



## Use Cases on Using Telemetry

This section provides use case on using Telemetry.

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### Example: Configure Event-driven Telemetry for LLDP

Telemetry supports NETCONF event notifications where the NETCONF client is configured to receive event notifications from a NETCONF server through a subscription. The NETCONF client must subscribe using a `create-subscription` request. Currently, only the events from Link Layer Discovery Protocol (LLDP) is supported. These event notifications are sent until either the NETCONF session or the subscription is terminated.



**Note** Configuring a sensor group and a subscription is not required for receiving NETCONF notifications. While sensor path and subscription configurations are required for receiving telemetry events, NETCONF `create-subscription` is required for receiving NETCONF notifications.

To generate NETCONF notifications:

1. Enable NETCONF agent and SSH sub system.

```
ssh server netconf
netconf-yang agent ssh
```

2. Enable model-driven telemetry.

```
telemetry model-driven
```

3. Enable LLDP.

```
lldp
```

This example shows event-driven telemetry fo LLDP configuration data.

1. Create a destination group.

```
grpc
port 56782
```

```

address-family ipv4
!
telemetry model-driven
destination-group <destination-udp>
  address-family ipv4 <client-ip>1 port <udp port num>
  encoding self-describing-gpb
  protocol udp
!
!
destination-group <destination-tcp>
  address-family ipv4 <client-ip> port <tcp port num>
  encoding gpb
  protocol tcp
!
!
destination-group <destination-grpc>
  address-family ipv4 <grpc client ip>port <grpc port num>
  encoding self-describing-gpb
  protocol grpc no-tls

```

## 2. Create a sensor group.

```

sensor-group <sensor-group-name>
  sensor-path Cisco-IOS-XR-ethernet-lldp-oper:lldp/global-lldp/lldp-info
  sensor-path Cisco-IOS-XR-ethernet-lldp-oper:lldp/nodes/node/interfaces/interface
  sensor-path Cisco-IOS-XR-ethernet-lldp-oper:lldp/nodes/node/neighbors/details/detail
!

```

## 3. Create a subscription.

```

subscription udp-out
  sensor-group-id <sensor-group-name> sample-interval 0
  destination-id <destination-udp>
!

subscription <subscription-name>
  sensor-group-id <sensor-group-name> sample-interval 0
  destination-id <destination-tcp>

subscription <subscription-name>
  sensor-group-id <sensor-group-name> sample-interval 0
!
netconf-yang agent
ssh
!

```

## 4. Set the notification to stream data when an event occurs.

```

Router(config-lldp)#timer 12
Router(config-lldp)#commit

Router(config-lldp)#holdtime 150
Router (config-lldp)#commit

Router (config-lldp)#exit
#506
<?xml version="1.0"?>
<notification xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
  <eventTime>Date-and-Time</eventTime>
  <lldp xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-ethernet-lldp-oper">
    <global-lldp>
      <lldp-info>
        <chassis-id>000b.1bc9.e700</chassis-id>

```

```

    <chassis-id-sub-type>4</chassis-id-sub-type>
    <system-name>ios</system-name>
    <timer>12</timer>
    <hold-time>120</hold-time>
    <re-init>2</re-init>
  </lldp-info>
</global-lldp>
</lldp>
</notification>
Ready to send a request.
Paste your request or enter 'get', 'get-config', 'create-sub', or 'bye' to quit):

```

##### 5. Validate response received from NETCONF agent.

```

#506
<?xml version="1.0"?>
<notification xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
  <eventTime>Date-and-Time</eventTime>
  <lldp xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-ethernet-lldp-oper">
    <global-lldp>
      <lldp-info>
        <chassis-id>000b.1bc9.e700</chassis-id>
        <chassis-id-sub-type>4</chassis-id-sub-type>
        <system-name>ios</system-name>
        <timer>12</timer>
        <hold-time>150</hold-time>
        <re-init>2</re-init>
      </lldp-info>
    </global-lldp>
  </lldp>
</notification>

```

## Example: Create and Delete LACP Bundle or Member

OpenConfig-Link Aggregation Control Protocol (OC-LACP) data model can be used to stream model-driven telemetry (MDT) and event-driven telemetry (EDT) data. Link Aggregation Control Protocol (LACP) controls the bundling of one or more ports together to form a single logical link. This single link provides higher bidirectional bandwidth, redundancy, and load balancing between the routers in the network.

The OC-LACP model defined by the OC community, helps manage LACP-enabled bundles and member interfaces. Cisco IOS XR software supports OC-LACP version 1.0.2. The support is extended to version 1.1.0 from Cisco IOS XR software release 6.6.1.



**Note** Streaming model-driven or event-driven telemetry data is supported only on operational state parameters.

The support for telemetry is provided only for LACP state data at global, bundle and member level.

Using this model, user can configure LACP parameters on the bundle interface and view state data for LACP-enabled bundle and member interfaces.

The OC LACP yang model is available in the [Github](#) repository.

