Configuring GNSS

This chapter describes how to configure the Global Navigation Satellite System (GNSS) on Cisco NX-OS devices.

This chapter includes the following sections:

About GNSS

The GNSS receiver is designed to operate on the GPS, Galileo, GLONASS, BeiDou and QZSS L1 frequencies 1551MHz to 1614MHz, standard position service, and Coarse Acquisition code. When connected to an external GNSS antenna, the receiver contains all the circuitry necessary to automatically acquire GNSS satellite signals, track up to 32 GNSS satellites, and compute location, speed, heading, and time. It provides an accurate one pulse-per-second (PPS) and stable 10-MHz frequency output for internal system use.

It automatically initiates a self-survey upon acquisition of GNSS satellites. When the survey is completed, the receiver switches into the "Over-Determined" timing mode. In this mode, the reference position from the self-survey is maintained in memory and the receiver solves only for clock error and clock bias. The receiver provides for both Position and Time Receiver Autonomous Integrity Monitoring (T-RAIM) which allows the receiver to self-determine position change or to remove a satellite providing incorrect information to the timing solution.

Note   No signals are transmitted out of GNSS ports (Antenna port).

Guidelines and Limitations for GNSS

GNSS has the following guidelines and limitations:

- Beginning with Cisco NX-OS Release 10.3(2)F, the GNSS is supported on the Cisco Nexus 93180YC-FX3 switch.

Enabling the GNSS Receiver

Use this procedure to enable the GNSS Receiver as input.

SUMMARY STEPS

1. **configure terminal**
2. **feature frequency-synchronization**
3. **gnss-receiver sync 1/2**
4. **frequency synchronization**
5. (Optional) **constellation** *<type>*
6. (Optional) **cable-delay compensation**
7. (Optional) **elevation threshold**
8. (Optional) **snr threshold**
9. (Optional) **pdop threshold**
10. (Optional) **1pps polarity**
11. (Optional) **anti-jam disable**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**feature frequency-synchronization**
	
	Example:
	
	`switch# feature frequency-synchronization`
	`switch(config)#`
		Enable the feature frequency-synchronization.

Step 3	**gnss-receiver sync 1/2**
	
	Example:
	
	`switch(config)# gnss-receiver sync 1/2`
	`switch(config-gnss-if)# no shutdown`
	`switch(config-gnss-if)#`
		Enable the GNSS Receiver as input.

Step 4	**frequency synchronization**
	
	Example:
	
	`switch(config-gnss-if)# frequency synchronization`
	`switch(config-gnss-freqsync)# selection input`
	`switch(config-gnss-freqsync)# wait-to-restore 0`
	`switch(config-gnss-freqsync)# exit`
		Configures the frequency synchronization on GNSS Receiver.

Step 5	(Optional) **constellation** *<type>* **Example:**	You can configure the GNSS module to automatically track any satellite or configure it to explicitly use a specific

	Command or Action	Purpose
	`switch(config-gnss)# constellation gps` `switch(onfig-gnss)#`	constellation as mentioned in the below table. The default constellation configuration is **AUTO**: • Auto • GPS • GALILEO • BEIDOU • QZSS • GLONASS

Step 6	(Optional) **cable-delay compensation**
	
	Example:
	`switch(config-gnss)# cable-delay compensation 0`
	`switch(onfig-gnss)#`
		Configures the delay that is introduced by the antenna cable. For long cable runs, this delay can be significant. The range is –1000000, +1000000 nanoseconds.
		
		Note The cable delay is about 5.9 nanoseconds per meter of cable.

Step 7	(Optional) **elevation threshold**
	
	Example:
	`switch(config-gnss)# elevation threshold 10`
	`switch(onfig-gnss)#`
		Configures the lowest satellite elevation for fixes. The range is from 0 to 90°. The default value is 10°.

Step 8	(Optional) **snr threshold**
	
	Example:
	`switch(config-gnss)# snr threshold 10`
	`switch(onfig-gnss)#`
		Configures the Carrier to Noise ratio (C/No). The range is 0 to 15db-Hz. The default value is 0.0 C/No.
		
