

A review of

SeaChange Video on Demand

Esfandiar Zolghadr

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Introduction

Video on demand (VOD), is a high quality live and stored video delivery system over IP networks. SeaChange's end-to-end VOD solution includes a video engine called "MediaCluster", that is a platform managing network interfaces, right management and video formats. SeaChange owns the largest VOD system market deployed at telecommunications and television providers around the world. SeaChange's VOD system enables program providers to stream multi-format VOD content over DSL, fiber and Metro Ethernet networks. The SeaChange VOD System, comprising standards-based video servers and software supports MPEG-2 and MPEG-4 streams and advanced codecs including H.264 and Microsoft Windows Media 9 to stream on-demand movies, television programs and other content to PCs and televisions. Among their customers are companies such as TIME-Warner, COX, ComCast and many others. This system has been studied from different aspects such as reliability, scalability, resilience and performance as described later in this report.

System overview

SeaChange's streaming system consists of forest of individual video servers interconnected via Giga-bits networks termed as MediaCluster. Their Mediacluster is highly expandable and additional servers could be added with no intrusion to system operations. Existing content of MediaCluster is automatically shared with newly added servers without replication to maintain the minimum delay in real-time applications as well as operation cost reduction. New media acquired by capturing real-time feeds or DVD or other sources such as advertisers. System operations from media acquisition to distribution can be set to operate automatically. Customization and configuration of the automatic programming is applied using Command center (see figure-10). Command Center includes several services with specific functionalities.

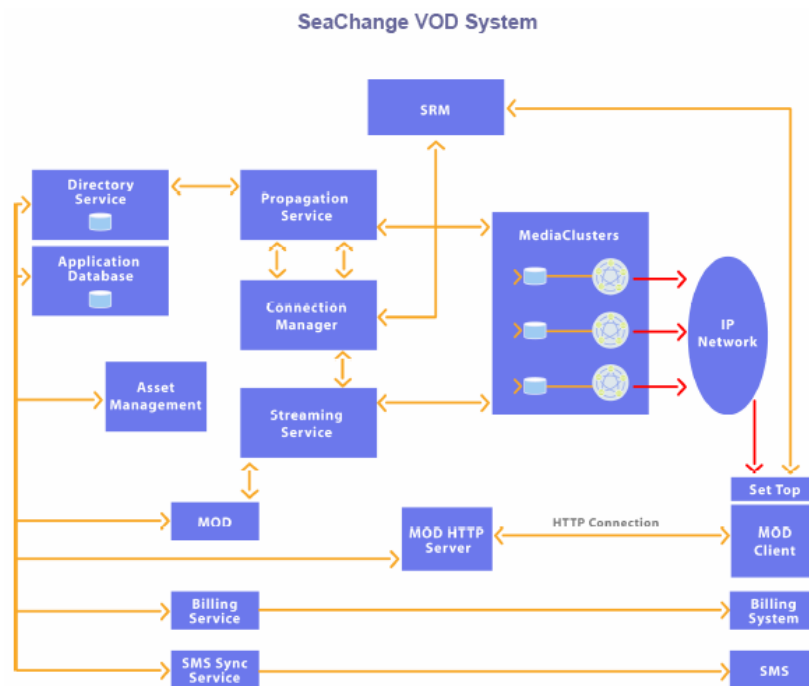


Figure 1. SeaChanges's VOD system

Available content on the MediaCluster is organized using a high-speed distributed master database maintained by Directory Service. Directory service stores extensible metadata about media objects, and other attributes associated with these objects. Physical placement of the data is handled automatically and based on the media type by Propagation Service. Propagation service performs intelligent asset replication automatically. This unit works with Asset Manger to add or delete the media objects to/from media stores. User demands, system configurations and asset manger determine what assets should be replicated or deleted at the end of their life cycle.

Session Bandwidth Management

Client driven bandwidth management allows Connection Manager to allocate necessary bandwidth. Connection manager allocates best path and server for a streaming session at beginning or at the time of a failover. Session Resource Manager (SRM) interfaces with client using RTSP to accept and execute streaming requests from IP clients. SRM informs connection manager of streaming client needs or issues. RTSP is used for to carry control messages between client and server.

Fault Tolerance

SeaChanges uses NT-based Servers to host Directory Service, Propagation service, Connection manager/SRM and Application Service. Each MediaCluster is set up using fault tolerant pairs of these servers. At increments of 6000 streams one pair of these servers can be added with no maximum limitation.

Resilience

Video media or asset striped across all servers in MediaCluster in a patented scheme called RAID². This scheme that is similar to Raid hard disk, prevents interruption or loss of data in case of physical failure in one of the servers. The failed hard disk content can be recovered using addition information on the recovery disk.

