

Spectrum Overview

Spectrum is a network media management solution that combines subscriber management controls with Quality of Experience optimizations, and “on-the-fly” file repackaging for the most personalized video experience available.

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Spectrum Overview

Spectrum is software designed to operate in the network to help manage and optimize the delivery of Adaptive Bitrate (ABR) video streams. It does this by offering three major features, Session-based Management, Dynamic Manifest Manipulation, and File Repackaging.

Spectrum provides a host of tools that allow vendors to deliver ABR content in a managed way while also optimizing the content and helping provide the highest possible Quality of Experience for the viewers.

Spectrum is targeted to the Service Providers seeking to extend their subscriber services into the Online Video and OTT markets. It can manage and deliver both live and On-Demand video content and works with all three major ABR protocols currently used, Apple's HLS (HTTP Live Streaming), Microsoft's Smooth Streaming, and Adobe's HDS (HTTP Dynamic Streaming).

File Repackaging

Spectrum repackages content from one ABR protocol to another in real-time. This means service providers can consolidate their video libraries to a single ABR protocol, while still delivering to any device or protocol requested. Content is repacked on-the-fly or "Just in Time." By taking the just-in-time approach to repackaging, only content requested is ever processed and only the specific chunks or sections of content viewed are ever processed, cutting down on a large quantity of processing and management of videos required to deliver on the ABR experience for any platform.

Spectrum is focused around support for both Apple's HLS and Microsoft's Smooth Streaming for ingress formats and can output both protocols plus Adobe's HDS on egress; this is true for both live and on-demand content. In addition to changing into different protocols, Spectrum has the ability to change the fragment duration while repackaging content. This enables content to be optimized for delivery to different networks that may require larger fragment sizes to compensate for laginess (such as 3G networks).

Spectrum's Format Support Matrix:

Origin	Client	VoD	Live	Max Rate	Fragment Duration	Origin Maps
SS	SS	✓	✓	✓	R1.1	✓
SS	HLS	✓	✓	✓	R1.1	✓
SS	HDS	✓	✓	✓	R1.1	✓
HLS	HLS	✓	✓	✓	R1.1	✓
HLS	HDS	✓	✓	✓	R1.1	✓

At the Edge

Spectrum's repackaging is performed at the edge of the network (see Deployment Models section for more details around what defines an edge). By performing repackaging at the edge at the time of the request being made for content, fewer requests need to be made back to the origin servers; Spectrum's cache friendly approach makes much better advantage of the popular content already stored at the edge.

Session-based Management

In most ABR streaming solutions, the same manifest file is delivered to each viewer and client side controls are relied upon to provide personalized viewing experiences. With Spectrum deployed, a unique manifest file is generated per request. Each manifest is customized for the subscriber providing a highly personalized viewing experience. Spectrum then manages the viewing session of content by creating an internal table per session and mapping all requests (both client and network side) in a log known as the Session Detail Record (SDR).

In addition to applying subscriber authentication (viewer is approved) and even resolution specific authentication (viewer is approved to view specific resolution streams of the content), Spectrum also allows for time and data related limits on delivery (ie: viewer is capped to viewing a specific number of minutes or megabytes of content per session).

Session policies can also be set against specific devices (ie: viewers are authenticated to iPhones versus set top boxes or desktop players, etc.).

Spectrum connects to existing subscriber databases and policy engines via a REST XML API, allowing integration into existing subscriber infrastructures.

Session Management Highlights

Stateful Session Management

- » Session is defined as a series of requests associated with the delivery of a single media asset to a single client
- » All requests are linked to an internal client session table

Session Identification

- » Spectrum creates a unique manifest response per session with embedded client session information
- » All Subsequent requests contain this information

Session States

- » Sequence of requests and associated timeline used to determine session events
- » Intelligence to take into account nuances of each player type

