

FFMPEG RTP TO AWS ELEMENTAL MEDIALIVE TO AWS ELEMENTAL MEDIAPACKAGE

Workflow Example



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INTRODUCTION

This workflow illustrates how to use ffmpeg as an RTP contribution encoder for the AWS Elemental MediaLive service. The ffmpeg software may be run on a ground appliance or an EC2 instance in the cloud. For simplicity, this example uses “appliance” to reference the device from which ffmpeg will stream the source to AWS Elemental MediaLive.

In this scenario, you will set up the RTP output from ffmpeg as an input into AWS Elemental MediaLive. You will then set up AWS Elemental MediaLive to produce an HLS output that contains an ABR stream set. This output is the input into AWS Elemental MediaPackage.

It is strongly urged that when RTP is used for inputs to MediaLive, Forward Error Correction (FEC) is also be enabled. The FEC data is sent in parallel with the RTP output and allows the receiving device to rebuild corrupted or lost data in the RTP stream.

Note that FEC data are sent on additional ports, not in the actual RTP stream itself. The MPEG RTP transport is transmitted on port 5000, with FEC on ports 5002 & 5004. MediaLive has FEC enabled on its input and will make use of the FEC data once it's detected on the input.

Important: AWS Elemental MediaLive uses two inputs, encoder pipelines, and outputs for fault-tolerance and redundancy. The ffmpeg program does not support sending to multiple destinations, therefore this example will only send to one of the pipelines, and in the event of an input loss or pipeline failure the workflow will not function until the problem is corrected.

Note: To use this workflow in production, it is highly recommended you use the AWS Elemental MediaPackage endpoint as an origin for a CDN such as Amazon CloudFront. The AWS Elemental MediaPackage console includes an option to create a CloudFront distribution during channel creation.

REQUIREMENTS

To perform this procedure, you must have some experience using ffmpeg. Only the specific configuration related to creating the RTP output will be addressed in detail in this document.

ORDER OF WORK

1. Obtain needed information.
2. Create a channel in AWS Elemental MediaPackage.
3. Create an input in AWS Elemental MediaLive.
4. Prepare the appliance.
5. Create a channel in AWS Elemental MediaLive.
6. Start the video stream.

PREREQUISITE: OBTAIN NEEDED INFORMATION

Obtain the public IP address (or addresses) from the appliance that will run ffmpeg.

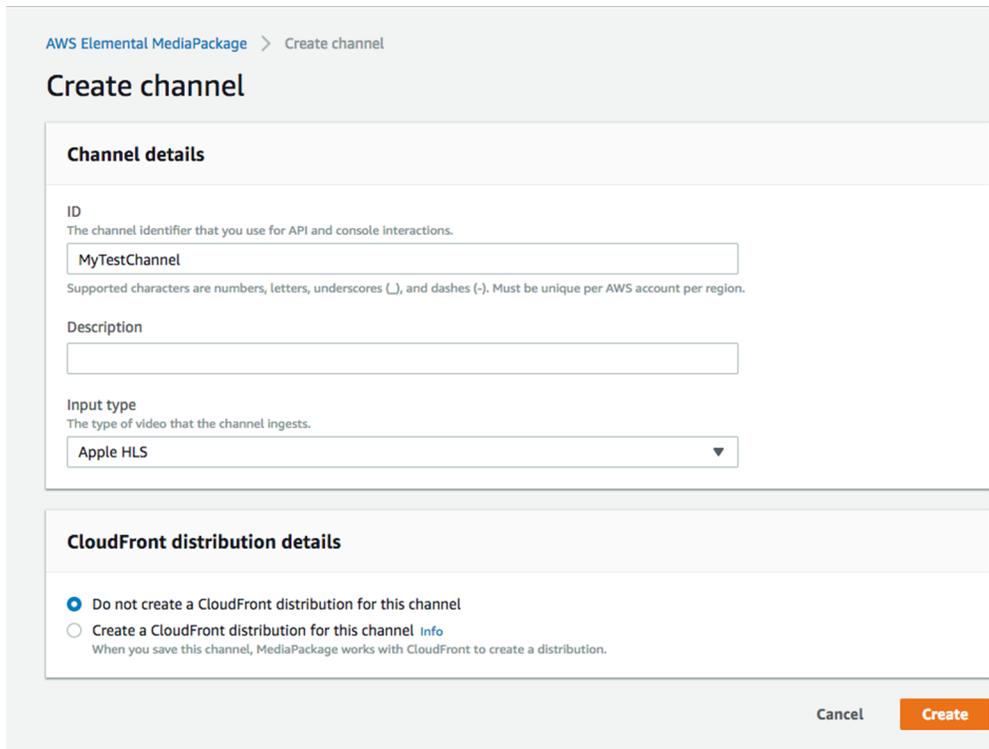
Note: If there is a firewall between the ffmpeg appliance and the internet (highly recommended), the public IP addresses will likely be different from those that the appliance reports. If so, you need to determine the external address being used. The appliance network might also be configured to utilize a

