Configure Collection

This section contains the following topics:

Collection Service Overview

Multiple applications requesting same data overload network devices causing outages. Cisco Crosswork Data Gateway's **Collection Optimization** feature tackles this problem by optimizing collection requests. Thereby, reducing redundant data collections.

Users with administrative privileges can monitor Collection Service status and performance, and start/stop/restart it or its underlying services, using the Cisco Crosswork Change Automation and Health Insights user interface. You can also collect logs and performance metrics for this service. For help with these tasks, see Manage Cisco Crosswork Network Automation.

Prerequisites for Device Model Driven Telemetry

The Cisco Crosswork Change Automation and Health Insights Collection Service configures telemetry as needed on the devices enrolled within the service.

Note If an operator configures telemetry directly on the same devices either manually or through some mechanism outside of the Collection Service, the commands must not contain the keyword `cw`. The keyword `cw` is reserved for use by the Collection Service. In particular, the following commands must not contain the keyword `cw` when configured outside of the Collection Service:

```
destination-group
sensor-group
subscription
        sensor-group-id
        destination-id
```

For example (invalid telemetry configuration):

```
telemetry model-driven
 destination-group CW_1b4ac245d863cf3e787d42bae97f1d18dd300d5e
```

For more information, see the telemetry configuration documentation for your particular device (for example: Telemetry Configuration Guide for Cisco ASR 9000)

For collection to work, the maximum number of interfaces on a single device must be less than 8,000. The cumulative count of interfaces across all devices must be less than 30,000.

Invalid Telemetry Configuration

The following sample output shows an *invalid* telemetry configuration on a device when configured outside of the Collection Service.

```
telemetry model-driven
 destination-group CW_1b4ac245d863cf3e787d42bae97f1d18dd300d5e
  address-family ipv4 172.16.2.31 port 31500
   encoding self-describing-gpb
   protocol tcp
  !
 !
 destination-group CW_6da4e808ed4724911f2288dbaeee605bb62f9617
  address-family ipv4 <IP_address> port 31500
   encoding self-describing-gpb
   protocol tcp
  !
 !
 destination-group CW_7ee5d52d7e513640f71417d4fcdb584c6a883f7c
  address-family ipv4 <IP_address> port 31500
   encoding self-describing-gpb
   protocol tcp
  !
 !
 destination-group CW_bbd6f2991d04e920fbda0f2a5ceb63d1c9f62cdf
  address-family ipv4 <IP_address> port 31500
   encoding self-describing-gpb
   protocol tcp
  !
```

Valid Telemetry Configuration

The following sample output shows a *valid* telemetry configuration on a device when configured outside of the Collection Service. Note that the <*IP_address*> referred to in this sample should not be the IP address of the Cisco Crosswork Change Automation and Health Insights server. It should be the IP address of the other data consumer.

```
telemetry model-driven
destination-group CUSTOM_X_1171424d5b08d674367318299db2f8a0d7d489e9
  address family ipv4 <IP_address> port <Port>
   encoding gpb
```

```
   protocol grpc no-tls
  !
!
sensor-group CUSTOM_X_1171424d5b08d674367318299db2f8a0d7d489e9
  sensor-path Cisco-IOS-XR-spirit-install-instmgr-oper:software-install/active
!
subscription CUSTOM_X_1171424d5b08d674367318299db2f8a0d7d489e9
  sensor-group-id CUSTOM_X_1171424d5b08d674367318299db2f8a0d7d489e9 sample-interval 70000
  destination-id CUSTOM_X_1171424d5b08d674367318299db2f8a0d7d489e9
!
```

Note The **sample-interval** can be changed depending on the size of your network. It is defined in milliseconds and determines how fast you want the data to be pushed out.

Confirm that all PCCs or provider edge routers have telemetry configured and report data to . For example, routers should report prefix and tunnel counters:

```
RP/0/RP0/CPU0:PE1#show traffic-collector ipv4 counters prefix
Thu Jul 11 08:32:32.993 UTC
Prefix Label Base rate TM rate State
(Bytes/sec) (Bytes/sec)
------------------------------ -------- ------------ ------------ ----------
192.168.0.1/32 16001 1 0 Active
192.168.0.2/32 16002 1 0 Active
192.168.0.3/32 16003 1 0 Active
192.168.0.4/32 16004 2 0 Active
192.168.0.6/32 16006 501023 501021 Active
192.168.0.7/32 16007 17320774 17320772 Active
192.168.0.8/32 16008 3737825 3737823 Active
192.168.0.9/32 16097 3 0 Active
192.168.0.10/32 16096 2 0 Active
```

```
RP/0/RP0/CPU0:PE1#show traffic-collector ipv4 counters tunnel
Thu Jul 11 08:32:20.746 UTC
Interface Base rate Base rate State
(Packet/sec) (Bytes/sec)
------------------------------ ------------ ------------ ----------
srte_c_102_ep_192.168.0.7 0 0 Active
```

Cisco IOS XR devices that are onboarded through telemetry must have the following configuration settings on the device to ensure that NETCONF and SSH work correctly:

```
ssh server v2
ssh server vrf default
ssh server netconf vrf default
ssh server rate-limit 600
ssh server session-limit 1024
netconf-yang agent ssh
```

Cisco IOS XR devices that are onboarded through SNMP must have SNMP enabled on the device. The following is an example of an SNMP configuration on a Cisco IOS XR device:

```
snmp-server community public RO
```

Please note that, currently, Cisco Crosswork Change Automation and Health Insights does not itself support execution of EXEC privilege commands, such as **enable**, on devices. These types of commands must be executed using the device console or other means.

About Collection Jobs

As mentioned earlier, Crosswork Data Gateway pulls functional images from the Crosswork. Each functional image represents a collection type. You can create multiple jobs for a given collection type. A collection job describes what task a Crosswork Data Gateway is expected to perform. Crosswork receives the data collection requests via these collection jobs and assigns to a Crosswork Data Gateway instance to serve the request.

You can collect more than one type of data at a time by using separate collection jobs.

For each collection job you create, Crosswork Data Gateway executes the collection request and deposits the collected data in the preferred data destination(s).

Crosswork Data Gateway lets you create three types of collection jobs:

CLI Collection Job

Enables CLI-based data collection (such as device configuration) from the network devices. The CLI collector uses XDE/PAL to collect device data for a given CLI. Only **show** commands are supported for this type of collection job.

SNMP Collection Job

Enables SNMP-based data collection based on the OIDs supported on the devices.

Supported SNMP versions include SNMPv1, SNMPv2c, and SNMPv3 for data polling and traps.

MDT Collection Job

Collects model driven telemetry data streamed from the device to the Crosswork Data Gateway.

Note

1. Crosswork Data Gateway drops incoming southbound traffic if there is no corresponding (listening) collection job request for the same. It also drops data/SNMP traps received from an unsolicitied device (i.e., not attached to Crosswork Data Gateway). Crosswork Data Gateway records this in log and notifies Crosswork.
2. Polled data cannot be requested from the device until Crosswork Data Gateway is ready to process and transmit the data. If it cannot keep up with the amount of data, it sends an error to northbound interface indicating when the throttling began and condition cleared.

Collection Job Payload Model

A collection job describes the following:

- Data to be collected.
- Devices from which collection is desired and credentials to authenticate.

- Collection intervals (a periodic interval no less than 60 seconds or greater than 32 days or immediately on demand.)
- Data Destinations where the collected data is to be deposited.

A single collection job can contain either CLI commands, SNMP MIB requests, or MDT subscriptions. Crosswork Data Gateway routes the request to the appropriate collector to fetch the requested data.

A collection job has three main parts:

```
//          Device Groups(s) -- identifies the different device groups from which data is
//                              to be collected and their authentication credentials.
//          Data Destinations(s) -- identifies the different output destination the final
data
//                               is sent to
//
```

Note Without clustered setup of external Kafka, if two destination nodes are specified, one is discarded.

Shown below is a sample collection job payload:

```
{
  "collection_job": {
    "application_context": {
      "context_id": "collection-job1",
      "application_id": "APP1"
    },
    "collection_mode": {
      "lifetime_type": "APPLICATION_MANAGED",
      "collector_type": "CLI_COLLECTOR"
    },
    "job_device_set": {
      "device_set": {
        "devices": {
          "device_ids": [
            "658adb03-cc61-448d-972f-4fcec32cbfe8"
          ]
        }
      }
    },
    "sensor_input_configs": [
      {
        "sensor_data": {
          "cli_sensor": {
            "command": "show platform"
          }
        },
        "cadence_in_millisec": "tel:60000"
      }
    ],
    "sensor_output_configs": [
     {
        "sensor_data": {
          "cli_sensor": {
            "command": "show platform"
          }
        },
        "destination": {
          "destination_id": "1e71f2fb-ea65-4242-8efa-e33cec71b369",
          "context_id": "topic1"
```

```
            }
        }
    ]
  }
}
```

The following table explains the fields of the above payload:

Field	Type	(M)andatory or (O)ptional	Description
collection_job	json object	M	Describes collection job with application context as key.
application_context	json object	M	Unique handle to identify your application's subscription. **Note** Combination of application ID and Context ID must be globally unique.
application_id	String	M	Unique identifier for the application. **Note** The prefix "`cw`" is reserved for Crosswork collection jobs and must not be used for jobs of other applications.
context_id	String	M	Unique identifier for the application subscription across all the collection jobs.
collection_mode	json object	M	A json object that holds lifetime type and collector type attributes of the collection job.
lifetime_type	string	O	Type of lifetime of job: • UNKNOWN_TEMPORAL_TYPE (default) • APPLICATION_MANAGED • CALENDAR_MANAGED • AUTO_DELETE_AFTER_N_SAMPLES

Field	Type	(M)andatory or (O)ptional	Description
collector_type	string	M	Type of the collector: • UNKNOWN_COLLECTOR (default) • CLI_COLLECTOR • SNMP_COLLECTOR • TRAP_COLLECTOR • MDT_COLLECTOR
n_collections	int	M	Number of collections to run before auto-deletion. Used only when lifetime_type is AUTO_DELETE_ AFTER_N_SAMPLES.
job_device_set	json object	M	A json object containing device sets information.
device_set	json object	M	Device Grouping Object. For a given request, set one of either one device grouping i.e., list of devices or a device group, but not both.
device_ids	json array	M	Array of device IDs. Corresponds to UUID of the devices in the Crosswork inventory.
sensor_input_configs	json object	M	A group of sensors and their cadences.

