Video Delivery
MMD Live Streaming Guide

2021-09

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Audience and Overview

This guide is intended for Edgio Networks Video Delivery customers who want to stream live media to desktop, mobile, and set-top boxes simultaneously using Video Delivery Multi-device Media Delivery Live (MMD Live). Video Delivery's multi-device support enables you to input a live stream, configure your video slots using the Control portal, and receive a URL or video player for delivery worldwide to desktop and mobile devices.

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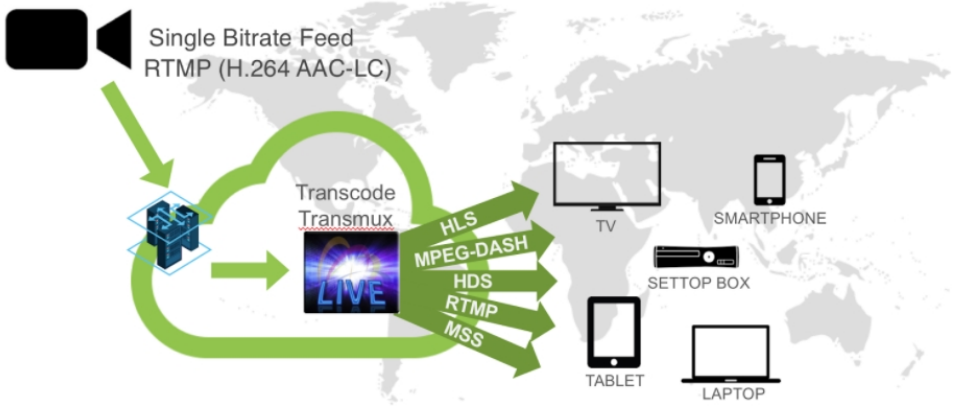
Delivering MMD Live

Limelight delivers MMD Live with transcoding and transmuxing.

- Transcoding converts a single input stream into multiple bitrates and formats.
- Transmuxing converts a stream into different formats only.

Transcode

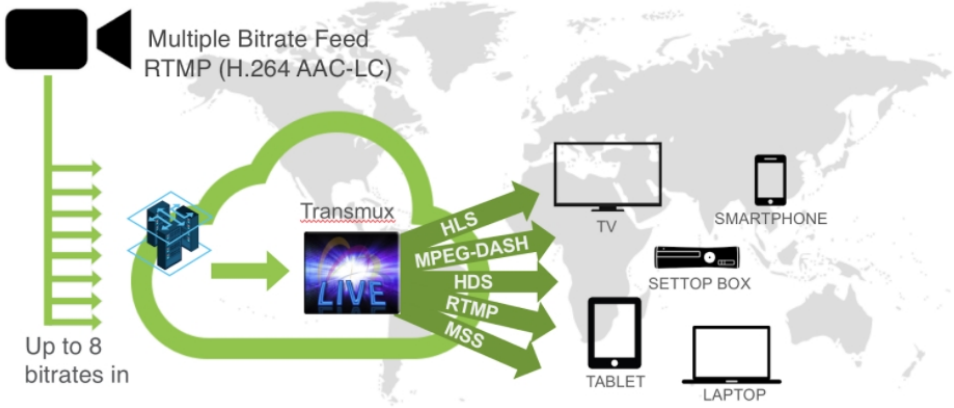
The following diagram gives an overview of the process of delivering multi-device media via transcode slots. Transcode slots allow you to send MMD Live a single high bitrate RTMP input, which will be transcoded to multiple bitrates and then transmuxed to the output formats.



You send a single bitrate RTMP stream to the Limelight ingest server. Limelight streaming servers located in all of your target regions deliver live playback to support desktop, set-top, and mobile devices across a range of connection speeds. The Limelight Video Player automatically selects the best bitrate for the device. If you use your video player, the playback URLs provided to you also allow you to access multiple bitrates.

Transmux

The following diagram gives an overview of the process of delivering multi-device media via transmux.



You can input up to eight bitrates per live stream. Your encoder sends these bitrates into the Limelight ingest server, and MMD Live transmuxes the bitrates into multiple playback formats.

MMD Outputs

- HLS
- HDS
- MPEG-DASH
- MSS
- RTMP

Customizable Latency

Your video latency from ingest to the edge is customizable. The allowable configuration range is from three to 60 seconds, with a default of 30 seconds. If you want to customize your latency, please contact your Account Manager.

Slot Configuration

MMD Live is allocated by “slot.” A slot is a reserved capacity for you to ingest your live stream into. Slots are of type SD, HD, FHD, or transmux. See Inputs and Output for more detail.

The *MMD Live* section of Control (referred to as the "Configuration UI" in this document) allows you to configure slots for transcoding and transmuxing. Available customer configurations include:

- bitrates
- bitrate ordering (if that option is available)
- frame size/resolution (transcode only)
- slot names and descriptions to help define metadata
- MediaVault and DRM protection

Configuration details are covered in Configuration UI.

DRM Protection

Edgio's DRM capabilities use a sophisticated system of IDs and keys to provide Digital Rights Management (DRM) protection to live streams. DRM is configured on a per-slot basis.

For configuration instructions, see Configuration UI.

For more information about DRM, contact your Edgio Customer Representative.

Live Stream Encoders

A client-based live stream encoder must capture live footage and stream to the ingest servers of MMD Live. All encoders must be able to support H.264 CODEC and AAC Audio CODEC.

MediaVault also allows the configuration of RTMP output protection at the account level.

If you want to protect your RTMP output, please contact your Account Manager.

Live to VoD

Limelight MMD Live includes a capability that allows an event that is being streamed live to be automatically recorded to Limelight Origin Storage for later playback as a Video on Demand (VoD) asset. Customers can configure the recording of single live events, recurring live events, or continuous streaming for later VoD playback.

Details about the service and its configuration are in Live to VOD.

Multi-device Media Delivery - The Basic Steps

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Overview

Use this section to help plan your implementation of MMD Live. These steps give you an overview with additional details provided in the following sections.

Implementation

To implement MMD Live:

1. Determine your live video needs: broadcast time, regions, playback devices, and so on.
2. Contact your Edgio representative to order slots and receive your login credentials.
3. Log into the Edgio Control portal. Choose Configure on the left navigation bar. From that expansion, choose **Live Streaming**.
4. Follow the steps to configure your **Live Streaming** slots according to the instructions in Configuration UI. You can only configure the number and type of slots you have already purchased.
5. Once configured, you'll receive primary, and backup ingest URLs, playback URLs, and other information.
6. Set up your live stream RTMP encoder.
7. Begin recording live media and start your encoder.
8. View your live stream on the playback URLs.

Inputs and Outputs

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Overview

MMD Live receives incoming live streams from your encoder and either transcodes or transmuxes them into up to five video formats and one audio-only stream. (Please note that audio-only is produced exclusively for HLS). Once you complete your slot setup, you receive playback URLs for different formats. MMD Live supports HTTP, HLS, HDS, MSS, MPEG-DASH, and RTMP. You can place these playback URLs in your endpoints, and MMD Live live streams and provides Adaptive Bitrate Streaming (ABS) with the following resolutions and bitrates, depending on the output format and whether your slot is a transcode or a transmux slot.

> **Note:** MPEG-DASH playback on the DASH.js player is not supported.

Transmux Slots

A transmux slot allows you to input up to 8 bitrates per live stream and receive five formats out at those same bitrates. The maximum throughput of all 8 bitrates combined must not exceed 16 Mbps. Your encoder sends these bitrates into your slot, and MMD Live transmuxes them into multiple playback formats. The output bitrates are the same as your input bitrates for each playback format. Your endpoints can use the ABS feature of MMD Live to switch among the bitrates to optimize the user experience for HLS, HDS, MPEG-DASH, and MSS. You can set up your bitrates through the Control portal.

> **Note:** MPEG-DASH outputs will include configured bitrates in the master manifest only if they are available from the encoder. If the encoder is not publishing a particular bitrate, that bitrate will not appear in the MPEG-DASH manifest.

Flexible Aspect Ratio

MMD Live Transmux slots can take whatever aspect ratio you provide as input and produce as output HLS, DASH (and other formats) with that same aspect ratio.

For example, if you want to have a 4:3 ratio video like 320x180 (landscape) with a 268 Kbps video bitrate video along with a 64 Kbps audio bitrate, just set up a Transmux slot with those video and audio bitrates. Send the signal in the 320x180 resolution from your encoder to the MMD Live Transmux slot.

MMD Live Transmux slots also support vertically oriented aspect ratio video in addition to landscape or letterbox.Using the same video and audio bitrates example, if you encode your video to 180x320, then the MMD Live Transmux slots will produce the same resolution aspect ratio and bitrates in HLS DASH and other formats. The 180x320 resolution is just an example; any aspect ratio you input into a Transmux slot will be output in HLS, DASH (and other formats).

Note: Transcode slots are fixed in aspect ratio to 16:9. If you feed in a 4:3 signal or any other aspect ratio than 16:9 into a Transcode slot, the output will appear with a black filling where the input image ends.

Transcode Slots

A transcode slot allows you to input a single RTMP stream and receive five formats at multiple bitrates out. MMD Live accepts 576p (SD), 720p (HD), and 1080p (FHD) input streams and transcodes them into the output streams listed below.

Note: For Transcode slots, the audio-only stream is exclusively available for HLS output.

You can set up your slots through the Control portal.

SD Slots

576p (SD) Slot Input Requirements: 1024x576_1800 kbps video, 128 kbps audio, 30 fps

Outputs:

Video Stream	Audio Stream	Stream Name
1024x576_1800 kbps	LLNW 1 AAC-LC 128 kbps	`$sourceStreamName_1800`
848x480_1000 kbps	LLNW 1 AAC-LC 128 kbps	`$sourceStreamName_1000`
640x360_668 kbps	LLNW 1 AAC-LC 64 kbps	`$sourceStreamName_668`
320x180_268 kbps	LLNW 1 AAC-LC 64 kbps	`$sourceStreamName_268`
320x180_110 kbps	LLNW 1 AAC-LC 64 kbps	`$sourceStreamName_110`
None (audio only)	LLNW 1 AAC-LC 64 kbps	`$sourceStreamName_a`

HD Slots

720p (HD) Slot Input Requirements: 1280x720_2400 kbps video, 192 kbps audio, 30 fps

Outputs:

Video Stream	Audio Stream	Stream Name
1280x720_2400 kbps	LLNW 1 AAC-LC 192 kbps	`$sourceStreamName_2400`
1024x576_1800 kbps	LLNW 1 AAC-LC 128 kbps	`$sourceStreamName_1800`
848x480_1000 kbps	LLNW 1 AAC-LC 128 kbps	`$sourceStreamName_1000`
640x360_668 kbps	LLNW 1 AAC-LC 64 kbps	`$sourceStreamName_668`
320x180_268 kbps	LLNW 1 AAC-LC 64 kbps	`$sourceStreamName_268`
None (audio only)	LLNW 1 AAC-LC 64 kbps	`$sourceStreamName_a`

FHD Slots

1080p (FHD) Slot Input Requirements: 1920x1080_4000 kbps video, 192 kbps audio, 30 fps

Outputs:

Video Stream	Audio Stream	Stream Name
1920x1080_4000 kbps	LLNW 1 AAC-LC 192 kbps	`$sourceStreamName_4000`
1280x720_2400 kbps	LLNW 1 AAC-LC 192 kbps	`$sourceStreamName_2400`
1024x576_1800 kbps	LLNW 1 AAC-LC 128 kbps	`$sourceStreamName_1800`
848x480_1000 kbps	LLNW 1 AAC-LC 128 kbps	`$sourceStreamName_1000`
640x360_668 kbps	LLNW 1 AAC-LC 64 kbps	`$sourceStreamName_668`
None (audio only)	LLNW 1 AAC-LC 64 kbps	`$sourceStreamName_a`

RTMP Out

If you want to have RTMP out for your MMD Live slot, please contact your Limelight Account Manager for more information.

