# Overview of the IoT FND North Bound API

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## Overview

IoT FND maintains a database of inventory information about network devices, groups, properties, metrics, and events. You can use NB API to retrieve network statistics and properties for deployed networked devices. You can also access the database using the IoT FND NB API (Database Queries).

The IoT FND NB API is a Simple Object Access Protocol (SOAP) API that provides methods for:

- Read-only access to the IoT FND database

- Push-based event reporting

- Invoking management operations such as mesh firmware updates, rule creation, and mesh migration

Many APIs return lists of identifiers or objects. Because these lists could be very long in a large network, every method has three optional arguments: queryId, count, and offset. NB APIs use the Web Services Description Language (WSDL) to define network services.

When no argument is included, the 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 call using the same queryId, and increment the offset by *count* for each call, starting from 0. When the call returns an empty list, the iteration is complete, and the queryId is invalidated on the server. Reusing queryId starts the request from the beginning. If a particular queryId is not used for 10 minutes, it is cleared to conserve resources.

The API uses HTTPS and HTTP Basic Authentication for username and password authorization, and for sending event data.

**Note**   IoT FND Release 2.1.1-54 and later do not support TLSv1.0 or TLSv1.1 based connections. Only TLS1.2 based connections are supported.

**Figure 1: Database Queries**
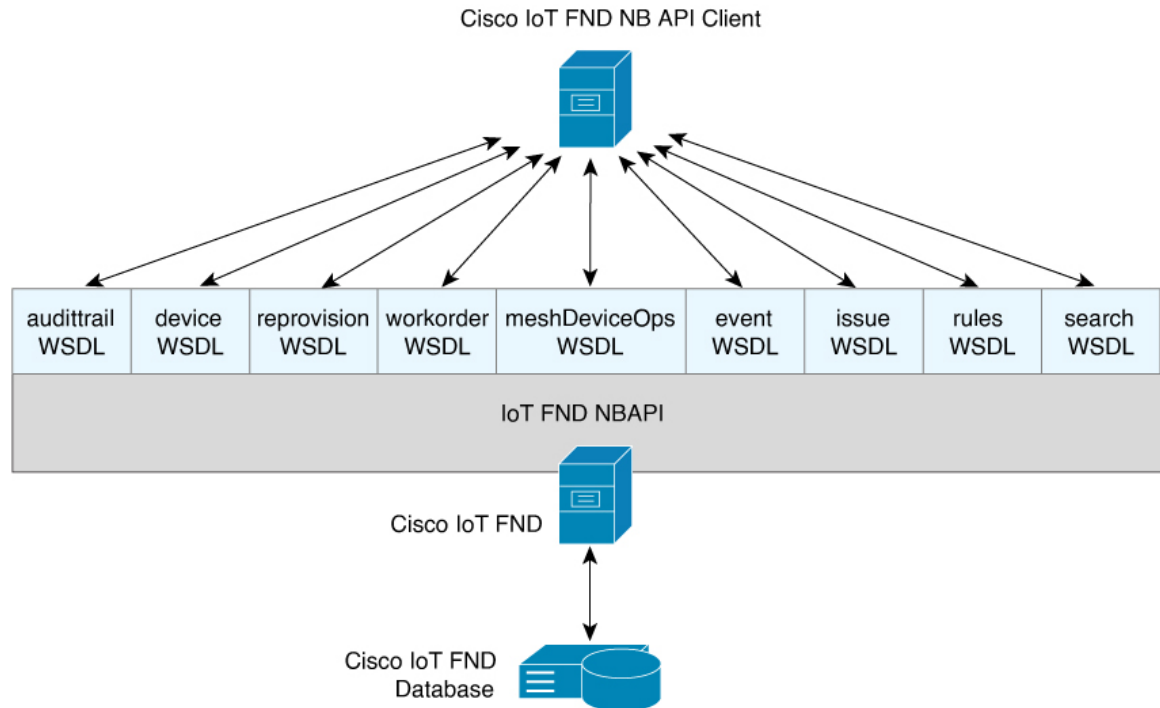


## Document Conventions

This document uses the following conventions:

| Conventions | Indication |
|---|---|
| **bold** font | Commands and keywords and user-entered text appear in **bold** font. |
| *italic* font | Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font. |
| [ ] | Elements in square brackets are optional. |
| {x \| y \| z } | Required alternative keywords are grouped in braces and separated by vertical bars. |
| [ x \| y \| z ] | Optional alternative keywords are grouped in brackets and separated by vertical bars. |
| string | A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks. |
| courier font | Terminal sessions and information the system displays appear in courier font. |
| < > | Nonprinting characters such as passwords are in angle brackets. |
| [ ] | Default responses to system prompts are in square brackets. |
| !, # | An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line. |

| Note | Means *reader take note* . Notes contain helpful suggestions or references to material not covered in the manual. |

| Caution | Means *reader be careful*. In this situation, you might perform an action that could result in equipment damage or loss of data. |

| Danger | **IMPORTANT SAFETY INSTRUCTIONS Means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.** |

# Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at: http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html .

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# IOT FND NB API Modules

IoT FND defines the following API modules:

| API Module | WSDL URL | Method Calls |
| --- | --- | --- |
| audittrail<br><br>Audit Trail API | https://<*server_address*><br>/nbapi/audittrail?wsdl | deleteAuditTrailsByTime<br><br>getAuditTrailsByOperation<br><br>getAuditTrailsByTime<br><br>getAuditTrailsByUser<br><br>getAuditTrailsByUserAndIp<br><br>getAuditTrailsByUserAndOperation<br><br>getAuditTrailsByUserIpAndOperation |

| API Module | WSDL URL | Method Calls |
|---|---|---|
| device<br><br>Device Management API | https://<*server_address*><br>/nbapi/device?wsdl | addDevices<br><br>exportDevices<br><br>getJob<br><br>removeDevices<br><br>setDevices<br><br>updateDevices |
| reprovision<br><br>Mesh Firmware Migration API | https://<*server_address*><br>/nbapi/reprovision?wsdl | cancelReprovision<br><br>showReprovisionStatus<br><br>startReprovisionByEidList<br><br>startReprovisionByEidListAbridged<br><br>startReprovisionByGroup<br><br>startReprovisionByGroupAbridged |
| meshDeviceOps<br><br>Firmware Upgrade API | https://<*server_address*><br>/nbapi/meshDeviceOps?wsdl | getFirmwareUploadStatus<br><br>getFirmwareImageInfoList<br><br>scheduleReload<br><br>setBackupFirmwareImage<br><br>startUpload<br><br>stopUpload |
| **Note** Firmware upgrades are only supported on Cisco IOS. | | |
| workorder<br><br>Workorders API | https://<*server_address*><br>:portnumber/nbapi/workorder | RequestUserAuthentication<br><br>RequestSignedAuthorization<br><br>UploadServiceReport |
| event<br><br>Event API | https://<*server_address*><br>/nbapi/event?wsdl | searchEvents<br><br>subscribeForCgmeshOutage<br><br>subscribeForEvents<br><br>unSubscribeForCgmeshOutage<br><br>unSubscribeForEvents |
| issue<br><br>Issues API | https://<*server_address*><br>/nbapi/issue?wsdl | searchIssues |

| API Module | WSDL URL | Method Calls |
|---|---|---|
| rules<br><br>Rules API | https://*<server_address>*<br>/nbapi/rules?wsdl | activateRule<br><br>createRule<br><br>deactivateRule<br><br>dropRule<br><br>findRulesByName<br><br>findRulesByUsername |
| search<br><br>Search API | https://*<server_address>*<br>/nbapi/search?wsdl | getDeviceDetails<br><br>getDeletedDevices<br><br>getUpdatedDeviceDetails<br><br>getGroups<br><br>getMetricHistory<br><br>searchDevices<br><br>findEidsForIpAddress<br><br>findEidsForIpAddressByDeviceType |