		Note Applicable only in Over-Determined Clock. Not applicable during selfsurvey.

Step 9	(Optional) **pdop threshold**
	
	Example:
	`switch(config-gnss)# pdop threshold 6`
	`switch(onfig-gnss)#`
		Position Dilution of Precision (PDOP) indicates the confidence level of a position fix. Low DOP values indicate a high confidence level, while high DOP values indicate a low confidence level. The range is from 0 to 10. The default value is 6.

Step 10	(Optional) **1pps polarity**
	
	Example:
	`switch(config-gnss)# 1pps polarity positive`
	`switch(onfig-gnss)#`
		Configures the polarity of the GNSS receiver. It can be set to either positive or negative. The default option is positive.

Step 11	(Optional) **anti-jam disable**
	
	Example:
	`switch(config-gnss)# anti-jam disable`
	`switch(onfig-gnss)#`
		Enables or disables the jamming occurred when the receiver function is disturbed by external RF sources that interfere with GNSS signals or saturate the antenna LNA or receiver front end. Values are Enable or Disable.
		
		Note If enabled, minimum of two satellites required for fix in Over-Determined Clock mode.

Verifying the GNSS Configuration

After performing the GNSS configuration tasks, use this reference to check for configuration errors and verify the configuration.

show gnss-receiver

The output of this command displays details of GNSS configuration.

The following is an example of the output of the **show gnss-receiver** command:

```
switch(config-gnss-if)# sh gnss-receiver
GNSS-receiver SYNC 01/02
Status: Available, Up
Position: 41:11:660 N 74:0:0 W -12.805 m
Time: 1648046422 (UTC offset: 18s)
Firmware version: 1.7
Lock Status: Phase Locked, Receiver Mode: 3D-fix
Survey Progress: 100, Holdover Duration: 0
Major Alarm: Not used
Minor Alarm: Antenna shorted
Anti-jam: Disabled, Cable-delay compensation: 1000
1PPS polarity: Negative
PDOP: 0.000, HDOP: 0.000, VDOP: 0.000, TDOP: 0.001
Constellation: Auto, Satellite Count: 7
Satellite Thresholds:
SNR - 0 dB-Hz, Elevation - 0 degrees, PDOP - 5, TRAIM - 1 us
Satellite Info:
PRN   Channel Acquisition Ephemeris  SV        Signal
No.   No.     Flag        Flag        Type     Strength  Elevat'n  Azimuth
--- ------- ----------- --------- ----------- -------- -------- --------
11     0       On          On          GPS      0.036     0.076     0.024
28     1       On          On          GPS      0.036     0.025     0.272
1      2       On          On          GPS      0.037     0.089     0.002
19     3       On          On          GPS      0.037     0.036     0.151
14     5       On          On          GPS      0.036     0.019     0.045
17     6       On          On          GPS      0.037     0.025     0.314
23     7       On          On          GPS      0.037     0.014     0.178
switch(config-gnss-if)#
```

show frequency synchronization selection

The following is an example of the output of the **show frequency synchronization selection** command:

```
switch(config-gnss-if)# sh frequency synchronization selection
==============
Selection point: System Clock (T0) Selector (2 inputs, 1 selected)
Last programmed 00:53:56 ago, and selection made 00:53:35 ago
Next selection points
Node scoped :
Uses frequency selection
Used for local line interface output
S Input Last Selection Point QL Pri Status
== ======================= ======================== ===== === ===========
Internal0[1] n/a SEC 255 Available
11 GNSS2[1] n/a PRC 100 Locked
==============
Selection point: IEEE 1588 Clock Selector (2 inputs, 1 selected)
Last programmed 00:53:56 ago, and selection made 00:53:55 ago
Next selection points
Node scoped :
```

```
Uses frequency selection
S Input Last Selection Point QL Pri Status
== ======================== ======================= ===== === ===========
21 Internal0[1] n/a SEC 255 Holdover
GNSS2[1] n/a PRC 100 Unmonitored
=============
switch(config-gnss-if)#
```