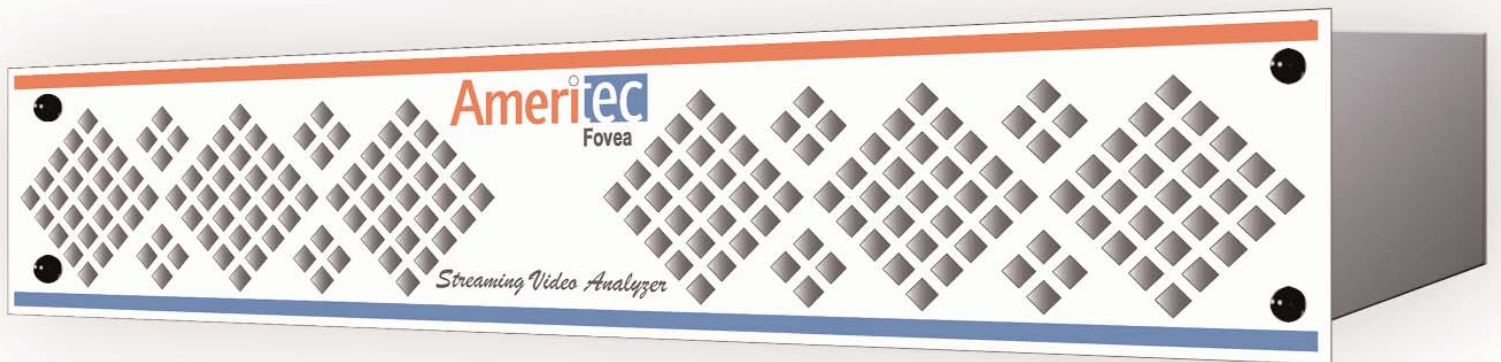


Ameritec

Fovea

Streaming Video Analyzer



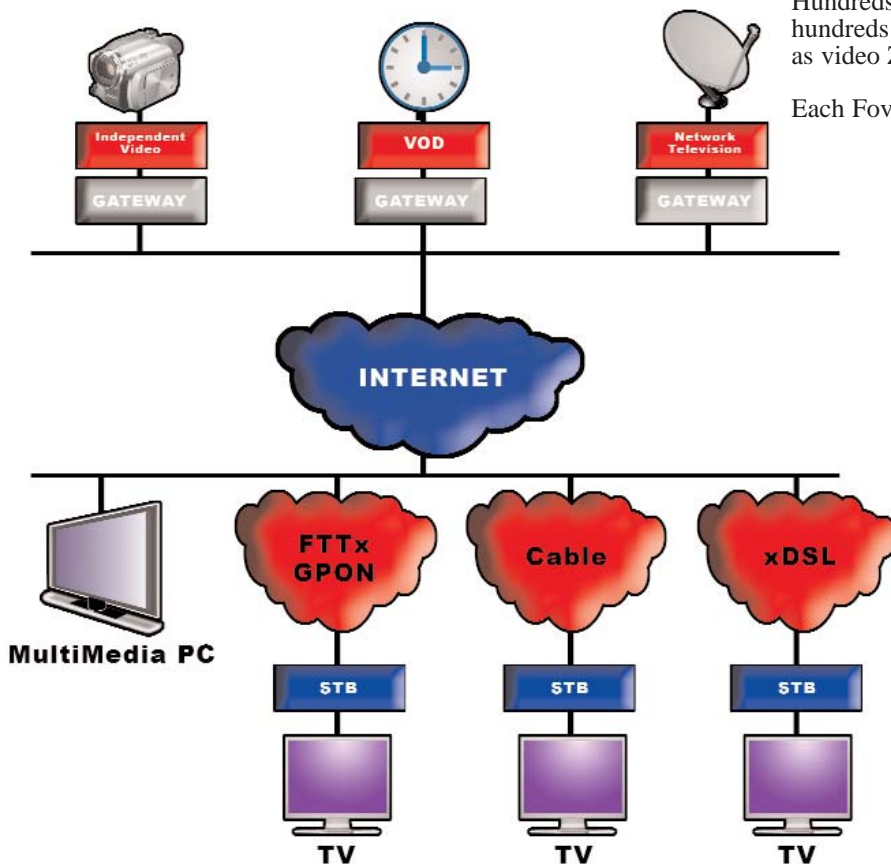
- ▶ Fovea provides the industry's first Video Reception Index (VRI) that captures the user's experience in both lost packets and maximum outage time.
- ▶ Fovea provides industry standard ETSI TR101290, RFC4445, and RFC3550 values in addition to standard packet based metrics.
- ▶ Fovea GoldenEyes simultaneously monitors hundreds of video streams. GoldenEyes evaluate each I, B, P frame and measure Zap Time, thus providing a true measure of the quality of the user experience.
- ▶ Fovea simulates hundreds of Set Top Boxes independently changing and watching channels.

