Speaker Bios and Presentations

August 10, 2021

Regulator's Financial Toolbox: Communications Networks

The Regulators' Financial Toolbox series is where technology meets bookkeeping. On the Communications Networks Toolbox webinar, regulators will hear multiple perspectives on how communications networks work; what is unique about distribution system and grid edge communications vis a vis the distribution system and bulk power system communications; what their benefits are to the electricity system; and considerations specifically for regulators. Like many things, the perfect communications solution will be up to the jurisdiction, but this webinar will provide a framework for making decisions and help regulators be prepared to engage with utilities on this thorny issue.

Moderator: Gladys Brown-Dutrieuille, Pennsylvania PUC

Speakers
Andrew Bordine (Anterix)
Paul De Martini (Newport Consulting Group)
Wendell Reimer (Xcel Energy)
Jonathan Schrag (Taconic Advisory Services, LLC)

All webinar and Toolbox materials will be posted to https://www.naruc.org/cpi-1/electricity-system-transition/valuation-and-ratemaking/

Commissioner Gladys Brown Dutrieuille

Gladys Brown Dutrieuille is now serving her second term as a Commissioner for the Public Utility Commission, after being nominated by Gov. Tom Wolf on Feb. 13, 2018, and unanimously confirmed by the Pennsylvania Senate on April 17, 2018. Her term expires April 1, 2023. She began her service at the PUC in 2013, and was first appointed as Chairman of the Commission in 2015. On April 15, 2019, Gov. Tom Wolf reappointed her as Chairman.

Chairman Dutrieuille has pledged to use the same fair and balanced approach in dealing with PUC issues that she used in her more than 22 years as an aide in the Pennsylvania Senate. She highlighted the importance of the Commissions work to educate consumers, enhance the safety and reliability of utility services and explore innovations for the future.

Andrew Bordine

With two decades of experience designing, planning and leading electric system programs and software architecture, Andrew Bordine currently serves as Vice President of Energy Markets and Innovation for Anterix. In this role, he directs ongoing efforts to leverage wireless telecommunication networks to the benefit of utility providers within the energy sector while providing customer value. His position also involves partnering closely with State and Federal Regulators nationwide on critical infrastructure deployments.

Prior to his current role, Andrew was the Executive Director of Grid Infrastructure for Michigan's largest utility, Consumers Energy. As part of this role, he started the company's Grid Modernization program and oversaw system design, standard development, and device deployments across the company's service territory. While leading storm operations as the Statewide Incident Commander, Bordine implemented lean principles to deliver more efficient and effective crew and system response. During his tenure in IT Enterprise Architecture, his primary focus was on grid devices and controls systems that would enable an interactive future grid.

Bordine has been named as a Public Utility Fortnightly top 40 innovator, has held an appointment on the Unmanned Aerial Systems task force for the Governor and the State of Michigan drafting and filing state policy, was a member of the Department of Energy's DSPx and has served as a lead witness in utility electric rate cases. He served as the Utility Chair for EPRI's Photovoltaic working group that researched solar inverter design and communications technology for use on distribution systems.

He holds a Bachelor of Science in Electrical Engineering from Kettering University and a MBA from Baker College.

Paul De Martini
Managing partner, Newport Consulting

Paul De Martini is a leading expert on the business, policy and technology dimensions of a more distributed and resilient power system. His consulting practice includes supporting utility, market operator, regulatory and government clients worldwide. He has authored and co-authored several seminal reports that have been widely cited, including several DOE reports including the DSPx Modern Distribution Grid Report, Integrated Distribution Planning and Transmission-Distribution Operational Coordination. He was a member of the National Academies committee on T&D Resilience.

Paul has over 40 years of electric industry experience including as the Chief Strategy & Technology Officer for Cisco System's energy business unit, Vice President, T&D Advanced Technology at Southern California Edison and T&D operational and engineering management roles at PG&E. Paul is a senior member of IEEE and California state certified electric system operator.

Wendall Reimer

Wendall Reimer is the director of delivery Agis portfolio at Xcel energy with over a decade of experience at Xcel and a background in information security. Xcel Energy Inc. is a utility holding company based in Minneapolis, Minnesota, serving more than 3.7 million electric customers and 2.1

million natural gas customers in Minnesota, Michigan, Wisconsin, North Dakota, South Dakota, Colorado, Texas, and New Mexico in 2019.

Jonathan Schrag

Jonathan Schrag specializes in regulatory strategy and innovation for the electric and gas industries as a Principal at Taconic Advisory Services, LLC. Jonathan Schrag most recently served as the Deputy Administrator at the Rhode Island Division of Public Utilities and Carriers (DPUC). Previously, Schrag was the Senior Director of the Clean Energy Idea Bank at the Environmental Defense Fund. The EDF Clean Energy Idea Bank is "an internal think tank, analytics team, and strategic planning hub."

Before joining the EDF, Schrag was a Senior Fellow in Energy at the Guarini Center on Environmental, Energy and Land Use Law, based out of New York University. He has also held positions at the Connecticut Department of Energy and Environmental Protection, the Regional Greenhouse Gas Initiative, the New York Association for Energy and Economics, and the Columbia University Lenfest Center for Sustainable Energy, among other distinguished roles throughout his accomplished career.

Regulators' Financial Toolbox: Communications Network for DER Integration

TUESDAY, AUGUST 10, 2021

NARUC CENTER FOR PARTNERSHIPS AND INNOVATION

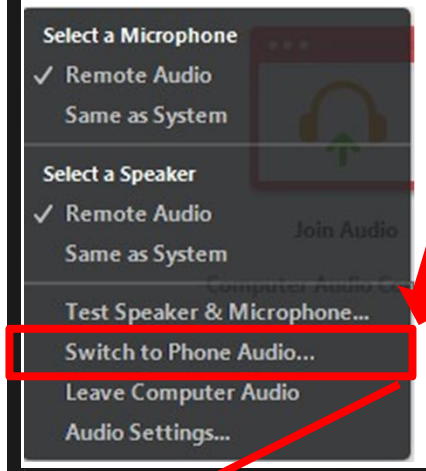
Recording

Zoom Webinar 101

If you have audio issues, dial in using your phone. You can find dial in information with a unique pin here.

Click **Chat** to show the chat window.

Click **Q&A** to type a question during Q&A sessions.



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Regulators' Financial Toolbox: Communications Network for DER Integration

TUESDAY, AUGUST 10, 2021

NARUC CENTER FOR PARTNERSHIPS AND INNOVATION

NARUC
Center for Partnership and Innovation (CPI)

https://www.naruc.org/cpi-1/electricity-system-transition/valuation-and-ratemaking/

NARUC

The National Association of Regulatory Utility Commissioners (NARUC) is a non-profit organization founded in 1889.

Our Members are the state regulatory Commissioners in all 50 states & the territories. FERC & FCC Commissioners are also members. NARUC has Associate Members in over 20 other countries.

NARUC member agencies regulate electricity, natural gas, telecommunications, and water utilities.

CPI

Grant-funded team dedicated to providing technical assistance to members.

CPI identified emerging challenges and connects state commissions with expertise and strategies.

CPI builds relationships, develops resources, and delivers trainings.

CPI thanks the US Department of Energy for support in today's session.

NARUC CPI Regulators Toolbox Series

https://www.naruc.org/cpi-1/electricity-system-transition/valuation-and-ratemaking/

The Regulator's Financial Toolbox series examines regulatory issues where technology meets bookkeeping.

