TechNote – AltitudeCDN™ Multicast+ Integration with IBM Cloud Streaming Manager for Enterprise

Version 1.0

AltitudeCDN™ Multicast+ is a patented (US Pat. 9,516,390) solution that brings multicast support to live video deployments that use IBM Cloud Streaming Manager for Enterprise. The Multicast+ integration with Stream Manager for Enterprise provides customers with a solution that efficiently delivers high-quality live (or video on demand (VOD) published as live) streaming across the enterprise, without overloading or degrading network resources.

This guide describes the Multicast+ integration with IBM Cloud Streaming Manager for Enterprise, and how to configure Multicast+ to support Streaming Manager for Enterprise video events.

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Introduction

During live (or video on demand (VOD) published as live) events, large numbers of viewers attempt to connect separately to external internet content delivery servers. This surge creates a high demand on network resources that can lead to poor video quality, or even denial of service for viewers and other network clients.

To avoid these issues, customers who use Streaming Manager for Enterprise can integrate AltitudeCDN Multicast+ into their existing video content delivery environment. By using Multicast+ Senders and Receivers, a video event is presented as a single multicast stream that is shared simultaneously by multiple viewers, allowing an event deployment to scale to large audiences, while conserving network bandwidth.

The Multicast+ integration with IBM Cloud Video Streaming Manager for Enterprise requires minimal additional configuration to your Multicast+ environment, and requires no changes to the stream player.

Requirements

To use Multicast+ with Streaming Manager for Enterprise, you need the following:

Item	Recommendation
Multicast+ Sender	Multicast+ Sender v1.8.1 or later – The Senders must be installed and running on on-premise Windows or Linux platforms, positioned within the customer network so multicast traffic can reach the audience. For more information, see the *AltitudeCDN Multicast+ Deployment Guide*.
Multicast+ Receivers	Any of the following: • Multicast+ Windows Receiver 1.8.1 or later. • Multicast+ Mac Receiver 1.8.1 or later. • Multicast+ Java Receiver 1.8.1 or later. The Receivers must be installed on each client viewing device prior to the event. For more information, see the *AltitudeCDN Multicast+ Deployment Guide*.
IBM Cloud Video Streaming Manager for Enterprise Channel ID and Shared Secret	The Streaming Manager for Enterprise <channel ID> and <shared secret> are required by the Multicast+ Sender to access and process the stream source. See your IBM Cloud Video Streaming Manager for Enterprise documentation for information on obtaining this information.

Solution Summary

The Multicast+ integration with IBM Cloud Video Streaming Manager for Enterprise extends the functionality of Multicast+ Senders and Receivers to provide support for Streaming Manager for Enterprise events. To deploy the Multicast+ integration with IBM Cloud Video Streaming Manager for Enterprise, you first need to have a functional Multicast+ environment, then perform the additional configurations described in this guide.

> **Note:** *Multicast must be enabled in your IBM configuration. For more information, see your IBM Cloud Video Streaming Manager for Enterprise documentation.*

Functional Overview

The sections below describe how Multicast+ processes Streaming Manager for Enterprise events.

Program Guide

The Program Guide lists entries for all video events that are currently available in your environment. Program Guide entries are sent from Multicast+ Senders, and Multicast+ Receivers listen for entry updates. When a Multicast+ Receiver has a request for an event that matches a Program Guide entry, the Receiver uses information from the entry to start receiving the video event.

The Program Guide is configured by creating enterprise DNS entries that specify the Program Guide's multicast group and port. Multicast+ Senders and Receivers search for the DNS entries to obtain the information necessary to start the communication flow with the Program Guide.

