

Cisco Connected Grid Network Architecture Services



Communications network as strategic asset through effective architecture planning and design.

Today's utilities face many challenges in designing and building communications networks to support grid modernization. Industry organizations need a robust, converged communications infrastructure that protects the utility investment and supports applications and services for the long term. However, interoperability, legacy networks, disparate tools, and security requirements all add complexity to the transforming grid. Building a utility communications infrastructure is often a gradual multiyear effort.

Connected Grid Service Benefits

- An extensible, secure communications infrastructure to support grid modernization
- Increased return on assets, efficiency, and utilization with careful planning and detailed custom design
- Faster, more effective deployment of the IP infrastructure based on Cisco leading practices
- Better regulatory compliance with integrated security features across the network
- Framework for real-time network management of the grid
- New energy services offerings such as demand response and distributed generation integration

Our Cisco Services experts offer a step-by-step methodology that helps lead utilities through the grid modernization process based on the Cisco® GridBlocks architecture. This methodology includes business and technical consulting that allows utilities to look at project-level development and design, as well as full information communication technology (ICT) planning that prioritizes minimizing operations and maintenance costs. We help assess readiness to support proposed solutions, integrate new capabilities, and help keep network devices and applications secure, available, and operating reliably.

The Cisco GridBlocks Architecture

Cisco GridBlocks provides a communications reference architecture for the power delivery chain. It also offers an open standards-based infrastructure that enables effective system integration and security, increasing access to information throughout the grid. The modular GridBlocks approach allows Cisco Services to help build the architecture on a project-by-project basis as utilities implement smart grid programs such as advanced metering and substation automation. We help utility teams create design efficiencies, minimize deployment times, and reduce risk in deploying the converged platform.

Cisco Connected Grid Network Architecture Services

Cisco Services has architected some of the world's largest industrial networks based on deep technical expertise and best practices. The team envisions the communications framework, creates a blueprint for improving grid efficiency, and paves the way for innovative business models and energy services.

They also undertake a thorough analysis of use cases for current and future environments, customizing each service to specific needs for generation, transmission, and distribution. Cisco Services are built on these use cases to help create an intelligent, fully integrated, and participative communications architecture designed to play a pivotal role in the utility's success. The resulting designs bridge the utility's business needs and the necessary technical solutions:

- Network Architecture Discovery Service
- Network Architecture Assessment Service
- Network Architecture Planning and Design Service
- Cisco Network Optimization Service

Table 1. Cisco Architecture Services

Services Offering	Purpose	Deliverables
Network Architecture Discovery Service	Onsite facilitated session includes reviewing new business transformational solutions with operational specialists, mapping to the business objectives and priorities, and creating recommendations for the converged architecture	<ul style="list-style-type: none"> • Discovery workshop and presentation summary • Alignment and scoping plan document • Business case and ROI model report • Priorities and planning constraints report • High-level requirements description report
Network Architecture Assessment Service	A multiweek engagement to assess the current state of the infrastructure, identify gaps, and propose a networking architecture and solution recommendation	<ul style="list-style-type: none"> • Architecture framework document • Business diagnosis report • Gap analysis report
Network Architecture Planning and Design Service	Reviews the current state of each network and areas for improvement to align the utility to the needs of its business, unify network-based services, and ascertain the most effective architecture for the organization	<ul style="list-style-type: none"> • Map of business and technical objectives with to proposed high-level architecture and network design • "Future-state" use cases, high-level designs, and requirements for communication and security
Network Optimization Service	Ongoing services engagement that assures optimal performance and security	<ul style="list-style-type: none"> • Network assessment and upgrades service • Ongoing design review service • Change management service

Cisco Network Architecture Discovery Service

Our Architecture Discovery Service provides guidance in analyzing the merits of various technology options and solutions to arrive at a comprehensive grid networking strategy. Through a multiday architecture and solution workshop, Cisco reviews the utility's business and technology requirements, network infrastructure, and security strategies, and documents recommendations for adopting solutions within the end-to-end energy delivery infrastructure.

Typically, this onsite facilitated session includes reviewing new business transformational solutions with operational specialists, mapping to the business objectives and priorities, and creating recommendations for the converged architecture needed to enable the Connected Grid, including one or more of the following:

- Architectural transition
- Roadmap and analysis of tech investment priorities

- Requirements and solutions planning
- Security and NERC CIP compliance
- Distributed intelligence
- Network management
- Customer premises networks (business and home energy management)
- Operations center network design
- Data center design
- Field area network and advanced metering infrastructure
- Transmission and substation design
- Utility and regional network



Network Architecture Assessment Service

The Network Architecture Assessment Service is a more detailed discovery process that occurs over several weeks and requires onsite review and remote analysis. This service provides a detailed network roadmap and seeks to achieve long-term objectives for its investments in communications devices and networks. Through a multiweek engagement, we work with the utility team to assess the current state of the infrastructure, identify gaps, and propose a networking architecture and solution recommendation.