pool of external IP addresses. In this case, you will need the CIDR range for the entire pool to include in the Input Security Group.

STEP A: CREATE A CHANNEL IN AWS ELEMENTAL MEDIAPACKAGE

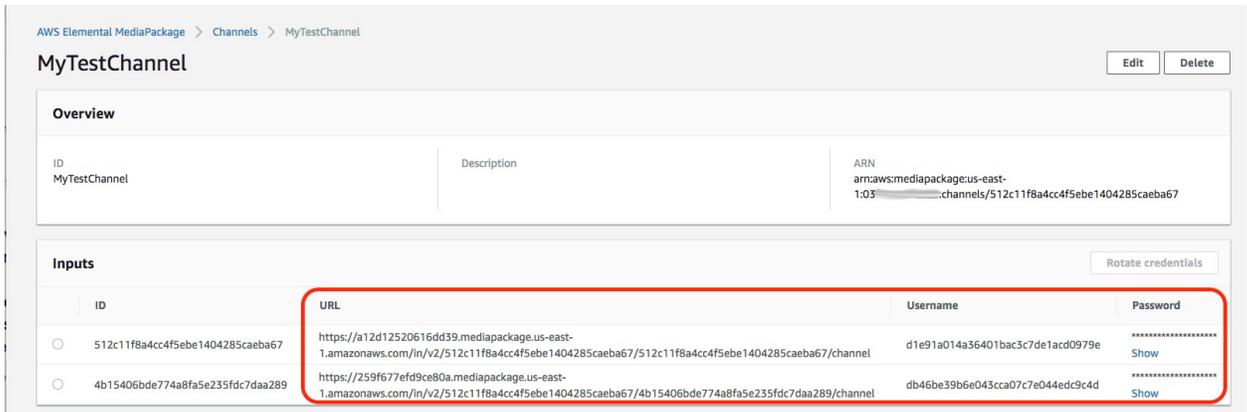
In order to create your AWS Elemental MediaLive channel, you must first know the destination URLs and credentials for your output(s). For this example, use AWS Elemental MediaPackage as your destination. MediaLive requires two output destinations per output group, and MediaPackage provides two inputs per channel:

1. Log into the AWS Elemental MediaPackage console for the same region where you will be using AWS Elemental MediaLive.
2. If you have previously created channels in MediaPackage, the channel listing view will appear. Otherwise the introductory landing page will appear.
 - a. From the landing page, enter a channel name and choose **Next Step**.
 - b. From the Channel Listing page, choose **Create Channel**.
3. For either case above, you should now see the Create channel page:



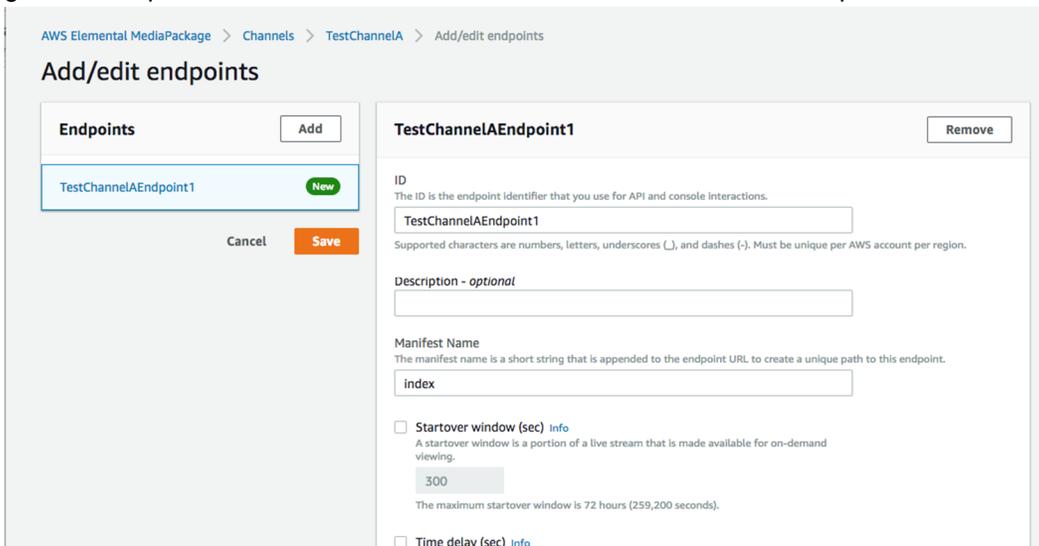
The screenshot shows the 'Create channel' page in the AWS Elemental MediaPackage console. The page has a breadcrumb trail 'AWS Elemental MediaPackage > Create channel'. The main heading is 'Create channel'. Below this, there are two main sections: 'Channel details' and 'CloudFront distribution details'. In the 'Channel details' section, there is a text input for 'ID' with the value 'MyTestChannel' and a description 'The channel identifier that you use for API and console interactions.' Below the input is a note: 'Supported characters are numbers, letters, underscores (_), and dashes (-). Must be unique per AWS account per region.' There is also a text input for 'Description'. Below that is a dropdown menu for 'Input type' with the value 'Apple HLS' and a description 'The type of video that the channel ingests.' The 'CloudFront distribution details' section has two radio button options: 'Do not create a CloudFront distribution for this channel' (which is selected) and 'Create a CloudFront distribution for this channel' with an 'info' link. Below the second option is a note: 'When you save this channel, MediaPackage works with CloudFront to create a distribution.' At the bottom right of the form are 'Cancel' and 'Create' buttons.

4. Add a description if desired. Note that there is an option to create a CloudFront distribution to work with this channel. For production workloads it is important to place a content distribution network (CDN) in front of the MediaPackage endpoints. Choose **Create** to save and create the channel. The channel detail page appears.



Make a note of the **Input URL**, **Username**, and **Password** for each of the two inputs (use the **show** button to reveal the password) as you will need to use these values when creating your AWS Elemental MediaLive channel.

- Just below the channel detail tile, choose **Add endpoints** to create an appropriate endpoint to be able to view your channel. For this example, it is sufficient to create a simple HLS endpoint so just give it a unique name in the **ID** field and choose **Save** to create the endpoint.



When the MediaLive channel is up and running you will be able to point an HLS compatible player or browser at the endpoint (or the CloudFront URL if you enabled CloudFront at channel creation) to view the channel, or you can preview it from inside the MediaPackage console.

- Keep this browser session active so you can easily come back later to check your channel.