CORS Support

CORS (Cross-Origin Resource Sharing) is default enabled for all MMD Live output URLs.

The header `Access-Control-Allow-Origin: *` is included in playback response headers.

Closed Captions

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Overview

MMD Live supports closed captions on some streamed outputs. If you embed closed captions in your stream, viewers can see these captions in their RTMP, HLS, and HDS outputs. Closed caption support is not available in MPEG-DASH or MSS.

If desired, you can enable or disable subtitles for HLS output on a per-slot basis. Please see Configuration UI for more information.

Closed Captions Formats

The input is required to be in CEA 608 format, and the outputs are:

Output	Closed Caption Format
HDS	`OnTextData`
HLS	`WebVTT`
RTMP	`OnTextData`

For instructions on using captions, see the Closed Captioning Guide.

Configuration UI

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Overview

You can access the Control portal to view and configure the slots you have purchased. You can view, create, copy, and more.

Main Configuration Page

After logging into the Control portal, click the "Configure" menu on the left navigation, then click "Live Streaming."

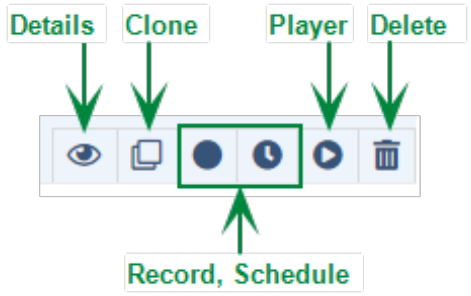
The live slots configured for your specific shortname are listed. You can view summary information for the type of slots you have purchased at the top of this page. For the transcode and transmux slots, the display shows how many you have configured (used) and how many of each type you still have left to configure (available). If 0 slots are available, you cannot create any more of that specific slot type.

Buttons and Icons

+ new button: At the top right of the screen, allows you to configure one of your purchased live slots.

Icons are on the right side of each slot row. Icons for non-Live Push slots and Live Push slots are different.

Non-Live Push Slots



- **Details**: This lets you view a specific live slot in detail. See View Slot Details. (You can also view slot details by clicking in the slot's row.)
- **Clone**: Makes a copy of an existing live slot configuration. See Clone a Slot.

- **Record** and **Schedule**: Specific to Live to VoD functionality.
- **Player**: This allows you to view the live stream. See Viewing a Slot's Live Stream.
- **Delete**: This allows you to delete a live slot configuration. See Delete a Slot.

Live Push Slots

Live Push slots do not allow recording and scheduling. They also allow users to edit a slot.

- **Edit**: Edit the Live Push configuration. See Edit a Slot.
- **Player**: View the live stream. The embedded player is disabled for the Live Push feature.
- **Details**, **Clone**, **Delete**: See descriptions in Non-Live Push Slots.

List Information

Each entry in the list has the following information:

- **name**: The name given to the slot when creating it.
- **date created**: The date the slot was created.
- **type**: The type of slot.
- **region**: The geographic region into which the slot ingests.
- **ID**: The specific ID number given to your slot for tracking and routing purposes.

The status of the slot is shown to the left of the icons. Possible statuses are:

- "Published" means your slot has been properly configured and is ready to use.
- "LiveEventProvisioning" means the slot configuration is in the process of being set up. It can take several minutes for all the configurations to be enabled.
- "Not_Provisioned" or "Error" means the configuration has not been set up on the ingest. Please contact Customer Support.

Click on a specific slot (or click the **Details** icon) to view slot details.

Filtering and Sorting the List of Slots

Filtering and sorting controls appear above the list of slots:

The **Show only** drop-down menu is disabled by default.

Filtering

To filter the list, click the **Filter by** drop-down menu and select a value to filter by:

- Region
- Type

When you select a value, the **Show only** drop-down menu becomes enabled and contains a list of options relevant to the value in the **Filter by** drop-down menu.

'Filter by' Value	Options in 'Show only'
Region (the region the slot ingests into)	• **All**: show all regions; the default value • **North-America**: show North America regions only. • **Asia-Pacific**: show Asia Pacific regions only. • **Europe**: show European regions only. **Note:** The regions shown in the drop-down menu are limited to those regions where slots are set up.
Type (the type of slot)	• **All**: show all slot types, default • Other options (click to limit the list to that type): ◦ **Realtime Streaming** ◦ **Transcode 720p** ◦ **Transcode 576p** ◦ **Transcode 1080p** ◦ **Transmux** **Note:** The entries shown in the drop-down menu will be those types with slots that are set up.

Sorting

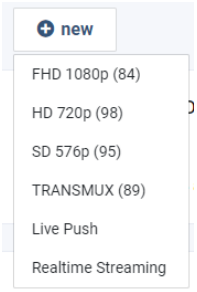
Select a value in the **Sort by** drop-down menu:

- Date created
- Name
- Region
- Type

Configuring a Slot

Configuring a slot is a simple process.

1. Begin by clicking the **new** button at the top of the page and selecting a slot type:



> **Note:** According to your account, the number in parentheses beside the transcode and transmux slots indicates the number of remaining slots you can create of each type.

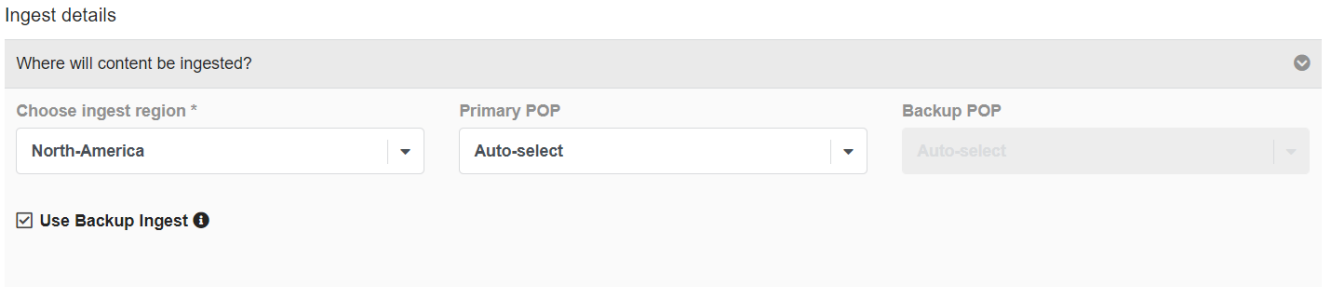
2. Then, fill out fields in the following sections on the page that appears:
   Identifying information
   Ingest details
   Configuration Details
   Encoding details
   Content security
3. Review your configuration, making any corrections.
4. When finished, click the **Submit** button.

Name & description

Field Name	Description	Notes
Name	Identifies your slot.	A unique slot name is required; no two slots may have the same name. The slot name can have a maximum of 63 characters. A name can only contain letters, numbers, and hyphens (-). It cannot start or end with a hyphen. Spaces are not allowed.
Keywords, comma-separated	Optional keywords to tag your slot.	• Maximum of 128 characters each. To

Field Name	Description	Notes
	(A search feature may be added in the future.)	enter a tag, type the value, then press the Enter key. The following characters are not allowed: ◦ period ('.') ◦ apostrophe (''') ◦ slash ('/') ◦ backward slash ('\') ◦ left bracket ('[') ◦ right bracket (']')
Description	An optional free-form field to describe your slot.	Maximum of 1024 characters.

Ingest details



Field Name	Description	Notes
Choose ingest region	The region in which you want to ingest into your slot.	Select a region where your encoder is located or the region closest to the physical location of your encoder.
Primary POP, Backup POP	Once you select a region, the available PoPs are listed in these drop-downs.	Select the primary that is closest to the physical location of your encoder to minimize data transmission time. Your backup selection must be different from your primary to provide redundancy for your live stream if there is a problem streaming to the primary. **Note:** The Backup POP field is only displayed if you check the 'Use Backup Ingest' checkbox.

Encoding details

[Transcode Slots]

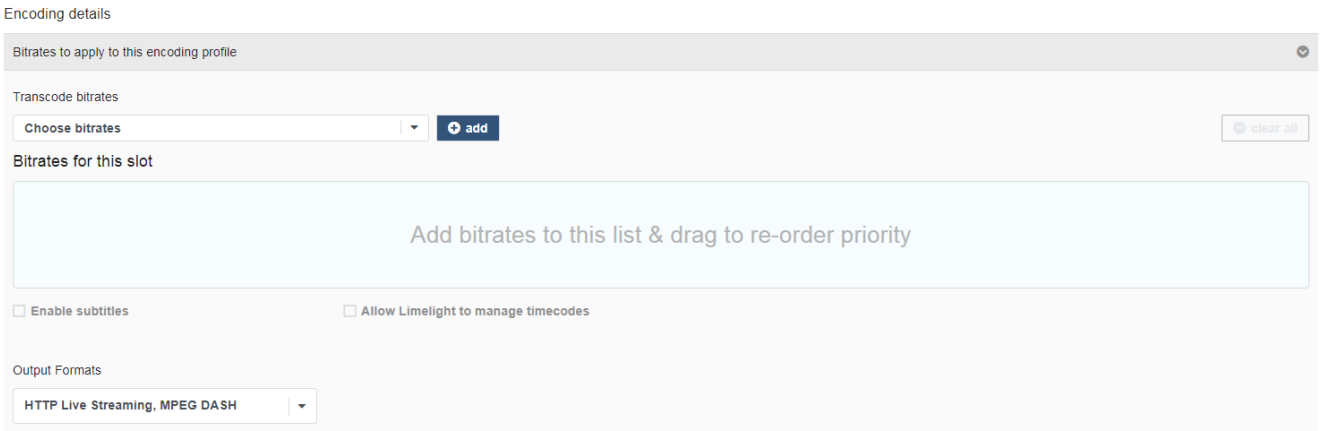
[Transmux Slots]

[Subtitles and Timecodes]

Note: The Encoding Details section is not available for Live Push streams.

Note: For Realtime Streaming Encoding Details, please see Creating a New Slot Configuration in the Realtime Streaming Guide.

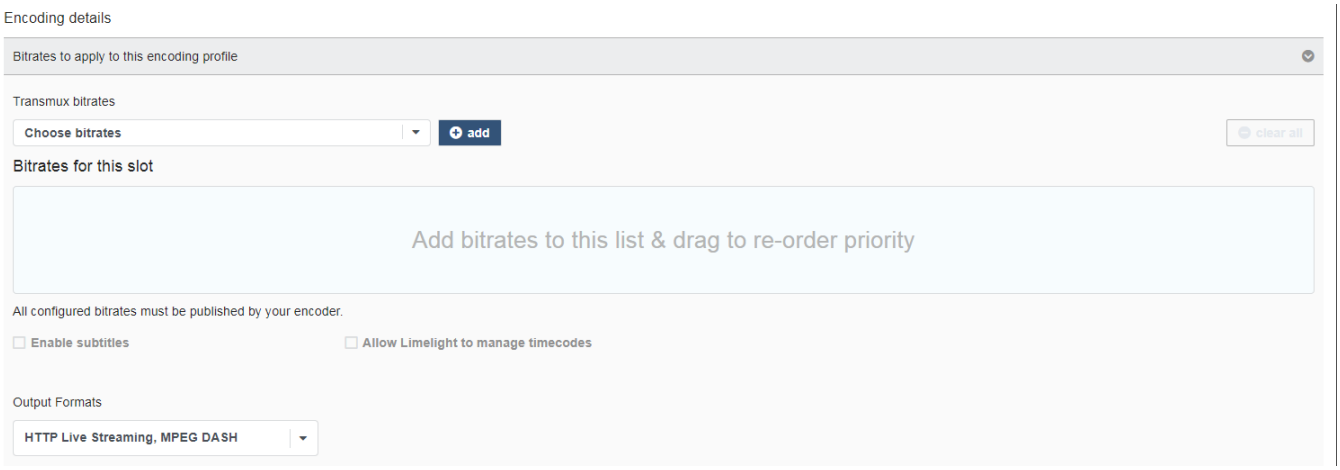
Transcode Slots



Field Name	Description/Instructions	Notes
Transcode bitrates	The bitrates you want to output from this slot. By default, none are selected, but you must choose at least one to proceed. 1. Select individual bitrates or choose 'Select all'. 2. Click the **add** button.	Each selection is an encoding profile All configured bitrates must be published by your encoder to MMD Live for the slot to function correctly.
Bitrates for this slot	Displays all selected bitrates. If you have 'Bitrate Order' enabled for your account, a drag handle displays when you hover your mouse to the left a slot's order number. Use the drag handle to drag and drop bitrates to reorder them. The order number determines the order in which the bitrate URL appears in the output manifest file.	MSS output will not support a custom order in which the audio-only bitrate is placed first. To remove a bitrate, hover over its row and click the **remove** button.
• **Enable subtitles** • **Allow Edgio to manage timecodes**	See Subtitles and Timecodes.	