Just as audio Quality of Service (QoS) metrics were developed for voice communication's migration from traditional, fixed line networks to modern, internet-based networks, an identical need is occurring for video's migration to today's IPTV networks. It is no longer acceptable for a service provider to provide its customers with best-effort IP services. With competing suppliers offering IPTV services, only those suppliers providing the highest QoS/QoE will be able to minimize customer churn and meet the customers' expectations in terms of quality.

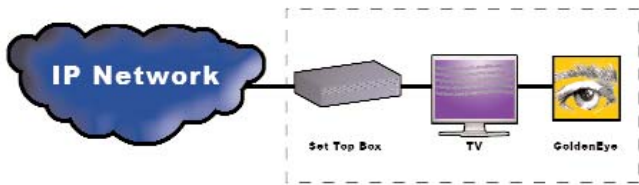
Ameritech's Fovea Streaming Video Analyzer is designed to measure the performance of today's IPTV networks. Fovea combines detailed packet-based metrics along with the industry's first Video Reception Index (VRI) that captures the user's experience in both lost packets and maximum outage time. Hundreds of Fovea GoldenEyes can be configured to simulate hundreds of Set Top Box endpoints where video quality as well as video Zap Time is analyzed.

Each Fovea is equipped with the following capabilities:

- ◆ Two, 1GB Ethernet ports
- ◆ Monitor up to 500 Standard Definition MPEG-4 streams
- ◆ Scriptable synchronized stream requests and measurements
- ◆ Transport Stream information (bitrate, codec, GOP structure, etc.)
- ◆ Measure VRI, Zap Time, Jitter



Fovea Applications



- ◆ Emulates multiple Set Top Boxes that can each receive multiple video streams.
- ◆ Each video stream is connected to a "Golden Eye" to generate quality metrics.
- ◆ Supports RTP and UDP packets.
- ◆ Can configure each virtual STB with a unique MAC address, IP address, VLAN and QnQ.

Operation

The Fovea product is essentially one or more Set Top Boxes and an associated viewer, or GoldenEye. Up to 500 GoldenEyes can be configured for each Fovea unit, where it would be possible to emulate a single Set Top Box with 500 GoldenEyes monitoring 500 unique TS streams or 500 Set Top Boxes monitoring a single TS stream or any combination in between. The Fovea utilizes Ameritec's Conductor graphical user interface that allows for easy data capture along with the ability to graph histograms of various metrics over time. A third-party video tool, such as VLC or mplayer can be used is also used within Conductor to allow the developer to watch a specific TS stream while performing measurements.

Scripting

The Fovea is controlled in the same manner that a user would control a Set Top Box with a remote. Commands include Wait, Watch and Surf. Wait indicates the amount of time the user performs an action or non-action. Watch selects a particular video stream in which the measurements will be performed. Surf commands the Fovea to surf a range of channels so that Zap Times can be calculated. Virtual STBs operate either synchronously or "randomly". "Random" actions may be reproduced thus allowing a failure mode to be recreated.

