Cisco Bandwidth Quality Manager 3.2

Product Overview

Providing the required quality of service (QoS) to applications on a wide-area access network consistently and reliably is increasingly becoming a challenge. Cisco® Bandwidth Quality Manager (BQM) is a network application congestion-management tool that provides outstanding visibility and analysis of traffic, bandwidth, and QoS on IP access networks.

Cisco BQM is part of the Cisco Network Application Performance Analysis Solution. This solution is a set of tools and services that help customers quickly isolate application performance problems and optimize their networks for current and future applications to help ensure that they meet their information technology performance and cost objectives. The solution helps maximize the value of applications and network assets by validating the behavior and performance of an application before it is deployed over the network. As part of the Cisco Network Application Performance Analysis Solution, Cisco BQM provides baseline analysis of detailed WAN traffic to help customers with problems take corrective action and avoid future problems.

Dynamic Congestion

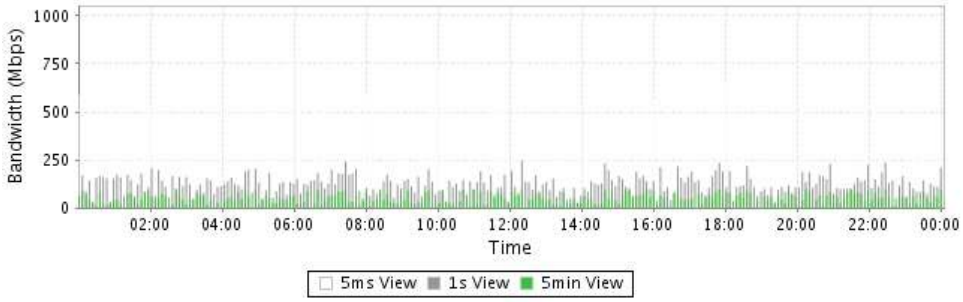
Data center LANs are upgrading from 100 Mbps to speeds from 1 Gbps to 10 Gbps, but the speed of branch and data center access links has not kept pace. Furthermore, with traffic sourced at Gbps rates, a large amount of data is transferred in a very short period of time. Therefore, even brief periods of congestion at the speed mismatch points in which packets are lost or delayed excessively can significantly affect application performance.

This dynamic congestion is a general network phenomenon but is most typically seen at network boundaries, such as the LAN and WAN boundary or the subscriber and service provider boundary. When traffic from the LAN reaches the WAN router, it is queued and transmitted to the WAN at the WAN interface speed, resulting in rapid queue build-up, followed by queue emptying. This cycle continues as a function of the arrival rate of the traffic. These queuing events can introduce from tens to hundreds (or even thousands) of milliseconds (ms) of delay into the traffic stream or very high levels of loss for the duration of the event, for example, 30 to 60 percent of packets lost. The duration of these events is too short to be detected by traditional performance monitoring. Consequently, organizations are often unable to diagnose the problem or may incorrectly conclude that the problem is not related to the network. Designing and planning the network to mitigate dynamic congestion requires specialized network instrumentation and analysis capabilities that are found in Cisco BQM.

The level of acceptable dynamic congestion depends on the application. For example, queuing delay of greater than approximately 30 milliseconds for IP telephony can degrade quality, whereas front-office data applications can typically tolerate up to 500 milliseconds of queuing delay.

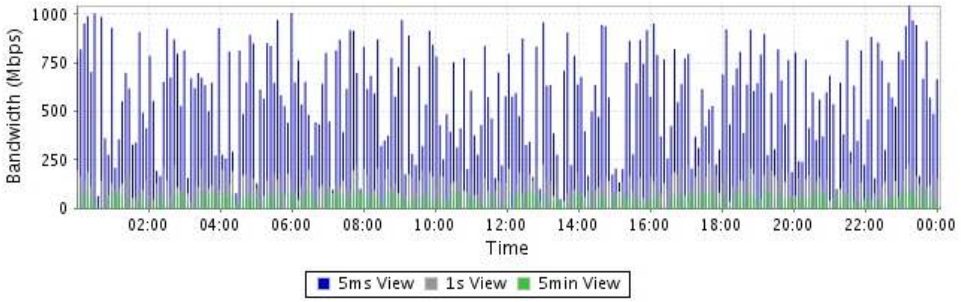
To illustrate dynamic congestion, Figure 1 shows the graph of the 5-minute view and the 1-second view of 24 hours of traffic captured from a market data application on a gigabit link. According to this view, the link is approximately 20 percent loaded, and there is no congestion. However, the events that determine network application performance often occur at timescales far below 1 second.

Figure 1. Dynamic Congestion—1-Second View



At shorter timescales, a different picture emerges (Figure 2).

Figure 2. Dynamic Congestion—5-Millisecond View



At the 5-millisecond timescale, you can see that the application is frequently saturating the link, which can result in loss and delay: dynamic congestion. Cisco BQM provides this microvisibility view so that organizations can truly manage network application congestion.