Field Name	Description/Instructions	Notes
• **Output Formats**		

Transmux Slots



Field Name	Description/Instructions	Notes
Transmux bitrates	Bitrate configuration for transmux slots is highly customizable. 1. Select up to eight bitrates from the drop-down menu. 2. Click the **add** button	Each selection is an encoding profile Your encoder must publish all configured bitrates.
Bitrates for this slot	A suggested set of video and audio bitrates is available in the drop-down boxes, but you may also enter your custom bitrates in those boxes. If you have 'Bitrate Order' enabled for your account, each bitrate has a drag handle to its left. Drag and drop bitrates to reorder them. The order number determines the order in which the bitrate URL appears in the output manifest file.	You must select at least one bitrate. All configured bitrates must be published by your encoder to MMD Live for the slot to function correctly. The total bitrate (video + audio) is automatically calculated and displayed in the row for each bitrate. The summation of all totals is displayed at the top of the bitrate list. To remove a bitrate, hover over its row and click the **remove** button.
• **Enable subtitles** • **Allow Edgio to manage timecodes** • **Output Formats**	See Subtitles and Timecodes.	

Subtitles and Timecodes

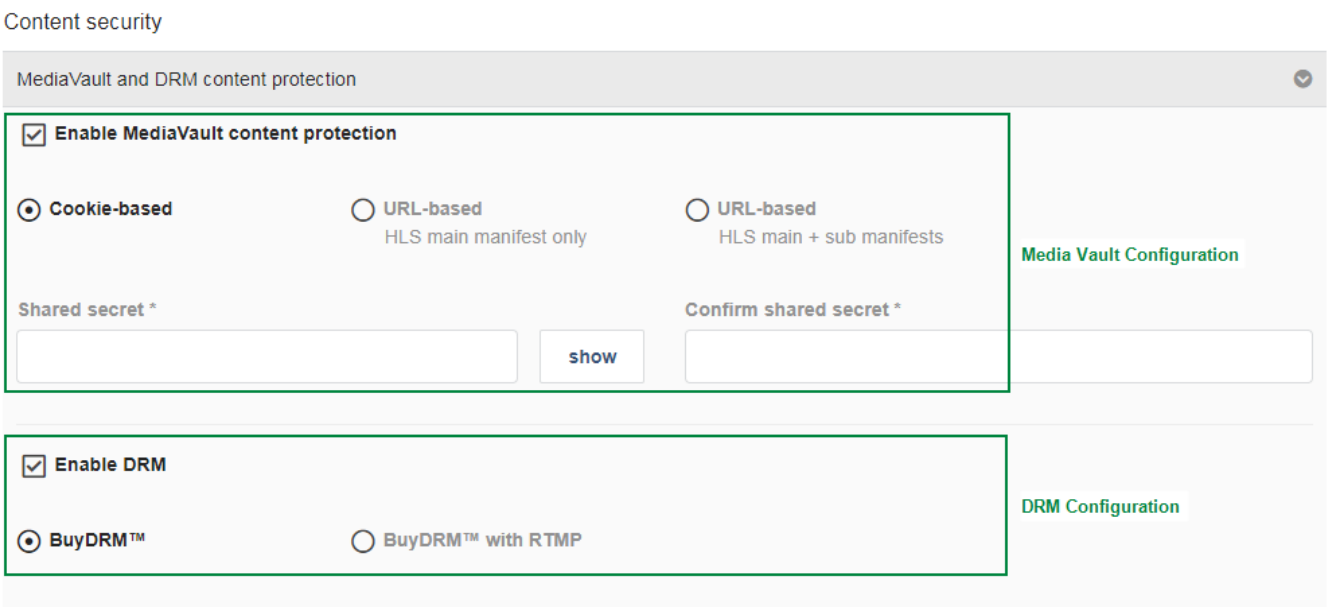
Beneath the slot's list of bitrates are checkboxes for managing subtitles and timecodes and a drop-down menu for selecting the output format.

Field Name	Description/Instructions	Notes
Enable subtitles	Select this option to accurately inform iOS players that subtitles are present in HLS output from MMD Live.	If you don't select the option and the `#EXT-X-MEDIA:TYPE=SUBTITLES` tag is present, but subtitles are not, the iOS player will display a CC menu option to display subtitles even though subtitles are not present.
Allow Edgio to manage timecodes	If your encoder does not allow you to enable absolute timecodes in chunks or if you want Limelight to manage timecodes, check this checkbox.	Absolute timecodes in chunks are necessary to enable the seamless transition from primary to backup to ingest in a primary ingest failure. Timecodes allow the failover mechanism to seamlessly switch to the backup stream at the correct time, resulting in little or no interruption to a viewer's experience when watching the live stream.
Output Formats	Select one or more output formats; then click the 'Apply' entry at the bottom of the drop-down menu.	The slot will produce output in the formats that you selected.

Content Security

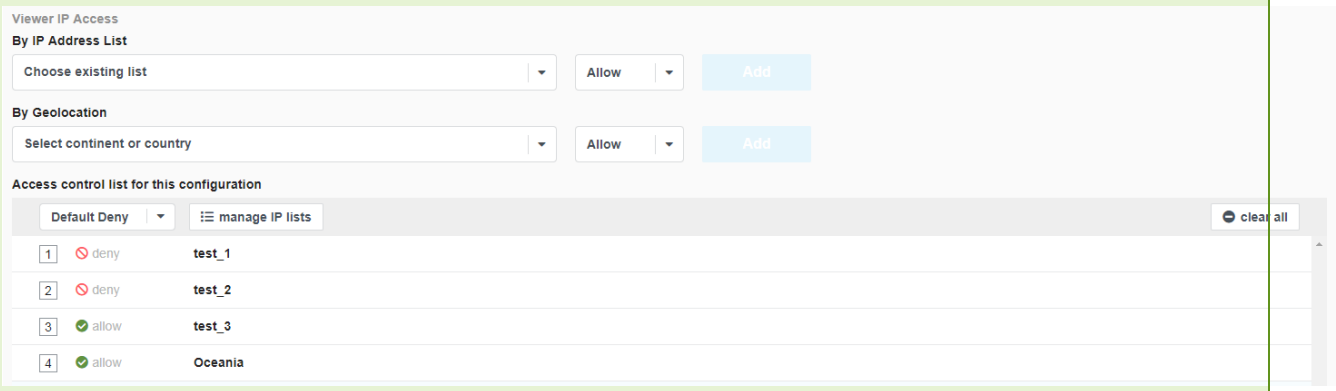
This section allows you to configure MediaVault and DRM content protection.

Here is a sample configuration for non-Live Push slots:



Notes:
For Live Push slots:

- The Enable DRM option is not available.
- The ability to configure **Allow** and **Deny** lists to control viewer access is also available:



MediaVault

If you have the MediaVault service option, this section is activated.

Check the **Enable MediaVault content protection** checkbox, then choose the type of MediaVault you would like to implement in this slot:

- URL-based. For URL-based MediaVault, you may choose to MediaVault protect just the main manifest of HLS outputs or both the main manifest and all sub-manifests.
- Cookie-based

You can set your hash secret per slot. You can find more information in the "MediaVault User Guide" or by talking to your Edgio Representative.

Note: Enabling MediaVault causes the Integrated Player Embed Code not to function.

DRM Configuration

If you have the DRM service option, this section is activated.

Check **Enable DRM**, then choose the desired option:

- **BUYDRM**: Enables DRM on MPEG-DASH output; disables all other outputs.
- **BUYDRM_WITH_RTMP**: Enables DRM on RTMP and MPEG-DASH output; disables all other outputs.

Slots - Clone, Delete and View

These sections explain how you can manage your slots:

Clone a Slot

Delete a Slot

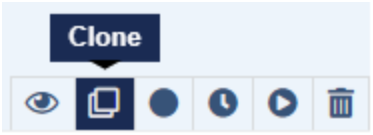
Edit a Slot

View Slot Details

View a Slot's Live Stream

Clone a Slot

1. Locate the slot you want to clone and click the **Clone** icon.



2. Follow the same steps used when configuring a slot. The values are pre-populated with the same information as the original slot except for the slot name. Since the name has to be unique, you must enter a new name.
3. Click the **Submit** button, and the new slot is created.

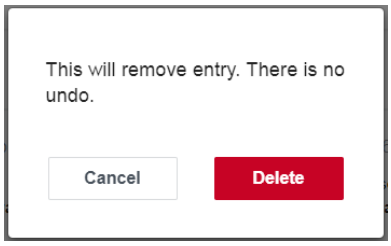
Note: If you do not change the name or enter the name of an existing slot, a warning appears in the right part of the window.

Delete a Slot

Note: You cannot undo or recover a deleted slot.