Field	Type	(M)andatory or (O)ptional	Description
sensor_data	json object	M	Type of sensor data: • snmp_sensor • snmp_yang_sensor • cli_yang_sensor • cli_sensor • mdt_sensor • trap_sensor • trap_yang_sensor **Note** YANG sensors are used for Crosswork initiated collection jobs, whereas Non-YANG sensors are used for API-initiated collection jobs.
cadence_in_millisec	int	O	Optional cadence value of this sensor config in seconds. If not passed the sensor config collection is done once.
sensor_output_configs	json array	M	A group of sensors and their cadences. Sensor Output represents output of sensor to a destination for given sensor which is a topic on Kafka or gRPC server.

Field	Type	(M)andatory or (O)ptional	Description
sensor_data	json object	M	Every sensor path on the input side needs to have one mapping on the output side: • snmp_sensor • snmp_yang_sensor • cli_yang_sensor • cli_sensor • mdt_sensor • trap_sensor • trap_yang_sensor **Note** YANG sensors are used for Crosswork initiated collection jobs, whereas Non-YANG sensors are used for API-initiated collection jobs.
destination	json object	M	A JSON object that holds the final data destination information. It can hold one or more type of target information. Currently supported data destinations are kafka and gRPC.
destination > context_id	string	M	Destination context identifier. It could be Kafka topic name if destination is external Kafka server. The combination of destination_id and context_id needs to be unique for destination. What context id means depends on the destination type of destination provider. If gRPC is destination type, context_id is not used and will be ignored.

Field	Type	(M)andatory or (O)ptional	Description
destination_id	string	M	Unique identifier for the data destination in inventory.

Create Collection Jobs

Note Cisco Crosswork Data Gateway API access for external data collection integration is separately licensed.

You can create and delete collection jobs using the Crosswork REST APIs. To access API documentation, see API Documentation.

For reference of collection job payloads, see Collection Jobs, on page 11. Once the collection job is created, Crosswork adds it to the respective collector of the Crosswork Data Gateway.

The collection job is then picked up by the Crosswork Data Gateway for execution when the Image Manager syncs with Crosswork and retrieves the latest boot-config and docker-compose.

Upon successful creation of collection job, if the data destination is up, running, and accessible, Crosswork Data Gateway starts sending data to it. In this scenario, status for per device per sensor config is shown as ACTIVE in the Crosswork UI in **Collection Jobs** view. See Monitoring Collection Jobs, on page 21

Note Sensor output and input configs can be changed post creation by using a PUT collection job API. Other collection job parameters are immutable.

However, if output server is inaccessible, Crosswork Data Gateway fails to send data to it.

If you want to delete a collection job created by a Cisco Crosswork Change Automation and Health Insights application, it must be deleted via the corresponding application only.

Best Practices and Limitations for Creating Collection Jobs

Cisco recommends that following best practices be followed while creating collection job payloads:

Limitation	Best Practices
Scale	

Limitation	Best Practices
Maximum size of sensor path collected data is 10 MB. Crosswork Data Gateway collector data at the same time from N devices cannot exceed 6 GB.	1. Any collected sensor path's data size should not be > 10 MB when data destination is Kafka, otherwise you will get the following error message in `collector.log` file (to access log files, see Run show-tech.): **RecordTooLargeException: The message is xxxxxxxx bytes when serialized which is larger than the maximum request size you have configured with the max.request.size configuration.** 2. Crosswork Data Gateway collector data at the same time from N devices with M sensor path per device and with P average size of collected data per sensor path cannot exceed 6 GB i.e., **(N = # of devices) x (M = # of sensor path) x (P= Average Message size per sensor path) < 6GB**
Log Purge Policy	
When total log file size for a collector reaches 2 GB, Crosswork Data Gateway starts cleaning up by removing the old log files.	If you would like to save the old log files, save it to any other remote server before the total log file size reaches 2 GB per collector. This can be done by running **show-tech** from Crosswork Data Gateway **Main Menu** > **Troubleshooting**.

Collection Jobs

This section contains sample collection job payloads for the following collection profiles:

- CLI Collection Job, on page 11
- SNMP Collection Jobs, on page 13
- MDT Collection Job, on page 19

CLI Collection Job

Crosswork Data Gateway supports CLI-based data collection from the network devices. It uses XDE/PAL to collect device data for a given CLI. Only show commands are supported for this type of collection job.

Note

- The initial status for all the collection jobs in the UI is Unknown. Upon receiving a CLI collection job, Cisco Crosswork Data Gateway performs basic validations on it. If the collection job is valid, its status changes to Successful, else it changes to Failed.
- Device should not have any banner configuration for CLI collection to work properly. Please refer to device documentation on how to turn this off.
- The value of **Cadence** is in seconds. It should be set either to 0 to indicate the sensor configured to be collected only once.

  OR

  It should be >= 60 (i.e. at least 1 minute) up to 2764800 seconds (i.e. at most 32 days) max, indicating how frequently configured sensor data should be collected.
- When collection from a device is skipped due to previous execution still in progress, Cisco Crosswork Data Gateway raises a warning log. No alert is generated for this scenario.

Following is a CLI collection job sample:

```
{
  "collection_job": {
    "application_context": {
      "context_id": "collection-job1",
      "application_id": "APP1"
    },
    "collection_mode": {
      "lifetime_type": "APPLICATION_MANAGED",
      "collector_type": "CLI_COLLECTOR"
    },
    "job_device_set": {
      "device_set": {
        "devices": {
          "device_ids": [
            "658adb03-cc61-448d-972f-4fcec32cbfe8"
          ]
        }
      }
    },
    "sensor_input_configs": [
      {
        "sensor_data": {
          "cli_sensor": {
            "command": "show platform"
          }
        },
        "cadence_in_millisec": "tel:60000"
      }
    ],
    "sensor_output_configs": [
     {
        "sensor_data": {
          "cli_sensor": {
            "command": "show platform"
          }
        },
        "destination": {
          "destination_id": "1e71f2fb-ea65-4242-8efa-e33cec71b369",
          "context_id": "topic1"
```

```
            }
        }
    ]
  }
}
```

SNMP Collection Jobs

Crosswork Data Gateway supports SNMP-based data collection based on the OIDs supported on the devices.

The SNMP collector makes a poll request to Crosswork to get its configuration profile (a list of MIB objects to collect and a list of devices to fetch from). It determines the corresponding OIDs by looking up the pre-packaged list of MIB modules or the custom list of MIB modules.

Note MIBs are required only if the collection request references MIB TABLE names or SCALAR names. However, if the requests are OID-based, then MIBs are not required.

Once the OIDs are resolved, they are provided as input to the SNMP collectors.

The device packages can be imported into the Crosswork Data Gateway VM as described in Section Add a Custom Software Package.

The following SNMP versions are supported:

- SNMPv1
- SNMPv2c
- SNMPv3

The table below lists supported privacy protocols and the value that needs to be given in the collection payload for SNMP and SNMP Trap collection jobs:

Protocol	SNMP Collection Payload	SNMP Trap Collection Payload
aes	AES	N/A
des56	DES	DES
3des	3DES	3DES
aes 128	AES128	AES128
aes 192	AES192 or CiscoAES192(Cisco specific)	AES192 or CiscoAES192(Cisco specific)
aes 256	AES256 or CiscoAES256(Cisco specific)	AES256 or CiscoAES256(Cisco specific)

Note

- The initial status for all the collection jobs in the UI is Unknown. Upon receiving a SNMP collection job, Cisco Crosswork Data Gateway performs basic validations on it. If the collection job is valid, its status changes to Successful, else it changes to Failed.
- The value of **Cadence** is in seconds. It should be set either to 0 to indicate the sensor configured to be collected only once.

  OR

  It should be >= 60 (i.e. at least 1 minute) up to 2764800 seconds (i.e. at most 32 days) max, indicating how frequently configured sensor data should be collected.
- When collection from a device is skipped due to previous execution still in progress, Crosswork Data Gateway raises a warning log. No alert is generated for this scenario.
- For SNMP v1/v2c, if the device details (such as host or community string) are incorrect in the payload, Crosswork Data Gateway ignores the traps received from the device and logs the a WARN message.

  In case of SNMP v3, if the device details (such as auth, priv, and security name details) are incorrect in the payload, Crosswork Data Gateway filters it out and hence, does not receive the trap. Thus, no WARN message is logged.