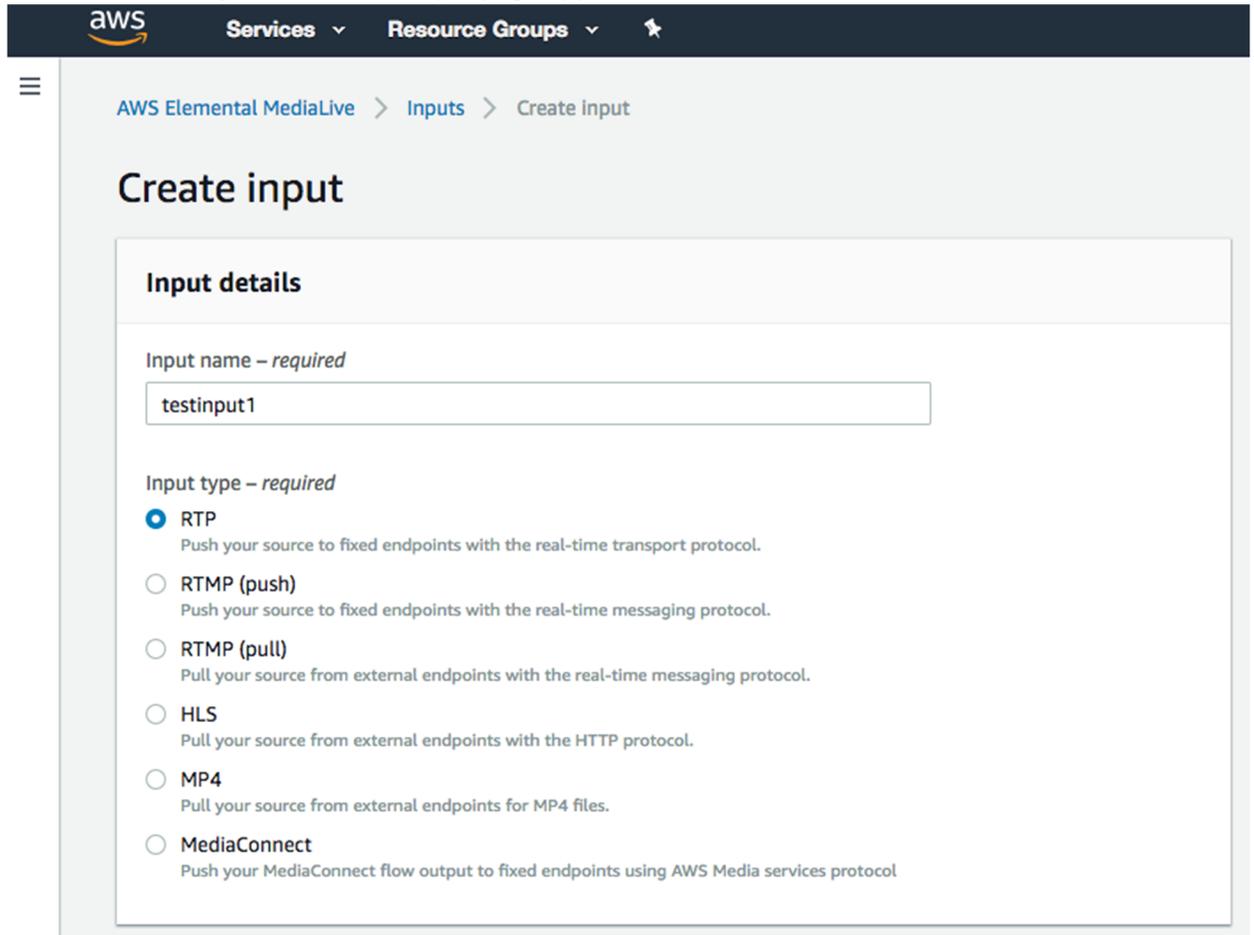
STEP B: SET UP INPUTS IN AWS ELEMENTAL MEDIALIVE

- In a new browser tab or window, log into the AWS Elemental MediaLive console for the same region you just used to create your AWS Elemental MediaPackage channels and endpoints.
- Take the appropriate action:
 - If the standard service page appears, choose **Inputs** from the navigation panel on the left side.

- If the service landing page appears, expand the left-hand menu by choosing the three horizontal lines near the top just below the AWS icon. Choose **Inputs**.

The Input listing page appears.

3. Choose **Create input**. The Create input page appears.



aws  Services ▾ Resource Groups ▾ ⌵

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AWS Elemental MediaLive > Inputs > Create input

Create input

Input details

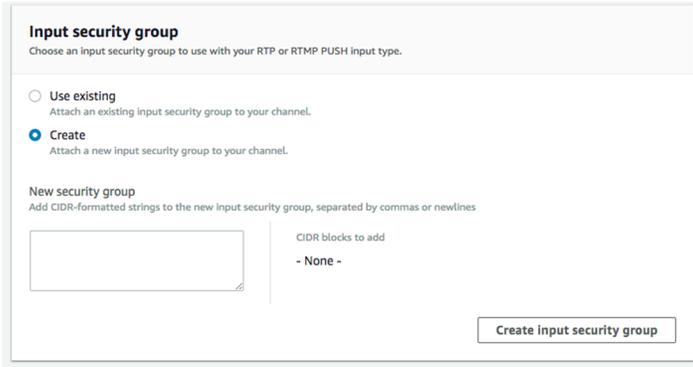
Input name – *required*

Input type – *required*

- RTP**
Push your source to fixed endpoints with the real-time transport protocol.
- RTMP (push)**
Push your source to fixed endpoints with the real-time messaging protocol.
- RTMP (pull)**
Pull your source from external endpoints with the real-time messaging protocol.
- HLS**
Pull your source from external endpoints with the HTTP protocol.
- MP4**
Pull your source from external endpoints for MP4 files.
- MediaConnect**
Push your MediaConnect flow output to fixed endpoints using AWS Media services protocol

4. Complete the fields as follows:

- **Input name:** Assign a meaningful name.
- **Input type:** Choose **RTP**.
Note: Forward Error Correction (FEC) is always enabled on MediaLive inputs, so there is no option to enable or disable it.
- **Input security group:** Choose **Create**.



