CHAPTER 1

Overview of the CG-NMS North Bound API

This chapter provides a general description of the North Bound API (NB API) supported by Cisco Connected Grid Network Management System (Cisco CG-NMS, or CG-NMS).

API Overview

The CG-NMS maintains a database of inventory information about network devices, groups, properties, metrics, and events. You can access the database using the CG-NMS web interface. You can also access the database using the CG-NMS NB API.

The CG-NMS NB API is a Simple Object Access Protocol (SOAP) API that provides methods for:

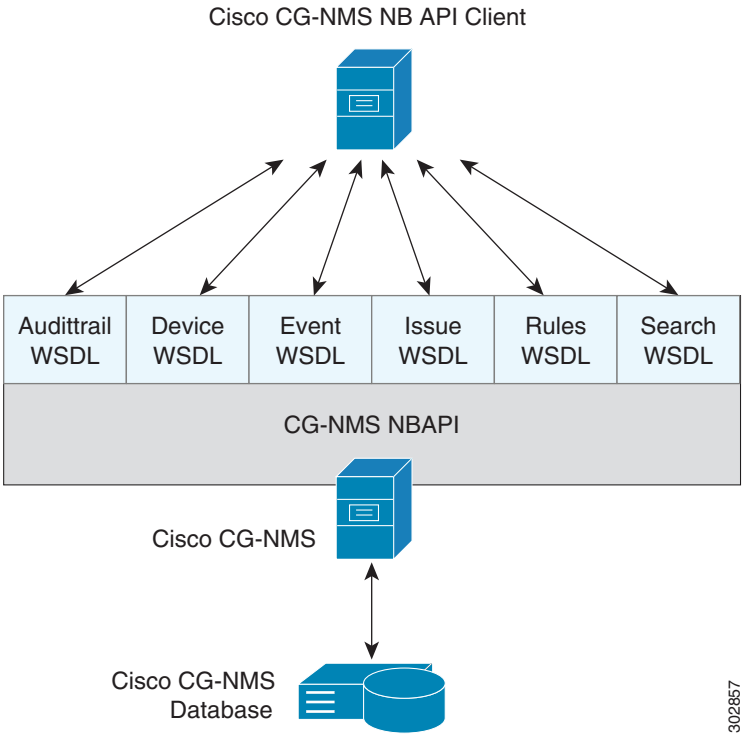
- Read-only access to the CG-NMS database
- Push-based event reporting

Many of these API methods return lists of identifiers or objects. Because these lists could potentially be very long in a large network, every method has three optional arguments: queryId, count, and offset.

When no argument is included, the method call returns the first count list items. The maximum count is 1000 items.

To iterate through the full contents of a list, select a queryId, which is a random string. Then repeat the method call with the same queryId, and increment the offset by count for each call, starting from 0. When the method call returns an empty list, the iteration is finished, and the queryId is invalidated on the server. Reusing the queryId starts the request again from the beginning. If a particular queryId is not used for 10 minutes, it will be cleared to conserve resources.

The API uses HTTPS and HTTP Basic Authentication for username and password authorization.


Cisco CG-NMS NB API Client
Audittrail WSDL
Device WSDL
Event WSDL
Issue WSDL
Rules WSDL
Search WSDL
CG-NMS NBAPI
Cisco CG-NMS
Cisco CG-NMS Database
302857

CG-NMS NB API Modules

CG-NMS defines the following API modules:

API Module	WSDL URL	Methods
audittrail Audit Trail API, page 2-1	http://<*server_address*>/nbapi/audittrail?wsdl	deleteAuditTrailsByTime getAuditTrailsByOperation getAuditTrailsByTime getAuditTrailsByUser getAuditTrailsByUserAndIp getAuditTrailsByUserAndOperation getAuditTrailsByUserIpAndOperation
device Device Management API, page 3-1	http://<*server_address*>/nbapi/device?wsdl	addDevices exportDevices getJob removeDevices setDevices updateDevices
event Event API, page 4-1	http://<*server_address*>/nbapi/event?wsdl	searchEvents subscribeForCgmeshOutage subscribeForEvents unSubscribeForCgmeshOutage unSubscribeForEvents
issue Issue API, page 5-1	http://<*server_address*>/nbapi/issue?wsdl	searchIssues
rules Rules API, page 6-1	http://<*server_address*>/nbapi/rules?wsdl	activateRule createRule deactivateRule dropRule findRulesByName findRulesByUsername
search Search API, page 7-1	http://<*server_address*>/nbapi/search?wsdl	getDeviceDetails getGroups getMetricHistory searchDevices