Measurements

Ameritec has incorporated into Fovea a comprehensive set of measurements designed to best depict the user's experience as it pertains to video quality. Utilizing a standards based approach, Ameritec has incorporated ETSI TR101290, Media Delivery Index (RFC4445) and RFC3550 measurements for each of the TS streams configured, up to a maximum of 500 streams. Additionally, Fovea provides a Video Reception Index measurement that captures two critical components of a video quality problem: (1) the percentage of bad frames and (2) the duration of the longest outage in seconds. Fovea also measures Zap Time, both in terms of Zap Time Video (time between sending Join request and receiving first I-frame) and Zap Time Join (time first packet is received after sending Join request). Additional packet-based measurements are also provided such as Jitter.

Performance

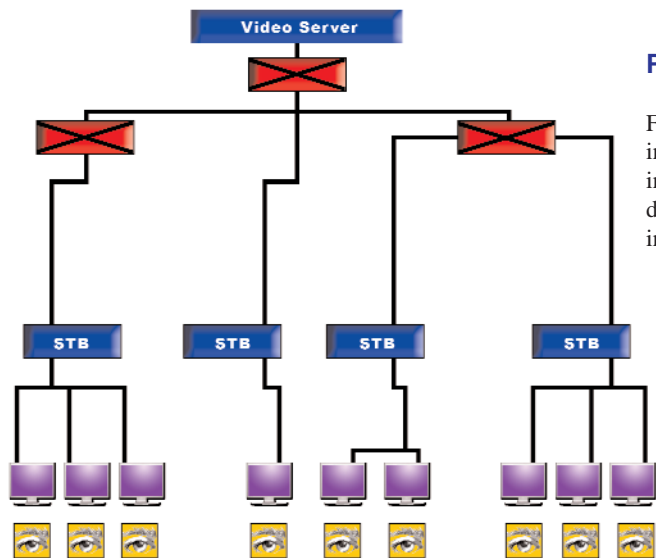
Fovea is designed to support hundreds of TS streams using its 1 GB Ethernet interface. Due to the differences in compression, high definition vs. standard definition video, etc., the number of TS streams that can be monitored will vary depending on the characteristics of each TS stream. Common configurations include up to:

- ◆ 500 standard definition, MPEG-4 (H.264) streams
- ◆ 500 standard definition, MPEG-2 streams
- ◆ 250 high definition (HD), MPEG-4 (h.264) streams
- ◆ 125 high definition (HD), MPEG-2 streams

