GLOBAL LEADER IN
BROADCAST QUALITY
LIVE VIDEO OVER IP

Zixi Broadcaster User Guide

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Zixi Technology

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Zixi Technology

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Introduction to Zixi Broadcaster

The Zixi Broadcaster is the central component in the Zixi Video Network. Zixi Broadcaster takes video streams from Zixi Feeder, and can process the stream, enabling transcoding, transmuxing, recording, and distribution in multiple bit rates and protocols to any device anywhere. The Zixi Broadcaster is an intelligent and versatile video distribution component that may reside on premise at a customers' site, on the customer's cloud, or offered by Zixi as a cloud service. Zixi Broadcaster offers the following features:

- **Robust content delivery over IP** - communicates with Zixi Feeder and Zixi Receiver over UDP-based, video-optimized protocols on private and public IP networks for maximal quality at a predictable latency
- **Adaptive Bit Rate** - Dynamically adjusts stream rate to adapt to changing network conditions, using unicast or multicast, to meet specific application requirements
- **Transcoding** - transcodes to a variety of different profiles and bit rates
- **Format conversion** – supports Internet protocols: HLS/MPEG-DASH/RTMP/FLV/MPEG-TS over HTTP
- **Recording** - store streams as MPEG-TS files.
- **Time-shifting** – records the stream to delay its broadcasting
- **Secure and rapid file transfer** – accelerated and secure file transfers delivered at wire speed and accelerated HTTP delivery including optimized playback of HLS over UDP.
- **VOD** - stored files can be accessed on demand in multiple formats.
- **Clustering and load balancing** – supports cluster architectures to provide continuous uptime.
- **Transport Stream Analyzer** – MPEG-TS ETSI TR 101-290 analyzer (priorities 1 and 2)
- **Content Analysis** - analysis of the stream's audio and video content, including audio levels, audio silence detection, frozen video detection, and more.
- **Monitoring** - captures network and content specific statistical information in real-time.
- **Supports many to many and any to any** - gateway platform between UDP (unicast/multicast), Zixi protected stream (unicast/multicast), RTMP, or other supported formats.
- **Network bonding with hit-less fail-over** – reunites divided streams coming from multiple network channels into a single stream, enabling simultaneous load balancing between multiple networks and ensuring high availability of the stream.
- **Hitless failover** - hitless failover for inputs enables undisrupted streaming when switching from one source to another. Zixi's new hitless failover feature is based on the SMPTE 2022-7 standard, which specifies "seamless" or hitless failover between binary-identical streams with synchronized RTP headers.
- **IFB Support** - a monitoring and cueing system for one-way communication from the director or assistant director to on-air talent or a remote location. IFB support has been

implemented in Zixi Broadcaster Pull and UDP outputs, allowing the decoder with a Zixi Receiver to send audio back to the encoder with a Zixi Feeder.

- **AES stream encryption and decryption** - UDP, File and RTMP input streams can be encrypted by Zixi Broadcaster using a fixed key (AES 128, AES 192, AES 256), which can be entered into the input settings or automatically generated. Zixi Broadcaster can also decrypt contribution streams using a matching key, or securely forward encrypted streams to receivers, without being able to see or analyze the traffic.
- **MPTS demuxing** - MPTS streams can be demuxed into single SPTS input streams for specific programs.
- **SCTE-35** - SCTE-35 markers found in the source input will be used to segment the stream and the #EXT-X-CUE-IN/#EXT-X-CUE-OUT tags will be added to the manifest.
- **Low-latency HLS** - Zixi Broadcaster supports low latency HLS delivery using chunked transfer encoding, which starts sending an HTTP response as chunks of data when they are ready before the complete response is available. Chunked transfer encoding can be use with transport stream (TS) segments and with fragmented MP4 (fMP4), which is also called Common Media Application Format (CMAF). For low latency HLS and DASH, Zixi Broadcaster must be used as an origin server.

Zixi Technology

Zixi's transport stream protocol is a content and network-aware protocol that dynamically adjusts to varying network conditions and employs error correction techniques for error-free video streaming over IP. With minimum overhead to physical bandwidth, this dynamic mechanism provides low end-to-end latency, removes jitter, recovers and re-orders packets, smooths video delivery and regenerates video to its original form, all in real-time.

Zixi delivers outstanding performance (at low predictable latency), superior reliability (no packet loss) and broadcast-grade video quality (SD, HD, and UHD) with no tradeoffs to delay, resolution or stutter.

Streaming from one Zixi-enabled device/server to another Zixi-enabled device/server protects the stream from quality degradations along the path. It enables the streaming of high-quality video over any distance, while overcoming the varying network conditions of the public Internet, where the amount of network errors, packet loss, jitter and out-of-order packets fluctuate "every second".

The Zixi transport stream protocol can be also deployed on part of the path. For example, from a Zixi Feeder to a Zixi Broadcaster (Zixi protected path) and on to the end user through UDP or RTMP. In this case, the path that has challenging conditions (e.g. long distance or unstable wireless conditions) will be protected by Zixi and then delivered on to the end-user on a standard UDP or RTMP protocol.

Zixi's transport stream technology includes the following features for ultimate quality and security:

- Network sensing
- Dynamic de-jitter
- MPEG specific optimizations
- Z-ARQ error recovery
- Z-FEC - Dynamic content aware forward error correction
- Active multi-path error recovery
- Adaptive bitrate over UDP, unicast or multicast
- Rate control and congestion avoidance
- 256-bit AES transport encryption

Zixi Platform Architecture

The Zixi platform architecture shows how a live linear broadcast or event is ingested through a Zixi Feeder (ZF) or Zixi embedded device running Zixi Feeder at acquisition. Zixi Feeder encapsulates the stream in the Zixi transport protocol and delivers point to point or point to multi-point over standard IP connections to Zixi Broadcaster (ZB). Zixi Broadcaster can be deployed on premise or in the cloud with the ability to monitor streams anywhere along the path. For management, processing and larger scale distribution capabilities, Zixi can support complex production workflows for live events, including transcoding, recording, and more, all in

a clustered environment that supports reliability and scalability. The stream is distributed through a CDN, OTT, or endpoint device, running Zixi Receiver (ZR) to any device.
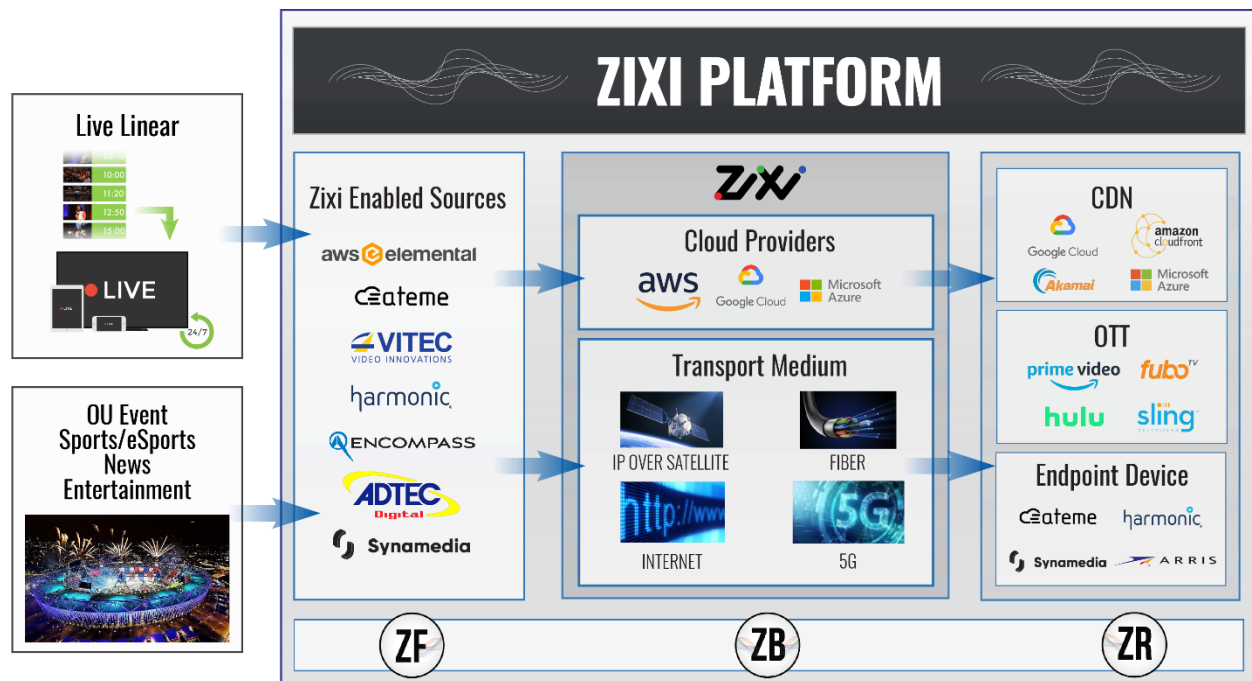
Supported Protocols

Input:

- Zixi protected transport
- MPEG-TS over UDP and/or RTP with SMPTE-2022 and/or
- RTMP pull from CDNs and/or other sources
- RTMP push
- RTMPS
- RTSP input
- RIST (TR-06-1)
- NDI
- Transport stream files from local file system
- SRT (configured via Zen Master or Zixi API)

Supported Protocols

Output:

- Zixi protected transport
- MPEG-TS over UDP and/or RTP with SMPTE-2022 and/or RIST (TR-06-1)
- RTMP and RTMPS push to CDNs and/or other media servers;
- Apple HTTP Live Streaming (HLS)
- Adobe HTTP Dynamic Streaming (HDS)
- FLV over HTTP (HTTP pseudo-streaming)
- MPEG-DASH (DASH264 profile)
- SHOUTcast
- NDI
- Transport stream files to local file system
- Re-multiplex output streams to strict CBR for extensive compatibility with Integrated Receiver- Decoders (IRDs)
- SRT (configured via Zen Master or Zixi API)

Transcoding Options

Zixi Broadcaster can transcode a single input stream using multiple profiles. The transcoder supports the following options:

- Video Decoding – MPEG2, H.264/AVC, H.265/HEVC, Raw
- Video Encoding – MPEG2, H.264/AVC, H.265/HEVC, Raw
- Audio Decoding – AAC, MPEG-1 Audio Layer I / II / III, MPEG-2 Audio Layer I / II / III, AC-3 (Dolby Digital), Opus.

> For AC-3, which can contain up to six discrete channels of sound, the transcoder only supports the left and right channels and will ignore the other channels.

- Audio Encoding – AAC, AAC-HE (High Efficiency) and AAC-HEv2; Pass through (no encoding) – any audio codec (MPEG1/2 / AAC / AC-3, E-AC-3 (Dolby Digital Plus), Opus.

Recording Options

Live stream inputs can be stored as MPEG-TS files to a local disk drive or mounted drive.

Multicast Options

Multicast streams can be received or be sent by the Zixi Broadcaster. Zixi Broadcaster serves as a gateway between Unicast and Multicast streams, while allowing reliable streaming over multicast.

Adaptive Options

Zixi Broadcaster can create an adaptive group, subsequently editing, recording, or playing it in conjunction with DASH, HLS, HDS or Zixi. You can also set a Pre-roll video/screen that will be played before the live streaming begins.

VOD Options

Zixi Broadcaster supports VOD (Video on Demand) playback of stored files in multiple formats such as TS, MP4, HLS, FLV.

Latency Considerations

Latency defines the delay in which the video stream will be delivered to the endpoint. This delay is essentially a buffer that is used for additional processing, thereby improving the quality of video stream. The latency should be considered based on the importance of immediacy. For example, if the video requires interaction (e.g. between a reporter in the field and an anchor in

Latency Considerations

the studio), the latency should be set to a minimum so that the interaction does not suffer from any delay.

Latency can vary from tens of milliseconds to several seconds.

Zixi protocol can start providing benefit from one frame (30ms), while increasing the latency will provide more robustness for the error-recovery.

Logging in to the Broadcaster

➡ **To log in to Zixi Broadcaster:**

1. In your web browser, navigate to http://localhost:4444.
   A user authentication window opens.
2. In the **User Name** field, enter **'admin'**.
3. In the **Password** field, enter **'1234'**.
4. Click **OK**.
   The Broadcaster UI opens on the **Status** page.

Activating Your License

In order to start using Zixi Broadcaster, first activate your license. Zixi Broadcaster and its optional features are activated by license files. Before using Zixi Broadcaster, and when adding optional features, **activate** the appropriate license.

Online Activation (License Key)

The following procedure requires connectivity to the Internet. If you are not able to connect, you can activate the Broadcaster using the procedure described in OFFLINE ACTIVATION (LICENSE FILE).

To Activate the License online using a License Key:

1. In the **Status** page of the Zixi Broadcaster UI, click **Options** in the menu bar.
   The drop-down menu is displayed.
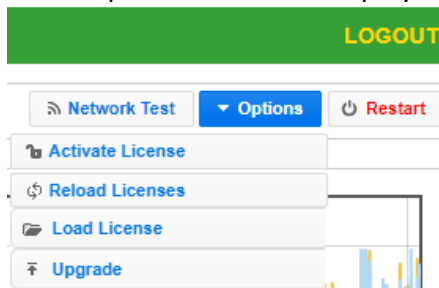
2. Click **Activate License.**
   The **Activate License** window appears.
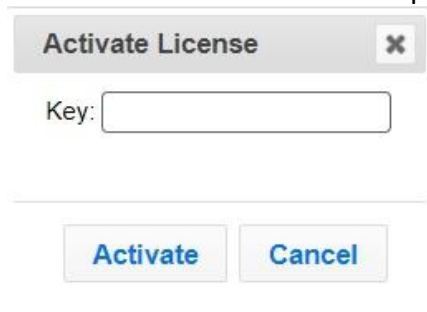
3. In the **Key** field, enter your Activation Key.
4. Click **Activate**.
   The Zixi Broadcaster is enabled.

Offline Activation (License File)

If you want to activate your license without an internet connection, you can upload a License File. To obtain a license file, please contact *Zixi Support* at support@zixi.com.

Reloading the License

➡ **To Load the License File:**

1. In the **Status** page of the Zixi Broadcaster UI, click **Options** in the menu bar.
   The drop-down menu is displayed.
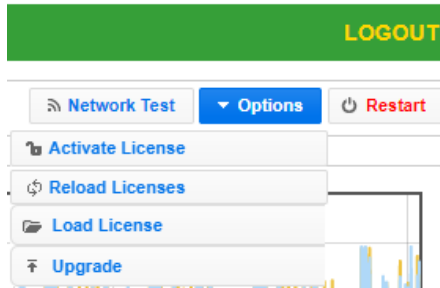
2. Click **Load License.**
   The directory of the local drive opens.
3. Navigate to the License File and click **Open**.
   A prompt window instructs you to Reload the license to activate the license.
4. Click again on **Options** and select **Reload Licenses** from the dropdown menu.
   The Zixi Broadcaster is enabled.

Reloading the License

In the event that your license expires, you must re-enter a new Zixi license key.

➡ **To reload the license:**

1. In the **Status** page of the Zixi Broadcaster UI, click **Options** in the menu bar.
   The drop-down menu is displayed.
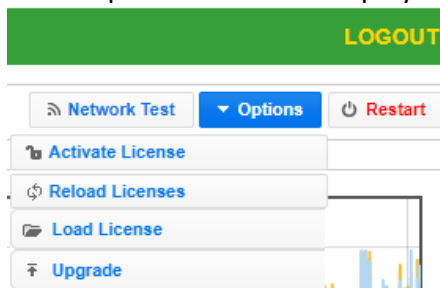
2. Click **Reload License.**
   The Zixi Broadcaster is enabled.

Upgrading the Product Version (Linux)

When a new version of Zixi Broadcaster becomes available, you will receive a new installation archive file (.tar.gz file) from your Zixi representative to upgrade your Zixi Broadcaster software. It is recommended to perform the installation within a "maintenance window" and notify end users that the streaming will be momentarily interrupted. The upgrade process may last a few minutes after which the streams will be automatically resumed.

Upgrading the Product Version (Linux)

➡ **To upgrade the version:**

1. In the **Status** page of the Zixi Broadcaster UI, click **Options** in the menu bar.
   The drop-down menu is displayed.
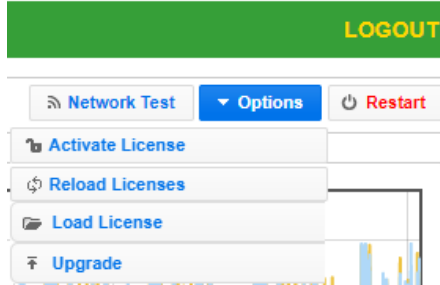
2. Click **Upgrade**.
3. Select the relevant installation archive file (.tar.gz file) and click **Open**.
   The installation process will begin. The process may take up to a few minutes. During the process, the streams and the management UI will not be available. After the upgrade, all streams will be automatically resumed.

Viewing Status

The Status screen displays aggregated statistics on all the input and output streams and a graph representing the network utilization of active streams over time.

➡ **To View the Status of the Streams:**

In the Zixi Broadcaster **Status** page, the **General** area, **Network Status** area, **License Information** area**, Machine Information** area and **Operating System** area are displayed.

General Status

General	
ID	The Zixi Broadcaster ID number
Host ID	Displays the ID of Zixi Broadcaster host.
Start Time	Displays the time that the Zixi Broadcast began to actively stream content.
Up Time	The duration of time that the broadcast is running.
Inputs	The number of current active inputs
Outputs	The number of current active outputs
Remote In [kbps]	The current aggregate input bitrate from remote sources – Zixi Push/Pull (in Kbps)
Local In [kbps]	The current aggregate input bitrate from local sources – UDP streams (in Kbps)
Remote Out [kbps]	The current aggregate output bitrate to remote destinations (in Kbps)
Local Out [kbps]	The current aggregate output bitrate to local destinations (in Kbps)
HTTP Out [kbps]	The current aggregate output bitrate for HTTP streams - FLV/RTMP/HLS/ MPEG-TS over HTTP (in Kbps)
kBytes Sent	The cumulative traffic transmitted (in Kbps)
kBytes Received	The cumulative traffic received (in Kbps)
RTMP Server	Active – the RTMP server is enabled (See Settings > Live Protocols > RTMP Server section) Off – the RTMP server is disabled

Network Status

The network status graph displays the total input/output bitrate during the last hour. The changes in the amplitude of both the input (gold) and output (blue) presented in 10-minute intervals.
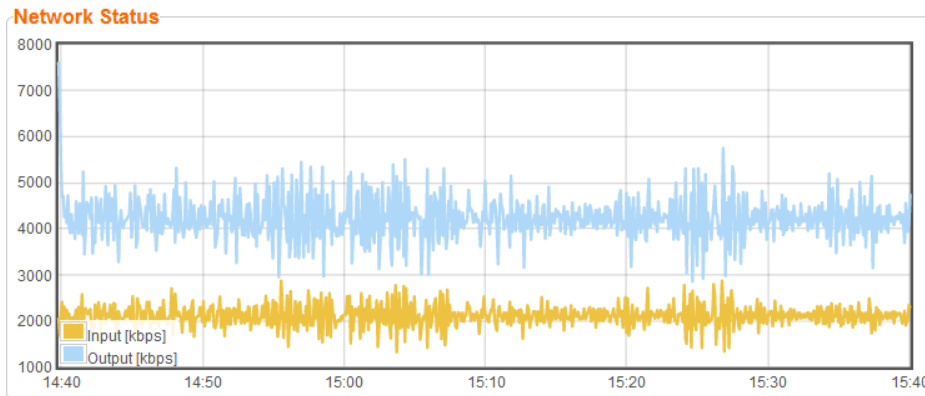
Viewing Current License Information

You can view the current license information in the **License Information** section.

Metered License Monitoring

If you have a metered license (based on usage), you can view the license conditions and monitor your current usage status under the License Information section on the main screen.
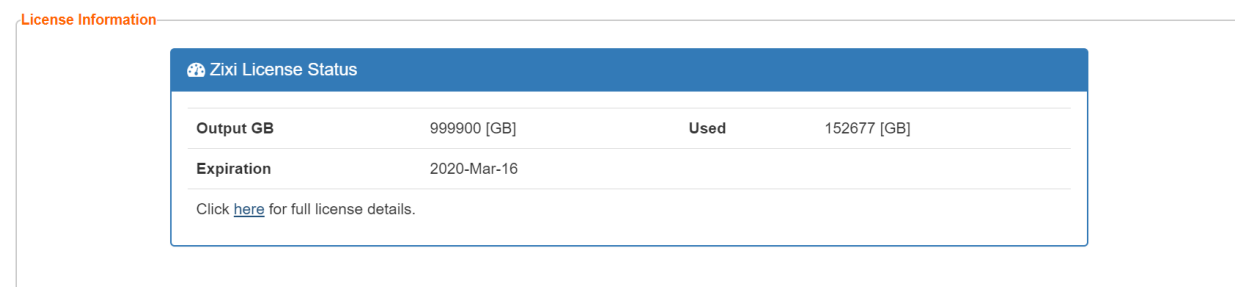
The section includes the following elements:

Element	Description
Output GB	The total amount of output traffic in GB per month that is allowed in the license.
Expiration	License expiration date.
Used	The actual usage this month so far in GB.

Viewing Current License Information

To view additional license terms and usage statistics, click the link at the bottom of the Zixi License Status box.
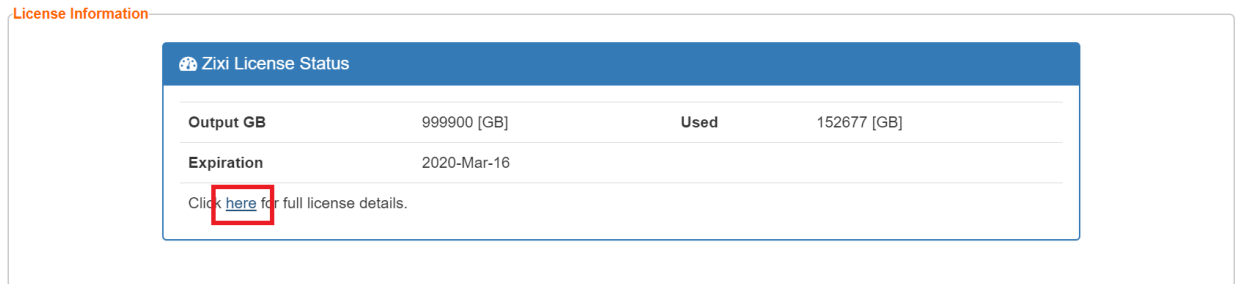
The License Status Screen is displayed.

Viewing Current License Information

License Status Screen

Machine Information

The screen includes the following elements:

Element	Description
Application	The product version and license key.
Meters	- Output GB - The total amount of output traffic in GB per month that is allowed in the license. - Expires - license expiration date. - Available - the total amount of traffic in GB per month that is allowed in the license. - Used - the actual usage this month so far in GB..
Limits	License usage restrictions. Unlimited - no restrictions.
Features	List of enabled/disabled features.
Daily Usage	Daily traffic statistics. Click the Host drop-down menu to select a specific host.
Daily Bitrate	Daily bitrate statistics. Click the Host drop-down menu to select a specific host.

Machine Information

This pane shows information about the machine on which the Broadcaster is installed.

The pane includes the following data:

Parameter	Description
System Model	The model of the machine on which the Broadcaster is installed.
Processor Model	The model and specifications of the machine's processor.
Processor	The number of CPUs installed on this machine.

Logical Cores	The number of logical cores per processor (for each processor).
Installed RAM	The size of the RAM installed on the machine.
GPU(s)	The number of GPUs. If no GPUs - Not Found.

Operating System Information

This pane shows information about the operating system running on the machine.

```
OS Information
           OS: Amazon Linux release 2 (Karoo)
        Build: 4.14.88-88.73.amzn2.x86_64
 Architecture: x86_64
```

The pane Includes the following data:

Parameter	Description
OS	The operating system running on the machine.
Build	The operating system build (version) number.
Architecture	The system architecture of the operating system, number of bits.

Network Cards (Linux only)

This pane shows information about the network cards running on the machine. Each line represents another network card.

```
Network Cards
NIC          Link Speed    Duplex        IPs
eth0                       Full          172.31.17.149
```

The pane Includes the following data:

Parameter	Description
NIC	The name of the Network Interface Controller (a.k.a network card).
Link Speed	The link speed capability of the network card.
Duplex	Full - full duplex Half - half duplex

Network Cards (Linux only)
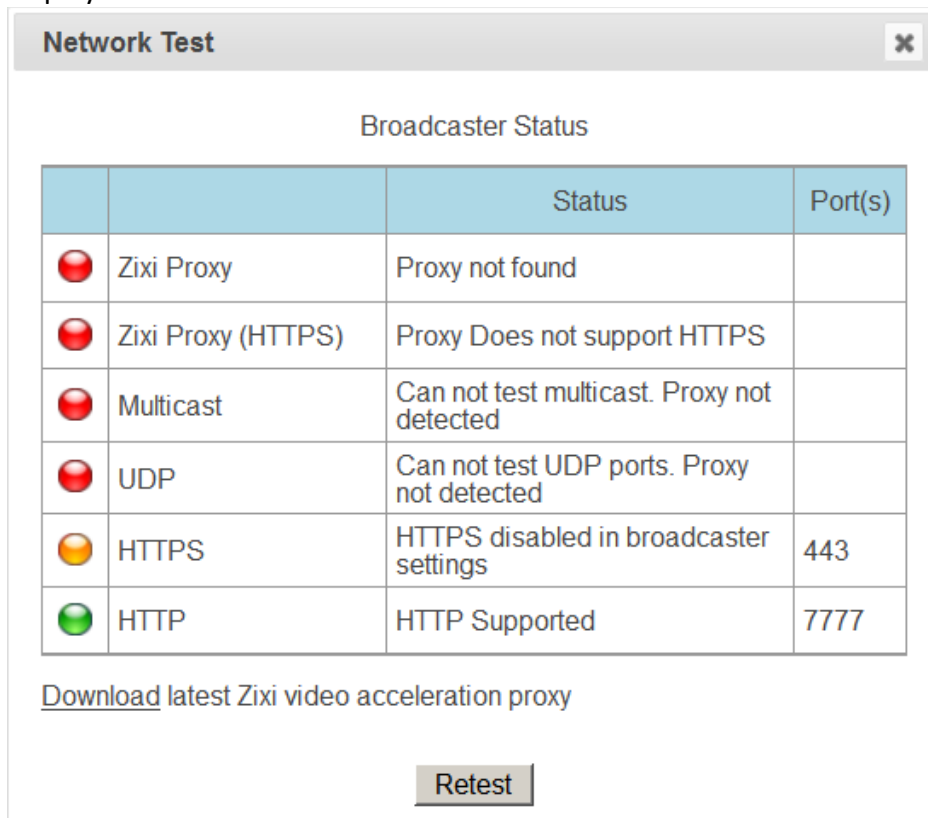
IPs	The IP of the network card.