To view an API's WSDL from a web browser, use this URL format:

http://<*server_address*>/nbapi/<*api*>?wsdl

For example:

http://10.27.167.19/nbapi/event?wsdl

Query Syntax

The CG-NMS NB API supports the following simple query language:

Search `:= filter ?[filter ...]`

Filter `:= Filter := <fieldName><operator><value>`

operator `:= < | <= | > | >= | <> | = | :`

Here are examples of search queries:

"deviceType:cgr1000 uptime>=100 uplinkTxDrops<-50"

"deviceType:cgmesh uptime>=100"

"" (search everything)

"uptime>=100 status:up"

"eid:xyz"

"xyz"

Property Field Names for All Devices

Table 1-1 describes the property field names available to all devices. The field names are case sensitive.

Table 1-1 Property Field Names for All Devices

Field Name	Type	Description	Example
eid	string	Unique identifier for the device. For routers and communication modules, this is the string representation of the X.500 distinguished name subject ID contained in the devices X.509 certificate. This field name is obtained from the notice-of-shipment file.	r1
deviceType	enum	Identifier for the device type, which indicates which CG-NMS module will be used to coordinate communications with the device. For routers, this will always be **cgr1000.** For communication modules, this will always be **cgmesh**. Obtained from the notice-of-shipment file.	cgmesh
ip	string	Primary IP address that CG-NMS uses to contact the device. Can be IPv4 or IPv6. Obtained when the device registers with the CG-NMS.	1.1.1.1

Table 1-1 Property Field Names for All Devices (continued)

Field Name	Type	Description	Example
lat	decimal	Latitude of the device, obtained from manual CSV import.	10
lng	decimal	Longitude of the device, obtained from manual CSV import.	-11.1
alt	decimal	Altitude of the device, obtained from manual CSV import.	10
mapLevel	decimal integer	Minimum map zoom level at which the device is displayed on the map, which is useful for visualization of larger networks. Obtained from manual CSV import. Optional field.	16
geoHash	string	String hash of the device's latitude and longitude values used for automatic hierarchical grid-based clustering of the devices.	
lastHeard	timestamp	Time at which the device was last heard from or contacted. This is used as the primary determiner of device activity level and status. Automatically set whenever the device reports to the CG-NMS or the CG-NMS contacts the device.	2011-05-02 00:00:00
status	enum	Current status of the device, which is automatically set by CG-NMS. Values are limited to up, down, and unheard.	up
certC	string	X.500 country name from the certificate subject, if one exists. Obtained from the notice-of-shipment file, as are the rest of the "cert" properties.	
certST	string	X.500 state or province name, if one exists.	
certL	string	X.500 locality name, if one exists.	
certO	string	X.500 organization name, if one exists.	
certOU	string	X.500 organizational unit name, if one exists.	
certCN	string	X.500 common name, if one exists.	
certSN	string	X.500 serial number, if one exists.	
pid	string	Product ID for the device. For routers and communication modules, this is the Cisco Secure Unique Device Identifier (SUDI) product ID from the certificate.	
vid	string	Version ID for the device. For routers and communication modules, this is obtained from the SUDI.	
sn	string	Serial number for the device.	

Property Field Names for Supported Routers

Table 1-2 describes the property field names available to supported Connected Grid routers. The field names are case sensitive.

Table 1-2 Property Field Names for Supported Routers

Field Name	Type	Description
meshAddress	string	IP address of the mesh link, which is assigned automatically by the CG-NMS during registration.
meshLocalAddress	string	Local WPAN address of the mesh link, which is assigned automatically by the CG-NMS during registration.
meshPrefix	string	Subnet prefix address.
meshPrefixLength	string	Subnet prefix address length.
meshPanid	string	Subnet Private Area Network (PAN) ID.

Property Field Names for Communications Modules

Table 1-3 describes the property field names available to communications modules. The field names are case sensitive.