Sample Configurations on Device:

Version	Configuration
V1	snmp-server group group1 v1 snmp-server user user1 group1 v1 snmp-server host <host_ip> traps <community_string> udp-port 1062 For example, snmp-server host 172.29.194.78 traps test udp-port 1062 **Note** Version 1 is the default version used by the device.
V2c	snmp-server group group1 v2c snmp-server user user1 group1 v2c snmp-server host 172.29.194.142 traps version 2c v2test udp-port 1062
V3	snmp-server group group1 v3 auth notify user1 read user1 write user1 snmp-server view user1 1.3 included snmp-server user user1 group1 v3 auth md5 <password> priv aes 128 <password> snmp-server host 172.23.92.193 traps version 3 priv user1 udp-port 1062

The SNMP Collector supports the following operations:

- SCALAR

- TABLE

Note For TABLE operation, you can either provide a Table OID or a Column OID.

- MIB_WALK
- TRAP
- DEVICE_PACKAGE

These operations are defined in the sensor config (see payload sample below).

Note There is an optional **deviceParams** attribute **snmpRequestTimeoutMillis** (not shown in the sample payloads) that should be used if the device response time is very high. It's not recommended to use **snmpRequestTimeoutMillis** unless you are absolutely certain that your device response time is very high.

The value for snmpRequestTimeoutMillis should be specified in milliseconds:

Default value is 1500 milliseconds

Minimum value is 1500 milliseconds

However, there is no limitation on the maximum value of this attribute.

Following is an SNMP collection job sample:

```
{
  "collection_job": {
    "application_context": {
      "context_id": "collection-job1",
      "application_id": "APP1"
    },
    "collection_mode": {
      "lifetime_type": "APPLICATION_MANAGED",
      "collector_type": "SNMP_COLLECTOR"
    },
    "job_device_set": {
      "device_set": {
        "devices": {
          "device_ids": [
            "c70fc034-0cbd-443f-ad3d-a30d4319f937",
            "8627c130-9127-4ed7-ace5-93d3b4321d5e",
            "c0067069-c8f6-4183-9e67-1f2e9bf56f58"
          ]
        }
      }
    },
    "sensor_input_configs": [
      {
        "sensor_data": {
          "snmp_sensor": {
            "snmp_mib": {
              "oid": "1.3.6.1.2.1.1.3.0",
              "snmp_operation": "SCALAR"
            }
          }
        },
```

```
        "cadence_in_millisec": "60000"
      },
      {
        "sensor_data": {
          "snmp_sensor": {
            "snmp_mib": {
              "oid": "1.3.6.1.2.1.31.1.1",
              "snmp_operation": "TABLE"
            }
          }
        },
        "cadence_in_millisec": "60000"
      }
    ],
    "sensor_output_configs": [
      {
        "sensor_data": {
          "snmp_sensor": {
            "snmp_mib": {
              "oid": "1.3.6.1.2.1.1.3.0",
              "snmp_operation": "SCALAR"
            }
          }
        },
        "destination": {
          "destination_id": "4c2ab662-2670-4b3c-b7d3-b94acba98c56",
          "context_id": "topic1_461cb8aa-a16a-44b8-b79f-c3daf3ea925f"
        }
      },
      {
        "sensor_data": {
          "snmp_sensor": {
            "snmp_mib": {
              "oid": "1.3.6.1.2.1.31.1.1",
              "snmp_operation": "TABLE"
            }
          }
        },
        "destination": {
          "destination_id": "4c2ab662-2670-4b3c-b7d3-b94acba98c56",
          "context_id": "topic2_e7ed6300-fc8c-47ee-8445-70e543057f8a"
        }
      }
    ]
  }
}
```

SNMP Traps Collection Job

SNMP traps are handled in a similar manner. Trap listeners listen on a port and then dispatch data to recipients (based on their topic of interest).

Note

- Device should have been pre-configured by the traps.
- Crosswork Data Gateway listens on UDP port 1062 for Traps.
- If the collection job is invalid, there is missing configuration on the device, or no trap is received, the status of the job remains "Unknown".
- For list of supported Traps and MIBs, see List of Pre-loaded Traps and MIBs for SNMP Collection, on page 26.

On receiving a trap, Crosswork Data Gateway does the following validations:

1. Check if any collection job is created for the device.
2. Checks the trap version and community string.
3. For SNMP v3, validates for user auth and priv protocol and credentials.

Following is an SNMP-Trap collection job sample:

```
{
  "collection_job": {
    "application_context": {
      "context_id": "collection-job1",
      "application_id": "APP1"
    },
    "collection_mode": {
      "lifetime_type": "APPLICATION_MANAGED",
      "collector_type": "TRAP_COLLECTOR"
    },
    "job_device_set": {
      "device_set": {
        "devices": {
          "device_ids": [
            "a9b8f43d-130b-4866-a26a-4d0f9e07562a",
            "8c4431a0-f21d-452d-95a8-84323a19e0d6",
            "eaab2647-2351-40ae-bf94-6e4a3d79af3a"
          ]
        }
      }
    },
    "sensor_input_configs": [
      {
        "sensor_data": {
          "trap_sensor": {
            "path": "1.3.6.1.6.3.1.1.4"
          }
        },
        "cadence_in_millisec": "60000"
      }
    ],
    "sensor_output_configs": [
      {
        "sensor_data": {
          "trap_sensor": {
            "path": "1.3.6.1.6.3.1.1.4"
          }
        },
        "destination": {
```

```
          "destination_id": "4c2ab662-2670-4b3c-b7d3-b94acba98c56",
          "context_id": "topic1_696600ae-80ee-4a02-96cb-3a01a2415324"
        }
      }
    ]
  }
}
```

Enabling Traps forwarding to external applications

As per the current implementation, in case of an SNMP Trap collection job, all traps are sent to the specified data destination even if the SNMP Trap OID is not provided in the sensor path.

Therefore, it is recommended to have a single SNMP Trap collection job per device (with any OID as sensor path) as it would be enough to get all traps from that device.

Note It is also recommended to selectively enable on the device only those traps that are needed by Crosswork.

To identify the type of trap from the data received on the destination, look for *oid* (OBJECT_IDENTIFIER, for example, `1.3.6.1.6.3.1.1.4.1.0`) and *strValue* associated to the *oid* in the OidRecords (application can match the OID of interest to determine the kind of trap).

Below are some sample values and a sample payload:

- Link up

  ```
  1.3.6.1.6.3.1.1.4.1.0 = 1.3.6.1.6.3.1.1.5.4
  ```

- Link Down

  ```
  1.3.6.1.6.3.1.1.4.1.0 = 1.3.6.1.6.3.1.1.5.3
  ```

- Syslog

  ```
  1.3.6.1.6.3.1.1.4.1.0 = 1.3.6.1.4.1.9.9.41.2.0.1
  ```

- Cold Start

  ```
  1.3.6.1.6.3.1.1.4.1.0 = 1.3.6.1.6.3.1.1.5.1
  ```

```
{
  "nodeIdStr": "BF5-XRV9K1.tr3.es",
  "nodeIdUuid": "C9tZ5lJoSJKf5OZ67+U5JQ==",
  "collectionId": "133",
  "collectionStartTime": "1580931985267",
  "msgTimestamp": "1580931985267",
  "dataGpbkv": [
    {
      "timestamp": "1580931985267",
      "name": "trapsensor.path",
      "snmpTrap": {
        "version": "V2c",
        "pduType": "TRAP",
        "v2v3Data": {
          "agentAddress": "172.70.39.227",
          "oidRecords": [
            {
              "oid": "1.3.6.1.2.1.1.3.0",
              "strValue": "7 days, 2:15:17.02"
            },
```

```
            {
              "oid": "1.3.6.1.6.3.1.1.4.1.0",  // This oid is the Object Identifier.
              "strValue": "1.3.6.1.6.3.1.1.5.3" // This is the value that determines the
kind of trap.
            },
            {
              "oid": "1.3.6.1.2.1.2.2.1.1.8",
              "strValue": "8"
            },
            {
              "oid": "1.3.6.1.2.1.2.2.1.2.8",
              "strValue": "GigabitEthernet0/0/0/2"
            },
            {
              "oid": "1.3.6.1.2.1.2.2.1.3.8",
              "strValue": "6"
            },
            {
              "oid": "1.3.6.1.4.1.9.9.276.1.1.2.1.3.8",
              "strValue": "down"
            }
          ]
        }
      }
    }
  ],
  "collectionEndTime": "1580931985267",
  "collectorUuid": "YmNjZjEzMTktZjFlOS00NTE5LWI4OTgtY2Y1ZmQxZDFjNWExOlRSQVBfQ09MTEVDVE9S",
  "status": {
    "status": "SUCCESS"
  },
  "modelData": {},
  "sensorData": {
    "trapSensor": {
      "path": "1.3.6.1.6.3.1.1.5.4"
    }
  },
  "applicationContexts": [
    {
      "applicationId": "APP1",
      "contextId": "collection-job-snmp-traps"
    }
  ]
}
```


MDT Collection Job

Crosswork Data Gateway supports data collection from network devices using Model-driven Telemetry (MDT) to consume telemetry streams directly from devices (for IOS-XR based platforms only).

Note

- MDT collector retains the collection ID that comes as part of the telemetry proto for the device. This behavior is different from CLI and SNMP collectors which compute the collection ID based on the sequence number of the collection.
- MDT collection jobs require some configuration to be done on the device. This configuration is automatically taken care of by NSO.
- If there is some change (delete/update) in existing MDT jobs between backup and restore operations, Crosswork does not replay the jobs for config update on the devices as it involves Provider(NSO). You have to restore configs on provider/devices. Crosswork will just restore the jobs in database.
- Before using any YANG modules, check if they are supported. See Section: List of Pre-loaded YANG Modules for MDT Collection , on page 32.

