber security

- Two-way communication
- Real-time monitoring, control and configuration
- Optimized performance
- Cyber threat protection



IEEE 1547.3 for DER Cybersecurity

IEEE Guide for Cybersecurity of Distributed Energy Resources Interconnected with Electric Power Systems

IEEE1547-2018 Interoperability requirements
- Data Exchange between many DER stakeholders

No history of risk assessments for:
- New DER technology
- Equipment in sites with minimal security

No cross-organizational security agreements

Common vulnerabilities risk simultaneous disconnection of generation

Confidence Impacts- DER can't be relied on

Financial Impacts

No DER is currently held to any cybersecurity standard.

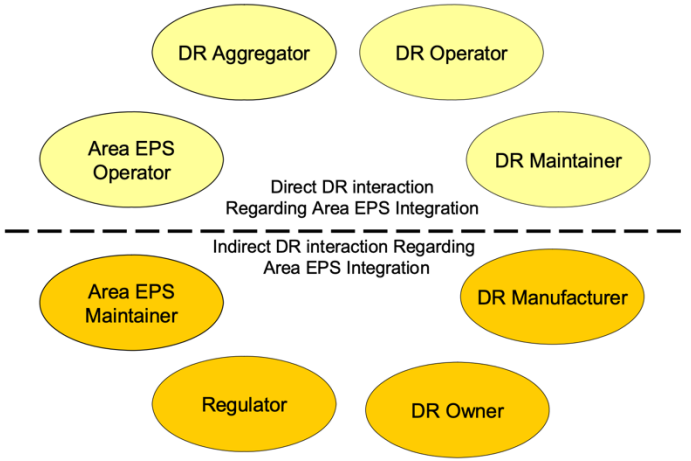


Figure 2—Stakeholder roles relevant to DR interconnection

Testing and Commissioning for Cybersecurity and Conformance with the IEEE 1547.3 Recommendation.

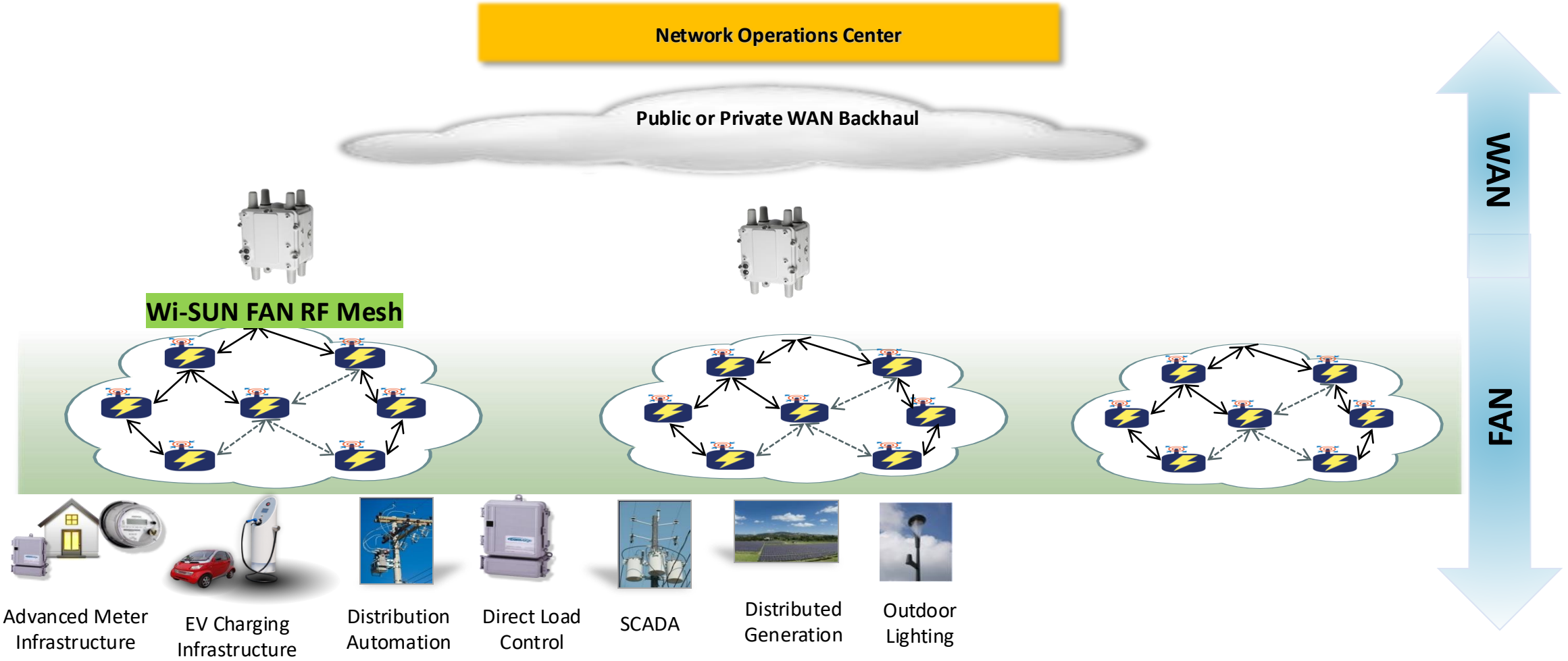
- IEEE1547.3 provides an objective means for evaluating the effectiveness of cybersecurity controls, identifying weaknesses and vulnerabilities in the system
- It also provides a means for evaluating the cybersecurity posture of the target system
- The testing recommendations apply to individual DER and as well as the networks they reside in.
- IEEE1547.3 recommends this testing recommendations should be viewed as a risk mitigation activity and that it should be integrated with overall cybersecurity risk management framework
- It provides testing recommendations for the lifecycle DER device such as manufacturing, commissioning, and system deployment, and all the way to continuous testing after installation.