1. Locate the slot you wish to delete and click the **Delete** icon.

2. A confirmation dialog is displayed.



3. Click the **Delete** button.
   The slot is removed from the list.

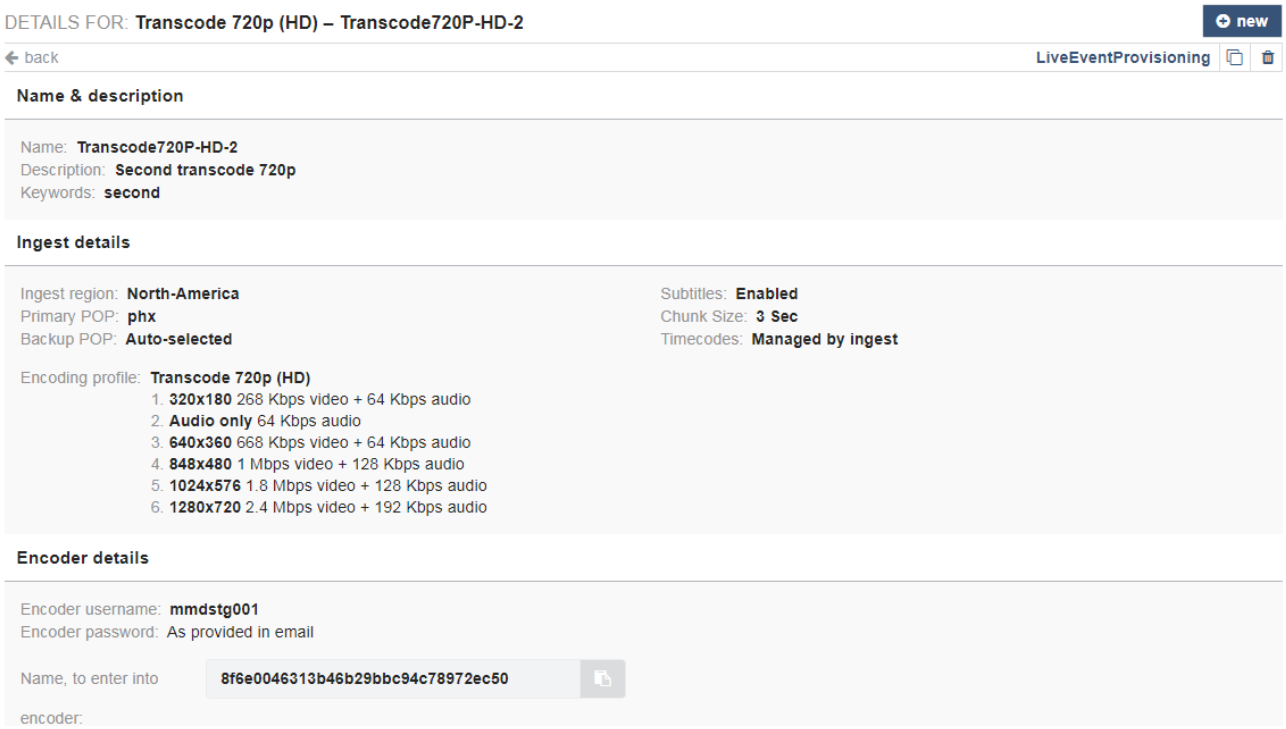
Edit a Slot

MMD Live currently does not support the editing of slots. Currently, you must create a new slot and then delete the old or incorrect slot.

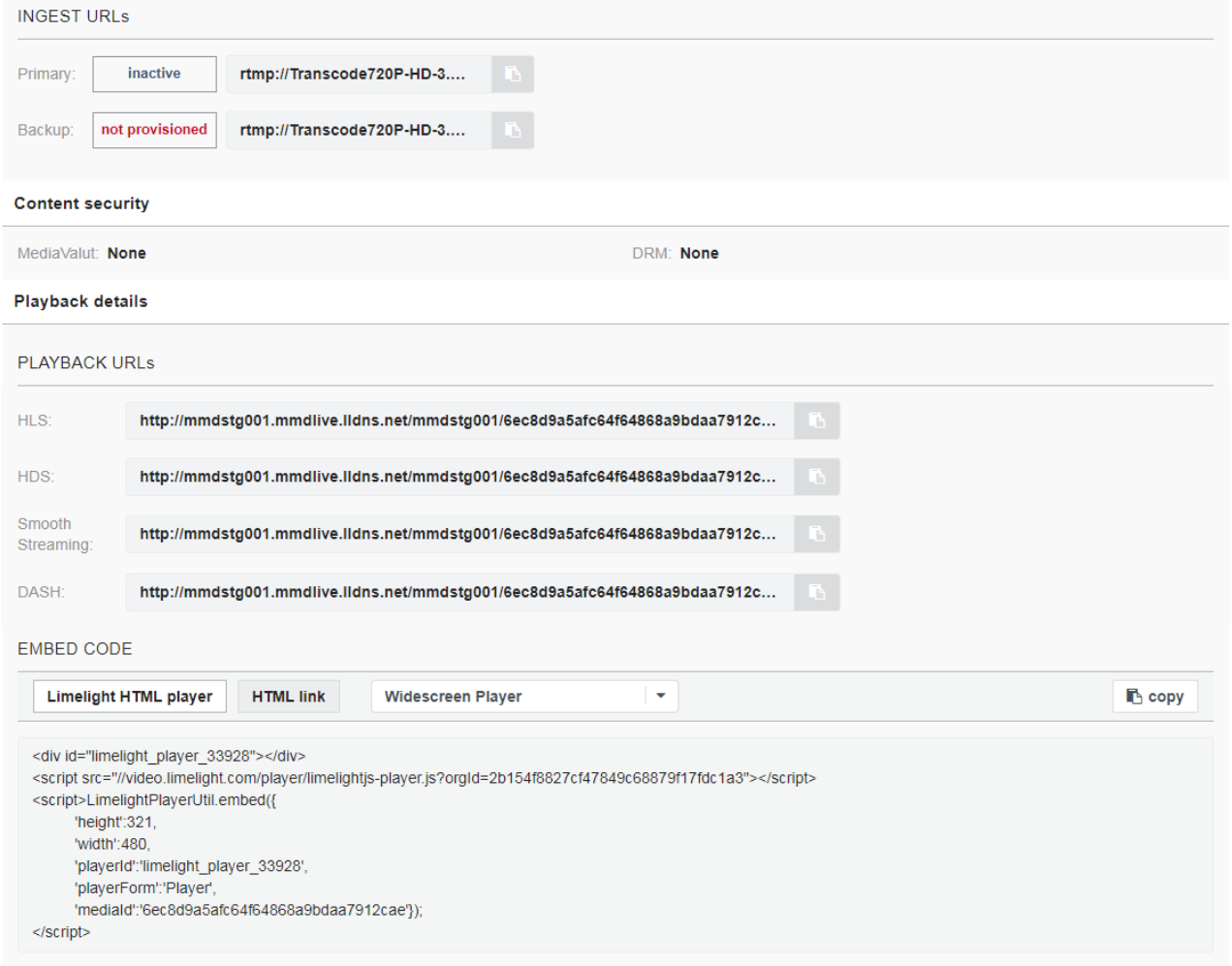
View Slot Details

1. Locate the slot and click the **Details** icon (or click the slot's row)

   You will see the Ingest URLs and Stream Name to enter into your encoder, and you will see the Playback URLs to use in your player:



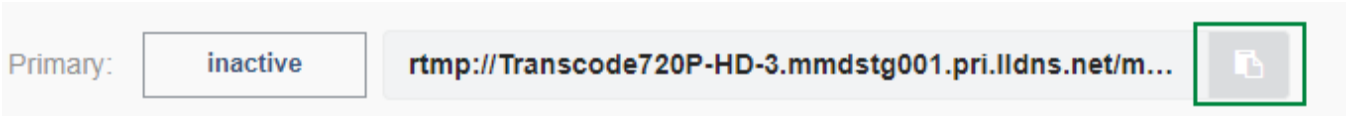
You can also view the slot's playback URLs:



2. If you choose to, you may use the Limelight SmartEmbed Player found in the section labeled “EMBED CODE.” Choose an embed code option and player type, then copy the embed code and place it on your website. The embed code will play your live stream. For more information about SmartEmbed, see the Player Embedding Guide.

> **Note:** If you enable MediaVault, the EMBED CODE section is not displayed because MediaVault and embed code are not compatible

3. The Copy (double-window) icon next to a field allows you to copy the field to the clipboard easily:



When you click the icon, the browser displays a confirmation that the data has been copied.

4. You can quickly determine if you are streaming to MMD Live ingest servers by looking at the URL status indicator to the right of the Primary and Backup **Ingest URLs**:
   - "Active" means the encoder is currently publishing to that ingest.
   - "Inactive" means the encoder is not currently publishing to that ingest.
   - "Error" or "Not Provisioned" means there was an error when querying the ingest for status. Please contact Customer Support.

View a Slot's Live Stream

> **Note:** You cannot view a Live Push slot's stream.

To view a slot's live stream:

1. Locate the desired slot and click the **Player** icon.

2. A new tab opens in your browser with the HTML player embedded in it. The player plays the live stream.

> **Notes:**
> The **Player** icon is only enabled if MediaVault is not enabled for the slot. See MediaVault for additional information.
>
> The player's options in the EMBED CODE section of the slot details screen define the embedded player's look and feel. See View Slot Details for additional information.

Using Your Slot

> **Note:** For instructions about using Live Push slots, see 'Use Your Slot' in the Video Live Push Guide.

Once your slot is configured, you can begin streaming to it right away. The slot is available to you whenever you want to use it.

Start by setting up your encoder with the information provided in the “Slot Details” screen. See 'Setting Up Your Encoder' in the MMD Live Streaming Guide for encoder requirements and recommended settings.

Be sure to use the specifications of your slot type when setting up your encoder. It's also important to publish to both primary and backup publishing URLs and use an absolute Timecode in your encoder to provide maximum failover protection for your live stream.

Once you are streaming, use one of the playback URLs shown in the “Slot Details” screen in your video player or app. Or you can use the Limelight SmartEmbed on your website or blog, which loads a player that automatically contains your playback URL.

Using Secure Playback URLs

MMD Live and Live Push support the delivery of live streams over secure URLs. Simply change your playback protocol from `http://` to `https://` to take advantage of secure delivery.

Live to VoD

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Introduction

Limelight MMD Live includes a capability that allows an event that is being streamed live to be automatically recorded to Limelight Origin Storage for later playback as a Video on Demand (VoD) asset. Customers can configure the recording of single live events, recurring live events, or continuous streaming for later VoD playback.

Live to VoD simplifies the process of making live-streamed events available for later re-use as on-demand video assets. Anyone that delivers live video streams and needs to repurpose live content for VoD playback will benefit from using Live to VoD Recording.

With Limelight's Live to VoD Recording, you can:

- Repurpose live content as VoD assets to increase viewership and monetization.
- Have a simplified and automatic recording process that creates recordings with minimal human intervention.
- Have a library of recorded assets that can be delivered to audiences anywhere, on any device.
- Have flexibility in scheduling the recording of live events.
- Develop a workflow to deliver content directly and quickly from Origin Storage.

Limelight's Live to VoD recording feature enables an integrated workflow from live streaming to VoD asset capture to VoD playback. The VoD asset is captured directly to Edgio Origin Storage within minutes of the end of the event without having to cross the internet to an outside cloud storage vendor.

Customers can deliver captured files through the Edgio CDN using MMD On-Demand. They can upload the files to their Limelight Video Platform (LVP) account and use LVP to encode and playback the captured recording with the LVP HTML Player. The recording files may also be downloaded using the Edgio Origin Storage features. (See Origin Storage documentation.)

Limelight's Live to VoD solution provides a powerful scheduling capability that gives customers total flexibility when recordings will be made. With a simple set of controls, the recordings can be made continuously (24/7),

scheduled with beginning and end times, or recorded on a recurring schedule (for example, every Saturday and Sunday from 8 am to noon). Also, the schedules can be set to local time to adjust to Daylight Saving Time automatically.

The Live to VoD service is available to MMD Live customers world-wide. Contact your Edgio representative to find out if you can add Live to VoD to your MMD Live service.

More about Live to VoD

Live to VoD is available for both transcode and transmux type slots.

You can use the Live to VoD service on slots that were created before you purchased the service.

The service is available to both existing and new MMD Live customers.

The recordings from Live to VoD may be used as input to Edgio MMD OD service for on-demand playback.

Configuring Live to VoD

Adding Live to VoD to your MMD Live account is easy - just contact your Edgio representative.

The configuration options to set up Live to VoD include:

- Your Origin Storage account information. You must have an Origin Storage account to store the Live to VoD service's recording files output. Once you set up your account, all your recordings will be stored and made accessible to you in your Origin Storage account.
- The Origin Storage Folder. A specific folder will hold all your recordings from Live to VoD. The specific folder will keep them separated from your other Origin Storage files and make them easily identifiable. You can move them from this folder if you wish, but this folder will always be the place the look for your recordings.
- Notification Email Address. Upon completing a recording and the placement of that recording in your Origin Storage account, an email will be sent to the notification email address. The email will contain the details of the recording.

How Live to VoD Works

Live to VoD uses the output of MMD Live to record and convert to MP4 files.