Service activities and deliverables include:

- Analyzing and documenting of the business profile, requirements, and target network success metrics relative to Cisco leading practices
- Assessing the utility's current architecture, including:
 - High-level design for routing and switching infrastructure
 - Current LAN performance, traffic, and configurations
 - Existing network security: internal, perimeter, wireless, unified communications, data center, endpoint, and firewall security
- Developing a high-level converged network solution proposal identifying technologies and solutions to achieve business and network goals

Network Architecture Planning and Design Service

Cisco's planning and design service is an onsite or remote engagement that provides the guidance and leading-practice expertise to help utilities succeed. Our teams review the current state of each network and areas for improvement to align the utility to the needs of its business, unify network-based services, and ascertain the most effective architecture for the organization.

They then create a design document that maps the utility's business objectives and technical requirements to a proposed network architecture design, as well as offering an adoption schedule. The power of this service is its deep analysis of the utility's business profile, grid requirements, metrics, and current architecture. Deliverables include:

- Business and technical objectives mapped to a proposed high-level architecture and network design
- "Future-state" use cases, high-level designs, and requirements for communication and security

Optimizing the Connected Grid Infrastructure

Following deployment of the Cisco Connected Grid solution, the Cisco Network Optimization Service helps to assure that performance and security are optimized on an ongoing basis. Deliverables include:

- Ongoing network assessments of software and hardware
- Ongoing design reviews, especially when adding new devices
- Change management and support

Designs Crossing Operational and Functional Boundaries

Cisco's design services map how a utility's grid functions from one end to the other across operational and functional boundaries. This results in an architecture that addresses the utility's overall business needs by uniting the communications and electrical networks onto a single platform, which may include:

- **Transmission and distribution substation network:** Cisco Services creates communications network architectures that connect transmission and distribution substations to headquarters and the data center. They enable a series of automated services that allow utilities to monitor intelligent electronic devices (IEDs), gather sensor readings, manage assets, and provision devices and software for operational and nonoperational SCADA, synchrophasors, CRAS, teleprotection, and physical security.
- **Field area network:** Field area networks (FANs) are designed to integrate existing systems with advanced meter infrastructure (AMI), distribution automation (DA), and protection and control. Such applications support the automatic gathering of information; monitoring and security of distributed systems; and faster fault location, recovery, and automated sectionalization. Cisco Services teams analyze, plan, and design a complete IPv6-based network based on a combination of core, edge, and access layer products and solutions. By delivering multiple applications over a single secure platform, electric utilities benefit from lower total cost of ownership as well as create value from new services and functional integration.
- **Data center:** A secure and efficient operation center environment contains the applications associated with data collection, analysis, and control. Cisco Services helps utilities set up fully virtualized operational environments, enabling scalability, efficiency, and cost effectiveness as well as manageability and security.
- **Operations center:** As the central point for analysis of operational data, optimal IP network designs are critical for reliability and performance. Applications residing in the control centers perform a variety of functions ranging from grid monitoring and control to generation scheduling and market operations. Cisco Services helps utilities send the right data from intelligent devices to the appropriate applications quickly and accurately – and provide a response in real time.
- **Customer premises network:** The designs required for this part of the network address the communications needs within the utility's consumer, commercial, and industrial environments and determine how the utility's business requirements can be effectively achieved in a secure manner. Cisco architecture and design services can provide the flexible frameworks necessary to address multiple premises network scenarios and integrate them into a single, high-level communications architecture.
- **Utility and regional network:** Today's electric utilities increasingly connect thousands of geographically dispersed communications networks, relying on multiservice wide area networks (WANs) to unite these disparate resources into a single extended environment. Cisco's architectural designs for the WAN enable optimum availability, safety, and performance for large-scale networks by automating the entire energy chain. By establishing a technology foundation to support rapidly expanding power systems, utilities are assured of long-term reliability, increased responsiveness, and lowered operations costs.

Why Cisco?

Cisco brings more than 25 years of industrial networking experience to each utility project, offering security, reliability, and efficiency for the energy industry. Our Cisco Services team has the experience, expertise, and portfolio of technology solutions to revolutionize how the energy industry serves its customers and manages its business day to day:

- Plans, builds, and optimizes forward-looking architecture designs to meet utility needs
- Implements large-scale deployments that support service across distributed territories
- Reduces risk, delays, and the total cost of network deployments and ownership
- Creates proofs of concept and long-term roadmaps to serve as the foundation for the utility in decades to come

Cisco architectures provide a variety of options to meet the needs of electric utilities. Automating the transmission and distribution substation using the network enables utilities to manage, control, and automate remote grid assets more efficiently, secure information across the network, converge business and utility functions, and simplify grid operations for the future.

Further Information

For more information about Connected Grid Services, go to <http://www.cisco.com/go/smartgridservices>.



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