

# TELCHEMY EMBEDDED PERFORMANCE MONITOR

## Product Overview

As service providers, cable operators, and enterprises deploy advanced IP services, they are challenged to efficiently measure service quality, verify service-level agreements (SLAs), and troubleshoot problems. Frequently, they accomplish this with application specific monitoring appliances, an approach that is inefficient to deploy and maintain.

To help customers overcome these challenges, Juniper Networks partnered with Telchemy, the leading provider of IP and VoIP performance management solutions, to develop Telchemy embedded Performance Monitor (TePM). TePM offers router-integrated performance monitoring for Juniper Networks industry-leading M Series Multiservice Edge Routers and MX Series 3D Universal Edge Routers.

## Product Description

Service providers, cable operators, managed service providers, and enterprises all share a common requirement to monitor and analyze the performance of their network as well as the complex mix of IP and VoIP services, VPNs and data center applications that the network supports. To do this, these organizations frequently deploy a wide variety of monitoring and analysis appliances. Unfortunately, this approach inefficiently consumes precious space, power, and cooling resources, and also presents operational challenges associated with qualifying and maintaining multiple appliances from multiple vendors, each with their own operating systems and management tools.

Juniper Networks® Telchemy embedded Performance Monitor (TePM)—a Junos® Ready Software application—overcomes these challenges. TePM is a comprehensive, router integrated IP performance management application that facilitates network, session and application-level monitoring for a host of IP and VoIP services. Router integrated TePM eliminates the capital and operational expenses associated with deploying monitoring appliances; there are less network elements to spare, maintain, upgrade, power, and cool.

TePM was developed by Telchemy, a Juniper SDK Development Program partner and the leading provider of VoIP performance management solutions. Telchemy leveraged the Junos SDK to integrate its performance monitoring technology with Juniper Networks Junos operating system for use with Juniper Networks M7i, M10i, M120, M320 Multiservice Routers and Juniper Networks MX240, MX480 and MX960 3D Universal Edge Routers.

With its broad set of advanced capabilities, TePM is important to all businesses that need to efficiently monitor the performance of IP services, VoIP services, VPNs and data center applications. TePM can conduct network layer tests on IP paths between TePM-enabled edge routers (this includes hop-by-hop tests for available bandwidth, congestion, duplex mismatch, packet loss, and the presence of firewall filters), as well as application-layer tests, including support for Two-Way Active Measurement Protocol (TWAMP), that injects synthetic transactions into the network. Importantly, TePM also provides real-time performance reporting at the IP, TCP/UDP, service, and transaction layer for each test.

For VoIP services, TePM provides perceptual quality scores (Mean Opinion Scores (MOS) and R-factor), and analyzes network performance factors including packet loss, jitter, delay, and other typical impairments. If impairments are identified, TePM reports the level of quality degradation attributable to specific conditions and speeds repair by diagnosing the likely root cause.

## Architecture and Key Components

### Telchemy embedded Performance Monitor (TePM)

TePM provides an active test solution for IP, VoIP, and IP VPN performance management that consists a central TePM Controller application that controls and manages distributed TePM Agents.

Operators use the TePM Controller to configure, collect, and visualize a wide range of simulated Real-Time Transport Protocol (RTP) and network layer IP diagnostic tests.

TePM Agents run on M Series and MX Series routers and conduct tests that monitor the quality and performance of calls and sessions in real time.

## The Multiservices PIC (MS-PIC) and Multiservices DPC (MS-DPC)

The Multiservices PIC (MS-PIC, for M Series Routers) and the Multiservices DPC (MS-DPC, for MX Series routers) are high-performance processing modules that flexibly host TePM as well as a broad array of other Junos Ready Software applications such as Juniper Networks Session Border Control, StreamScope eRM video monitoring and intrusion prevention system (IPS). The MS-PIC and MS-DPC enable equipment consolidation and support revenue generation while avoiding the complexity of deploying and maintaining standalone appliances.

In this example, operations personnel use the TePM Controller to configure and initiate a wide set of IP and VoIP performance tests that are conducted by TePM Agents that are deployed on MX Series 3D Universal Edge Routers (A, B and C). Network test capabilities are also available for testing against IP addressable devices such as servers, switches, routers, computers and IP phones. The TePM Controller collects and graphically displays the test results, on a per hop as well as end to end basis.