IEEE 2857 for Large Scale IoT Network

- Wi-SUN FAN specification has been a system level standards uniting all SDO's across the globe.
- Initially developed by the industry leader under Wi-SUN Alliance umbrella and later adopted by IEEE as IEEE 2857.
- Later adopted by many national SDO's across globe including BIS as one of Indian national standard (IS 18010-4-1).
- Also currently the standard is under discussion on IEC/ISO for adoption.
- Wi-SUN Alliance have also announced the Certification program for Indian Spectrum (865-868MHz) with first set of certified products from Comminent, Silicon labs and Renesas.

IEEE 2857 for Large Scale IoT Network

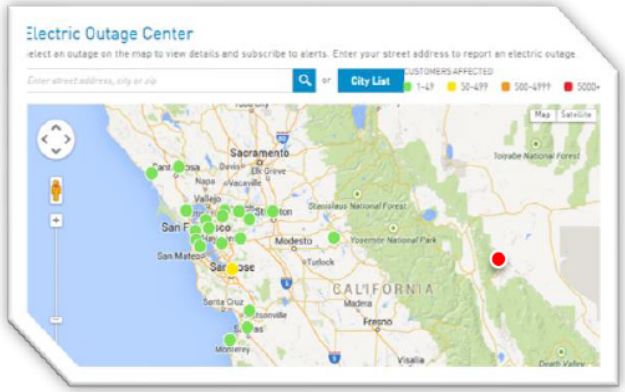
What is Wi-SUN FAN/IEEE 2857/IS 18010-4-1.



AMI-BASED OUTAGE MANAGEMENT

Description

PG&E uses its 5.3M meter AMI infrastructure to better manage outages



- AMI detects areas affected by outages
- Meter "pings" determine whether power is on before a truck is dispatched
- Results in quicker and more accurate restorations

Annual benefits reported[1]

$3.9M	*Costs avoided with more intelligent infrastructure modernization and replacement*
$2.5M	*Costs avoided by using smart meter outage information*
22,500	*Truck rolls avoided by using smart meter outage information*

[1] PG&E's 2017 Annual Smart Grid report

CONSISTENT, RAPID STORM RESTORATION

Hurricane Hermine & Matthew. September & October 2016.