The process starts with your usual publishing of an RTMP output from your encoder to the MMD Live ingest. No additional configurations are needed with your MMD Live service - you publish to MMD Live just as before.

Live to VoD captures the MMD Live service output and converts the outgoing stream to MP4s. At times you configure using the Live to VoD scheduling interface if you schedule a recording and are not streaming during the entire scheduled time, no problem! As long as your schedule covers a set amount of time, it will capture whatever and whenever you stream during that scheduled time.

If you include CEA-608 caption data in the video transport stream, Live to VoD will capture the video content stored within the output MP4 files.

The time between the end of the capture of the chunks (your scheduled end time) and the availability of the MP4s will vary based on the duration of the recording. On average, you can expect that MP4s will be available no longer than 30 minutes after the scheduled end time, though most recordings will be available much sooner than that.

MMD Live can deliver different bitrate and resolution versions of your video; Live to VoD can convert either just the highest bitrate or all the bitrates, according to how you configure the schedule.

More About Recordings

Stream Availability

If streaming stops and then starts again in the middle of a recording schedule, the recording will stop and start again based on the presence of the incoming stream. Live to VoD will not record if there is no incoming stream.

Failover Redundancy

Recordings are captured from the output of the MMD Live service. If you publish to both primary and backup MMD Live ingests, your recording will be available even upon interruption of the primary stream.

To ensure your recording can proceed smoothly in case of an interruption of your primary stream, the Live to VoD system enforces a timecoding of each HTTP chunked output of MMD Live. The timecoding allows the recording system to combine HTTP outputs when switching between the MMD Live primary and backup streams.

The Live to VoD recording system also employs a high availability redundant system with failover capability within the recording system itself.

Restrictions

In any given slot, you can only make one recording at any point in time. That is, you may not schedule overlapping times to record a stream. Only authorized users can create, edit, cancel and remove recordings.

Recording Length and Renditions

All recordings are optimized for HTTP streaming and progressive download. MP4s are written with the moov atom at the beginning of the file to enable easy management and processing. Recording lengths may be as short as 5 minutes or as long as four hours to accommodate longer recordings, such as a sporting event.

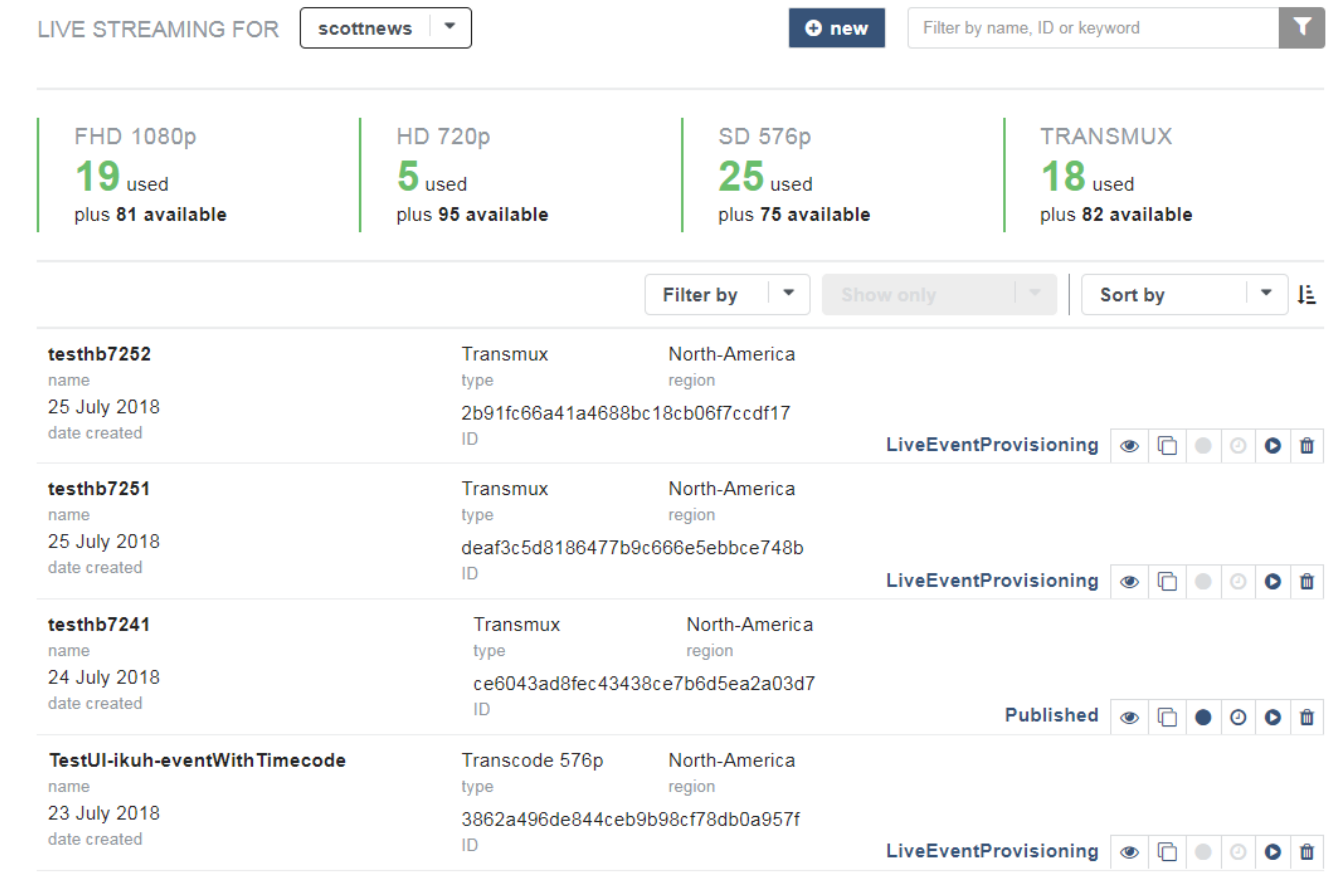
During the setup of a recording schedule, customers can opt to record just the highest bitrate of a live stream. If they want to archive a copy of the live stream suitable for MMD OD streaming, they can record all the renditions (in other words, bitrates).

Closed Captions

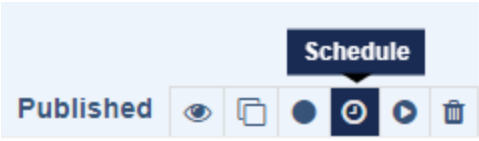
If your RTMP stream includes CEA-608 captions, MMD Live will convert them to WebVTT captions within the chunked streaming output. The captions data will also be maintained within the video stream itself. When Live to VoD captures the output of MMD Live and converts it to MP4 files, the captions data within the video stream will be stored within the MP4 files.

Accessing Scheduling Functionality

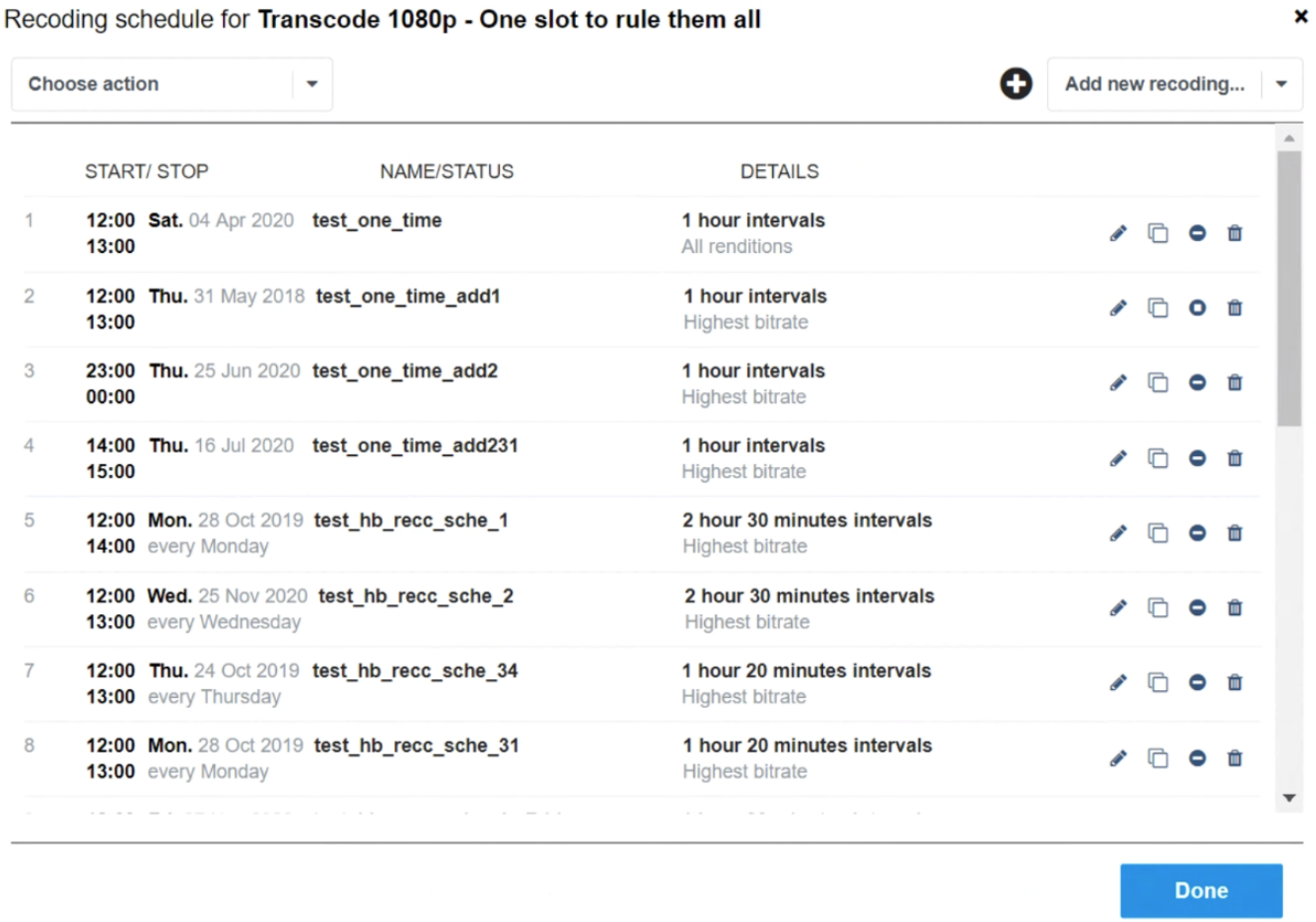
To access scheduling functionality, begin by clicking **Configure** in the left navigation panel in the Control portal. Then click **Live Streaming**. A list of slots for your account appears:



To access a slot's schedule, locate the desired slot and click the **Schedule** icon on the right side of the slot's row:



If there are previously configured recordings for the slot, they are listed in the *Recording Schedule* dialog:



From this dialog, you can perform tasks described in the following sections:

Filtering the List of Recordings

Scheduling recordings

Editing a recording

Cloning a recording

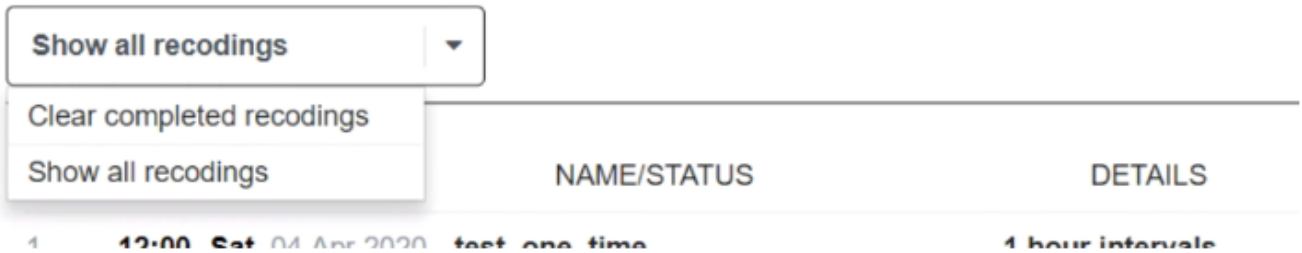
Canceling a recording

Removing a recording from the schedule

> **Note:** As a convenience, icons for editing, cloning, canceling, and removing a recording are disabled if that functionality is not available at the time.