Table 1-3 Property Field Names for Communications Modules

Field Name	Type	Description
meshAddress	string	IP address of the mesh link, which is assigned automatically by the CG-NMS during registration.
meshLocalAddress	string	Local WPAN address of the mesh link, which is assigned automatically by the CG-NMS during registration.
meshPrefix	string	Subnet prefix address.
meshPrefixLength	string	Subnet prefix address length.
meshPanid	string	Subnet PAN ID.

Metrics Field Names

Metrics collected by CG-NMS are defined per device type, and maintained in a XML file specific to each device type. CG-NMS locates the XML files after it loads the boot strap image.

Note Metrics defined for interfaces should not be used for search.

Metrics for Communication Modules

Table 1-4 describes the metrics for communication modules.

Table 1-4 Metrics for Communication Modules

Metric Name	Unit	Min.	Max	Description
uptime	sec.	0	31536000	Amount of time in seconds that the element has been running since last boot.
meshTxSpeed	bits/sec.	0	76800	Current speed of data transmission over the uplink network interface, measured in bits per second, averaged over a short element-specific time period.
meshTxDrops	drops/sec.	0	1	Rate of packets that were dropped while trying to transmit on the uplink interface because the outbound queue was full.
meshRxSpeed	bits/sec.	0	76800	Rate of data that has been received by the uplink network interface, measured in bits per second, averaged over a short element-specific time period.
meshRxReassemblyDrops	drops/sec.	0	1	Rate of incoming packet fragments that were dropped because there was no space in the reassembly buffer.
meshHops	hops	1	8	Number of hops that the element is from the root of its RPL routing tree.
meshLinkCost		1	3	RPL cost value for the link between the element and its uplink neighbor.
meshPathCost		1	24	RPL path cost value between the element and the root of the routing tree.
meshRssi	dBm	-80	20	Measured RSSI value of the primary mesh RF uplink.
meshReverseRssi	dBm	-80	20	RSSI value measured by the element's mesh uplink neighbor.

Metrics for Communication Module Loopback Interface

Table 1-5 describes the metrics for communication modules loopback interface.

Table 1-5 Metrics for Communication Modules Loopback Interface

Metric Name	Unit	Min.	Max	Description
txSpeed	bit/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period (e.g. an hour).
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
rxSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period (e.g. an hour).
txUnicastPackets	packets/sec	0	76800	Current packet receive rate over the interface, measured in packets per second, averaged over a short element-specific time period (e.g. an hour).

Metrics for WPAN Module Interfaces

Table 1-6 describes the metrics for WPAN module interfaces.

Table 1-6 Metrics for the WPAN Module Interfaces

Metric Name	Unit	Min	Max	Description
txSpeed	bits/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period (e.g. an hour).
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
txSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period (e.g. an hour).

Table 1-6 Metrics for the WPAN Module Interfaces

Metric Name	Unit	Min	Max	Description
txUnicastPackets	packets/sec	0	76800	Current packet send rate over the interface, measured in packets per second, averaged over a short element-specific time period (e.g. an hour).
rxUnicastPackets	packets/sec	0	76800	Current packet receive rate over the interface, measured in packets per second, averaged over a short element-specific time period (e.g. an hour).

Metrics for PPP Interfaces

Table 1-7 describes the metrics for PPP interfaces.

Table 1-7 Metrics for PPP Interfaces

Metric Name	Unit	Min	Max	Description
txSpeed	bits/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period.
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
rxSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period.
txUnicastPackets	packets/sec	0	76800	Current packet send rate over the interface, measured in packets per second, averaged over a short element-specific time period.
rxUnicastPackets	packets/sec	0	76800	Current packet receive rate over the interface, measured in packets per second, averaged over a short element-specific time period.

Metrics for RPL Interfaces

Table 1-8 describes the metrics for Routing Protocol for Low Power and Lossy Networks (RPL) interfaces.

Table 1-8 Metrics for RPL Interfaces

Metric Name	Unit	Min	Max	Description
hops	hops	1	8	Number of hops that the element is from the root of it's RPL tree.
linkCost		1	3	RPL cost value for the link between the element and it's uplink neighbor.
pathCost		1	24	RPL path cost value between the element and the root of the routing tree.
rssi	dBm	-80	20	Measured RSSI value of the primary mesh RF uplink.
reverseRSSI	dBm	-80	20	RSSI value measured by the element's mesh uplink neighbor.