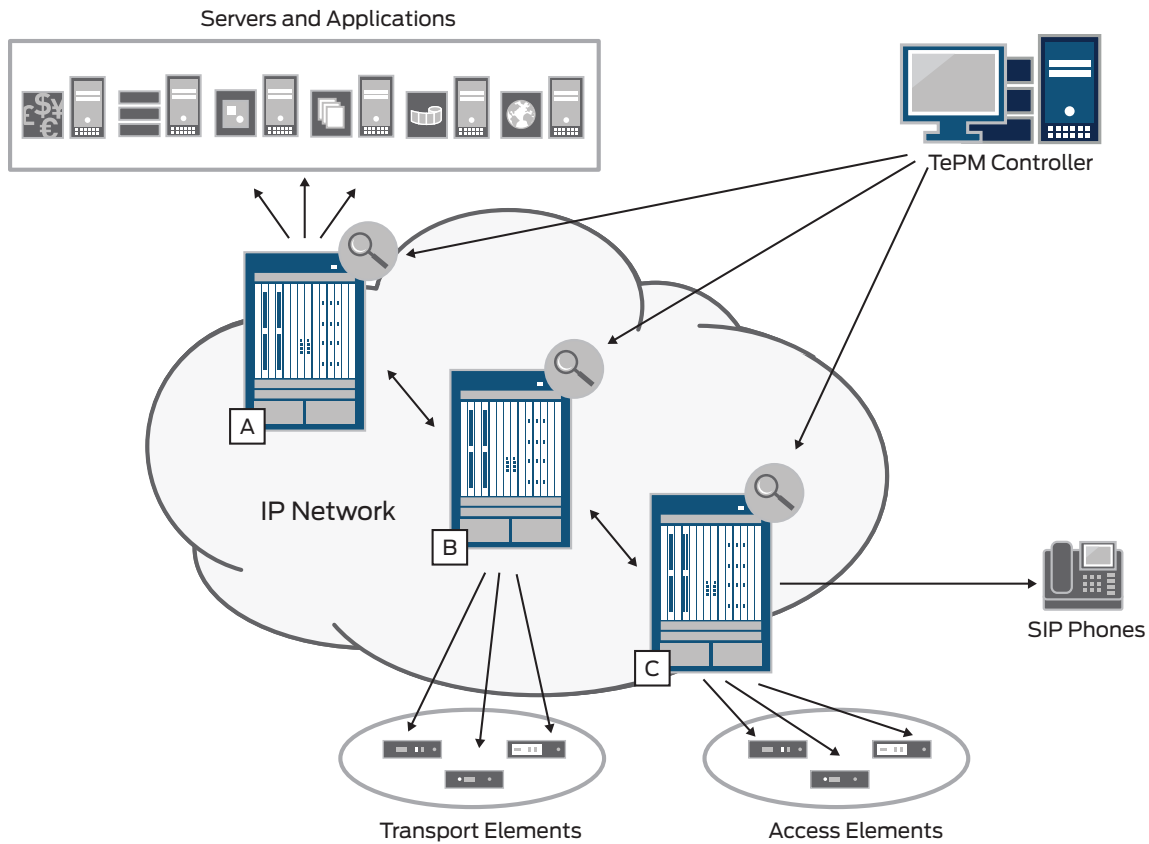


Figure 1: TePM deployment scenario

Features	Benefits
Comprehensive monitoring and analysis	<ul style="list-style-type: none"> <li>• TePM is a distributed active test system that improves efficiency and scale. A single TePM Controller can control many TePM Agents, and each TePM Agent can monitor a large number of concurrent calls and sessions.</li> <li>• Reduces OpEx, supplements or replaces stand-alone appliances.</li> <li>• Prior to service deployment, TePM can be used to simulate real-world VoIP and IP service traffic conditions.</li> <li>• Post service deployment, TePM can be used to validate SLAs and troubleshoot service performance issues.</li> <li>• TWAMP server interoperability between TePM and other RFC 5357 standard products.</li> <li>• Identifies impairments for a wide range of IP and VoIP services, with real-time reporting of test results, visualization of test data and path, fault correlation, and analysis.</li> <li>• TePM reports the level of quality degradation attributable to specific conditions and speeds repair by diagnosing the likely root cause.</li> </ul>
Design and deployment flexibility	<ul style="list-style-type: none"> <li>• Provides carrier class router scale, reliability, and performance.</li> <li>• Adds Telchemy monitoring expertise to Juniper's network expertise.</li> <li>• Avoids OpEx needed to qualify, integrate, spare, and maintain appliances; reduces power and cooling costs, reduces training costs.</li> <li>• MS-PIC and MS-DPC provide the high performance needed to meet fine inter-packet spacing requirements, without impacting other services.</li> <li>• Juniper validates TePM, and Juniper Networks Technical Assistance Center (JTAC) supports TePM.</li> <li>• TePM is easily implemented at any location where M Series and MX Series routers are deployed, without requiring new systems or appliances, rack space or additional cabling.</li> <li>• TePM provides design flexibility and investment protection, because it is supported on dedicated service cards and is decoupled from the network interfaces that are transporting the IP and VoIP services.</li> </ul>
Router integration enhances monitoring environment	<ul style="list-style-type: none"> <li>• TePM inherits the carrier class attributes of the M Series, MX Series and Junos OS, including scale, performance and resiliency.</li> <li>• Increased operational efficiency and reduced complexity: no new appliances or appliance interconnect as routers are already deployed in the data path, no port mirroring to external probes is required.</li> <li>• Lower OpEx: fewer network elements to spare, maintain, upgrade, power and cool, fewer administrative, configuration and monitoring touch points, reduced footprint.</li> <li>• Increased scale and performance: MX Series offers high density Gigabit Ethernet and 10-Gigabit Ethernet interface support.</li> <li>• Each MS-PIC and MS-DPC provides dedicated high-performance processing for TePM Agents, enabling 2,000 concurrent tests without impacting router scale, performance or reliability.</li> </ul>

