



Cheetah DOCSIS-based transponders provide unparalleled visibility into the HFC network and can be upgraded to be advanced VoIP test points.

## Cheetah VoIP CQM-Call Quality Manager

Cheetah's Call Quality Manager (CQM) is an IP based networked element that enables cable operators to remotely test and monitor the network's ability to deliver VoIP services from the head-end across the HFC trunk and feeder network. The CQM supports up to 20 simultaneous test end points, each providing a dedicated Network-Based Call Signaling (NCS) based endpoint for VoIP testing, as well as provides the ability for media use with popular codecs, that are commonly used in PacketCable networks. PacketCable™ based telephony calls are auto-answered using NCS signaling protocol, while measuring and reporting call quality in real-time. The CQM applications are accessed using a secure web based interface and along with licensed VoIP capable Cheetah DOCSIS transponders together provide cable network operators with a solution that can easily test and measure VoIP service availability and call quality as seen at the subscriber's location.

The CQM offers configuration flexibility with multiple options for testing and measuring various capabilities of your VoIP network, including:

- Measurement of the key VoIP parameters: delay, jitter, and packet loss
- Voice quality analysis, including RTCP XR metrics and computed MOS score (includes verbal playback of raw numerical score as well as easy phrase feedback)
- Testing of dialing plans and CODECs (G.711, G.728 and G.729e)
- Emulation of a residential subscriber.
- Verification and benchmarking of service level during installation.
- Multi-lingual outbound call support (Spanish and English at this time)
- QAM Constellation for identifying RF path signal issues
- Reporting of Quality, Impairments and degradation metrics in graphical format with drill down capability and user selectable time periods.

Duration (Seconds)	Call Quality	Linking Quality	PCQ	Call Quality	Linking Quality	QoS	Call Quality
2007-04-09 18:02:09	1	4.0	4.0	3.0	3.0	3.0	3.0
<b>Call Quality (Use R YR Path 4.1)</b>							
<b>Quality Statistics</b>				<b>Per End Results (Last Hour All Reports)</b>			
R Factor Call Quality	35	Packet Loss Rate	0.0 %	Loss Rate	0 %		
R Factor Linking Quality	37	Packet Discard Rate	0.0 %	Discard Rate	0 %		
R Factor Jitter	35	Avg Delay	0 msec	Avg Setup Duration	0 msec		
MOS Link Quality	4.0	Avg Latency	0 msec	Avg Call Duration	0 %		
MOS Linking Quality	4.0	Avg. Jitter	0 msec	Avg. Call Duration	0 msec		
MOS-PSQ (avg)	3.2	Max. Jitter	200 msec	Max. Setup Delay	0 msec		
<b>Media Results</b>				<b>Setup (Overall Loss)</b>			
Duration (By Reference)	00:00:00	Mean Run Duration	000 msec	End System Delay	Not avail		
RTT Packets Transmitted	125	Mean Cap Loss Rate	0.0 %	Signal Level	Not avail		
RTT Packets Received	122	Mean Cap In Factor(Linking)	7%	Signal Level	Not avail		
RTT Packets Lost	3	<b>Results (Overall)</b>		Residual Error Return Loss	Not avail		
RTT Packets Discarded	0	Mean Setup Duration	60 msec	R Factor	Not avail		
<b>Session Information</b>				Mean Setup Loss Rate	00.0 %		
CQM Call Identifier	716467128001	Mean Run In Factor(Linking)	7%	Mod Linkage	3.2		
				Mod Status	0.0		

## VoIP CQM Specifications

### Physical

Size	.1 RU
Power	AC Power (110V/220V)
Interfaces	GigE Test Interface GigE Management Interface
Operating Temperature	0°C to +60°C

### VoIP Call Emulation

NCS Signaling	PacketCable™ 1.x
Incoming Calls	Automatically answer
Loopback	NCS network loopback mode
Jitter	Jitter buffer selection
Media	G.711, G.728 and G.729e RTP media
DTMF digits	0-9, A, B, C, D, #, *
DTMF Tones	1KHz, 2KHz, 3KHz

### VoIP Signaling Results

Caller ID
Setup Delay
Post-Dial Delay
NCS DLCX Performance Parameters

### VoIP Call Quality Results

Packets Lost
Jitter
Latency
Mean Burst Loss Rate
Mean Burst Duration
Mean Burst Listening rFactor
Mean Gap Loss Rate
Mean Gap Duration
Avg Abs Jitter
Avg Max Jitter
rFactor Call Quality
rFactor Nominal
Calc MOS Listening Quality
Calc MOS Call Quality
Calc MOS Nominal
Packet Loss Rate
Packet Discard Rate
Avg Round Trip Delay
Max Round Trip Delay
Origin End System Delay
Avg One Way Delay
Termination End System Delay
Avg One Way Delay
Max One Way Delay

### VoIP Media Results

Media In Duration
RTP Packets Transmitted
RTP Packets Received
RTP Packets Lost
RTP Packets Discarded
Media In Session Id
Media Out Session Id
Media In Codec
Media In Packet Duration
Media In SID Enabled

### VoIP Degradation Results

Degradation Due to Packet Loss
Degradation Due to Packet
Degradation Due to Codec
Degradation Due to One Way Delay

### Audio MOS Response

Media File Playback
Calc MOS Call Quality

## VoIP CQM Applications

### Pre-Qualify Networks for Digital Voice Support

Pro-actively verify the performance of Digital Voice services within targeted HFC network segments via scheduled test calls with DOCSIS-based VSAPs. Isolate return path, DOCSIS, and CMTS utilization issues prior to initial service offerings.

Verify service quality of new Digital Voice subscribers during installation.

Verify proper provisioning and performance from the subscriber's home phone by completing a test call session with the CQM. Real-time voice performance is analyzed for the duration of the call – associated results are provided via verbal response. All test calls are logged by the CQM, providing a good benchmark for the customer's initial service quality and a means to track technician performance.

Remotely Isolate Reported Troubles prior to technician dispatch.

Pro-actively isolate troubles among CPE, HFC, and IP Access Network Segments without costly and time consuming technician dispatches. Support for subscriber-initiated test calls to verify call signaling and performance. Remotely isolate troubles among head-end, Node and EOL locations via on-demand or scheduled call tests with associated DOCSIS-based VSAPs.

Cheetah Technologies, LP  
381 Mansfield Avenue  
Pittsburgh, PA 15220  
412.923.3486  
[www.cheetahtech.com](http://www.cheetahtech.com)

© 2009 Cheetah Technologies, LP. All rights reserved. Specifications and features are subject to change without notice. (10-09)