CHAPTER 1

Overview of IPM

This chapter provides an overview of Cisco's Internetwork Performance Monitor (IPM) application. It contains the following sections:

- What Is IPM?
- Key Terms and Concepts
- How Does IPM Work?

What Is IPM?

IPM is a network management application that allows you to monitor the performance of multi-protocol networks. IPM measures the response time and availability of IP networks on a hop-by-hop (router-to-router) basis. It also measures response time between routers and the mainframe in SNA (Systems Network Architecture) networks.

Use IPM to perform the following tasks:

- Troubleshoot problems by checking the network latency between devices
- Send Simple Network Management Protocol (SNMP) traps and SNA alerts when a user-configured threshold is exceeded, a connection is lost and reestablished, or a timeout occurs
- Analyze potential problems before they occur by accumulating statistics, which are used to model and predict future network topologies
- Monitor response time between two network end points

The IPM product is composed of three parts, the IPM server, the IPM client application, and the RTR (response time reporter) feature of the Cisco IOS software. The focus of this document is the IPM network management application which includes the server and the

client. In some cases, however, it is not possible to fully describe IPM without including information about the Cisco IOS RTR feature. Therefore, we have included some information about the Cisco IOS feature. Information about the RTR feature provided in the latest Cisco IOS software documentation take precedence over the information about the RTR feature contained in this document.

Key Terms and Concepts

An understanding of the following terms and concepts is helpful for using the IPM application:

- **Source**—Originating router from which IPM makes the response-time data measurements. The source router must be running Cisco IOS software Release 11.2(8) or later or Cisco IOS software Release 11.3(6) or later and must contain the RTR feature. The RTR feature, which is available only in the IP Plus, IBM, Desktop Plus, or Enterprise feature set, contains the Cisco RTTMON MIB and the SNMP agent.
- **Target**—Any IP-addressable device or IBM Multiple Virtual Storage (MVS) mainframe that can be reached by the source router. The target is the destination of the response time measurement.
- **Operation**—Set of parameters used in measuring response time. The parameters specify the type of measurement to be performed.
- **Collector**—Entity defined to measure response time from a specific router (source) to a specific device (target). The collector definition includes information about the target, the protocol used to measure response time, how often response-time measurement is to be taken, and the length of time (duration) of the response-time measurements.
- **Interval**—How often, in seconds, the collector at the source router executes the operation to measure the response time to and from the target. The default value is every 60 seconds. The valid range is 10 to 3600 seconds (1 hour).
- **Duration**—Number of seconds that the collector actively collects response time information at the source router. The default value is every 3600 seconds (1 hour). The valid range is 1 hour to forever.

How Does IPM Work?

IPM measures response time between a source router and a target device. The target is either an IP-addressable device or an IBM MVS mainframe. If the target is an IP-addressable device, it is either a network device or a workstation. If the target is an IBM MVS mainframe, it must be running an IPM virtual telecommunications access method (VTAM) application called NSPECHO and on SNA response time is measured.

There are two types of measurements that you can take:

- **Echo**—Measures the total response time from the source router to the target device.
- **PathEcho**—Measures the total response time as well as the incremental response time for each hop in the path between the source router and the target device. PathEcho is available only for the IP protocol.

The IPM application is used to configure the RTR agent in each source router and then extract and display the response-time information. The RTR agent in the router measures the actual response-time samples between itself and the target device. The IPM application extracts the response-time data every hour from each source router and stores the data in the IPM database. However, each collector can measure the response time between the source router and the target device more often. When you use the IPM configuration process, you specify the interval at which each measurement operation is performed by a collector. IPM also provides a real-time feature that allows you to immediately display the response-time data without waiting for the one-hour data collection interval. However, the data displayed in the Real Time window is not stored in the IPM database.

Measuring Response Time in IP Networks

In an IP network, you can request either an Echo or a PathEcho measurement.

If you request an Echo measurement, the Cisco IOS RTR feature in the source router issues an Internet Control Message Protocol (ICMP) ping to the target device and extracts the response-time data from the reply.

If you request a PathEcho measurement, the Cisco IOS RTR feature first issues a **traceroute** command to determine the path through the network from the specified source router to the specified target device. The data returned from the **traceroute** command contains the host name or IP address of each of the routers in the path. RTR then issues ICMP pings to each of the routers listed in the traceroute data. The ICMP ping returns statistics regarding the response time between the specified source and each of the routers.

Measuring Response Time to an SNA Mainframe

For SNA environments, IPM allows you to measure the response time to an MVS mainframe using the following types of SNA sessions:

- System services control point-logical unit (SSCP-LU)
- LU0
- LU2

Because SNA is a connection-oriented protocol, the only type of measurement you can request is Echo.

