Linear Ingest Guide

Using this Guide

Prime Video provides access to linear TV stations across more than 20 Marketplaces, delivering a range of high-quality news, sports and entertainment programming for Customers to choose from, both for free and as add on subscriptions to accompany their Prime benefit.

Our customers across Freevee and Prime Video, have access to FAST content unlocking vast selection to premium content and content suited to linear format like News and Sports. This benefits non-prime customers as well removing the payment wall.

This guide provides information that will help you get setup to deliver linear feeds into Prime Video; it covers our partner integration process and technical delivery requirements for live channel feeds[1]. Illustrative drawings can be found in the Appendix.

Thanks again for choosing to partner with Prime Video, we look forward to working with you!

Partner Integration

Prime Video has a standard process for integrating new partners delivering live video feeds to our service. This process is critical to establishing a high-quality product for Amazon customers. This process consists of four parts:

1. Completion of the Linear Ingest Information Form
2. Onboarding call to align on technical integration details and timelines
3. Establishing connectivity and acquiring the source feeds
4. Soak Testing of source feeds[2]

Linear Ingest Information Form

The first stage of this process is for the content partner to complete the Linear Ingest Information Form. This form is designed to capture key information about your live feeds, including the point of origin, video format, delivery protocols, and any security requirements. This form should be filled out and returned to the Prime Video Live Linear Integration Team for review prior to the onboarding call. This will allow your Technical Integration Manager /Solution Architect to determine whether or not any additional stakeholders will need to participate in the onboarding call(s).

[1] This guide only provides details on delivering linear content; Prime Video has a separate onboarding process for delivering VOD content which is covered in the Amazon Video Global Content Guide.

[2] Please refer to Appendix for the criteria to pass the soak testing and soak metrics analyzed from PV side before launch.

Onboarding Call

Once the Linear Ingest Information Form has been completed and reviewed, your primary point of contact for signal on-boarding will be assigned Technical Integration Manager or Solution Architect. Prime Video encourages content partners to be prepared with any questions they may have regarding the delivery of live feeds. In order to make the process more efficient, all relevant transport or delivery partners must have representation from their technical operations team present on the call.

Acquiring the Source Feeds

Prior to launching a new linear channel, Prime Video and the content owner must successfully complete an end-to-end test of the signal delivery path from the source's point of origin (playout facility or downlink location) into Prime Video, for encoding, packing and delivery to customers. This test must include all network infrastructure, signal processing, transport, hardware and software systems, as well as all first and third-party components required to deliver the content to Prime Video.

For brand new integrations (as opposed to incremental additions to existing services) Prime Video requires a 4-week stability soak test.

Delivery of Live Feeds to Amazon Video

Signal Flow Overview

Prime Video operates its cloud video processing services within AWS, in multiple global regions; choosing the most appropriate one to use based on proximity to both our Content Partners and Customers. PV has a 99.999[3]% uptime target for both our internal systems, and partners on whom Customers depend. To achieve these targets, we require partners to deliver multiple redundant low latency feeds of each station, which we process across multiple redundant services within different AWS Regions and Availability Zones. Without this high level of redundancy, we risk poor performance for Customers and a high operational burden for both PV and partner teams. Prime Video receives, processes and delivers all redundant feed and considers all to be active, as opposed to primary and backup.

Prime Video provides several options for partners to deliver their channel content feed (s) to our delivery endpoints.

Broadly, these options are:

1. Cloud sourced delivery from either a playout server, or another cloud-based video processing service
2. On-Premise sourced delivery from the content partner's playout location or 3rd party location via AWS Direct Connect or other agreed networking solution

Under either option PV prefers partners contribute video using the Zixi protocol which provides a high level of protection against network impairments. Once signal delivery is established, any changes to that workflow need to be communicated to the Prime Video Integration Manager or Solution Architect with at least 90 days advance notice; any change in delivery cost will be the responsibility of the content owner. PV can also receive SRT as an alternative protocol.

Drawings can be found in the Appendix.

Cloud Sourced Delivery

Prime Video works with a range of partners who operate 1st or 3rd party playout and video processing systems in the cloud. Contribution of linear services from these partners must use the Zixi protocol in order to ensure the feeds are delivered reliably, this can be achieved by either 1) the playout system supporting Zixi protocol 2) the partner supporting Zixi feeder or Zixi Broadcaster within their cloud infrastructure or 3) the partner using Elemental MediaConnect and sharing the signal with Prime Video using an "entitlement"[2].

