



IMA Dynamic Bandwidth

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The IMA Dynamic Bandwidth feature introduces the ability to configure Cisco IOS software to automatically manage changes in the total bandwidth of an Asynchronous Transfer Mode (ATM) interface configured with an Inverse Multiplexing over ATM (IMA) group. This feature eliminates manual intervention required when an individual link goes up or down, and allows the available bandwidth to be used effectively.

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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 www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for IMA Dynamic Bandwidth

- An ATM interface must be configured for IMA operation.
- An IMA group interface must be configured.



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Restrictions for IMA Dynamic Bandwidth

- This feature is supported only for ATM permanent virtual circuits (PVCs). Switched virtual circuits (SVCs) are not supported.
- This feature is supported only for the unspecified bit rate (UBR), available bit rate (ABR), and variable bit rate nonreal-time (VBR-NRT) quality of service (QoS) classes.
- The algorithm used to implement this feature is applied only when dynamic changes to an IMA group interface occur. It is not applied at VC creation on router bootup.
- Incorrect QoS parameters may be applied to PVCs if the IMA Dynamic Bandwidth feature is disabled after a change in total bandwidth, and then enabled again after another change in total bandwidth.

Information About IMA Dynamic Bandwidth

- [IMA Groups, page 2](#)
- [Dynamic Changes in Bandwidth Availability, page 2](#)
- [How the IMA Dynamic Bandwidth Feature Works, page 2](#)

IMA Groups

IMA provides the capability to send and receive a single high-speed ATM data stream over multiple slower-speed physical links. The originating stream of ATM cells is divided so that complete ATM cells are sent in round-robin order across the set of ATM links.

IMA requires the configuration of a logical ATM interface. The logical ATM interface is called an IMA group, and consists of multiple physical ATM links. VCs are configured under the IMA group interface, and can send data over any or all of the physical ATM links in the group.

Dynamic Changes in Bandwidth Availability

When multiple T1 or E1 lines are grouped into an IMA group, the total available bandwidth is the sum of the bandwidth of each line. If one or more of the lines goes down, the total bandwidth available on the IMA group interface is reduced. If a line then come back up, the total available bandwidth increases. These dynamic changes in available total bandwidth impact the bandwidth that is available for any VC configured on the IMA group interface.

How the IMA Dynamic Bandwidth Feature Works

When the total available bandwidth on an IMA group interface changes, all of the PVCs configured on that interface are re-created.

If necessary and applicable for a particular PVC based on its QoS class, new values are applied for the following parameters when PVCs are re-created:

- PCR--peak cell rate
- MCR--minimum cell rate
- SCR--sustainable cell rate

The following steps are performed by the Cisco IOS software to determine what value should be assigned to a parameter when a PVC is re-created in response to a change in total available bandwidth:

- A value is calculated for the parameter. The calculation takes into account the configured value for the parameter, the active value for the parameter (if it is different from the configured value), and the change in total available bandwidth.
- The calculated value is compared to the configured value of the parameter and to the maximum available cell rate, and a new value is determined. The new value is applied when the PVC is re-created.

**Note**

The configured value of a parameters is not overwritten in the configuration file by any new value that is applied in response to dynamic bandwidth changes.

The following sections describe how the new parameter values are determined when a PVC is re-created for supported QoS classes:

- [UBR PVCs, page 3](#)
- [ABR PVCs, page 3](#)
- [VBR-NRT PVCs, page 3](#)

UBR PVCs

When the total available bandwidth changes, PVCs configured with UBR QoS are re-created as follows:

- If the PCR configuration is set to the default, the PVC is re-created with a PCR value equal to the maximum available rate.
- If the configured PCR value is less than the calculated PCR value, the PVC is re-created with the configured PCR value.
- If the configured PCR value is greater than the calculated PCR value, the PVC is re-created with a new PCR value. The new PCR value will be the lower of the following values:
 - The calculated PCR value
 - The maximum available cell rate