## Specifications

- VoIP test capabilities support VoIP test call generation to other TePM Agents and standard-based Session Initiation Protocol (SIP) endpoints.
  - Real Time Transport Protocol (RTP) stream generation according to RFC3550
  - Real Time Transport Control Protocol (RTCP) SR/RR (RFC3550) and RTCP XR VoIP (RFC3611) metrics
  - 10, 20, 30 ms packet intervals (up to 100 ms for some tests)
  - Selectable pre-encoded payloads for numerous codecs, including G.711, G.729A codecs
  - "Thin call" option with zero length payload
  - Call setup using SIP signaling
  - Measurement of incoming RTP stream
  - Insertion of packet impairments into outgoing stream, including independent and bursty packet loss
  - Generation of multiple concurrent streams
  - Configurable minimum and maximum call duration and inter-call time interval
  - Integrated UDP traceroute function to detect route followed by call
- Network application test capabilities support generation of synthetic network application transactions.
  - Dynamic Host Configuration Protocol (DHCP) availability and response time tests
  - Domain Name System (DNS) availability and response time tests
  - HTTP availability and response time tests
  - Point of presence (POP) availability and response time tests
  - Simple Mail Transfer Protocol (SMTP) availability and response time tests
  - Measurements and reports on the availability and performance at each layer associated with the specific network application (i.e. IP, UDP/TCP, session, transaction)
  - Identification of the layer at which performance failure occurs
- Network test capabilities for testing against IP addressable devices such as a server or router.
  - Ping
  - Traceroute
  - Hop-by-hop tests, with congestion detection, duplex mismatch detection, and available bandwidth estimation results reported on a per hop basis.

## Juniper Networks Services and Support

Juniper Networks is the leader in performance-enabling services that are designed to accelerate, extend, and optimize your high-performance network. Our services allow you to maximize operational efficiency while reducing costs and minimizing risk, achieving a faster time to value for your network. Juniper Networks ensures operational excellence by optimizing the network to maintain required levels of performance, reliability, and availability. For more details, please visit [www.juniper.net/us/en/products-services](http://www.juniper.net/us/en/products-services).

## About Juniper Networks

Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at [www.juniper.net](http://www.juniper.net).

## Ordering Information

Model Number	Description
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### Hardware

MS-DPC	Multiservices DPC for MX Series 3D Universal Edge Routers (MX960, MX480, MX240)
MS-PIC 100	Multiservices PIC for M7i and M10 Multiservice Edge Routers
MS-PIC 400	Multiservices PIC for M120 and M320 Multiservice Edge Routers

### Software

S-TePM-Agent-Controller-Base	TePM Controller – Application software
S-TePM-Agent-Active-Controlled-1	TePM Agent software - 1 copy – TePM Controller Authentication
S-TePM-Agent-Active-Controlled-5	TePM Agent software - 5 copies – TePM Controller Authentication
S-TePM-Agent-Active-Controlled-25	TePM Agent software – 25 copies – TePM Controller Authentication
S-TePM-Agent-Active-Controlled-100	TePM Agent software – 100 copies – TePM Controller Authentication
S-TePM-Agent-Active-Controlled-500	TePM Agent software - 500 copies – TePM Controller Authentication

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