Sources must come from redundant infrastructure hosted in different AWS Regions or Availability Zones.

[3] Equating to less than 26s unplanned downtime per station per month

On-Premise Sourced Delivery

Prime Video can receive signals directly from the partner playout facility or from several signal acquisition partners (Encompass Digital Media, Softbank, SES and Telstra); we have established Direct Connections into AWS from these partners' facilities. If your content originates its playout with one of these partners, it makes the most sense to acquire directly from that source playout location. If your content is available via satellite downlink, Prime Video will work with our acquisition partners to downlink the satellite service(s) and transport the feeds over established direct fiber connections into Prime Video. All hardware and/or receivers required to downlink content via satellite, especially if there is any encryption on the source feed(s), will need to be provided in advance to Prime Video by the channel partner. There should be redundant downlinks available.

Delivery via IP

Prime Video's preference is to directly connect with the playout or acquisition facility from which the signals are being contributed. If the signal is available in a public data center it may be possible to directly connect with the partner within the data center, or via the data center.

If it isn't possible to connect directly with the partner, under some circumstances Prime Video will support contribution of signals over the internet and/or via AWS site to site VPN. In order to support this, the partner must deliver the source feeds over at least two diverse internet connections. The partner must also support delivery via Zixi protocol in order to ensure that the signals are delivered reliably.

Video Specifications

Prime Video always prefers to receive the highest quality signal available from partners. The primary video codec we primarily support for ingestion of live feeds is H.264 wrapped in either an MPEG-2 Transport Stream, or MPEG-4 container. The below chart outlines specifications for delivery of live video streams to Prime Video. PV can also support H.265 for HD and UHD content. For HDR content, PV requires LUT files to confirm colour space which can be discussed and exchanged at the time of the Design phase.
If the video signal format you plan to provide is in a format other than the ones listed below, please discuss this with your Technical Integration Manager / Solution Architect so that we can determine feasibility of support.

HD Video and Embedded Audio	Video Codec	H.264 or H.265 (UHD/HD)	
	Container	MPEG-2 TS, MP4	
	Minimum Bit Rate[4]	80 Mbps (2160p) or 25 Mbps (1080p) or 15 Mbps (720p)	
	Display Aspect Ratio	16:9	
	Scan Type	Progressive	
	Color Space	Rec. 709	
	Chroma Subsampling	4:2:0, 4:2:2	
	Chroma Bit Depth	8-bit, 10-bit	
	Constant Frame Rate	23.976fps, 24fps, 25fps, 29.97fps, 30fps, 50fps, 60fps	
	Audio Codec	AC-3 or AAC or DD+	
	Minimum Audio Bit Rate	ST: 192kbps	
	Sample Rate	48kHz	ST: 320k
	Bit Depth	16bit, 24bit	

[4] Bit rates lower than this minimum will be subject to evaluation prior to launch.

Slating/Content Replacement

Please provide a rights cleared feed that only contains content that Prime Video has the rights to deliver. Prime Video will pass through all delivered content and cannot blank content on incoming sources.

Moving frames 30 seconds of static image will cause alarming. This would be standard for broadcasting. Our monitoring system will alarm with no audio at -60 dB of 5 min.

Latency

PV requires low latency feeds from the Channel Partner playout facilities or from Sporting venue to the handoff. Our recommendation for latency configuration is 500ms on Zixi or SRT protocols.

Audio Levelling Requirements

Adhering to specific loudness standards has become increasingly important. Depending on distributor, geography, content type and more, the loudness LUFS requirements can differ. Our recommendation is between -16 and -24 LUFS.

SCTE35/DAI/AD Insertion

Amazon Prime Video Supports ad insertion in Live Streams via SCTE-35 messages in MPEG-2 transport streams (TS) inputs or alternatively via SCTE-104 messages in SDI inputs.
Both, splice insert and time signal SCTE-35 messages are supported with following conditions

SCTE Message Type	Conditions
splice insert	Supported with or without duration
	Supported with or without presence of Segmentation_type_id
time signal	Supported with or without duration
	Segmentation_type_id is mandatory

We treat the following SCTE-35 messages as ad insertion opportunities.
See Appendix A for the full list of SCTE-35 segmentation types. See Appendix B for the full list of SCTE-35 message requirements.

