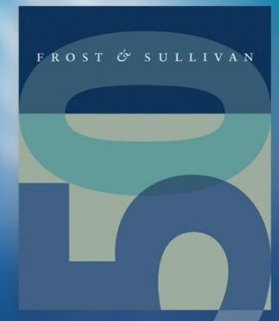


# The New Digital Grid

A Snapshot of the Changing Dynamics in Communication Infrastructure  
For Power Grid Markets in North America



November, 2017

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# Market Overview and Definitions



# Market Overview

- The communication infrastructure occupies a critical role in modernizing the existing electric transmission and distribution (T&D) system. As grid technologies and applications continue to evolve and develop, the communication network must help utilities transition to a fully digitized smart grid.
- The communication network is one of the most complex physical components of the smart grid architecture. Generally, the communication network comprises of a range of hardware and software components that are responsible for collecting, transmitting and analyzing large volumes of data generated by the grid.
- It is this component that truly brings the Internet of Things (IoT) to the grid by enabling systems, meters and sensors to communicate with one another as well as transmit data securely and efficiently.
- Although an electric utilities' core operation is the generation, transmission and distribution of energy, their communications operations are swiftly making substantial inroads in their overall business plans owing to the technological and financial impacts it has on the overall grid operations.
- There are a number of differentiating elements associated with every power utility and never a one-size-fits-all communications solution.

Source: Frost & Sullivan

# Market Overview

- Depending on the whether it is an investor owned utility (IOU), cooperative or municipality, specific communication platforms could be deployed.
- Levels of available capital, existing communication infrastructure, local regulations, population density, service area terrain, future applications as well as bandwidth and latency requirements could as well determine the type and scale of communication networks needed to be adopted.
- A rising need for two-way communications in meters and sensors, cyber-security and growth in renewable energy deployment are likely to increase the need for a modern and robust communication infrastructure.
- Some of the key challenges the industry faces include issues of interoperability and standards, high capital expenditures related to upgrading the network, and the general unwillingness of utilities to change their network operations.
- To sum up, utilities will need secure, reliable and cost-effective communication solutions that help them manage and automate grid operations, and that will eventually enable them to operate effectively and profitably in the future.