- **New security group:** Using CIDR format, type the set of IP addresses from the Prerequisite step in this document. If you're entering a range, specify a mask that encompasses all of the addresses, or enter several CIDR entries to encompass all of the addresses.
5. Choose **Create input security group**. The tile changes to show the newly created group.
 6. Choose **Create**. The new input appears in the list of inputs.
 7. Make a note of the endpoint URLs. You will need to enter them in the ffmpeg command line(s) in the next step.
 8. Leave this page open. You will return to it in a later step.

STEP C: PREPARE THE APPLIANCE

Important: Depending on the length of the file you are using you may want to wait to execute this command until after you have your AWS Elemental MediaLive channel in the Running state. Because this example is using RTP, a protocol with no acknowledgement required from a destination, the command will immediately start streaming your content upon execution regardless of whether there is a channel there to receive it. Prepare the command line as shown below and leave it ready so you can just switch to the terminal and hit Enter when you want to start streaming.

Note: You may have to recompile ffmpeg with support for PROMPEG to enable support for FEC. Assistance with the compiling of ffmpeg is outside of the scope of this document.

The basic command to transmit RTP with FEC is as follows:

```
./ffmpeg -re -i <source_file> -c copy -map 0 -f rtp_mpegts -fec prompeg=l=5:d=20
rtp://<IP>:5000
```

Option	Definition
-re	Stream in real-time, using the frame rate of the source
-i <source_file>	Source file that will be transmitted
-c copy	Use the audio and video as-is (no transcoding)
-map 0	Use all streams in the source file
-f rtp_mpegts	Set the output format to MPEG-TS over RTP
-fec prompeg=l=5:d=20	Enable FEC and add 5 columns and 20 rows of FEC data

rtp://<IP>:5000

Output RTP to the address defined in <IP>, using port 5000

Example:

```
./ffmpeg -re -i mySourceFile.ts -c copy -map 0 -f rtp_mpegts -fec prompeg=1=5:d=20
rtp://192.0.2.100:5000
```

Note: The ffmpeg process can only send to a single destination.

To provide the two inputs required for redundancy and fault tolerance in the AWS Elemental MediaLive workflow, set up two ffmpeg instances. These instances can be on the same device, or on two different appliances, depending on the capabilities of the appliance and the ffmpeg parameters being used. The destinations to use for these two instances are the URLs referenced in Step B.

STEP D: CREATE A CHANNEL IN AWS ELEMENTAL MEDIALIVE

1. Switch back to the AWS Elemental MediaLive console.
2. Choose **Channels** from the left-hand column, then choose **Create channel**. The Create channel page appears.
3. For **Channel name**, type a meaningful identifier for the channel.
4. In the **Channel template** section, choose **HTTP Live Streaming**. The Channel navigation panel is populated with:
 - One output group named TN2224 (HLS)
 - Ten outputs that all belong to that output group.
5. In the IAM role section, take the appropriate action:
 - If the **Create role from template** option is *enabled*, select that option and choose **Create IAM role**. The role is created. Once the creation process is complete, the role is automatically selected from the **Use existing role** drop-down.
 - If the **Create role from template** option is *grayed out*, select **Use existing role** and then select **MediaLiveAccessRole** from the dropdown.

General info

Channel name – *required*

IAM role

Defines the permissions for accessing your channel. If you create an IAM role instead of using an existing role, it might take a few minutes before the service makes the new role available for you to use.

Use existing role
 Create role from template
The IAM user MediaLiveAccessRole is already created.
 Specify custom role ARN