SCTE Message Type	Segmentation_type_id	Segmentation Descriptor Type
splice insert	N/A	No segmentation descriptor present
splice insert	34 (0x22)	Break Start
splice insert	48 (0x30)	Provider Advertisement Start
splice insert	50 (0x32)	Distributor Advertisement Start
splice insert	52 (0x34)	Provider Placement Opportunity Start
splice insert	54 (0x36)	Distributor Placement Opportunity Start
splice insert	56 (0x38)	Provider Overlay Placement Opportunity Start
splice insert	58 (0x3A)	Distributor Overlay Placement Opportunity Start
time signal	34 (0x22)	Break Start
time signal	48 (0x30)	Provider Advertisement Start
time signal	50 (0x32)	Distributor Advertisement Start

time signal	52 (0x34)	Provider Placement Opportunity Start
time signal	54 (0x36)	Distributor Placement Opportunity Start

Signals that include an avail termination must contain a matching *segmentation_event_id* or *splice_event_id* and with a matching avail END type (eg. Break Starts must be terminated with a Break END).

We convert SCTE-104 messages (via SDI inputs) to SCTE-35 automatically. The following table specifics the supported source types for each message type.

Message Type	Supported Input Type
SCTE-35	Transport Stream (UDP, RTP, SRT or SMPTE 2022-7)
	MediaConnect
	AWS CDI
SCTE-104	SDI (Quadrant or 4k interleave)
	SMPTE 2110-04 (UDP or RTP)
	Elemental Link

If the input source is Transport Stream and contains SCTE-35 messages in multiple Packet Identifiers (i.e. PIDs), we support the ability to select the desired SCTE-35 PID. This requires that the input contains the desired PID at the start of the event, if it does not, we will continue without reading any SCTE-35 data from the input. Note, if the PID selection is left undefined, we will select the first SCTE-35 PID found in the input.

FAQ

1. How can we ensure the security of cloud-to-cloud contribution?
   PV considers contribution using the Zixi protocol the most secure option since it requires delivery to a specific, named entry point and supports symmetric 256bit encryption of the contributed feed. Additionally, AWS supports VPC (Virtual Private Cloud) peering either directly or through attaching the VPC to Transit Gateway to ensure that traffic sent between services within AWS doesn't leave the AWS network. If the sources are not in AWS then Zixi can be used as the transport protocol to deliver signals between cloud providers, but this would likely result in signals being delivered over the internet and so PV would require them to be encrypted.

2. Does PV support other video delivery protocols e.g. RTP or RTMP?
   PV supports RTP-FEC only on managed networks however we have seen reliability issues with these protocols over both the internet and private networking. We don't support HLS or RTMP contribution feed.
   Although PV prefers Zixi,SRT can also be considered. The preferred solution will need to be discussed with the Technical Integration Manager / Solution Architect.

3. What if I have my own Direct Connect?
   We can connect to partners who already have Direct Connect, either by using Transit Gateway with Transit VIF or Direct Connect Gateway. The preferred solution will need to be discussed with the Technical Integration Manager / Solution Architect.

4. What if I'm unable to use Direct Connect?
   If a partner is not able to use direct connect or provide the signals via a 3rd party, then PV can consider supporting direct delivery over the Internet. In this scenario PV prefers to make use of AWS site to site VPN, which coupled with AWS Global Accelerator, provides an internet facing AWS entry point as close to the partners site as possible in order to reduce the duration which the signals traverse the internet.
   If a partner is delivering signals via the internet (including when using VPN), signals must egress the partner site over diverse, redundant internet connections and use Zixi protocol to provide resilience.

5. Which partners support playout solutions?
   PV has experience with partners using playout solutions provided by SES, Softbank (TV Bank), Amagi, Xumo, Wurl and Frequency.

6. Does PV support audience measurement technologies
   PV systems pass through audio water-marking technologies from Kantar without altering them. We also have an integration with Nielsen in the US.

7. Does PV support DAI (Dynamic Ad Insertion)
   PV does support dynamic ad insertion; please refer to SCTE35/DAI/AD Insertion in this document. The preferred solution will need to be discussed with Technical Integration Manager / Solution Architect.

8. What if I can't provide a redundant source
   PV will NOT launch stations which don't have source redundancy

9. Does PV support custom ISO codes in audio tracks?
   PV currently can support limited custom ISO codes. Please reach out to Technical Integration Manager / Solution Architect for further details.