Network Test

You can test the Zixi Broadcaster status, the status of the http or https connection with the relevant port, and the status of the Zixi Video Acceleration Proxy component. This can be accomplished remotely after the installation of the Broadcaster and subsequently any time after that.

➡ **To Test the Network:**

1. In the Zixi Broadcaster **Status** page, click [🔊 Network Test]. The **Network Test** screen is displayed:

The Broadcaster Status table lists the various components of the Zixi Broadcaster with the relevant ports and status (description) and the following health indicators:
- **Green** – component has been tested and was found available.
- **Yellow** – component has been disabled.
- **Red** – component was not found or is not available.

Click **Retest** to run an additional test on all the server's current connections and their relative ports.

The following tests will be displayed:

Installing the Zixi Video Acceleration Proxy

- **Zixi Proxy** – checks that the Zixi Video Acceleration Proxy is running on the local machine and is listening through port 4500 (HTTP).
- **Zixi Proxy (HTTPS)** – checks that the Zixi Video Acceleration Proxy is running on the local machine and is listening through port 4501 (HTTPS).
- **Multicast** – checks if the multicast feature is enabled.
- **UDP** – checks if Zixi Broadcaster can be accessed through UDP (port 2077).
- **HTTP** – checks is Zixi Broadcaster can be accessed through HTTP (HTTP server port 80).
- **HTTPS** - checks is Zixi Broadcaster can be accessed through HTTPS (HTTPS server port 8080)

Installing the Zixi Video Acceleration Proxy

The Zixi Video Acceleration Proxy is a software component, which is installed on the local machine, that enables pulling a stream from Zixi Broadcaster over HTTP, while using the Zixi protocol. The Zixi Video Acceleration Proxy is mainly used to preview a stream to assess its quality, by playing it on a local player. VLC video player has another version of the proxy, called Zixi VLC Plugin, which offers the same functionality. For more information, see Zixi VLC Plugin Setup Guide.

The Zixi Video Acceleration Proxy component is installed on the local machine, while Zixi Broadcaster can be running on another machine (e.g., in the cloud) or can be running on the same machine. The Proxy uses port 4500 (HTTP) or 4501 (HTTPS) to listen to the stream.

The Zixi Video Acceleration Proxy is also required when using Zixi Broadcaster to transfer large files. In this case, the component allows both uploading and downloading the files. For more information, see **Accelerated File Transfer.**

➡ **To Install the Zixi Video Acceleration Proxy:**

1. In the Zixi Broadcaster **Status** page, click Network Test . The **Network Test** screen is displayed.

Installing the Zixi Video Acceleration Proxy

    2. On the **Network Test** screen, click the **Download** link below the table.

		Status	Port(s)
🔴	Zixi Proxy	Proxy not found	
🔴	Zixi Proxy (HTTPS)	Proxy Does not support HTTPS	
🔴	Multicast	Can not test multicast. Proxy not detected	
🔴	UDP	Can not test UDP ports. Proxy not detected	
🔴	HTTPS	HTTPS Request failed	
🔴	HTTP	HTTP Request failed	

Download latest Zixi video acceleration proxy

[Test Again] [Close]
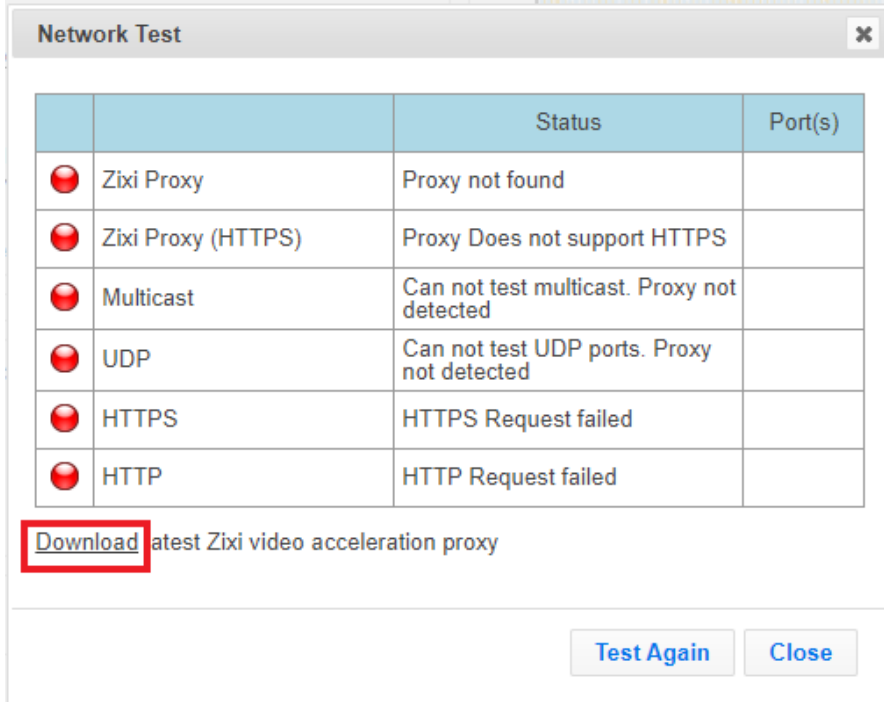
    The setup file will be downloaded locally.

    3. Run the downloaded file to open the setup wizard.

Z Zixi video acceleration proxy Setup

Welcome to Zixi video acceleration proxy installer.

The wizard will install Zixi video acceleration proxy on your computer.

[Next >] [Cancel]
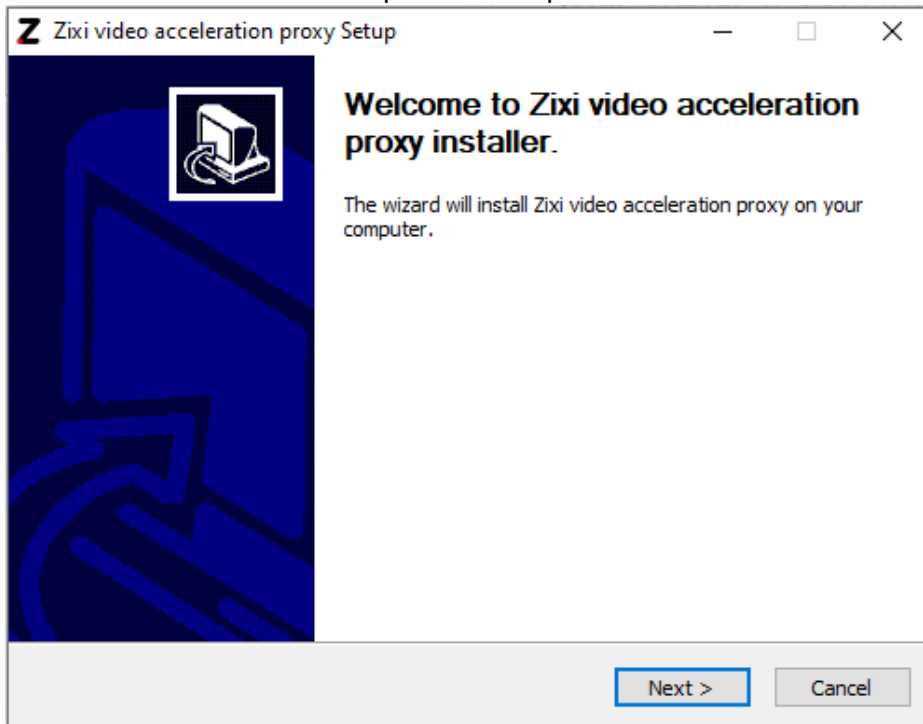
    4. Click **Next**.

Installing the Zixi Video Acceleration Proxy

5. Select a destination folder to install.
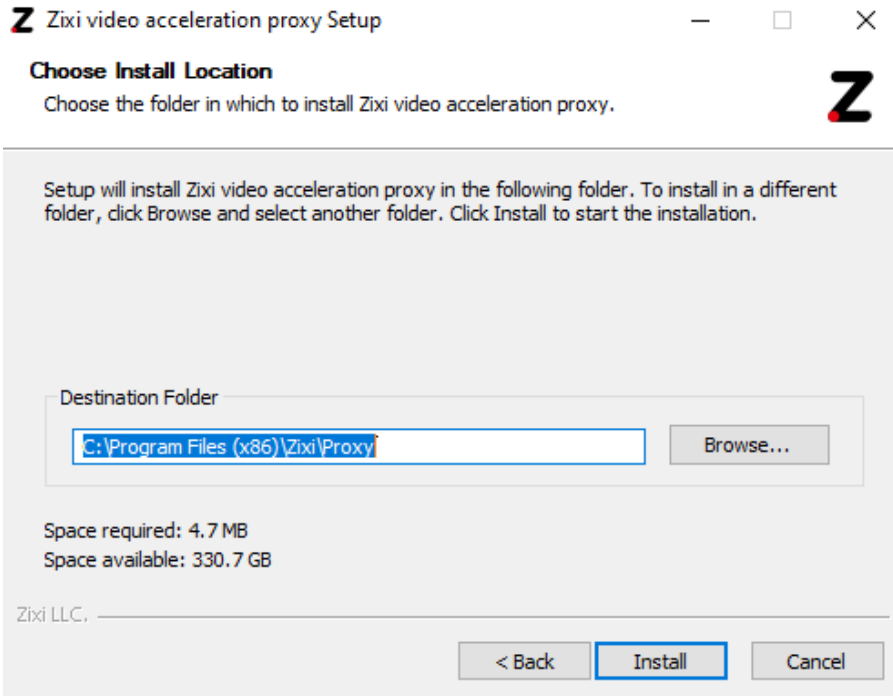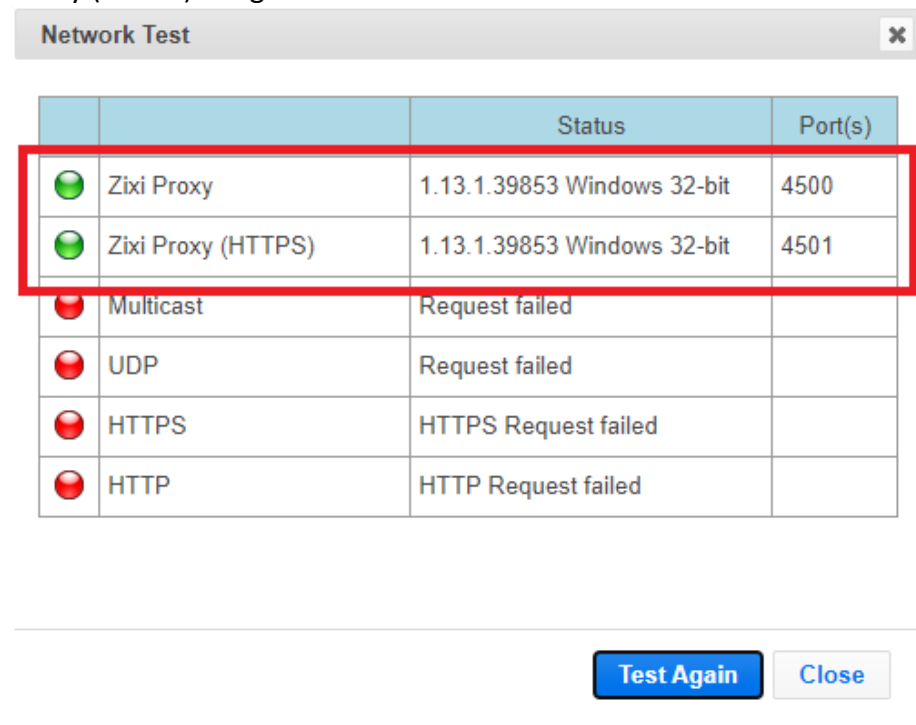
6. Click **Install**.
7. After the installation process, click **Finish**.
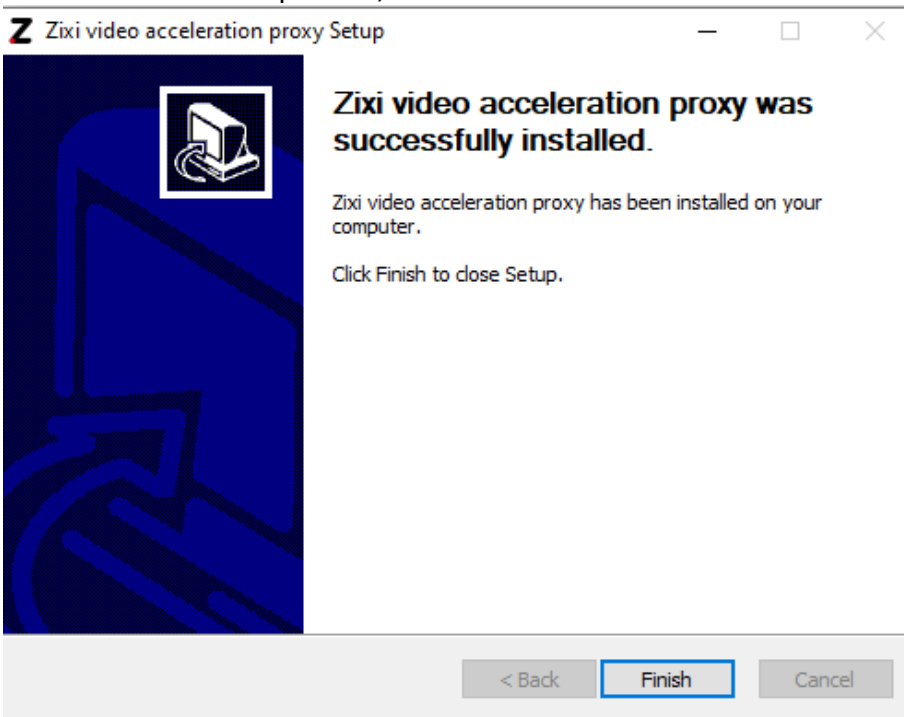
Using the Zixi Video Acceleration Proxy for previewing a stream

If you will run the network test again, you should be able to see that the Zixi Proxy and Zixi Proxy (HTTPS) are green.

Using the Zixi Video Acceleration Proxy for previewing a stream

The Zixi Video Acceleration Proxy can be used for previewing a stream through a video player. The locally installed Proxy can be accessed through the following IP address – `127.0.0.1`. The following URL - `127.0.0.1:4500/version.json` will provide a response that includes the version and build numbers of the Proxy.

➡ **To playback a stream using the Zixi Video Acceleration Proxy:**

1. In a web-connected video player, enter the following network URL:
   http://127.0.0.1:4500/?url=<broadcaster_ip>:2077/<stream_name>.

Using the Zixi Video Acceleration Proxy for previewing a stream

The video will be streamed to the player through the locally installed Proxy.
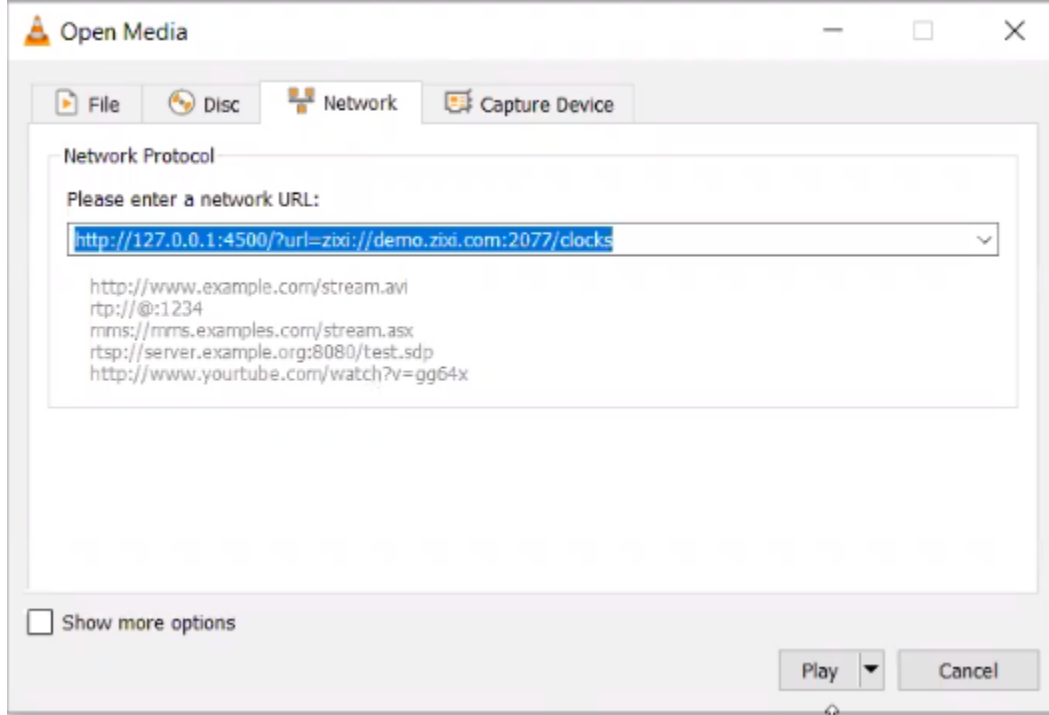
Broadcaster Inputs

You can add input streams to Zixi Broadcaster from one of the following sources:

- **Zixi Feeder (Push)** – the Zixi feeder pushes the stream to the Zixi Broadcaster. Since both the Zixi Feeder and the Zixi Broadcaster use the Zixi protocol, the stream is protected by the Zixi protocol.
- **Another Zixi Broadcaster (Pull)** – the Zixi Broadcaster can pull a stream from another Zixi Broadcaster. Since both components use the Zixi protocol, the stream can be protected by the Zixi protocol.
- **UDP streams** - the source is a UDP or RTP stream, RTP + SMPTE 2022 FEC over unicast or multicast.
- **Delayed** - input stream will be stored on the local disk, while a variant of the input is created and delayed according to the specified duration.
- **Local files (for VOD)** – the source in this case is a local transport stream file from your local computer or local network.
- **RTMP streams** - The source is an RTMP stream, pushed into the Zixi Broadcaster or pulled by it.
- **RTSP** - The source is an RTSP stream, pushed into the Zixi Broadcaster, or pulled by it.
- **HLS** - The source is an HLS stream that is pulled by the Zixi Broadcaster.
- **HTTP Pull/Push (TS over HTTP)** - The source is a Transport Stream over HTTP, which is pushed into Zixi Broadcaster or pulled by it.
- **RIST** – The source is a RIST stream using Simple or Main Profile over unicast or multicast.
- **SRT** – The source is an SRT stream and is configured via Zen Master or Zixi API only.

Adding Input Streams

The Zixi Broadcaster enables you to add various types of streams. When you create a new stream, select the stream type and then fill in the fields that are applicable for that stream type.

Adding Push Streams

Typically, a Push Stream is transmitted from a Zixi Feeder. In this case, the stream is initiated by the Zixi Feeder while the Zixi Broadcaster remains in "listening mode" until the stream is initiated.
If the stream is an MPTS stream and you want to demux it into separate SPTS input streams, create the stream, by following the instructions below, and then follow the instruction in the **Demuxing an MPTS Stream** section.
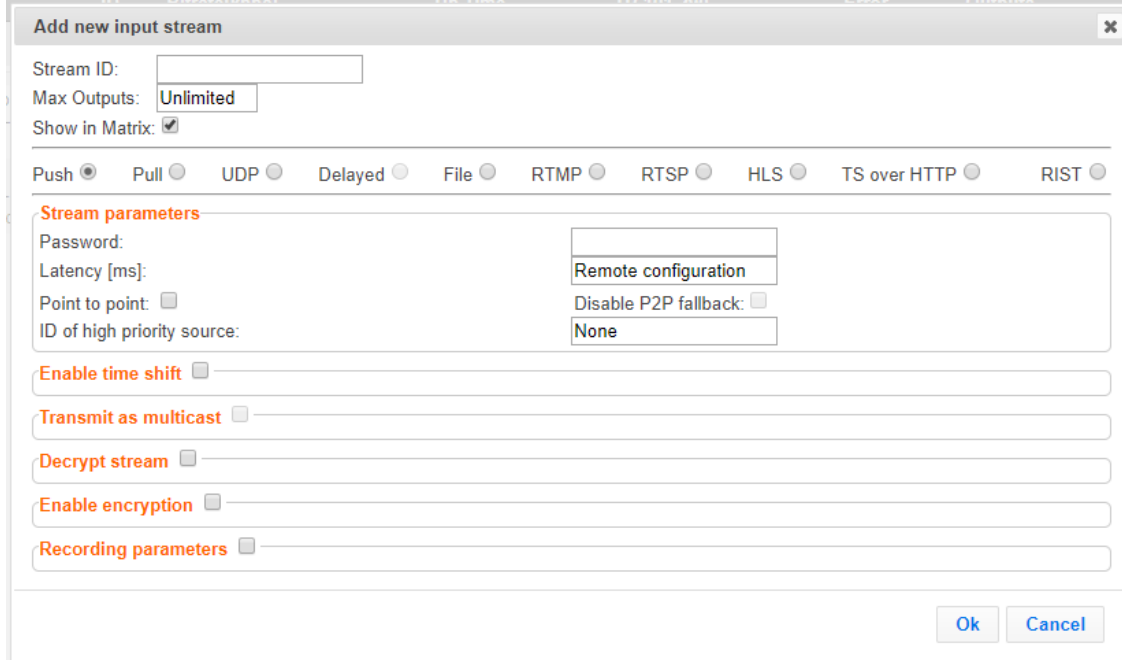
➡ **To Add a Push Stream:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.

Adding Input Streams

In the **Menu** bar, click **New Input**. The **Add a new input stream** window is displayed.

Enter the unique **Stream ID** for the Broadcaster.

> Note: this must be identical (case sensitive) to the stream name configured in the Zixi Feeder.

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

> This setting can be modified without interrupting an existing stream.

Select the **Show in Matrix** checkbox to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Select **Push** for this input stream.

Specify the **Stream Parameters** (see Input Stream Parameters Table below).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameter Table below). The stream will be recorded and broadcasted after the specified delay. The time shift feature is typically used to broadcast a live event across time zones (due to the time differences between locations).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameter Table).

If you want to record the stream, you can configure the **Recording Parameters** (see Input Stream Parameter Table).

You can decrypt an encrypted stream as it enters Zixi Broadcaster. To decrypt a stream, select the **Decrypt Stream** checkbox and fill in the parameters as describes in the Input Stream Parameter Table below. For more information, see **Decrypting an Input Stream in Zixi Broadcaster.**

Adding Input Streams

Click **OK**. The "Input added" message appears on the top of the screen. The Push Stream from the Zixi Feeder is added to the Zixi Broadcaster and now appears in the list of input streams available in the Zixi Broadcaster input UI.

Input Stream Parameters Table

Parameter	Description
Stream Parameters	
Password (Optional)	If desired, enter a password string to use for authentication (must be identical to the string configured on the Feeder) This setting can be modified without interrupting an existing stream.
Latency [ms]	Specify the maximal latency that will override the latency that was defined in the Feeder (in ms). Default: Remote configuration (i.e. use the latency was set in the Feeder). (See **Latency Considerations**) This setting can be modified without interrupting an existing stream.
Point to point only	Selecting this checkbox transmits the stream directly (point-to-point) from the Feeder to the Receiver, while only delivering messaging to the Broadcaster. In case there is a problem with the P2P connection, it will re-route the transmission through the Zixi Broadcaster.
Disable P2P Fallback	Selecting this checkbox will allow <u>only</u> P2P (disabling the option to re-route traffic though the Zixi Broadcaster)
ID of high priority source	Specify the ID of the Zixi Feeder for which you want to grant priority. The ID of the Zixi Feeder can be found in the **ID** field on the Zixi Feeder's **Status** screen. Upon connection of the Zixi Feeder with this ID, all other existing sources will be disconnected.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**) .
Maximum delay [hh:mm:ss]	Specify the time of the delayed transmission of this stream. Maximum: 24 hours.

Adding Input Streams

Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default, Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling **Multicast Pull** in the **Settings**.
Multicast Only	Selecting this checkbox will force the transmission of this stream only in multicast.
Decrypt stream	Select this checkbox to decrypt the Input stream. Please note that the stream will not be encrypted as it passes through the Zixi path. For more information, see **Decrypting an Input Stream in Zixi Broadcaster**.
Decryption type (for Decrypt stream enabled)	Specify the type of encryption that is being used in the stream. This setting can be modified without interrupting an existing stream.
Decryption key (for Decrypt stream enabled)	Specify the key for decryption. This setting can be modified without interrupting an existing stream.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster**.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk –** the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	

File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	

File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated.

The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows:

 • %S=stream id - optional.

 • %Y=year - optional

 • %M=month - optional

 • %D=day - optional

 • %T=HH.MM.SS creation time - mandatory

For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts. |
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Adding Pull Streams

Typically, a Pull Stream is transmitted from another Zixi Broadcaster. In this case, the stream is initiated by your Zixi Broadcaster.
If the stream is an MPTS stream and you want to demux it into separate SPTS input streams, create the stream, by following the instructions below, and then follow the instruction in the **Demuxing an MPTS Stream** section

➡ **To Add a Pull Stream:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.
2. In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.
3. Enter the unique **Stream ID.** for the Broadcaster.

> Note: this must be identical (case sensitive) to the stream name configured in the Zixi Feeder.

Adding Input Streams

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

> This setting can be modified without interrupting an existing stream.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Select **Pull** for the input stream.

Specify the **Stream Parameters** (see Input Stream Parameter table).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameter table). The stream will be recorded and broadcasted after the specified delay. The time shift feature is typically used to broadcast a live event across time zones (due to the time differences between locations).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameter table).

If you want to configure the **Recording Parameters**, specify them in the respective fields (see Input Stream Parameter table).