During the Communications Networks Toolbox webinar, regulators will hear multiple perspectives on how communications networks work; what is unique about distribution system and grid edge communications vis a vis the distribution system and bulk power system communications; what their benefits are to the electricity system; and considerations specifically for regulators. Like many things, the perfect communications solution will be up to the jurisdiction, but this webinar will provide a framework for making decisions and help regulators be prepared to engage with utilities on this thorny issue.

After the webinar, the recording and a summary brief will be posted on the CPI website, www.naruc.org/cpi-1. Presentations are available now.

SERIES TOPICS

- ✓ Cloud Computing (Fall 2020)
- ✓ AMI (Spring 2021)
- ✓ Network Communications (Spring 2021)
- ✓ Communications Network for DER Integration (Today, August 10, 2021)
- ❑ Resilience Technologies (August 25, 2021)

Join our listserv for all CPI events.

Agenda & Housekeeping

AGENDA

2:00 ET	Introduction by NARUC Staff and Moderator Hon. Gladys Brown Dutrieuille
2:05 ET	Paul De Martini (Newport Consulting Group)
2:20 ET	Andrew Bordine (Anterix)
2:35 ET	Wendall Reimer (Xcel Energy)
2:50 ET	Jonathan Schrag (Taconic Advisory Services LLC)
3:05 ET	Q&A with Moderator and audience
3:30 ET	Close

DURING THE WEBINAR

The webinar is being recorded.

Chat the organizers anytime for questions on the logistics or discussion.

AFTER THE WEBINAR

Please allow a few business days to process and post the webinar recording to https://www.naruc.org/cpi-1/electricity-system-transition/valuation-and-ratemaking/.

A written summary will become available.

Chairman
Gladys Brown Dutrieuille

PENNSYLVANIA PUBLIC UTILITY COMMISSION (PA PUC)

PANEL MODERATOR

Up next…

Paul De Martini

NEWPORT CONSULTING GROUP

Regulators' Financial Toolbox Communications Networks for DER Integration

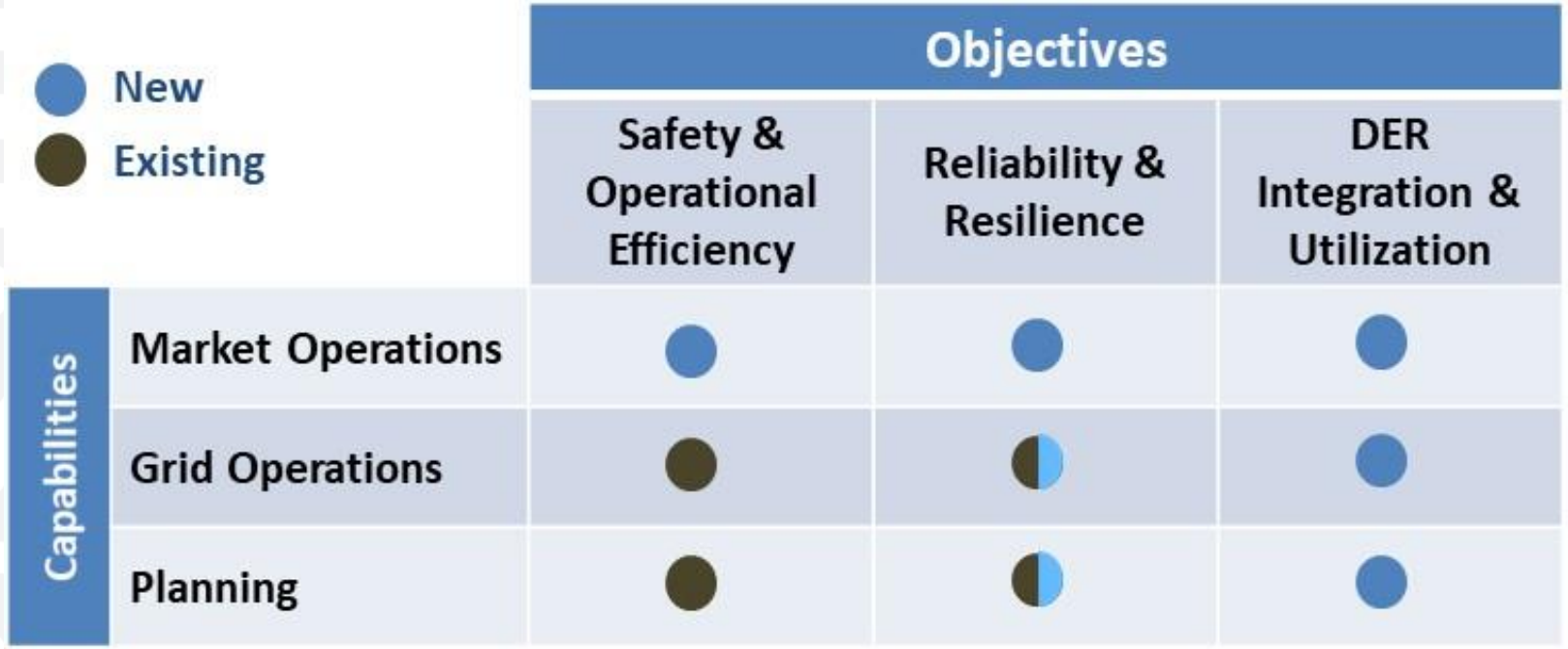
Paul De Martini

Newport Consulting

NARUC
August 10, 2021

Multi-Use Grid Telecommunication Networks

Grid telecommunications networks are converging to support multiple uses in support of a wider range of applications enabling multiple objectives



Source: DSPx Volume 1

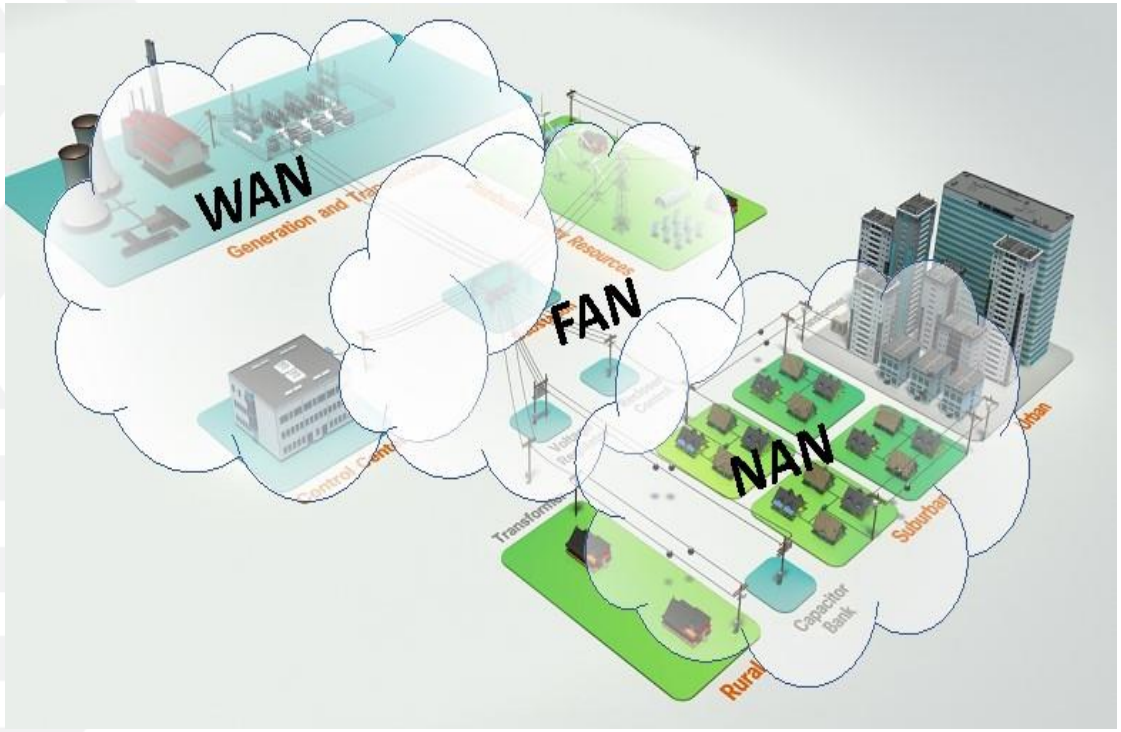
Modern Grid Telecommunications

Grid telecom networks are no longer designed for single purpose, but rather as a converged set of networks between back office & edge

- **Wide Area Network (WAN)** for operations links substations and control centers. The WAN may also provide the two-way network needed for SCADA, and points of interconnection with FANs and specific low latency applications (e.g., teleprotection) or high bandwidth applications (e.g., substation video surveillance).