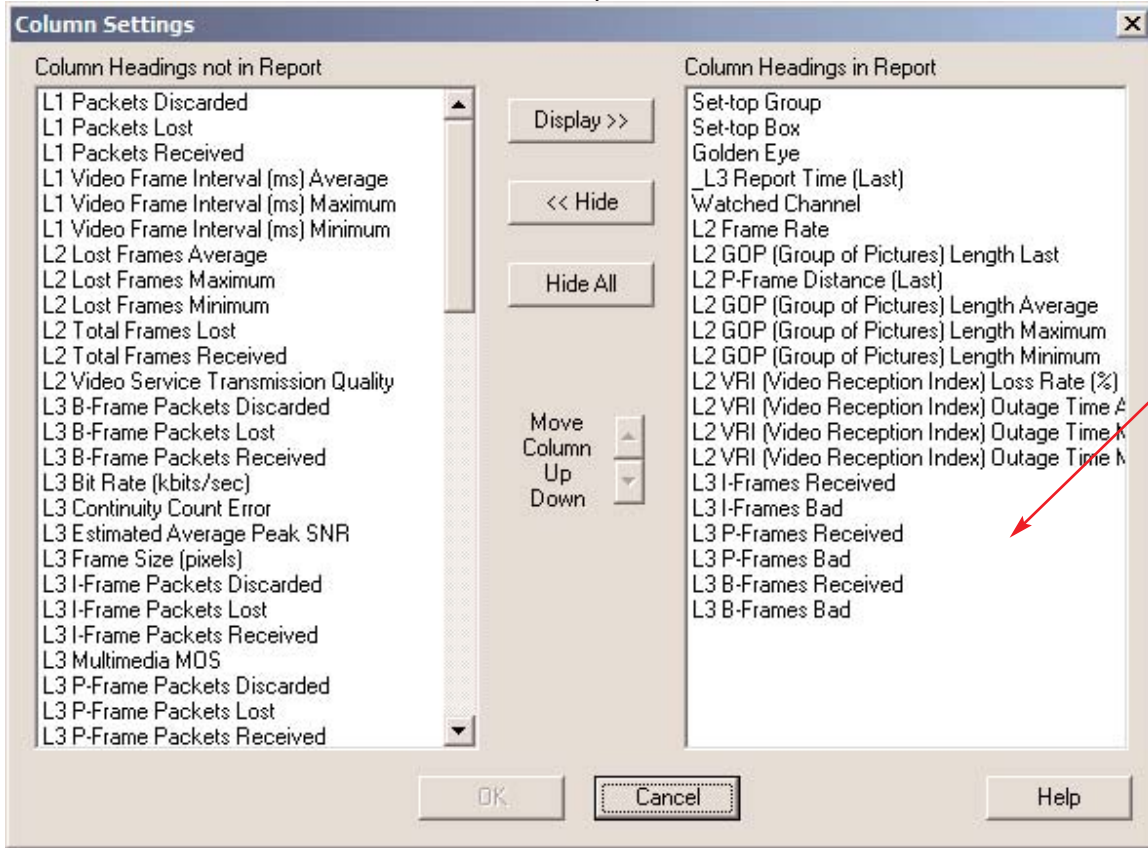
Applications

- ◆ Quality of Service Testing
- ◆ Network Testing
- ◆ Server Congestion

IPTV (simplified)



Conductor



Customization of reports is possible by selecting fields from a comprehensive list of parameters.

