IPDR Streaming Protocol on the Cisco CMTS Routers

First Published: December 17, 2008

Last Updated: July 11, 2012

The Cisco universal broadband router supports the Internet Protocol Detail Record (IPDR) streaming protocol feature that provides high volume data exported from the network equipment to mediation systems such as the Operations Support Systems (OSS) or Business Support Systems (BSS). IPDR provides information about IP-based service usage and other activities that are used by OSS and BSS. This protocol provides a mechanism to collect data from various network elements or equipment using a push model as opposed to the conventional Simple Network Management Protocol (SNMP) polling mechanism.

Based on the DOCSIS 3.0 specifications, the IPDR feature optimizes time and resource efficiency in the transfer of large amounts of performance metrics to the management systems. DOCSIS 3.0 introduces five management features or the FCAPS model. FCAPS represents Fault, Configuration, Accounting, Performance and Security.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://tools.cisco.com/ITDIT/CFN/. An account on http://www.cisco.com/ is not required.

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Prerequisites for Configuring IPDR Streaming Protocol

The table shows the hardware compatibility prerequisites for the IPDR streaming protocol.

Note The hardware components introduced in a given Cisco IOS Release are supported in all subsequent releases unless otherwise specified.

Table 1: Cable Hardware Compatibility Matrix for the IPDR Streaming Protocol

Cisco CMTS Platform	Processor Engine	Cable Interface Line Cards
Cisco uBR10012 Universal Broadband Router	Cisco IOS Release 12.2(33)SCB and later • PRE2 • PRE4 • PRE5	Cisco IOS Release 12.2(33)SCB and later • Cisco uBR10-MC5X20U/H Cisco IOS Release 12.2(33)SCC and later • Cisco UBR-MC20X20V Cisco IOS Release 12.2(33)SCE and later • Cisco uBR-MC3GX60V [1]
Cisco uBR7246VXR Universal Broadband Routers	Cisco IOS Release 12.2(33)SCD and later • Network Processing Engine G2 (NPE-G2)	Cisco IOS Release 12.2(33)SCD and later • Cisco uBR-MC88V [2]
Cisco uBR7225VXR Universal Broadband Router	Cisco IOS Release 12.2(33)SCD and later • NPE-G2	Cisco IOS Release 12.2(33)SCD and later • Cisco uBR-MC88V

[1] Cisco uBR3GX60V cable interface line card is not compatible with PRE2. You must use PRE4 with the Cisco uBR3GX60V cable interface line card.

[2] Cisco uBR-MC88V cable interface line card is not compatible with NPE-G1. You must use NPE-G2 with the Cisco uBR-MC88V cable interface line card.

Restrictions for Configuring IPDR Streaming Protocol

- An IPDR exporter can be connected to many collectors, but it will only send data to the highest priority operating collector at any given time.

- Each IPDR session can be associated to one active (zero) or more standby collector with priority.

Information About IPDR Streaming Protocol

IPDR Streaming Protocol is designed to address the need for a reliable, fast, efficient, and flexible export process of high volume data records such as billing, performance and diagnostic data.

The IPDR/SP process communicates with IPDR collectors. The IPDR streaming protocol supports multiple IPDR sessions. The architecture supports primary and secondary collectors for failover purposes. At any time, data is sent to only one collector. If the exporter to primary collector connection fails due to any reason, the data is sent to the secondary collector. Depending on the network configuration, you can have only one primary collector for each session, while for different sessions, you can have different primary collectors. For example, there may be a billing collector, a diagnostic collector, and so on.

Note   IPDR exporter refers to the Cable Modem Termination System (CMTS) and the IPDR collector refers to the network equipment.

Data Collection Methodologies

IPDR is the data generated or collected for various performance related metrics such as billing information, diagnostics, network topology, signal quality monitoring, and other management data. These data are based on the FCAPS model (Fault, Configuration, Accounting, Performance and Security.)

The IPDR client application communicates with the IPDR exporter using the IPDR_GET_SESSIONS message to identify the streams provided by the exporter, and the exporter sends responses to the client using the IPDR_GET_SESSIONS_RESPONSE message. This data collection method is based on the *Operations Support System Interface Specification* (CM-SP-OSSIv3.0-I13-101008).

Beginning with Cisco IOS Release 12.2(33)SCE, the IPDR_GET_SESSIONS_RESPONSE message includes the SessionBlock.reserved attribute to identify the IPDR session ID. This attribute helps the Cisco CMTS router define an IPDR session ID for each data collection mechanism supported for each IPDR service definition. This attribute was not used in Cisco IOS Releases earlier to Cisco IOS Release 12.2(33)SCE.

Note   You must use a Cisco CMTS router running Cisco IOS Release 12.2(33)SCE or later, if your IPDR client application looks for the SessionBlock.reserved attribute in the IPDR_GET_SESSIONS_RESPONSE message.