It supports data collection for the following transport mode:

- MDT TCP Dial-out Mode

Following is a sample of MDT collection payload:

```
{
 "collection_job": {
  "job_device_set": {
   "device_set": {
    "device_group": "mdt"
   }
  },
  "sensor_output_configs": [{
    "sensor_data": {
     "mdt_sensor": {
      "path":
"Cisco-IOS-XR-infra-statsd-oper:infra-statistics/interfaces/interface/latest/generic-counters"

     }
    },
    "destination": {
     "context_id": "cw.mdt_sensor.cisco-ios-xr-infra-statsd-oper.gpb",
     "destination_id": "c2a8fba8-8363-3d22-b0c2-a9e449693fae"
    }
   },
   {
    "sensor_data": {
     "mdt_sensor": {
     "path": "Cisco-IOS-XR-infra-statsd-oper:infra-statistics/interfaces/interface/data-rate"

     }
    },
    "destination": {
     "context_id": "cw.mdt_sensor.cisco-ios-xr-infra-statsd-oper.gpb",
     "destination_id": "c2a8fba8-8363-3d22-b0c2-a9e449693fae"
    }
   }
  ],
  "sensor_input_configs": [{
    "sensor_data": {
     "mdt_sensor": {
     "path": "Cisco-IOS-XR-infra-statsd-oper:infra-statistics/interfaces/interface/data-rate"
```

```
      }
     },
     "cadence_in_millisec": "70000"
    }, {
     "sensor_data": {
      "mdt_sensor": {
       "path":
"Cisco-IOS-XR-infra-statsd-oper:infra-statistics/interfaces/interface/latest/generic-counters"

      }
     },
     "cadence_in_millisec": "70000"
    }
   ],
   "application_context": {
    "context_id": "c4",
    "application_id": "a4-mdt"
   },
   "collection_mode": {
    "lifetime_type": "APPLICATION_MANAGED",
    "collector_type": "MDT_COLLECTOR"
   }
  }
}
```

Monitoring Collection Jobs

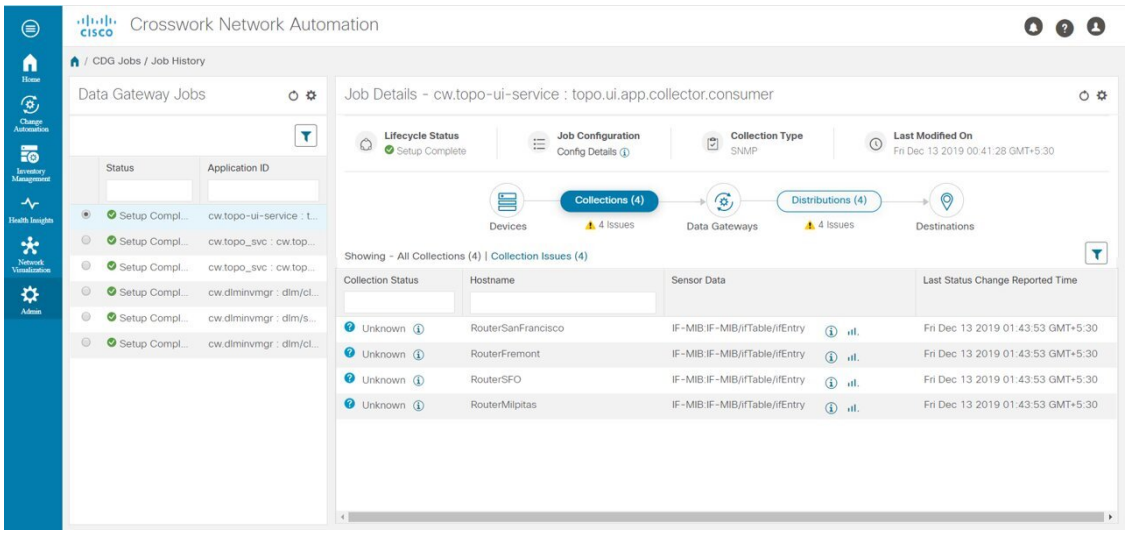
Once a device is mapped to a Cisco Crosswork Data Gateway instance, the status of all the associated collection jobs is set to 'Unknown'. A job could have staus as 'Unknown' for either of the following reasons:

- Cisco Crosswork Data Gateway has not yet reported its status.
- Loss of connection between Cisco Crosswork Data Gateway and Crosswork.
- Cisco Crosswork Data Gateway received the collection job, but actual collection is still pending.

After the collection job is processed, the status changes to 'Successful' if the processing was successful or else it changes to 'Failed'.

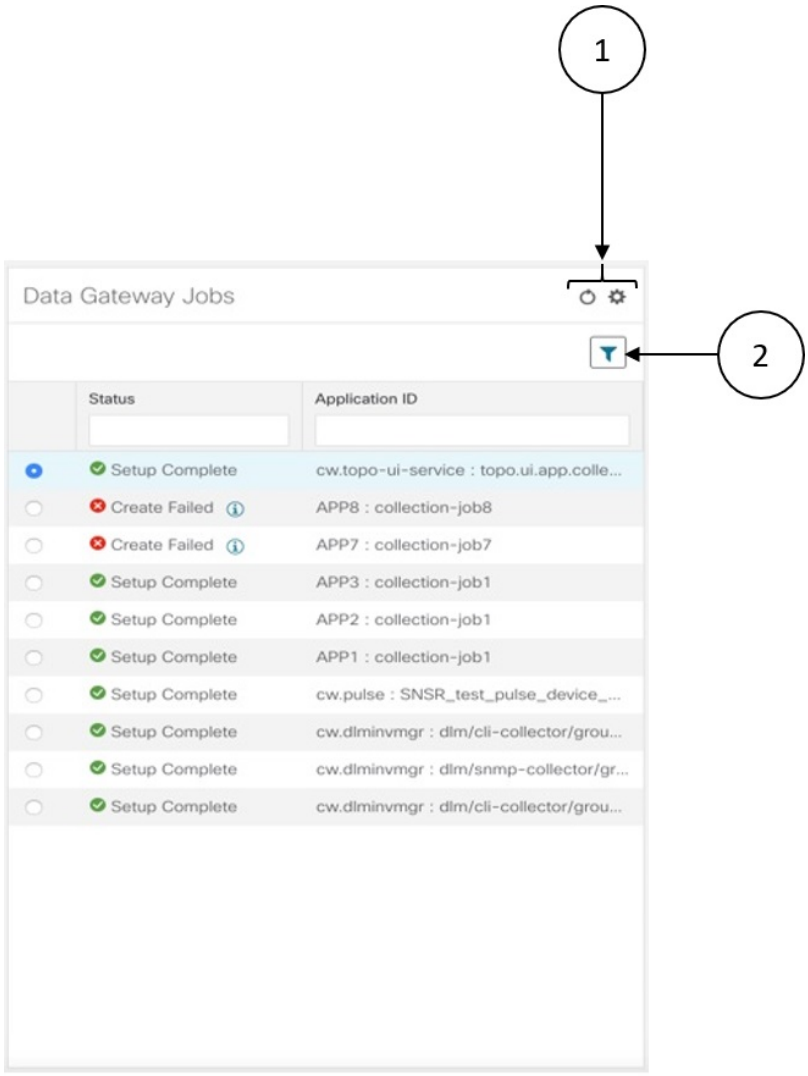
From the **Collection Jobs** view, you can monitor the status of the collection jobs currently active on all the Cisco Crosswork Data Gateway instances enrolled with Cisco Crosswork Change Automation and Health Insights, such as system jobs and API-defined collection jobs.

From the navigation bar, choose **Admin** > **Collection Jobs**.



Item	Description
Data Gateway Jobs Pane	Shows the list of all active collection jobs along with their status and application ID.
Job Details Pane	Shows the details of a particular job selected in the **Data Gateway Jobs** pane.

To view details of a collection job, select the collection job from the **Data Gateway Jobs** pane. The details of the selected job are displayed in the **Job Details** pane right next to the **Data Gateway Jobs** pane.



Item	Description
1	Click to refresh the **Data Gateway Jobs** window.
	Click to choose the columns to make visible in the **Data Gateway Jobs** window (see Set, Sort and Filter Table Data).
2	Click to show/hide the quick filters.
	Click the **Clear All Filters** link to clear any filter criteria you may have set.

Data Gateway Jobs pane displays only the status and application ID.