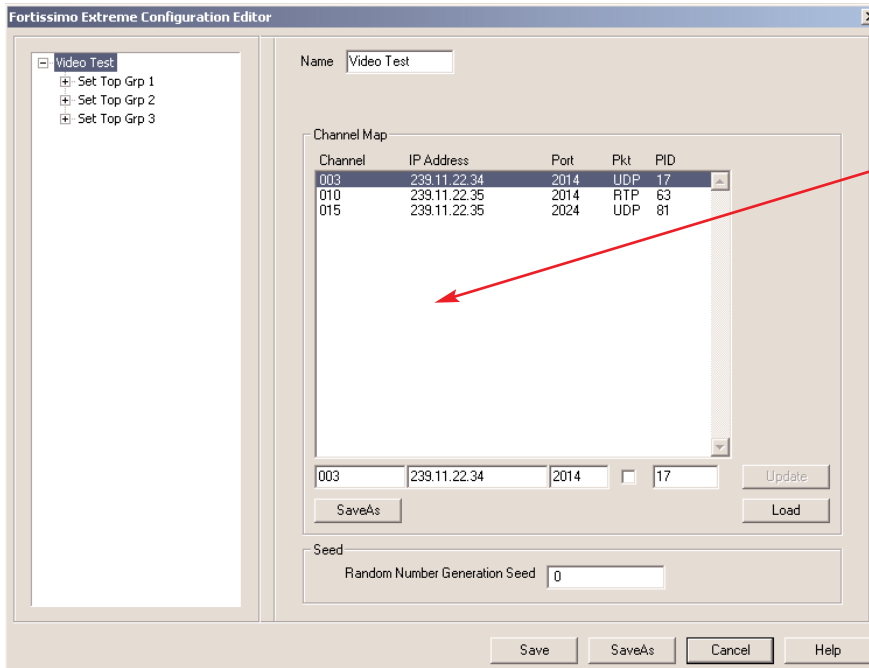
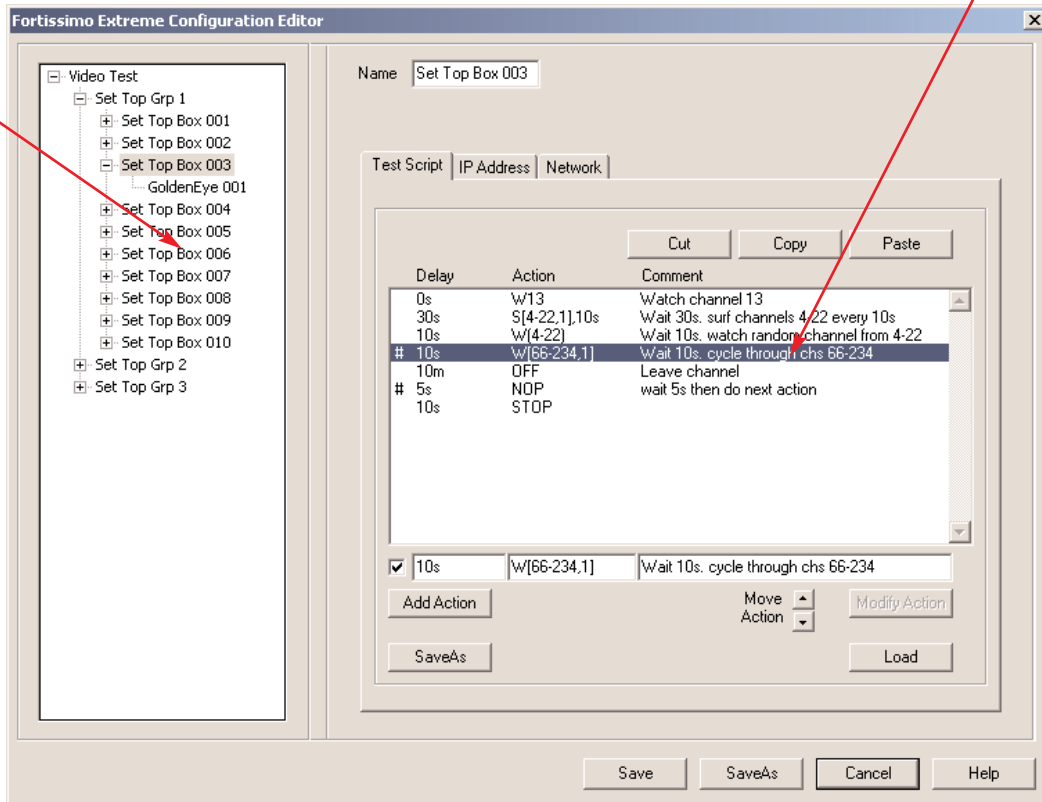
Reports are generated that allow the user to sort on any measured parameter. Violations are automatically filtered to the top of the report so the user can quickly identify problematic channels.