You can decrypt an encrypted stream as it enters the Zixi Broadcaster. To decrypt a stream, select the **Decrypt Stream** checkbox and fill in the parameters as describes in the Input Stream Parameter Table below. For more information, see **Decrypting an Input Stream in Zixi Broadcaster.**

Click **OK**. The "Input added" message appears on the top of the screen. The Push Stream from the Zixi Feeder is added to the Zixi Broadcaster and now appears in the list of streams available in Zixi Broadcaster inputs UI.

Adding Input Streams

Input Stream Parameters table

Parameter	Description
Stream Parameters	The general stream settings.
Host	Enter the IP Address of the remote Broadcaster server. Note that additional (failover) destinations can be added by clicking the adjacent **"+"** button
Port	Enter the port through which the Broadcaster receives the stream from another Broadcaster server. Default: 2088 The default input port for Zixi Broadcaster is UDP port **2088**. This port *must be open* on any firewalls between Zixi Broadcaster and other devices it is communicating with.
Stream	Enter the unique stream ID from another Broadcaster server.
Password (Optional)	If desired, enter the string for authentication. It must be identical to the string configured on the other Zixi Broadcaster.
Latency [ms]	Specify the maximum number of milliseconds that Zixi Broadcaster should protect the stream for. For example, 6000 milliseconds would ensure that the stream is protected for up to six seconds of delay in the network. This setting affects memory usage as higher levels of protection require more buffering. Default:6000.
Ignore TLS certificate error	Select this option when connecting to a trusted server that does not have a valid certificate. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors. This setting can be modified without interrupting an existing stream.
Bind to IP	Select from the drop-down list the local IP address to be used for this Input, OR select *Any* to enable any IP to be used.
Bind to NIC	Select from the drop-down list the NIC to be used for this Input, OR select *Any* to enable any NIC to be used.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the time of a delayed transmission of this stream. Maximum: 24 hours

Adding Input Streams

Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi Broadcaster that will pull the stream will receive it in multicast. By default Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling **Multicast Pull** in the **Settings**. This setting can be modified without interrupting an existing stream.
Multicast-Only (for multicast enabled)	If desired, specify multicast-only outputs.
Decrypt stream	Select this checkbox to decrypt the Input stream. Please note that the stream will not be encrypted as it passes through the Zixi path. For more information, see **Decrypting an Input Stream in Zixi Broadcaster**.
Decryption type (for Decrypt stream enabled)	Specify the type of encryption that is being used in the stream. This setting can be modified without interrupting an existing stream.
Decryption key (for Decrypt stream enabled)	Specify the key for decryption. This setting can be modified without interrupting an existing stream.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster.**
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.

Adding Input Streams

Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk –** the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	

File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Adding UDP Streams

This enables the Broadcaster to receive a UDP stream. The UDP stream is not protected by the Zixi protocol. The UDP streams can be one of the following types:

- **UDP** – the input stream is plain UDP.

- **RTP** – the input stream uses the RTP protocol, which adds RTP headers to the UDP stream. RTP adds a 12-byte header, which includes a sequence number and a timestamp that can be used to detect dropped packets. The sequence number in the RTP headers can be used to do automatic reordering and the timestamps can help overcome inter-packet gaps, also known as IAT (Inter Arrival Time).
  However, plain RTP does not feature error recovery or error protection. By default, the RTP headers (which include the timestamps and sequences) are being used on the input side, but then they are stripped off and they no longer propagate to outputs.

- **RTP + SMPTE 2022 FEC** – the input stream includes forward error correction, which enables error recovery or error protection.

If the stream is an MPTS stream and you want to demux it into separate SPTS input streams, create the stream, by following the instructions below, and then follow the instruction in the **Demuxing an MPTS Stream** section.

➡ **To Add a UDP Stream:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.
2. In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.

Enter the unique **Stream ID.**

> Note this must be identical (case sensitive) to the stream name configured in the Zixi Feeder.

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Adding Input Streams

Select **UDP** for the input stream.

Specify the **Stream Parameters** (see Input Stream Parameters Table).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameters Table).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameters Table).

If you want to configure the **Recording Parameters**, specify them in the respective fields (see Input Stream Parameters Table).

If you want to **Enable encryption**, select this checkbox (see Input Stream Parameters Table). For more information, see **Encrypting an Input Stream in Zixi Broadcaster.**

Click **OK**.

The "Input added" message appears on the top of the screen. The UDP Stream from the Zixi Feeder is added to the Zixi Broadcaster and now appears in the list of streams available in the Zixi Broadcaster inputs UI.

Input Stream Parameters Table

Parameter	Description
Stream Parameters	
Port	Specify the port to listen on. This port must be open on all firewalls between the Zixi Broadcaster and other devices it is communicating with.
Multicast IP	If multicast, type the Multicast IP address (or leave blank in the case of Unicast).
SSM Source	Specify the source IP for a source-specific multicast.

Type	Select the appropriate protocol type from the drop-down list: **UDP** – the input stream is plain UDP. **RTP** – the input stream uses the RTP protocol, which adds RTP headers to the UDP stream. RTP adds a 12-byte header, which includes a sequence number and a timestamp that can be used to detect dropped packets. The sequence number in the RTP headers can be used to do automatic reordering and the timestamps can help overcome inter-packet gaps, also known as IAT (Inter Arrival Time). However, plain RTP does not feature error recovery or error protection. By default, the RTP headers (which include the timestamps and sequences) are being used on the input side, but then they are stripped off and they no longer propagate to outputs. **RTP + SMPTE 2022 FEC** – the input stream includes forward error correction, which enables error recovery or error protection.
Bind to IP	Select from the drop-down list the local IP address to be used for this Input, OR select *Any* to enable any IP to be used.
Max. bitrate [kbps]	Specify the maximum expected bitrate for memory allocation. Recommended: 2X the actual bitrate, which will prevent buffer overruns (especially with VBR streams). Default: 8000. Note – Overflows will typically occur when the Max Bitrate isn't sufficient.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the maximum time delay of this input.
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings.
Multicast-Only (for multicast enabled)	Selecting this checkbox will force the transmission of this stream only in multicast.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster**
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).

Adding Input Streams

Encryption key (for Encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk** – the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	

Adding Input Streams

File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Adding Input Streams

Adding Delayed Streams

You can delay the broadcasting of an input stream by selecting **Enable time shift** and then creating a Delayed input stream that uses the Input with the time shift as a source. In this case the input stream will be stored on the local disk, while a variant of the input is created and delayed according to the specified duration. The input stream of the time-shifted stream will be stored on the local disk. In parallel, you can create a "Delayed" stream that will stream the "time-shifted" input stream according to the specified delay. For example, you can specify a 6-hour time-shift to "stream_A". This means that 6 hours of streaming are stored. You can then create a delayed stream that will stream "Stream_A" with a two-hour delay. This means that the delayed stream will always stream with a two-hour delay.

> The duration of the delayed stream should be less or equal to the time shifted stream.

➡ **To Add a Delayed Stream:**

1. Make sure at least one of the existing inputs has the **Enable time shift** setting selected.
2. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.

In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.

Enter the unique **Stream ID.**

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** check box to display this stream in the Matrix (see **Using the Matrix**). Default: Selected.

Select **Delayed** for the input stream.

Specify the **Stream Parameters** (see Input Stream Parameters Table).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameters Table).

Click **OK**.
The "Input added" message appears on the top of the screen. The Delayed Stream is added to the Zixi Broadcaster and now appears in the list of streams available in the Zixi Broadcaster inputs UI.

Input Stream Parameters Table

Parameter	Description
Stream Parameters	
Source	Select one of the input streams that were configured to enable "time shift".
Delay	Specify the delay period relative to the original stream in the following format: hh:mm:ss.
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling **Multicast Pull** in the **Settings**.
Multicast-Only (for Multicast enabled)	If desired, specify multicast only outputs.

Adding File Streams

This input creates a file input for the Zixi Broadcaster from a local or mounted disk and subsequently streams it to the end-user.

If the stream is an MPTS stream, you can either upload it as an MPTS file or you can demux it into separate SPTS input streams. To Demux the MPTS stream, create the input stream, by following the instructions below, and then follow the instruction in the **Demuxing an MPTS Stream** section.

➡ **To Add a File Stream:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.
   In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.
   Enter the unique **Stream ID.**

> Note: this must be identical (case sensitive) to the stream name configured in the Zixi Feeder.

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Select **File** for the input stream.

Specify the **Stream Parameters** (see Input Stream Parameter table).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameter table). The stream will be recorded and broadcasted after the specified delay. The time shift feature is typically used to broadcast a live event across time zones (due to the time differences between locations).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameter table).

If you want to **Enable encryption**, select this checkbox (see Input Stream Parameter table). For more information, see Encrypting an Input Stream in Zixi Broadcaster.

Adding Input Streams

Click **OK**. The "Input added" message appears on the top of the screen. The Push Stream from the Zixi Feeder is added to the Zixi Broadcaster and now appears in the list of streams available in the Zixi Broadcaster inputs UI.

Input Stream Parameters Table

Parameter	Description
Stream Parameters	
Path	Type the local or mounted (Linux) disk or click the adjacent browse button to select the desired one. The suffix .ts indicates a transmitted stream.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the maximum time delay of this input.
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default, Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings.
Multicast Only (for Multicast enabled)	If desired, specify force multicast-only outputs. A Zixi receiver will receive it in multicast (unless it is out of the LAN in which case it will relay in as unicast). You can also force Multicast only outputs.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster**.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.

Adding Input Streams

Adding RTMP Streams

This enables you to create a Push or Pull RTMP input stream.

➡ **To Add a RTMP Stream:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.

In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.

Enter the unique **Stream ID.**

> Note: this must be identical (case sensitive) to the stream name configured in the Zixi Feeder.

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Select **RTMP** for the input stream.

Specify the **Stream Parameters** (see Input Stream Parameters Table).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameters Table).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameters Table).

If you want to **Enable encryption**, select this checkbox (see Input Stream Parameters Table). For more information, see Encrypting an Input Stream in Zixi Broadcaster.

If you want to configure the **Recording Parameters**, specify them in the respective fields (see Input Stream Parameters Table).

Adding Input Streams

Click **OK**. The "Input added" message appears on the top of the screen. The RTMP Stream is added to the Zixi Broadcaster and now appears in the list of streams available in the Zixi Broadcaster inputs UI.

Input Stream Parameters Table

Parameter	Description
Stream Parameters	
Type	Select the desired type for the RTMP stream: • Push – the stream is pushed to the Zixi Broadcaster (not initiated by the Zixi Broadcaster). No additional connection parameters need to be filled. If the stream name will match, the stream will be inputted. • Pull – Zixi Broadcaster will initiate the stream by accessing it through the following parameters:
URL (for Pull)	Type the Stream URL from which the Zixi Broadcaster will access. Use the following URL format: `rtmp://host:[port]/app/stream`. You can define RTMPS clients with the proven security of a secure socket layer (SSL), by using the `rtmps:// url`
Stream Name (for Pull)	Type the unique name for the stream that has been defined in the RTMP server.
User Name (for Pull)	Specify the user name to authenticate on the remote RTMP server
Password (for Pull)	Specify the string that is used for authorization on the remote RTMP server.
Ignore TLS certificate	Select this option when connecting to a trusted server that does not have a valid certificate. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors.
Disconnect if inactive	Disconnects the connection if inactive.
Padding	If the stream's bitrate fluctuates you can pad the stream with null packets to create a steady bitrate. Select this checkbox to enable padding.
Muxing bitrate (for Padding enabled)	Specify the padding level in kbps.

Adding Input Streams

Smoothing Latency [ms]	The Smoothing feature uses a buffer to time packets according to the stream's clock. This is useful when there are bursts in the rate in which the stream arrives. The smoothing features creates a queue in the buffer, allowing smoother entry into the Broadcaster. The Smoothing parameter defines the size of the buffer in Milliseconds. A larger buffer enables smoother entry, however, it may influence the latency rate.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the maximum time delay of this input.
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default, Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings.
Multicast Only (for Multicast enabled)	Select the check box to force only Multicast outputs.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster**
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk** – the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	

Adding Input Streams

File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory

	For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Adding Input Streams

Adding RTSP Streams

This enables you to create RTSP streams.

➡ **To Add RTSP Streams:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.

In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.

Enter the unique **Stream ID.**

> Note: this must be identical (case sensitive) to the stream name configured in the Zixi Feeder.

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Select **RTMP** for the input stream.

Specify the **Stream Parameters** (see Input Stream Parameters Table).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameters Table).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameters Table).

If you want to **Enable encryption**, select this checkbox (see Input Stream Parameters Table).

If you want to configure the **Recording Parameters**, specify them in the respective fields (see Input Stream Parameters Table).

Click **OK**. The "Input added" message appears on the top of the screen. The RTMP Stream is added to the Zixi Broadcaster and now appears in the list of streams available in the Zixi Broadcaster inputs UI.

Adding Input Streams

Input Stream Parameters Table

Parameter	Description
Stream Parameters	The general stream settings.
URL	Type the Stream URL from which the Zixi Broadcaster will access.
Video UDP Port	Specify the UDP port to be used for streaming the video.
Audio UDP Port	Specify the UDP port to be used for streaming the audio.
Pad to bitrate	If the stream's bitrate fluctuates you can pad the stream with null packets to create a steady bitrate. This setting determines the padding level in kbps.
Latency	Specify the maximum latency you can tolerate for the stream in milliseconds. Recommended - the length of two frames.
TCP	Select this checkbox for streams that use TCP protocol. Leave unselected in case the stream uses UDP.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the maximum time delay of this input.
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings.
Multicast Only (for Multicast enabled)	Select the check box to force only Multicast outputs.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see Encrypting an Input Stream in Zixi Broadcaster.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.

Adding Input Streams

Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk** – the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated.

	The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Adding HLS Streams

This screen enables the Broadcaster to receive an HLS stream. The HLS stream is not protected by the Zixi protocol. There are two options for pulling the stream:

- **Single source (adaptive bitrate)** - the stream can be an adaptive bitrate stream. In this case, Zixi Broadcaster will pull the main playlist to adapt between bitrates according to network conditions.
- **Multiple sources** - it is possible to pull multiple input streams with static individual bitrates. In this case, Zixi Broadcaster will automatically create a separate input for each bitrate.

➡ **To Add an HLS stream:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.

In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.

Enter the unique **Stream ID**.

> Note: this must be identical (case sensitive) to the stream name configured in the Zixi Feeder.

Enter the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Select **HLS** for the input stream.

Specify the **Stream Parameters** (see Input Stream Parameters Table below).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameters Table).

Adding Input Streams

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameters Table).
If you want to configure the **Recording Parameters**, specify them in the respective fields (see
Input Stream Parameters Table).
If you want to **Enable encryption**, select this checkbox (see Input Stream Parameters Table).
Click **OK**.
The "Input added" message appears on the top of the screen. The HLS stream from the Zixi
Feeder is added to the Zixi Broadcaster and now appears in the list of streams available in the
Zixi Broadcaster inputs UI. If the "multiple sources" option was select, Zixi Broadcaster will
automatically create a separate input for each bitrate.

Input Stream Parameters Table

Parameter	Description
Stream Parameters	
Master Playlist URL	Specify the URL of the HLS stream.
Download Type	Specify whether the variants will be pulled from a single source (adaptive bitrate) or multiple sources (pull all bitrates).
Smoothing Latency	The Smoothing feature uses a buffer to time packets according to the stream's clock. This is useful when there are bursts in the rate in which the stream arrives. The smoothing features creates a queue in the buffer, allowing smoother entry into the Broadcaster. The Smoothing parameter defines the size of the buffer in Milliseconds. A larger buffer enables smoother entry, however, it may influence the latency rate.
Inject SCTE35 on CUE Marks	Select this checkbox to inject SCTE markers into the adaptive stream manifest. SCTE-35 markers found in the source input will be used to segment the stream and the #EXT-X-CUE-IN/#EXT-X-CUE-OUT tags will be added to the manifest.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the maximum time delay of this input.
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By

Adding Input Streams

	default, Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings.
Multicast Only (for Multicast enabled)	If desired, specify multicast only outputs.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster**.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk** – the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.

Adding Input Streams

Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated.
	The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows:
	• %S=stream id - optional.
	• %Y=year - optional
	• %M=month - optional
	• %D=day - optional
	• %T=HH.MM.SS creation time - mandatory
	For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Adding TS over HTTP (Pull) Streams

In this mode Zixi Broadcaster pulls a Transport Stream over TCP from an HTTP server. In this case, the stream is initiated by your Zixi Broadcaster.

➡ **To Add a TS over HTTP (Pull) Stream:**

1. In the Zixi Broadcaster navigation menu, click the **Inputs** tab.
2. In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.
3. Enter the unique **Stream ID**.

> Note: this must be identical (case sensitive) to the stream name configured in the Zixi Feeder.

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.
Select the **Show in Matrix** checkbox to display this stream in the Matrix (see Using the Matrix). Default: Selected.
Select **TS over HTTP** for the input stream.
In the **Type** field, select **Pull**.

Specify the **Stream Parameters** (see Input Stream Parameter table).
If you want to **Enable time shift**, select this checkbox (see Input Stream Parameter table). The stream will be recorded and broadcasted after the specified delay. The time shift feature is typically used to broadcast a live event across time zones (due to the time differences between locations).
If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameter table).
If you want to **Enable encryption**, select this checkbox (see Input Stream Parameters Table).

Adding Input Streams

If you want to configure the **Recording Parameters**, specify them in the respective fields (see Input Stream Parameter table).
Click **OK**.

Input Stream Parameters table

Parameter	Description
Stream Parameters	The general stream settings.
TS URL	Enter the URL of the Transport Stream.
Smoothing	The Smoothing feature uses a buffer to time packets according to the stream's clock. This is useful when there are bursts in the rate in which the stream arrives. The smoothing features creates a queue in the buffer, allowing smoother entry into the Broadcaster. The Smoothing parameter defines the size of the buffer in Milliseconds. A larger the buffer enables smoother entry. However, it may influence the latency rate.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the time of a delayed transmission of this stream. Maximum: 24 hours
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi Broadcaster that will pull the stream will receive it in multicast. By default, Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling **Multicast Pull** in the **Settings**.
Multicast-Only (for multicast enabled)	If desired, specify multicast-only outputs.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see Encrypting an Input Stream in Zixi Broadcaster.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click Generate to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.

Adding Input Streams

Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk** – the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	

File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Adding TS over HTTP (Push) Streams

In this mode Zixi Broadcaster will receive a Transport Stream over TCP from an HTTP server. In this case, the stream is initiated by the source HTTP Server, while the Zixi Broadcaster remains in "listening mode" until the stream (with the specified stream ID) is initiated.

➡ **To Add a TS over HTTP (Push) Stream:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.
In the **Menu** bar, click **New Input**. The **Add a new input stream** window is displayed.
Enter the unique **Stream ID** for the Broadcaster.

> Note: this must be identical (case sensitive) to the stream name configured in the Zixi Feeder.

Adding Input Streams

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** checkbox to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Select **TS over HTTP** for the input stream

In the **Type** field, select **Push**.

Specify the **Stream Parameters** (see Input Stream Parameters Table below).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameter Table below). The stream will be recorded and broadcasted after the specified delay. The time shift feature is typically used to broadcast a live event across time zones (due to the time differences between locations).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameter Table).

If you want to **Enable encryption**, select this checkbox (see Input Stream Parameters Table).

If you want to record the stream, you can configure the **Recording Parameters** (see Input Stream Parameter Table).

Click **OK**.

Adding Input Streams

Input Stream Parameters Table

Parameter	Description
Stream Parameters	
Smoothing	The Smoothing feature uses a buffer to time packets according to the stream's clock. This is useful when there are bursts in the rate in which the stream arrives. The smoothing features creates a queue in the buffer, allowing smoother entry into the Broadcaster. The Smoothing parameter defines the size of the buffer in Milliseconds. A larger buffer enables smoother entry, however, it may influence the latency rate.
User	If the stream is password protected, enter the username to access the stream.
Password	If the stream is password protected, enter the password.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss]	Specify the time of the delayed transmission of this stream. Maximum: 24 hours.
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default, Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling **Multicast Pull** in the **Settings**.
Multicast Only	Selecting this checkbox will force the transmission of this stream only in multicast.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster**.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click Generate to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.

Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk** – the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings > General** screen.
Record to S3 Parameters	

Adding Input Streams

File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Adding RIST Streams

This enables the Broadcaster to receive a RIST stream. RIST seeks to provide reliable, high performance media transport by using UDP at the transport layer to avoid the inefficiencies of TCP, then layering on top Forward Error Correction and Retransmits to add the reliability inherently absent from UDP. Zixi Broadcaster supports RIST streams from any compliant RIST device.

Zixi supports the following RIST profiles:

- **Simple Profile** - The RIST Simple Profile provides best-in-class packet protection, as well as support for multi-link bonding and seamless switching.
- **Main Profile** – The RIST Main Profile builds upon the features of the Simple Profile to provide backwards compatibility, while opening the door for additional features, including the use of industry-standard DTLS with a variety of available cyphers to ensure the most up-to-date protection, while being flexible to accommodate local legal regulations. Support for pre-shared keys is also included, which makes RIST Main Profile compatible with one-to-many environments such as satellite or multicast distribution

Contact your Zixi representative to learn more about interoperability testing between Zixi Broadcaster and 3rd party devices. More details about RIST can be found at www.rist.tv

➡ **To Add a RIST Stream:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.
2. In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.

Enter the unique **Stream ID.**

> Note this must be identical (case sensitive) to the stream name configured at the source (e.g. Zixi Feeder).

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Adding Input Streams

Select **RIST** for the input stream.

Specify the **Stream Parameters** (see Input Stream Parameters Table).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameters Table).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameters Table).

If you want to configure the **Recording Parameters**, specify them in the respective fields (see Input Stream Parameters Table).

If you want to **Enable encryption**, select this checkbox (see Input Stream Parameters Table). For more information, see **Encrypting an Input Stream in Zixi Broadcaster.**

Click **OK**.

The "Input added" message appears on the top of the screen. The RIST Stream f is added to the Zixi Broadcaster and now appears in the list of streams available in the Zixi Broadcaster inputs UI.

Input Stream Parameters Table

Parameter	Description
Stream Parameters	
Profile	Select one of the following RIST profiles that matches the input stream: • Simple Profile (default) • Main Profile

Adding Input Streams

	Simple Profile Parameters
Local Port	Specify the port to listen on. This port must be open on all firewalls between the Zixi Broadcaster and other devices it is communicating with.
Multicast IP	If multicast, type the Multicast IP address (or leave blank in the case of Unicast).
SSM Source	Specify the source IP for a source-specific multicast.
Remote Port	Specify the remote port in the source RIST device. Default: 0 (any port)
Type	Select one of the following protocol types from the drop-down list: • RTP • RTP + SMPTE 2022 FEC
Bind to IP	Select from the drop-down list the local IP address to be used for this Input, OR select *Any* to enable any IP to be used.
Max. bitrate [kbps]	Specify the maximum expected bitrate for memory allocation. Recommended: 2X the actual bitrate, which will prevent buffer overruns (especially with VBR streams). Default: 8000. Note – Overflows will typically occur when the Max Bitrate isn't sufficient.
Max Latency [ms]	Specify the maximum latency of the stream in milliseconds. Default: 1000
	Main Profile – Push Parameters
Local Port	Specify the port to listen on. This port must be open on all firewalls between the Zixi Broadcaster and other devices it is communicating with.
Multicast IP	If multicast, type the Multicast IP address (or leave blank in the case of Unicast).
SSM Source	Specify the source IP for a source-specific multicast.
Remote Port	Specify the remote port in the source RIST device. Default: 0 (any port)
Type	Select one of the following protocol types from the drop-down list: • RTP • RTP + SMPTE 2022 FEC
Bind to IP	Select from the drop-down list the local IP address to be used for this Input, OR select *Any* to enable any IP to be used.
Max. bitrate [kbps]	Specify the maximum expected bitrate for memory allocation. Recommended: 2X the actual bitrate, which will prevent buffer overruns (especially with VBR streams). Default: 8000. Note – Overflows will typically occur when the Max Bitrate isn't sufficient.
Max Latency [ms]	Specify the maximum latency of the stream in milliseconds. Default: 1000

Adding Input Streams

Use DTLS	Select this checkbox to encrypt the stream dynamically using DTLS.
Main Profile – Pull Parameters	
Remote Host	Specify the IP Address of the remote RIST device from which the stream will be pulled.
Remote Port	Specify the port of the remote RIST device from which the stream will be pulled. Default: 0 (any port)
Local Port	Specify the local port to which the stream will be pulled. Default: 0 (any port)
Type	Select one of the following protocol types from the drop-down list: • RTP • RTP + SMPTE 2022 FEC
Bind to IP	Select from the drop-down list the local IP address to be used for this Input, OR select *Any* to enable any IP to be used.
Max. bitrate [kbps]	Specify the maximum expected bitrate for memory allocation. Recommended: 2X the actual bitrate, which will prevent buffer overruns (especially with VBR streams). Default: 8000. Note – Overflows will typically occur when the Max Bitrate isn't sufficient.
Max Latency [ms]	Specify the maximum latency of the stream in milliseconds. Default: 1000.
Use DTLS	Select this checkbox to encrypt the stream dynamically using DTLS.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the maximum time delay of this input.
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings.
Multicast-Only (for multicast enabled)	Selecting this checkbox will force the transmission of this stream only in multicast.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster**

Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk** – the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.

Record to S3 Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated.
	The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows:
	• %S=stream id - optional.
	• %Y=year - optional
	• %M=month - optional
	• %D=day - optional
	• %T=HH.MM.SS creation time - mandatory
	For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Adding NDI Streams

The NDI is pulled into Zixi Broadcaster using the auto-discovery mechanism described in the **NDI Stream Discovery** section.

➡ **To Add an NDI Input Stream:**

> ✎ Before adding the NDI Input Stream, you must configure the relevant transcoding profiles – See **Configuring Transcoding Profiles for NDI Sources**.

Broadcaster Inputs

Adding Input Streams

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.

In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.

Select **NDI** for the input stream.

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Specify the **Stream Parameters** (see Input Stream Parameter table).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameter table). The stream will be recorded and broadcasted after the specified delay. The time shift feature is typically used to broadcast a live event across time zones (due to the time differences between locations).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameter table).