Multicast+ Sender

Once configured with the IBM Cloud Video Streaming Manager for Enterprise <channel ID>/<shared secret> for the stream source and started, the Multicast+ Sender does the following:

- Performs a DNS lookup for the Program Guide DNS entries:
    - If found, the Sender sends Program Guide entries when a video event is available.
    - If not found, the Sender continues to periodically perform DNS lookups.
- Selects the CDN from which to obtain the stream source. If the advanced and optional preferred CDN setting is used, the Sender selects the first CDN that matches the defined regular expression. Otherwise, the Sender selects the first CDN that is found.
- Selects the stream with the highest bitrate that does not exceed the optional maximum bitrate setting. If all streams exceed the limit, the Sender selects the stream with the lowest bitrate.
- Encapsulates the video event segments for processing by Multicast+ Receivers.

Multicast+ Receiver

The Multicast+ Receiver requires no additional configuration for Streaming Manager for Enterprise events. Once started, the Receiver does the following:

- Performs a DNS lookup for the Program Guide DNS entries:
    - If found, the Receiver listens for Program Guide entry updates.
    - If not found, the Receiver continues to periodically perform DNS lookups.
- When the video player tries to load a URI with the Multicast+ Receiver HTTP(S) localhost, the Receiver:

- o   Sees an HTTP(S) request that matches a URI pattern listed in a Program Guide entry.
        - o   Starts receiving on that multicast group using information from the Program Guide entry.
- Receives the encapsulated video event segments from the Sender.
- Processes and buffers the segments so they are available for the video player.

Configuration Summary

To use Multicast+ with Streaming Manager for Enterprise:

1. Create enterprise DNS entries for the Program Guide.
2. Configure the Multicast+ Sender, or use AltitudeCDN Altimeter, to set the properties used to support Streaming Manager for Enterprise.

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Creating Program Guide DNS Entries

Multicast+ Senders and Receivers scan for Program Guide DNS entries that define the multicast group and port used by the Program Guide:

- Once the DNS entries are found, Multicast+ Senders send video event updates to the Program Guide, which maintains a list of all video events available in your environment. Multicast+ Receivers listen for Program Guide entry updates, and use entry information to begin receiving an event.
- If the DNS entries are not found, the Program Guide is not used. However, Multicast+ Senders and Receivers continue to perform DNS lookups even if Streaming Manager for Enterprise is not used.

Note: Non-persistent Receivers, such as the Multicast+ Mac Receiver, scan for the Program Guide DNS entries whenever they are re-started.

To create the Program Guide DNS entries:

1. Within your enterprise DNS, create the following entries:

DNS Entry	Description
MulticastPlusProgramGuide	Defines the multicast group used by the Program Guide. The value must be a DNS A record, or CNAME that resolves to a DNS A record. For example: `239.123.123.123 MulticastPlusProgramGuide` Default value: None.
MulticastPlusProgramGuidePort	(Optional) Defines the multicast port used by the Program Guide. The value must be a DNS A record, or CNAME that resolves to a DNS A record, where the lower two octets are interpreted as a port number. For example: `10.10.48.57 MulticastPlusProgramGuidePort` Default value: *x.y*.48.57

Configuring the Multicast+ Sender

The Multicast+ Sender obtains the stream source, and encapsulates stream segments for multicast distribution to Multicast+ Receivers. The Sender is configured by defining a set of additional properties on each Sender used for Streaming Manager for Enterprise events.

To configure the Multicast+ Sender:

1. Do one of the following:
    - For stand-alone Multicast+ Senders, open the following file:
        o Windows:
        `C:\ProgramData\Ramp_Multicast\MultiCastBinaries\sender.properties`
        o Linux:
        `/install_dir/sender.properties`
    - For Altimeter Management Server version 1.3 or greater, from the Event tab, create or edit an Events to display the Event Details panel.
2. Add or edit the following properties:

    Note: For Altimeter Management Server, only the Content Server URL property is configurable. To set any of the optional properties listed below, contact your Customer Success Manager.

Item	Description

multicastUrl
 	
(Altimeter – Content Server URL)
	Identifies the URI for the stream source.
	