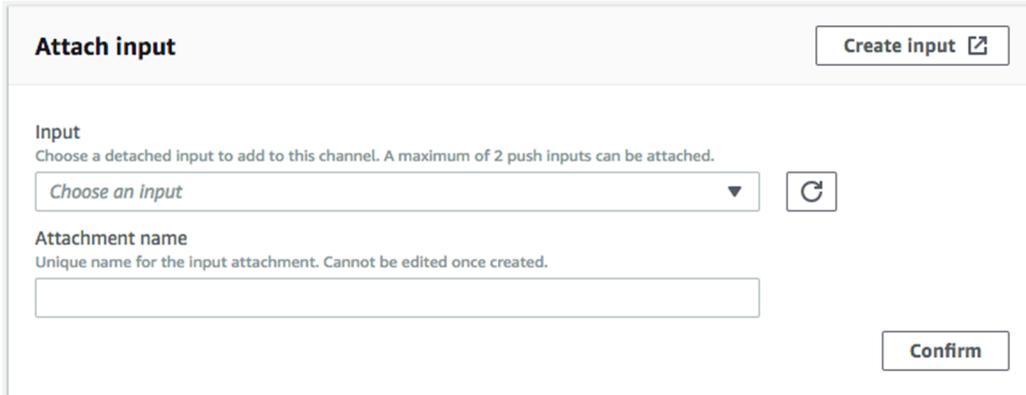
Use existing role

Use an existing IAM role. This field displays only the roles that include a compatible medialive.amazonaws.com service principal. It's your responsibility to ensure that this role has the permissions that AWS Elemental MediaLive needs.

Remember role

AWS Elemental MediaLive will save this IAM role for you. You can choose to use it the next time you create a channel.

6. In the Channel template section, choose **HTTP live streaming** from the drop-down list. The output group and outputs appear in the left-hand column.
7. Under Input specifications, adjust the Maximum input bitrate, input resolution, and codec as appropriate for the content you will be sending from your appliance.
8. In the left-hand column choose the Add button beside **Input attachments**. The Attach input card appears to the right. Choose the input you created earlier from the drop-down and then choose Confirm. Additional options appear to configure the network input settings, which you can adjust if necessary for your particular source.



Attach input Create input 

Input
Choose a detached input to add to this channel. A maximum of 2 push inputs can be attached.

Choose an input  

Attachment name
Unique name for the input attachment. Cannot be edited once created.

Confirm

9. In the left hand column, navigate to “output groups” and choose the group named TN2224 (HLS). The Output Group details appear to the right.
 - In the **HLS group destination A** section, expand the **Credentials** sub-section, then complete the fields with the information from the *first* input of the AWS Elemental MediaPackage channel you created earlier (as described in Step A, part 4).
 - **URL:** Type the first URL.
 - **Username:** Type the first username.
 - From the list of **Password** options, select the **Create AWS Elemental MediaLive parameter**. In **Name**, enter a meaningful name for the EC2 parameter store entry where your credentials will be stored.
 - **Password:** Type the first password from the AWS Elemental MediaPackage channel. The password will be stored securely in the AWS EC2 parameter store under the name `medialive/<name you entered above>`.

Choose the **Create AWS Elemental MediaLive parameter** button to create it.

1. TN2224
Remove

HLS group destination A

Type a destination for your first HLS group.

URL

▼ **Credentials (optional)**

Username

Password

Retrieves the password that is stored in the specified parameter in Amazon EC2 Systems Manager Parameter Store.

Use an existing AWS Elemental MediaLive parameter.
 Create AWS Elemental MediaLive parameter.
 Use an existing parameter.

Use an existing AWS Elemental MediaLive parameter.

Choose parameters that were created specifically for AWS Elemental MediaLive.

Choose a name
▼

10. Repeat step 8 for **HLS group destination B**, using the information from the *second* input of the AWS Elemental MediaPackage channel.
11. Under HLS settings, change “Input Loss Action” from EMIT_OUTPUT to PAUSE_OUTPUT. This will allow AWS Elemental MediaPackage to detect a loss of input on one of the MediaLive pipelines and switch any endpoints using the failed pipeline to use the other redundant pipeline.
12. This channel template includes a WebVTT captions output. However, we didn’t define a caption selector on the input, nor did we configure captions on the source appliance. Navigate to the HLS outputs card and choose the X to the right of Output 10 (_webvtt) to delete the captions output.
13. In the Channel navigation panel on the left, choose **Output 1** from the list of **Output groups** under **TN2224 (HLS)**. The details for that output appear.
14. Examine the video and audio encodes for this output and make any desired changes.
15. Repeat for the other outputs. The only differences among the outputs are in resolution and bandwidth.
16. Choose **Create channel**. The page with the list of channels appears, showing the new channel. The status of the channel changes from Creating to Idle.

STEP E: START STREAMING THE VIDEO

1. In AWS Elemental MediaLive, on the Channels page, choose the radio button next to your new channel. The buttons along the top are enabled.
2. Choose **Start**.
The channel state changes to Starting, and then to Running.
3. Switch to the terminal where you have your ffmpeg command line ready to execute, then perform the command.

Video should start streaming from the appliance through to AWS Elemental MediaLive, then to AWS Elemental MediaPackage, where you can view it in a preview window.