

Cheetah™ IP/HFC Service Assurance

Today's cable network is evolving at a rapid pace. Initially built to provide high-quality broadcast video, these networks are now being leveraged to deliver a full range of entertainment and communications services such as high-speed Internet, Voice-over-IP (VoIP) and IP Video. With this broad array of new services comes the challenge of both managing the network's performance to meet increased customer expectations, and remotely isolating troubles within complex, multi-layered networks.

These dynamics have driven Tollgrade to expand its industry-leading Cheetah Cable Status and Performance Monitoring System to address the unique challenges of IP-based service deployments within the cable broadband marketplace.

The Cheetah IP/HFC Service Assurance Solution consists of enhanced CheetahIP™ host software and a strategically located suite of Cheetah Probes and

DOCSIS®-based transponders. Once deployed, this solution works in concert with existing Cheetah hardware and host software to:

- Verify quality of service for VoIP and IP Video subscribers via either customer- or technician-driven connection tests;
- Proactively manage network performance via the display of IP-related service alarms; and
- Remotely isolate multi-layered service troubles by identifying and correlating faults within customer, outside plant, headend and core network locations.

Tollgrade's seamlessly integrated hardware and software offering allows cable broadband service providers to build, operate and assure their IP networks, applications and services by providing proactive, end-to-end, service level management (SLM) and service level agreement (SLA) verification.



*Tollgrade
is everywhere
your broadband
network needs
to be.™*

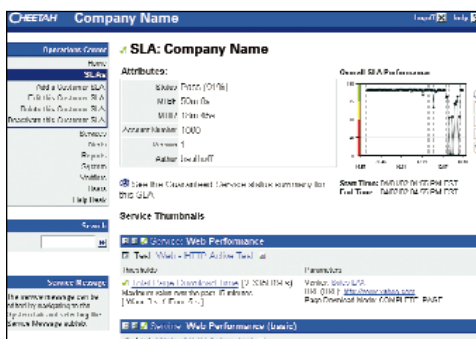
tollgrade
Network Assurance
Simplified.™

The Cheetah IP/HFC Solution allows cable broadband service providers to proactively build, operate and assure their IP networks, applications and services.

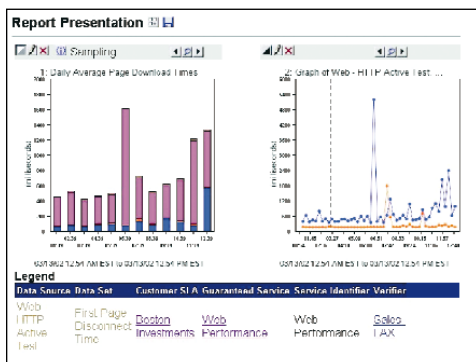
Cheetah IP/HFC Service Assurance System Components

Host Software

The CheetahIP host is a server-based software application. Users access the system via a zero-install, web-based client, providing secured access to the system for configuring and controlling Cheetah Probes as well as integrating and correlating IP test measurements across the cable domain. The easy-to-understand interface provides users with the critical information they need to quickly and accurately troubleshoot problems that affect service quality before they result in customer churn.



Real-time, proactive SLA verification based on objective data.



A comprehensive reporting and graphing interface.

Cheetah Probes

Three configurations of Cheetah Probes are offered to support a wide variety of network architectures and test applications as illustrated below.

Each Cheetah Probe is seamlessly managed by the CheetahIP host software via either an independent TCP/IP management port or an IP connection within the network's actual payload.

CP-100

When deployed at select customer sites, the CP-100 is designed to isolate multi-layered troubles between the CPE and outside plant.



CP-1000

Optimized for rack-mountable deployments within the headend, the CP-1000 is ideally suited to co-reside with CMTS, soft switch and media gateway service delivery points.



CP-2500

Commonly deployed within the transport network, the CP-2500 enables quick isolation of multi-layered troubles between network hand-offs and for high-volume testing applications.



