Enabling Protocol Discovery

Network-Based Application Recognition (NBAR) includes a feature called Protocol Discovery. Protocol discovery provides an easy way to discover the application protocol packets that are passing through an interface. When you configure NBAR, the first task is to enable protocol discovery.

This module contains concepts and tasks for enabling the Protocol Discovery feature.

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Prerequisites for Enabling Protocol Discovery

Before enabling Protocol Discovery, read the information in the "Classifying Network Traffic Using NBAR" module.

Restrictions for Enabling Protocol Discovery

NBAR protocol discovery does not support the following:

- Asymmetric flows with stateful protocols.

Note In the NBAR context, asymmetric flows are the flows in which different packets of the flow go through different routers, for reasons such as load balancing implementation or asymmetric routing where packets flow through different routes to different directions.

- NBAR processing. By design, NBAR processing is temporarily disabled during the In-Service Software Upgrade (ISSU). The following syslog message indicates restart of NBAR classification once ISSU is complete.

"%NBAR_HA-5-NBAR_INFO: NBAR sync DONE!"

- Multicast packet classification.
- Multiprotocol Label Switching (MPLS)-labeled packets. NBAR classifies IP packets only. You can, however, use NBAR to classify IP traffic before the traffic is handed over to MPLS. Use the modular quality of service (QoS) CLI (MQC) to set the IP differentiated services code point (DSCP) field on the NBAR-classified packets and make MPLS map the DSCP setting to the MPLS experimental (EXP) setting inside the MPLS header.
- Non-IP traffic.
- Packets that originate from or that are destined to the router running NBAR.

NBAR is not supported on the following logical interfaces:

- Dialer interfaces
- Dynamic tunnels such as Dynamic Virtual Tunnel Interface (DVTI)
- IPv6 tunnels that terminate on the device
- MPLS
- Overlay Transport Virtualization (OTV) overlay interfaces

Note In cases where encapsulation is not supported by NBAR on some links, you can apply NBAR on other interfaces of the device to perform input classification. For example, you can configure NBAR on LAN interfaces to classify output traffic on the WAN link.

The following virtual interfaces are supported depending on the image of your Cisco IOS:

- Generic routing encapsulation (GRE)
- IPsec IPv4 tunnel (including tunneled IPv6) in protocol discovery mode and MQC mode
- IPsec IPv6 tunnel in protocol discovery mode but not in MQC mode
- Multipoint GRE/Dynamic Multipoint VPN (DMVPN) in protocol discovery mode

Note NBAR requires more CPU power when NBAR is enabled on tunneled interfaces.

If protocol discovery is enabled on both the tunnel interface and the physical interface on which the tunnel interface is configured, the packets that are designated to the tunnel interface are counted on both interfaces. On the physical interface, the packets are classified and are counted based on the encapsulation. On the tunnel interface, packets are classified and are counted based on the Layer 7 protocol.

Note You cannot use NBAR to classify output traffic on a WAN link where tunneling or encryption is used. Therefore, you should configure NBAR on other interfaces of the router (such as a LAN link) to perform input classification before the traffic is switched to the WAN link.

Information About Protocol Discovery

Protocol Discovery Overview

The Protocol Discovery feature of NBAR provides an easy way of discovering the application protocols passing through an interface so that appropriate QoS features can be applied.

NBAR determines which protocols and applications are currently running on your network. Protocol discovery provides an easy way of discovering the application protocols that are operating on an interface so that appropriate QoS features can be applied. With protocol discovery, you can discover any protocol traffic that is supported by NBAR and obtain statistics that are associated with that protocol.

Protocol discovery maintains the following per-protocol statistics for enabled interfaces:

- Total number of input packets and bytes
- Total number of output packets and bytes
- Input bit rates
- Output bit rates

These statistics can be used when you define classes and traffic policies (sometimes known as policy maps) for each traffic class. The traffic policies (policy maps) are used to apply specific QoS features and functionality to the traffic classes.

Interface Scalability

Depending on your release, there is a limit on the number of interfaces on which protocol discovery can be enabled.

The following table provides the details of the protocol discovery supported interface and the release number:

Table 1: Release and Protocol Discovery Interface Support

Release	Number of Interfaces Supported with Protocol Discovery
Releases prior to Cisco IOS XE Release 2.5	No restriction
Cisco IOS XE Release 2.5	128
Cisco IOS XE Release 2.6	256
Cisco IOS XE Release 2.7	32
Cisco IOS XE Release 3.2S and later	32

How to Enable Protocol Discovery

Enabling Protocol Discovery on an Interface

Perform this task to enable protocol discovery on an interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number* [*name-tag*]
4. **ip nbar protocol-discovery**
5. **end**

DETAILED STEPS

Procedure

	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	**interface** *type number* [*name-tag*] **Example:** `Router(config)# interface fastethernet1/1/1`	Configures an interface type and enters interface configuration mode. • Enter the interface type and the interface number.
Step 4	**ip nbar protocol-discovery** **Example:** `Router(config-if)# ip nbar protocol-discovery`	Configures NBAR to discover traffic for all protocols that are known to NBAR on a particular interface. **Note** The **ipv4** and **ipv6** keywords are deprecated from the Cisco IOS XE Cupertino 17.10.1 release onwards. • Enables the protocol discovery statistics collection for both IPv4 and IPv6. • The **no** form of this command is not required to disable a keyword because the statistics collection is enabled for the specified keyword only.