Appendix

VPN to Transit Gateway Requirements

- Partner Gateway IP: this is the public IP address associated with the partner gateway to establish the VPN connection to AWS. It requires a fixed IP address from the partner. We prefer the range: Partner GW IP: 169.254.<VLANID>.253/30, Amazon IP: 169.254.<VLANID>.254/30.
- Partner BGP ASN: this is the partner's BGP ASN associated with the partner gateway to establish the AWS's VPN connection.
- Amazon BGP ASN: Amazon to provide
- IPSec Tunnel Options: verify if the partner agrees in using the default IPSec tunnel options. Check the table on the AWS documentation for the default values.

Direct Connect Requirements

- General requirement in integrating with a DX: BGP and 802.1Q VLAN tags
  - BGP is used to advertise routes in both directions. 802.1Q is used to identify both public and private VIF's on the Direct Connect.
- Your router BGP ASN: this is the Private BGN ASN of the router interfacing the feeds
- BGP Peering IP Network: The Amazon approved CIDR range is 169.254.<vlanID>.254/30 network to establish the BGP peering. Do you agree with this range? If not, please let us know which range you would prefer so we can verify on our side
- VPC CIDR: we will allocate two /23 CIDR ranges on AWS for the service in the 172.X.X.X range. These two ranges must be routable from your internal network.
- For further information about AWS Direct Connects, please refer to AWS network requirements

Soak Metrics for soak testing Pass/Fail Criteria.

Tech Attribute	Amazon Recommendation (Mandatory)	Comments
Packet Loss Percentage	Overall packet loss must maintain average less than 0.01% over 30 days.	Transient peak values are acceptable, but averages must be sustained.
Connection Loss	Connected state must remain active for 30 days uninterrupted	

Disconnections	No more than 2 disconnections on a single feed in a 30-day period.	Connected status and disconnections are not always inverse values. Graphed independently to ensure stability.
4x way disconnections	Zero disconnections across all origins simultaneously.	
PCR Errors	PCR errors must not be regular, frequent or cyclical. Transient occasional PCR errors will be evaluated in the context of overall stability during the soak test.	
PTS Errors	PTR errors must not be regular, frequent or cyclical. Transient occasional PTR errors will be evaluated in the context of overall stability during the soak test.	
Transport Errors	Transport errors must not be regular, frequent or cyclical. Transient occasional errors will be evaluated in the context of overall stability during the soak test.	
Source Bit Rate Deviation	Source Bit Rate must match the partner stated bit rate. All origin must have identical bit rate over 30-day period.	Transient peak values are acceptable, but averages must be sustained.

Regarding Partner Support/Escalation Details.

Partners should provide PV with their primary 24/7 operations contacts (Slack, phone number, e-mail – with preference for Slack) to use when PV has issues to escalate to the partner with <5 minute response time SLA.

Partners should provide secondary escalation contacts for when primary ops contact isn't responsive within SLA.

For any planned maintenance notifications on any of the channels, please notify below email ID.

pv-live-maint-notifications@amazon.com

For any planned maintenance activities, we require changes are made one leg at a time and ensure there is 75 mins of healing window between the changes on both the legs. This avoids a 100% outage.

For any issues/outages notifications and troubleshooting required, please include following PV side operations team email IDs.

