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OMG OTT Media Grinder

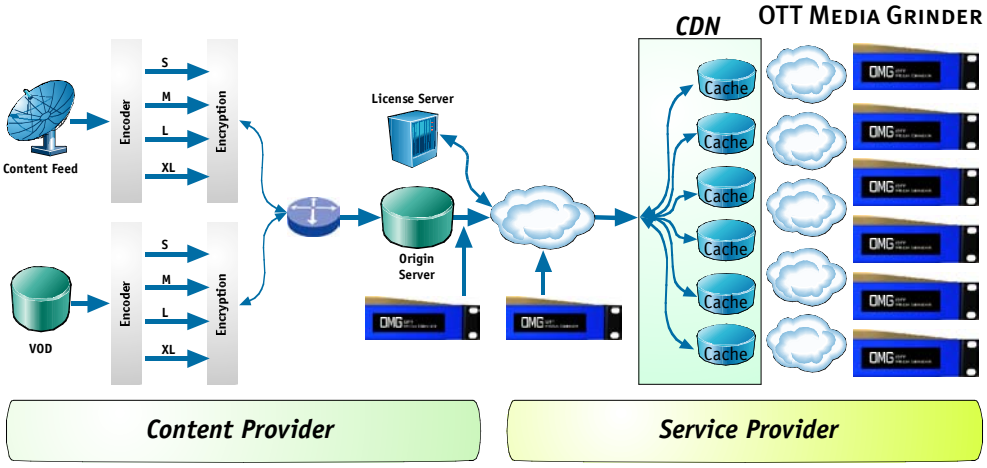
OTT Media Grinder (OMG)

Introduction

The OTT Media Grinder (OMG) is a comprehensive system for validation of Over-The-Top Television Delivery.

The OMG enables operators to qualify and periodically audit OTT Service Quality by simultaneously emulating thousands of OTT clients – generating large amounts of OTT transaction traffic into the network.

CDN and server farm owners, System Integrators, Network Operators and OTT service providers can all use OMG to test or monitor their services: throughout development, deployment and operation – all while adding value to their respective products and services.



Key Features

- Track 5 nines availability of OTT network
- High density load generation capability
- Highly configurable test profiles
- Automatically generated availability reports
- Compact 1RU chassis with standards compliant HTML interface

Deployment

The OMG can be used either as a load generator to stress test your service or as an active monitoring tool, which periodically or continuously monitors and reports service quality. OMG can be used in a lab network or in a deployed and operational network, depending on the requirement.

One way to deploy is to connect it through a network emulator to a server/CDN and observe service performance under various network conditions as imposed by the network emulator. This could be particularly useful for setting up, managing and evaluating servers/CDNs.

Another way is to replace the upstream port of a DSLAM with the load port of OMG. This could help network operators to see the combined effects of the actual deployed network infrastructure and the servers/CDNs.

When used as an active monitoring tool, OMG can also be connected at the consumer end of a network, possibly through a DSL Modem.

Overview

The Pixelmetrix OTT Media Grinder (OMG) simulates thousands of OTT clients (iPhone, iPad, etc) with multiple user-defined behaviors. Pools of clients can behave well (for example, consume content to the end), while other pools of clients can randomly change speeds, drop connections, or flap between adaptive bit rates.

To quantify the unique QoS/QoE performance factors for OTT, Pixelmetrix has developed the comprehensive VideoMargin™ Metrics, which give complete insight into the OTT delivery. Measuring network, HTTP and video layer performance, the seven VideoMargin™ parameters measure each aspect of the delivery domain spanning content server, network, authentication, individual client behavior as well as collective client behavior. Consolidated service availability is also provided as a single number in a familiar five nines type of representation.

Packaged in a compact 1RU form factor, dedicated GigE Interfaces are available for management and Load Generation.

Results Analysis & History Archiving

The test results collected across the entire population of clients at 1-minute intervals are also presented in multiple lower resolution levels of time. This consolidation of data into information highlights statistically significant aspects without the overwhelming details of individual client transactions.

Test results can be conveniently analyzed while the test is running, or at any time after using a multi-user web browser GUI. Alarms can be configured on individual measurements to bring important failures to the forefront.

Every time a test plan is executed, the results are saved for future reference, along with other information such as when it was run, comments on the session, all configuration settings, etc. This system-wide snapshot captures all the important information for easy reference, while analyzing test results. Verification of results at a later time can also be done. Concise printable reports can also be generated from these historical records for management or other purposes.

Pixelmetrix corporation

Traditional Measurements Are Not Enough

Because OTT is based on HTTP, which itself is based on TCP, traditional QoS measurements for television are meaningless. Measurements focusing on network impairments such as packet loss and jitter do not apply because TCP does not lose packets.

HTTP measurements do apply, but they are insufficient to provide true visibility of service quality. Furthermore, a host of new problems can arise since OTT delivers visually continuous video by dividing it into thousands of small files.