Description

- Destructive hurricanes cause widespread outages in FL
- AMI meters and Fault Indicators quickly identify where faults have occurred, expediting power restoration
- Automated Feeder Switches reroute electricity around faults, preventing customer outages

Meteorological Map of Hurricane Hermine over Florida

"..leveraging technology and the benefits of our 4.8 million smart meters, have resulted in one of the most advanced smart grids in the nation. In short, these investments helped reduce the number of outages our customers experienced during Hurricane Hermine..."[1]

- Eric Silagy, President and CEO of FPL

Results

99% — *Of 1.3M customer outages restored within 48 hours[1,2]*

143,000 — *Customers avoided losing power due to automated switching[1,2]*

< 3 hours — *Average customer outage duration during Hermine[2]*

Davies' Consulting Award for Leadership in Emergency Response[2]

[1] FPL press release, [2] FPL press release

FIGHTING BACK ELECTRICITY THEFT

BC Hydro

Description

- By 2011, it was estimated that 52% of the growers were stealing power across BC Hydro's service territory, more than double the figure from the previous decade.
- Grow-ups, 95% of which were run by organized crime, also had 5x higher fire risk compared to a normal home
- BC Hydro leveraged Itron's real-time IPv6 smart grid platform and a 3rd party analytics tool to pinpoint where theft was occurring across its 2M electric customers

Marijuana grow-ops were gutting homes and installing high wattage bulbs, dehumidifiers, cooling and other equipment, increasing the fire risk

Benefits reported

$80M *Annual avoided theft*

< 1 Yr *Payback time of the entire theft program*

Source: Forbes

Wi-SUN FAN/IEEE 2857/IS 18010-4-1 global use cases

INTEROPERABILITY STRATEGY FOR AN AMI DEPLOYMENT IN THE US

IBERDROLA AVANGRID EPRI ELECTRIC POWER RESEARCH INSTITUTE

Introduction

Although most AMI systems and devices comply with some standards, **interoperability in the current US market largely remains an unrealized goal**. However, the paper presents a strategy, facilitated through the existing work performed by standards organizations and industry alliances, to **deploy and interoperable AMI solution in the US**, accelerating the digitization of the grid in a cost effective way.

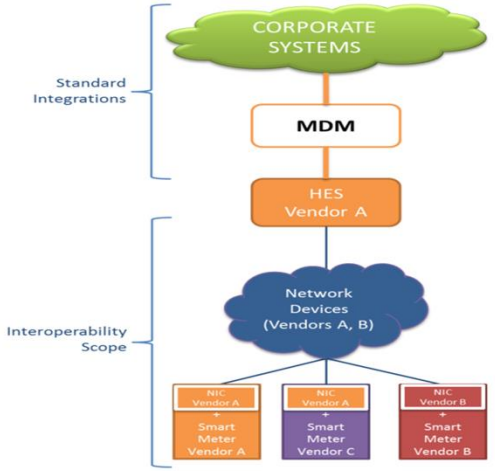


Figure 1 – Interoperable AMI Architecture

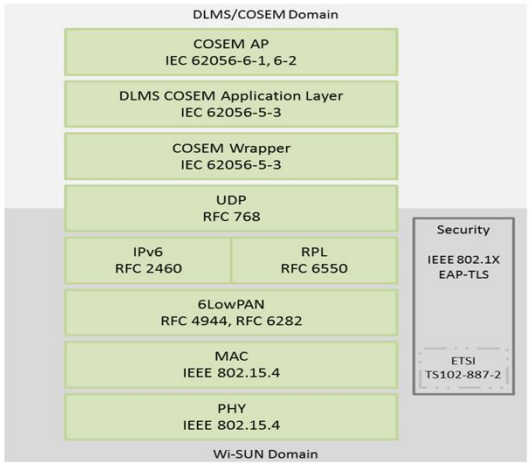


Figure 2 – Protocol Stack

Major Benefits of interoperability for Utilitites

Reduced risk of single vendor dependency	Accelerate development of new use cases and applications	Influence system enhancements and technological evolution
Allow the use of open and flexible platforms for field operations	Expand knowledge and control of the solution	Increase control of Cyber Security strategy

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THANK YOU

For discussions/suggestions/queries email: isuw@isuw.in

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Links/References (If any)