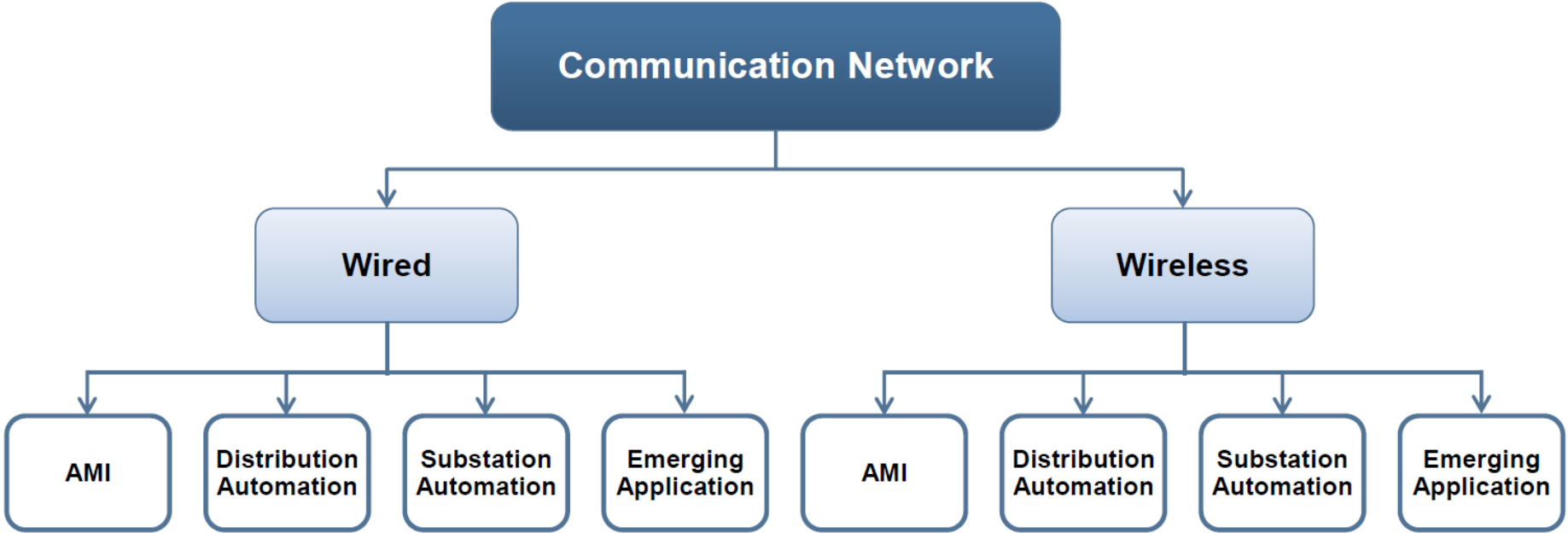
Source: Frost & Sullivan

# Market Definitions

- The communications market servicing mission critical electric utilities consist of both hardware and software components. For the purposes of this study, the focus is principally on sizing and forecasting the hardware component of the communication infrastructure.
- The current communication hardware market provides utilities with the necessary infrastructure to manage a complex ecosystem of meters, sensors and other intelligent electronic devices from a central location.
- There are several communications technologies and architectures involved to support a wide array of transmission and distribution functions in the present smart grid.
- The study, therefore, categorizes the market into two core segments – Technology and Application.
- In this study, technologies are broadly classified into wired and wireless technologies, while applications are classified into four sub-segments under each type of technology, namely – Advanced Meter Infrastructure (AMI), Distribution Automation (DA), Substation Automation (SA) and Emerging Applications that includes the steadily developing grid edge intelligence market.

Source: Frost & Sullivan

# Market Segmentation



Source: Frost & Sullivan

# Critical Industry Trends





# Market Drivers

## Digital Grid Communication Infrastructure Market: Key Market Drivers, North America, 2017–2023

Drivers	1–2 Years	3–4 Years	5–7 Years
Increasing need for two-way communications in advanced smart grid applications	M	H	H
Growth in end-point devices to promote demand for smart communication	M	H	H
Cyber security threats to push communication infrastructure upgrade and overhaul	M	H	H
Growth of Distributed Energy Resources (DERs) to highlight the need for more sophisticated communication infrastructure	M	H	H
Cost reduction and operational efficiency to drive utilities to adopt an effective communication network	M	M	M

Impact Ratings: H = High, M = Medium, L = Low

Source: Frost & Sullivan

# Market Restraints

## Digital Grid Communication Infrastructure Market: Key Market Restraints, North America, 2017–2023

Restraints	1–2 Years	3–4 Years	5–7 Years
High investment costs to upgrade networks	H	M	M
Lack of willingness to upgrade to modern communication platforms	M	M	L
Lack of interoperability prolongs investment decisions	M	L	L

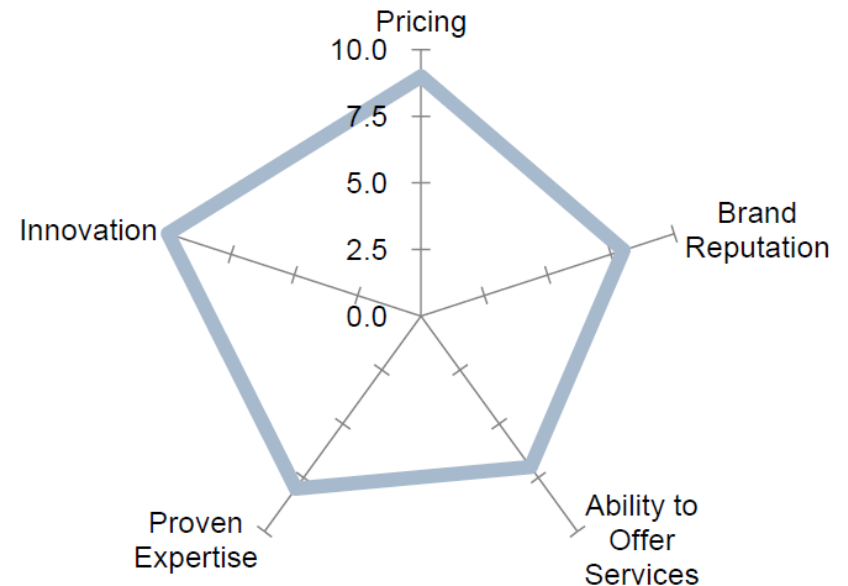
**Impact Ratings: H = High, M = Medium, L = Low**

Source: Frost & Sullivan

# Competitive Factors

- Pricing is an important factor in this market given the high competition for market share and need to drive smart communication adoption among price-conscious utilities.
- Past expertise, along with success stories, is critical in this market given the relatively new technologies in wired and wireless communications.
- Strong relationships with utilities in the case of direct sales are important, given the multiple products and solutions in the market and the reluctance of utilities to upgrade their infrastructure.
- Expectation from utilities in terms of the ability of key communication vendors to offer services is on the rise, given that utilities are still adapting to new technologies in this market.
- The only way manufacturers can operate profitably is to innovate and ensure their products offer specifications and features that utilities value such as product durability, interoperability, resilience and security.