ABR PVCs

When the total available bandwidth changes, PVCs configured with ABR QoS are re-created as follows:

- If the configured PCR value is less than the calculated PCR value, the PVC is re-created with the configured PCR value.
- If the configured PCR value is greater than the calculated PCR value, the PVC is re-created with a new PCR value. The new PCR value will be the lesser of the following values:
 - The calculated PCR value
 - The maximum available cell rate
- If the configured MCR value is less than the calculated MCR value, the PVC is re-created with the configured MCR value.
- If the configured MCR value is greater than the calculated MCR value, the PVC is re-created with the calculated MCR value.

VBR-NRT PVCs

If the total available bandwidth decreases or increases, VBR-NRT PVCs will be re-created as follows:

- If the configured PCR value is less than the calculated PCR value, the PVC is re-created with the configured PCR value.
- If the configured PCR value is greater than the calculated PCR value, the PVC is re-created with a new PCR value. The new PCR value will be the lesser of the following values:
 - The calculated PCR value
 - The maximum available cell rate
- If the configured SCR value is less than the calculated SCR value, the PVC is re-created with the configured SCR value.

If the configured SCR value is greater than the calculated SCR value, the PVC is re-created with the calculated SCR value.

How to Enable IMA Dynamic Bandwidth

- [Enabling IMA Dynamic Bandwidth, page 4](#)

Enabling IMA Dynamic Bandwidth

The IMA Dynamic Bandwidth feature allows Cisco IOS software to make dynamic adjustments to VC bandwidth in response to changes in the overall IMA interface bandwidth.

Perform this task to enable the IMA Dynamic Bandwidth feature.



Note

Incorrect QoS parameters may be applied to PVCs if the IMA Dynamic Bandwidth feature is disabled after a change in total bandwidth, and then reenabled after another change in total bandwidth.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm slot /ima group-number**
4. **atm bandwidth dynamic**

DETAILED STEPS

Command or Action	Purpose
Step 1 enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.

Command or Action	Purpose
Step 2 <code>configure terminal</code> Example: <pre>Router# configure terminal</pre>	Enters global configuration mode.
Step 3 <code>interface atm slot /ima group-number</code> Example: <pre>Router(config)# interface atm 3/ima 1</pre>	Configures an IMA group and enters interface configuration mode.
Step 4 <code>atm bandwidth dynamic</code> Example: <pre>Router(config-if)# atm bandwidth dynamic</pre>	Enables the automatic management of changes in the total bandwidth of an ATM interface configured with an IMA group.

Configuration Examples for IMA Dynamic Bandwidth

- [Enabling the IMA Dynamic Bandwidth Feature Example, page 5](#)

Enabling the IMA Dynamic Bandwidth Feature Example

The following example creates IMA group 1, enables automatic bandwidth management, and assigns a physical ATM interface to the IMA group:

```
interface atm3/ima 1
  atm bandwidth dynamic
!
interface atm0/1
  ima-group 1
```

Additional References

The following sections provide references related to the IMA Dynamic Bandwidth feature.

Related Documents

Related Topic	Document Title
Configuring IMA	Configuring ATM
ATM Commands	ATM Commands

Standards

Standard	Title
None	--

MIBs

MIB	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
None	--

Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	http://www.cisco.com/techsupport

Feature Information for IMA Dynamic Bandwidth

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.

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Table 1 **Feature Information for IMA Dynamic Bandwidth**

Feature Name	Releases	Feature Information
IMA Dynamic Bandwidth	12.0(30)S1	<p>The IMA Dynamic Bandwidth feature provides the ability to configure Cisco IOS software to automatically adjust PVC bandwidth in response to changes in the total available IMA group interface bandwidth.</p> <p>In 12.0(30)S1, this feature was introduced on the Cisco 12000 and 4500 series router.</p> <p>The following sections provide information about this feature:</p> <p>The following commands were introduced or modified: atm bandwidth dynamic.</p>

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