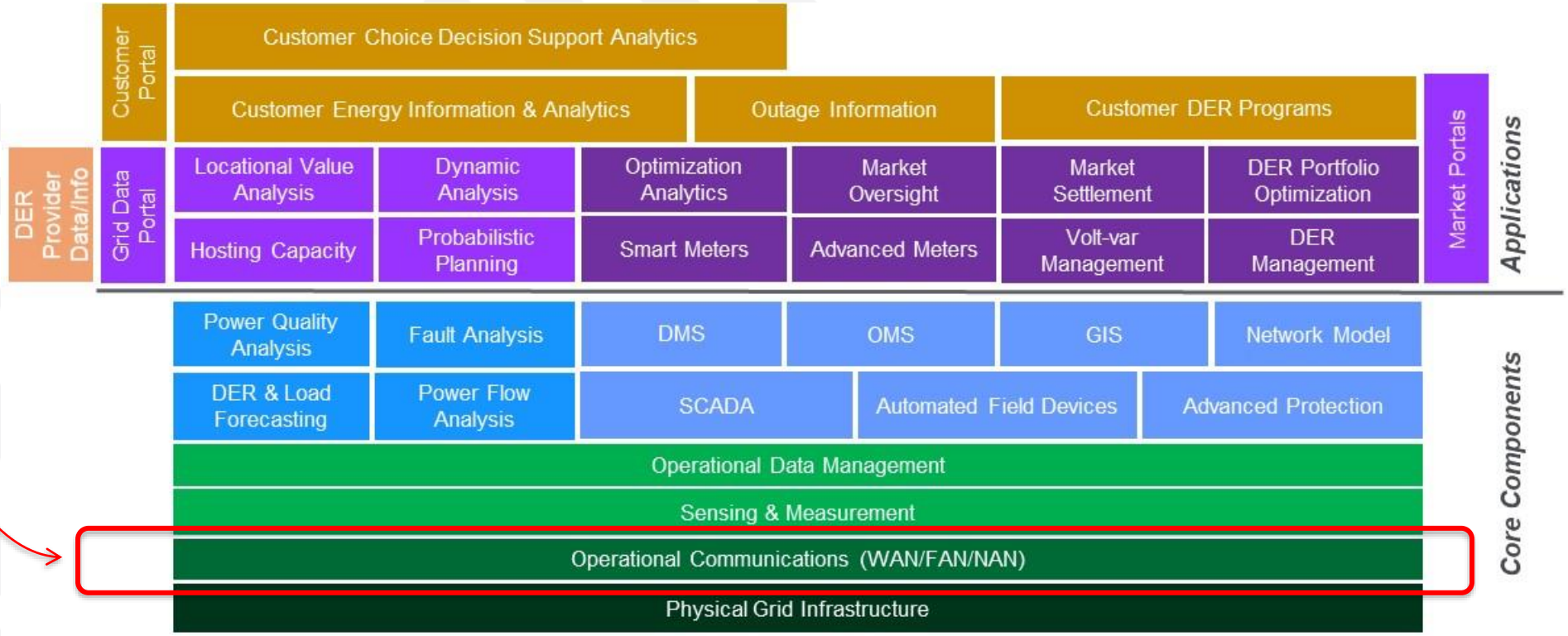
- **Field Area Network (FAN)** connects the WAN to specific field devices for SCADA or metering, or to access points for a Neighborhood Area Network. A FAN is designed for low latency, but often not high bandwidth given the grid need.

- **Neighborhood Area Network (NAN)** is used to connect higher latency devices that have low bandwidth requirements, such as smart meters.



Modern Distribution System Platform

Grid Telecommunications are a core component in a modern grid

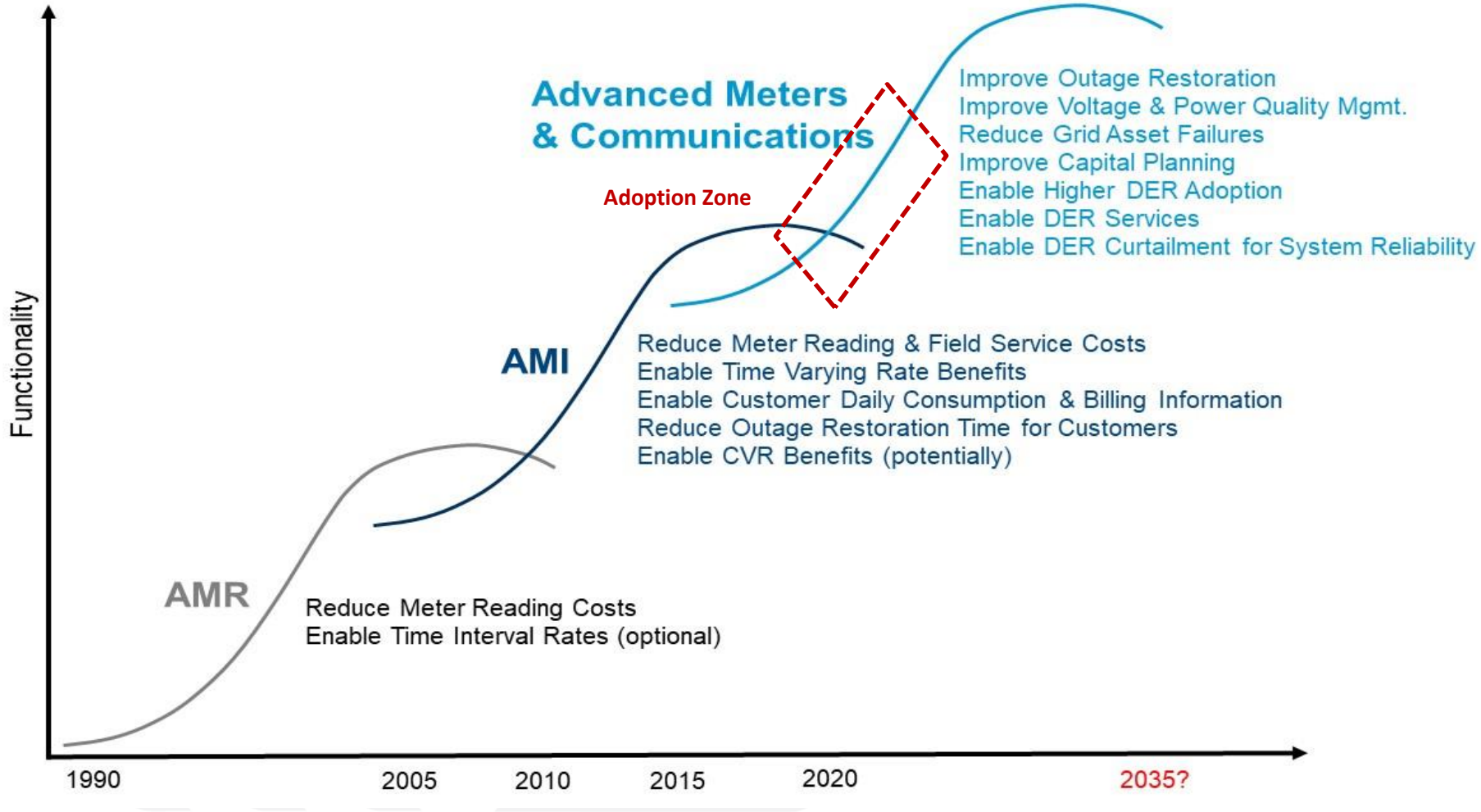


Source: U.S. Department of Energy-Office of Electricity Delivery and Energy Reliability, 2019. *Modern Distribution Grid, Volume IV: Guidebook.*