If you want to configure the **Recording Parameters**, specify them in the respective fields (see Input Stream Parameter table).

If you want to **Enable encryption**, select this checkbox (see Input Stream Parameters Table). For more information, see Encrypting an Input Stream in Zixi Broadcaster.

Click **OK**. The "Input added" message appears on the top of the screen. The NDI Stream is added to the Zixi Broadcaster and now appears in the list of streams available in Zixi Broadcaster Inputs screen.

Input Stream Parameters table

Parameter	Description
Stream Parameters	

Adding Input Streams

Stream	Select one of the NDI streams available based on your configuration from the drop-down menu. On a local area network NDI will use the discovery mechanism to advertise the sources and Zixi Broadcaster will automatically discover these streams. To make the streams discoverable in the cloud, you need to deploy an NDI Discovery Server and configure the NDI plug-in with the settings mentioned above.
Video Profile	Select an existing transcoding video profile, or select **Remove stream** if you want to remove the video track.
Audio Profile	Select an existing transcoding audio profile, or select **Remove stream** if you want to remove the audio track.
Audio Reference Level [dB]	This parameter attenuates the audio level by the specified level in dB. This setting is used to prevent audio clipping.
Transport Stream Bitrate [kbps]	Specify the bitrate of the transport stream. This parameter is optional. If you do not specify a TS Bitrate, the stream will be VBR. If you specify a bitrate, the stream will be CBR. The bitrate value must be compatible with the selected profile.
Use Intel hardware acceleration (if available)	Select this checkbox to use the Intel hardware acceleration component if it available.
Smoothing buffer	The Smoothing feature uses a buffer to time packets according to the stream's clock. This is useful when there are bursts in the rate in which the stream arrives. The smoothing features creates a queue in the buffer, allowing smoother entry into the Broadcaster. The Smoothing parameter defines the size of the buffer in Milliseconds. A larger the buffer enables smoother entry. However, it may influence the latency rate.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the time of a delayed transmission of this stream. Maximum: 24 hours
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi Broadcaster that will pull the stream will receive it in multicast. By default Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling **Multicast Pull** in the **Settings**. This setting can be modified without interrupting an existing stream.

Adding Input Streams

Multicast-Only (for multicast enabled)	If desired, specify multicast-only outputs.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster.**
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk –** the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours

Adding Input Streams

Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Viewing Existing Input Streams

The **Inputs** screen displays all the input streams that have been created. At the bottom of the screen you can also view accumulative utilization statistics for any connected streams selected. Hovering the cursor on the status indicator of a stream will provide you with the stream configuration information and basic utilization statistics, where applicable.

Any of the columns in the following table can be sorted in ascending/descending order by clicking on its heading. The Search text box in the upper left-hand side of the screen can be used to search for a specific input stream by entering the desired Stream ID.

Field	Description
Status	Displays the status of input stream. The following colored indicators are displayed: • Green = Connected • Yellow = Connecting

	• Red = Disconnected with an error condition
	• Blue = Offline with no connection attempts
	• Grey = Offline and stopped
ID	Displays the unique ID of the stream, as defined in the Zixi Broadcaster.
Type	Displays the type of input stream.
Source	Displays the source host and port number.
Bitrate [kbps]	Displays bitrate of the connected input stream.
Uptime	Displays the amount of time the stream has been active.
TR 101 209	Displays if the Analyzer is active and the streams that are being analyzed according to the TR101 protocol. **P1** and **P2** are error priorities.
Error	Displays connection and transmission errors.
Outputs	Displays the amount of outputs currently configured for this input stream.
Actions	Provides access to various actions to be performed on this input stream (see Broadcaster Actions on Input Streams).

Viewing Stream Statistics

You can view all the accumulative statistics for a connected input stream in real-time. It is possible to reset the counters by clicking **Reset**. The statistics may differ between the various stream types.

➡ **To View Stream Statistics:**

1. On the Inputs page of Zixi Broadcaster, click the desired input stream for which you want to view statistics for. The stream's statistics are displayed on the bottom of the screen.

Field	Description
Bitrate (kbps)	Displays the current bitrate of the input stream.
Uptime	Displays the amount of time the stream has been active.
Reconnections	Displays the number of reconnection attempts.

Viewing Stream Statistics

Total Packets	Displays the total number of packets that have been transmitted.
Packet Rate	Displays the current number of packets per second.
Remuxing Resets	Remuxing resets can occur when remuxing to CBR (i.e value of 'Remux to bitrate' field is set). In this case, the value is not high enough to remux the video+audio+other PIDs data. A possible solution is to increase value of the 'Remux to bitrate' parameter.
Remuxing Overflows	This indicates that the multiplexer internal queues are full.
Smoothing Drops	The Smoothing feature uses a buffer to time packets according to the stream's clock. This is useful when there are bursts in the rate in which the stream arrives. The smoothing drops indicator indicates that the stream is too "bursty".
RTT (ms)	Displays the Round Trip Time (RTT) from the source (in milliseconds).
Jitter (ms)	Displays the current Jitter, measured in milliseconds.
Latency (ms)	Displays the stream latency configured on the source Feeder.
Total Packets	Displays the total number of packets that have been transmitted.
Packet Rate	Displays the current number of packets per second.
Packet Loss %	Displays current percentage of the packets that were dropped on route from the source.
Dropped Packets	Displays the total number of packets dropped between the Feeder and the Broadcaster since the beginning of the stream.
Recovered Packets	Displays the number of dropped packets that have been recovered since the beginning of the stream.
Non Recovered Packets	Displays the number of non-recovered packets.
FEC Packets	Displays the number of FEC packets transmitted.
FEC Recovered	Displays the number of FEC packets recovered.
ARQ Requests	Displays the number of requests for retransmission of dropped packets made with ARQ.
ARQ Recovered	Displays the number of dropped packets recovered via ARQ.
ARQ Duplicates	Displays the number of duplicate recovery packets received via ARQ.
Overflows	The number of packets lost due to buffer overflow. **Note:** Overflow is usually the result of the Max Bitrate being too low.

Viewing Stream Statistics

Searching for Input Streams

➡ **To Search for an Input Stream:**

1. In the **Inputs** page of Zixi Broadcaster, type in the specific input stream name in the search text box on the left- hand top of the screen and click [🔍] .

2. The **Input** screen displays the requested output stream(s).

Broadcaster Actions on Input Streams

Every stream has a shortcut button that can be used to perform relevant actions on the stream. The following actions can be performed through the Actions button:

- Adding Analysis to the Input Stream
- Recording the Input Stream
- Stopping/Starting the Input Stream
- Deleting Input Streams from Broadcaster
- Editing Input Settings or Duplicating Input Streams
- Transcoding an Input Stream
- Playing Input Streams with Players
- Add Output
- Traceroute

Stopping/Starting the Input Stream

You can start or stop the input stream at any time.

➡ **To Stop/Start the Input Stream:**

1. On the **Inputs** page of Zixi Broadcaster, click the desired row of the input stream that you want to stop.

Click the [⚙▾] button on the right end of the selected row and then **Stop**. The selected row which was a Connected Input Stream is no longer displayed and appears below as **Offline**.
To continue the Input Stream click **Start** from the same menu.

Editing Input Settings or Duplicating Input Streams

➡ **To Edit the Configuration of an Input Stream:**

1. In the Zixi Broadcaster **Inputs** page, click the desired input stream that you want to edit.

Click [⚙▾] button on the right end of the selected row and then **Edit**. The Edit input stream name window is displayed. You can modify any of the settings.
Click **OK**. The new settings will take effect.
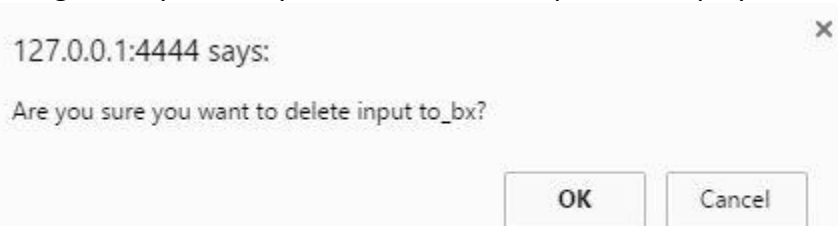
Broadcaster Actions on Input Streams

➡ **To Duplicate the Configuration of an Input Stream:**

1. In the Zixi Broadcaster **Inputs** page, click the desired input stream that you want to duplicate.

2. Click ⚙️ button on the right end of the selected row and then **Duplicate**. The **Duplicate input stream name** window with the settings of the original input stream is displayed. You can modify any of these settings.

3. Click **OK**. The duplicate input stream with its new settings will be created.

Deleting Input Streams from Broadcaster

➡ **To Delete an Input Stream from Broadcaster:**

1. In the Zixi Broadcaster **Inputs** page, click the desired input stream that you want to delete.

2. Click the ⚙️ button on the right end of the selected row and then **Delete**. The message "Are you sure you want to delete input?" is displayed.

3. Click **OK**. The selected row which was a Connected Input Stream will be deleted.

Recording the Input Stream

You can record an input stream and store it as .TS file. The duration of the time the recording will be kept on the server is defined in the Input Stream configuration.

➡ **To Record the Input Stream:**

1. In the Zixi Broadcaster **Inputs** page, click the desired input stream that you want to record.

2. Click the ⚙️ button on the selected row and then choose **Record**. A small red dot appears in the green circle at the left-hand side of the selected row indicating that the input stream is being recorded.

3. Clicking **Stop Recording** will stop the recording of the Input Stream and the newly recorded file will appear in the designated file directory in the **Files** page.

Broadcaster Actions on Input Streams

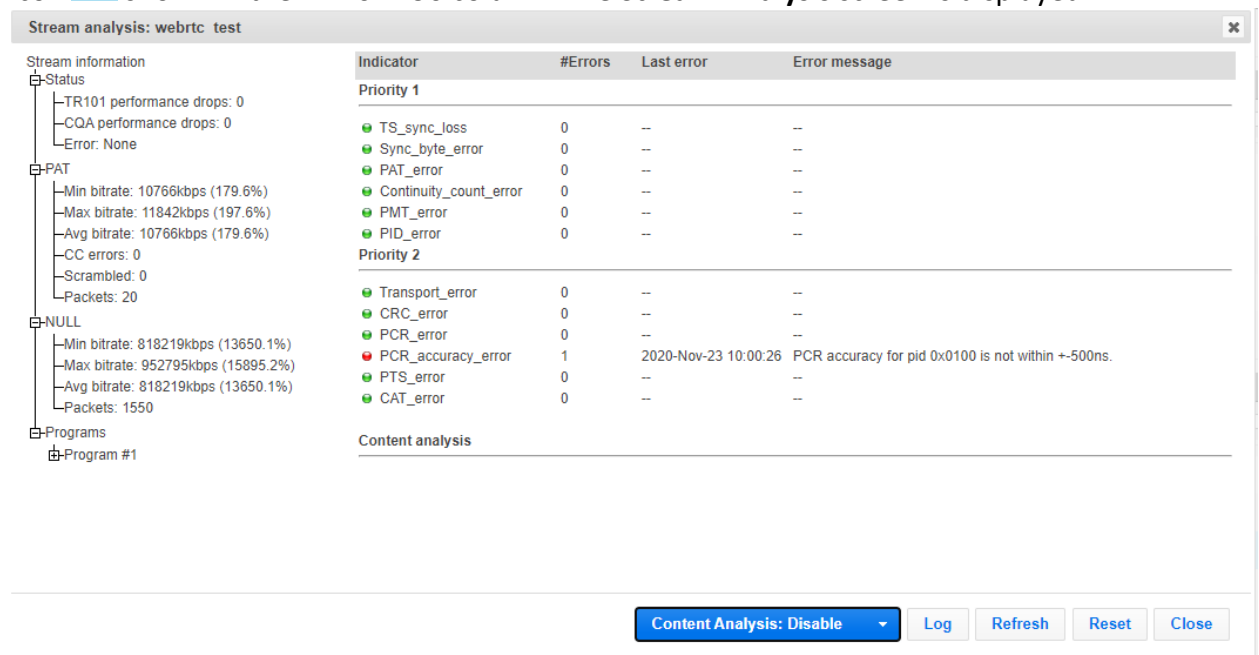## Adding TR101 Analysis to the Input Stream

A TR101 analysis can be added to the input stream for the monitoring of the TS while in operation. The analysis can be used to check the integrity of the TS and the most important elements of the stream. The analysis includes priority 1 and 2. To learn more about TR101 analysis see TR 101 290 Technical Report. For more information on Zixi's TR101 analysis, see **Viewing TR101 Analysis**.

➡ **To Add Analysis to the Input Stream:**

1. In the Zixi Broadcaster **Inputs** page, click the stream for which you want to analyze from the input streams UI.

Click the [button icon] button on the right end of the selected row and then select **Analyze**. The statuses of a **P1** (high priority error) and **P2** (low priority error) are indicated by an adjacent green or red button displayed in the *TR 101 290* column.

You can view the detailed analysis of the P1 and P1 errors by clicking on the stethoscope icon [icon] shown in the TR 101 290 column. The **Stream Analysis** screen is displayed.

The following can be done from the **Stream Analysis** screen:

- **Content Analysis** – shows errors in the audio and video content (i.e. Frozen video, Blank picture, Silent audio, Low video quality and Audio clipping)**.**
- **Log**- start sending the events of this stream to the event log ('stop logging' will stop the reporting of events).
- **Refresh** – refreshes the data that is displayed.
- **Reset** – resets all the field's values to zero.

On the left-hand side of the screen is a stream information tree that displays accumulative statistics regarding the stream. Click the **+** icons to expand the tree.

Broadcaster Actions on Input Streams

Clicking **Stop Analysis** will discontinue the action.

Transcoding an Input Stream

Zixi Broadcaster offers live transcoding, enabling users to create multiple bitrate streams from a single input stream.

Supported Video and Audio formats include:

- Video Decoding – MPEG2, H.264/AVC, H.265/HEVC
- Video Encoding – MPEG2, H.264/AVC, H.265/HEVC
- Audio Decoding – AAC, MPEG-1 Audio Layer I / II / III, MPEG-2 Audio Layer I / II / III, AC-3 (Dolby Digital)

> For AC-3, which can contain up to six discrete channels of sound, the transcoder only supports the left and right channels and will ignore the other channels.

- Audio Encoding – AAC, AAC-HE (High Efficiency) and AAC-HEv2; Pass through (no encoding) – any audio codec (MPEG1/2 / AAC / AC-3, E-AC-3 (Dolby Digital Plus).

The transcoder comes with pre-set common video profiles:

1080i60 / 1080i59.94, 1080p30 / 1080p25, 720p60, 720p50 / 720p30, 576i60 / 576p25, 480i60 / 480p29.97

In order to transcode an input stream from the Inputs screen you must first configure the transcoding profiles in the Transcoder screen. For more information, see **Transcoder** section
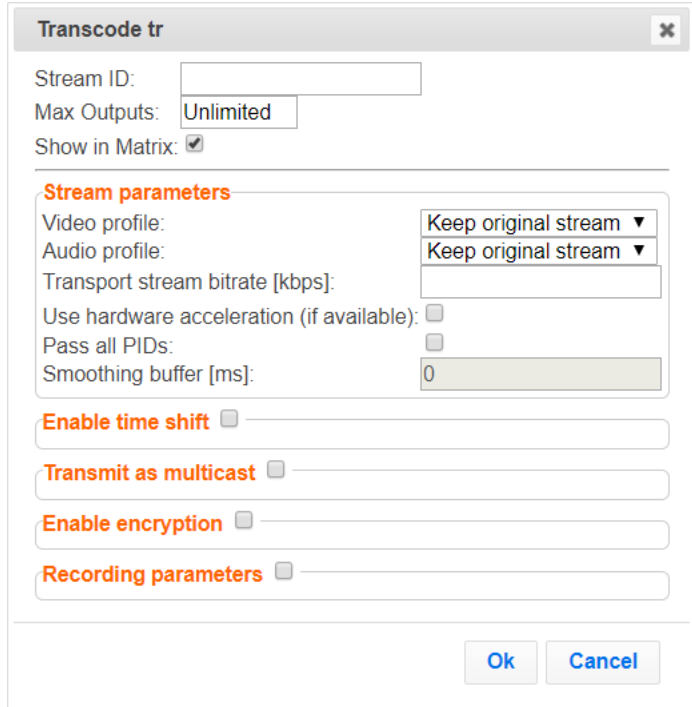
Broadcaster Actions on Input Streams

➡ **To Transcode an Input Stream:**

1. In the Zixi Broadcaster **Inputs** page, click the desired input stream that you want to transcode.

Click ![gear button] button on the right end of the selected row and then **Transcode**. The **Transcode <input stream name>** window with the settings of the selected input stream is displayed.

Enter the unique **Stream ID.**, which will correspond to the new transcoded input that will be added.

Under Stream Parameters, in the **Video profile** and **Audio profile** fields, do one of the following:

- Select the desired Video Profile and/or Audio Profile that you have configured.
- Select **Keep original stream** - if you have not configured a video or audio profile or do not want it transcoded or you want to set specific transcoding parameters for the specific stream. In this case the video or audio input will not be transcoded.
- Select **Remove stream** – you can use the transcoder to remove the video or audio track from the stream.

Fill in additional fields (see table below for additional parameters).

Click **OK**. The transcoded input stream is created and appears in an embedded window labeled Transcoded sources under the original input stream from which it was created.

Parameter	Description

Broadcaster Actions on Input Streams

Video Profile	Select an existing profile, select **Keep original stream** if you do not wish to transcode the video stream, or select **Remove stream** if you want to remove the video track.
Audio Profile	Select an existing profile, select **Keep original stream** if you do not wish to transcode the audio stream, or select **Remove stream** if you want to remove the audio track.
Transport Stream Bitrate (Kbps)	Specify the bitrate of the transport stream. This parameter is optional. If you do not specify a TS Bitrate, the stream will be VBR. If you specify a bitrate, the stream will be CBR.
Use Hardware Acceleration (if available)	Select this checkbox to use hardware acceleration component (e.g. NVIDIA or Intel) if it has been installed.
Pass all PIDs	Select this checkbox to pass-through all non-transcoded PIDs.
Smoothing Buffer (ms)	Specify how much of the transcoded stream (in milliseconds) to store before transmitting it back to the server in order to prevent bursts. If the **Transport stream bitrate [kbps]** field is empty, the smoothing buffer is disabled. If the **Transport stream bitrate [kbps]** field is NOT empty, it is recommended to enter around 200ms, which should be enough to prevent bursts.
Enable time shift	
Maximum delay [hh:mm:ss]	Specify the time of the delayed transmission of this stream. Maximum: 24 hours.
Transmit as multicast	Selecting this checkbox enables the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default, Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings. This setting requires enabling Multicast Pool (Settings > Multicast Pool).
Multicast Only	Selecting this checkbox will force the transmission of this stream only in multicast.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster**.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.

Broadcaster Actions on Input Streams

Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk** – the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated.

Broadcaster Actions on Input Streams

	The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Add Output

This is an alternative method (shortcut) to adding an output to a specific input stream instead of configuring it through the **Outputs** screen. The available types of outputs are:
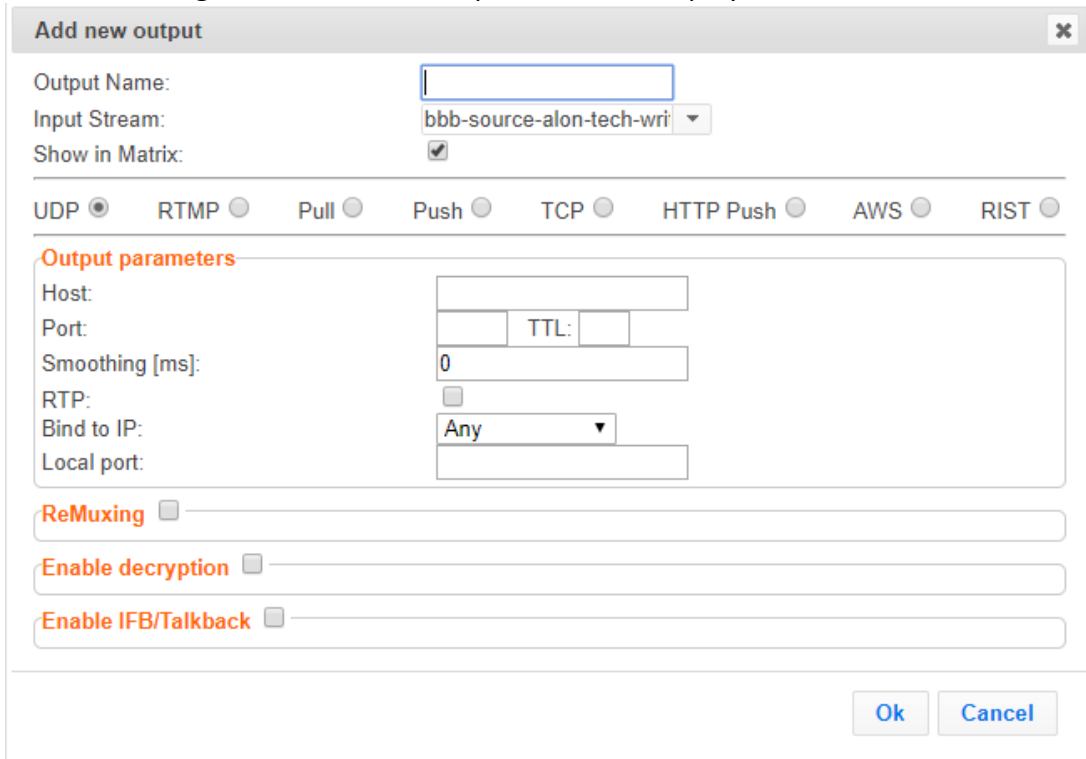
- **UDP** – Target is a UDP or RTP stream, over unicast or multicast.
- **RTMP** – Real Time Messaging Protocol streams can be played on systems that accept this protocol as input. Originally designed to enable Adobe® Flash® streams to be sent between a server and a client, RTMP has become a popular protocol for streaming into content-delivery networks (CDNs).
- **Pull** – Pull streams are Zixi protocol streams destined for Zixi Receivers. In this case, the Zixi Broadcaster can offer status and statistics for a stream that is being pulled from it by another device.
- **Push** – Push streams are Zixi protocol streams destined for other Zixi Broadcasters.
- **TCP** – The TCP output can push the stream directly to a TCP socket or to an HTTP server.
- **HTTP Push** – The HTTP Push output stream can be encapsulated in HLS or DASH. The source of the output stream is a predefined adaptive group that has been configured in the Adaptive Groups screen. The configuration of the stream includes the option to delete outdated stream fragments on the server. Output streams can be pushed to one Zixi Broadcasters or Zixi Receiver.
- **AWS** – The HTTP output stream (HLS or DASH) can be pushed to an AWS S3 Bucket or too an Elemental MediStore. The native S3 support includes the ability to configure the S3 authentication credential, including the Region, Access Key, and Secret Key.
- **RIST** – The RIST output stream can be pushed to an external target using Simple or Main Profile over unicast or multicast. The output stream can include Forward Error Correction (SMPTE-2022 FEC).

Broadcaster Actions on Input Streams

➡ **To Add Output:**

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.

2. Click the Settings button [⚙▾], and then click **New Output**. The **New Output** window with the settings of the selected output stream is displayed.

3. Follow the specific instructions of each output type from one of the following sections:
   - **Adding UDP Outputs**
   - **Adding RTMP and RTMPS Outputs**
   - **Adding Pull Outputs**
   - **Adding Push Outputs**
   - **Adding TCP Outputs**
   - **Adding HTTP Push Outputs**
   - **Adding AWS Outputs**
   - **Adding RIST Outputs**

Broadcaster Actions on Input Streams

Playing Input Streams with Players

You can preview the input streams through the following video players:
- VLC Player
- Flash Player
- Shoutcast
- WebRTC

In order to preview an input stream you must first configure its output. See **Broadcaster Outputs** section for more details.

➡ **To Play Input Streams with a VLC Player:**

1. In the Zixi Broadcaster **Inputs** page, click the desired input stream that you want to play with VLC.

Click the [button] button on the right end of the selected row and then **Play with VLC.** The **Link Description** window with the directory path for the desired file is displayed.
Click **Run VLC.** The selected file is downloaded to the computer.
Double-click on the newly downloaded file. This configured file runs using the VLC player and appears on a new output line on the **Output** screen wherein it can be monitored. Alternatively, copy the path and send it to the user so it can be entered in the Network URL of the VLC player.

➡ **To Play Input Streams with a Flash Player:**

Flash Player enables playing the stream on a native browser with the Flash player.
1. In the Zixi Broadcaster **Inputs** page, click the desired input stream that you want to play with Flash Player.

Click the [button] button on the right end of the selected row and then **Play with Flash.** The **Link Description** window with the directory path and proxy path for the desired file is displayed.
Click **Run** to view the .flv file that appears on the first line of the window or **Run Accelerated** to run the file from the proxy server with better results.

➡ **To Play Input Streams with Shoutcast:**

Shoutcast enables playing an audio file on a native browser.
1. In the Zixi Broadcaster **Inputs** page, click the desired input stream that you want to play with Shoutcast.

Click the [button] button on the right end of the selected row and then **Play with Shoutcast.** The **Link Description** window will open with the directory path for the desired file.

➡ **To Play Input Streams with WebRTC:**

WebRTC enables playing a video file on a native browser without the need for plug-ins or extensions.
1. In the Zixi Broadcaster **Inputs** page, click the desired WebRTC input stream that you want to play.

Broadcaster Actions on Input Streams

Click the ⚙▾ button on the right end of the selected row and then **Play WebRTC.**
The **Link Description** window will open with the directory path for the desired file and a link to open a browser window to play the stream.

Link description	✖
WebRTC	
http://18.188.220.36:4444/webrtc.html?stream=8dacd9c9-3232-4350-b325-4193e67d061d-WebRTC-03	
Open WebRTC player	
	Close

Copy the link or click the **Open WebRTC player** link to view the stream.

Broadcaster Actions on Multiple Inputs

Viewing Traceroutes

For streams sent from a Zixi Feeder (v13 and above) to a Zixi Broadcaster (v13 and above), you can view traceroute data for the stream.