Set Top Group	Set Top Box	Golden Eye	L3 Time	Chan	Fm Rate	Last GOP Len	P-Fm Dist Last	GOP Len Avg	GOP Len Max	GOP Len Min	VRI L3	VRI Out Avg	VRI Out Max	VRI Out Min	I-Frm Rcvd	I-Frm Bad	P-Frm Rcvd	P-Frm Bad	B-Frm Rcvd	B-Frm Bad
STG001	STB001	GE001	14:29:13	104	29.970	12	1	12	12	12	0.06	0.00	0.03	0.00	2,404	0	9,783	1	1,187	0
STG001	STB001	GE002	14:29:29	101	29.970	12	1	12	12	12	0.35	0.00	0.03	0.00	1,220	0	13,069	1	0	0
STG001	STB001	GE003	14:29:29	102	29.970	12	1	12	12	12	7.14	0.00	0.03	0.00	1,216	0	13,024	2	0	0
STG001	STB001	GE004	14:29:29	105	29.970	15	3	14	15	5	33.33	0.03	0.10	0.00	911	0	3,556	17	8,580	14
STG001	STB001	GE005	14:29:29	106	29.970	15	3	15	15	15	0.57	0.00	0.10	0.00	571	0	2,234	6	5,373	11
STG001	STB002	GE001	14:29:13	110	29.970	1	1	1	1	1	0.05	0.00	0.03	0.00	13,071	1	1,602	0	1,189	0
STG001	STB003	GE001	14:29:29	101	29.970	12	1	12	12	12	7.14	0.00	0.03	0.00	1,230	0	13,021	1	0	0
STG001	STB004	GE001	14:29:13	104	29.970	12	1	12	12	12	0.06	0.00	0.03	0.00	2,402	0	9,781	1	1,184	0
STG001	STB005	GE001	14:29:29	101	29.970	12	1	12	12	12	14.29	0.00	0.03	0.00	1,226	0	13,025	1	0	0
STG001	STB006	GE001	14:29:29	101	29.970	12	1	12	12	12	0.34	0.00	0.03	0.00	1,227	0	13,028	1	0	0
STG001	STB007	GE001	14:29:29	101	29.970	12	1	12	12	12	0.31	0.00	0.03	0.00	1,228	0	13,031	1	0	0
STG001	STB008	GE001	14:29:29	101	29.970	12	1	12	12	12	0.36	0.00	0.03	0.00	1,223	0	13,032	1	0	0
STG001	STB009	GE001	14:29:29	101	29.970	12	1	12	12	12	100.00	0.00	0.03	0.00	1,221	0	13,041	1	0	0
STG001	STB010	GE001	14:29:29	101	29.970	12	1	12	12	12	20.00	0.00	0.03	0.00	1,218	0	13,046	1	0	0
STG001	STB011	GE001	14:29:29	101	29.970	12	1	12	12	12	7.14	0.00	0.03	0.00	1,222	0	13,039	1	0	0

Conductor

Fovea can configure groups of Set Top Boxes or individual Set Top Boxes with unique scripts. This allows the developer to test the effects of synchronized channel changing to measure Zap Times or individual channel monitoring for video quality metrics.

Scripting language is clear and straight forward. Commands simulate a user selecting video channels similar to using a Set Top Box's remote control device.



A channel mapping function is provided to configure IP address, RTP/UDP packet selection, port, etc.

General Characteristics

User Interface	Windows XP, Vista based GUI
Ethernet Port	One RJ45 connector and two LED indicators per network interface 10/100 BaseT interface Complies with IEEE 802.3

Dimensions

Power	17" Wide x 3.5" High x 16" Deep
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90 - 264 VAC, 47 to 65 Hz

Weight 18.5 Pounds (40.7 kg)

Interface

Capacity	Two, 1 GB Ethernet (electrical) simultaneous monitoring of 500 streams
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Measurements

Quality Metrics	VSPQ VSMQ MOS-V MOS-AV VSTQ EPSNR Video Reception Index (VRI)
JitterStatistics (RFC3550)	Packet - Packet Delay Variation (PPDV)
Media Delivery Index (RFC4445)	Delay Factor Media Loss Rate
MPEG-2 Transport Statistics (ETSI RT101290)	TS Error State TS Sync Error Continuity Count Error Sync Byte Error Transport Error PCR Repetition Error PCR Discontinuity Error PTS Error
Frame Statistics	I - frame packets received I - frame packets lost I - frame packets discarded P - frame packets received P - frame packets lost P - frame packets discarded B - frame packets received B - frame packets lost B - frame packets discarded I - frames received I - frames impaired P - frames received P - frames impaired B - frames received B - frames impaired
Zap Time	Zap Time Leave Zap Time Join Zap Time Video

Ordering Information

Mainframe/Chassis/Test Set

Fovea Fovea Streaming Video Analyzer

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