The IPDR feature defines methods for the collectors or network elements to collect data from the CMTS. Below is the list of collection methodologies:

Time Interval Session: In this method, the CMTS follows a schedule-based session to stream data at a periodic time interval. A time interval is the time gap between two adjacent sessions' start messages. This method is

managed by the CMTS in controlling the start and stop operation of a session. The time interval session terminates after the CMTS exports the records.

> **Note** During the course of a one-time interval when the CMTS is streaming records, if another time interval is expected, the CMTS will ignore the new time interval and continue exporting the data until the previous time interval ends.

Event-based Session: In this method, the CMTS can export records at any time, when the session is open. In other words, this method works on an open-ended session.

Ad-hoc Session: In this method, the CMTS creates a session, allows data streaming, and closes the session when the data export is complete or when a closing command is generated.

A new session is created by issuing the **ipdr session** command. After, the CMTS receives the FLOW_START message from the collector, the CMTS exporter sends a SESSION_START message to start exporting the IPDR data from the collector. After all data is transported, the exporter receives a ACK message from the collector, and then sends a SESSION_STOP message to the collector. This method is known as the Ad-hoc session.

IPDR Access Control List

The IPDR streaming protocol in Cisco uBR10012 router is enhanced to improve the security of the IPDR collector function. This enhancement prevents the validation and authentication of the fake IPDR collectors, thus preventing billing theft.

This enhancement is optional and may be enabled or disabled. To enable the IPDR Access Control List enhancement, use the **ipdr authorization** command. Effective with Cisco IOS Release 12.2(33)SCI2, only the IPDR collectors on the CMTS network side are authorized based on the authorization procedure.

The **ipdr collector** command is enhanced to configure a NAT address for an IPDR collector that operates from a NAT router. For authorization of such IPDR collectors, the NAT address is also configured for the IPDR collectors using the **nat-address** keyword.

Restrictions

The following restrictions are applicable when the IPDR Access Control List enhancement is enabled:

- Effective with Cisco IOS Release 12.2(33)SCI2, the IPDR collectors on the CMTS bundle side are blocked. This block is irrespective of whether the **ipdr authorization** is enabled or not.

- An IPDR collector that operates from within a NAT router, the NAT address parameter may be configured for that IPDR collector.

- For authentication:

  ◦ If the IPDR collector operates from within a NAT router, then the NAT address of the IPDR collector must match the NAT address of the listed IPDR collector. The IP address of the IPDR collector also must match the IP address of the listed IPDR collector.

  ◦ If the IPDR collector does not operate from within a NAT router, only the IP address of the IPDR collector must match the IP address of the listed IPDR collector.

How to Configure IPDR Streaming Protocol

This section describes the configuration tasks that are performed when using the IPDR streaming protocol feature on the Cisco CMTS platforms.

Note   Use no ipdr command to remove the IPDR configuration.

Configuring the IPDR Session

To enable the CMTS application to add a session to the IPDR exporter, use the ipdr session command in global configuration mode.

Use the no form of the command to remove the IPDR session.

Note   • The session ID must be unique.

• To remove an active session, you must deactivate it before removing it.

>

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# configure terminal	Enters global configuration mode.
Step 3	ipdr session session_id session_name session_descr **Example:** Router(config)# ipdr session 1 samis_sxn test	Enables the CMTS application to add a session to the IPDR exporter.

Configuring the IPDR Type

To configure the IPDR session type, use the ipdr type command in global configuration mode. The IPDR session types that can be defined using this command are event type, time-interval type, and the ad hoc type.

Use the no form of the command to reset the session type to the default "event" type.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	ipdr type session_id [ad-hoc | event | time-interval value] **Example:** `Router(config)# ipdr type 1 time-interval 15`	Enables the CMTS application to configure an IPDR session type.

What to Do Next

Note Once the IPDR session type is configured, only the templates supported by this IPDR type are allowed be associated with it. Also, the console provides information about those templates that are not supported by this IPDR session type when the type is changed.

Configuring the IPDR Collector

To configure the IPDR collector details, use the ipdr collector command in global configuration mode. The port number is used when an exporter creates an active connection.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: Router> enable	• Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# configure terminal	Enters global configuration mode.
Step 3	**ipdr collector** **Example:** Router(config)# ipdr collector federal 192.168.6.5	Enables the CMTS application to configure an IPDR collector and authenticate the IPDR protocol. **Note** Configure the NAT address in case of an IPDR collector that is operating in a NAT enabled network.

Configuring the IPDR Associate

To associate the collector with a session, use the ipdr associate command in global configuration mode.

Before You Begin

- You must deactivate the session before configuring the associate.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**ipdr associate session_id collector_name priority** **Example:** Router(config)# ipdr associate 1 federal 1	Associates the collector with a session.

