Q&A

Cisco Connected Grid Network Management System

Q. What is the Cisco Connected Grid Network Management System (CG-NMS)?

A. Cisco CG-NMS is a software application that performs lifecycle management for various operations in an end-to-end utility smart grid communication network. Some of these operations include smart metering, also referred to as Advanced Metering Infrastructure (AMI), distribution automation, distributed intelligence, substation automation, and protection and control. Cisco CG-NMS provides a powerful, geographic information system-based (GIS) visualization and monitoring capabilities. It proactively alerts utility operators of abnormal network conditions. Utility operators access the Cisco CG-NMS using a web-browser to perform entire life-cycle management for Cisco 1000 Series Connected Grid Routers (CGR 1000), called pole-top routers, and Cisco IPv6 RF mesh endpoints (smart meters).

In the first release, CG-NMS will manage the Cisco Connected Grid Field Area Network (FAN). This includes the Cisco CGR 1000 Series pole-top/din-rail-mount routers and the Cisco IPv6 RF mesh endpoints. In future releases, CG-NMS will manage the utility substation automation network.

CG-NMS is typically hosted in the utility control center, and co-located with other utility headend operational systems, such as an AMI headend, distribution management system, or outage management system.

Q. What devices can be managed by the CG-NMS?

A. In the first release, CG-NMS provides lifecycle management for Cisco CGR 1000 Series pole-top/din-rail-mount routers and the Cisco IPv6 RF mesh communication modules embedded in partner endpoints. Examples of endpoints include smart meters or range extenders.

Q. What are the primary features in the CG-NMS?

A. Table 1 shows the core functionality that CG-NMS provides for managing a multi-service communication network.

Table 1. CG-NMS Core Functionality

Feature	Details
Secure Zero-touch Deployment	Zero-touch commissioning of field area routers (FAR) and smart meters
Asset Visualization	GIS-map-based visualization of field area network (FAN) assets such as routers, repeaters, smart meters Large-scale management with asset grouping, template-based configuration mechanism, and role-based access control
Security Management of Field Devices	Secure access (https), role-based access control. Key configuration and management for communication message signing, firmware image signing. hardware security module (HSM) for secure encryption key storage.
Performance Monitoring	Displays color-coded, real-time performance information on a GIS-based map for various parts of the communication network, including RF mesh and cellular/WiMax. Exception reporting based on key communication metric threshold levels.
Communication Network Faults and Outage Monitoring	Real-time reporting of critical events relating to communication faults and outages (Field Area Routers, Meters). Event de-duplication and filtering.
Device Firmware Management	Manage firmware updates to field area routers. Large-scale firmware update to meters.

Feature	Details
Diagnostics and Troubleshooting	Rule engine infrastructure for effective monitoring and triage-based troubleshooting. Device troubleshooting with on-demand device path trace; ping to any FAR or meter.
North Bound API	Allows ease of integration for existing utility applications like outage management system (OMS), meter data management (MDM), trouble-ticketing systems, and Manager-of-Managers
High Availability and Scalability	Up to five million endpoints are supported in the first release of the CG-NMS

Q. Is Cisco CG-NMS suitable for utility operations like smart metering, AMI, and distribution automation?

A. Yes, Cisco CG-NMS is built around layered system architecture to help enable clear separation between communication network management functionality and operation systems such distribution management system (DMS), Outage management system (OMS), and meter data management (MDM). This clear separation between network management and operational applications help enable utilities to roll out smart grid projects incrementally, starting with AMI and extending into distribution automation using a shared, multi-service network infrastructure and a common network management system across various utility operations.

A powerful, SOAP-based northbound API from Cisco CG-NMS allows various utility applications like DMS, OMS, or MDM to pull appropriate operation-specific data, be it for distribution grid information, outage information, or metering data, to enrich their operations.

Q. Can Cisco CG-NMS scale to manage a large power grid network with millions of devices?

A. Yes, the first release of Cisco CG-NMS will provide support for up to five million end-point devices, like smart meters and range extenders. In future releases, Cisco CG-NMS will scale to manage up to 10 million end-point devices.

Q. Can CG-NMS integrate with utility IT or enterprise security policies?

A. Yes, Cisco CG-NMS has strong role-based access control (RBAC) for operators and end-point devices. It also offers a flexible grouping of devices, configurations, and template schemes that facilitate various operations teams to view and restrict access to specific operational devices.

Further, Cisco CG-NMS also logs operator activity, including change logs for all configuration changes, critical operational events, and security events. Cisco CG-NMS can forward all logs and events, through the North Bound API, to a standard Security Information and Event Monitoring (SEIM) application for NERC-CIP reporting and compliance.

Q. What is the hardware environment required for Cisco CG-NMS?

A. Table 2 displays the recommended generic hardware configuration for running CG-NMS software to manage up to 500,000 IPv6 RF mesh endpoints.

Table 2. Recommended Hardware Configurations

Hardware Server	Operating System	Hardware Profile, Software and Network connectivity requirements
CG NMS Application Server Software	Red Hat Enterprise 5.2 or later	2 CPU—Intel Dual core Xeon x5000 series, with 16 GB RAM
CG NMS Database Server (Oracle)	Red Hat Enterprise 5.2 or later	Oracle® 11g Enterprise Edition 11 with Replication 2 CPU—Intel Dual core Xeon x5000 series, with 192 GB RAM 1TB or more, 10k+ RPM disk, RAID 10 configuration
Web Browser Client	N/A	Microsoft Internet Explorer **Access to Internet (for GIS Maps Access)**

For large-scale deployments, it is recommended to use additional servers with the same profile for every additional 500,000 endpoints, up to a maximum of five million endpoints. Further, Cisco CG-NMS software uses Oracle Enterprise Database servers to store configuration and state information in an Oracle database.

For high system throughput and high availability, server load balancing, and redundancy, it is recommended to have at least two servers running Cisco CG-NMS software, a primary and secondary Oracle database in replication mode, and a standard IP-load balancer.

Q. Can the CG-NMS be integrated with utility head-end applications?

A. Yes, a northbound integration API from Cisco CG-NMS allows various utility applications like DMS, OMS, MDM, or enterprise bus to be integrated and thus allow bi-directional exchange of information.

Additionally this Cisco CG-NMS can be integrated with utilities' existing or new manager-of-managers at the control center for a single pane-of-glass view.

For More Information

For more information on the Cisco Connected Grid Network Management System please visit http://www.cisco.com/go/cgnms.

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