To view the WSDL of the API in a Web browser, use this URL format:

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

For example:

https://10.27.167.19/nbapi/event?wsdl

# Query Syntax

The IoT FND NB API supports the following simple query language:

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

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

- Operator := < | <= | > | >= | <> | = | :

**Search query examples:**

```
"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

The following table describes the property field names available to all devices. Field names are case sensitive.

*Table 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. | CGR1240/K9<br>CGR1120/K9 |
| deviceType | enum | Identifier for the device type that indicates which IoT FND module coordinates communications with the device.<br><br>• Cisco Connected Grid Routers 1000 series are **cgr1000**<br><br>• Cisco Aggregation Services Routers 1000 series are **asr1000**<br><br>• Cisco Integrated Services Routers 3900 series are **isr3900**<br><br>• Cisco 8000 Series Routers are **c8000**<br><br>• Cisco 800 Series Integrated Services Routers (ISR 800s) are **c800**<br><br>• Cisco 800 Series Integrated Services Routers (IR 800s) are **ir800**<br><br>• Cisco 800 Series Access Points are **ap800**<br><br>• Cisco Catalyst IR8100 Heavy Duty Series Routers are **ir8100**<br><br>• Cisco 500 Series Wireless Personal Area Network (WPAN) Industrial Routers (IR 500) are **ir500**<br><br>• Communications modules are **cgmesh**<br><br>• The IoT FND database is **db**<br><br>This identifier is obtained from the notice-of-shipment file. | cgmesh<br>cgr1000 |
| ip | string | Primary IP address that IoT FND uses to contact the device. Can be IPv4 or IPv6. This address is obtained when the device registers with IoT FND. | 1.1.1.1 |
| 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. This is useful for viewing large networks. This value is obtained from manual CSV import and is an optional field. | 16 |
| geoHash | string | String hash latitude and longitude values that are used for automatic hierarchical grid-based clustering of the devices. | s1qeg9spc8n95rrw1dww7 |

| Field Name | Type | Description | Example |
|---|---|---|---|
| lastHeard | timestamp | Time when the device was last heard from or contacted. This is used as the primary determiner of device activity level and status.<br><br>This value is automatically set when the device reports to the IoT FND or the IoT FND contacts the device. | 2011-05-02 00:00:00 |
| status | enum | Current status of the device automatically set by IoT FND. Values are limited to up, down, and unheard. | up |
| certC | string | X.500 country name from the certificate subject, if one exists. This value is obtained from the notice-of-shipment file, as are all "cert" properties. | US |
| certST | string | X.500 state or province name, if one exists. | CA |
| certL | string | X.500 locality name, if one exists. | San Jose |
| certO | string | X.500 organization name, if one exists. | Cisco Systems, Inc. |
| certOU | string | X.500 organizational unit name, if one exists. | Operations Department |
| certCN | string | X.500 common name, if one exists. | App Client |
| certSN | string | X.500 serial number, if one exists. | 12:34:A4:B9 |
| 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. | CGR1240/K9 |
| vid | string | Version ID for the device. Obtained from the SUDI for routers and communication modules. | 1.0 |
| sn | string | Serial number for the device. | JAF1741ALPA |

## Property Field Names for Supported Routers

The following table describes the property field names available to supported Connected Grid routers. The field names are case sensitive.

*Table 2: Property Field Names for Supported Routers*

| Field Name | Type | Description |
|---|---|---|
| activeLinkType | string | Physical link type over which device communicates with other devices, including IoT FND. |
| endUserIPv6Prefix | string | End user IPv6 address for basic mapping rule for the device. |
| endUserIPv6PrefixLen | string | Prefix length for the end user IPv6 address. |
| mapTipv6Address | string | Map-T settings IPv6 address. |
| mapTipv4Address | string | Map-T settings IPv4 address. |

| Field Name | Type | Description |
|---|---|---|
| mapTpsid | string | Map-T status PSID. |
| meshAddress | string | IP address of the mesh link automatically assigned by IoT FND during registration. |
| meshLocalAddress | string | Local WPAN address of the mesh link automatically assigned by IoT FND during registration. |
| meshPrefix | string | Subnet prefix address. |
| meshPrefixLength | string | Subnet prefix address length. |
| meshPanid | string | Subnet Private Area Network (PAN) ID. |