DOCSIS Transponder (CMD-P) VoIP Firmware

An optional upgrade that transforms Tollgrade's DOCSIS transponder into a virtual E-MTA for VoIP quality testing of the HFC trunk and feeder network.



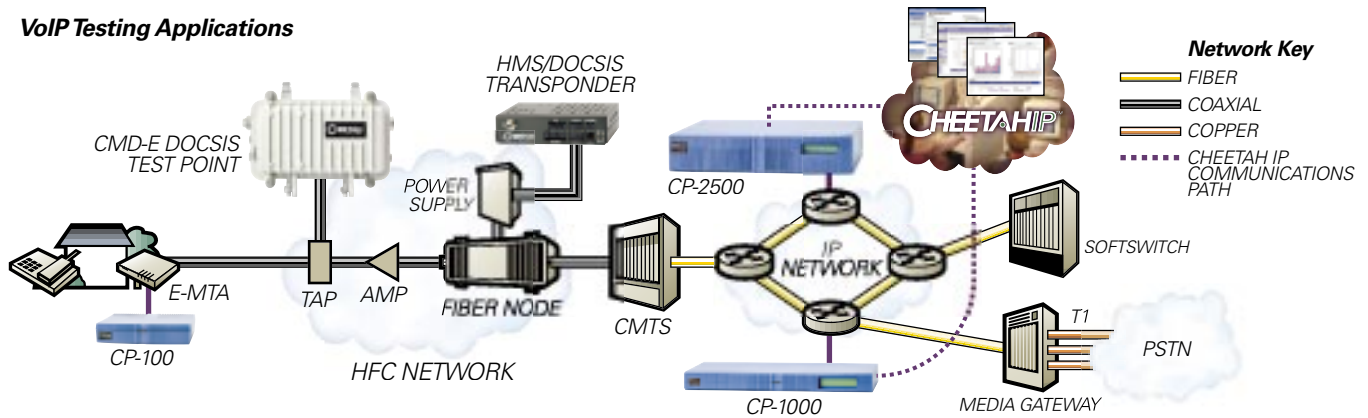
DOCSIS VoIP Test Point (CMD-E)

An environmentally hardened, line powered E-MTA in a strand-mounted housing that can be deployed anywhere within the HFC network to measure VoIP quality from the headend to the end-of-line.



Primary Applications

VoIP Testing Applications



Active VoIP Testing

The Cheetah IP/HFC solution makes NCS loopback test calls to power supply transponders, EOL devices and subscriber MTAs to validate call quality and service performance over the HFC network, where most impairments occur. All Cheetah products provide call quality analysis for consolidated originating and terminating end call performance analysis between managed test points.

Verify service and performance:

- Exercise Network Call Signaling (NCS) protocol for call setup and teardown from subscriber MTAs, including NCS Loopback calls;
- Precisely measure IP QoS parameters (i.e., mean opinion score [MOS], delay, loss, jitter) between identified headend, hub and OSP network segments via scheduled RTP sessions; and
- Quickly correlate test failures with current OSP network performance.

Proactively manage VoIP network performance:

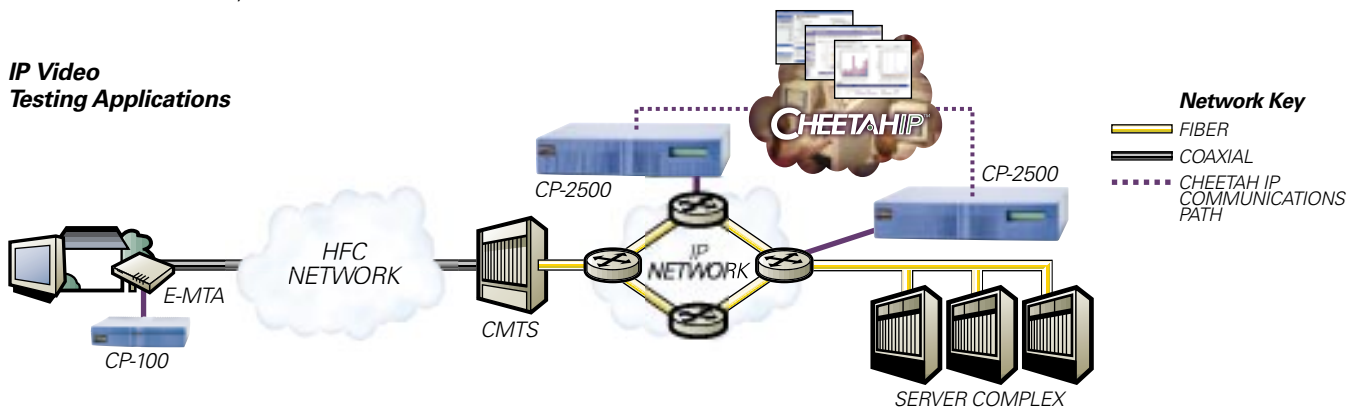
- Confirm NCS signaling across crucial network hand-offs;
- Proactively sample call quality between identified headend, hub and OSP network segments via scheduled RTP sessions; and

- Quickly isolate root causes via automated impairment analysis and correlation with basic broadcast network performance
 - Soft switch availability
 - PSTN/media gateway call completion
 - MOS-based quality assessment.

Remotely isolate common IP service troubles such as one-way audio, excessive delay and signaling failures:

- Isolate OSP/HFC-related causes of service degradation;
- Confirm correct CPE operation and performance; and
- Confirm core network, router and softswitch configuration and performance.

IP Video Testing Applications



Proactively manage IP Video network performance:

- Confirm IP Video server availability and session establishment;
- Proactively sample IP connection parameters such as delay, loss, jitter, frame rate and rebuffering; and
- Accurately measure video service performance.

Remotely isolate common video service troubles including delay variation, video/audio synchronization and overall picture quality:

- Confirm poor connection speeds and transfer rates;
- Real-time streaming protocol (RTSP) signaling for video session setup and teardown; and
- Isolate IP network performance troubles such as excessive loss, utilization and buffering.

Specifications

CP-100 Probe

Indicators and Interfaces

System status LED
Reset switch (recessed)
Two 10/100 Mbps Fast Ethernet ports (RJ-45 female)

Network Management

SNMP agent v1 (RFCs 1155-1157, 1901, 2570-2576)
SNMP MIB II (RFC 1213), Ethernet MIB (RFC 2665)
EtherStats (from RMON MIB, RFC 2021)

Physical

1.75"(H)X7.375"(W)X8.5"(D) (4.4cmX5.19cmX5.22cm)
Weight One lb. (.5kg)
Mounting on table-top or 19" rack

Power

Universal AC supply (90-240VAC, 50/60Hz, 300mA max)

Environmental

Operating temp. 41°F to 104°F (5°C to 40°C)
Storage temp. 14°F to 158°F (-10°C to 70°C)
Relative humidity 90% (non-condensing)
Operating altitude 13,000 feet max. (4,000 meters)

CP-1000 Probe

Indicators and Interfaces

System status LED
System information LCD display
Reset switch (recessed)
One 10/100 Mbps Fast Ethernet test port (RJ-45 female)
One 10/100 Mbps Fast Ethernet management port (RJ-45 female)
Console port (EIA-232 DCE, DB-9 female)
Three dry-contact alarms (DB-9 male and LED)
Optional GPS timing input (SMB female)

Network Management

Command line interface
SNMP agent v1 (RFCs 1155-1157, 1901, 2570-2576)
SNMP MIB II (RFC 1213), Ethernet MIB (RFC 2665)
EtherStats (from RMON MIB, RFC 2021)

Physical

1.75"(H)X17"(W)X9.75"(D) (4.4cmX5.43cmX5.25cm)
Weight 15 lbs. (6.8kg)
19-inch rack mount (front- or rear-mounted)