Note

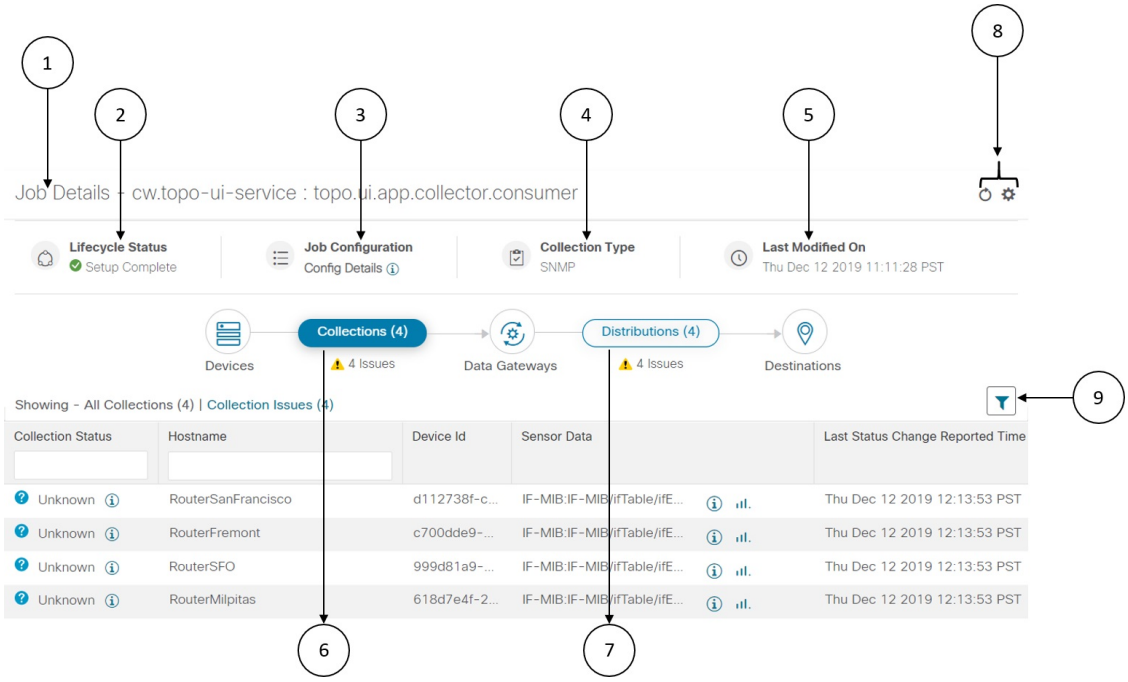
- `Create Failed` error means out of N devices, some devices failed to setup. However, the collection would happen on the devices that were successfully setup. You can identify the device(s) causing this error by using `Control Status` API.
- If job creation failed on a particular device because of NSO errors, after fixing NSO errors , you have to manually change the administration state of the device first to "Down" and then "Up". However, doing so resets the collection on the device.

Note

Create/Delete failed errors are shown in a different screen pop up. Click next to the job status to see details of the error.

- You may also try recreating the job using PUT collection job API with the same payload.

However, when you select a job, more details are displayed in the **Job Details** pane:



Item	Description
1	Application name and context associated with the collection job.
2	Lifecycle status of the collection job.

Item	Description
3	Job payload of the collection job that you pass in the REST API request. Click icon next to **Config Details** to view the job configuration. Crosswork Data Gateway lets you view configuration in two modes: • View Mode • Text Mode
4	Collection Type
5	Time and date of last modification of the collection job.
6	Collections (x): x refers to requested input collections that span device by sensor paths. The corresponding **(y) Issues** is the count of input collections that are in UNKNOWN or FAILED state.
7	Distributions (x): x refers to requested output collections that span device by sensor paths. The corresponding **(y) Issues** is the count of output collections that are in UNKNOWN or FAILED state.
8	Click to refresh the **Job Details** window.
	Click to choose the columns to make visible in the **Job Details** window (see Set, Sort and Filter Table Data).
9	Click to show/hide the quick filters.
	Click the **Clear All Filters** link to clear any filter criteria you may have set.

Job Details pane displays the following details about a collection job:

Field	Description
Collection/Distribution Status	Status of the collection/distribution. It is reported on a on change basis from Cisco Crosswork Data Gateway. Click next to the collection/distribution status for details.
Hostname	Device hostname with which the collection job is associated.
Device Id	Unique identifier of the device from which data is being collected.

Field	Description
Sensor Data	Sensor path Click to see collection/distribution summary. From the sensor data summary pop up you can copy the sensor data by clicking **Copy to Clipboard**. and Click to see collection/distribution metrics summary. The metrics are reported on cadence-basis i.e., once every 10 minutes by default. It shows the following metrics for a collection: • last_collection_time_msec • total_collection_message_count • last_device_latency_msec • last_collection_cadence_msec It shows the following metrics for a collection: • total_output_message_count • last_destination_latency_msec • last_output_cadence_msec • last_output_time_msec • total_output_bytes_count
Last Status Change Reported Time	Time and date on which last status change was reported for that device sensor pair from Cisco Crosswork Data Gateway.

List of Pre-loaded Traps and MIBs for SNMP Collection

This section lists the traps and MIBs that the Collection Service supports for SNMP collection.

Note This list is applicable only when Crosswork is the target application and is not limited when the target is an external application.

Note the following constraints:

- The system cannot extract index values from OIDs of conceptual tables. If any of the columns that define indices in the conceptual table are not populated, the index value is replaced on the data plane with the instance identifier (oid suffix) of the row.

- The system cannot extract index values from conceptual tables that include the **AUGMENT** keyword or refer to indices of other tables.
- Named-number enumerations (using the integer syntax) are sent on the wire using their numeric value.

Table 1: Supported Traps

Trap	OID
linkDown	1.3.6.1.6.3.1.1.5.3
linkUp	1.3.6.1.6.3.1.1.5.4
coldStart	1.3.6.1.6.3.1.1.5.1
isisAdjacencyChange	1.3.6.1.2.1.138.0.17

ADSL-LINE-MIB.mib	CISCO-LWAPP-INTERFACE-MIB.mib	IANA-ITU-ALARM-TC-MIB.mib
ADSL-TC-MIB.mib	CISCO-LWAPP- IPS-MIB.mib	IANA-LANGUAGE- MIB.mib
AGENTX-MIB.mib	CISCO-LWAPP-LINKTEST-MIB.mib	IANA-RTPROTO- MIB.mib
ALARM-MIB.mib	CISCO-LWAPP-LOCAL-AUTH-MIB.mib	IANAifType-MIB.mib
APS-MIB.mib	CISCO-LWAPP- MDNS-MIB.mib	IEEE8021-CFM-MIB.mib
ATM-FORUM-MIB.mib	CISCO-LWAPP-MESH-BATTERY-MIB.mib	IEEE8021-PAE-MIB.mib
ATM-FORUM- TC-MIB.mib	CISCO-LWAPP-MESH-LINKTEST-MIB.mib	IEEE8021-TC-MIB.mib
ATM-MIB.mib	CISCO-LWAPP-MOBILITY-EXT-MIB.mib	IEEE802171-CFM- MIB.mib
ATM-TC-MIB.mib	CISCO-LWAPP-MOBILITY-MIB.mib	IEEE8023-LAG-MIB.mib
ATM2-MIB.mib	CISCO-LWAPP-NETFLOW-MIB.mib	IEEE802dot11-MIB.mib
BGP4-MIB.mib	CISCO-LWAPP- REAP-MIB.mib	IF-INVERTED-STACK-MIB.mib
BRIDGE-MIB.mib	CISCO-LWAPP- RF-MIB.mib	IF-MIB.mib
CISCO-AAA- SERVER-MIB.mib	CISCO-LWAPP- SI-MIB.mib	IGMP-STD-MIB.mib
CISCO-AAA- SESSION-MIB.mib	CISCO-LWAPP- TC-MIB.mib	INET-ADDRESS-MIB.mib
CISCO-AAL5-MIB.mib	CISCO-LWAPP-TRUSTSEC-MIB.mib	INT-SERV-MIB.mib
CISCO-ACCESS-ENVMON-MIB.mib	CISCO-LWAPP- TSM-MIB.mib	INTEGRATED-SERVICES-MIB.mib

CISCO-ATM-EXT -MIB.mib	CISCO-LWAPP- WLAN-MIB.mib	IP-FORWARD-MIB.mib
CISCO-ATM-PVCTRAP-EXTN-MIB.mib	CISCO-LWAPP-WLAN-SECURITY-MIB.mib	IP-MIB.mib
CISCO-ATM- QOS-MIB.mib	CISCO-MEDIA-GATEWAY-MIB.mib	IPMCAST-MIB.mib
CISCO-AUTH-FRAMEWORK-MIB.mib	CISCO-MOTION-MIB.mib	IPMROUTE-MIB.mib
CISCO-BGP-POLICY-ACCOUNTING-MIB.mib	CISCO-MPLS-LSR-EXT-STD-MIB.mib	IPMROUTE-STD -MIB.mib
CISCO-BGP4-MIB.mib	CISCO-MPLS-TC-EXT-STD-MIB.mib	IPV6-FLOW-LABEL-MIB.mib
CISCO-BULK-FILE -MIB.mib	CISCO-MPLS-TE-STD-EXT-MIB.mib	IPV6-ICMP-MIB.mib
CISCO-CBP-TARGET -MIB.mib	CISCO-NAC-TC -MIB.mib	IPV6-MIB.mib
CISCO-CBP-TARGET -TC-MIB.mib	CISCO-NBAR-PROTOCOL-DISCOVERY-MIB.mib	IPV6-MLD-MIB.mib
CISCO-CBP-TC-MIB.mib	CISCO-NETSYNC -MIB.mib	IPV6-TC.mib
CISCO-CCME-MIB.mib	CISCO-NTP-MIB.mib	IPV6-TCP-MIB.mib
CISCO-CDP-MIB.mib	CISCO-OSPF- MIB.mib	IPV6-UDP-MIB.mib
CISCO-CEF-MIB.mib	CISCO-OSPF- TRAP-MIB.mib	ISDN-MIB.mib
CISCO-CEF-TC.mib	CISCO-OTN-IF-MIB.mib	ISIS-MIB.mib
CISCO-CLASS-BASED-QOS-MIB.mib	CISCO-PAE-MIB.mib	ITU-ALARM-MIB.mib
CISCO-CONFIG- COPY-MIB.mib	CISCO-PAGP-MIB.mib	ITU-ALARM-TC- MIB.mib
CISCO-CONFIG- MAN-MIB.mib	CISCO-PIM-MIB.mib	L2TP-MIB.mib
CISCO-CONTENT-ENGINE-MIB.mib	CISCO-PING-MIB.mib	LANGTAG-TC-MIB.mib
CISCO-CONTEXT-MAPPING-MIB.mib	CISCO-POLICY-GROUP -MIB.mib	LLDP-EXT-DOT1 -MIB.mib
CISCO-DATA-COLLECTION-MIB.mib	CISCO-POWER-ETHERNET-EXT-MIB.mib	LLDP-EXT-DOT3 -MIB.mib
CISCO-DEVICE-EXCEPTION-REPORTING-MIB.mib	CISCO-PRIVATE -VLAN-MIB.mib	LLDP-MIB.mib
CISCO-DIAL- CONTROL-MIB.mib	CISCO-PROCESS-MIB.mib	MAU-MIB.mib
CISCO-DOT11-ASSOCIATION-MIB.mib	CISCO-PRODUCTS- MIB.mib	MGMD-STD-MIB.mib
CISCO-DOT11-HT- PHY-MIB.mib	CISCO-PTP-MIB.mib	MPLS-FTN-STD- MIB.mib
CISCO-DOT11-IF-MIB.mib	CISCO-RADIUS- EXT-MIB.mib	MPLS-L3VPN-STD- MIB.mib