## Properties Field Names for Range Extenders

Property Field Names for Range Extenders table describes the property field names available to range extenders. The field names are case sensitive.

**Table 3: Property Field Names for Range Extenders**

| Field Name | Type | Description |
|---|---|---|
| batteryState | string | Determine the current battery state. |
| bbuManufacturer | string | The manufacturer of the Battery Backup Unit (BBU). |
| bbuPid | string | The physical model name of the BBU. |
| bbuPresent | string | The BBU hardware is present. |
| bbuReady | string | The BBU is ready. |
| bbuSn | string | The serial number of the BBU. |
| bbuVid | string | The physical hardware version of the BBU. |
| powerSource | string | Determine if the device is running on AC or DC power. |

## Property Field Names for Communications Modules

The following table describes the property field names available to communications modules. The field names are case sensitive.

**Table 4: Property Field Names for Communications Modules**

| Field Name | Type | Description |
|---|---|---|
| meshAddress | string | The IP address of the mesh link automatically assigned by IoT FND during registration. |

| Field Name | Type | Description |
|---|---|---|
| meshLocalAddress | string | Local WPAN address of the mesh link automatically assigned by IoT FND during registration. |
| meshPrefix | string | Subnet prefix address. |
| meshPrefixLength | string | Subnet prefix address length. |
| meshPanid | string | Subnet PAN ID. |

# Metrics Field Names

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

**Note** Do not use metrics defined for interfaces for searches.

## Metrics for Communication Modules

The following table describes the metrics for communication modules.

*Table 5: Metrics for Communication Modules*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| uptime | sec | 0 | 31536000 | Amount of time, in seconds, that the module has been running since last boot. |
| meshTxSpeed | b/s | 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 dropped while trying to transmit on the uplink interface because the outbound queue was full. |
| meshRxSpeed | b/s | 0 | 76800 | Rate of data 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 dropped because there was no space in the reassembly buffer. |
| meshHops | hops | 1 | 8 | Number of hops 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 mesh uplink neighbor. |

## Metrics for Communication Module Loopback Interface

The following table describes the metrics for communication modules loopback interface.

*Table 6: Metrics for Communication Modules Loopback Interface*

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

## Metrics for WPAN Module Interfaces

The following table describes the metrics for WPAN module interfaces.

*Table 7: Metrics for the WPAN Module Interfaces*

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

## Metrics for PPP Interfaces

The following table describes the metrics for PPP interfaces.

*Table 8: Metrics for PPP Interfaces*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| txSpeed | b/s | 0 | 76800 | Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period. |

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| txDrops | drops/sec | 0 | 1 | Rate of packets dropped while trying to transmit on the interface because the outbound queue was full. |
| rxSpeed | b/s | 0 | 76800 | Rate of data 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

The following table describes the metrics for Routing Protocol for Low Power and Lossy Networks (RPL) interfaces..

*Table 9: Metrics for RPL Interfaces*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| hops | hops | 1 | 8 | Number of hops the element is from the root RPL tree. |
| linkCost | – | 1 | 3 | RPL cost value for the link between the element and its 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

The following table describes the metrics for supported routers.

*Table 10: Metrics for Supported Routers*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| 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. |
| cellRSSI | dBm | -100 | 0 | Cell Received Signal Strength Indicator (RSSI). |
| chassisTemp | Celsius | 0 | 100 | Internal temperature of the device. |

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| meshEndpointCount | devices | 0 | 10000 | Number of active mesh endpoints connected to this element. |
| 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 PAN. |
| meshRxReassemblyDrops | drops/sec | 0 | 1 | Rate of incoming packet fragments dropped because there was no space in the reassembly buffer. |
| meshRxSpeed | b/s | 0 | 76800 | Rate of data received by 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 dropped while trying to transmit on the uplink interface because the outbound queue was full. |