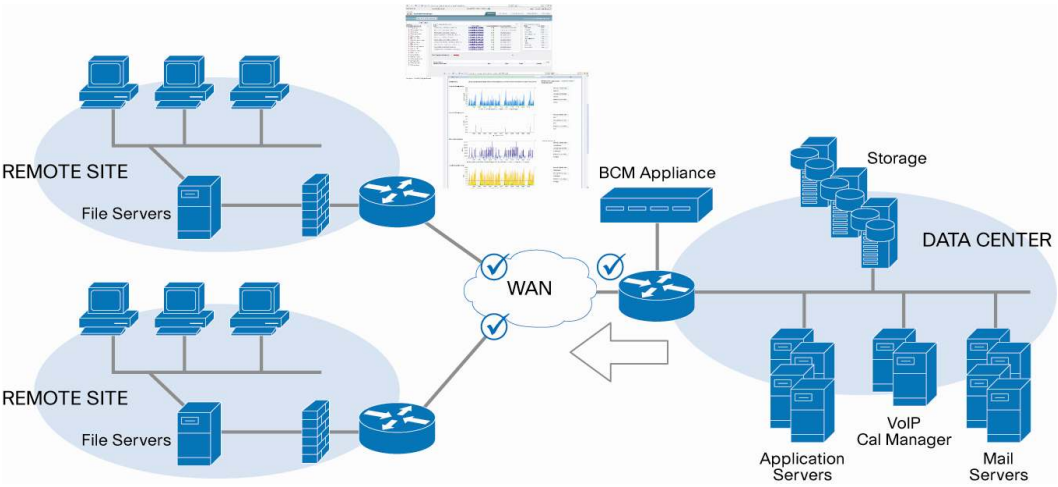
Product Description

Cisco BQM is used to monitor, troubleshoot, and help meet network performance objectives for converged application traffic:

- Cisco BQM monitors application traffic with microsecond granularity and allows per packet analysis with nanosecond precision.
- Cisco BQM estimates in real time the QoS effect of traffic and computes an overall figure of merit for each interface or class, called the congestion indicator.
- Cisco BQM computes in real time the bandwidth requirement of network application traffic to meet specified QoS objectives.

Cisco BQM software runs on an appliance with gigabit-speed traffic monitoring ports. It is typically deployed at the data center (as shown in Figure 3) or other potential traffic aggregation points and monitors every packet passively by spanning or tapping the Ethernet data links. All analysis and configuration functions are delivered through an advanced, user-friendly Web interface, with additional support for Secure Shell (SSH) Protocol and Telnet access to an intuitive command-line interface (CLI).

Figure 3. Cisco BQM Data Center Deployment



Cisco BQM Functions

Cisco BQM performs the following functions:

- Traffic insight: Cisco BQM traffic insight provides a detailed view and real-time analysis of how network resources are being used to support the network application environment. Cisco BQM traffic insight does the following:
  - Autodiscovers network applications with Layer 7 signatures
  - Identifies traffic microbursts of programmable duration from 5 milliseconds to 1 second
  - Identifies top talkers, listeners, and conversations
  - Provides insight into end-to-end quality through the Internet Control Message Protocol (ICMP)
  - Reports average link use, packet rate, and packet size distribution
- Congestion analysis: Cisco BQM computes the expected service level in terms of loss and delay for each packet across hundreds of configured classes or site interfaces. The Cisco BQM congestion indicator condenses this information into a single number that reflects the performance of each site relative to the network performance objectives. Cisco BQM congestion analysis does the following:
  - Estimates expected queuing loss and latency at local and remote bottleneck points
  - Reports the baseline health of a network with respect to congestion, using the congestion indicator
  - Summarizes the information and provides a detailed view of all the congested periods, including time in congestion
  - Uses an easy-to-understand quality events timeline to highlight trouble periods
- Event analysis: Cisco BQM provides event tracing wherein a rolling real-time trace is always kept. If any congestion event is detected, a 10-second section of the trace around the event is recorded for later analysis. Cisco BQM provides analysis capabilities at the site, class, application, conversation, or even packet level. Cisco BQM event analysis does the following:
  - Analyzes quality event triggering from excessive delay or loss, traffic microbursts, and bandwidth use
  - Provides host, class, and application filtering for traffic root-cause analysis

- Bandwidth sizing: Cisco BQM recommendations give clear, plain-language guidelines on class and link bandwidth requirements, queue-limit sizing, and policy settings. Each recommendation takes into account the amount of dynamic congestion that applications or classes can tolerate. Cisco BQM bandwidth sizing does the following:
  - Allows users to specify queuing delay and loss targets and sizing policy; for example, queue 99.9 percent of the packets in the busiest one-hour period for less than 500 milliseconds
  - Recommends changes if required to help each class meet its dynamic congestion requirements
- Quality alarms: Cisco BQM detection and analysis of congestion is made available to external systems through fully configurable Simple Network Management Protocol (SNMP) traps, syslog streaming, and e-mail alerts.