➡ **To view traceroute data:**

1. On the **Inputs** page of Zixi Broadcaster, click on the row of the input stream for which you want to view traceroutes.

Click the [gear button] button on the right end of the selected row and then select **Trace**.
The traceroute data for this stream is displayed.
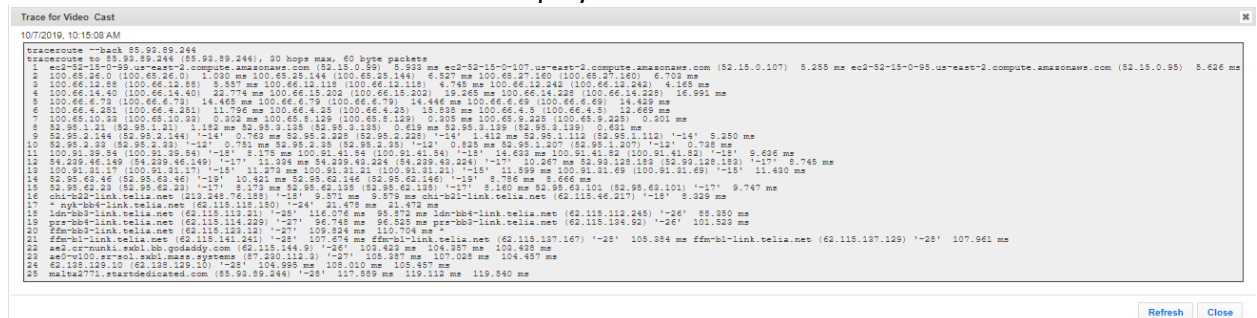
You can refresh the Traceroute data at any time by clicking the **Refresh** button.

Broadcaster Actions on Multiple Inputs

In the Inputs screen, you can perform actions on multiple or all input streams at once by selecting them using the check boxes and then clicking the Marked drop-down menu.
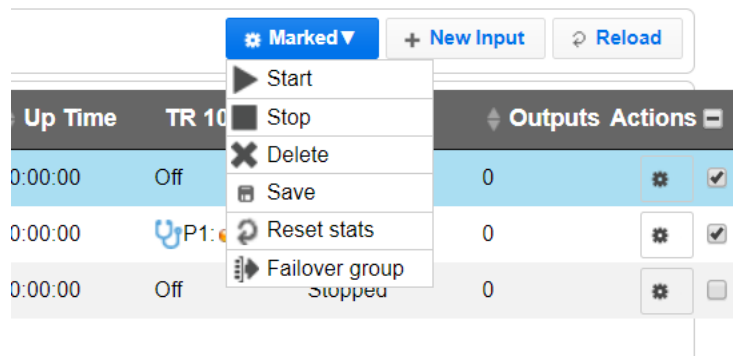
The actions include the following:

Starting and Stopping Multiple Input Streams

You can Start/Stop multiple streams.

➡ **To Start/Stop multiple Input Streams:**

1. In the Zixi Broadcaster Inputs screen, select the relevant Inputs by selecting the checkboxes
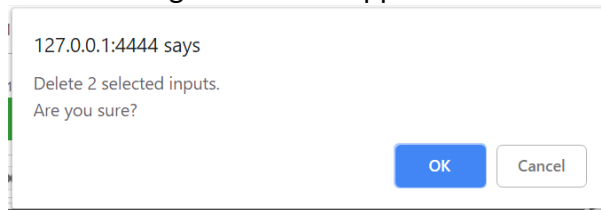
Broadcaster Actions on Multiple Inputs

2. Click the Marked drop-down menu and then click **Stop** or **Start**.
   The selected input streams will be started/stopped.

Deleting Multiple Input Streams

➡ **To Delete Multiple Input Streams:**

1. In the Zixi Broadcaster Inputs screen, select the relevant Inputs by selecting the checkboxes.
2. Click the **Marked** drop-down menu and then click **Delete**.
   The following notification appears:

   127.0.0.1:4444 says

   Delete 2 selected inputs.
   Are you sure?

   OK   Cancel

3. Click **OK**.

Saving Multiple Input Streams

➡ **To Save Multiple Input Streams:**

1. In the Zixi Broadcaster Inputs screen, select the relevant Inputs by selecting the checkboxes.
2. Click the **Marked** drop-down menu and then click **Save**.
3. All changes to the input streams are saved.

Resetting Stats for Multiple Input Streams

➡ **To Reset Stats for Multiple Input Streams:**

1. In the Zixi Broadcaster Inputs screen, select the relevant Inputs by selecting the checkboxes.
2. Click the **Marked** drop-down menu and then click **Reset Stats**.
   All accumulated stream statistics are reset.

Creating a Failover Group

Zixi features hitless failover for inputs, enabling undisrupted streaming when switching from one source to another. The hitless failover configuration involves grouping two or more inputs in a "Failover Group". If the inputs are identical (i.e. two or more binary-identical streams with synchronized RTP headers), whenever one of them is disrupted or interrupted completely, Zixi

Broadcaster Actions on Multiple Inputs

Broadcaster will seamlessly use the packets of the other input without any disruptions by "merging" the streams. The merging of the streams can be achieved using one of the following methods:

- **RTP headers (SMPTE 2022-7)** – if the sources are RTP and the RTP headers were maintained, Zixi will use the SMPTE 2022-7 to compare and merge the two streams in order to allow hitless failover. This option is the most recommended as it will use the sequence and the timestamp in the packets to compare which packets are missing. This method is more accurate than methods that compare the entire payload or methods that use sophisticated DNA sequencing algorithm, which are more error prone, as the payload may have multiple matches.
- **RTP headers or TS content** – if the sources do not have RTP headers, Zixi will try to merge using the MPEG-TS content itself.

> If the streams are not identical, the failover process will not be seamless and may take up to a second.

The following procedure describes how to configure inputs as a Failover Group in Zixi Broadcaster.

➡ **To create a Failover Group:**

1. On the Input screen of Zixi Broadcaster, select the checkboxes of the relevant identical input streams.
2. At the top of the inputs list, click the **Marked** drop-down menu and then click **Failover Group**.

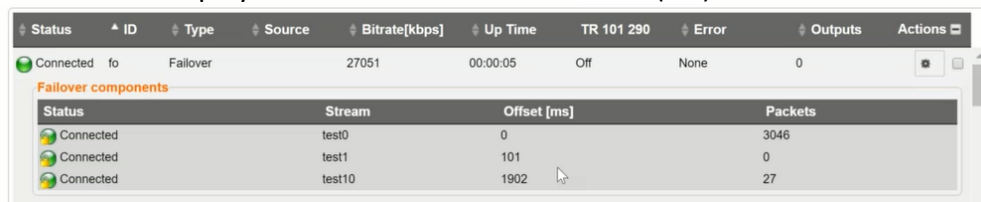3. The **Create a Failover Group** window opens:

4. In the **Stream ID** field, type a new name for Failover Group. This name will appear in the list of Inputs.
5. In the **Max Outputs** field, type the number of desired concurrent outputs that can use the **Failover Group**. Default: Unlimited.
6. In the **Search Window** field, type the timeframe in which the system can search for the relevant packets in a matching stream. If there is a latency difference between the streams in the group, the **Search Window** value should be higher than the latency difference between the streams. In case the **Merge Mode** is set to **No Merge**, the **Search Window** time specifies how long the stream will wait for packets before attempting to switch between streams.
7. In the **Max Bitrate** field, specify the maximum bitrate of the stream. Default: 8000. This is used for internal memory allocation and will not affect the transmitted bitrate. Recommended: double the bitrate of the highest bitrate stream.
8. In the **Merge mode** field, select one of the following:
   - **No merge** – select this option if you want Zixi to treat the streams as different and not try to merge the streams. In this case, the time period specified in the **Search Window** field defines how long the stream will wait for packets before attempting to switch between streams.

- **RTP headers (SMPTE 2022-7)** – select this option if the sources are RTP and the RTP headers were maintained. In this case, Zixi will use the SMPTE 2022-7 to compare and merge the two streams in order to allow hitless failover. This option is the most recommended as it will use the sequence and the timestamp in the packets to compare which packets are missing. This method is more accurate than methods that compare the entire payload or methods that use sophisticated DNA sequencing algorithm, which are more error prone, as the payload may have multiple matches.
- **RTP headers or TS content** – select this option if you are not sure if the sources do have RTP headers. In this case, Zixi will try to merge using RTP and if not, using the MPEG-TS content itself.

9. Under **Candidates**, if you want to configure one or more of the streams as back up, select the checkbox next to the relevant stream. Backup streams will be used only when all the "Primary" streams are down.
10. Configure additional parameters as required.
11. Click **OK**.

    The Hitless Failover Group is added to the list of inputs, listing the sub-streams that are part of the group. The system will automatically detect the offset between the sub-streams and display it in milliseconds under Offset (ms).

Status	ID	Type	Source	Bitrate[kbps]	Up Time	TR 101 290	Error	Outputs	Actions
⬤ Connected	fo	Failover		27051	00:00:05	Off	None	0	⚙ ☐
Failover components									
Status			**Stream**		**Offset [ms]**			**Packets**	
🟡 Connected			test0		0			3046	
🟡 Connected			test1		101			0	
🟡 Connected			test10		1902			27	

Encrypting an Input Stream in Zixi Broadcaster

You can encrypt a specific input stream using static key AES scrambling encryption (AES 128, AES 192, AES 256). If the stream has been encrypted at the source, it can be encrypted by Zixi Broadcaster only after its decryption (See: **Decrypting an Input Stream in Zixi Broadcaster**). The stream encryption prevents any further processing, such as analysis, transcoding, etc. For more information, see TRANSCODER section.

➡ **To encrypt an input stream in Zixi Broadcaster:**

1. In **Inputs** screen, click **+New Input**.
2. Select the relevant input type.
3. Fill in the stream parameters.
4. At the bottom, select the **Enable Encryption** checkbox.
5. In the **Encryption Type** field, select **AES 128**, **AES 192**, **AES 256** for fixed encryption.
6. In the **Encryption Key** field, enter your own key or click **Generate** to generate a key by the system. The exact key should be used to decrypt the stream on the other end.

Decrypting an Input Stream in Zixi Broadcaster

7. Click **OK**.

Decrypting an Input Stream in Zixi Broadcaster

Any stream that has been encrypted using standard AES static key can be decrypted in Zixi Broadcaster. You can configure the decryption of a specific stream by entering the decryption key.

➡ **To decrypt an input stream in Zixi Broadcaster:**

1. In **Inputs** screen, click **+New Input**.
2. Select **Push** or **Pull**.
3. Fill in the input details.
4. At the bottom, select the **Decrypt Stream** checkbox.
5. In the **Decryption Type** field, select **AES 128**, **AES 192**, **AES 256** for fixed key.
6. In the **Decryption Key** field, enter the exact same key that was used to encrypt the stream.

Demuxing an MPTS Stream

7. Click **OK**.

Demuxing an MPTS Stream

MPTS (Multi Program Transport Streams) streams can be demuxed into single SPTS (Single Program Transport Streams) streams. MPTS demuxing is available for Pull, Push, UDP, and File input streams. From the various programs in the MPTS stream, you can select specific programs, which will be turned into induvial SPTS input streams.

➡ **To demux an MPTS stream:**

1. Create a Pull/Push/UDP/File input stream using an MPTS stream.
2. In the **Inputs** page, click the newly created input stream that you want to demux.

3. Click the action button on the right end of the selected row and then **Edit**. The Edit input stream name window is displayed.

Select the **Demux MPTS** checkbox.

A list of included programs is displayed.

Demuxing an MPTS Stream

Click **Add Program** on the program that you want to create a separate SPTS input stream. An **Add Input** screen opens with the new SPTS input details, including a suggested **Stream ID**, the original MPTS as a Source Stream and the relevant **Program** number.

In the **Max Bitrate** field, specify the maximum bitrate of the stream. This is used for internal memory allocation and will not affect the transmitted bitrate. Recommended: double the bitrate of the highest bitrate stream.
Configure additional parameters as necessary.
Click **OK**.
The channel is assigned an input:

Repeat steps 5-8 to add more programs.

Click **OK**.

The newly created MPTS input stream and the related SPTS input streams will appear in the Inputs list.

Viewing TR101 Analysis

TR101 analysis can be added to an input stream for the monitoring of the TS while in operation. The analysis can be used to check the integrity of the TS, as well as perform content analysis to identify frozen video, blank picture, silent audio, low video quality and audio clipping. The TR101 analysis covers priority 1 and 2 messages.

To enable the TR101 analysis follow the instructions in the **Adding TR101 Analysis to the Input Stream** section. After enabling the analysis, the stream will include the P1 (high priority error) and P2 (low priority error) status, indicating is there are P1 or P2 messages.

To open the analysis window, click the stethoscope ( ) icon.

The TR101 Analysis window includes the following elements:

Viewing TR101 Analysis

Stream Information Statistics Panel

The stream information statistics panel displays the following accumulative statistics about the stream:

Parameter	Description
Status	
TR101 performance drops	
CQA performance drops	Specify the UDP port to be used for streaming the video.
Error	Specify the UDP port to be used for streaming the audio.
PAT	The Program Association Table (PAT), which only appears in PID 0x0000 packets, tells the decoder what programs are in the TS and points to the Program Map Tables (PMT) which in turn point to the component video, audio and data streams that make up the program. If the PAT is missing then the decoder can do nothing, no program is decodable.
Min bitrate	The minimum bitrate of the PAT packets
Max bitrate	The maximum bitrate of the PAT packets

Viewing TR101 Analysis

Avg bitrate	The average bitrate of the PAT packets
CC errors	Indicates if continuity count errors were found. For this indicator three checks are combined. The preconditions "Incorrect packet order" and "Lost packet" could cause problems for IRD which are not equipped with additional buffer storage and intelligence. It is not necessary for the test equipment to distinguish between these two preconditions as they are logically OR-ed, together with the third precondition, into one indicator.
Scrambled	Indicates if the packet is encrypted.
Packets	The number of packets which are related to the PAT (with the same PID – 0)
NULL	Null (stuffing) packets. In order to ensure that the stream maintains a constant bitrate, a multiplexer may need to insert some additional packets. The PID 0x1FFF is reserved for this purpose. The payload of null packets is all zeroes, and the receiver is expected to ignore its contents. Null packets are indicated by PID 8191 (all 1s)
Min bitrate	The minimum bitrate of the NULL packets
Max bitrate	The maximum bitrate of the NULL packets
Avg bitrate	The average bitrate of the NULL packets
Packets	The number of packets which are related to NULL (with the same PID 8191)
Programs	The Transport Stream can include one program (SPTS) or multiple programs (MPTS). Every program is described by a program map table (PMT). The elementary streams associated with that program have PIDs listed in the PMT. Another PID is associated with the PMT itself.
PMT PID	Indicates the PID number of the program map table PMT
Min bitrate	The minimum bitrate of the packet which is related to the PMT PID
Max bitrate	The maximum bitrate of the packet which is related to the PMT PID
Avg bitrate	The average bitrate of the packet which is related to the PMT PID
CC errors	Indicates if continuity count errors were found in the packets that are related to the PMT PID. For this indicator three checks are combined. The preconditions "Incorrect packet order" and "Lost packet" could cause problems for IRD which are not equipped with additional buffer storage and intelligence. It is not necessary for the test equipment to distinguish between these two preconditions as they are logically OR-ed, together with the third precondition, into one indicator.
PCR PID	Indicated the PID value that includes the program clock reference (PCR). The PCR is used to enable a decoder to present synchronized content, such as audio tracks matching the associated video.

Viewing TR101 Analysis

PCR	Indicates the program clock reference (PCR) value.
Accuracy	Indicates the difference between the actual PCR value and the value it should have in the TS represented by the byte index for its actual position. For example, if the calculated PCR (derived from adding the value to the previous packet) is the same as the actual PCR value, the Accuracy value will be '0'.
Deviation	Indicates the frequency deviation.
Delay	Indicates the delay in delivery.
OJ max	Indicates the maximal Overall Jitter, which are variation in delays.
OJ Dev	Indicates the deviation in the overall jitter.
Bitrate	The bitrate of the specific PCR PID packets.
Elementary PIDs	*Below the Elementary PIDs level are all the different programs that are included in the stream.*
Type	The type of program.
Min Bitrate	The minimum bitrate of the packet which is related to the Elementary PID
Max Bitrate	The maximum bitrate of the packet which is related to the Elementary PID
Avg Bitrate	The average bitrate of the packet which is related to the Elementary PID
CC errors	Indicates if continuity count errors were found in the packets that are related to the Elementary PID.
Scrambled	Indicates if the packet is encrypted. Possible values include: Not scrambled, scrambled with even key, scrambled with odd key.
PTS	The Presentation Time Stamp (PTS) that the analyzer has captured on the Element stream. The PTS is only accessible if the TS is not scrambled
DTS	The Decode Time Stamp (DTS) that the analyzer has captures on the Element stream. The Decode Time Stamp (DTS) indicates the time at which an access unit should be instantaneously removed from the receiver buffer and decoded. It differs from the Presentation Time Stamp (PTS) only when picture reordering is used for B pictures. If DTS is used, PTS must also be provided in the bit stream. PTS (or DTS) is entered in the bitstream at intervals not exceeding 700 mS. ATSC further constrains PTS (or DTS) to be inserted at the beginning of each access unit.
Total Bytes	The total amount of bytes that has passed through the current elementary stream. This includes the Transport Stream Headers.
Packets	The total amount of packets that have passed through the current elementary stream.

Width	The frame resolution width setting.
Height	The frame resolution height setting.
FPS	The Frames Per Second setting.
Interlaced	Indicates whether the video is interlaced or not.
Chroma	Indicates the Chroma Subsampling.
Frames	Indicates the number of frames. This indicator is enabled when content analysis is turned on.
Content	Indicates the status of the content. This indicator is enabled when content analysis is turned on. Possible values: • Live – indicates that there is a difference between two consecutive frames within a period of 30 seconds. • Frozen video – indicates that there is a single frame that is displayed (frozen). • Blank picture – the entire frame is in one color (e.g. black, white, etc.). • Unknown – this status is displayed during the first 30 seconds of the content analysis.

P1/P2 Errors

The P1/P2 errors panel displays data about Priority 1 and Priority 2 errors that were found in the stream during the analysis. The table displays the following information for each error:
- **Indicator** – the indicator for which the error was generated.
- **#Errors** – the total number of errors that were generated.
- **Last error** – the time in which the last error was generated.
- **Error message** – the message that was generated with the error.

The statistics regarding the following Priority 1 and Priority 2 errors are displayed.

Parameter	Description
Priority 1	
TS_sync_loss	Indicates a loss of synchronization with the TS. When 5 sync bytes have been acquired, the decoder is considered synched, but a loss of just 2 sync bytes indicates a loss of sync.

Viewing TR101 Analysis

Sync_byte_error	If the sync byte is not equal to 47 hexidecimals, then a sync byte error occurs. The system then looks for the reoccurrence of the sync byte (which must be 47 hexadecimals) every 188 bytes.
PAT_error	The program association table (PAT) is the only packet with packet ID (PID) Hex 0000, and it must occur at least every 0.5s to keep this error from occurring. Every program within the TS is listed in the PAT; if it is missing, then no programs can be decoded
Continuity_count_error	This error occurs when any of the following faults happen — incorrect packet order, a packet occurs more than twice or a packet is lost.
PMT_error	This error can occur if the program map table (PMT) does not come up at least every 0.5s on the PID that is referred to in the PAT.
PID_error	When TSes are remultiplexed, this can occur if any PID doesn't refer to an actual data stream.
Priority 2	
Transport_error	This flag is set in the TS header by the demodulator if it can't correct errors in the stream.
CRC_error	This indicates that a CRC error (data corruption) occurred in any of the following tables — CAT, PAT, PMT, NIT, EIT, BAT, SDT or TOT.
PCR_error	This flag is raised if the primary clock reference (PCR) is not seen for more than 100ms. The time interval between two consecutive PCR values should be no more than 40ms. This type of error can cause the decoder to lose lock on the 27MHz clock.
PCR_accuracy_error	This error can occur when the PCR accuracy of the selected program is outside the range of ±500ns.
PTS_error	This occurs when the presentation time stamp (PTS) repetition is more than 700ms. The PTS is contained in the MPEG-2 program stream and is used to aid the decoder in presenting the program on time, at the correct speed and synchronized. The PTS is compared to the PCR.
CAT_error	This is used for conditional access programs (paid programming).

Content Analysis

The Content Analysis errors panel displays that were found in the stream as part of Zixi's content analysis. To see this table, you must enable the content analysis, by following the instructions in the **Enabling Content Analysis** section. The table displays the following information for each error:

- **Indicator** – the indicator for which the error was generated.

Viewing TR101 Analysis

- **#Errors** – the total number of errors that were generated.
- **Last error** – the time in which the last error was generated.
- **Error message** – the message that was generated with the error.

Parameter	Description
Frozen_video	Occurrence of frozen video, i.e. no motion, for a duration of approximately 60s or longer.
Blank_picture	Occurrence of blank frames of any color for a duration of approximately 60s or longer.
Silent_audio	Occurrence of silence (dBFS < -90) on AAC or MPEG audio with a duration of about 30s or longer.
Low_video_quality	The estimated video quality, which is based on the Peak signal-to-noise ratio (PSNR) is below the 20dB threshold and therefore considered as poor.
Audio_clipping	Occurrence of clipped audio upon occurrence on AAC or MPEG audio.

Enabling Content Analysis

Zixi's content analysis can be enabled in two of the following modes:
- **Content Analysis: I-Frames** – The content analysis is performed on I-frames only. This option requires far less processing resources.
- **Content Analysis: All Frames** - The content analysis is performed on all frames. This may require more processing resources.

➡ **To enable content analysis:**

1. Add TR101 Analysis to an input stream. See **Adding TR101 Analysis to the Input Stream**
2. Click the stethoscope icon shown in the TR 101 290 column. The Stream Analysis screen is displayed.
3. On the Stream Analysis screen, select one of the following content analysis options from the Content Analysis drop-down menu:
   - **Content Analysis: I-Frames**
   - **Content Analysis: All Frames**

Broadcaster Outputs

Zixi Broadcaster supports the following output types:
- **UDP** – Target is a UDP or RTP stream, over unicast or multicast.
- **RTMP** – Real Time Messaging Protocol streams can be played on systems that accept this protocol as input. Originally designed to enable Adobe® Flash® streams to be sent between a server and a client, RTMP has become a popular protocol for streaming into content-delivery networks (CDNs).
- **RTMPS** – RTMP over a TLS/SSL connection.
- **Pull Stream** – Pull streams are Zixi protocol streams destined for Zixi Receivers. Zixi Broadcaster can offer status and statistics for a stream that is being pulled from it by another device. **You normally do not need to set up a Pull output stream in Zixi Broadcaster.** If your application uses Zixi Receiver, you should configure the stream as input on Zixi Receiver and point it to the IP address and output port (default 2077) of the Zixi Broadcaster. Zixi Receiver will pull the stream and automatically create the proper output definition in the Zixi Broadcaster.
- **Push Stream** – Push streams are Zixi protocol streams destined for other Zixi Broadcasters and "Accept mode" Zixi Receivers.
- **TCP** - TCP protocol provides reliable transmission guarantee for no loss of frame. Its bandwidth probing and congestion control will attempt to use all of the available bandwidth between the server and client, fetching content as quickly as possible while being friendly to other (TCP) traffic on the same links. Output streams can be pushed to one Zixi Broadcasters or Zixi Receiver.
- **HTTP Push** - The HTTP Push output stream can be encapsulated in HLS or DASH. The source of the output stream is a predefined adaptive group that has been configured in the Adaptive Groups screen. The configuration of the stream includes the option to delete outdated stream fragments on the server. Output streams can be pushed to one Zixi Broadcasters or Zixi Receiver.
- **S3 Bucket** - The HTTP output stream (HLS or DASH) can be pushed to an AWS S3 Bucket. The native S3 support includes the ability to configure the S3 authentication credential, including the Region, Access Key, and Secret Key.
- **RIST** - The RIST output can be pushed or have them pulled to/from a RIST-enabled device. RIST seeks to provide reliable, high performance media transport by using UDP at the transport layer to avoid the inefficiencies of TCP, then layering on top Forward Error Correction and Retransmits to add the reliability inherently absent from UDP.
- **SRT** – The SRT output can be pulled to/from an SRT-enabled device and is configured via Zen Master or Zixi API only. SRT stands for 'Secure Reliable Transport' and is an open-source video transport protocol and technology stack. SRT uses secure streams and easy firewall traversal to optimize streaming performance and deliver high-quality video over even the most unreliable networks.

When Zixi Receiver pulls a stream, a Pull stream definition is generated automatically in Zixi Broadcaster, the stream is identified in the Name and Destination columns of Zixi Broadcaster with the ID and IP address of the Zixi Receiver that pulls the stream.

Automated Output Configuration with Output Templates
Instead of manually creating an output and then connecting the output to an input, you can define output templates with rules for automatic creation of outputs with predefined settings. The template includes an Input pattern. When an input pattern matches the pattern of an incoming input stream, the output is created automatically. For more information about Output Templates, see **Using Output Templates**.
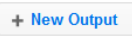
Adding Outputs

Zixi Broadcaster enables you to add various types of outputs. When you create a new output, select the output type and then fill in the fields that are applicable for that output type.

Adding UDP Outputs

This enables the Broadcaster to send a UDP stream. The UDP stream is not protected by the Zixi protocol. The UDP streams can be one of the following types:
- UDP – plain UDP
- RTP – Real-Time Transport Protocol
- RTP + SMPTE 2022 FEC - SMPTE 2022 standard with Forward Error Correction

➡ **To Create a UDP Output:**

1. In the Zixi Broadcaster **Outputs** page, click ⊞ New Output . The **New output** window is displayed.

Adding Outputs

Type in the unique identifier for this output in the **Output Name**.

Select an **Input Stream** to be made available on this output from the drop-down list.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix).
Default: Selected.

Select **UDP**.

Specify the **Output parameters** (see Output Stream Parameters Table).

In the **Host** field, specify the IP address or URL of the stream destination.

In the **Port** field, specify the port of the destination.

If you want to remux the stream to CBR (used for professional IRDs) in order to avoid bandwidth waste, select **Remuxing** and configure the respective parameters (see Output Stream Parameters Table).

Click **OK**.

The new UDP Output with its settings is created and now appears on the **Outputs** screen.