Metrics for Supported Connected Grid Routers

Table 1-9 describes the metrics for supported routers.

Table 1-9 Metrics for Supported Routers

Metric Name	Unit	Min	Max	Description
uptime	sec	0	31536000	Amount of time, in seconds, that the element has been running since last boot.
batteryLevel	%	0	100	Percentage of charge remaining in the first battery.
batteryLevel2	%	0	100	Percentage of charge remaining in the second battery.
batteryRuntime	minutes	0	65535	Runtime remaining on the first battery.
batteryRuntime2	minutes	0	65535	Runtime remaining on the second battery.
chassisTemp	celsius	0	100	Internal temperature of the device.
cellRSSI	dBm	-100	0	Cell received Signal Strength Indicator (RSSI).
meshEndpointCount	devices	0	10000	Number of active mesh endpoints connected to this element.
uplinkTxSpeed	bits/sec	0	500000	Current speed of data transmission over the uplink network interface, measured in bits per second, averaged over a short element-specific time period.

Table 1-9 Metrics for Supported Routers

Metric Name	Unit	Min	Max	Description
uplinkTxDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the uplink interface because the outbound queue was full.
uplinkRxSpeed	bits/sec	0	3000000	Rate of data that has been received by the uplink network interface, measured in bits per second, averaged over a short element-specific time period.
uplinkRxDrops	drops/sec	0	1	Rate of packets that were received on the uplink interface, but then dropped because the inbound queue was full.
uplinkRssi	dBm	-100	-50	Measured RSSI value of the primary RF uplink used for all RF uplinks.
meshTxSpeed	bits/sec	0	7600	Current speed of data transmission over the uplink network interface, measured in bits per second, averaged over a short element-specific time period.
meshTxDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the uplink interface because the outbound queue was full.
meshRxSpeed	bits/sec	0	76800	Rate of data that has been received by the uplink network interface, measured in bits per second, averaged over a short element-specific time period.
meshRxReassemblyDrops	drops/sec	0	1	Rate of incoming packet fragments that were dropped because there was no space in the reassembly buffer.
meshRoutes	entries	0	1000	Number of entries that a given router has in its source-route table. This is a method to measure the number of elements in a given Private Area Network (PAN).

Metrics VPN Interfaces

Table 1-10 describes the metrics for the VPN interfaces.

Table 1-10 Metrics for VPN Interfaces

Metric Name	Unit	Min	Max	Description
txSpeed	bits/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period.
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
txSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period.

Metrics for 3G Interfaces

Table 1-11 describes the metrics for 3G interfaces.

Table 1-11 Metrics for 3G Interfaces

Metric Name	Unit	Min	Max	Description
txSpeed	bits/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period.
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
txSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period.

Metrics for WiMAX Interfaces

Table 1-12 describes the metrics for WiMAX interfaces.

Table 1-12 Metrics for WiMAX Module Interfaces

Metric Name	Unit	Min	Max	Description
txSpeed	bits/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period.
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
txSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period.

Metrics for WPAN Interfaces

Table 1-13 describes the metrics for the WPAN interfaces.

Table 1-13 Metrics for WPAN Interfaces

Metric Name	Unit	Min	Max	Description
txSpeed	bits/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period.
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
txSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period.

Metrics for Management Interfaces

Table 1-14 describes the metrics for management interfaces.

Table 1-14 Metrics for Management Interfaces

Metric Name	Unit	Min	Max	Description
txSpeed	bits/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period.
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
txSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period.

Metrics for Ethernet Interfaces

Table 1-15 describes the metrics for Ethernet interfaces.

Table 1-15 Metrics for Ethernet Interfaces

Metric Name	Unit	Min	Max	Description
txSpeed	bits/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period.
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
txSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period.

Metrics for Serial Interfaces

Table 1-16 describes the metrics for the serial interfaces.

Table 1-16 Metrics for Serial Interfaces

Metric Name	Unit	Min	Max	Description
txSpeed	bits/sec	0	76800	Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period.
txDrops	drops/sec	0	1	Rate of packets that were dropped while trying to transmit on the interface because the outbound queue was full.
txSpeed	bits/sec	0	76800	Rate of data that has been received by the network interface, measured in bits per second, averaged over a short element-specific time period.