	The format used for the multicastUrl/Content Server URL property depends upon on the type of Multicast+ Receiver used with the video event:
	
	• Format for Windows/Java Receivers:
	`multicastUrl=ustream://<channelId>/<shared_secret>`
	
	• Format for Mac Receivers:
	`multicastUrl=ustreamhls://<channelId>/<shared_secret>`
	
	The <channelId> and <shared secret> are required by Multicast+ to access and process the source stream. See your IBM Cloud Video Streaming Manager for Enterprise documentation for information on obtaining this information.
	
	Note:
	
	• *You can only configure one Multicast+ Sender per <channelID> on any network segment.*
	
	• *If your video event uses both Windows/Java Receivers and Mac Receivers, you must:*
	  • *Configure one Sender or Altimeter Event for "ustream" with <channelId1>.*
	  • *Configure another Sender or Altimeter Event for "ustreamhls" with <channelId2>.*

ustream. allowedVideo Bandwidth	(Optional) The maximum bitrate for the video stream that is sent to the Multicast+ Receiver, in bits/sec. The highest allowable bitrate under the limit

	is selected, or if all bitrates exceed the limit, the lowest available bitrate is selected. This limit applies to the main video stream only. This setting falls back to hlsAlllowedVideoBandwidth, then allowedVideoBandwidth. Format: `ustream.allowedVideoBandwidth=`*`bitrate`* Default value: If undefined, the default value is positive infinity.
ustream.preferred CdnRegexp	(Optional/Advanced) A regular expression or string that filters CDN host names to specify a preferred CDN from which to obtain the source stream. This setting facilitates network management to work around CDNs that issue slow load warnings. The first CDN that matches the regular expression is selected, or if none match, the first CDN found is selected. Partial matches are permitted. Format: `ustream.preferredCdnRegexp=`*`regular_expression`* Default value: .*.
ustream.buffer NumSegments	(Optional/Advanced) The number of segments that are buffered by the Multicast+ Receiver to ensure smooth playback. The default of 0 segments should not need to be changed unless your network is experiencing uncorrectable slow load issues when the Sender obtains the source stream. Setting a higher value increases the startup latency for the Receiver, but yields more consistent streaming. Format: `ustream.bufferNumSegments=`*`n`* Default value: 0 segments.
programGuide. diagnosticsServer	The Diagnostics Server used by the Program Guide. ***Note:*** *For Altimeter version 1.3 or later, this is automatically set to use the Diagnostics Server within Altimeter.* Default value: use_sender:18000

Operational Notes

Once you have deployed the Multicast+ integration with IBM Cloud Video Streaming Manager for Enterprise, note the following:

- Multicast+ Mac Receivers are not persistent, and must be restarted to view a stream. As a result, their startup latency can be higher as these Receivers:
    - Scan for the Program Guide DNS entries.
    - Consult the Program Guide.
    - Wait for the segments to arrive from the Sender.
- The video player attempts to load a URI with the Receiver localshost:
    - HTTP – 127.0.0.1:12345 or ustream.multicast-receiver-altitudecdn.net:12345.
    - HTTPS – ustream.multicast-receiver-altitudecdn.net:12350.
- The Multicast+ integration with IBM Cloud Video Streaming Manager for Enterprise does not currently support HTTP proxy, but provides support for SOCKS proxy. For example:
    - (-DsocksProxyHost=${proxyHost} -DsocksProxyPort=${proxyPort})
- Multicast+ Senders always send video, audio, and closed-caption tracks. If a stream has no closed-caption track, messages similar to the following initially appear in the Sender log, but stop after a few attempts:
  ```
  2017-08-11 20:09:10,891 UTC [Ray Test Sender 1:TailPlaylist-CLOSED-CAPTIONS-
  vtt] INFO  HLSSender$TailPlaylist - No playlist send bec too short:
  http://UStreamRetrieverInternal/23360845/vtt.m3u8,
  numTsInPlaylist=0,startLine=0,limit=3,cutoff=3,lastSentMediaSeq=-1
  ```
- Diagnostics for Streaming Manager for Enterprise only show segment loads, rather than playlist loads, as Streaming Manager for Enterprise does not access a playlist.