Output Stream Parameters Table

Parameter	Description
Output Parameters	

Adding Outputs

Host	Specify the destination IP address or URL.
Port	Specify the target UDP port.
TTL	Specify the time-to-live (TTL). Used mainly to limit the range (or "scope") of a multicast transmission. Leaving it as blank uses the default value specified by the operating system.
Smoothing [mms]	Enables transmission of the output at the correct rate. Required when the receiving device is sensitive and can't lock on to the stream (in such a case, the recommended latency is 100 - 1000 ms).
RTP	Enables use of the Real-time Transport Protocol.
SMPTE 2022 FEC:	Disables the FEC or specify the type of FEC matrix to D1/ D2. This setting can be modified without interrupting an existing stream. In the SMPTE-2022 FEC standard, 1-D and 2-D parity codes are systematic FEC codes of decent complexity that provide protection against bursty or random losses. To enable SMPTE-2022 FEC (Forward Error Correction) select one of the following parity options from the drop-down menu: • **1D** (single dimension FEC) - SMPTE-2022 1D can fix a problem in ONE packet per row. This means that the number of rows specified should consider the packet loss rate- the shorter the row, the more error resilience can be achieved on the expense of bitrate level. However, longer rows increase the delay that the FEC will add. It is recommended to select this option when the packet loss is sporadic. The stream will occupy the source port and two ports above it (e.g. if the source port is 8988, it will occupy 8990). • **2D** - SMPTE-2022 2D uses a table of packets, which includes rows and columns. This option is more error resilient, but it increases the delay by (row*column) packets and increases the bitrate with R+C packets per each table of R*C packets. It is recommended to select this option when packet loss is bursty. The stream it will occupy four ports above (e.g. if the source port is 8988, it will occupy 8992).
Bind to IP	Select from the drop-down list the local IP address to be used for this Output, OR select *Any* to enable any IP to be used.
Local Port	Specify from which local port to source the stream, if desired (instead of randomly chosen by the operating system).
ReMuxing	Select this checkbox to enable remuxing from VBR MPEG-TS to MPEG-TS CBR (used for professional IRDs).

Adding Outputs

Remux to bitrate [kbps]:	Specify the CBR bitrate to target for a remuxed stream.
Buffer Size [ms]	Specify the size of the buffer that will be used for the remixing. A larger buffer increases the quality, but also increases latency.
No NULL Packets	Select this option to re-multiplex the stream to CBR but remove the NULL packets in order to maintain low bitrate.
Enable Decryption	Select this checkbox to decrypt an encrypted stream.
Decryption type	If the stream has been encrypted, you can decrypt through the output by selecting this checkbox and specifying the type of encryption that was used. Select **Automatic** to decrypt a stream that has been encrypted using **Automatic** encryption. Only if the stream has not been encrypted, select **None** (default). **Important Notice: if the stream has been encrypted you must decrypt it in the output.**
Decryption key	If the decryption type includes a key, enter the key to decrypt the stream during output.
Enable IFB/Talkback	Select this checkbox to enable IFB/Talkback for one-way communication from the director or assistant director to on-air talent or a remote location. Selecting the checkbox allows the decoder with a Zixi Receiver to send audio back to the encoder with a Zixi Feeder. This offers the ability to, for example, give audio feedback to the camera operator.
Port	The port that will be used to send the audio feedback.

Adding RTMP and RTMPS Outputs

Real Time Messaging Protocol streams can be played on systems that accept this protocol as input. Originally designed to enable Adobe® Flash® streams to be sent between a server and a client, RTMP has become a popular protocol for streaming into content-delivery networks (CDNs).

> To create an RTMPS output, select the RTMP output option but make sure rtmps:// url is used in the URL field.

> SCTE-35 markers in MPEG-TS streams trigger OnCuePoint call function in RTMP.

➡ **To create an RTMP Output:**

1. In the Zixi Broadcaster **Outputs** page, click `+ New Output` . The **New output** window is displayed.

Type the unique identifier for this output in the **Output Name**.

Adding Outputs

Select an **Input Stream** to be made available on this output from the drop-down list.
Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix).
Default: Selected.
Select **RTMP**.
Specify the **Output parameters** (see Output Stream Parameters Table).
Click **OK**.
The new RTMP Output with its settings is created and now appears on the screen.

Output Stream Parameters Table

Parameter	Description
Output Parameters	
URL	Specify the destination Stream URL according to the following format: rtmp://host:[port]/app. You can define RTMPS clients with the proven security of a secure socket layer (SSL), by using the rtmps:// url. Note that Facebook currently supports RTMPS streams only.
Backup URL	Enter a backup URL (fallback mode) – will be used in case the primary server is not responsive.
Stream Name	Specify the unique name for the stream that the RTMP server at the other end of the connection expects.
Username	Specify the Username to authenticate on the remote RTMP server
Password	Specify the string that is used for authorization on the remote RTMP server.
Bitrate (kbps)	Specify the actual bitrate in kbps or the maximum stream bitrate in case of a VBR stream.
Reconnect (sec)	If the stream drops, this value represents the time between reconnection attempts (in seconds). Default: 5.
Send Timecode	Converts the MPEG-TS SEI section to RTMP ONFI command (pass the encoder timecodes to the RTMP server)
Disconnect if inactive	Select this checkbox to disconnect if the stream is not active for 30 seconds.
Ignore TLS certificate errors	Select this option when streaming to a trusted server that does not have a valid certificate. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.

Adding Outputs

Enable Decryption	Select this checkbox to enable decryption of an encrypted stream.
Decryption type	If the stream has been encrypted, you can decrypt through the output by selecting this checkbox and specifying the type of encryption that was used.
	Select **Automatic** to decrypt a stream that has been encrypted using **Automatic** encryption.
	Only if the stream has not been encrypted, select **None** (default).
	Important Notice: if the stream has been encrypted you must decrypt it in the output.

Adding Pull Outputs

➡ **To Create a Pull Output:**

1. In the Zixi Broadcaster **Outputs** page click + New Output . The **New Output** window is displayed.

Type in the unique identifier for this output in the **Output Name**.

Select an **Input Stream** to be made available on this output from the adjacent drop-down list.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Select **Pull**.

Enter the **Output Parameters** (see Output Stream Parameters Table).

Adding Outputs

Click **OK**.
The new Pull Output with its settings is created and now appears on the screen.

Output Stream Parameters Table

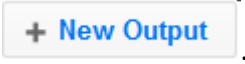| Parameter	Description
Output Parameters	
Stream ID	Specify the unique Stream ID that the remote Zixi Receiver/Broadcaster expects (recommended – identical to 'Input Stream').
Remote ID	Specify the Zixi Receiver/Broadcaster ID (shown in the Zixi Receiver/Broadcaster **Status** window) that will be allowed to pull the stream.
Password	Specify a string that can be used to authenticate that the Zixi Receiver is authorized to pull this stream (Optional).
Latency [ms]	Specify the buffer size that Zixi Broadcaster will be able to maintain for error correction. For example, 6000 milliseconds would ensure that the stream is protected for six seconds of errors in the network. Default: Remote configuration. Remote configuration – use the latency configured in the Zixi Receiver/Broadcaster. Otherwise use a value to override the value configured in the Zixi Receiver/Broadcaster.
Enable Encryption	Select this checkbox to encrypt the Output stream.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256). Click **Generate** to generate an encryption key or enter another encryption key.
Enable IFB/Talkback	Select this checkbox to enable IFB/Talkback for one-way communication from the director or assistant director to on-air talent or a remote location. Selecting the checkbox allows the decoder with a Zixi Receiver to send audio back to the encoder with a Zixi Feeder. This offers the ability to, for example, give audio feedback to the camera operator.
Port	The port that will be used to send the audio feedback.

Adding Push Outputs

Output streams can be pushed to one or more Zixi Broadcasters and Zixi Receivers. You can specify multiple destinations (Broadcasters/Receivers) by adding them in the Links section. You
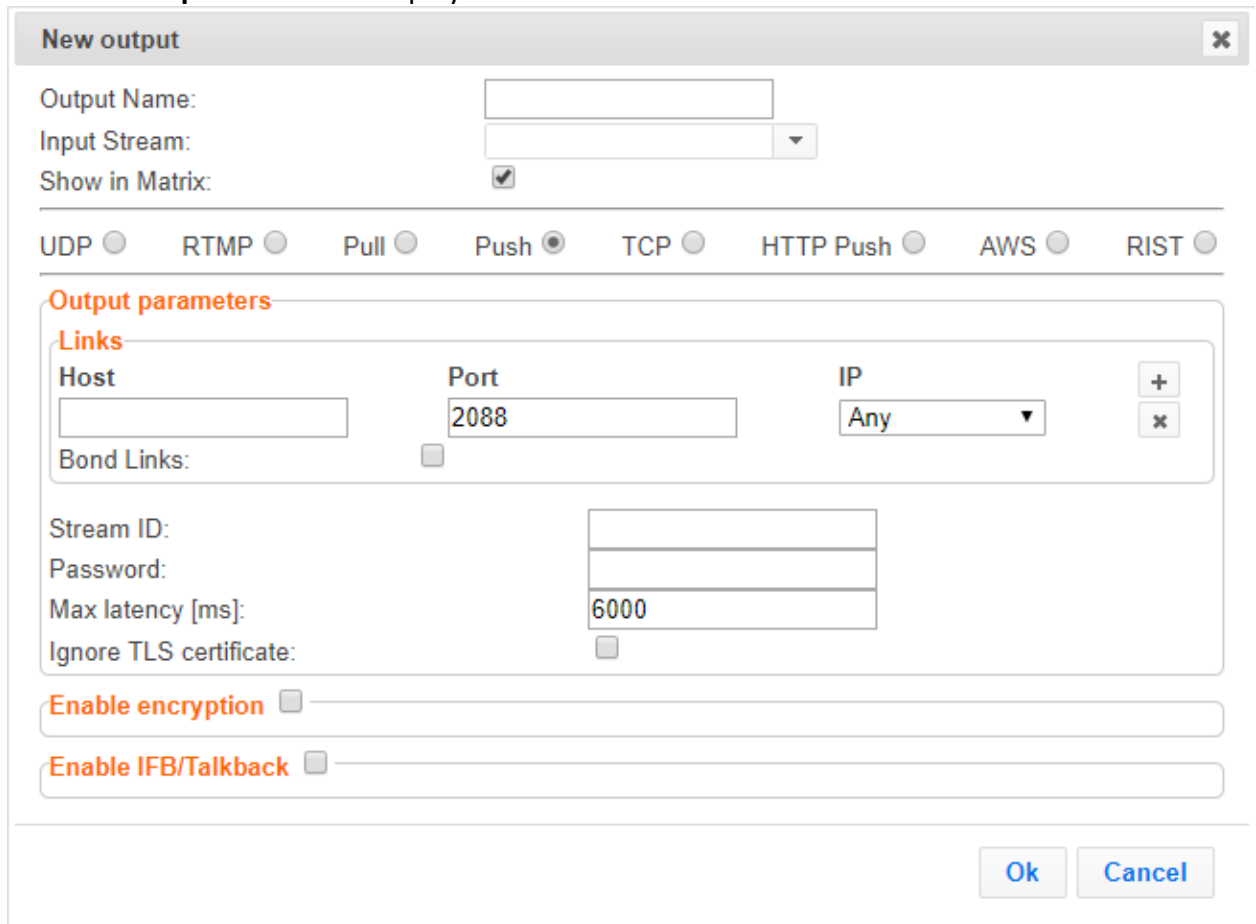
can also split a single stream using multiple links and then bond them into a single stream in target Zixi Broadcaster using the Bond Links feature. For each of these links, you can specify the max bitrate that can be used. In addition, some links may be specified as backups. The backup links will be used if the bandwidth across all the non-backup links are not enough for the stream (i.e. if a non-backup link is not available, it will not use the backup). Only if the accumulated bandwidth of non-backup links is not enough, then the Broadcaster will stream to a backup link.

➡ **To Create a Push Output:**

1. In the Zixi Broadcaster **Outputs** page, click [+ New Output].
    The **New Output** window is displayed.

Type in the unique identifier for this output in the **Output Name**.
Select an **Input Stream** to be made available on this output from the adjacent drop-down list.
Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix).
Default: Selected.
Select **Push**.
Do one of the following:

- **Stream to multiple destinations** - you can stream the same identical stream to multiple destinations by entering the destination parameters and then clicking

Adding Outputs

the **"+"** button to add another destination (see **Output Stream Parameters** Table).
- **Bonded link to a single destination** - you can split the stream into multiple links, which will be forwarded to a single Zixi Broadcaster by selecting the **Bond Links** checkbox (see **Using Network Bonding for Hitless Failover**).

Enter additional parameters as necessary (see Output Stream Parameters Table)
Click **OK**. The new Push Output with its settings is created and now appears on the screen.

Output Stream Parameters Table

Parameter	Description
Output Parameters	
Links	
Host	The destination host for the push stream. **Note:** additional failover destinations can be added by clicking the adjacent "**+**" button.
Port	Specify the ports to listen on for Push streams. Default: 2088.
IP	Specify the local IP address.
Max Bitrate (for Bond Links enabled)	Relevant for **Bond Links** option. Specify the max bitrate in Kbps for the specific link.
Bond Links	Click this checkbox to split the stream into multiple links, which will be forwarded to a single Zixi Broadcaster.
Backup (for Bond Links enabled)	Relevant for Bond Links option. Select this checkbox to define the link as a backup. The backup will be used only if the accumulated bandwidth of the non-backup links is not sufficient.
Stream ID	Specify the unique Stream ID that the remote Zixi Broadcaster expects.
Password	Optional - Specify a string to be used at the receiving Zixi Broadcaster to authenticate that the pushing Broadcaster is allowed to push this stream.
Max Latency [ms]	Specify the buffer size that Zixi Broadcaster will keep for error correction. For example, 6000 milliseconds would ensure that the stream is protected for six seconds of errors in the network. Default:6000

Adding Outputs

Ignore TLS certificate errors	Select this option when streaming to a trusted server that does not have a valid certificate. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Enable Encryption	Select this checkbox to encrypt the Output stream.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256). Click **Generate** to generate an encryption key or enter another encryption key.
Enable IFB/Talkback	Select this checkbox to enable IFB/Talkback for one-way communication from the director or assistant director to on-air talent or a remote location. Selecting the checkbox allows the decoder with a Zixi Receiver to send audio back to the encoder with a Zixi Feeder. This offers the ability to, for example, give audio feedback to the camera operator.
Port	The port that will be used to send the audio feedback.

Adding TCP Outputs

TCP protocol provides reliable transmission guarantee for no loss of frame. Its bandwidth probing and congestion control will attempt to use all of the available bandwidth between the server and client, fetching content as quickly as possible while being friendly to other (TCP) traffic on the same links. The TCP output can push the stream directly to a TCP socket or to an HTTP server.

MultiPath TCP
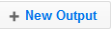
Developed by the Internet Engineering Task Force's (IETF) Multipath TCP working group, MultiPath TCP (MPTCP) is an effort towards enabling the simultaneous use of several IP-addresses/interfaces by a modification of TCP that presents a regular TCP interface to applications, while in fact spreading data across several subflows. Zixi supports MultiPath TCP for Linux based on the OS Kernel support. This means that the Linux Kernel should be updated to support MPTCP. For detailed information on how to update the Kernel and use MPTCP, see **Configuring MultiPath TCP**.

The MPTCP functionality is similar to Zixi's "multi-link bonding" feature, which is available for UDP only. In this case MPTCP works on TCP.
If both the sending end and the receiving end support MultiPath TCP, Zixi can use this functionality to transmit a stream over TCP using multiple network interfaces (e.g. Wifi + mobile). The multiple links can be configured to:
- **Aggregate** - aggregate the bandwidth of the multiple links in order to use the total capacity of the links. In this case Zixi will use all available bandwidth among all available flows (if needed) to send the stream.
- **Duplicate** - enhance the path's resiliency by duplicating the stream and sending though multiple links in order to overcome errors and packet loss.

➡ **To Create a TCP Output:**

1. In the Zixi Broadcaster **Outputs** page, click [+ New Output]. The **New Output** window is displayed.

Adding Outputs

Type in the unique identifier for this output in the **Output Name**.

Select an **Input Stream** to be made available on this output from the adjacent drop-down list.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Select **TCP**.

Specify the Output parameters (see **Output Stream Parameters** Table).

If the target is an HTTP server, select the **HTTP** checkbox. In this case, HTTP headers will be added to the stream.

Enter additional parameters as necessary (see Output Stream Parameters Table).

Click **OK**. The new TCP Output with its settings is created and now appears on the screen.

Output Stream Parameters Table

Parameter	Description
Output Parameters	
Host	The destination host for the stream.
Port	Specify the ports to listen on for TCP streams. Default: 7777.
HTTP	If the target is an HTTP server, select the **HTTP** checkbox. In this case, HTTP headers will be added to the stream.
Multi Path TCP	Select this checkbox to enable MultiPath TCP, which enables the transmission of a stream over TCP using two network interfaces (e.g. Wifi + mobile). Multi Path TCP is available for Linux only.

Mode	The multiple links can be configured to: • **Aggregate** - aggregate the bandwidth of the multiple links in order to use the total capacity of both links. In this case Zixi will use all available bandwidth among all available flows (if needed) to send the stream. • **Duplicate** - enhance the path's resiliency by duplicating the stream and sending through multiple links in order to overcome errors and packet loss.
Enable Decryption	Select this checkbox to enable decryption of an encrypted stream.
Decryption type	If the stream has been encrypted, you can decrypt through the output by selecting this checkbox and specifying the type of encryption that was used. Select **Automatic** to decrypt a stream that has been encrypted using Automatic encryption. Only if the stream has not been encrypted, select **None** (default). Important Notice: if the stream has been encrypted you must decrypt it in the output.
Decryption key	Enter the decryption key to decrypt the encrypted stream.

Adding HTTP Push Outputs
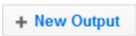
The HTTP Push output stream can be encapsulated in HLS or DASH. The source of the output stream is a predefined adaptive group that has been configured in the **Adaptive Groups** screen. The configuration of the stream includes the option to delete outdated stream fragments on the server. SCTE-35 markers in the source input will be preserved and used to segment the stream for both HLS and DASH encapsulation. Output streams can be pushed to one Zixi Broadcasters or Zixi Receiver.

The path to the destination can be formed in one of the following ways:
- **Full path** – in this option the path would be constructed as follows: `<base url>/<path>/<file>?<aditional params may be also with path and file>`
- **Path in parameters** - in this option the path would be constructed as follows: `<base url>?<aditional params may be also with path and file>`
- **Flat path** - in this option the path would be constructed as follows: `<base url>/<path>_<file>?<aditional params may be also with path and file>`. Any "/" in path should be replaced with "_"

Low Latency HLS - Zixi Broadcaster supports low latency HLS delivery using chunked transfer encoding, which starts sending an HTTP response as chunks of data when they are ready before the complete response is available. Chunked transfer encoding can be used with transport stream (TS) segments and with fragmented MP4 (fMP4). For low latency HLS and DASH, Zixi Broadcaster must be used as an origin server. To enable low latency HLS and DASH, select **Enable HLS Fast playback** on **Settings > Live Protocols** screen.

➡ **To Create an HTTP Push Output:**

1. In the Zixi Broadcaster **Outputs** page, click [+ New Output].
   The **New Output** window is displayed.

Adding Outputs

Select the **HTTP Push** option (radio button).

Type in the unique identifier for this output stream in the **Output Name**.

Select an **Input Adaptive Group** to be made available on this output from the adjacent drop-down list. To create an Adaptive Group, see **Adaptive Groups**.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: not selected.

Enter the **Output Parameters** (see Output Stream Parameters Table).

Click **OK**.

Output Stream Parameters Table

Parameter	Description
Output Parameters	

Encapsulation Options	• HLS Encapsulation - the output stream, which includes all the streams in the selected Adaptive group, will be encapsulated in HTTP Live Streaming format. • Dash Encapsulation - the output stream, which includes all the streams in the selected Adaptive group, will be encapsulated in MPEG DASH format.
Target URL	Depending on the selection in the **Segment Path** field below, this field should include the following: • **Full path** – `<base url>/<path>/<file>` • **Path in parameters** - in this option the path would be constructed as follows: `<base url>` • **Flat path** - in this option the path would be constructed as follows: `<base url>/<path>_<file>`
Additional URL parameters	Depending on the selection in the **Segment Path** field below, this field should include the following: • **Full path** – `?<aditional params may be also with path and file>` • **Path in parameters** -`?<aditional params may be also with path and file>` • **Flat path** - `?<aditional params may be also with path and file>`. Any "/" in path should be replaced with "_" URL parameters support macros as follows: • %PATH% - file path as it appears in the playlist • %FILE% - file name
Delete outdated stream fragments on server	Select this checkbox to delete any outdated stream fragments from the server.
Upload DVR playlist	Select this checkbox if you are streaming a recorded/VOD stream and you want to upload a DVR playlist in addition to the live playlist.

Segment Path	Select one of the following path segmentation types: • **Full path** – in this option the path would be constructed as follows: `<base url>/<path>/<file>?<aditional params may be also with path and file>` • **Path in parameters** - in this option the path would be constructed as follows: `<base url>?<aditional params may be also with path and file>` • **Flat path** - in this option the path would be constructed as follows: `<base url>/<path>_<file>?<aditional params may be also with path and file>`. Any "/" in path should be replaced with "_"
Ignore TLS certificate errors	Select this option when streaming to a trusted server that does not have a valid certificate. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Authorization	Select this checkbox if your destination server requires authorization credentials to connect.
Method	Select one of the following authorization methods: • Basic authorization • Digest authorization • OAuth2 authorization
Username	Type the username
Password	Type the password

Adding AWS Outputs

The HTTP output stream, which is encapsulated in HLS or DASH/fMP4 HLS can be pushed to either an AWS S3 Bucket or to an AWS Elemental MediaStore. The native AWS support includes the ability to configure the S3 authentication credential, including the Region, Access Key, and Secret Key.

➡ **To Create an AWS Output:**

1. In the Zixi Broadcaster **Outputs** page, click + New Output . The **New Output** window is displayed.

Adding Outputs

Select the **AWS** option (radio button).

Type in the unique identifier for this output stream in the **Output Name**.

Select an **Input Adaptive Group** to be made available on this output from the adjacent drop-down list. To create an Adaptive Group, see **Adaptive Groups**.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: not selected.

Enter the **Output Parameters** (see Output Stream Parameters Table).

Click **OK**.

Output Stream Parameters Table

Parameter	Description
Output Parameters	
Service	Select one of the following options: • S3 Bucket - the output stream will be pushed to the specified S3 Bucket. • Elemental Media Store - the output stream will be pushed to the specified AWS Elemental MediaStore.
Encapsulation	• HLS Encapsulation - the output stream, which includes all the streams in the selected Adaptive group, will be encapsulated in HTTP Live Streaming format. • Dash Encapsulation - the output stream, which includes all the streams in the selected Adaptive group, will be encapsulated in MPEG DASH format.

URL	The URL address of the destination host for the S3 Bucket or the AWS Elemental MediaStore. The path to the destination can be formed in one of the following ways according to the option selected in the **Segment Path** field below: **Full path** – in this option the path would be constructed as follows: `<base url>/<path>/<file>?<aditional params may be also with path and file>` **Path in parameters** - in this option the path would be constructed as follows: `<base url>?<aditional params may be also with path and file>` **Flat path** - in this option the path would be constructed as follows: `<base url>/<path>_<file>?<aditional params may be also with path and file>`. Any "/" in path should be replaced with "_"
Delete outdated stream fragments on server	Select this checkbox to send delete messages to S3/AWS Elemental MediaStore to delete the outdated stream fragments from the servers.
Ignore TLS certificate errors	Select this option when streaming to a trusted server that does not have a valid certificate. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access key	Enter your AWS S3 or AWS Elemental MediaStore Access key.
Secret key	Enter your AWS S3 or AWS Elemental MediaStore Secret key.
Segment Path	Select one of the following path segmentation types: **Full path** – in this option the path would be constructed as follows: `<base url>/<path>/<file>?<aditional params may be also with path and file>` **Path in parameters** - in this option the path would be constructed as follows: `<base url>?<aditional params may be also with path and file>` **Flat path** - in this option the path would be constructed as follows: `<base url>/<path>_<file>?<aditional params may be also with path and file>`. Any "/" in path should be replaced with "_"

Adding RIST Outputs

The RIST output can be push streams or have them pulled to/from a RIST-enabled device. RIST seeks to provide reliable, high performance media transport by using UDP at the transport layer

Adding Outputs

to avoid the inefficiencies of TCP, then layering on top Forward Error Correction and Retransmits to add the reliability inherently absent from UDP.
Zixi supports the following RIST profiles:

- **Simple Profile (PUSH only)** - The RIST Simple Profile provides best-in-class packet protection, as well as support for multi-link bonding and seamless switching.
- **Main Profile (PUSH/PULL)** – The RIST Main Profile builds upon the features of the Simple Profile to provide backwards compatibility, while opening the door for additional features, including:
  - o **Encryption and authentication** - RIST Main Profile uses industry-standard DTLS or PSK with a variety of available cyphers to ensure the most up-to-date protection, while being flexible to accommodate local legal regulations. Support for pre-shared keys is also included, which makes RIST Main Profile compatible with one-to-many environments such as satellite or multicast distribution.
  - o **Native tunneling and multiplexing** - the ability to combine multiple Simple Profile RIST streams into one single connection, optionally with one single encryption and authentication step, using industry-standard GRE over UDP.
  - o **Bandwidth optimization** - by deleting NULL packets at the source and re-inserting them at the destination.
  - o **Support for high bit rate streams** - The RIST Main Profile includes an RTP header extension which increases the sequence number size to 32-bits, and therefore increases the maximum size of retransmission buffers, and thus opens the door for higher bitrate streams, such as lightly compressed (e.g. JPEG 2000, Tico) and uncompressed video.

Contact your Zixi representative to learn more about interoperability testing between Zixi Broadcaster and 3rd party devices. More details about RIST can be found at www.rist.tv

➡ **To Add a RIST Output:**

1. In the Zixi Broadcaster **Outputs** page, click [+ New Output]. The **New Output** window is displayed.

Adding Outputs

Select the **RIST** option (radio button).

Type in the unique identifier for this output stream in the **Output Name**.