Filtering the List Of Recordings

Recordings completed will remain in the schedule view of Live to VoD but will be indicated as completed. You can filter the list by clicking an option from the drop-down menu above the list of recordings:



- **Clear completed recordings**: hides completed recordings but does not delete them
- **Show all recordings**: shows completed, in-progress, and future recordings

Scheduling Recordings

Other than the "record now" type, each recording can be configured to record into files at 5-minute increments up to a maximum of 4 hours. "Record now" recordings default to 3-hour increments.

How to Make a Recording

There are four ways to make recordings:

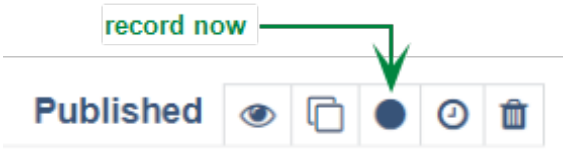
- Use the “record now” feature on the MMD Live slot list to start immediately
- Create a one-time event schedule to record in the future for a set duration
- Create a recurring recording schedule to record on the same day and time every week for a set duration
- Record continuously, 24/7

Notes:

- As an alternative to creating a recording, you can clone and modify an existing recording. See Clone a Recording for details.
- You cannot schedule recordings that overlap in time.
- If there is a recording already in progress, you cannot start a new recording.

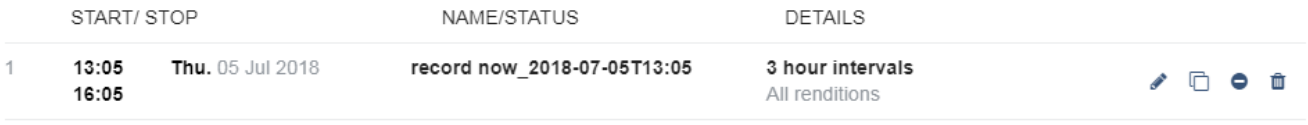
Record Now

To start recording immediately, close the *Recording Schedule* dialog, then click the **Record** icon on the row containing the slot:



The icon blinks red once, and then after a pause, the icon becomes solid red to indicate that the recording has started.

A new row is added to the slot's recording schedule (click the **Schedule** icon to view the schedule):



Live to VoD defaults all values; you can change any setting except the following:

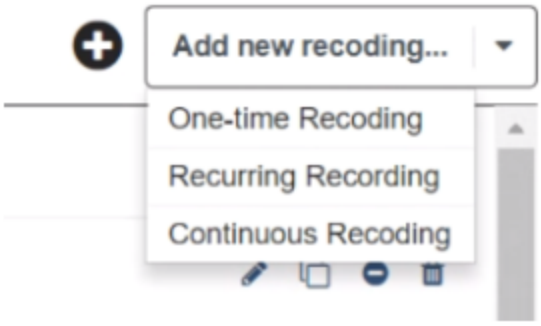
- *Record increments of*
- *Name*: The recording's name is 'record now_' + the timestamp when the recording started.
- *Record all renditions*

When the icon is red, it means the 'Record Now' function is continuing to record. To stop recording, click the icon once. It may take a few seconds for the recording to wrap up and stop.

> **Note:** 'Record Now' may require a few seconds to start and stop the recording workflow.

Other Recording Options

To access other recording options, choose a slot, then click the **Add new recording...** drop-down menu:



Then click the desired option:

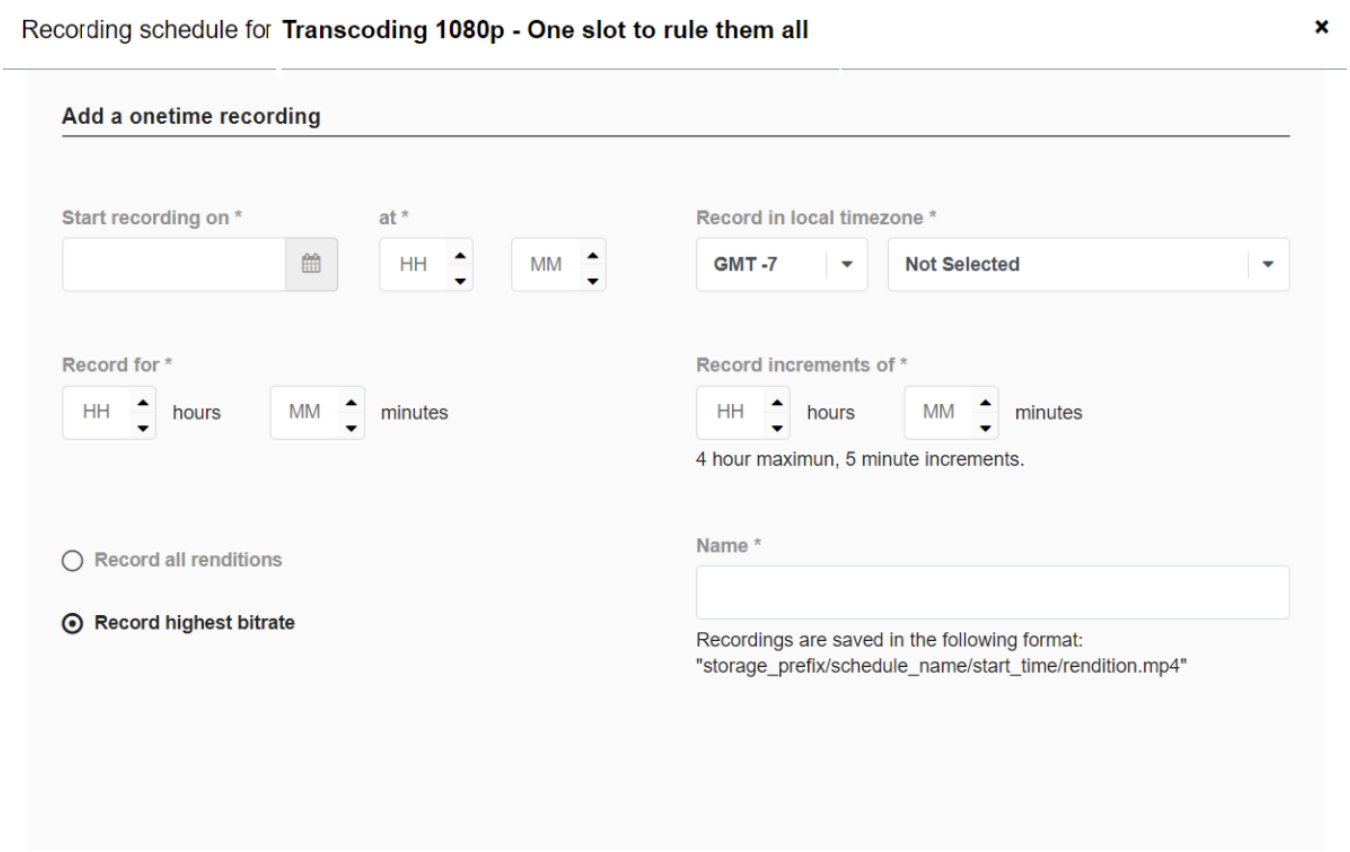
One-time Recording

Recurring Recording

Continuous Recording

One-Time Recording

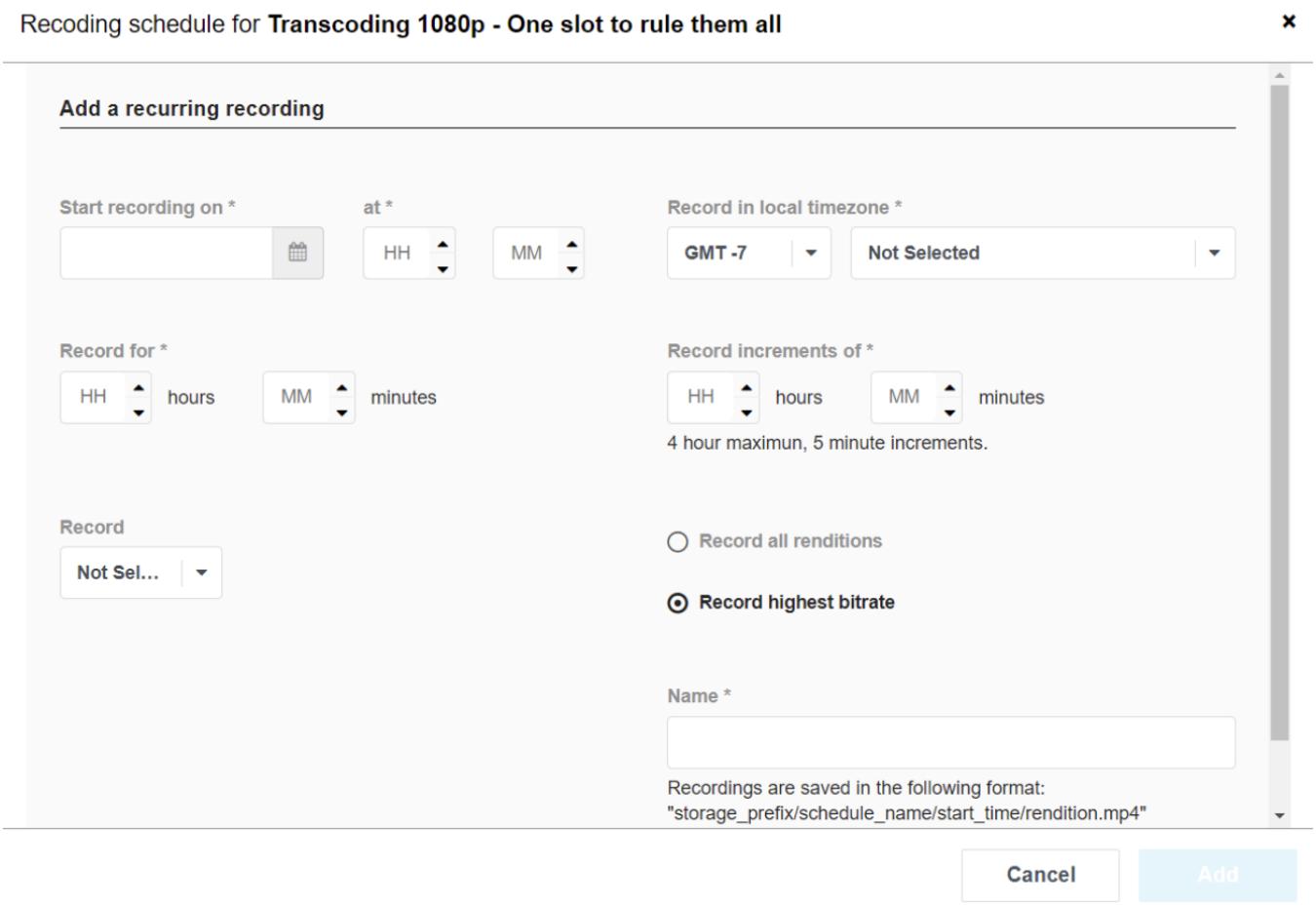
A one-time recording automatically records all renditions (i.e., bitrates).



Configure the desired settings using the information in Fields in the Recording Schedule Dialog.

Click **Add** to save the recording.

