



# Enabling Protocol Discovery

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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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## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and 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.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [www.cisco.com/go/cfn](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

## 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.




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**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.

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- 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




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**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.

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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



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

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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.



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**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.

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## 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** [ipv4 | ipv6]
5. **end**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Router# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>interface</b> <i>type number</i> [ <i>name-tag</i> ] <b>Example:</b> Router(config)# interface fastethernet1/1/1	Configures an interface type and enters interface configuration mode. <ul style="list-style-type: none"> <li>• Enter the interface type and the interface number.</li> </ul>

	Command or Action	Purpose
Step 4	<b>ip nbar protocol-discovery [ipv4   ipv6]</b> <b>Example:</b> <pre>Router(config-if)# ip nbar protocol-discovery</pre>	Configures NBAR to discover traffic for all protocols that are known to NBAR on a particular interface. <ul style="list-style-type: none"> <li>• (Optional) Enter the <b>ipv4</b> keyword to enable protocol discovery statistics collection for IPv4 packets, or enter the <b>ipv6</b> keyword to enable protocol discovery statistics collection for IPv6 packets.</li> <li>• Specifying either of these keywords enables the protocol discovery statistics collection for the specified IP version only. If neither keywords is specified, statistics collection is enabled for both IPv4 and IPv6.</li> <li>• The <b>no</b> form of this command is not required to disable a keyword because the statistics collection is enabled for the specified keyword only.</li> </ul>
Step 5	<b>end</b> <b>Example:</b> <pre>Router(config-if)# end</pre>	(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

	Command or Action	Purpose
Step 1	<b>enable</b> <b>Example:</b> <pre>Router&gt; enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>show policy-map interface</b> <i>type number</i> <b>Example:</b> <pre>Router# show policy-map interface FastEthernet 1/1/1</pre>	(Optional) Displays the packet and class statistics for all policy maps on the specified interface. <ul style="list-style-type: none"> <li>• Enter the interface type and interface number.</li> </ul>

	Command or Action	Purpose
<b>Step 3</b>	<p><b>show ip nbar protocol-discovery</b> [<i>interface type number</i>]  [<i>stats {byte-count   bit-rate   packet-count  max-bit-rate}</i>]  [<i>protocol protocol-name   top-n number</i>]</p> <p><b>Example:</b></p> <pre>Router# show ip nbar protocol-discovery interface Fastethernet1/1/1</pre>	<p>Displays the statistics gathered by the NBAR Protocol Discovery feature.</p> <ul style="list-style-type: none"> <li>(Optional) Enter keywords and arguments to fine-tune the statistics displayed. For more information on each of the keywords, refer to the <b>show ip nbar protocol-discovery</b> command in Cisco IOS Quality of Service Solutions Command Reference.</li> </ul>
<b>Step 4</b>	<p><b>exit</b></p> <p><b>Example:</b></p> <pre>Router# exit</pre>	(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 IPv6 packets:

```
Router> enable

Router# configure terminal

Router(config)# interface fastethernet1/1/2

Router(config-if)# ip nbar protocol-discovery ipv6

Router(config-if)# end
```

In the following sample configuration, protocol discovery is enabled on Fast Ethernet interface 1/1/2 for IPv6 packets. Later, the protocol discovery is enabled for IPv4 packets and this does not require the **no** form for the **ipv6** keyword.

```
Router> enable

Router# configure terminal

Router(config)# interface fastethernet1/1/2

Router(config-if)# ip nbar protocol-discovery ipv6

Router(config-if)# ip nbar protocol-discovery ipv4

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
```

Protocol	Input		Output	
	Packet Count	Byte Count	Packet Count	Byte Count
	30sec Bit Rate (bps)	30sec Bit Rate (bps)	30sec Bit Rate (bps)	30sec Bit Rate (bps)
	30sec Max Bit Rate (bps)	30sec Max Bit Rate (bps)	30sec Max Bit Rate (bps)	30sec Max Bit Rate (bps)
rtp	3272685	242050604	3272685	242050604
	768000	2002000	768000	2002000
gnutella	513574	118779716	513574	118779716
	383000	987000	383000	987000
ftp	482183	37606237	482183	37606237
	121000	312000	121000	312000
http	144709	32351383	144709	32351383
	105000	269000	105000	269000
netbios	96606	10627650	96606	10627650
	36000	88000	36000	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	<a href="#">Cisco IOS Master Commands List, All Releases</a>
QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	<i>Cisco IOS Quality of Service Solutions Command Reference</i>
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: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

### 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.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>



## 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 [www.cisco.com/go/cfn](http://www.cisco.com/go/cfn). 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: <b>ip nbar protocol discovery</b> , <b>show ip nbar protocol discovery</b> .