Power

100-240VAC, 50/60Hz 2.0A
-42.5 to -60VDC 3.5A

Environmental

Operating temp. 41°F to 104°F (5°C to 40°C)
Storage temp. 14°F to 158°F (-10°C to 70°C)
Relative humidity 90% (non-condensing)
Operating altitude 13,000 feet max. (4,000 meters)

CP-2500 Probe

Indicators and Interfaces

System status LED
System information LCD display (backlit)
Reset switch (recessed)
Gigabit Ethernet media module
OC-3 ATM media module
10/100 Mbps Fast Ethernet management port (RJ-45)
Console port RS-232 (RJ-45)
Three dry-contact alarms (DB-9 female)
Supports an optional CDMA or GPS module

Network Management

Command line interface
SNMP agent v1 (RFCs 1155-1157, 1901, 2570-2576)
SNMP MIB II (RFC 1213), Ethernet MIB (RFC 2665)
EtherStats (from RMON MIB, RFC 2021)

Physical

3.5"(H)X17.25"(W)X15.9"(D) (8.9cmX5.43cmX5.40cm)
Weight 14.7-15.4 lbs. (6.7-7.0 kg)
19-inch rack mount (front- or rear-mounted)

Power

100-240VAC, 50/60Hz 2.0A
-42.5 to -60VDC 3.5A

Environmental

Operating temp. 41°F to 104°F (5°C to 40°C)
Storage temp. 14°F to 158°F (-10°C to 70°C)
Relative humidity 90% non-condensing
Operating altitude 13,000 feet max. (4,000 meters)

CMD DOCSIS Transponder VoIP Firmware

Communications

DOCSIS Version 1.1
PacketCableTM MGCP/NCS 1.0
CODEC G.711 (μ & A-law), G.728, G.729 Annex E
RTCP XR (RFC 3611)

Network Management

SNMP Versions 1, 2 and 3

CMD-E DOCSIS VoIP Test Point

Interfaces

5/8-inch for power and RF, 75 Ohms, 5 to 860 Mhz

Communications

DOCSIS Version 1.1
PacketCable MGCP/NCS 1.0
CODEC G.711 (μ & A-law), G.728, G.729 Annex E
RTCP XR (RFC 3611)

Network Management

SNMP Versions 1, 2 and 3

Physical

16"(H)X8"(L)X3.5"(D) (41cmX5.20cmX5.21cm) approx.

Power

Voltage 40 to 90 VAC quasi-square wave
Power Consumption 7W at 60 VAC typical

Certifications

DOCSIS Version 1.1
FCC FCC Part 15, Class A
CENELEC EN50022, Class A

Active Test Suites

E-mail: IMAP; POP3; SMTP

File Transfer Protocol: FTP

IP Addressing: DHCP; DNS

Monitoring: SNMP; Router status

Network: Ping; Traceroute; Treno; TCP/Echo; UDP/Echo; Latency, jitter, loss
News: NNTP

One-way Performance: Latency, jitter, loss

Quality of Service: Differentiated Services; Virtual LAN

Streaming Media: RTP

Virtual Private Network: Full-mesh availability and performance; Virtual LAN

Voice over IP: MGCP; SIP; RTCP; RTP; TCP

Web and Web-based Applications: HTTP; HTTPS; Web application scripts

IP-Based Signaling: H.323; SIP; MGCP

System Requirements

Web Browser: Access the CheetahIP user interface from Microsoft® Internet Explorer™ or Netscape Navigator® Web browsers. Supports Version 6.0 (or higher) for both.

CheetahIP Servers (Minimum Recommended)

- Sun Microsystems™ UltraSPARC 10 (or larger)
- Sun Solaris™ operating system: Version 2.8 (or later)
- System memory: 512 MB
- Available disk space: 18 GB

CheetahIP Database Server

Oracle® Version 8.1.7.0 (or later)

Ordering Information

Please contact your Tollgrade representative for ordering information.



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