Recurring Recording



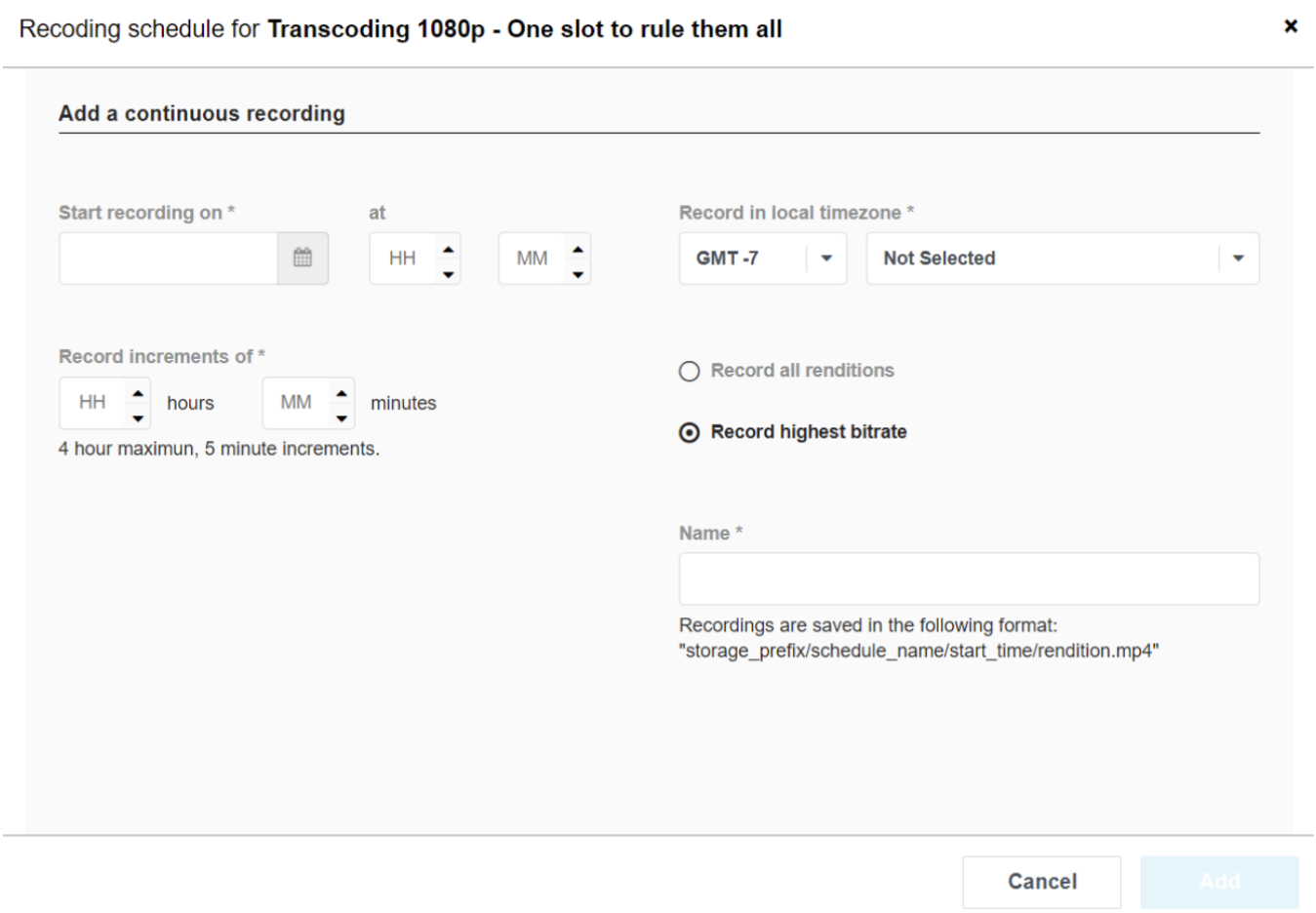
Configure the desired settings using the information in Fields in the Recording Schedule Dialog.

Click **Add** to save the recording.

If you configure the recurring recording to happen on multiple days, you will see a unique entry for each day's recording schedule after you save the schedule. You can then edit, cancel, delete or clone these entries independently of each other. Canceling a recurring recording requires the canceling of each entry.

Continuous Recording

A continuous recording records a stream continuously. You cannot set an end time on a continuous recording; if you want to stop a continuous recording, you must cancel it. If your stream starts and stops, a continuous recording schedule will record during your streaming.



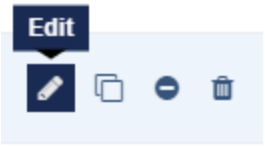
Configure the desired settings using the information in Fields in the Recording Schedule Dialog.

Click **Add** to save the recording.

> **Note:** If you create a continuous recording schedule, the system will not let you create another kind of schedule before the continuous recording begins, even if the continuous recording is scheduled to start in the future. This prevents a schedule from overlapping the continuous recording.

Editing a Recording

To edit an existing recording, click the **Edit** icon on the right side of the recording row in the *Recording Schedule* dialog:



Configure the desired settings using the information in Fields in the Recording Schedule Dialog.

Notes:
You can modify a schedule before it has begun recording.

You can modify a schedule after it has begun recording, but you can only lengthen or shorten it.

You cannot edit a canceled recording.

You cannot change the day on a recurring schedule. To record on a different day, create a new recurring schedule for the new day.

Cloning a Recording

As an alternative to creating a new recording, you can clone an existing recording by clicking the **Clone** icon on the right side of the recording's row in the *Recording Schedule* dialog:

The cloned recording opens in the *Recording Schedule* dialog.

Configure the desired settings using the information in Fields in the Recording Schedule Dialog.

Note: You must change the name of the recording at a minimum, or you will not save it.

Canceling a Recording

When you cancel a recording, the system unschedules the recording and makes it non-editable but does not remove it from the *Recording Schedule* dialog (see Removing a Recording from the Schedule).

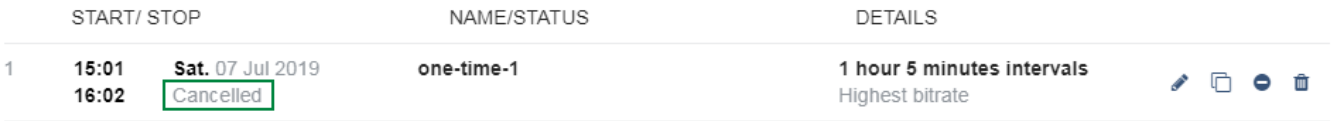
Use either of the following methods to cancel a recording:

- Click the **Cancel** icon on the right side of the recording's row in the *Recording Schedule* dialog:

- Click the **Edit** icon on the right side of the recording's row in the *Recording Schedule* dialog, then click the **Cancel recording** button at the bottom of the dialog:

Click **OK** in the confirmation dialog.

If the recording is in progress, it will end as soon as possible after you cancel, typically within a minute or two. The recording's status becomes 'Cancelled' in the *Recording Schedule* dialog:

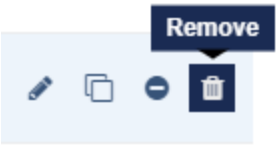


Removing a Recording from the Schedule

Schedules that have been completed or canceled remain in the *Recording Schedule* dialog for your historical reference. You can filter the view of the dialog to show only active recordings. You can also remove a schedule from the dialog completely.

Before you remove an unfinished recording, you must cancel it.

To remove a recording from the schedule, click the **Remove** icon on the right side of the recording row in the *Recording Schedule* dialog:



Then click **OK** in the confirmation dialog.

The system completely removes the recording schedule from the *Recording Schedule* dialog.

> **Note:** Removing a recording schedule does not remove any completed MP4 files. MP4 files made from your live stream may only be deleted using the Origin Storage interfaces. (See Origin Storage documentation.)

Understanding Output Directory Structure

Recordings are saved to a specific directory within your Limelight Origin Storage account. This directory is set up when you are first configured for the Live to VoD feature.

That directory has sub-directories based on each of your recordings. MP4s are stored at the lowest level of the directory structure, with each rendition (in other words, bitrate) being a separate MP4 file.

The directory structure for recordings follows this pattern:

```
<origin storage hostname>/
  |---->&lt;mmd live to vod folder&gt;/
    |--->&lt;slot name&gt;/
      |--->&lt;schedule name&gt;/
        |--->&lt;increment start datetime&gt;/
          |-->&lt;bitrate1.MP4&gt;
          |-->&lt;bitrate2.MP4&gt;
          |-->&lt;bitrate3.MP4&gt;
          |-->&lt;bitrate4.MP4&gt;
```

- Your `<mmd live to vod folder>` name was chosen by your organization when your organization signed up for Live to VoD. The folder name usually begins with your account name. If you want to change the name, please contact your Account Manager.
- The name you give to your schedule will be the folder that contains the recording files associated with that schedule.
- If your schedule has multiple increments (for example, a four-hour recording in 30-minute increments), each increment will have a separate folder with the MP4s for that increment stored within it.
- If your slot has multiple schedules with the same name, each schedule will have its entry under `<slot name>`.

Access to your recordings is through the tools available with your Edgio Origin Storage account.

Use the Origin Storage tools to access your recordings. (See Origin Storage documentation.)

Disabling Live to VoD

Live to VoD is a feature of MMD Live that allows you to create recording schedules and then place recordings on your Origin Storage account.

If you delete a schedule or disable the Live to VoD feature on your MMD Live account, only the schedules will be deleted. All the completed MP4 files in your Origin Storage account will remain unaffected.

If your Live to VoD service is disabled:

- Schedules that are actively recording when the service is disabled will continue recording until their end time. Continuous recordings will continue until the current increment is completed, based on the recording schedule's increment duration.
- Schedules planned to begin in the future will be canceled from the scheduling system.
- MP4s within your Origin Storage account will remain unaffected.

If your Live to VoD service is re-enabled after being disabled, schedules made before re-enabling the service will be visible in the *Recording Schedule* dialog as 'finished'.

Fields in the Recording Schedule Dialog

This appendix describes fields in the *Recording Schedule* dialog for all recording types (One-time, Recurring, Continuous).

> **Notes:**
> Fields are available for all recording types except where noted.
>
> All fields are required; the **Add** button is only enabled after you configure all fields.

Field	Description
Start recording on/at	Date and time to begin recording. You cannot create overlapping recordings on the same slot.
Record in local timezone	Timezone and sub-timezone in which recording should occur. Recurring schedules are based upon a geographic location's time zone, so if that zone uses daylight saving time, your recording schedule will always be correct. For example, if you record every Sunday at 8 am and live in a time zone that changes based on daylight saving, your recording will still commence at 8 am on Sunday after daylight saving has changed the time within the zone.
Record for	The number of hours and minutes to record. You must set values in both fields. **Note:** Not available in the 'Continuous Recording' option
Record in increments of	How often to start a new MP4 recording. You must set values in both fields. Each recording can be configured to record into any minute-length interval ranging from five minutes to 60 minutes (up to a maximum of four hours in length).

Field	Description
	Any scheduled recording must be a minimum of five minutes. For example, selecting 01 hours and 10 minutes means that a file will be produced every 1 hour and 10 minutes up to the recording duration. **Note:** Not available in the 'Continuous Recording' option
Record (repeat interval)	Click either 'every day' or 'every week'. If you choose ‘every week’, choose which days of the week you want to record. **Note:** Only available in the 'Recurring Recordings' option
Record all renditions, **Record highest bitrate**	Indicate whether you want to record all renditions (in other words, bitrates) or only the highest bitrate according to the bitrates configured for the slot. Defaults to recording all renditions. See Configuration UI for additional information.
Name	Enter a descriptive name. There is no restriction on the number and type of characters. Duplicate schedule names are allowed.

