Linear Ingest Guide

Using this Guide

Prime Video provides access to live TV stations across more than 10 countries, 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.

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. 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 three 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

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 to determine whether or not any additional stakeholders will need to participate in the onboarding call(s).

Onboarding Call

Once the Linear Ingest Information Form has been completed and reviewed, your Prime Video Technical Integration Manager will schedule an onboarding call with your team. 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.

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.
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\% uptime target for both our internal systems, and partners on whom Customers depend. To achieve these targets we require partners to deliver multiple redundant 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 feeds 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

   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 Technical Integration Manager with at least 90 days advance notice; any change in delivery cost will be the responsibility of the content owner.

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* where possible.

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

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.

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2 Equating to less than 26s unplanned downtime per station per month
3 Requiring both source and destination Elemental MediaConnects to be in the same Region

Amazon.com Confidential
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 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. 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 so that we can determine feasibility of support.

<table>
<thead>
<tr>
<th>Video Codec</th>
<th>H.264 (HD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container</td>
<td>MPEG-2 TS, MP4</td>
</tr>
<tr>
<td>Minimum Bit Rate</td>
<td>25 Mbps (1080p) or 15 Mbps (720p)</td>
</tr>
<tr>
<td>Display Aspect Ratio</td>
<td>16:9</td>
</tr>
<tr>
<td>Scan Type</td>
<td>Progressive</td>
</tr>
<tr>
<td>Color Space</td>
<td>Rec. 709</td>
</tr>
<tr>
<td>Chroma Subsampling</td>
<td>4:2:0, 4:2:2</td>
</tr>
<tr>
<td>Chroma Bit Depth</td>
<td>8-bit, 10-bit</td>
</tr>
<tr>
<td>Constant Frame Rate</td>
<td>23.976fps, 24fps, 25fps, 29.97fps, 30fps, 50fps, 60fps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Audio Codec</th>
<th>AC-3 or AAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Audio Bit Rate</td>
<td>ST: 192kbps</td>
</tr>
<tr>
<td>Sample Rate</td>
<td>48kHz</td>
</tr>
<tr>
<td>Bit Depth</td>
<td>ST: 320k</td>
</tr>
<tr>
<td>Bit Depth</td>
<td>16bit, 24bit</td>
</tr>
</tbody>
</table>

HD Video and Embedded Audio

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.

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 entrypoint and supports symmetric 256bit encryption of the contributed feed. Additionally PV can support HLS, over HTTPS using TLV 1.3. 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 will require them to be encrypted.
2. Does PV support other video delivery protocols e.g. RTP or RTMP?
PV supports RTP and RTP-FEC however we have seen reliability issues with these protocols over both the Internet and private networking. We support HLS contribution from cloud sources though this is not preferred. We are currently assessing support of SRT so this is subject to change.

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.

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 entrypoint as close to the partners site as possible in order to reduce the duration which the signals traverse the internet.

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

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; this will require further discussion with the Technical Integration Manager.

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.XXX range. These two ranges must be routable from your internal network.
- For further information about AWS Direct Connects, please refer to AWS network requirements.
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

Cloud Playout to Cloud: EMX Entitlement