While traditional HTTP measurements do cover aspects of content delivery such as number of requests, number of clients served, etc, they fall short of capturing the critical aspects of video experience like 'continuity in time' and 'video quality'.

Meaningless	Insufficient
Video • Packet Loss • Jitter • Inter-packet arrival time • RTP statistics • IGMP statistics	**HTTP** • HTTP Traffic sent • HTTP Traffic received • HTTP Error statistics - Timeouts - 4xx Errors - 5xx Errors

Traditional Video-over-IP metrics for RTP and RTSP are invalid while packet loss, jitter etc are unnecessary/insufficient.

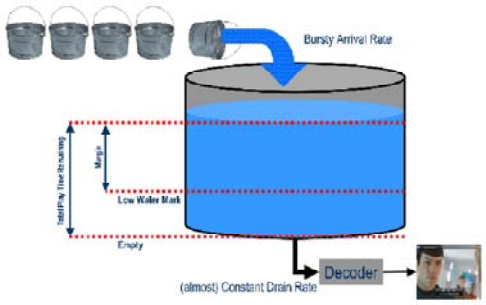
Since HTTP rides on TCP/IP connections which guarantee data delivery, what really affects video experience is not really 'did the data arrive?', but 'when did the data arrive?' Neither do traditional absolute bandwidth measurements fully reflect the effects of the delivery network on video, because the actual required bandwidth depends on the quality of the content being watched. Changes to content bit rate in adaptive bit rate systems, as chosen by the individual clients, work towards compensating for such absolute bandwidth variations.

With the new VideoMargin™ metrics reported by the OMG, the shortcomings of traditional approaches have been eliminated – helping to quickly isolate problems and tune performance within the delivery network, client, content server and license server.

Buffering Model & 'The Margin'

OTT divides large video files into thousands of small 'chunks', each chunk containing a few seconds of video. Because the arrival rate of the chunks might not be constant, clients must buffer incoming data in order to create a constant bit rate to feed the decoder.

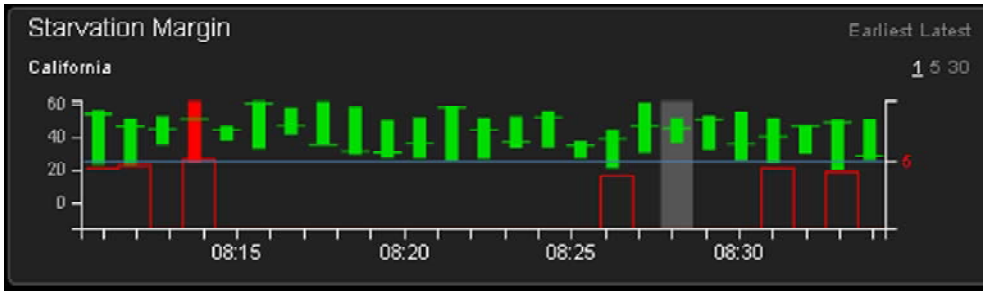
Running out of data in the buffer leads to immediate picture freeze and the dreaded 're-buffering' message on the player. Therefore, players have a minimum level needed to continue playing (the 'low watermark'). The difference between the actual data level and this low watermark is the safety margin of the player – or 'the margin'.



The Pixelmetrix VideoMargin™ metrics look at the real time, dynamic behavior of the margin – giving true insight into delivery performance and service quality.

Each measurement is displayed across a variable zoom timeline; letting you quickly get summary information or zoom in for detailed analysis. Alarms can be generated if too many clients fail a particular measurement.

Furthermore, measurements are aggregated across thousands of clients to derive an overall figure of merit for the network as a whole.



VideoMargin™ Metrics

The Pixelmetrix VideoMargin™ is a set of eight metrics quantifying the performance of individual aspects of the Over–the–Top television delivery system.

The metrics can equally be applied to live client simulation as well as passive, in-network monitoring.

Four of the metrics relate to how much excess delivery capacity, or 'margin' is available in the network and server. Measurements of instantaneous margin and response times are made.

Two metrics measure the characteristics of adaptive bit rate delivery. Specifically, the percentage of users watching a specific quality/bit rate as well as how frequently clients change speeds.

Delivery Margin

How fast is the data being delivered to the client?

Measures if available application layer bandwidth is adequate.

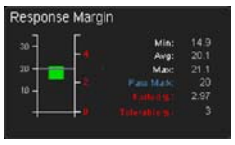
Request Margin

Is client requesting data too late?

Different client algorithms decide when to make new requests for data based on network characteristics.

Response Margin

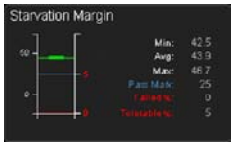
How quickly does the server respond to requests for video?



Slow response from servers or caches could cause the client to run out of data and starve.

Starvation Margin

Did the player starve?



Indicates remaining playback time in client buffer. Higher is better.