Green - Core Cyber-physical layer
Blue - Core Planning & Operational systems
Purple - Applications for Planning, Grid & Market Operations
Gold - Applications for Customer Engagement with Grid Technologies
Orange - DER Provider Application

Technology lifecycles have considerations for useful life, depreciation, and impact on rates

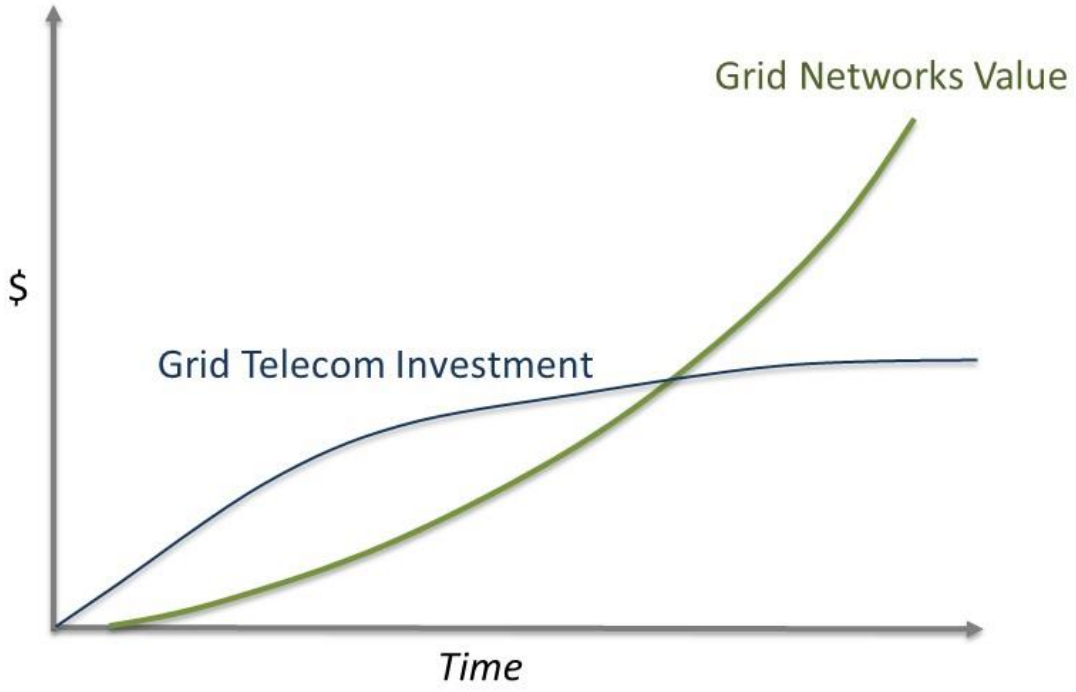
Advanced Metering System Example



Grid Telecom Network Value Creation

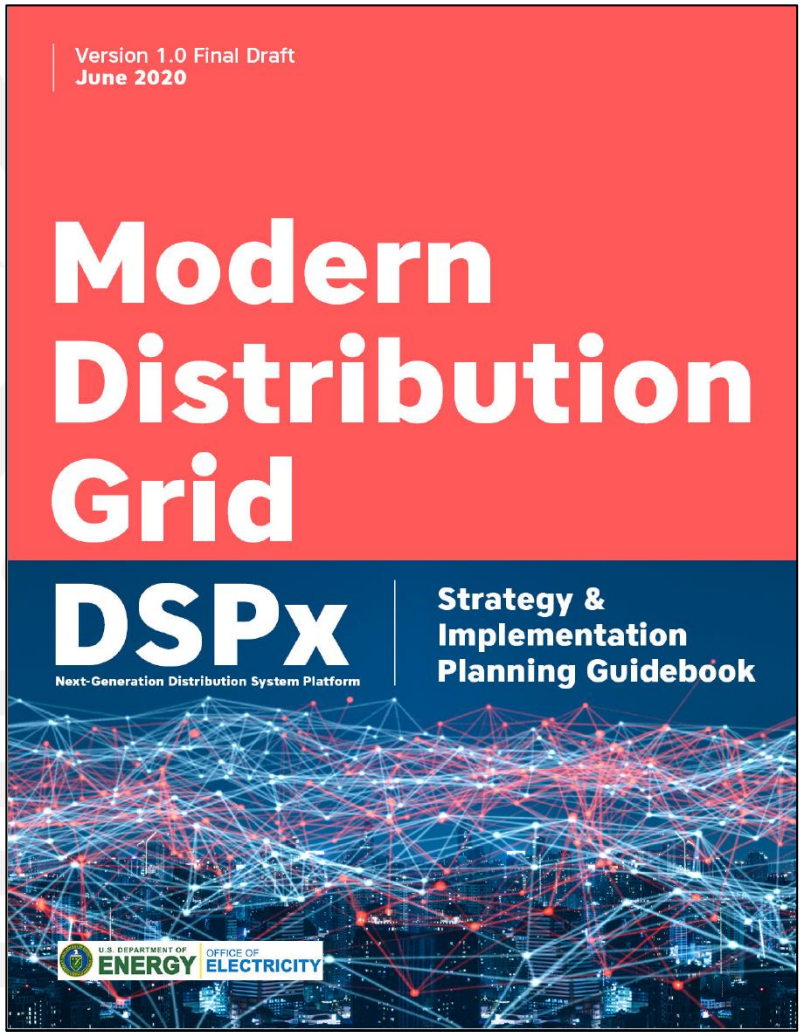
Grid telecom network value grows exponentially with more uses (akin to Metcalfe's law)

- Modern Grid Telecommunications support multiple uses enabling a range of customer & policy objectives
- Telecom value can lag expenditures initially as the value is derived from connecting a wide range of field devices with substation controls and various operational and customer systems - thereafter value grows exponentially with more uses (akin to Metcalfe's law)
- Telecom investments are also inherently proportional to value creation as they are deployed across a service area in relation to the devices that support policy, customer and operational priorities