CISCO-DOT11-SSID-SECURITY-MIB.mib	CISCO-RF-MIB.mib	MPLS-LDP-ATM-STD-MIB.mib
CISCO-DOT3- OAM-MIB.mib	CISCO-RF-SUPPLEMENTAL -MIB.mib	MPLS-LDP-FRAME -RELAY-STD-MIB.mib
CISCO-DS3-MIB.mib	CISCO-RTTMON-TC -MIB.mib	MPLS-LDP-GENERIC-STD-MIB.mib
CISCO-DYNAMIC-TEMPLATE-MIB.mib	CISCO-SELECTIVE-VRF-DOWNLOAD-MIB.mib	MPLS-LDP-MIB.mib
CISCO-DYNAMIC -TEMPLATE-TC-MIB.mib	CISCO-SESS-BORDER-CTRLR -CALL-STATS-MIB.mib	MPLS-LDP-STD-MIB.mib
CISCO-EIGRP-MIB.mib	CISCO-SESS-BORDER-CTRLR-EVENT-MIB.mib	MPLS-LSR-MIB.mib
CISCO-EMBEDDED-EVENT-MGR-MIB.mib	CISCO-SESS-BORDER-CTRLR-STATS-MIB.mib	MPLS-LSR-STD-MIB.mib
CISCO-ENHANCED-IMAGE-MIB.mib	CISCO-SMI.mib	MPLS-TC-MIB.mib
CISCO-ENHANCED-MEMPOOL-MIB.mib	CISCO-SONET-MIB.mib	MPLS-TC-STD-MIB.mib
CISCO-ENTITY-ASSET -MIB.mib	CISCO-ST-TC.mib	MPLS-TE-MIB.mib
CISCO-ENTITY-EXT -MIB.mib	CISCO-STACKWISE- MIB.mib	MPLS-TE-STD-MIB.mib
CISCO-ENTITY-FRU-CONTROL-MIB.mib	CISCO-STP-EXTENSIONS -MIB.mib	MPLS-VPN-MIB.mib
CISCO-ENTITY- QFP-MIB.mib	CISCO-SUBSCRIBER -IDENTITY-TC-MIB.mib	MSDP-MIB.mib
CISCO-ENTITY-REDUNDANCY-MIB.mib	CISCO-SUBSCRIBER-SESSION-MIB.mib	NET-SNMP-AGENT -MIB.mib
CISCO-ENTITY-REDUNDANCY-TC-MIB.mib	CISCO-SUBSCRIBER-SESSION-TC-MIB.mib	NET-SNMP-EXAMPLES -MIB.mib
CISCO-ENTITY- SENSOR-MIB.mib	CISCO-SYSLOG-MIB.mib	NET-SNMP-MIB.mib
CISCO-ENTITY-VENDORTYPE-OID-MIB.mib	CISCO-SYSTEM-EXT- MIB.mib	NET-SNMP-TC.mib
CISCO-ENVMON-MIB.mib	CISCO-SYSTEM-MIB.mib	NHRP-MIB.mib
CISCO-EPM-NOTIFICATION-MIB.mib	CISCO-TAP2-MIB.mib	NOTIFICATION-LOG-MIB.mib
CISCO-ETHER-CFM- MIB.mib	CISCO-TC.mib	OLD-CISCO-CHASSIS-MIB.mib
CISCO-ETHERLIKE- EXT-MIB.mib	CISCO-TCP-MIB.mib	OLD-CISCO-INTERFACES -MIB.mib
CISCO-FABRIC- C12K-MIB.mib	CISCO-TEMP-LWAPP -DHCP-MIB.mib	OLD-CISCO-SYS- MIB.mib

CISCO-FIREWALL -TC.mib	CISCO-TRUSTSEC -SXP-MIB.mib	OLD-CISCO-SYSTEM -MIB.mib
CISCO-FLASH-MIB.mib	CISCO-TRUSTSEC -TC-MIB.mib	OPT-IF-MIB.mib
CISCO-FRAME- RELAY-MIB.mib	CISCO-UBE-MIB.mib	OSPF-MIB.mib
CISCO-FTP-CLIENT -MIB.mib	CISCO-UNIFIED-COMPUTING-ADAPTOR -MIB.mib	OSPF-TRAP-MIB.mib
CISCO-HSRP-EXT -MIB.mib	CISCO-UNIFIED-COMPUTING-COMPUTE -MIB.mib	OSPFV3-MIB.mib
CISCO-HSRP-MIB.mib	CISCO-UNIFIED-COMPUTING-ETHER -MIB.mib	P-BRIDGE-MIB.mib
CISCO-IETF-ATM2 -PVCTRAP-MIB.mib	CISCO-UNIFIED-COMPUTING-FC- MIB.mib	PIM-MIB.mib
CISCO-IETF-BFD -MIB.mib	CISCO-UNIFIED-COMPUTING-MEMORY -MIB.mib	PIM-STD-MIB.mib
CISCO-IETF-FRR -MIB.mib	CISCO-UNIFIED- COMPUTING -MIB.mib	POWER-ETHERNET -MIB.mib
CISCO-IETF-IPMROUTE -MIB.mib	CISCO-UNIFIED-COMPUTING-NETWORK -MIB.mib	PPP-IP-NCP-MIB.mib
CISCO-IETF-ISIS -MIB.mib	CISCO-UNIFIED-COMPUTING-PROCESSOR -MIB.mib	PPP-LCP-MIB.mib
CISCO-IETF-MPLS-ID -STD-03-MIB.mib	CISCO-UNIFIED-COMPUTING-TC- MIB.mib	PPVPN-TC-MIB.mib
CISCO-IETF-MPLS-TE-EXT-STD-03- MIB.mib	CISCO-VLAN-IFTABLE-RELATIONSHIP -MIB.mib	PTOPO-MIB.mib
CISCO-IETF-MPLS-TE-P2MP-STD-MIB.mib	CISCO-VLAN-MEMBERSHIP-MIB.mib	PerfHist-TC-MIB.mib
CISCO-IETF-MSDP -MIB.mib	CISCO-VOICE-COMMON -DIAL-CONTROL-MIB.mib	Q-BRIDGE-MIB.mib
CISCO-IETF-PIM-EXT -MIB.mib	CISCO-VOICE-DIAL -CONTROL-MIB.mib	RADIUS-ACC-CLIENT -MIB.mib
CISCO-IETF-PIM -MIB.mib	CISCO-VOICE-DNIS -MIB.mib	RADIUS-AUTH-CLIENT -MIB.mib
CISCO-IETF-PW- ATM-MIB.mib	CISCO-VPDN-MGMT -MIB.mib	RFC-1212.mib
CISCO-IETF-PW- ENET-MIB.mib	CISCO-VTP-MIB.mib	RFC-1215.mib
CISCO-IETF-PW-MIB.mib	CISCO-WIRELESS-NOTIFICATION-MIB.mib	RFC1155-SMI.mib