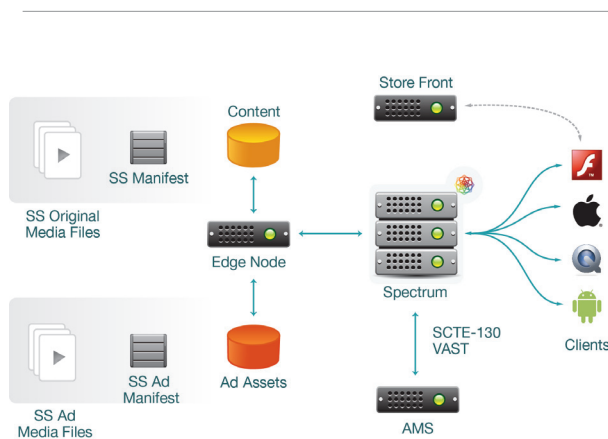
Dynamic Manifest Manipulation

Spectrum not only creates and delivers a unique manifest file at the beginning of a session. Spectrum can in fact continue to actively update the manifest file throughout the session, allowing for network and user conditions to be acted upon directly. Dynamic Manifest Manipulation (DMM) enables targeted advertising insertion and customized, personalized viewer programming. Likewise, as network conditions fluctuate DMM can be used to adjust the maximum amount of bits per second that can be delivered to a given viewer, allowing the network operator to guarantee quality of service for their subscribers.

In effect, Spectrum acts as a traffic cop on content being delivered to the viewer, taking instructions from the network and applying them to content in real-time, both Live and On-Demand and across all three ABR protocols.

Ad Insertion

Spectrum's Ad Insertion also operates on a REST XML API, supporting placement request and placement response commands and monitoring streams for SCTE-130 messages to detect advertising locations. Rather than redirecting the stream to a unique ad URL (how client side ad players operate), the ads are instead stitched into the stream network side and delivered as part of the same URL and session based on the ADS metadata.



Spectrum's Ad Insertion Deployment Model

Ad Insertion Highlights

- » Retrieve Ad content from origin – CDN, Edge Cache, Origin Server, etc.
- » Dynamically re-package Ad content
- » Serve Ad fragments in line with live or on-demand content
- » Delivery based on the dynamically generated Spectrum manifests

Analytics & Reporting

As previously mentioned, Spectrum generates robust Session Detail Records (SDR) per session that logs all the interaction and interactions that occurred. SDR's can be accessed through a syslog interface or offloaded to third party systems via the API.

Spectrum's dashboard also captures all media flows and overall system capacity (processing power used, throughput capacity, number of active sessions, etc.). This information can be viewed through Spectrums existing UI or ported via API to third party logging systems for integration into larger dashboards.



Spectrum Analytics & Reporting Dashboard

Spectrum Deployment Models

Spectrum is designed to be deployed as part of the edge network delivering content to the viewer. The edge is defined as the location last place on the network that managed requests for content can be completed - in some deployment models, this may be core based, mid-tier, or truly edge based.

Deployment Models

- » “Split” DNS Resolution
- » Parent Proxy Servers
- » Web Hosting Servers
- » URL Mapping
- » Client Proxy-Based Forwarding

How and where Spectrum is deployed may affect the features that are available to the service provider; as a rule of thumb, the closer to the viewer Spectrum is deployed, the more control over the ABR stream it can provide.

Performance

Spectrum is a Linux based 64-bit software solution. It can be deployed on a variety of hardware and virtual architectures. When installed on SeaWell’s reference appliance (specifications available upon request), expected performance is up to 2000 simultaneous sessions and up to 3 Gbps of data being managed.

About SeaWell NETWORKS

SeaWell Networks, Inc. provides unique software that enable managed, optimized delivery of HTTP adaptive streaming video while providing superior quality of experience. Our newest product Spectrum, is a high capacity session based ABR management solution combining subscriber management with quality of experience optimization, and on-the-fly ABR repackaging for the most personalized video experience available today.

Setting the bar for online video delivery, SeaWell Networks combines striking video quality, personalization, and the flexibility for any ABR protocol. Our innovative solutions create a superior experience for the viewer on a platform that is more scalable and cost effective than existing technology.

For more information on how to leverage Spectrum in your network today, visit www.seawellnetworks.com or email sales@seawellnetworks.com.

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