live-ops-linear@amazon.com

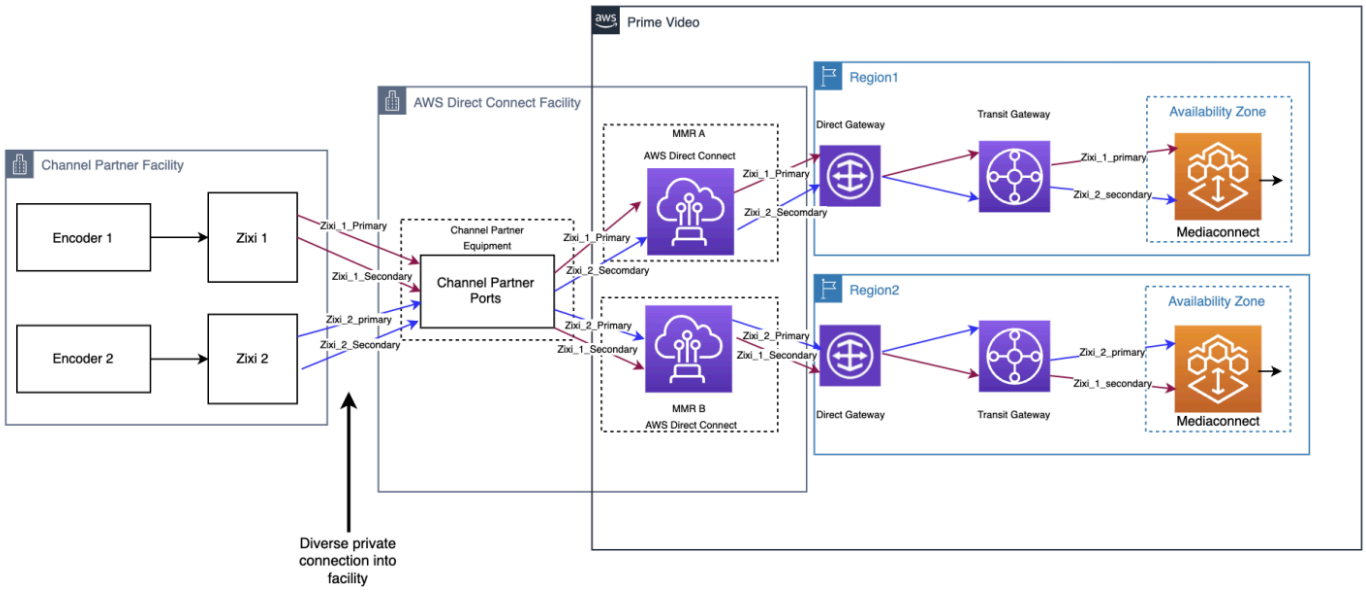
dv-live-ops-primary@amazon.com

dv-live-sys@amazon.com

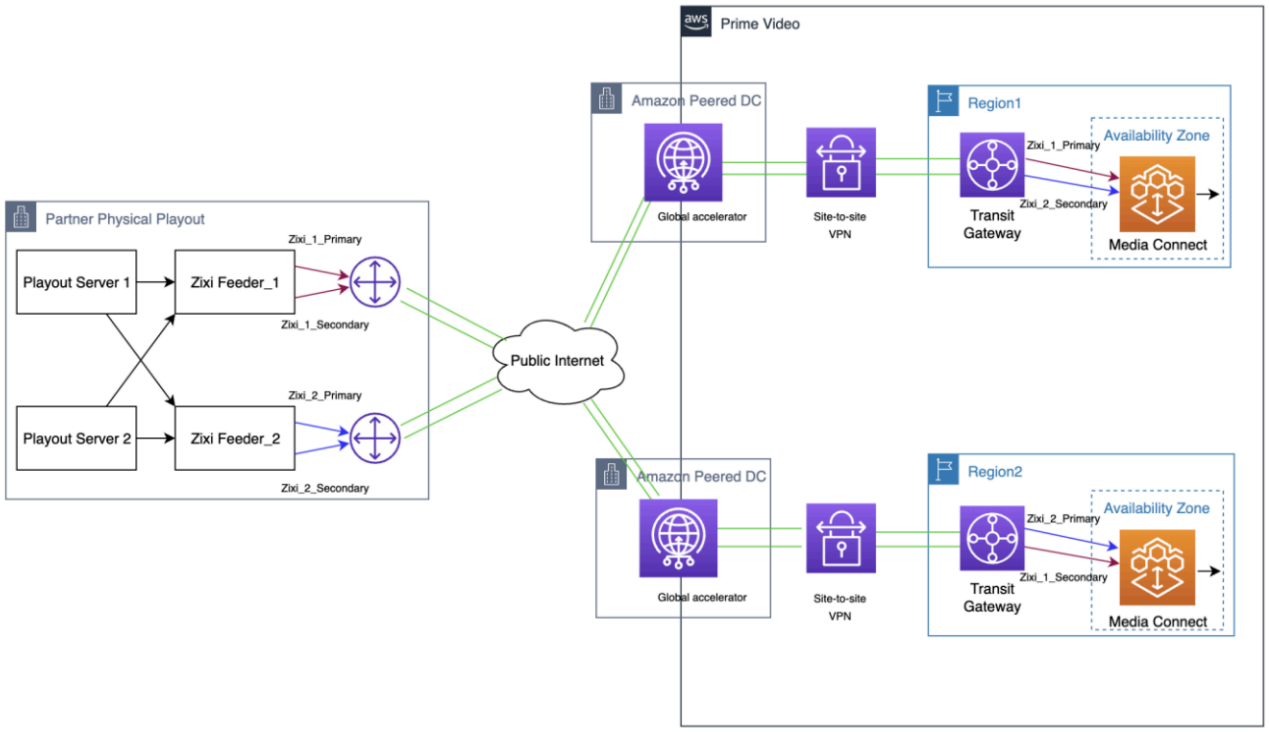
For escalations, partner should include:

dv-live-playback-lpi@amazon.com

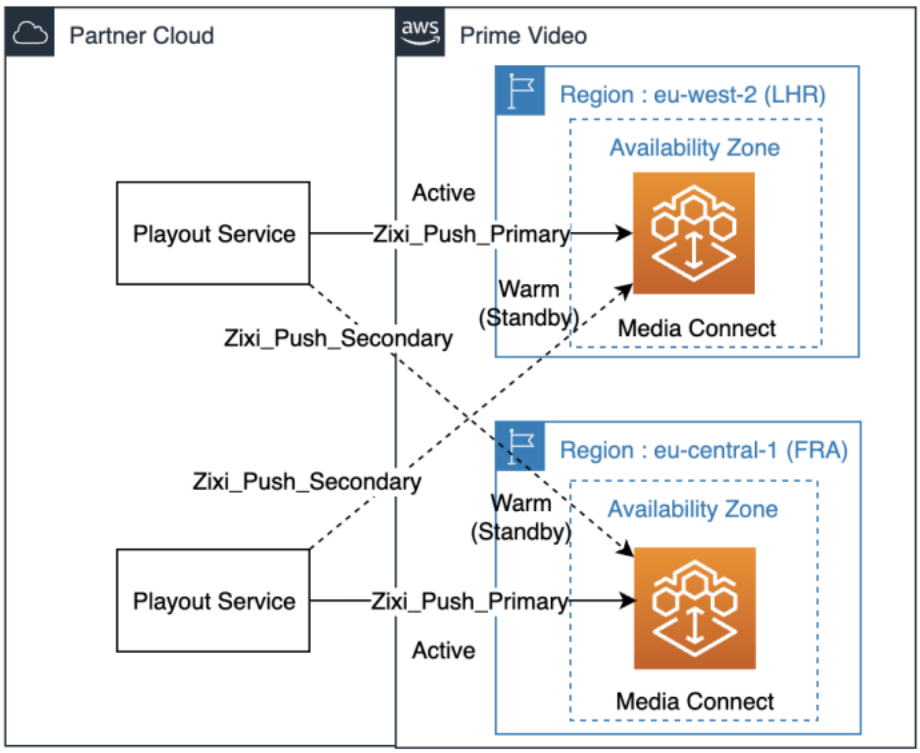
Direct Connect from Partner Facility



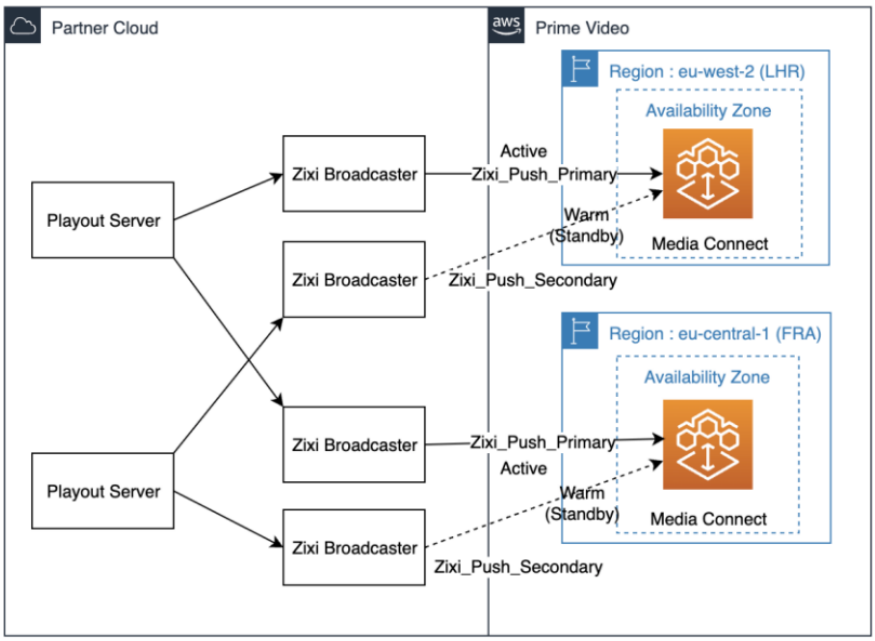
VPN over Internet from Partner Facility



Cloud Playout to Cloud: Playout Zixi Support



Cloud Playout to Cloud: Zixi Broadcaster Support



Appendix A

Appendix A – Different Types of SCTE-35 Messages

Segmentation_type_id	Segmentation Descriptor Type
00 (0x00)	Not Indicated
01 (0x01)	Content Identification
16 (0x10)	Program Start
17 (0x11)	Program End
18 (0x12)	Program Early Termination
19 (0x13)	Program Breakaway
20 (0x14)	Program Resumption
21 (0x15)	Program Runover Planned
22 (0x16)	Program Runover Unplanned
23 (0x17)	Program Overlap Start
24 (0x18)	Program Blackout Override
25 (0x19)	Program Start In Progress
32 (0x20)	Chapter Start
33 (0x21)	Chapter End
34 (0x22)	Break Start
35 (0x23)	Break End
36 (0x24)	Opening Credit Start
37 (0x25)	Opening Credit End
38 (0x26)	Closing Credit Start
39 (0x27)	Closing Credit End
48 (0x30)	Provider Advertisement Start
49 (0x31)	Provider Advertisement End
50 (0x32)	Distributor Advertisement Start
51 (0x33)	Distributor Advertisement End
52 (0x34)	Provider Placement Opportunity Start

53 (0x35)	Provider Placement Opportunity End
54 (0x36)	Distributor Placement Opportunity Start
55 (0x37)	Distributor Placement Opportunity End
56 (0x38)	Provider Overlay Placement Opportunity Start
57 (0x39)	Provider Overlay Placement Opportunity End
58 (0x3A)	Distributor Overlay Placement Opportunity Start
59 (0x3B)	Distributor Overlay Placement Opportunity End
64 (0x40)	Unscheduled Event Start
65 (0x41)	Unscheduled Event End
80 (0x50)	Network Start
81 (0x51)	Network End

Appendix B

SCTE-35 Message Requirements

When SCTE-35 messages (either splice_insert or timesignal) arrive with splice_descriptors, we require the splice_descriptors to comply to the following:

1. Among all the types of descriptors allowed by the SCTE-35 specification, we only support segmentation_descriptor, as defined by splice_descriptor_tag: 2

2. We only support one segmentation_descriptor in the SCTE-35 message even though the specification allows for multiple segmentation_descriptor in one SCTE-35 message (splice_insert or timesignal).