The following logs shows an example of expected telemetry data when a LACP member is added to bundle, and then deleted from the bundle.

## Add a LACP Member to Bundle

1. Add an ethernet link bundle with the specified bundle-id.

```
Router#config
Router(config)#interface bundle-ether 4
```

2. Specify the interface details.

```
Router(config)#interface gigabitEthernet 0/2/0/3
```

3. Add the link to the specified bundle. To enable active or passive LACP on the bundle, include the optional mode active or mode passive keywords in the command string.

```
Router(config-if)#bundle id 4 mode passive
Router(config-if)#no shutdown
```

4. Check the log.

```
Sub_id 200000001, flag 4, len 830
-----
{"node_id_str":"ios","subscription_id_str":"app_TEST_200000001","encoding_path":"openconfig-lacp:lacp",
"collection_id":"5","collection_start_time":"1542876320548","msg_timestamp":"1542876320548",
"data_json":[{"timestamp":"1542876320548","keys":[],"content":{"interfaces":{"interface":{"name":"Bundle-Ether4",
"members":{"member":{"interface":"GigabitEthernet0/2/0/3","state":{"interface":"GigabitEthernet0/2/0/3",
"activity":"PASSIVE","timeout":"LONG","synchronization":"OUT_SYNC","aggregatable":true,"collecting":false,
"distributing":false,"system-id":"02-9d-af-84-41-05","oper-key":4,"partner-id":"00-00-00-00-00-00","partner-key":0,
"port-num":0,"partner-port-num":0,"counters":{"lacp-in-pkts":"0","lacp-out-pkts":"0","lacp-rx-errors":"0",
"lacp-unknown-errors":"0","lacp-errors":"0"}}}}}}}},"collection_end_time":"1542876320548"}
-----
Sub_id 200000001, flag 4, len 830
-----
{"node_id_str":"ios","subscription_id_str":"app_TEST_200000001","encoding_path":"openconfig-lacp:lacp","collection_id":
"6","collection_start_time":"1542876320569","msg_timestamp":"1542876320569","data_json":[{"timestamp":"1542876320568",
"keys":[],"content":{"interfaces":{"interface":{"name":"Bundle-Ether4",
"members":{"member":{"interface":"GigabitEthernet0/2/0/3","state":{"interface":"GigabitEthernet0/2/0/3",
"activity":"PASSIVE","timeout":"LONG",
"synchronization":"OUT_SYNC","aggregatable":true,"collecting":false,"distributing":false,"system-id":
"02-9d-af-84-41-05","oper-key":4,"partner-id":"00-00-00-00-00-00","partner-key":0,"port-num":4,"partner-port-num":0,
"counters":{"lacp-in-pkts":"0","lacp-out-pkts":"0","lacp-rx-errors":"0","lacp-unknown-errors":"0","lacp-errors":"0"}}}}}}}}},
"collection_end_time":"1542876320569"}
-----
Sub_id 200000001, flag 4, len 466
-----
{"node_id_str":"ios","subscription_id_str":"app_TEST_200000001","encoding_path":"openconfig-lacp:lacp","collection_id":
"7","collection_start_time":"1542876320570","msg_timestamp":"1542876320570","data_json":[{"timestamp":"1542876320568",
"keys":[],"content":{"interfaces":{"interface":{"name":"Bundle-Ether4",
"members":{"member":{"interface":"Bundle-Ether4","interval":"SLOW","lacp-mode":
"PASSIVE","system-id-mac":"02-9d-af-84-41-05","system-priority":32768}}}}}},"collection_end_time":"1542876320570"}
-----
```

## Delete a LACP Member from Bundle

1. Delete a LACP member from the bundle, a scenario where the bundle also becomes non-LACP.

```
Router(config)#interface gigabitEthernet 0/2/0/3
Router(config-if)#bundle id 4 mode on
Router(config-if)#commit
```

2. Check the log.

```
-----
Sub_id 200000001, flag 4, len 425
-----
{"node_id_str":"ios","subscription_id_str":"app_TEST_200000001","encoding_path":"openconfig-lacp:lacp",
"collection_id":"8","collection_start_time":"1542876408256","msg_timestamp":"1542876408256","data_json":
```

```
[{"timestamp":"1542876408256","delete":true,"keys":[],"content":{"interfaces":{"interface":{"name":
"Bundle-Ether4","members":{"member":{"interface":"GigabitEthernet0/2/0/3"}}}}}], "collection_end_time":
"1542876408256"}
-----
Sub_id 200000001, flag 4, len 365
-----
{"node_id_str":"ios","subscription_id_str":"app_TEST_200000001","encoding_path":"openconfig-lacp:lacp",
"collection_id":"9","collection_start_time":"1542876408256","msg_timestamp":"1542876408256","data_json":
[{"timestamp":"1542876408256","delete":true,"keys":[],"content":{"interfaces":{"interface":{"name":
"Bundle-Ether4"}}}], "collection_end_time":"1542876408256"}
```