| meshTxSpeed | b/s | 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. |
| serial0rxSpeed | b/s | 0 | 100000000 | Receive rate for the Serial 0 interface. |
| serial0txSpeed | b/s | 0 | 100000000 | Transmit rate for Serial 0 interface. |
| serial1rxSpeed | b/s | 0 | 100000000 | Receive rate for the Serial 1 interface. |
| serial1txSpeed | b/s | 0 | 100000000 | Transmit rate for Serial 1 interface. |
| uplinkRssi | dBm | -100 | -50 | Measured RSSI value of the primary RF uplink used for all RF uplinks. |
| uplinkRxDrops | drops/sec | 0 | 1 | Rate of packets received on the uplink interface, but then dropped because the inbound queue was full. |
| uplinkRxSpeed | b/s | 0 | 3000000 | Rate of data received by the uplink network interface, measured in bits per second, averaged over a short element-specific time period. |
| uplinkTxDrops | drops/sec | 0 | 1 | Rate of packets dropped while trying to transmit on the uplink interface because the outbound queue was full. |
| uplinkTxSpeed | b/s | 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. |
| uptime | sec | 0 | 31536000 | Amount of time, in seconds, that the element has been running since last boot. |

## Metrics for VPN Interfaces

The following table describes the metrics for the VPN interfaces.

*Table 11: Metrics for VPN Interfaces*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| txSpeed | b/s | 0 | 76800 | Current speed of data transmission over the interface, measured in bits per second, averaged over a short element-specific time period. |

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

## Metrics for 3G Interfaces

The following table describes the metrics for 3G interfaces.

*Table 12: Metrics for 3G Interfaces*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| txSpeed | b/s | 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 dropped while trying to transmit on the interface because the outbound queue was full. |
| txSpeed | b/s | 0 | 76800 | Rate of data received by the network interface, measured in bits per second, averaged over a short element-specific time period. |

## Metrics for WiMax Interfaces

The following table describes the metrics for WiMAX interfaces.

*Table 13: Metrics for WiMAX Module Interfaces*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| txSpeed | b/s | 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 dropped while trying to transmit on the interface because the outbound queue was full. |
| txSpeed | b/s | 0 | 76800 | Rate of data received by the network interface, measured in bits per second, averaged over a short element-specific time period. |

## Metrics for WPAN Interfaces

The following table describes the metrics for the WPAN interfaces.

*Table 14: Metrics for WPAN Interfaces*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| txSpeed | b/s | 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 dropped while trying to transmit on the interface because the outbound queue was full. |
| txSpeed | b/s | 0 | 76800 | Rate of data received by the network interface, measured in bits per second, averaged over a short element-specific time period. |

## Metrics for Management Interfaces

The following table describes the metrics for management interfaces.

*Table 15: Metrics for Management Interfaces*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| txSpeed | b/s | 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 dropped while trying to transmit on the interface because the outbound queue was full. |
| txSpeed | b/s | 0 | 76800 | Rate of data received by the network interface, measured in bits per second, averaged over a short element-specific time period. |

## Metrics for Ethernet Interfaces

The following table describes the metrics for Ethernet interfaces.

*Table 16: Metrics for Ethernet Interfaces*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| txSpeed | b/s | 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 dropped while trying to transmit on the interface because the outbound queue was full. |
| txSpeed | b/s | 0 | 76800 | Rate of data received by the network interface, measured in bits per second, averaged over a short element-specific time period. |

## Metrics for Serial Interfaces

The following table describes the metrics for the serial interfaces.

*Table 17: Metrics for Serial Interfaces*

| Metric Name | Unit | Min | Max | Description |
|---|---|---|---|---|
| txSpeed | b/s | 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 dropped while trying to transmit on the interface because the outbound queue was full. |
| txSpeed | b/s | 0 | 76800 | Rate of data received by the network interface, measured in bits per second, averaged over a short element-specific time period. |