CISCO-IETF-PW- MPLS-MIB.mib	CISCOSB-DEVICEPARAMS -MIB.mib	RFC1213-MIB.mib
CISCO-IETF-PW -TC-MIB.mib	CISCOSB- HWENVIROMENT.mib	RFC1315-MIB.mib
CISCO-IETF-PW -TDM-MIB.mib	CISCOSB-MIB.mib	RFC1398-MIB.mib
CISCO-IETF-VPLS -BGP-EXT-MIB.mib	CISCOSB-Physicaldescription -MIB.mib	RIPv2-MIB.mib
CISCO-IETF-VPLS -GENERIC-MIB.mib	DIAL-CONTROL-MIB.mib	RMON-MIB.mib
CISCO-IETF-VPLS- LDP-MIB.mib	DIFFSERV-DSCP-TC.mib	RMON2-MIB.mib
CISCO-IF-EXTENSION -MIB.mib	DIFFSERV-MIB.mib	RSTP-MIB.mib
CISCO-IGMP-FILTER -MIB.mib	DISMAN-NSLOOKUP -MIB.mib	RSVP-MIB.mib
CISCO-IMAGE-LICENSE -MGMT-MIB.mib	DISMAN-PING-MIB.mib	SMON-MIB.mib
CISCO-IMAGE-MIB.mib	DISMAN-SCHEDULE -MIB.mib	SNA-SDLC-MIB.mib
CISCO-IMAGE-TC.mib	DISMAN-SCRIPT-MIB.mib	SNMP-COMMUNITY -MIB.mib
CISCO-IP-LOCAL- POOL-MIB.mib	DISMAN-TRACEROUTE -MIB.mib	SNMP-FRAMEWORK -MIB.mib
CISCO-IP-TAP-MIB.mib	DOT3-OAM-MIB.mib	SNMP-MPD-MIB.mib
CISCO-IP-URPF-MIB.mib	DRAFT-MSDP-MIB.mib	SNMP-NOTIFICATION -MIB.mib
CISCO-IPMROUTE- MIB.mib	DS0-MIB.mib	SNMP-PROXY-MIB.mib
CISCO-IPSEC-FLOW -MONITOR-MIB.mib	DS1-MIB.mib	SNMP-REPEATER -MIB.mib
CISCO-IPSEC-MIB.mib	DS3-MIB.mib	SNMP-TARGET-MIB.mib
CISCO-IPSEC-POLICY -MAP-MIB.mib	ENTITY-MIB.mib	SNMP-USER-BASED -SM-MIB.mib
CISCO-IPSLA-AUTOMEASURE-MIB.mib	ENTITY-SENSOR-MIB.mib	SNMP-USM-AES -MIB.mib
CISCO-IPSLA- ECHO-MIB.mib	ENTITY-STATE-MIB.mib	SNMP-USM-DH-OBJECTS-MIB.mib
CISCO-IPSLA- JITTER-MIB.mib	ENTITY-STATE- TC-MIB.mib	SNMP-VIEW-BASED-ACM-MIB.mib
CISCO-IPSLA- TC-MIB.mib	ESO-CONSORTIUM -MIB.mib	SNMPv2-CONF.mib
CISCO-ISDN-MIB.mib	ETHER-WIS.mib	SNMPv2-MIB.mib
CISCO-LICENSE- MGMT-MIB.mib	EtherLike-MIB.mib	SNMPv2-SMI.mib
CISCO-LOCAL-AUTH-USER-MIB.mib	FDDI-SMT73-MIB.mib	SNMPv2-TC-v1.mib

CISCO-LWAPP- AAA-MIB.mib	FR-MFR-MIB.mib	SNMPv2-TC.mib
CISCO-LWAPP- AP-MIB.mib	FRAME-RELAY -DTE-MIB.mib	SNMPv2-TM.mib
CISCO-LWAPP- CCX-RM-MIB.mib	FRNETSERV- MIB.mib	SONET-MIB.mib
CISCO-LWAPP- CDP-MIB.mib	GMPLS-LSR- STD-MIB.mib	SYSAPPL-MIB.mib
CISCO-LWAPP-CLIENT -ROAMING-CAPABILITY.mib	GMPLS-TC-STD- MIB.mib	TCP-MIB.mib
CISCO-LWAPP-CLIENT -ROAMING-MIB.mib	GMPLS-TE-STD-MIB.mib	TOKEN-RING-RMON -MIB.mib
CISCO-LWAPP-DHCP -MIB.mib	HC-PerfHist-TC-MIB.mib	TOKENRING-MIB.mib
CISCO-LWAPP-DOT11-CLIENT-CALIB-MIB.mib	HC-RMON-MIB.mib	TRANSPORT-ADDRESS -MIB.mib
CISCO-LWAPP-DOT11-CLIENT-CCX-TC-MIB.mib	HCNUM-TC.mib	TUNNEL-MIB.mib
CISCO-LWAPP-DOT11 -LDAP-MIB.mib	HOST-RESOURCES -MIB.mib	UDP-MIB.mib
CISCO-LWAPP- DOT11-MIB.mib	HOST-RESOURCES -TYPES.mib	VPN-TC-STD-MIB.mib
CISCO-LWAPP -DOWNLOAD-MIB.mib	IANA-ADDRESS-FAMILY-NUMBERS-MIB.mib	VRRP-MIB.mib
CISCO-LWAPP- IDS-MIB.mib	IANA-GMPLS-TC-MIB.mib	

List of Pre-loaded YANG Modules for MDT Collection

This section lists the YANG modules that the Collection Service supports for MDT collection on Cisco IOS XR devices.

cli_xr_bgp_oper.yang	Cisco-IOS-XR-ip-bfd-oper.yang
Cisco-IOS-XR-ipv4-bgp-oper.yang	Cisco-IOS-XR-asr9k-xbar-oper.yang
Cisco-IOS-XR-ipv4-acl-oper.yang	Cisco-IOS-XR-snmp-sensormib-oper.yang
Cisco-IOS-XR-shellutil-filesystem-oper.yang	Cisco-IOS-XR-config-cfgmgr-oper.yang
Cisco-IOS-XR-infra-alarm-logger-oper.yang	Cisco-IOS-XR-infra-fti-oper.yang
Cisco-IOS-XR-icpe-infra-oper.yang	Cisco-IOS-XR-dot1x-oper.yang
Cisco-IOS-XR-fretta-bcm-dpa-stats-oper.yang	Cisco-IOS-XR-sdr-invmgr-diag-oper.yang
Cisco-IOS-XR-cofo-infra-oper.yang	Cisco-IOS-XR-wanphy-ui-oper.yang
Cisco-IOS-XR-man-ems-oper.yang	Cisco-IOS-XR-bundlemgr-oper.yang
Cisco-IOS-XR-mpls-lsd-oper.yang	Cisco-IOS-XR-l2vpn-oper.yang
Cisco-IOS-XR-show-fpd-loc-ng-oper.yang	Cisco-IOS-XR-asr9k-qos-oper.yang
Cisco-IOS-XR-telemetry-model-driven-oper.yang	Cisco-IOS-XR-segment-routing-ms-oper.yang

Cisco-IOS-XR-shellutil-oper.yang	Cisco-IOS-XR-pfi-im-cmd-oper.yang
Cisco-IOS-XR-ip-iep-oper.yang	Cisco-IOS-XR-asic-errors-oper.yang
Cisco-IOS-XR-cdp-oper.yang	Cisco-IOS-XR-lib-keychain-oper.yang
Cisco-IOS-XR-ip-sbfd-oper.yang	Cisco-IOS-XR-sdr-invmgr-oper.yang
Cisco-IOS-XR-tty-management-cmd-oper.yang	Cisco-IOS-XR-ipv4-ospf-oper.yang
Cisco-IOS-XR-upgrade-fpd-oper.yang	Cisco-IOS-XR-pfm-oper.yang
Cisco-IOS-XR-crypto-macsec-secy-oper.yang	Cisco-IOS-XR-config-valid-ccv-oper.yang
Cisco-IOS-XR-ip-iarm-v6-oper.yang	Cisco-IOS-XR-ip-iarm-v4-oper.yang
Cisco-IOS-XR-ipv4-autorp-oper.yang	Cisco-IOS-XR-infra-statsd-oper.yang
Cisco-IOS-XR-pbr-vservice-ea-oper.yang	Cisco-IOS-XR-ipv4-vrrp-oper.yang
Cisco-IOS-XR-ip-domain-oper.yang	Cisco-IOS-XR-cmproxy-oper.yang
Cisco-IOS-XR-ipv4-io-oper.yang	Cisco-IOS-XR-crypto-ssh-oper.yang
Cisco-IOS-XR-ipv4-hsrp-oper.yang	Cisco-IOS-XR-controller-optics-oper.yang
Cisco-IOS-XR-freqsync-oper.yang	Cisco-IOS-XR-atm-vcm-oper.yang
Cisco-IOS-XR-aaa-diameter-oper.yang	Cisco-IOS-XR-dnx-driver-fabric-plane-oper.yang
Cisco-IOS-XR-ip-tcp-oper.yang	Cisco-IOS-XR-asr9k-lc-fca-oper.yang
Cisco-IOS-XR-drivers-media-eth-oper.yang	Cisco-IOS-XR-mpls-vpn-oper.yang
Cisco-IOS-XR-infra-policymgr-oper.yang	Cisco-IOS-XR-asr9k-sc-envmon-oper.yang
Cisco-IOS-XR-fretta-bcm-dpa-hw-resources-oper.yang	Cisco-IOS-XR-es-acl-oper.yang
Cisco-IOS-XR-subscriber-ipsub-oper.yang	Cisco-IOS-XR-evpn-oper.yang
Cisco-IOS-XR-infra-rsi-oper.yang	Cisco-IOS-XR-rptiming-tmg-oper.yang
Cisco-IOS-XR-prm-server-oper.yang	Cisco-IOS-XR-ethernet-lldp-oper.yang
Cisco-IOS-XR-l2rib-oper.yang	Cisco-IOS-XR-ip-ntp-oper.yang
Cisco-IOS-XR-subscriber-pppoe-ma-oper.yang	Cisco-IOS-XR-mediasvr-linux-oper.yang
Cisco-IOS-XR-ocni-local-routing-oper.yang	Cisco-IOS-XR-ipv6-ma-oper.yang
Cisco-IOS-XR-reboot-history-oper.yang	Cisco-IOS-XR-infra-rmf-oper.yang
Cisco-IOS-XR-asr9k-lpts-oper.yang	Cisco-IOS-XR-infra-correlator-oper.yang
Cisco-IOS-XR-infra-serg-oper.yang	Cisco-IOS-XR-mpls-static-oper.yang
Cisco-IOS-XR-rgmgr-oper.yang	Cisco-IOS-XR-snmp-entitymib-oper.yang
Cisco-IOS-XR-ncs1k-mxp-headless-oper.yang	Cisco-IOS-XR-pbr-vservice-mgr-oper.yang
Cisco-IOS-XR-aaa-nacm-oper.yang	Cisco-IOS-XR-pfi-im-cmd-ctrlr-oper.yang
Cisco-IOS-XR-infra-rcmd-oper.yang	Cisco-IOS-XR-fretta-bcm-dpa-resources-oper.yang
Cisco-IOS-XR-crypto-macsec-mka-oper.yang	Cisco-IOS-XR-macsec-ctrlr-oper.yang