Select an **Input Stream** to be made available on this output from the adjacent drop-down list.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix).
Default: not selected.

Enter the **Output Parameters** (see Output Stream Parameters Table).

Click **OK**.

> The new RIST Output with its settings is created and now appears on the Outputs screen.

Output Stream Parameters Table

Parameter	Description
Output Parameters	
Profile	Select one of the following RIST profiles that matches the input stream: • Simple Profile (default) • Main Profile
Type (Main Profile)	Select the stream direction: • Push • Pull
Host	Specify the destination IP address or URL of the host to which the steam will be pushed.
Port	Specify the target UDP port.

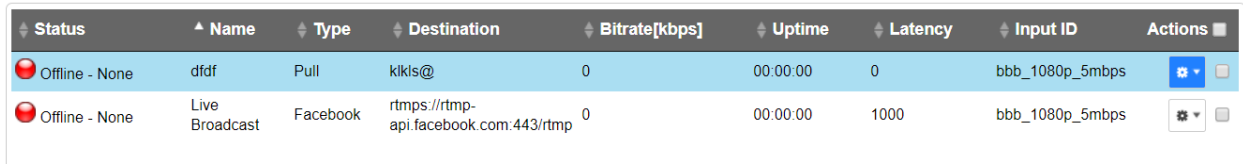|	
TTL	Specify the time-to-live (TTL). Used mainly to limit the range (or "scope") of a multicast transmission. Leaving it as blank uses the default value specified by the operating system
Smoothing [ms]	Enables transmission of the output at the correct rate. Required when the receiving device is sensitive and can't lock on to the stream (in such a case, the recommended latency is 100 - 1000 ms)
SMPTE-2022 FEC	In the SMPTE-2022 FEC standard, 1-D and 2-D parity codes are systematic FEC codes of decent complexity that provide protection against bursty or random losses. This setting can be modified without interrupting an existing stream. To enable SMPTE-2022 FEC (Forward Error Correction) select one of the following parity options from the drop-down menu: • **1D** - SMPTE-2022 1D can fix a problem in ONE packet per row. This means that the number of rows specified should consider the packet loss rate- the shorter the row, the more error resilience can be achieved on the expense of bitrate level. However, longer rows increase the delay that the FEC will add. It is recommended to select this option when the packet loss is sporadic. The stream will occupy the source port and two ports above it (e.g. if the source port is 8988, it will occupy 8990). • **2D** - SMPTE-2022 2D uses a table of packets, which includes rows and columns. This option is more error resilient, but it increases the delay by (row*column) packets and increases the bitrate with R+C packets per each table of R*C packets. It is recommended to select this option when packet loss is bursty. The stream will occupy four ports above (e.g. if the source port is 8988, it will occupy 8992).
Bind to IP	Select from the drop-down list the local IP address to be used for this Input, OR select *Any* to enable any IP to be used.
Local Port	Specify from which local port to source the stream, if desired (instead of randomly chosen by the operating system).
RIST main profile parameters	
Use DTLS	
ReMuxing	Select this checkbox to enable remuxing from VBR MPEG-TS to MPEG-TS CBR (used for professional IRDs).

Adding Outputs

Remux to bitrate [kbps]:	Specify the CBR bitrate to target for a remuxed stream.
Buffer Size [ms]	Specify the size of the buffer that will be used for the remixing. A larger buffer increases the quality, but also increases latency.
No NULL Packets	Select this option to re-multiplex the stream to CBR but remove the NULL packets in order to maintain low bitrate.
Enable Decryption	Select this checkbox to decrypt an encrypted stream.
Decryption type	If the stream has been encrypted, you can decrypt through the output by selecting this checkbox and specifying the type of encryption that was used. Select **Automatic** to decrypt a stream that has been encrypted using **Automatic** encryption. Only if the stream has not been encrypted, select **None** (default). **Important Notice: if the stream has been encrypted you must decrypt it in the output.**
Decryption key	If the decryption type includes a key, enter the key to decrypt the stream during output.
Enable IFB/Talkback	Select this checkbox to enable IFB/Talkback for one-way communication from the director or assistant director to on-air talent or a remote location. Selecting the checkbox allows the decoder with a Zixi Receiver to send audio back to the encoder with a Zixi Feeder. This offers the ability to, for example, give audio feedback to the camera operator.
Port	The port that will be used to send the audio feedback.

Viewing Existing Outputs

The Outputs screen displays all the output streams that have been created.

Hovering the cursor on the status indicator of a stream shows the stream configuration information and basic utilization statistics, where applicable.

Any of the columns in the following table can be sorted in ascending/descending order by clicking on its heading. The **Search** text box in the upper left-hand side of the screen can be used to search for a specific input stream by entering the desired Stream ID.

Field	Description
Status	Displays the status of output stream. The following colored indicators are displayed: • Green = Connected • Yellow = Connecting • Red = Disconnected with an error condition • Blue = Offline with no connection attempts • Grey = Offline and stopped
Name	Displays the name of the output stream, as defined in the Zixi Broadcaster.
Type	Displays the type of output stream.
Destination	Displays the IP address of the host that will be receiving the stream.
Bitrate [kbps]	Displays bitrate of the connected output stream.
Uptime	Displays the amount of time the stream has been active.
Latency	Displays the configured latency
Input ID	The ID of the related Input stream.
Actions	Provides access to various actions to be performed on this output stream (see Performing Actions on Output Streams below).

Viewing Existing Outputs

Stats Pane

The Stats pane on the bottom of the page shows data about the activity of the selected stream.

Click the 📊 icon next to a parameter to show the graph of historical data for the specified parameter.

Field	Description
Bitrate (kbps)	Displays the current bitrate of the output stream
Last Connected	Displays the date and time in which the stream was connected.
Send Errors	Displays the number of errors generated after sending the stream.
Reconnections	Displays the number of reconnection attempts.
RTT (ms)	Displays the Round Trip Time (RTT) from the source (in milliseconds)
Jitter	Displays the current Jitter, measured in milliseconds.
Total Packets	Displays the total number of packets that have been transmitted.
Packet Rate	Displays the current number of packets per second.
Packet Loss %	Displays the packet loss rate (how many packets were lost out of the total number of packets).
Dropped Packets	Displays the total number of packets that were dropped since the beginning of the stream.
Recovered Packets	Displays the total number of dropped packets that have been recovered since the beginning of the stream.
Not Recovered Packets	Displays the number of non-recovered packets.
Failed Sends	Displays the number of failed attempts to send the stream.
FEC Packets	Displays the number of FEC packets transmitted.
FEC Recovered	Displays the number of FEC packets that were recovered.
ARQ Requests	Displays the number of requests for transmission of dropped packets made with ARQ.
ARQ Recovered	Displays the number of dropped packets recovered via ARQ.

Viewing Existing Outputs

ARQ Duplicates	Displays the number of duplicate recovery packets received via ARQ.
Overflows	Displays the number of packets lost due to buffer overflow. Note: overflow is usually the result of the Max Bitrate being too low.

Searching for Output Streams

➡ **To Search for an Output Stream:**

In the Zixi Broadcaster **Outputs** page, type in the specific output stream name in the search text box on the left- hand top of the screen and click [🔍]. The **Output** screen displays the requested output stream(s).

Performing Actions on Output Streams

Every stream has a shortcut button that can be used to perform relevant actions on the stream. The following actions can be performed through the Actions button:

- **Deleting Output Streams from Broadcaster**
- **Switching Input**

Deleting Output Streams from Broadcaster

➡ **To Delete an Output Stream from the Broadcaster:**

1. In the Zixi Broadcaster **Outputs** page, select the output stream you want to delete, and then click [⚙▾].
2. Click **Delete** to the selected stream. The selected input stream was deleted and is not displayed anymore.

Switching Input

➡ **To change the input associated with the selected output:**

1. In the Zixi Broadcaster **Outputs** page, click [⚙▾] and select **Switch Input**. The **Switch source** window is displayed.
2. In the **New Input** drop-down, select the desired input, and click **OK**. The newly designated input is now associated with the selected output.

Viewing Traceroutes

You can view traceroute data for a stream sent from a Zixi Broadcaster (v13 or above) to a Zixi Receiver (v13 or above).

➡ **To view traceroute data:**

1. On the **Outputs** page of Zixi Broadcaster, click the desired row of the output stream for which you want to view traceroutes.

Click the [⚙▾] button on the right end of the selected row and then select **Trace**.

Performing Actions on Output Streams

The traceroute data for this stream is displayed.

Performing Actions on Multiple Outputs

Delete Marked Individual and Multiple Outgoing Stream

➡ **To Delete Output Streams:**

1. In the Zixi Broadcaster Outputs page, select all outputs by selecting the checking the Actions checkbox at the header line, or select individual outputs by selecting their checkboxes.
   The Marked drop-down button is displayed.
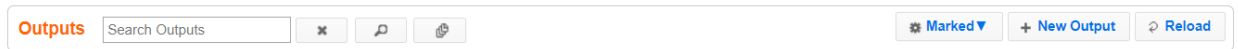
Click the **Marked** drop-down menu and then click **Delete**.
The selected Output Streams are deleted.

Start and Stop Marked Individual and Multiple Outgoing Streams

➡ **To Stop/Start Output Streams:**

1. In the Zixi Broadcaster Outputs page, select all outputs by selecting the **Actions** checkbox, located in the header line, or select individual outputs by selecting their checkboxes.
   The Marked drop-down button is displayed.

Click the **Marked** drop-down menu and then click **Start/Stop**.
The selected Output Streams are started/stopped.

Save Marked Individual and Multiple Outgoing Streams

➡ **To Save Output Streams:**

1. In the Zixi Broadcaster Outputs page, select all outputs by selecting the **Actions** checkbox, located in the header line, or select individual outputs by selecting their checkboxes.
   The Marked drop-down button is displayed.

Click the **Marked** drop-down menu and then click **Save**.
The selected Output Streams are saved.

Reset Stats for Individual and Multiple Outgoing Streams

➡ **To Reset Output Streams:**

1. In the Zixi Broadcaster Outputs page, select all outputs by selecting the **Actions** checkbox, located in the header line, or select individual outputs by selecting their checkboxes.
   The Marked drop-down button is displayed.

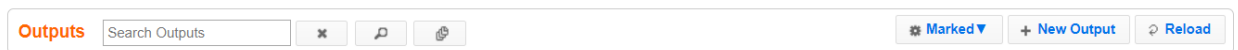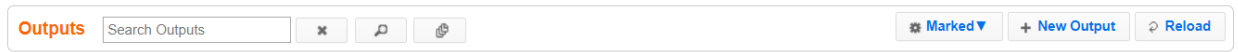Click the **Marked** drop-down menu and then click **Reset**.
The selected Output Streams are reset.

Viewing Traceroutes

For streams sent from Zixi Broadcasters (v13 and above) to Zixi Receivers (v13 and above), you can view traceroute data for this stream.

➡ **To view traceroute data:**

1. On the **Outputs** page of Zixi Broadcaster, click on the row of the stream for which you want to view traceroutes.

Click the button on the right end of the selected row and then select **Trace**.
The traceroute data for this stream is displayed.
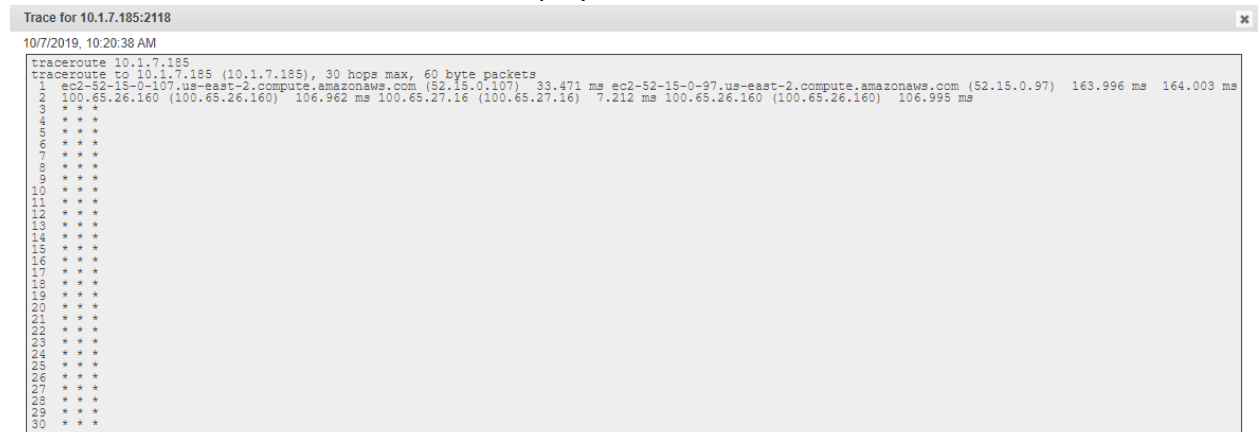
You can refresh the Traceroute data at any time by clicking the **Refresh** button.

Using Output Templates

Instead of manually creating an output and then connecting the output to an input, you can define output templates with rules for automatic creation of outputs with predefined settings. The template includes an Input pattern. When an input pattern matches the pattern of an incoming input stream, the output is created automatically.
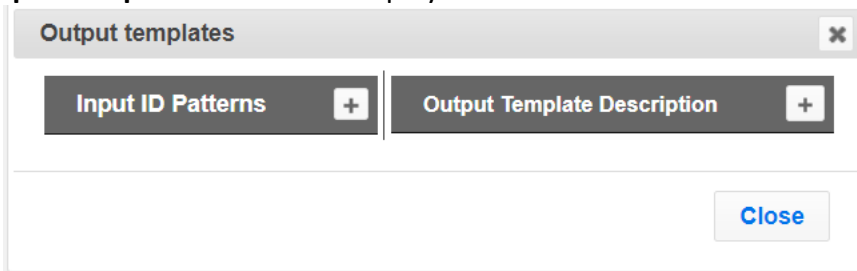
Using Output Templates

➡ **To create a new Output template:**

1. Click the **Outputs** tab at the top of the Zixi Broadcaster administrative screen.
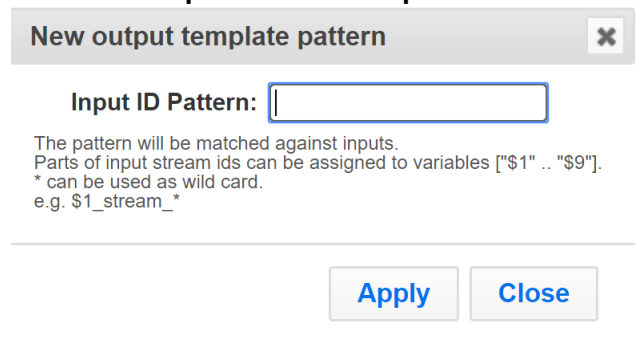
In the **Menu** bar, click the **Templates** (⊚) button.
The **Output Templates** window is displayed:

Under **Input ID Parameters**, click the **'+'** button.
The **New Output Pattern Template** window is displayed:

In the **Input ID Pattern** field, enter a pattern for the Stream ID of the input stream for which an output will be automatically created. This pattern will be used to identify the input stream and can include variables that are marked with the "$" sign followed by a number (e.g. $1, $2, etc.) and/or with an asterisk "*" wildcard.
The patterns should also include a part of the string that requires an exact match.
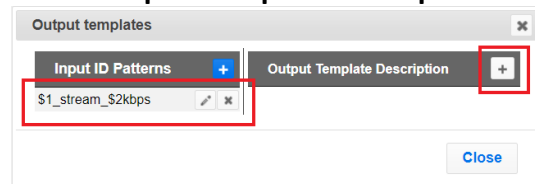For example, the pattern "$1_stream_$2kbps" will match an input stream "talk_show_stream_600kbps".
Click **Apply**.
The newly created input ID pattern is added to the **Input ID Patterns** list.
From the **Input ID Patterns** list, select a pattern for which you want to relate an output template.
In the **Output Template Description** section click the "**+**" button.

Using Output Templates

The **New Output Template** window is displayed:

In the **Output Name** field, enter a name for the output that will be created. The name can include variables used in the **Input Pattern** field. For example, the pattern *"$1_ouput_stream_$2kps"* will eventually create an output *"talk_show_output_stream_600kbps"*, as it uses the variables that were defined in the **Input Pattern** field.

Select the desired output type and fill-in the relevant Output parameters according to the instructions of the relevant section:

- **UDP Output –** Follow the instructions in the **Adding UDP Outputs** section.
- **RTMP Output –** Follow the instruction in the **Adding RTMP and RTMPS Outputs** section.
- **Pull Output -** Follow the instruction in the **Adding Pull Outputs** section.
- **Push Output -** Follow the instruction in the **Adding Push Outputs** section.
- **TCP Output -** Follow the instruction in the **Adding TCP Outputs** section.
- **HTTP Push -** Follow the instructions in the **Adding HTTP Push Outputs** section. Note that the **Target URL** field can also use the same variables used in the **Input Pattern** field. For example, "*https://s3.amazon.com/zixi/$1_folder_$2kbps*".

Using Output Templates

- **AWS Output** - Follow the instructions in the **Adding AWS Outputs** section. Note that the **URL** field can also use the same variables used in the **Input Pattern** field. For example, *"https://s3.amazon.com/zixi/$1_folder_$2kbps"*.
- **RIST Output** – Follow the instruction in the **Adding RIST Outputs** section.

Click **OK**.

The template is added to the **Output Template Description** list. When an input pattern will match the pattern of an incoming input stream, the defined output will be created automatically.

Broadcaster Network Bonding

Zixi's Network Bonding feature enables you to divide a stream into several network channels by utilizing multiple NICs and links and then subsequently reuniting them at the Zixi Broadcaster side. For example, a 5 Mbps stream can be streamed using two links, one 2 Mbps link that uses a mobile network and another 3 Mbps Wifi network. The stream is automatically bonded at the Zixi Broadcaster side without any special configuration (as long as the Push input is defined and the two NICs are setup in the machine running the Zixi Broadcaster). Network Bonding can be used for load balancing between multiple links in the following configurations:

- **Zixi Feeder with Multiple NICs to a single Zixi Broadcaster NIC** - the stream is divided at the Zixi Feeder end and then bonded at the Zixi Broadcaster end. This configuration requires configuring Network Bonding in the Zixi Feeder.
- **Zixi Feeder with Multiple NICs to multiple Zixi Broadcaster NICs** - the stream is divided at the Zixi Feeder end, sent to multiple IP addresses (each Zixi Broadcaster NIC has a separate IP address), and then bonded at the Zixi Broadcaster end. This configuration requires configuring Network Bonding in the Zixi Feeder. Each destination (i.e. each Broadcaster NIC is configured in a separate network bonding link by using a different Host IP address).
- **Zixi Feeder with single NIC to Multiple Zixi Broadcaster NICs** - the stream is sent to multiple IP addresses (each Zixi Broadcaster NIC has a separate IP address), and then bonded at the Zixi Broadcaster end. This configuration requires configuring Network Bonding in the Zixi Feeder. Each destination (i.e. each Broadcaster NIC is configured in a separate network bonding link by using a different Host IP address).
- **Zixi Broadcaster with multiple NICs to another Zixi Broadcaster with a single/multiple NICs** - a Zixi Broadcaster can transfer a stream to another Zixi Broadcaster through multiple NICs at the source Broadcaster and single/multiple NICs at the destination Broadcaster. This configuration requires configuring Network Bonding in the Zixi Broadcaster (see Broadcaster Output with Network Bonding).

Using Network Bonding for Hitless Failover

The Network Bonding feature can be used to ensure high availability of the stream. The feature ensures hit-less failover between multiple networks and network cards (i.e. network and hardware protection). As part of the configuration of the network bonding feature it is possible to set a NIC (which may be connected to a separate network) as a "Backup". In this case, the backup link will only be utilized if the stream has used all other available capacity. For example, a stream can be configured to be transferred on a WiFi network as the main link and a mobile network as a backup. If the WiFi link is compromised (either completely unavailable or limited bandwidth), the stream will be transferred, in full or partially through the backup mobile link and then bonded at the Zixi Broadcaster end, enabling uninterrupted streaming and high availability.
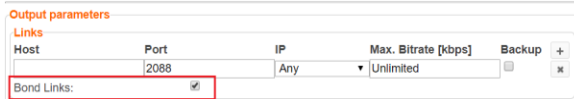
Broadcaster Output with Network Bonding

A Zixi Broadcaster can push a stream to another Zixi Broadcaster that has been divided into multiple network channels by utilizing multiple NICs. The Zixi Broadcaster at the destination will subsequently reuniting them into a single input stream.

➡ **To add network bonding to a Push Output:**

1. Create a **Push Output**, by following the instructions in the **Adding Push Outputs** section. In the **Output Parameters** section, select the **Bond Links** checkbox.

In the **Links** section, click the **+** button to add a second link:

In the **Host** field, type the IP address of the destination Zixi Broadcaster.

In the **Port** field, type the destination port number of the Zixi Broadcaster to which you want to stream. Default: 2088

In the **NIC** field, select the NIC in the Zixi Broadcaster (source) that you want to use to stream.

In the **Bitrate Limit** field, do one of the following:

- If you want to limit the bitrate that will be used in this link, enter the limit value in Kbps.
- If you DO NOT want to limit the bitrate, leave the default value - "0".

In the **Backup** field, do one of the following:

- If you want to use this link only if there is not enough bandwidth in the other links, select the Backup checkbox.
- If you want to use this link in parallel to other links, DO NOT select the Backup checkbox.

Configure additional parameters as required.

Click **OK** to save the Zixi Broadcaster Output.

Adaptive Groups

Zixi Broadcaster features the ability to create multiple bitrate profiles for a single input stream and set it as an adaptive group that can be used by a supporting client. The client will automatically switch between the various bitrate profiles of the stream according to the network conditions during playback.

After creating a group with different bitrates you can test them all out by playing them with the different 3rd party players (via the ⚙ Actions menu).

You can optionally create adaptive group templates that will automatically group streams in adaptive groups instead of defining groups in advance.

Creating New Adaptive Groups

➡ **To Create a New Adaptive Group:**

1. In the Zixi Broadcaster administrative screen, click the **Adaptive** tab.

Click **Add Group**.

The **Adaptive live streams group** window is displayed:

In the **Group Name** field, enter the unique string as the adaptive group's name.

Under **StreamID**, select an input stream from the drop-down list to create an adaptive bitrate.

Enter the desired **Bitrate[kbps]** for that stream in the adjacent field to **Stream ID**.

Creating New Adaptive Groups

Click [+ Add stream] to add as many streams as you want to include in the group and repeat steps 4 and 5 for every stream that is added to the group.

Select one or more **Protocols** that will be supported for this adaptive group. The Zixi protocol option enables devices using the Zixi SDK to view the stream using the Zixi protocol.

Select **Support MultiAudio** if the input streams include multiple audio channels to enable multiple separate audio channels in the adaptive group.

Specify the HLS/Dash segment/chunk duration and count (See details in the table below).

Specify the duration to **Keep recorded files for [minutes]**. If the file is left as blank, the system will use the global settings, specified in the **Settings > Live Protocols** screen in the **HLS DVR Maximum Recording Duration** field.

In the **File name template** field, specify the file name pattern that Zixi will use to generate when saving the recorded content.

Click **OK**.

The new Adaptive Group is created and appears on the Adaptive screen.

Parameter	Description
Group Name	Specify the unique identifier for this group.
Stream ID	Select an input stream from the drop-down list.
Bitrate [kbps]	Specify the bitrate for the selected stream.
Protocols	Select one or more **Protocols** that will be supported for this adaptive group - Zixi HLS (enables devices using the Zixi SDK to view the stream using the Zixi protocol), HLS, DASH/fMP4 HLS
Support MultiAudio	Select this checkbox to enable multiple separate audio channels in the adaptive group.
Fast playback	Select this setting to enable low latency HLS delivery. The **Enable HLS Fast playback** on the **Settings > Live Protocols** screen must be enabled. Only the TS segments version of the HLS stream will be available for adaptive streaming, not the fragmented MP4 (fMP4) version. When enabled, the following playback URLs will be available: • http://<server url>:7777/playback.m3u8?stream=<adaptive group name> • http://<server url>:7777/<adaptive group name>.m3u8
Convert CEA-708 to WebVTT	Extracts closed caption from video elementary stream and converts it to WebVTT format. This feature is currently available for HLS only and there is no support to styling/placement, just text.

Creating New Adaptive Groups

HLS Over Multicast	Select this checkbox to enable multicasting of the adaptive stream (requires multicast to be enabled in the **Settings**)
HLS Segment Duration [sec]	Specify the duration in seconds of each segment/chunk in the HLS playlist. You can specify sub-second durations (e.g. 0.5). (Default: 6 seconds)
HLS Segments Count	Specify the number of segments in the HLS playlist.
DASH Segment Duration [sec]	Specify the duration in seconds of each segment/chunk in the DASH adaptive group. You can specify sub-second durations (e.g. 0.5). (Default: 6 seconds)
DASH Segments Count	Specify the number of segments in the DASH adaptive group.
Recording	
Keep recorded files for [minutes]	Specify the maximum time for storing the recording. If the file is left as blank, the system will use the global settings specified in the **Settings > Live Protocols** screen in the **HLS DVR Maximum Recording Duration** field.
File name template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated.
	The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows:
	%S=stream id - optional.
	%Y=year - optional
	%M=month - optional
	%D=day - optional
	%T=HH.MM.SS creation time - mandatory
	For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.

Adding Streams to Existing Adaptive Groups

You can add additional streams to existing adaptive groups.

➡ **To Add Streams to an Adaptive Group:**

1. In the Zixi Broadcaster administrative screen, click the **Adaptive** tab.

Select the Group to which you want to add a stream, and click button, and then **Edit**. The **Adaptive live streams group** window is displayed.

Click button for as many streams as you want to include in the group. Another Stream row will be added in the above table to which a desired **Bitrate** must be specified. When clicking on the red at the end of any of the stream rows, the stream will be deleted from the group.
Click **OK**. The group has been modified accordingly.

Adaptive Groups Templates

Instead of defining adaptive groups in advance and then relating specific input streams to these groups, you can define templates with rules for automatic grouping of streams in adaptive groups. Every time a new input stream, which matches the conditions of the template, is added, it will be automatically added to the adaptive group that was defined in the template. Specific streams are identified by naming patterns and added to the group by setting static naming patterns and bitrates or dynamic patters.

