Connected Grid: Communications Architecture Methodology

Communications Architecture for the Smart Grid

Today’s utilities are increasingly turning to the smart grid to help transform and unify energy production, distribution, and business systems into a single communications platform. However, building the smart grid can be a complex, multyyear process, one that requires utilities to meet key technology milestones driven by present and future business needs. Cisco’s Connected Grid Services organization has developed a step-by-step methodology to help lead utilities through the smart grid development process.

Our methodology is based on mapping detailed business objectives to clear and well-defined utility use cases. Over the past several years, Cisco has built an extensive library of existing use cases and also continuously works with utilities and industry experts to create additional resources. This in-depth knowledge base enables analysis of communications requirements such as those around security, bandwidth, and quality of services, which can be used to build out utility architectures and designs. The result is a secure, intelligent communications infrastructure that serves as the basis for the smarter grid.

Challenges Facing Today’s Energy Operators

Today’s energy industry is undergoing a significant transformation. Exponentially growing demands for power, new sustainability initiatives, and increasingly stringent security regulations are requiring utilities to transition to a more efficient grid. Operators today are challenged by:

- Updating and managing an aging transmission and delivery (T&D) system, including adding millions of new wireless and wired devices
- Reducing OpEx of managing multiple leased line circuits and siloed applications that currently lack interoperability
- Steadily increasing CapEx costs ($168B over the next 20 years in the United States alone)
- An aging workforce: in some countries, up to 50 percent of utility engineers are expected to retire within the next decade
- Managing capacity needs that include new and sometimes unpredictable resources, such as renewables
- Meeting evolving regulatory and security requirements for critical infrastructure protection: In the United States, for example, NERC-CIP provides specific requirements that require both physical security and cybersecurity solutions
Cisco’s Architecture Development Methodology

The Cisco® Connected Grid Services communications architecture development methodology revolves around three key elements:

Use Case Library
Cisco has analyzed an array of industry use cases developed by leading utilities in the United States and Europe as well as by standards bodies, which outline the operational processes resulting from the advent of the smart grid. In addition, Cisco has developed its own business scenarios and industry use cases. The result is a library of more than 100 use cases and over 250 sub-use cases and categories, covering topics ranging from operations and workforce effectiveness to asset management and microgrids. Our Connected Grid Services experts utilize these cases to:

- Help utilities identify and develop relevant business-driven use cases
- Validate business and industry functionality of existing use cases

Requirements Analysis Process
Cisco has developed a range of associated tools for use case analysis to promote the discovery of primary communications requirements. These allow the Cisco Services organization to quickly and thoroughly validate the requirements derived from use case analysis for a given utility. For example, requirements might include bandwidth, quality of service (QoS), security, scalability, availability, and data management, each of which might have a wide range of parameters.

architecture Development Process
Cisco’s experience and expertise in developing large-scale, mission-critical communications architectures for complex industries are unparalleled. Our development process is based on the best practices gained from our experience in developing architectures that unite a diverse set of functions to share a common set of resources. Such architectures reduce costs and create new efficiencies by increasing interaction across the environment, enabling:

- Intelligence that allows elements (including applications) to analyze information, make collaborative decisions, and exercise control across domains
- A uniform set of service policies (such as security) to support overall business objectives
- Architectural designs that enable modularity while leveraging best practices across networks

Why Cisco?
The worldwide leader in networking, Cisco provides Connected Grid Services that deliver highly secure, reliable, and scalable communications across the energy chain. Cisco is uniquely positioned to serve as a trusted advisor for the energy industry, providing industry-leading professional services, networking technologies, and software services to enable smart grid functional requirements for both now and into the future.

For More Information
For more information, contact sg-services@cisco.com or your local account representative.