Cellular pluggable interface modules

The Cisco 4G LTE-Advanced Configuration chapter has been replaced by a new standalone guide called Cellular Pluggable Interface Module Configuration Guide . This guide contains updated information on all aspects of using the Cisco Cellular PIM.

Important The Pluggable Module is not hot swappable. The router must be reloaded after a new module is installed.

Support for P-5GS6-R16SA-GL pluggable module

From Cisco IOS-XE Release 17.18.2, the P-5GS6-R16SA-GL Pluggable Module is supported on ESR6300 routers.

Support for the P-5GS6-R16SA-GL Pluggable Module works the same way on the ESR6300 routers as it does on the other IoT routers. For details, see 5G Sub-6 GHz Pluggable Interface Module and Cellular Pluggable Interface Module Configuration Guide .

Galileo support on the LTE pluggable modules

The Cisco IOS XE 17.11.1a release introduces support for the Galileo constellation on LTE pluggable modules.

GPS was the only GNSS constellation supported in earlier releases. The Cisco IOS XE 17.11.1a release introduces support for Galileo constellation.

Note You can enable only one constellation at a time.

Configuration command examples:

```
config# controller cellular<slot/port>
(config-controller)# <no> lte gps constellation <gps | galileo | gnss >
```

Example:

```
(config-controller)# lte gps constellation ?
galileo  select Galileo as active constellation
gps      select GPS as active constellation
gnss      select multiple GNSS as active constellation
```

Note The default setting is GPS mode.

The galileo and gnss options in this CLI configure Galileo and simultaneous GNSS modes, such as GPS and Galileo.

If you disable the GPS configuration, make sure that no constellation is configured. This maintains consistency with GPS mode configuration.

Example:

```
config#


controller Cellular 0/4/0


(config-controller)# no lte gps constellation gps
```

Show commands example:

Note The example shows the current GNSS constellation as Galileo.

Example:

```
config#


show cellular 0/4/0 gps detail


GPS Feature =  enabled
GPS Mode Configured =  standalone
Current Constellation Configured =  galileo
GPS Port Selected =  Dedicated GPS port
GPS Status =  GPS acquiring
```

Any changes made to the configuration will require the router to be rebooted.

More information is available in the Cellular Pluggable Interface Module Configuration Guide .

Radio signal parameters and GPS coordinates of cellular telemetry monitoring using syslog messages

Cellular telemetry is a feature that enables real-time monitoring and analysis of cellular connection performance by collecting Radio Frequency (RF) parameters and Global Positioning System (GPS) coordinates from the cellular network at a fixed interval of 60 seconds.

- Monitors key radio signal parameters such as RSSI, RSRP, RSRQ, PCI, and SNR.
- Collects GPS coordinates for location tracking.
- Facilitates troubleshooting, network optimization, and ensures reliable connectivity.

Cellular Telemetry Reference Information

Cellular telemetry parameters that can be monitored include:

- Received Signal Strength Indicator (RSSI)
- Reference Signal Received Power (RSRP)
- Reference Signal Received Quality (RSRQ)
- Physical Cell Identity (PCI)
- Signal to Noise Ratio (SNR)
- Global Positioning System (GPS) coordinates

The Cisco Catalyst WAN Manager does not support cellular telemetry.

Enable cellular telemetry

To enable the cellular telemetry feature in the contoller cellular interface 0/x/0 using the CLI.

Before you begin

- Insert the cellular Pluggable Interface Module (PIM) into the IR device.
- Enable GPS in the controller for GPS coordinates to be displayed in syslogs.

Procedure

Step 1 Enter the global configuration mode.

Example:

```
Router#configure terminal
```

Step 2 Enter the cellular configuration mode.

Example:

```
Router (config)#controller cellular 0/4/0
```

Step 3 Enable the RF parameters and GPS coordinates.

Example:

```
Router (config-controller)#lte modem serviceability signal-parameters
Router (config-controller)#end
```

Disable cellular telemetry

To disable the cellular telemetry feature, use the no form of the **lte modem serviceability signal-parameters** command, as shown in the example:

```
Router#Configure terminal


Router(config)#controller cellular 0/4/0

Router(config-controller)#no lte modem serviceability signal-parameters
Router(config-controller)#end
```

Monitor cellular telemetry

You can monitor RF parameters and GPS coordinates for cellular interfaces by using the **show logging** command or check the console output.

The following example displays RF parameters and GPS coordinates at every one minute interval:

```
Router#show logging
*Sep  3 17:08:42.081: %CELLWAN-2-MODEM_SIGNAL_PARAM: Cellular0/4/0: 4G: RSSI = -54 dBm RSRP
 = -76 dBm RSRQ = -9 dB PCI = 1 SNR = 27.4 dB
Latitude =  12 Deg 56 Min 8.9260 Sec North
Longitude =  77 Deg 41 Min 44.1641 Sec East

*Sep  3 17:09:42.080: %CELLWAN-2-MODEM_SIGNAL_PARAM: Cellular0/4/0: 4G: RSSI = -54 dBm RSRP
 = -76 dBm RSRQ = -9 dB PCI = 1 SNR = 29.0 dB
Latitude =  12 Deg 56 Min 8.8989 Sec North
Longitude =  77 Deg 41 Min 44.1570 Sec East
```