DOE's Modern Distribution Grid Guidebook

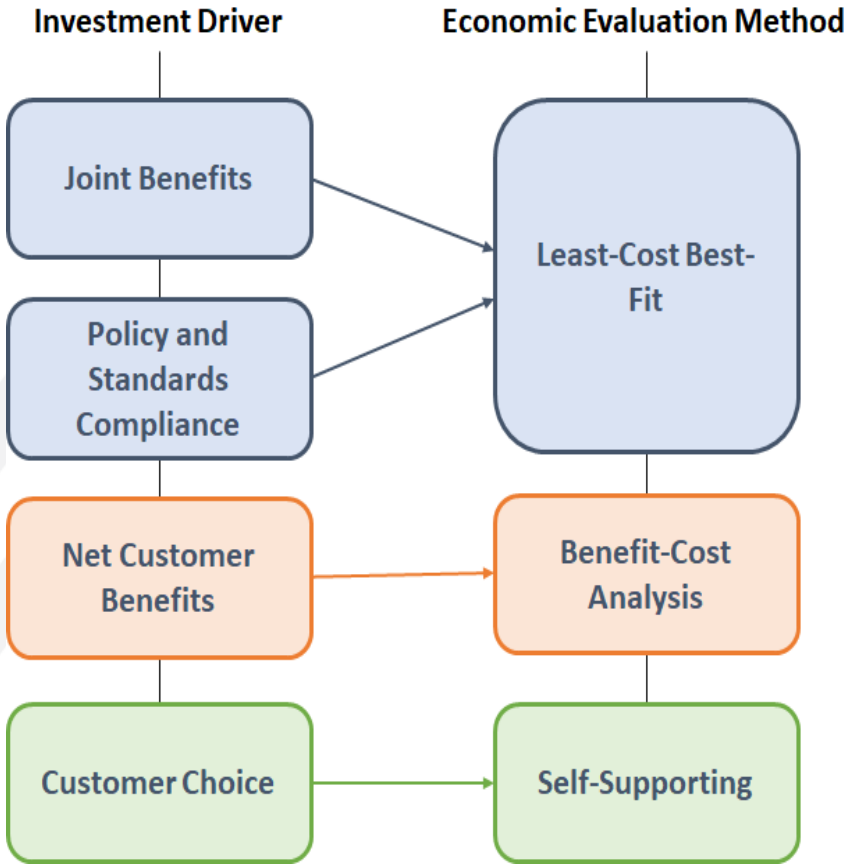
- Volume IV includes an economic evaluation framework for grid modernization investments
- Aims to inform approaches to evaluating economics and managing costs and risks of grid modernization investments
- Not a textbook approach — multiple reasonable paths to achieving the same broad goals



U.S. Department of Energy. *Modern Distribution Grid Volume IV: Guidebook (final draft)*

Grid Telecom Investment Evaluation Method

- **Joint and interdependent benefits** — core platform investments that are needed to enable new capabilities and functions in the distribution grid
- **Standards compliance and policy mandates** — utility investments that are needed to comply with safety and reliability standards or to meet policy mandates for proactive investments to integrate DER
- **Net customer benefits** — utility investments from which some or all customers receive net benefits in the form of bill savings
- **Customer choice** — utility investments triggered by customer interconnection, opt-in utility programs, and customer-driven reliability improvements, paid for by individual customers