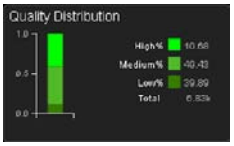
Which Metrics Where?

The different metrics apply to different parts of the delivery chain, as indicated in the table below.

Metric	Source License Server	Network	Client	Overall QoE
Starvation Margin	✓	✓	✓	
Response Margin	✓			
Delivery Margin		✓		
Request Margin			✓	
Quality Distribution				✓
Quality Stability				✓
License Requests	✓			

Additionally, overall system availability – the 5 nines – and overall status, provides concise reporting and easy monitoring.

Quality Distribution



What proportion of the total video was of high, medium and low bit rates?

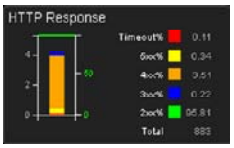
Number of clients watching each bit rate is divided into three buckets for reporting.

Quality Stability

How many times did the client change bit rates?

Quality Stability estimates measures the average 'gear shifts' per user.

HTTP Response Codes



Is the web server properly responding to requests?

What type of errors is the web server returning?

License Requests

License requests measure the proportion of new licenses granted against those rejected and/or where the server did not respond.

Central Dashboard

Whether during live execution or during the review of previously-run test sessions, OMG conveniently presents all relevant information in a compact and dynamic dashboard.

Simply mouse-over any part of the screen to dynamically 'zoom into' measurements at any specific point in time. Clicking on any margin panel shows detailed time view of that measurement.

Assets & Targets

The OTT servers under test can be grouped into 'targets', which associate to a single domain, but could resolve into multiple servers. Lists of assets for the clients to 'watch' can be individually defined or conveniently uploaded as a '.csv' file. Assets can further be grouped into categories to be sequentially 'watched' by specific squads.

Running the test plan brings all of the settings together, and the system measures and records all metrics over the run time of the test.

Full Execution History

All test measurements are shown on the multi-user GUI immediately once they are measured by the system. Over time, the results of all executed tests are stored in an internal database and are available for retrieval and viewing at any time.

Historical results can be viewed even when a live test is running.

Detailed Reporting

Since the results from all completed test runs are stored in an internal database, management reports can be automatically generated at any time after the test run.

OMG provides you with detailed QoS performance reports – giving you the information and tools you need to improve service quality and isolate issues quickly.

Professional Services

Pixelmetrix provides OTT client model libraries for each supported protocol type. However, should you need OTT client models with unique requirements or specific behavior patterns, Pixelmetrix professional services is on hand to customize and deploy a solution meeting your exact requirements.

Such customized models are delivered as installable shared libraries.

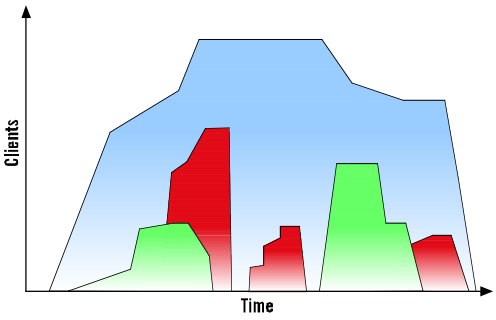
Test Plans, Mobs & Squads

The OMG executes user-configurable test plans to provide stress testing and active monitoring of OTT servers, CDNs and delivery networks. Each test plan is comprised of the server(s) to target, the assets to be 'watched', the number and type of clients, divided into pools, as well as the dynamic behavior of those clients.

Clients are modeled though an installable library, and the various client model parameters can be configured though the GUI. The collective behavior of each client pool can be extensively customized for each test plan.

Over the user-defined run time of the test plan, individual groups of clients, called squads, can be defined with each squad having a unique client type, protocol and dynamic behavior.

The number of clients within each squad can vary over the course of the test. Besides defining different squads, the total number of clients simulated, called the mob, can be independently configured, and the system automatically fills the gap between the mob and the squads with a filler squad.



Presence Model

Specifications

Supported Protocols
- Apple HTTP Live Streaming (HLS)

Maximum No of Clients
- 2000

Maximum Load
- Up to 990 Mbps

Measurement Resolution
- 1 minute

Control Interface
- HTML Web Browser

Operating System
- Linux

Mass Storage
- 250 GB SATA II HDD

System Interfaces
- Management Interface
  - 1 Gbps Ethernet Interface
  - RJ-45
- Copper Load Generating Interface
  - 1 Gbps Ethernet Interface
  - RJ-45
- System Recovery
  - USB
- Misc
  - USB 2.0

Mechanical Characteristics
- 1RU 19 inch rack-mountable
- Operating Temperatures
  - +10˚C to +30˚C
- Storage Temperature
  - 0˚C to +50˚C

Electrical Characteristics
- Power Input
  - 90-240 V AC; 47-63 Hz
  - 5A at 115 V AC
  - 2.5A at 230 V AC max

Regulatory Compliance
- CE Mark

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