Cisco-IOS-XR-tunnel-vpdn-oper.yang	Cisco-IOS-XR-ipv6-nd-oper.yang
Cisco-IOS-XR-ipv4-dhcpd-oper.yang	Cisco-IOS-XR-tunnel-l2tun-oper.yang
Cisco-IOS-XR-ip-rip-oper.yang	Cisco-IOS-XR-infra-dumper-exception-oper.yang
Cisco-IOS-XR-ncs1001-otdr-oper.yang	Cisco-IOS-XR-syncc-oper.yang
Cisco-IOS-XR-asr9k-asic-errors-oper.yang	Cisco-IOS-XR-dnx-driver-oper.yang
Cisco-IOS-XR-pmengine-oper.yang	Cisco-IOS-XR-ncs1k-macsec-ea-oper.yang
Cisco-IOS-XR-linux-os-reboot-history-oper.yang	Cisco-IOS-XR-fretta-bcm-dpa-drop-stats-oper.yang
Cisco-IOS-XR-ppp-ea-oper.yang	Cisco-IOS-XR-infra-sla-oper.yang
Cisco-IOS-XR-asr9k-ptp-pd-oper.yang	Cisco-IOS-XR-ncs1001-ots-oper.yang
Cisco-IOS-XR-ipv4-igmp-oper.yang	Cisco-IOS-XR-nto-misc-shmem-oper.yang
Cisco-IOS-XR-ipv4-bgp-oc-oper.yang	Cisco-IOS-XR-ip-rib-ipv4-oper.yang
Cisco-IOS-XR-ip-pfilter-oper.yang	Cisco-IOS-XR-ipv4-pim-oper.yang
Cisco-IOS-XR-lpts-pre-ifib-oper.yang	Cisco-IOS-XR-pppoe-ea-oper.yang
Cisco-IOS-XR-ipv6-ospfv3-oper.yang	Cisco-IOS-XR-infra-syslog-oper.yang
Cisco-IOS-XR-asr9k-netflow-oper.yang	Cisco-IOS-XR-crypto-sam-oper.yang
Cisco-IOS-XR-infra-xtc-oper.yang	Cisco-IOS-XR-Ethernet-SPAN-oper.yang
Cisco-IOS-XR-sysdb-oper.yang	Cisco-IOS-XR-lpts-ifib-oper.yang
Cisco-IOS-XR-lib-mpp-oper.yang	Cisco-IOS-XR-ethernet-link-oam-oper.yang
Cisco-IOS-XR-infra-xtc-agent-oper.yang	Cisco-IOS-XR-mpls-ldp-oper.yang
Cisco-IOS-XR-ip-rib-ipv6-oper.yang	Cisco-IOS-XR-tty-management-oper.yang
Cisco-IOS-XR-rptiming-dti-oper.yang	Cisco-IOS-XR-lmp-oper.yang
Cisco-IOS-XR-wd-oper.yang	Cisco-IOS-XR-nto-misc-shprocmem-oper.yang
Cisco-IOS-XR-man-xml-ttyagent-oper.yang	Cisco-IOS-XR-procmem-oper.yang
Cisco-IOS-XR-ip-daps-oper.yang	Cisco-IOS-XR-Subscriber-infra-subdb-oper.yang
Cisco-IOS-XR-spirit-install-instmgr-oper.yang	Cisco-IOS-XR-asr9k-np-oper.yang
Cisco-IOS-XR-fretta-grid-svr-oper.yang	Cisco-IOS-XR-ptp-oper.yang
Cisco-IOS-XR-clns-isis-oper.yang	Cisco-IOS-XR-tunnel-nve-oper.yang
Cisco-IOS-XR-ipv4-bgp-oper.yang	Cisco-IOS-XR-ocni-oper.yang
Cisco-IOS-XR-ipv4-ma-oper.yang	Cisco-IOS-XR-ncs6k-acl-oper.yang
Cisco-IOS-XR-l2-eth-infra-oper.yang	Cisco-IOS-XR-manageability-object-tracking-oper.yang
Cisco-IOS-XR-plat-chas-invmgr-oper.yang	Cisco-IOS-XR-ocni-intfbase-oper.yang
Cisco-IOS-XR-dwdm-ui-oper.yang	Cisco-IOS-XR-infra-tc-oper.yang
Cisco-IOS-XR-policy-repository-oper.yang	Cisco-IOS-XR-subscriber-session-mon-oper.yang

Cisco-IOS-XR-ipv6-new-dhcpv6d-oper.yang	Cisco-IOS-XR-ip-udp-oper.yang
Cisco-IOS-XR-subscriber-srg-oper.yang	Cisco-IOS-XR-ipv6-acl-oper.yang
Cisco-IOS-XR-manageability-perfmgmt-oper.yang	Cisco-IOS-XR-crypto-macsec-pl-oper.yang
Cisco-IOS-XR-dnx-port-mapper-oper.yang	Cisco-IOS-XR-aaa-tacacs-oper.yang
Cisco-IOS-XR-mpls-te-oper.yang	Cisco-IOS-XR-man-ipsla-oper.yang
Cisco-IOS-XR-nto-misc-oper.yang	Cisco-IOS-XR-invmgr-oper.yang
Cisco-IOS-XR-ppp-ma-oper.yang	Cisco-IOS-XR-ipv4-arp-oper.yang
Cisco-IOS-XR-config-cfgmgr-exec-oper.yang	Cisco-IOS-XR-aaa-locald-oper.yang
Cisco-IOS-XR-perf-meas-oper.yang	Cisco-IOS-XR-ha-eem-policy-oper.yang
Cisco-IOS-XR-snmp-agent-oper.yang	Cisco-IOS-XR-ascii-ltrace-oper.yang
Cisco-IOS-XR-asr9k-lc-ethctrl-oper.yang	Cisco-IOS-XR-skp-qos-oper.yang
Cisco-IOS-XR-ifmgr-oper.yang	Cisco-IOS-XR-flowspec-oper.yang
Cisco-IOS-XR-iedge4710-oper.yang	Cisco-IOS-XR-icpe-sdacp-oper.yang
Cisco-IOS-XR-controller-otu-oper.yang	Cisco-IOS-XR-fretta-bcm-dpa-npu-stats-oper.yang
Cisco-IOS-XR-subscriber-accounting-oper.yang	Cisco-IOS-XR-alarmgr-server-oper.yang
Cisco-IOS-XR-ncs5500-qos-oper.yang	Cisco-IOS-XR-fia-internal-tcam-oper.yang
Cisco-IOS-XR-skywarp-netflow-oper.yang	Cisco-IOS-XR-tty-server-oper.yang
Cisco-IOS-XR-ncs1k-mxp-lldp-oper.yang	Cisco-IOS-XR-qos-ma-oper.yang
Cisco-IOS-XR-fib-common-oper.yang	Cisco-IOS-XR-aaa-protocol-radius-oper.yang
Cisco-IOS-XR-dnx-netflow-oper.yang	Cisco-IOS-XR-platform-pifib-oper.yang
Cisco-IOS-XR-lpts-pa-oper.yang	Cisco-IOS-XR-asr9k-fsi-oper.yang
Cisco-IOS-XR-ncs1k-mxp-oper.yang	Cisco-IOS-XR-ncs5500-coherent-node-oper.yang
Cisco-IOS-XR-asr9k-sc-invmgr-oper.yang	Cisco-IOS-XR-snmp-ifmib-oper.yang
Cisco-IOS-XR-ptp-pd-oper.yang	Cisco-IOS-XR-ip-mobileip-oper.yang
Cisco-IOS-XR-ethernet-cfm-oper.yang	Cisco-IOS-XR-wdsysmon-fd-oper.yang
Cisco-IOS-XR-pbr-oper.yang	Cisco-IOS-XR-infra-objmgr-oper.yang
Cisco-IOS-XR-ip-rsvp-oper.yang	Cisco-IOS-XR-ipv6-io-oper.yang
Cisco-IOS-XR-terminal-device-oper.yang	Cisco-IOS-XR-plat-chas-invmgr-ng-oper.yang
Cisco-IOS-XR-mpls-oam-oper.yang	Cisco-IOS-XR-ncs5500-coherent-portmode-oper.yang
Cisco-IOS-XR-sse-span-oper.yang	Cisco-IOS-XR-infra-dumper-oper.yang
Cisco-IOS-XR-asr9k-sc-diag-oper.yang	Cisco-IOS-XR-mpls-io-oper.yang