Source: DSPx Volume 4

Thank you

Paul De Martini
paul@newportcg.com

That was…

Paul De Martini

NEWPORT CONSULTING GROUP

Up next…

Andrew Bordine

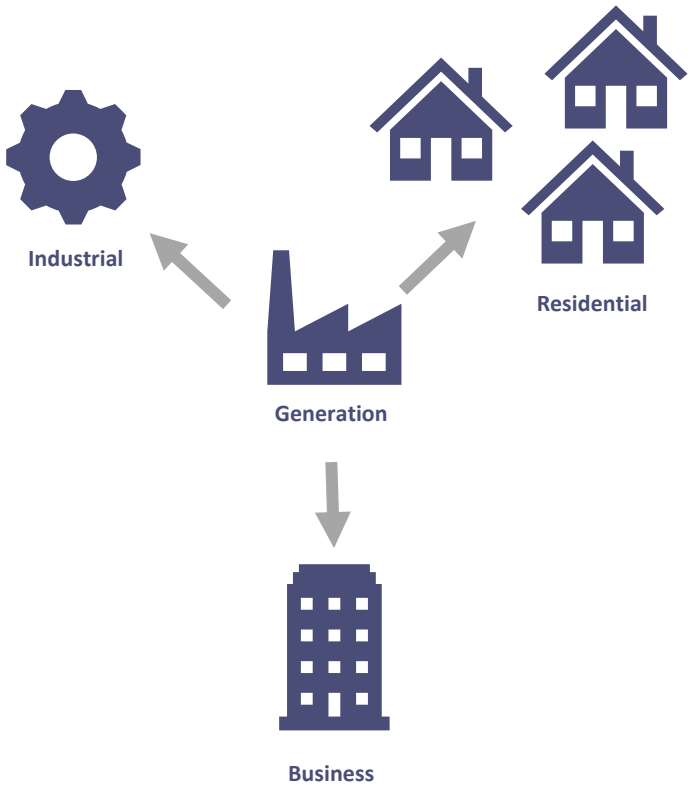
ANTERIX


Anterix™
NARUC Toolbox
Andrew Bordine
Proprietary & Confidential

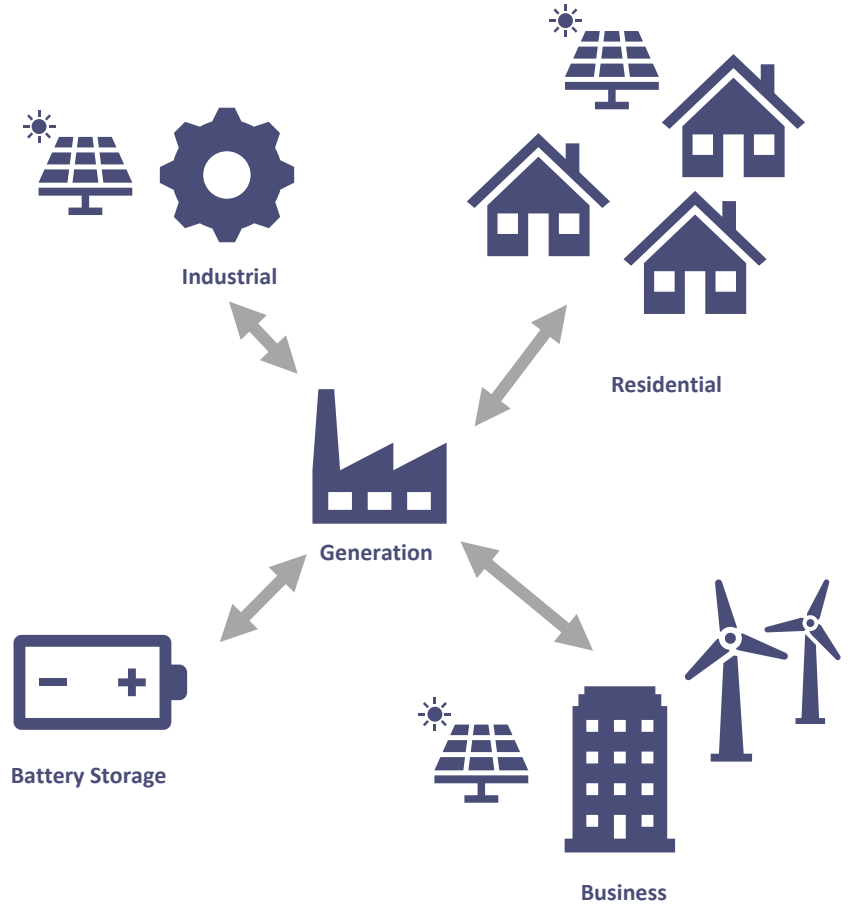
Evolution of Power Flow Direction

Anterix™

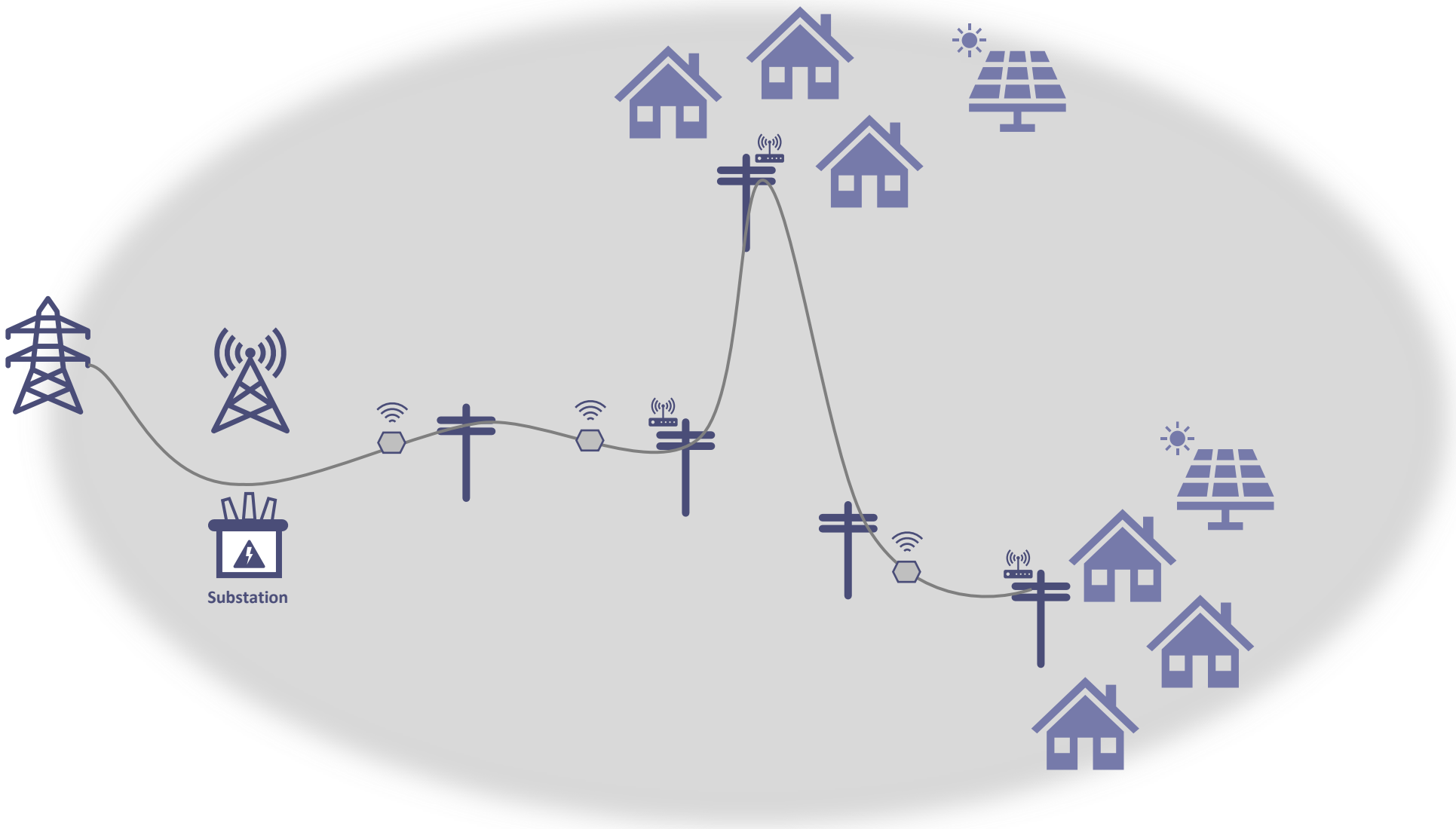
Centralized



Distributed

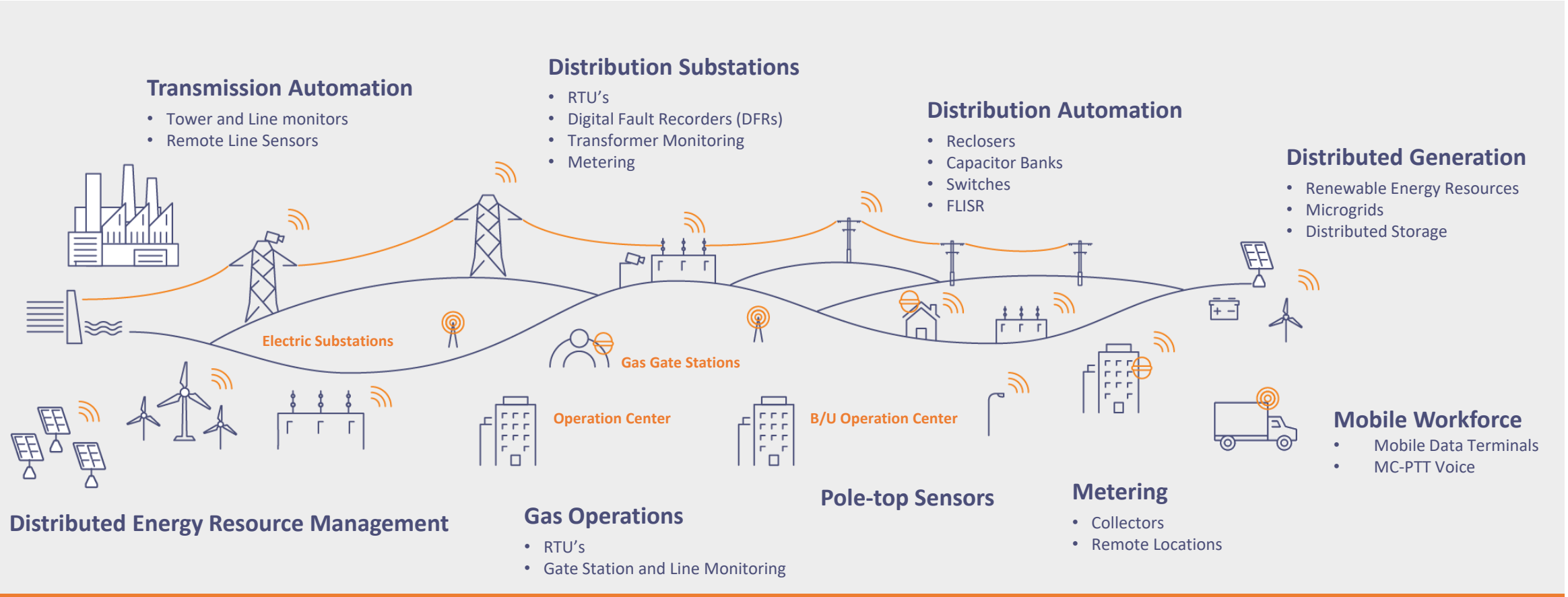


FAN (Field Area Network)



Digitization is Driving Rapid Growth of Connected Devices

Anterix™



Wireless broadband networks are creating multi-use opportunities to share network resources.