Configuring the IPDR Template

To add an IPDR template to the IPDR session, use the ipdr template command in global configuration mode. The template list can be viewed by entering a "?" at the command prompt.

Note • You can add only the system-supported templates.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# configure terminal	Enters global configuration mode.
Step 3	**ipdr template session_id template_name** **Example:** Router(config)# ipdr template 1 SAMIS	Adds an IPDR template to the IPDR session.

Configuring the IPDR Exporter

Starting with Cisco IOS Release 12.2(33)SCG, IPDR exporter parameters such as keepalive timer count, the maximum number of unacknowledged records, and unacknowledged timeout interval value can be configured using the following commands.

- **ipdr exporter keepalive**—Sets the keepalive timer count value on the IPDR Exporter.

- **ipdr exporter max-unacked**—Sets the maximum number of unacknowledged records on the IPDR Exporter.

- **ipdr exporter ack-timeout**—Sets the time interval for acknowledged records on the IPDR Exporter.

Note   Starting Cisco IOS Release 12.2(33)SCE, the default value for DataAckTimeInterval is 60 seconds and the default value for DataAckSequenceInterval is 200 seconds.

You can set the values for the IPDR parameters to customize exporter for the collectors used in the facility. However, these commands are optional, so if not configured, the default values of the commands are used when **ipdr exporter start** command is executed.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ipdr exporter keepalive** *time_interval* **Example:** `Router(config)# ipdr exporter keepalive 300`	(Optional) Sets the keepalive timer count for the IPDR Exporter. The valid range is from 5 to 300 seconds. The default value is 300.
Step 4	**ipdr exporter max-unacked** *records* **Example:** `Router(config)# ipdr exporter max-unacked 200`	(Optional) Sets the number of maximum unacknowledged records on the IPDR Exporter. The valid range is from 5 to 200 records. The default value is 200.
Step 5	**ipdr exporter ack-timeout** *time_interval* **Example:** `Router(config)# ipdr exporter ack-timeout 60`	(Optional) Sets the acknowledged records timeout interval on the IPDR Exporter. The valid range is from 5 to 60 seconds. The default value is 60.

	Command or Action	Purpose
Step 6	ipdr exporter start **Example:** `Router(config)# ipdr exporter start`	Enables the CMTS application to start the IPDR exporter process to connect the exporter and the collector.

Configuration Examples for IPDR Streaming Protocol

Example: Configuring the IPDR Session

The following example shows how to configure the IPDR session.

```
Router> enable
Router# configure terminal
Router(config)# ipdr session 1 test no_descr
```

Example: Configuring the IPDR Type

The following example shows how to configure the IPDR "time-interval" session type for a time interval of 15 minutes.

```
Router> enable
Router# configure terminal
Router(config)# ipdr type 1 time-interval 15
```

Example: Configuring the IPDR Collector

The following example shows how to configure the IPDR collector.

```
Router> enable
Router# configure terminal
Router(config)# ipdr collector federal 209.165.200.225
```

Example for Configuring the IPDR Collector with NAT Address

Effective with Cisco IOS Release 12.2(33)SCI2, this example shows the **nat-address** keyword used to configure the NAT address for an IPDR collector:

```
Router(config)#ipdr collector federal 192.0.2.225 nat-address 192.0.2.51
```

Example: Configuring the IPDR Associate

The following example shows how to associate the collector with a session.

```
Router> enable
Router# configure terminal
Router(config)# ipdr associate 1 federal 1
```

Example: Configuring the IPDR Template

The following example shows how to add an IPDR template to the IPDR session.

```
Router> enable
Router# configure terminal
Router(config)# ipdr template 1 SAMIS-TYPE1
```

Example: Configuring the IPDR Exporter

The following example shows how to configure the IPDR exporter process to connect the exporter and the collector.

```
Router> enable
Router# configure terminal
Router(config)# ipdr exporter keepalive 300
Router(config)# ipdr exporter max-unacked 200
Router(config)# ipdr exporter ack_timeout 60
Router(config)# ipdr exporter start
```

Example: Configuring the IPDR Authorization

The following example shows how to configure the IPDR authorization.

```
Router> enable
Router# configure terminal
Router(config)# ipdr authorization
```

Verifying IPDR Streaming Protocol

This section describes the commands used for verification of the IPDR streaming protocol feature on the Cisco CMTS platforms.

Verifying the IPDR Collector

The **show ipdr collector** command displays the collector information, message statistics, and event for all the sessions that are associated with the collector.