	Command or Action	Purpose
Step 5	**end** **Example:** `Router(config-if)# end`	(Optional) Exits interface configuration mode.

Reporting Protocol Discovery Statistics

Perform this task to display a report of the protocol discovery statistics per interface.

SUMMARY STEPS

1. **enable**
2. **show policy-map interface** *type number*
3. **show ip nbar protocol-discovery** [**interface** *type number*] [**stats** {**byte-count** | **bit-rate** | **packet-count**| **max-bit-rate**}] [**protocol** *protocol-name* | **top-n** *number*]
4. **exit**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show policy-map interface** *type number* **Example:** `Router# show policy-map interface FastEthernet 1/1/1`	(Optional) Displays the packet and class statistics for all policy maps on the specified interface. • Enter the interface type and interface number.
Step 3	**show ip nbar protocol-discovery** [**interface** *type number*] [**stats** {**byte-count** | **bit-rate** | **packet-count**| **max-bit-rate**}] [**protocol** *protocol-name* | **top-n** *number*] **Example:** `Router# show ip nbar protocol-discovery interface Fastethernet1/1/1`	Displays the statistics gathered by the NBAR Protocol Discovery feature. • (Optional) Enter keywords and arguments to fine-tune the statistics displayed. For more information on each of the keywords, refer to the **show ip nbar protocol-discovery** command in Cisco IOS Quality of Service Solutions Command Reference.
Step 4	**exit** **Example:** `Router# exit`	(Optional) Exits privileged EXEC mode.

Configuration Examples for Protocol Discovery

Example: Enabling Protocol Discovery on an Interface

In the following sample configuration, protocol discovery is enabled on Fast Ethernet interface 1/1/1:

```
Router> enable

Router# configure terminal

Router(config)# interface fastethernet1/1/1

Router(config-if)# ip nbar protocol-discovery

Router(config-if)# end
```

In the following sample configuration, protocol discovery is enabled on Fast Ethernet interface 1/1/2 for both IPv6 and IPv4 packets:

```
Router> enable

Router# configure terminal

Router(config)# interface fastethernet1/1/2

Router(config-if)# ip nbar protocol-discovery

Router(config-if)# end
```

Example: Reporting Protocol Discovery Statistics

The following sample output from the **show ip nbar protocol-discovery** command displays the five most active protocols on the Fast Ethernet interface 2/0/1:

```
Router# show ip nbar protocol-discovery top-n 5

 FastEthernet2/0/1
                            Input                     Output
                            -----                     ------
  Protocol                  Packet Count              Packet Count
                            Byte Count                Byte Count
                            30sec Bit Rate (bps)      30sec Bit Rate (bps)
                            30sec Max Bit Rate (bps)  30sec Max Bit Rate (bps)
--------------------------- ------------------------  ------------------------
   rtp                      3272685                   3272685
```

```
                        242050604               242050604
                        768000                  768000
                        2002000                 2002000
gnutella                513574                  513574
                        118779716               118779716
                        383000                  383000
                        987000                  987000
ftp                     482183                  482183
                        37606237                37606237
                        121000                  121000
                        312000                  312000
http                    144709                  144709
                        32351383                32351383
                        105000                  105000
                        269000                  269000
netbios                 96606                   96606
                        10627650                10627650
                        36000                   36000
                        88000                   88000
unknown                 1724428                 1724428
                        534038683               534038683
                        2754000                 2754000
                        4405000                 4405000
Total                   6298724                 6298724
                        989303872               989303872
                        4213000                 4213000
                        8177000                 8177000
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Cisco IOS Quality of Service Solutions Command Reference*
Concepts and information about NBAR	"Classifying Network Traffic Using NBAR" module
MQC	"Applying QoS Features Using the MQC" module

Standards

Standard	Title
No new or modified standards are supported, and support for existing standards has not been modified.	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported, and support for existing MIBs has not been modified.	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

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 Enabling Protocol Discovery

The following table provides release information about the feature or features described in this module. This 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.

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

Table 2: Feature Information for Enabling Protocol Discovery

Feature Name	Releases	Feature Information
Protocol Discovery	Cisco IOS XE 2.1 Cisco IOS XE 3.3S	This feature was introduced on Cisco ASR 1000 Series Routers. The following sections provide information about this feature: The following commands were introduced: **ip nbar protocol discovery, show ip nbar protocol discovery.**