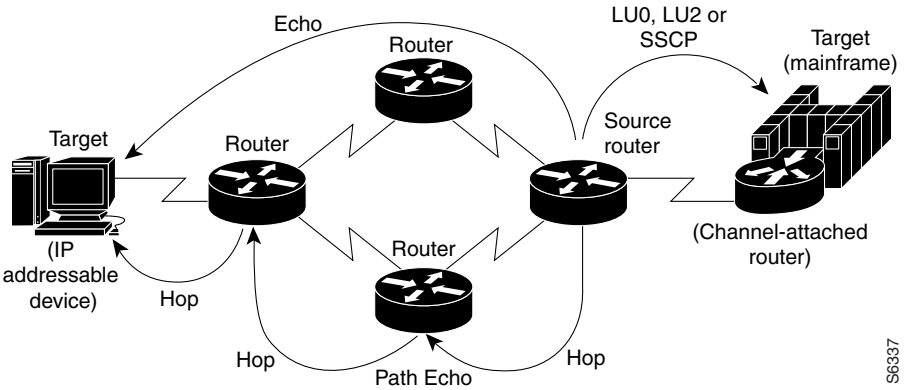
When measuring response time to an SNA mainframe, IPM uses an SNA ping. The source router sends a block of data (a request) to an IPM-supplied mainframe echo program (NSPECHO). NSPECHO responds with a block of data (a response), which is used to determine the response time.

You can customize both the request and response sizes to model traffic flow for various applications.

Components of IPM

The IPM system is a modular design (Figure 1-1). Some of the components are provided as part of the IPM application, others are provided as part of the Cisco IOS Software Release 11.2(8) or later or Cisco IOS Software Release 11.3(6) or later. The RTR feature contains the Cisco RTTMON MIB and the SNMP agent.

Figure 1-1 Components of IPM



The IPM application is comprised of two major components, the IPM server and the IPM client. Multiple IPM clients can connect to a single IPM server. If you are measuring response time in an SNA-over-TCP/IP environment, there is also a mainframe component required by the IPM application. These IPM application components are described in the following sections:

- IPM Server Components
- IPM Client Component
- RTR Feature Components
- Mainframe Component

IPM Server Components

The components of IPM server are described in the following sections:

- IPM Configuration Process
- IPM SNMP Server
- IPM Data Retriever
- IPM Relational Database
- IPM Display Server

IPM Configuration Process

The IPM configuration process runs on a UNIX workstation and is used to configure and schedule IPM collectors on source routers. It is provided as part of the IPM server. The configuration process includes the following functions:

- Configure IPM source routers
- Configure IPM targets, SNA hosts, or other IP devices in the IPM database
- Configure and manage the IPM collectors in the source routers
- Notify the IPM data retriever to start collecting data for new collectors

IPM SNMP Server

The SNMP server resides on a UNIX workstation and is provided as part of the IPM server. The IPM configuration and IPM data retriever processes use SNMP to deploy collectors in the routers and to gather data from the RTTMON MIB.

IPM Data Retriever

The IPM data retriever resides on a UNIX workstation. It is provided as part of the IPM server. The data retriever performs the following tasks:

- Reads all collector configurations from the IPM database. The configuration is read at startup and when the configuration process indicates that a new collector has been added.
- Collects response-time data for each collector from the source routers. The data retriever process uses the IPM SNMP server to collect the data.
- Stores the response-time data in the IPM database for each collector.
- Informs the display process that there is new response-time data to display.

IPM Relational Database

IPM includes an embedded relational database to manage its data. Several of the IPM processes interact with the relational database, including the following processes:

- Configuration process stores all source and collector configurations in this database
- Data retriever stores the response-time statistics in this database
- IPM graphical user interface (GUI) displays IPM statistics from this database

IPM Display Server

The IPM display server runs on a UNIX workstation and is used by the IPM client to perform the following functions:

- Retrieve response-time data from the database
- Start a real-time session between a source router and a hop (or target)
- Perform demand poll operations

The IPM display server is provided as part of the IPM server.

IPM Client Component

The IPM client runs on a UNIX or WindowsNT workstation. It provides a GUI to the IPM server to perform the following functions:

- Configure source routers, targets, and collectors
- View the properties of configured source routers, targets, and collectors
- View historical response-time statistics in graphical format
- View real-time response-time statistics in graphical format

RTR Feature Components

The RTR feature of the Cisco IOS software contains the components that are described in the following sections:

- SNMP Agent
- RTTMON MIB
- Collectors

Caution Do not use the Cisco IOS RTR feature commands to access and change IPM collectors that were created by the IPM application. Changes made using Cisco IOS commands might render the changed collectors unusable by the IPM application.

SNMP Agent

The SNMP agent resides in the source router and is provided as part of Cisco IOS software. The SNMP agent receives requests from the IPM SNMP server to perform all IPM-related functions.

RTTMON MIB

The RTTMON MIB is a proprietary MIB created by Cisco to obtain and store round-trip time statistics. The MIB is implemented by the Cisco IOS software in the source router. The IPM application obtains the round-trip time statistics from this MIB. You can access additional information about this MIB, on the Internet at ftp://ftp.cisco.com/pub/mibs/v2/CISCO-RTTMON-MIB.my.

Collectors

An IPM collector is a user-defined entity on the source router that includes information about the target device, the protocol used for measuring response time, the frequency at which the response time is measured, and the amount of time for which response-time measurements are taken.

The purpose of an IPM collector is to capture statistics and error information from the IPM-enabled routers.

Mainframe Component

When measuring response time to an SNA mainframe, IPM measures round-trip response times between a source router and an echo program in an SNA mainframe. A program in the SNA mainframe is responsible for providing the echo back to the router. IPM provides a mainframe echo program (NSPECHO) that you can install on an MVS mainframe for this purpose.