Key Considerations:
Utility Communication Networks

Anterix™

Standards of Interoperability

Flexibility & Scalability

Enforces Cyber Security

Resilient Grid

That was…

Andrew Bordine

ANTERIX

Up next…

Wendall Reimer

XCEL ENERGY

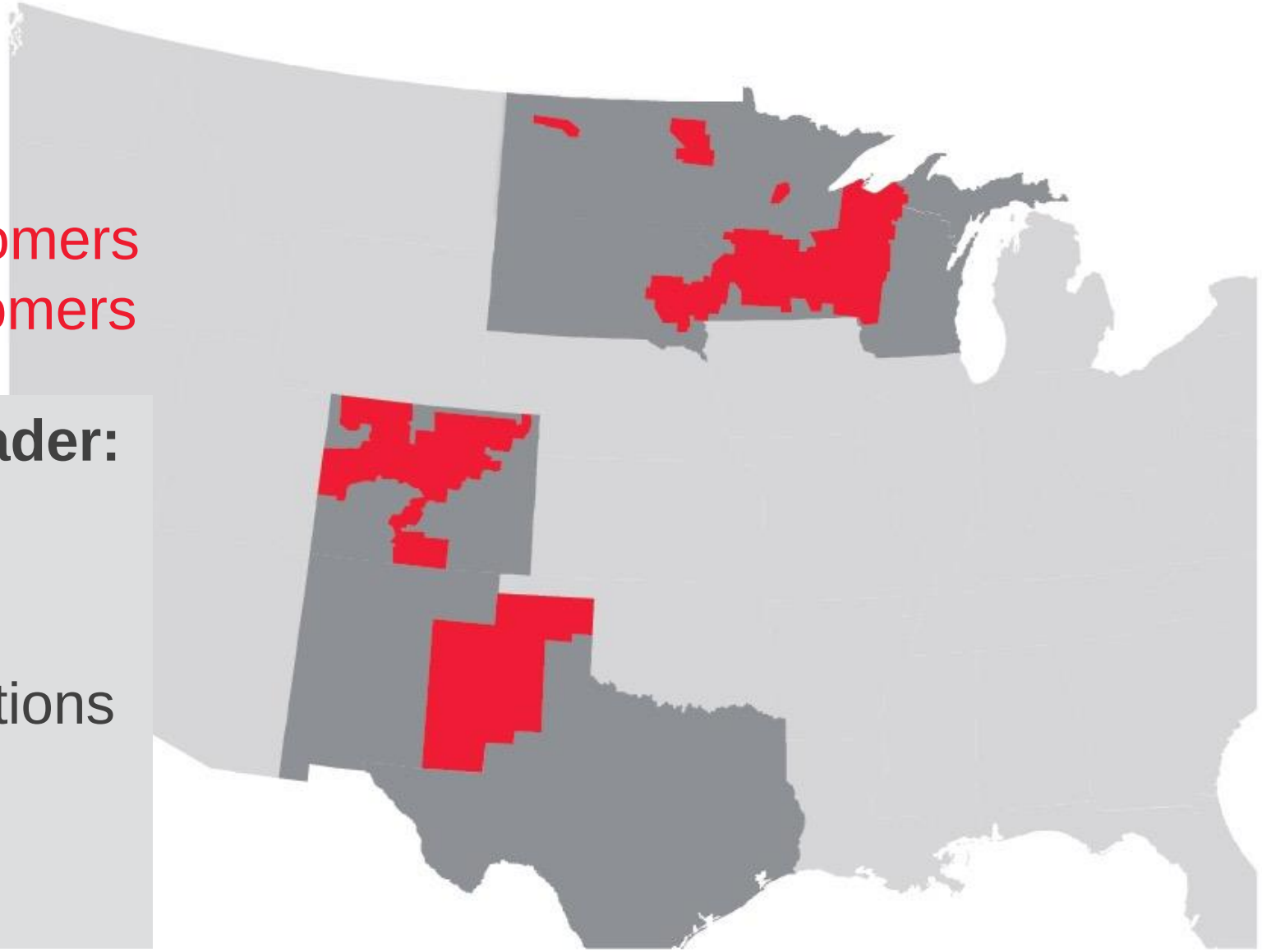
Xcel Energy

Serving eight states

- 3.6 million electricity customers
- 2 million natural gas customers

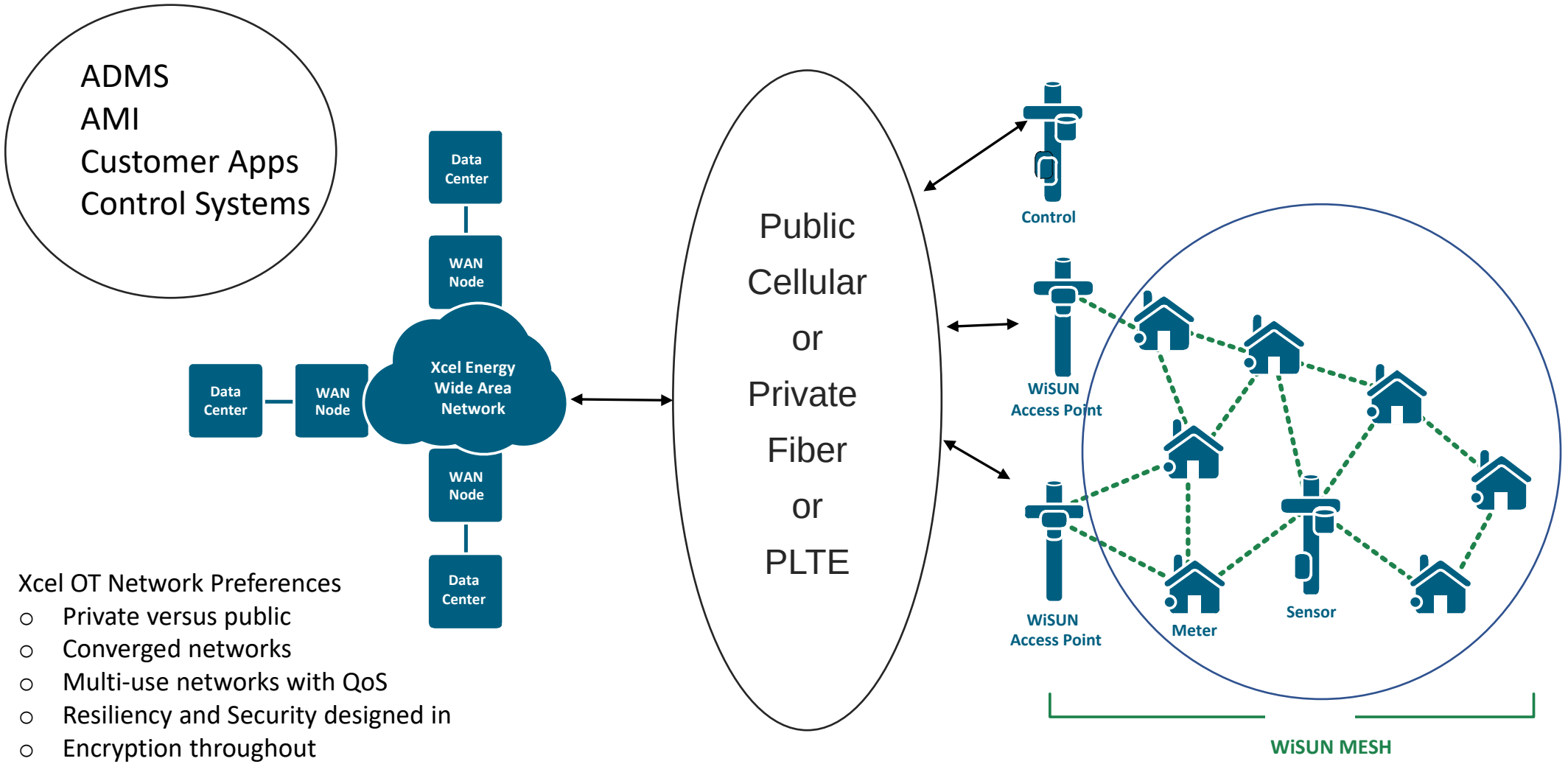
Nationally recognized leader:

- Wind energy
- Energy efficiency
- Carbon emissions reductions
- Innovative technology
- Storm restoration



