

Cisco Connected Grid Network Management System

The Cisco[®] Connected Grid Network Management System (CG-NMS) is a software platform that will manage a multi-service network and security infrastructure for smart grid applications, including advanced metering infrastructure (AMI), distribution automation, distributed intelligence, and substation automation. CG-NMS is a scalable, highly secure, modular, and open-platform with an extensible architecture. CG-NMS is a multi-vendor, multi-service, communications network management platform that helps enable network connectivity to an open ecosystem of power grid devices.

CG-NMS is built upon a layered system architecture to enable clear separation between network management functionality and applications, such as a distribution management system (DMS), outage management system (OMS), and meter data management (MDM). This clear separation between network management and applications helps utilities to roll out Smart Grid projects incrementally, for example with AMI, and extend into distribution automation using a shared, multi-service network infrastructure and a common, network management system across various utility operations. Further, a northbound API from Cisco Connected Grid management allows various utility applications like DMS, OMS, or MDM to pull appropriate, service-specific, network communications data, be it for distribution grid information, outage information, or metering data from a shared, multi-server communication network infrastructure. Figure 1 illustrates the operator view of the CG-NMS.

Figure 1. CG-NMS Operator View

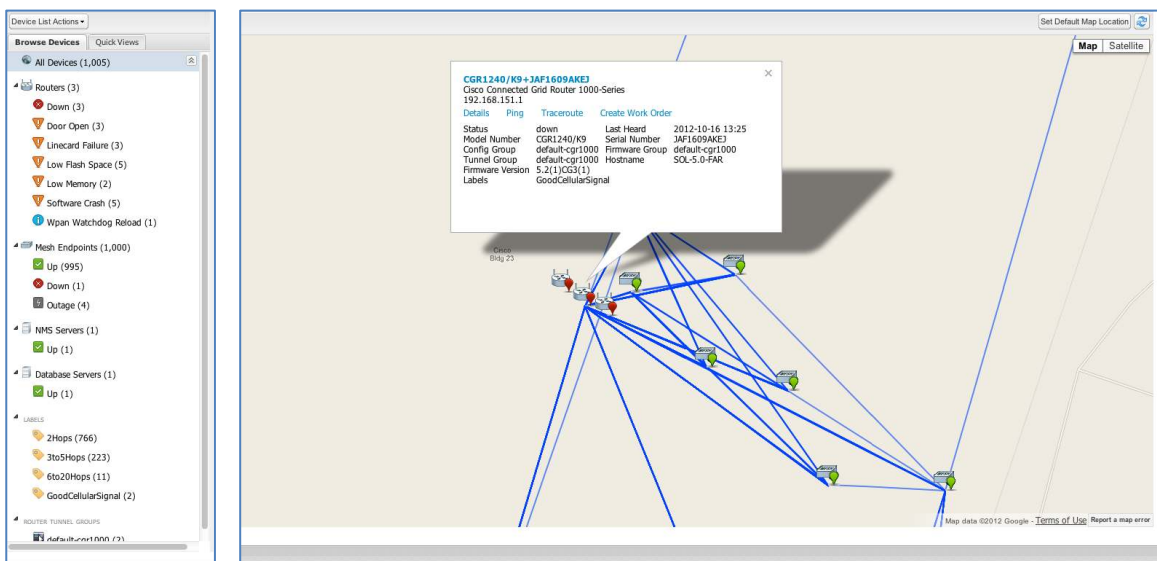


Table 1 shows the core functionality for managing a multi-service communication network with CG-NMS.

Table 1. Cisco Connected Grid Management Functionality

Fault Management	<ul style="list-style-type: none"> • Fault event collection, filtering, and correlation for communication network monitoring • Supports a variety of fault-event mechanisms for threshold-based rule processing, custom alarm generation, and alarm event processing • Faults can be visualized on a color-coded GIS-map view for the various endpoints in the utility network (e.g. AMI endpoints) • Allows operator-level custom, fault-event generation, processing, and forwarding to various utility applications such as an outage management system • Automatic issue tracking based on events collected
Configuration Management	<ul style="list-style-type: none"> • Performs over-the-air software and firmware upgrades to field devices like Cisco Connected Grid Routers and connected grid endpoints (e.g. AMI meter endpoints) • Allows centralized configuration management, including change control enforced through operator role-based access control • Delivers flexible device grouping options, including policy-based management and methods for deploying configuration changes
Accounting Management	<ul style="list-style-type: none"> • Logs access information for user activity for audit, regulatory compliance, and Security Event and Incident Management (SEIM) integration • Simplifies management and enhances compliance by integrated monitoring, reporting, and troubleshooting capabilities
Performance Management	<ul style="list-style-type: none"> • Displays color-coded, real-time performance information on a GIS-based map • Provides standard set of metric parameter collection as it relates to the utility operations network (e.g. AMI mesh and backhaul network) • Provides a powerful threshold-based rule processing engine for exception reporting and visualization on GIS map in real time • Customizable metric collection frequency, along with historical trend reporting to suit utility operational needs
End-to-End Security Management	<ul style="list-style-type: none"> • Fully automated, highly secure zero-touch deployment for Cisco Connected Grid Routers and connected grid endpoints (e.g. smart meters) • Provisions a mobile field technician with time-bound security credentials to perform authorized field maintenance • Integrates with enterprise security policies and role-based access control for AMI network devices • Provides device-level authentication through AAA and RADIUS integration, and alerts operators of attempted rogue device access to communication networks • Integrates with standard SEIM to help enable utility security and reporting needs (NERC-CIP Compliance)
GIS-Map Visualization, Diagnostics, and Troubleshooting Tools	<ul style="list-style-type: none"> • Allows entire network and security management function visualization on a GIS-map view for operator ease of use • Color-coded state view provided for a network operator to easily pinpoint network regions and devices to troubleshoot • Provides real-time troubleshooting using ping and traceroute with visual output on a GIS-map with primary metrics for each link, node, and endpoint
Northbound API	<ul style="list-style-type: none"> • Allows ease of integration for existing utility applications like outage management system (OMS), meter data management (MDM), trouble-ticketing systems, and manager-of-managers

Recommended Hardware Configuration

Table 2 lists recommended generic hardware configurations for running Cisco CG-NMS software to manage up to 1,000,000 AMI endpoints. For large-scale deployments, additional servers are recommended with the same profile for every additional 1,000,000 end-points, up to a maximum of five million endpoints.

Further, CG-NMS software uses enterprise database servers to store configuration and state information in an Oracle database.

Table 2. Recommended Hardware Configurations

Hardware Server	Operating System	Hardware Profile, Software, and Network Connectivity Requirements
CG NMS Application Server Software	Red Hat Enterprise Linux 5.8 or later	2 CPU - Intel Dual core Xeon x5000 series, with 32 GB RAM, with 500 GB storage or more
CG NMS Database Server (Oracle)	Red Hat Enterprise Linux 5.8 or later	Oracle® 11g Enterprise Edition 11.2.0.3 with Replication 2 CPU - Intel multicore Xeon x5000 series, with 192 GB RAM, storage 2.5 TB or more, At least 8 disks (15k+ RPM each, 16 with RAID 10 configuration)
Web Browser Client	N/A	Microsoft Internet Explorer Access to Internet (for GIS maps access)

High Availability

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

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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