## Digital Grid Communication Infrastructure Market: Competitive Factors and Assessment, North America, 2016

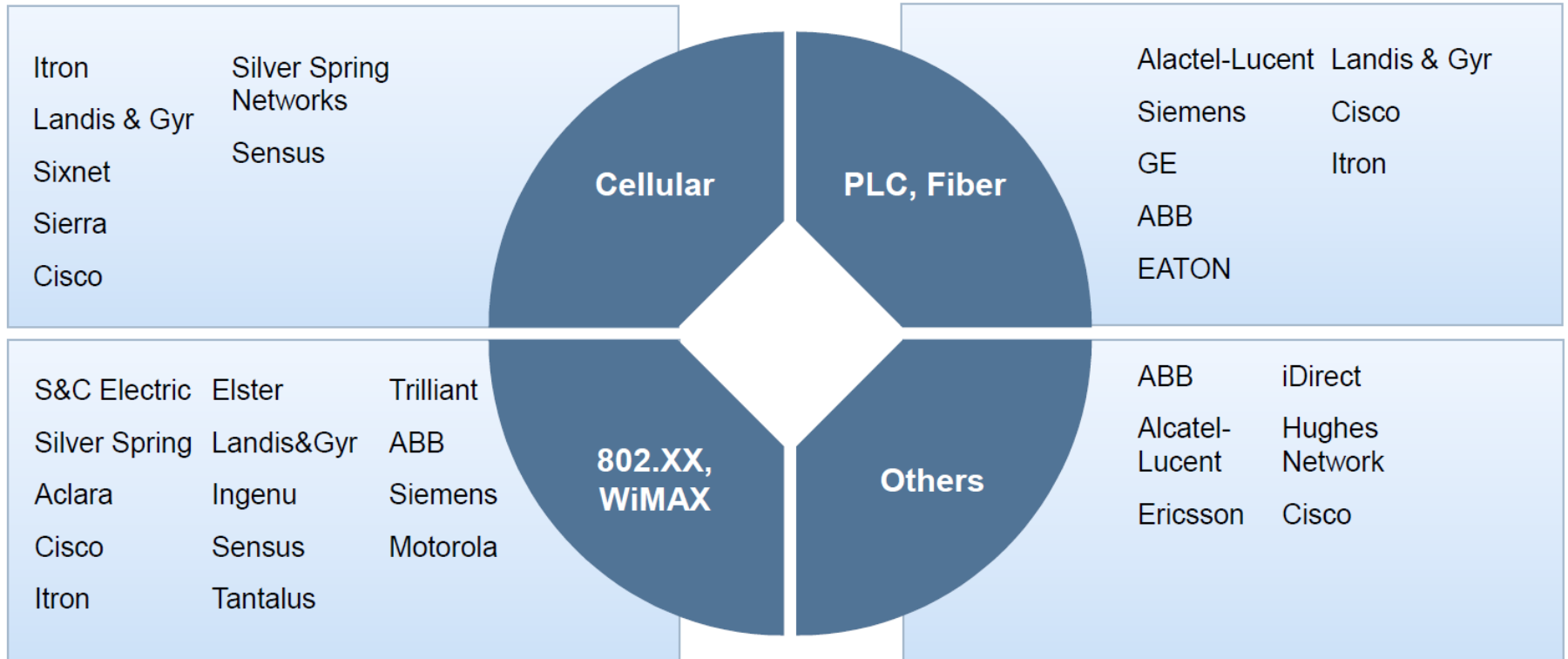


Note: All figures are rounded. The base year is 2016. Source: Frost & Sullivan

# Industry Ecosystem

**Key Takeaway: The growing state of the market provides equal opportunities for all vendors in the ecosystem.**

## Digital Grid Communications Market: Communication Device Ecosystem, North America, 2016



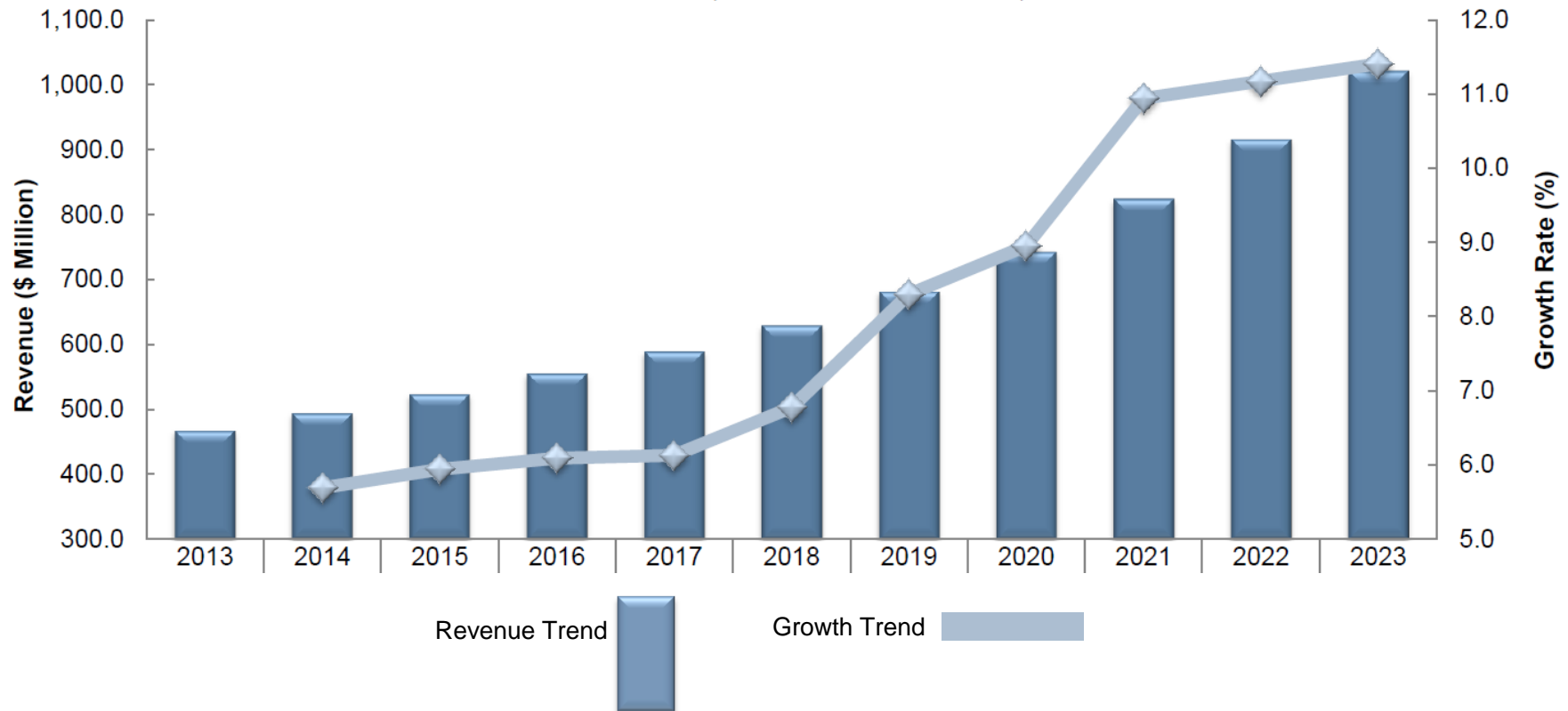
Source: Frost & Sullivan

# Market Growth Trends

**Key Takeaway: The rise in revenue is fueled by a strong growth in end-point devices for AMI, Distribution Automation and Emerging applications.**

## Digital Grid Communications Infrastructure Market: Revenue Forecast, North America, 2013–2023

Revenue CAGR, 2016–2023 = 9.1%,



# Strategic Conclusions



# Strategic Conclusions

1

By 2023, applications such as edge intelligence and Big Data management are forecast to be high-potential market that will drive demand and deployment of modern wireless communication devices.

2

The rapidly changing market environment demands flexibility in the communications infrastructure. With a forward looking market, vendors should develop a compelling business model like the “communication-as-a-service” model to improve bottom line results for end users.

3

With rapid developments in smart grid technology in the North America, inherent cyber vulnerabilities will push for utilities to upgrade or overhaul their communications infrastructure.

Source: Frost & Sullivan

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Frost & Sullivan

3211 Scott Blvd, Suite 203

Santa Clara, CA 95054

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# Appendix



# The Frost & Sullivan Story

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# Frost & Sullivan Brings a Global Perspective