Setting Up Your Encoder

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Live Stream Encoders

A client-based live stream encoder must capture live footage and stream it to the ingest servers of MMD Live. All encoders must support H.264 CODEC and AAC Audio CODEC.

There is a large variety of encoders, software, and hardware available for use with your workflow. Edgio cannot test every encoder model and encoder version available in the market. However, here is a list of encoders to help you get started:

- Elemental Live (Website)
- ffmpeg (For advanced or custom applications) (Website)
- Haivision Kulabyte (Website)
- Larix Broadcaster iOS, Android, and Windows Phone Apps (Website)
- Nimble Streamer (Website)
- Osprey (Website)
- OBS (Website)
- Telestream Wirecast (Website)

Encoder Settings Requirements

Setting up your encoder is the most crucial step to stream successfully to MMD Live. It's essential to have all your encoder settings correct to avoid delays and errors in making your streams available to end-users.

Use this checklist when configuring your encoder:

- **Primary and Backup**: MMD Live provides redundant ingest points for your live stream, providing robust failover capability during maintenance periods and outages. However, this requires your encoder to publish to both primary and backup ingests with timecode synchronization to best take advantage of this feature. Retrieve the primary and backup publish URLs from the slot configuration within the Control portal; you can return to Control and view the URLs at any time.
- **Timecode**: Many encoders have a timecode setting that synchronizes the primary and backup publish streams. Timecode synchronization is critical to allowing MMD Live to properly failover from the primary to the backup ingest during outages so your client endpoints can experience minimum disruption.
- **Encoder Output Resolution**: Be sure the resolution you set matches the resolution of the slot to which you are publishing. If an HD slot receives an encoder stream that has an FHD resolution, that slot rejects the connection.
- **Transcode or Transmux**? A transcode slot expects just one input sent to each of the primary and backup ingests. But a transmux slot allows you to set up multiple bitrates, and both primary and backup ingests expect to see your encoder publish each of these bitrates into the ingest. For example, if you set up your transmux slot to have four bitrates, your encoder should send these four bitrates to both the primary and the backup ingests.
- **Video Bitrate**: Be sure your video bitrate matches the expected bitrate of the slot to which you are publishing. Too high a bitrate may result in your connection being rejected. You can find the correct bitrates for your slot on the Inputs and Outputs section of this guide.
- **Audio Bitrate**: Matching the audio bitrate setting to our specifications ensures a proper sounding output at your client endpoints.

- **Frame Rate**: Matching the frame rate setting to our specifications ensures a smooth video experience at your client endpoints.
- **Keyframe Interval**: Set your keyframe interval based on the output chunk size setting of your MMD Live account. The keyframe interval setting inside the encoder MUST be a factor of the chunk size. That is, the division of `chunk size/keyframe interval` MUST result in an integer. For example, if your stream's chunk size is set to 10 seconds, your keyframe interval should be either 10, 5, 2, or 1 second. For 10 second chunks, a keyframe Interval of 5 seconds is recommended.

Keep in mind the following rules when declaring streams:

- • To ensure quality, declare settings that meet the input specification for the type of slot you publish. **NOTE**: Your input stream bitrate and resolution must match your slot configuration setup within the Control portal for your service to work correctly. MMD Live monitors your input stream to ensure it matches your slot configuration settings. If your input stream has a higher resolution than your slot configuration, or if your bitrate exceeds two times your configured setting for over 10 seconds, your input stream may be temporarily disconnected for up to ten seconds. The temporary disconnect is to provide time for your encoder settings to return to your configured values. When your input stream returns to your slot configuration settings, the stream is allowed to reconnect.
- Make sure you have enough upload bandwidth at your encoder to support your bitrate. Bitrates that are too high may cause buffering. To figure out how much upload bandwidth you need, add your video bitrate and audio bitrate and multiply by two for primary and backup.
- Enabling 'Timecode' on your encoder sets an absolute time code on the streams you send to MMD Live. The timcode keeps your primary and backup streams in synch so that if publishing to the primary ingest server fails, the backup stream can keep your live stream available to users.
- Ensure your keyframe Interval is set correctly within your encoder. The keyframe interval must be based on the output chunk size setting for your MMD Live account. Mismatched chunk size and keyframe interval combination may cause your live stream not to function correctly.

Sample Set-Up Using Larix Broadcaster Mobile Encoder App

Larix Broadcaster is a mobile application for Android, iOS, and Windows Phone, allowing live streaming from your device to any destination that supports RTMP or RTSP protocols.

Larix Broadcaster allows you to encode and broadcast both video and audio to your mobile device in real-time over WiFi, EDGE, 3G, or LTE.

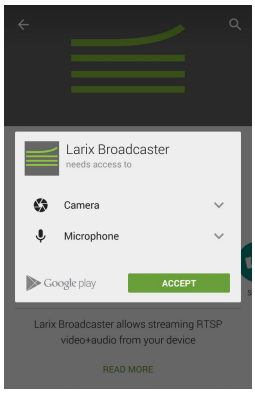
- Live H.264/AAC encoding.
- Front and back cameras are supported with a hot switch.
- Landscape and portrait mode, with "always horizontal" or “always vertical” support.
- Selfie stick support
- Custom white balance, exposure value, and anti-flicker.
- Long press the preview to focus lens to infinity, double-tap for continuous autofocus.
- Saving to MP4, making screenshots.
- Multiple simultaneous connections - you can add several destinations profiles and choose up to three connections for simultaneous streaming.

Limelight CDN authentication is supported - you can publish your streams directly into Limelight for further delivery.

Install Larix Broadcaster

You can install both the Android version and the iOS version. These instructions demonstrate that the Android setup and the iOS setup are similar.

1. Look for the name in the Google Play Store, select *Larix Broadcaster*, and click the **Install** button.
2. You are prompted for several permissions that are required to perform the capturing and streaming.

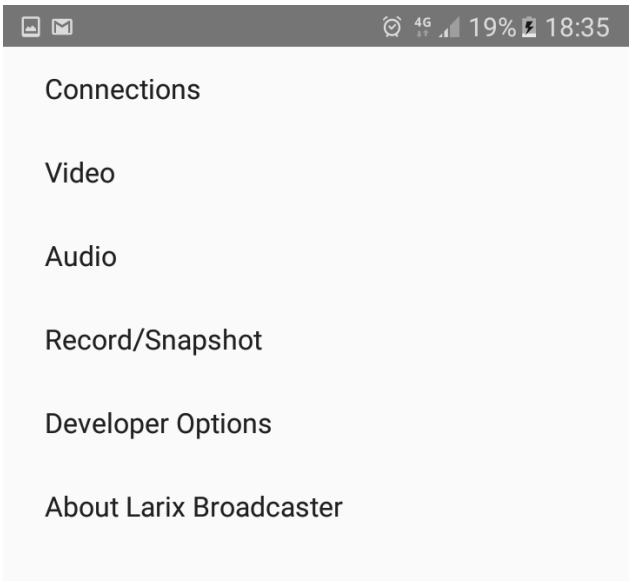


3. The preview screen displays with all control buttons:

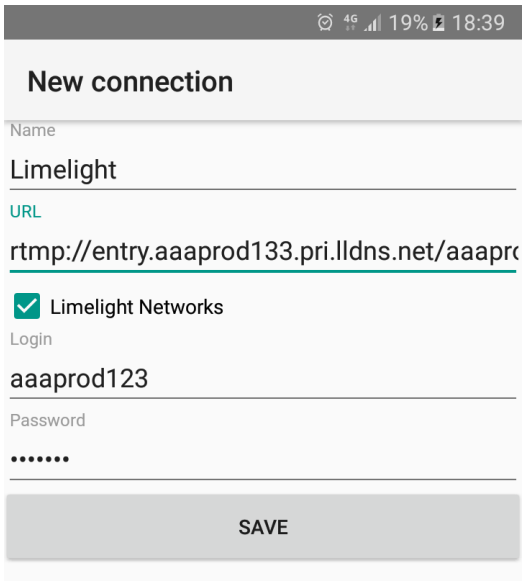
4. Click the gear icon to open the settings dialog.

Define Limelight Connection

The main menu displays:

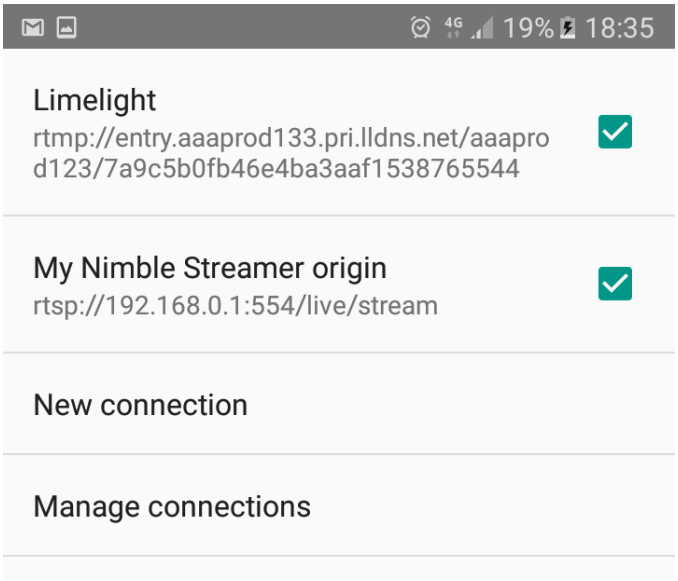


1. Click **Connections**. An empty list of connections displays.
2. Click **New connection**.



3. Enter the desired name and insert the URL of your ingest point that Limelight provided. Then click **Limelight**

Networks, enter your user login and password available for your ingest point, and then click the **SAVE** button.



Now you can select your destinations for other streaming. If you defined several destinations, you could select up to three of them simultaneously.

Start Streaming

Go back to the preview screen and click the red button to start the transmission. A status bar is visible at the bottom for each connection. Once it starts, you can open the URL which you obtained from Limelight to watch the stream.

SDK

Larix Broadcaster is based on a mobile library and is part of the Larix Mobile Broadcasting SDK, a separate commercial product provided by Softvelum LLC for mobile application developers. Suppose you need to embed streaming functionality into your application or create something similar to what you just saw. In that case, the SDK contains the library and the source code of Larix Broadcaster, which allows creating your app in a few steps. You can also subscribe for a license.

Secure Communications

Table of Contents

Overview

MMD Live provides a variety of methods to secure the publication of your live streams.

Publishing to MMD Live

MMD Live accepts RTMP inputs directly from your encoders. All encoders must authenticate using your MMD Live publication credentials given to you on account creation. Limelight works with encoder companies to implement Limelight's authentication directly into the encoder software.

Secure Playback of Live Streams

MMD Live provides several ways to secure live stream playback.

HTTPS

MMD Live supports live stream playback through SSL. Simply change your playback URL from `http://` to `https://` to take advantage of secure delivery.

If you would like to use your SSL certificate for secure delivery, please contact your Limelight Customer Representative for more information.

MediaVault For Chunked Streaming

The MediaVault service option allows you to secure the playback of your live streams using tokenization.

MediaVault for HTTP chunked streaming may be implemented using either URL- or Cookie-based tokenization. You are allowed to set your hash secret for each slot. For more information about MediaVault, see the MediaVault User Guide.

> **Note:** Enabling MediaVault causes the Integrated Player Embed Code to not function.

For additional information about securing live streams, see the MediaVault Selection in the Configuration UI chapter or contact your Limelight Customer Representative.

MediaVault for RTMP

The MediaVault service option is also available for RTMP outputs.

For more information, please see Customizable RTMP Protection or contact your Limelight Customer Representative.

DRM Protection

On a per-slot basis, you can protect your live streams using state-of-the-art Digital Rights Management (DRM) protection. See DRM Protection for more detail.