Business Benefits

Cisco BQM 3.2 provides the following business benefits:

- Increases network application uptime: Cisco BQM helps network managers ensure that network applications are performing by protecting against network congestion in converged WANs. Cisco BQM monitors, analyzes, and recommends corrective actions against network application congestion.
- Reduces operating time and troubleshooting expense: Through its unique ability to monitor and analyze traffic at the micro level, Cisco BQM diagnoses traffic-induced performance problems that many competing tools miss or misdiagnose.
- Mitigates risk of making expensive bandwidth upgrade decisions: Cisco BQM determines whether a bandwidth upgrade or QoS or traffic management policy is the preferred action based on its unique algorithms. These algorithms take into account whether an upgrade action may result in no improvement to network quality.
- Builds on investment made in Cisco QoS infrastructure: Cisco BQM models Cisco router QoS mechanisms, so that network managers can unleash the power of QoS without having to deploy yet another packet-processing appliance.

Key Features

Table 1 summarizes the primary features and benefits of Cisco BQM.

Table 1. Features and Benefits

Feature	Benefit
Cisco CLI compatibility	Allows network managers to use current knowledge and existing Cisco router configurations to program CorvilNet
Congestion indicator	By providing a highly summarized view of congestion, allows network managers to rank links according to congestion status
Corvil Bandwidth	Provides the required bandwidth per class according to user-configured quality targets and sizing policy; presents bandwidth numbers clearly and in a familiar format to allow easy application of the results
Data center deployment	Provides a low-operating-cost solution; a single installation can monitor hundreds of remote sites and thousands of classes and estimate delay and loss on hundreds of remote service provider routers
Comprehensive congestion analysis	Provides views into events down to the single packet and provides time stamps with 10-nanosecond accuracy
End-to-end QoS	Uses ICMP testing to provide insight into end-to-end delay and loss; size of packets and frequency of testing are user configurable to minimize effects on application traffic

Expected service level	Analyzes the amount of delay and loss that traffic to the remote site is experiencing; Cisco BQM estimates the router queuing delay and loss for every packet and also takes into account bandwidth sharing between classes
Export packet capture (optional)	Captures traffic and exports it to other analysis tools without the need for an additional network probe; standard Packet Capture (PCAP) format provides compatibility
Microburst detection	Sees traffic bursts as they are being injected into the network; detects microbursts from 5 milliseconds to 1 second
Multiprotocol Label Switching (MPLS) and VLAN support	Provides visibility for any traffic flow of interest including MPLS and VLAN traffic
Multiclass support	Supports monitoring of advanced networks that use QoS mechanisms such as class-based weighted fair queuing and low-latency queuing to optimize network performance
Multiport appliances	Four 10/100/1000 Ethernet ports provide easy support for redundant router configurations
Network-monitoring dashboard	Quickly identifies interfaces and classes in the network that are not delivering the required QoS and troubleshoots quality problems and quantitatively determines whether the network is contributing to the problem
QoS alarms	Provides alarms to report network performance degradation in real time and integrates with existing SNMP network management systems to provide correlation with other alarms
QoS-sensitive capacity planning	Integrates application requirements of delay and loss, not just bandwidth, into the capacity planning cycle
Remote-site monitoring	Through its logical network model, allows detection of likely quality alerts, even in the service provider network
System alarms	Provides warning and alarming mechanisms for system problems related to hardware failures, disk capacity, and use
Top talkers, listeners, and conversations	Provides insight into network use by hosts without the need to configure hundreds of IP addresses or ports
Triggered event traces	Captures event traces according to programmed thresholds of bandwidth, microbursts, latency, and loss; event traces can be used to perform comprehensive congestion analysis and eliminate the need to store terabytes of packet captures

Hardware Requirements

Cisco BQM 3.2 is offered on the Cisco Application Deployment Engine (ADE). Cisco ADE is a high-performance platform for Cisco network management applications. Customers can select the ADE platform that meets their application needs

Cisco BQM 3.2 is available on the Cisco ADE 1010 series and Cisco ADE 2120 series. Full details about availability and ordering of the required hardware platform are available from your Cisco sales representative.

Table 2 summarizes the hardware specifications for Cisco BQM.

Table 2. Hardware Specifications

Description	Specification
System	
Maximum monitored bandwidth	Cisco ADE 1010 series • 100 Mbps Cisco ADE 2120 series • 2 Gbps
Maximum number of remote sites monitored	Cisco ADE 1010 series • 20 Cisco ADE 2120 series • 250
Maximum number of classes monitored	Cisco ADE 1010 series • 60 Cisco ADE 2120 series • 1000

Network monitoring interfaces	Cisco ADE 1010 series • Copper: One 10/100/1000 Mbps port Cisco ADE 2120 series • Copper: One 10/100/1000 Mbps ports • Copper and fiber mix: Two or Four 1000 Mbps ports
Management	
Management access	Web browser interface, SSH, Telnet, and console
SNMP	Version 2
Syslog	Yes
Out-of-band management	10/100/1000 baseT Ethernet (RJ-45)
Software upgrades	FTP and Trivial FTP (TFTP)
Deployment	
Deployment options	• Switched Port Analyzer (SPAN) or mirror port • Passive tap

Service and Support

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For More Information

For more information about Cisco Bandwidth Quality Manager, visit http://www.cisco.com/go/bqm, send an e-mail bqm-product-info@external.cisco.com, or contact your local Cisco sales representative.

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