Client based RTST control provides feedback to the streaming server with QoS information. Based on the information received from client set-top box before session initiation, bandwidth allocation and path selection is done. During the streaming session, session control information is sent to server at constant intervals termed heartbeat. This information informs server of the quality of stream and the state of the set-top box. Retransmission, resynchronization and bandwidth re-allocation or de-allocation may be required. When user changes changes the channel or turns off the set top box, transmission of stream will stop and resources will reallocate to other users.

Scalability

MediaCluster enables servers to access the shared asset or video content automatically and in a way that guarantees balanced distribution of load among servers of the MediaCluster. Automatic load balancing increases the system scalability by linearly improving the overall performance and bandwidth of the system when number of servers increase.

Streaming Modes

-IP Streaming: media is delivered over managed switch/routed IO network using User Datagram Protocol (UDP) and Real Time Protocol (RTP). Real Time Signaling Protocol (RTSP) over TCP is used for streaming control (see Figure-2).

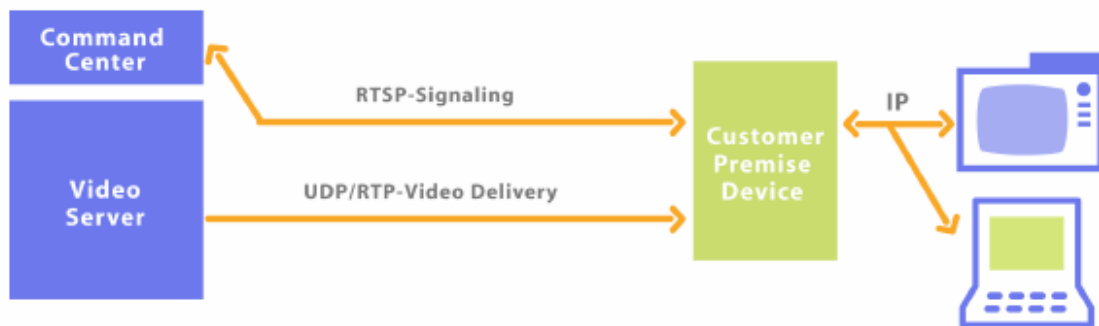


Figure 2. IP-Delivery

-IP/xDSL Streaming: Digital Subscriber Line Access Multiplexer (DSLAM) delivery substitutes RTP (see Figure-3).

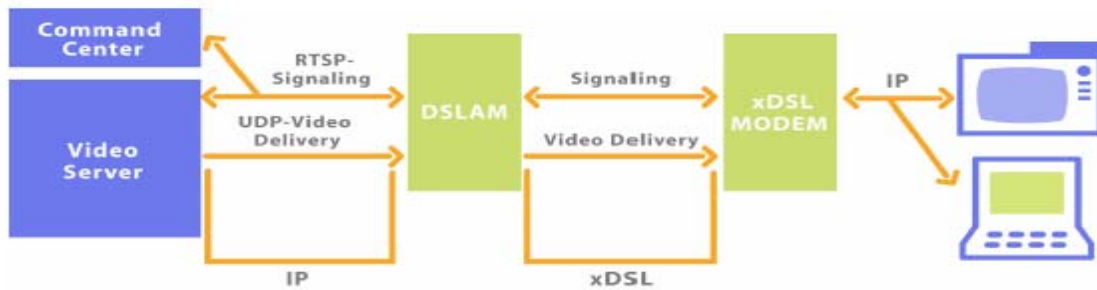


Figure 3. IP over DSL

Video On Demand (VOD)

VOD is ultimately used for viewing movies. User navigates through the dynamic list of available assets and associated metadata generated in html by server based on available content and operator's business rules. Once a movie is selected, a client-side software termed Movie On Demand (MOD) client starts communication with streaming server's SRM to set up a streaming session. Connection manager is used to allocate required bandwidth and other resource. Client-side software also provides server with information necessary for billing, rights management etc. Once a purchase is placed and verified Application Service begins to monitor the session event in order to control the rental grace period, to record billing events and to maintain a list suspended streams (Due to end users change of channel or client shutdown).

Finally, SeaChange security includes session based encryption, pre-encryption and digital rights management. However since VOD system is designed for Windows-NT and the SeaChange yet failed to upgrade their platform, the entire system suffers from windows related issues. ■

1. http://www.schange.com/Downloads/IP_Streaming/VODOVERIP_WhitePaper.pdf
2. http://assetmanagement.broadcastengineering.com/ar/broadcasting_seachange_nielson_measure/