Xcel OT Network Structure - Residential

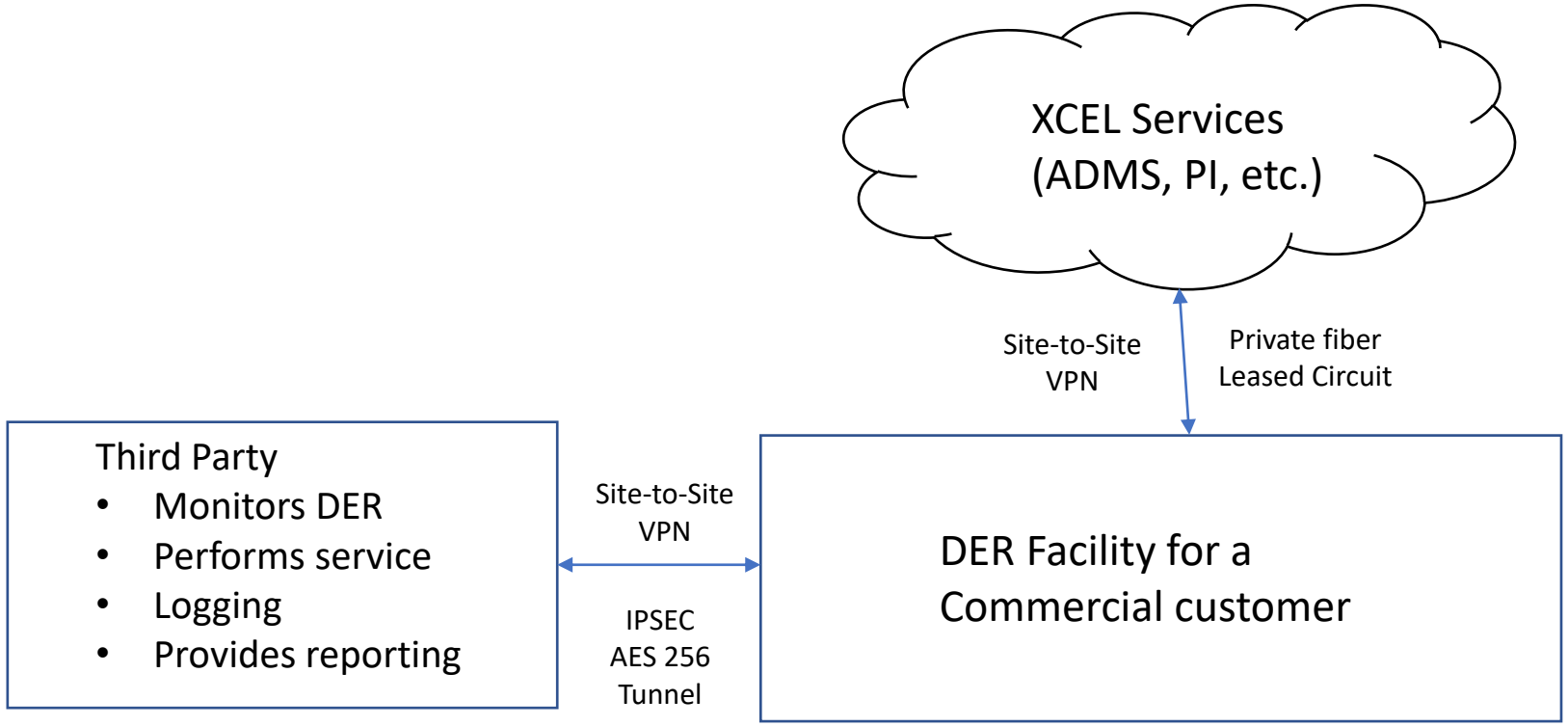
Looking at IEEE 2030.5 – DER Function Set
Involved with EPRI (Energy Power Research Institute)



Xcel OT Network Preferences

- Private versus public
- Converged networks
- Multi-use networks with QoS
- Resiliency and Security designed in
- Encryption throughout

Xcel OT Network Structure - Commercial



Key Xcel Standards

- Xcel Edge Router segregates and filters traffic between VLANS
- Xcel Edge Router provides Secure Edge connections back to regional Secure Services Edge Points of presence (SASE POPs)
- SASE gateways provide secured network paths to service provider and Xcel services
- Xcel Extranet firewall establishes secure connection to service provider
- Service provider must onboard all users with Xcel.

New Equipment Vendor Commissioning Access Issue

- Xcel energy recently purchased new grid support equipment.
- The vendor requires access to the machine (remote) to support commissioning activities.
- Xcel's standard is to onboard vendor support as Xcel employees to allow for credentialed logins for remote access.
- In order to meet their timeline and quoted commissioning expenses, the vendor requires multiple people to share the commissioning activities remotely.

Solution

Divide the network configuration into two phases:

- *Commissioning* – Direct vendor access while the vendor holds contractual liability and no connection to Xcel Energy IT infrastructure.

- *Operation* – The configuration is switched to the Xcel Energy access standard for security and maintenance. A small number of vendor employees are on-boarded for credentialled log-in for monitoring and maintenance purposes.

That was…

Wendall Reimer

XCEL ENERGY

Up Next…

Jonathan Schrag

TACONIC ADVISORY SERVICES

Regulatory Approaches to Maximize Benefits from Utility Investments in Communications

Jonathan Schrag
Taconic Advisory Services LLC
NARUC Financial Toolkit Webinar
August 12, 2021

The Need for Grid Edge Data in a Modern Distribution System

- New customer devices encounter the distribution system at the meter, known as the “grid-edge”.
- The advanced meter generates millions of data points carried by a range of utility-owned communications systems.
- The degree of operational complexity posed by electric vehicles, electric heating, rooftop solar, and batteries will require that the distribution system leverage real-time data to make operational adjustments to ensure continued safe, and reliable service.

Utility Attitudes Toward Grid Edge Data

Moving data from millions of meter end-points to a central “data lake” for real time analysis and processing would require cost-prohibitive increases in communications and centralized computational capacity. As a result, utilities state that:

- “the amount of data generated by the proposed system-level AMI deployment creates challenges to its use in real-time operations,”
- AMI data is “not feasible for use in a distribution management system,”
- “using AMI data would be cost prohibitive”.

AMI 1.0: Conventional AMI Benefits

Most utility AMI benefit cost analysis depend on conventional categories of benefits including:

- ❖Reduced truck rolls
- ❖Reduced meter reader employees
- ❖Better reactive outage management
- ❖In some jurisdictions, efficiencies in energy and capacity from voltage optimization and time varying rate designs

AMI 2.0: New Capabilities and Benefits

- The addition of communications and computational capabilities on each meter allow meters to act in a real-time peer-to-peer network.
- Advanced data analytics and on-meter software allow meters to ract to real time conditions to provide a range of new benefits including
  - Predictive outage management
  - Integration of distributed energy resources
  - System visualization
- These new capabilities can potentially replace significant “grid modernization investments, allowing advanced meters to serve as a customer and a grid facing asset

The Regulatory Challenge: To Encourage Utilities to Achieve AMI 2.0 Benefits

- The challenge for regulators is to encourage/require utilities to advance along the spectrum of use cases from conventional benefits to more advanced AMI 2.0 benefits after regulatory approval for AMI depoloyment.
- NY, KY and CT (under consideration) have enacted variations on the Benefit Implementation Plan to require continued development of the AMI communications capability.
- The BIP requires a schedule for realization of designated current and future benefits with agreement among a group of stakeholders and vendors. Once established, the schedule requires quarterly reporting to the Commission.

THANK YOU

Jonathan Schrag

jonathan.schrag@taconicadvisoryservicesllc.com

That was…

Jonathan Schrag

PLUGGED IN STRATEGIES

Q & A

Thank you!

WWW.NARUC.ORG/CPI