The following example shows the sample output for the **show ipdr collector** command.

```
Router# show ipdr collector federal
```

```
                    Collector Name: federal, IP: 192.0.2.0, Port: 0
                    2001-07-05T19:28:22 Collector in session 1 Statistics:
                     Transmitted 12658 Acknowledged 12658 Enqueued 12658 Lost 0
                     Last Event: Event Id 1 IPDR_EVENT_SERVER_CONNECTED - INCOMING
                    Router(config)#
```

Verifying IPDR exporter

The **show ipdr exporter** command displays information about the IPDR Exporter state as listed below.

- started

- not started

- not initialized

The following example shows the sample output for the **show ipdr exporter** command:

```
Router# show ipdr exporter
IPDR exporter is started.
Current parameters:
        KeepAliveInterval   :300
        AckTimeInterval     :60
        AckSequenceInterval :200
Router#
```

Verifying IPDR session

The **show ipdr session** command displays the session details such as the session ID, description, and the session state for all sessions as well as for a specific session.

The following example shows the sample output for the **all** keyword for the **show ipdr session** command.

```
Router# show ipdr session all
Session ID: 1, Name: utilsta, Descr: test, Started: False
```

The following example shows the sample output for the **session_id** keyword for the **show ipdr session** command.

```
Router# show ipdr session 1
Session ID: 1, Name: utilsta, Descr: test, Started: False
2001-07-05T19:36:28 Statistics:
Transmitted 0 Acknowledged 0 Enqueued 0 Lost 0
queuedOutstanding 0 queuedUnacknowledged 0
1 Collectors in the session:
Name: federal, IPAddr: 192.0.2.0, Port: 0, Priority: 1
```

Verifying IPDR Session Collector

The **show ipdr session collector** command displays the details of a collector that is associated with a specific session. Because there can be multiple collectors associated to a session, this command is used to show a specific session-collector pair.

The following example shows the sample output for the **show ipdr session collector** command.

```
Router# show ipdr session 1 collector federal
Session ID: 1, Name: utilsta, Descr: test, Started: False
Collecotr Name: federal, IP: 192.0.2.0, Port: 0
2001-07-05T19:38:02 Collector in session 1 Statistics:
 Transmitted 0 Acknowledged 0 Enqueued 0 Lost 0
 Last Event: Event Id 0 WRONG_EVENT_ID
```

Verifying IPDR Session Template

The **show ipdr session template** command displays the list of all active templates supported by a specific session.

The following example shows the sample output for the **show ipdr session template** command.

```
Router# show ipdr session 1 template
Template ID: 2, Name:
http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS-CMSERVICE-FLOW-TYPE,
Type: DOCSIS-Type, KeyNumber: 22
Session 1 has totally 1 templates.
```

Additional References

The following sections provide references related to configuring the IPDR streaming protocol feature.

Related Documents

Related Topic	Document Title
CMTS Command Reference	*Cisco IOS CMTS Cable Command Reference*
	http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html
Cisco uBR10012 Universal Broadband Router Documentation	*Cisco uBR10012 Universal Broadband Router Hardware Installation Guide*
	http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/installation/guide/hig.html
	Cisco uBR10012 Universal Broadband Router Software Configuration Guide http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/configuration/guide/scg.html
	Cisco uBR10012 Universal Broadband Router Release Notes
	http://www.cisco.com/en/US/products/hw/cable/ps2209/prod_release_notes_list.html

Related Topic	Document Title
IPDR/SP 2.1	IPDR/SP Protocol Specification Version 2.1 http://www.ipdr.org

Standards

Standard	Title
DOCSIS 3.0 OSSI	Data-Over-Cable Service Interface Specifications DOCSIS 3.0 Operations Support System Interface Specification CM-SP-OSSIv3.0-I13-101008 http://www.cablelabs.com

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
RFC 1014 XDR	XDR: External Data Representation Standard

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for IPDR Streaming Protocol

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Note The below table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 2: Feature Information for IPDR Streaming Protocol

Feature Name	Releases	Feature Information
IPDR Streaming Protocol	12.2(33)SCB	The Cisco universal broadband router supports the IPDR streaming protocol feature that enables efficient and reliable delivery of high volume data records from the service elements to any systems, such as mediation systems and BSS/OSS. The following sections provide information about this feature:
Data Collection Methodologies and DOCSIS 3.0 IPDR Schema	12.2(33)SCD2	This feature was introduced in this release. The following sections provide information about this feature: The following command was introduced: ipdr type
IPDR Exporter parameters such as keepalive timer value, maximum unacknowledged records, and acknowledged records timer value can be configured using the CLI.	12.2(33)SCG	The following commands were introduced: • **ipdr exporter keepalive** • **ipdr exporter max-unacked** • **ipdr exporter ack-timeout**

Feature Name	Releases	Feature Information
IPDR Access Control List	12.2(33)SCI2	This feature was introduced in this release. The following command was introduced: **ipdr authorization** The following command was modified: **ipdr collector**