The following example displays only RF parameters and not GPS coordinates since GPS is not enabled in the controller:

```
Router#show logging
*Sep  3 17:08:42.081: %CELLWAN-2-MODEM_SIGNAL_PARAM: Cellular0/4/0: 4G: RSSI = -54 dBm RSRP
 = -76 dBm RSRQ = -9 dB PCI = 1 SNR = 27.4 dB

*Sep  3 17:09:42.080: %CELLWAN-2-MODEM_SIGNAL_PARAM: Cellular0/4/0: 4G: RSSI = -54 dBm RSRP
 = -76 dBm RSRQ = -9 dB PCI = 1 SNR = 29.0 dB
```

GPS NMEA unique identifier

Starting with Cisco IOS-XE Release 26.1.1, Cisco routers can send a Unique Identifier (UID) to identify the source device when streaming NMEA GPS sentences over UDP on the Cisco IR1101 and Cisco IR1835

routers. UID streaming is supported from the Dead Reckoning (DR) module and from cellular modems that support GNSS. The UID uniquely identifies each router in GPS data processing systems.

Table 1: Feature History Table

Feature name	Release information	Feature description
Send a UID to identify the unique source when sending GPS coordinates data	Release 26.1.1	This feature allows you to configure Cisco routers to send a Unique Identifier (UID) while streaming NMEA GPS sentences over UDP. This UID streaming is supported by both the Dead Reckoning (DR) module and cellular modems with GNSS capabilities, enabling each router to be uniquely identified in GPS data processing systems.

Cisco proprietary NMEA sentence format

When you configure a UID, a Cisco proprietary NMEA sentence is sent alongside the standard NMEA sentence in the same UDP packet. The format is:

```
$PCSCU,<UID>,<Source>,<Router Time>,<NMEA Sentence Time>,<NMEA Sentence Checksum>,,,,,,*95
```

- `CSC` indicates Cisco
- `U` indicates this sentence provides a unique identifier
- `<UID>` is the serial number, hostname, or custom ID
- `<Source>` indicates the origin of the NMEA stream:
  - `0`: cellular modem0
  - `1`: cellular modem1
  - `2`: DR module

For example, for cellular modem1, if you use the serial number as the UID, the Cisco proprietary NMEA sentence appears as:

```
$PCSCU,FCW2447P0EU,1,213431.100,213431.000,75,,,,,,*95
```

In this NMEA sentence

- `CSC` indicates Cisco
- `U` indicates that this sentence provides a unique identifier
- `FCW2447P0EU` indicates serial number as the UID
- `1` indicates source as cellular modem1
- `1213431.100` indicates the router time
- `213431.000` indicates the NMEA sentence time

- `75` indicates the NMEA sentence checksum

NMEA sentence selection

By default, all NMEA sentences from the modem or DR module are sent to the configured UDP destination. To reduce UDP traffic, you can select specific NMEA sentence types to send using a hex bitmask. The table presents each NMEA sentence type and its corresponding HEX value.

Table 2: NMEA sentence type and HEX value

HEX value	NMEA sentence type
0x01	GGA
0x02	GSA
0x04	GSV
0x08	RMC
0x10	VTG
0x20	GNS

Configure dead reckoning GPS NMEA unique identifier

Follow these steps to configure dead reckoning GPS NMEA UID.

Procedure

Step 1 Use the **configure terminal** command to enter the configuration mode.

Example:

```
Router# configure terminal
```

Step 2 Use the command **controller gps-dr** command to enter the controller mode.

Example:

```
Router(config)# controller gps-dr
```

Step 3 Use the **dead-reckoning enable** command to enable Dead Reckoning.

Example:

```
Router(config)# dead-reckoning enable
```

Step 4 Use the **dead-reckoning nmea uid** {**custom** *unique-identifier* **| hostname | serial-number**} command to enable the GPS NMEA UID.

UID can be any of these:

- **custom**: user-configured string of upto 50 characters.

- **hostname**: host name of the router.
- **serial-number**: serial number of the router.

When using **serial-number** or **hostname**, the UID is automatically extracted and added to the proprietary NMEA sentence. This allows uniform CLI configuration across routers.

When using a **custom ID**, each router must be configured with a *unique-identifier* value to ensure distinct identification.

Example:

```
Router(config-controller)# dead-reckoning nmea uid custom 142
```

Example:

```
Router(config-controller)# dead-reckoning nmea uid hostname
```

Example:

```
Router(config-controller)# dead-reckoning nmea uid serial-number
```

Step 5 Use the **dead-reckoning nmea** *source-address destination-address destination-port* command to specify the UDP source and destination.

Example:

```
Router(config-controller)# dead-reckoning nmea udp 10.195.79.179 171.70.55.77 14013
```

Step 6 Use the **lte gps nmea filter** *hex-value* command to select the sentence types.

hex-value: HEX bitmask for NMEA message filtering (0x01:GGA, 0x02:GSA, 0x04:GSV, 0x08:RMC, 0x010:VTG, 0x20:GNS)

This example shows the HEX value if you want to send sentence type as only RMC (0x08) and GNS (0x20):

Example:

```
Router(config-controller)# dead-reckoning nmea filter 28
```

This example shows the HEX value if you want to send sentence type as only VTG (0x10) and GSV (0x04):

Example:

```
Router(config-controller)# dead-reckoning nmea filter 14
```

Step 7 Use the **end** command to exit the controller configuration mode and return to the privileged EXEC mode.

Example:

```
Router(config-controller)# end
```