3. The splice_event_id and the segmentation_event_id of the SCTE-35 message that signals the start of an ad break (e.g. Provider Placement Opportunity Start) must match that of the message that signals the end of the ad break (e.g. Provider Placement Opportunity End).

4. We do not support multiple SCTE-35 messages with the same splice_time, e.g. Provider Placement Opportunity Start and Break Start cannot both have the same splice_time.

5. As a best practice, we recommend to not reuse the value of splice_event_id for new ad breaks. Instead, increment the value for each new ad break.

6. As a best practice, we recommend to not send SCTE-35 message with pts_time in the past.

There are some additional requirements for SCTE-35 messages that come with a duration value, i.e., when duration_flag is set to True.

1. If the SCTE-35 message is sent with a specific duration, such as 120 seconds, the segmentation_descriptor must have the segmentation_duration_flag set to True and it must contain the duration value of the ad break in the segmentation_duration field. This duration value must match the value from the duration field in the splice_command. See an example here Appendix B - Provider Placement Opportunity Start

2. If a SCTE-35 message is sent with out_of_network_indicator: true, and duration_flag: true, then do not send a SCTE-35 message to end the ad break with out_of_network_indicator: false. We ignore auto_return setting and will automatically close the ad break when the duration expires. Only send a SCTE-35 message to end the ad break if the ad break needs to be cut shorter than the original duration.

There are some additional requirements for SCTE-35 messages that do not have a duration value, i.e., when duration_flag is set to False.

1. If a SCTE-35 message is sent with duration_flag: false, we treat that as an open ad break. We expect a subsequent message to close the ad break with out_of_network_indicator: false. If we do not receive a message to close the ad break, we will insert 5 min of ads before returning back to programming. Do not have a duration value or has a duration set to 0. We expect a subsequent message to close the ad break with out_of_network_indicator: false, a matching segmentation_event_id to the avail START message, and an explicit END message type.