➡ **To create a new adaptive group template:**

1. Click the **Adaptive** tab at the top of the Zixi Broadcaster administrative screen.

In the Menu bar, click the **Templates** ( ) button.
The Adaptive Groups Templates screen is displayed:

Adaptive groups templates	✖
Input ID Pattern **Adaptive Group Name**	➕
	Close
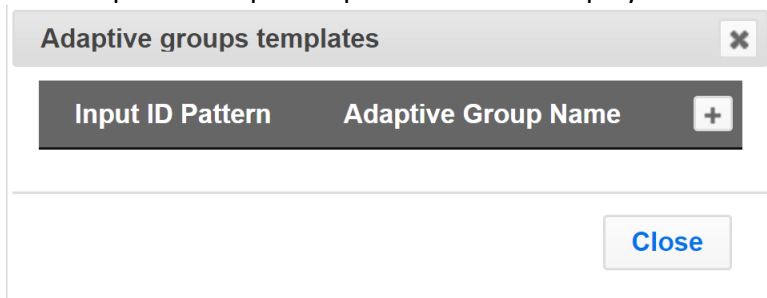
Adaptive Groups Templates

Click the **+** button.

The **Adaptive Group Template** window is displayed:

In the **Input ID Pattern** field, enter a pattern for the Stream ID of the input stream that will be automatically added to newly created adaptive group. This pattern will be used to identify the input stream and can include variables that are marked with the "$" sign followed by a number (e.g. $1, $2, etc.) and/or with an asterisk "*" wildcard. The patterns should also include a part of the string that requires an exact match. For example, the pattern "$1_stream_$2kbps" will match an input stream "talk_show_stream_600kbps". String parts that were matched again $X variables, can be reused in other settings, however, string parts that were matched against an asterisk wildcard cannot be reused in other settings.

In the **Adaptive Group Name** field, enter a string that will be used as the name of the adaptive group. You can use the $X variables that were used in the Input ID Pattern field above. For example, based on the above example, if you write "$1_group", the group name will be "talk_show_group".

Under the **Adaptive Group Properties**, select the checkboxes of the protocols with which these streams will be transmitted (Zixi, HLS, DASH, HLS over multicast).

If you want to record an HLS stream, select the **Record** checkbox and in the **Keep recorded files for [minutes]**, specify the maximum time (in minutes) to record. Default: the time defined in

the global settings, specified in the **Settings > Live Protocols** screen in the **HLS DVR Maximum Recording Duration** field.

Under **Adaptive Group Stream Patterns**, select the method in which the streams in the adaptive group will be created:

- **Dynamic Streams Acquisition:** this method will automatically add input streams that match the defined **Input ID Pattern** and give them a bitrate value based on the **Bitrate Pattern**. This option is based on the assumption that the bitrate value is part of the input stream's ID. Based on the example above, by entering the value "$2" in the **Bitrate Pattern** field, the system will automatically add the incoming "talk_show_stream_600kbps" stream, while giving it a 600 Kbps Bitrate setting (according to the definition in the **Input ID Pattern** field, the $2 was assigned a value of 600kps). If another stream that matches the input ID patters comes in (e.g. talk_show_stream_700kbps") with a different bitrate, for example, 700kbps, this stream will be also added to the same adaptive groups, however the bitrate setting will be 700 kbps.

To add a Dynamic Streams Acquisition bitrate pattern:

1. In the **Bitrate Pattern** field add the pattern as described above.
2. Click **Apply**.

   The new template is added to the **Adaptive Groups Templates** list:

- **Static Stream Set:** if the input streams do not have the bitrate value in their ID names, you can manually define the ID and the bitrate for each stream that will be included in the group. You can define streams that are not currently connected, but will be connected at a later stage.

Performing Actions on Adaptive Groups

Adaptive group stream patterns

Streams expected in adaptive group may connect later.

Dynamic streams acquisition ○   Static streams set ●

Stream pattern	Bitrate [kbps]	+
comedy_HD	512	✖

To add a Static Steam Set:
1. Click the **+** button
2. In the **Steam Pattern** field, enter a pattern for the stream ID (you can use the variables used in the Input ID Pattern field and add additional variables as needed). This pattern will be used to identify the stream and add it to the group (e.g. "comedy_HD").
3. In the **Bitrate [Kbps]** field, enter the Bitrate value of the stream.
4. Click the **+** button for as many streams as you want to include in the group and repeat the steps above for every stream that is added to the group.
5. Click **Apply** to save all changes.
   The new template is added to the **Adaptive Groups Templates** list:

Adaptive groups templates   ✖

Input ID Pattern	Adaptive Group Name	+
$1_stream_$2kbps	$1_adaptive_stream	✏ ✖

Close

the group will be active only when all the streams defined will be connected.

Performing Actions on Adaptive Groups

Every adaptive group has a shortcut button that can be used to perform relevant actions.

Stopping/Starting an Adaptive Group

You can start or stop the stream(s) in the adaptive group at any time.

Performing Actions on Adaptive Groups

➡ **To Stop/Start the Adaptive Group:**

1. In the Zixi Broadcaster **Adaptive Groups** page, click the adaptive group row that you want to start/stop.

2. Click the button on the right end of the selected row and then **Start/Stop**.
   The status will change to Connected/Stopped accordingly.

Editing an Existing Adaptive Group

➡ **To Edit the Configuration of an Adaptive Group:**

1. In the Zixi Broadcaster **Adaptive Groups** page, click the adaptive group row that you want to edit.

2. Click the button on the right end of the selected row and then **Edit**.
   The Adaptive live stream group screen is displayed. You can modify any of the settings.

3. Click **OK**. The new settings will take effect.

Deleting and Adaptive Group

➡ **To delete an Adaptive Group:**

1. In the Zixi Broadcaster **Adaptive Groups** page, click the adaptive group row that you want to delete.

2. Select the Group to which you want to add a stream, and click button, and then **Delete**. The message **"Are you sure you want to delete group <group_name>?"** is displayed.
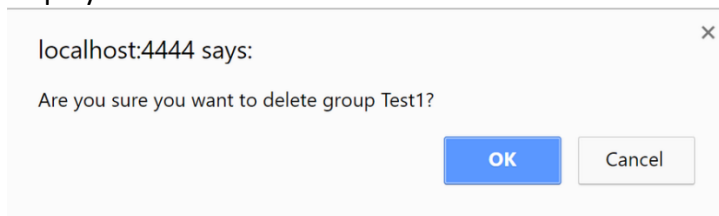
3. Click **OK**. The selected row adaptive group will be deleted.

Play Dash

Zixi Broadcaster can generate links to play the Adaptive Group stream in MPEG DASH format.

➡ **To Play MPEG DASH:**

1. In the Zixi Broadcaster **Adaptive Groups** page, click the adaptive group row that you want to playback.

Performing Actions on Adaptive Groups

2. Select the Group to which you want to add a stream, and click ![gear button] button, and then click **Play Dash**.
   The following window is displayed:
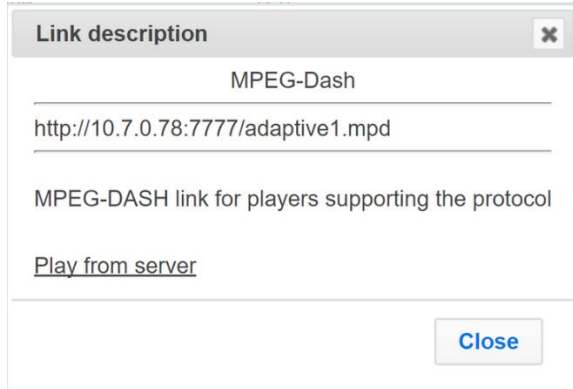
3. Do one of the following:
   - If you have a locally installed MPEG DASH compatible player - click the link to stream the data to your player.
   - If you DO NOT have a player - click **Play from server**. The stream will open in a web-based player.
4. Click **Close** when finished.

Play fMP4

Zixi Broadcaster can generate links to play the Adaptive Group stream in fMP4 HLS format.

➡ **To Play fMP4 HLS:**

1. In the Zixi Broadcaster **Adaptive Groups** page, click the adaptive group row that you want to playback.

2. Select the Group to which you want to add a stream, and click ![gear button] button, and then click **Play fMP4**.
   The following window is displayed:

Performing Actions on Adaptive Groups
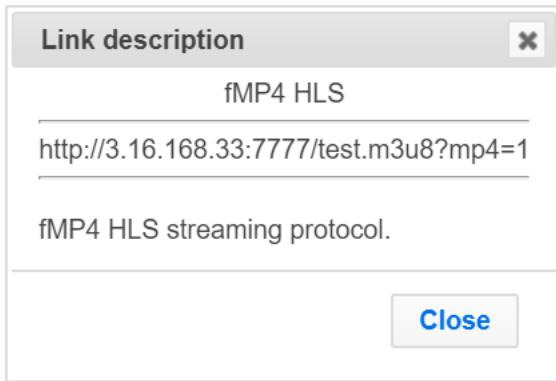
3. Copy the link that is generated at the bottom of the window and paste it into a player/browser for playback.
4. Click **Close** when finished.

Play HLS

Zixi Broadcaster can generate links to play the Adaptive Group stream in HLS format over HTTP, UDP, or Multicast (requires Multicast enabled).

➡ **To Play HLS:**

1. In the Zixi Broadcaster **Adaptive Groups** page, click the adaptive group row that you want to playback.

2. Select the Group to which you want to add a stream, and click [⚙▾] button, and then click **Play HLS**.
   The following window is displayed:
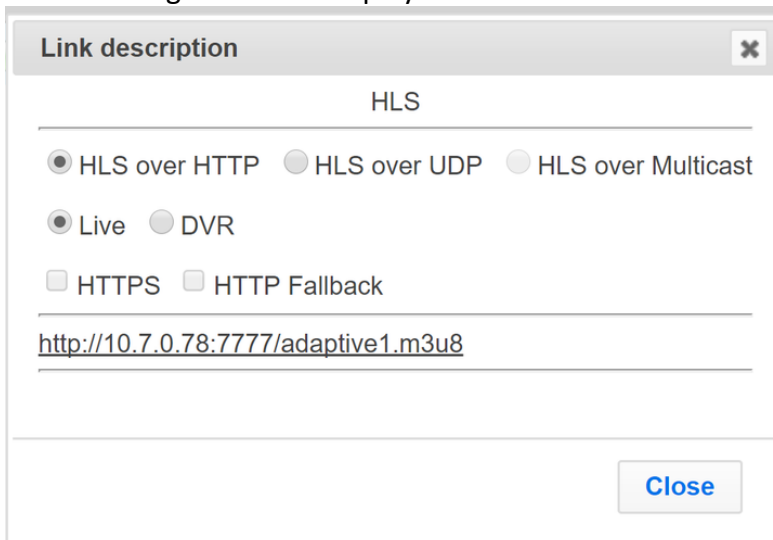
3. Do one of the following:

Performing Actions on Adaptive Groups

- **HLS over HTTP** - streams the adaptive stream over HTTP. Select **Live** to stream a live stream or select **DVR** to select a recorded stream. To stream from an encrypted HTTPS link, select the **HTTPS** checkbox. To stream from a secondary/backup server, select the **HTTP Fallback** checkbox.
- **HLS over UDP** - streams the adaptive stream over UDP. Select **Live** to stream a live stream or select **DVR** to select a recorded stream. To stream from an encrypted HTTPS link, select the **HTTPS** checkbox. To stream from a secondary/backup server, select the **HTTP Fallback** checkbox.
- **HLS over Multicast** - streams the adaptive stream over UDP. Select **Live** to stream a live stream or select **DVR** to select a recorded stream. To stream from an encrypted HTTPS link, select the **HTTPS** checkbox. To stream from a secondary/backup server, select the **HTTP Fallback** checkbox.

4. Copy the link that is generated at the bottom of the window and paste it into a player/browser for playback.
5. Click **Close** when finished.

Set Preroll

A preroll transport stream file is a video/audio file that is played before the adaptive group video is played. Before setting the preroll, you should make sure that the file is available for VOD and that VOD is enabled in the File Transfer and VOD settings.

➡ **To set a Pre-roll:**

1. Upload the Pre-roll TS File to the designated Root folder on the Zixi Broadcaster server. To find your Root folder location, go to Settings > General. The Root path is specified in the Root Folder field.

Enable read only user: ☐
Enable HTTPS administration: ☐

Root folder: C:/Program Files\Zixi\Broadcaster\files

Max disk quota [%]: 85
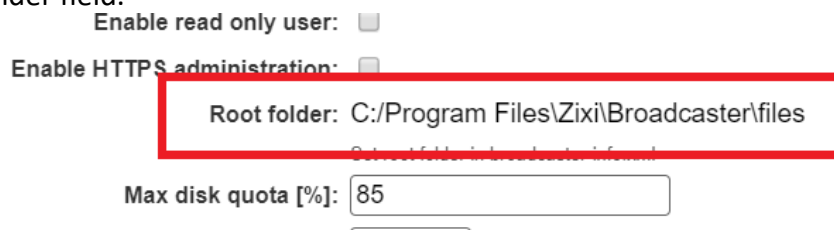
2. In the **Settings > File Transfer & VOD** screen, select the **VOD** checkbox. The following window is displayed:

HLS Indexing: ☐
MPEG-DASH Indexing: ☐
VOD: ☑
Encrypt downloads: ☐
Max download speed [kbps]: 100000   ~100.0 Mbit/s
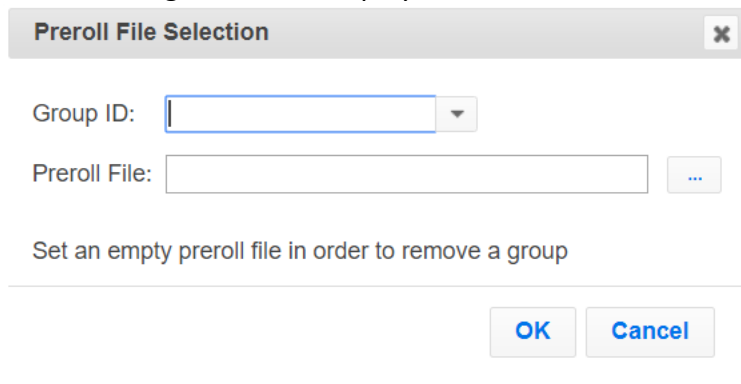
3. In the Zixi Broadcaster Adaptive Groups screen, click the desired adaptive group for which you want to add the preroll.

Performing Actions on Adaptive Groups

4. Click the button on the selected row and then click **Set Preroll**.
The following window is displayed:
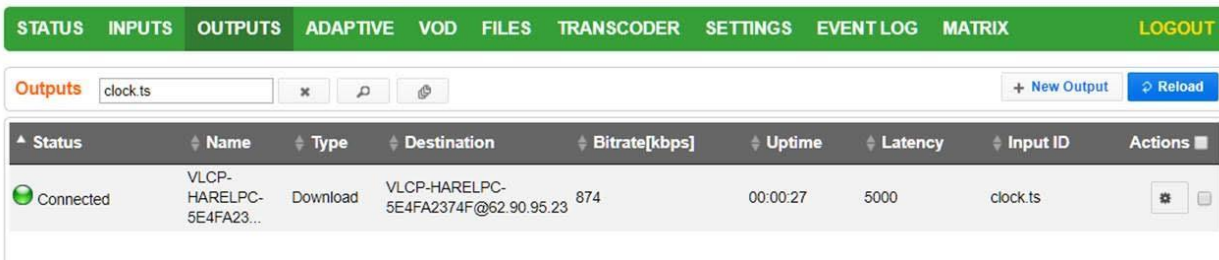
5. In the **Group ID** field, select the adaptive group for which you want to add the preroll.
6. In the **Preroll File** field, click the **Browse** button and select the desired file.
7. Click **OK**.

VOD (Video on Demand)

The VOD feature enables you to upload stream-able (.ts and mp4) files to the file system of the server on which Broadcaster is installed as well as make a previously recorded input stream available on demand (VOD). The VOD content is accessed through a local folder, where the Zixi Broadcaster is located. This local folder can be optionally mapped through a symbolic link or shortcut to a remote folder. The Broadcaster creates a unique URL for each file.

The streams can be played back using VLC (with Zixi Plugin for Zixi streams) and/or streamed to a Zixi Receiver or to a Zixi Broadcaster. During playback, an Output (with output type – **Download**) will be created automatically on the Source Zixi Broadcaster, as shown below.

VOD Activation

If you have a VOD-enabled license you will still need to activate the VOD feature in the **Settings** screen.

➡ **To activate the VOD feature:**

1. In the **Settings** page, click **File Transfer & VOD**.
2. Select the **VOD** checkbox.

3. Click **Apply**.

VOD Files Location

The VOD files are located in the following location by default -
`<Broadcaster_Installation_Folder>\Zixi\Broadcaster\files`

VOD Files Location

The contents of this folder are displayed in the **VOD** screen on the Zixi Broadcaster GUI –
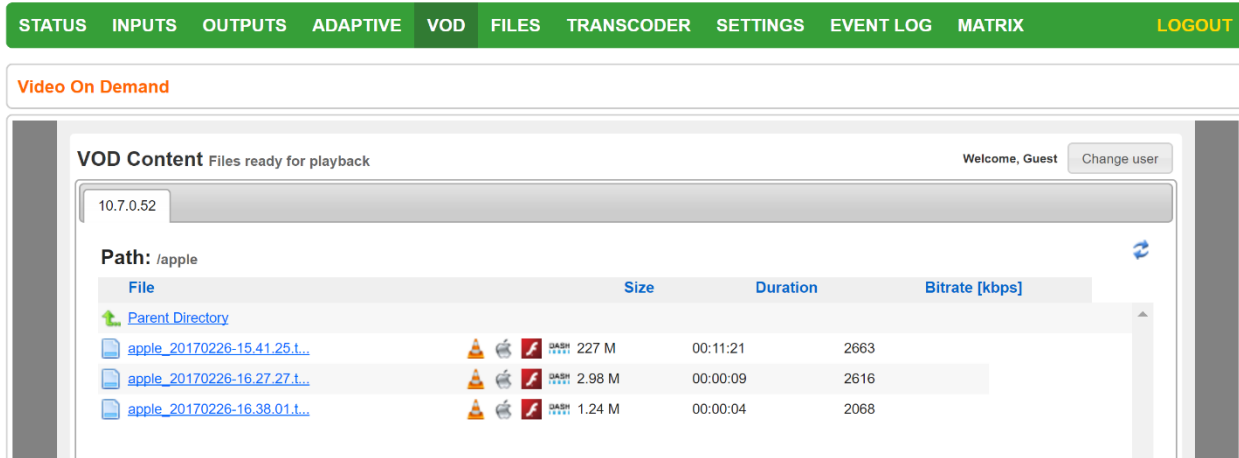
The VOD screen displays the following information:

Parameter	Description
File	Name of the file or folder. If in file level (not folder level), click the file name to preview the stream in the Matrix screen.
<Icons>	The following icons are displayed: - **VLC Playback** – click this icon to see the VLC playback URL and additional details, such as VLC plugin download link, and link to stream the file. - **HLS Playback** – click this icon to see the following three HLS playback URLs: local HLS playback (not Zixi protected), HLS playback using Zixi Proxy (Zixi Protected), HLS playback using Zixi Proxy through HTTPS (Zixi protected). The Zixi Proxy links require the installation of Zixi Proxy software in the receiving device/machine. The dialog includes links for downloading the Zixi Proxy for Windows and Mac. - **HDS Playback** – click this icon to see the Adobe HTTP Dynamic Streaming Protocol playback URL. The Play from server link, plays back the stream directly from the server. - **Flash Playback** – click this icon to see the following three Flash playback URLs: local Flash playback (not Zixi protected), Flash playback using Zixi Proxy (Zixi Protected), Flash playback using Zixi Proxy through HTTPS (Zixi protected). The Zixi Proxy links require the installation of Zixi Proxy software in the receiving device/machine. The dialog includes links for downloading the Zixi Proxy for Windows and Mac. - Dash Playback - click this icon to see the MPEG-DASH playback URL. The Play from server link, plays back the stream directly from the server.
Size	The size of the file.
Duration	The duration of the playback.

Bitrate [kbps]	The bitrate of the file in Kbps.

Changing the Files folder location

➡ **To change the Files folder location:**

1. In the Zixi Broadcaster installation folder (`<Broadcaster_Installation_Folder>\Zixi\Broadcaster\`) open the following file: **broadcaster-info.xml**.

2. Edit the <Folder> parameter with the desired path.

```xml
<?xml version="1.0" encoding="utf-8"?>
<ROOT_SETTINGS>
    <FOLDER>C:\Program Files\Zixi\Broadcaster\files</FOLDER>
    <MANAGED>false</MANAGED>
    <MANAGEMENT-ENABLED>false</MANAGEMENT-ENABLED>
</ROOT_SETTINGS>
<TUNNEL>
    <ALLOW>false</ALLOW>
    <MANAGED>false</MANAGED>
    <MANAGEMENT-ENABLED>false</MANAGEMENT-ENABLED>
</TUNNEL>
```

3. Save the file.

Adding Files to VOD

There are two ways to add files into the VOD Files folder:

- **Adding files to the folder** – using the operating system on which Zixi Broadcaster is installed, add the desired files to the Files folder (`<Broadcaster_Installation_Folder>\Zixi\Broadcaster\Files`)

- **Uploading using the Broadcaster GUI** – on the **Files** screen, click the **New Upload** button, browse to the desired file location, select the file and click **Upload**.
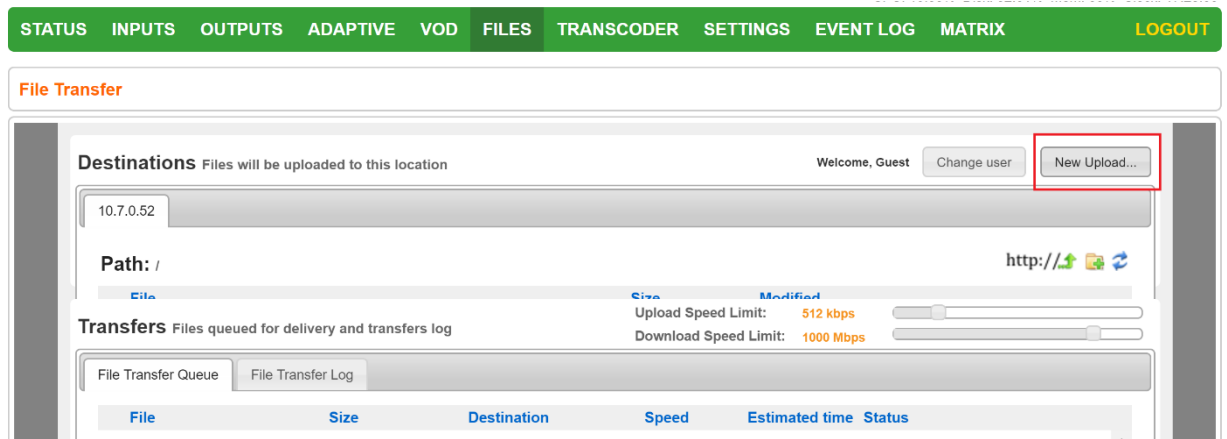
Playing back VOD content

The VOD content can be played back using VLC (with Zixi Plugin for Zixi streams) and/or streamed to a Zixi Receiver or to a Zixi Broadcaster by using the following methods:

- **URL (Static)** – entering a specific URL of a file. To find the URL of a specific file, go to the VOD screen, navigate to the specific file, and click on the relevant playback icon:

    o - **VLC Playback** – click this icon to see the VLC playback URL and additional details, such as VLC plugin download link, and link to stream the file.

    o - **HLS Playback** – click this icon to see the following three HLS playback URLs: local HLS playback (not Zixi protected), HLS playback using Zixi Proxy (Zixi Protected), HLS playback using Zixi Proxy through HTTPS (Zixi protected). The Zixi Proxy links require the installation of Zixi Proxy software in the receiving device/machine. The dialog includes links for downloading the Zixi Proxy for Windows and Mac.

    o - **HDS Playback** – click this icon to see the Adobe HTTP Dynamic Streaming Protocol playback URL. The Play from server link, plays back the stream directly from the server.

    o - **Flash Playback** – click this icon to see the following three Flash playback URLs: local Flash playback (not Zixi protected), Flash playback using Zixi Proxy (Zixi Protected), Flash playback using Zixi Proxy through HTTPS (Zixi protected). The Zixi Proxy links require the installation of Zixi Proxy software in the receiving device/machine. The dialog includes links for downloading the Zixi Proxy for Windows and Mac.

    o - Dash Playback - click this icon to see the MPEG-DASH playback URL. The Play from server link, plays back the stream directly from the server.

Indexing VOD content

- **API (Dynamic)** – you can use the Zixi API to implement dynamic access to the VOD content. For example, you can create an application that enables navigation throughout the VOD library (including folders and sub-folders) to access files in a dynamic fashion. The API GET request is: http://<broadcaster_location><web_server_port>/vod_ls.json

Indexing VOD content

Zixi Broadcaster can create m3u8 (HLS) and mpd (mpeg-dash) manifests for VOD files. When the **Automatically index VOD files** setting is enabled, Zixi Broadcaster will index the VOD files in the various VOD folders. In this case, Zixi Broadcaster will automatically monitor any file and directory structure changes (under "files" folder only). Any file that is added will be automatically indexed. In the same manner, any file that is deleted, the correspondent files in the index (.m3u8 and/or /mpd) will be removed as well. In some cases, the indexing of VOD files can affect performance. By enabling or disabling the **Automatically index VOD files** setting, you can decide when to index the VOD files in order to ensure optimal performance during peak times.

➡ **To activate the VOD indexing:**

1. In the **Settings** page, click **File Transfer & VOD**.
2. Select the **Automatically index VOD files** checkbox.

<div align="right">

Automatically index VOD files: ☑
Scan on startup: ☑
HLS Indexing: ☑
MPEG-DASH Indexing: ☑
VOD: ☑

</div>
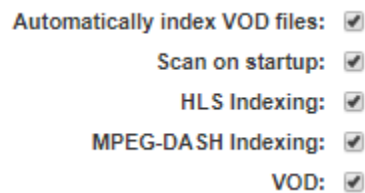
3. Select **Scan on startup** to enable indexing of the files in the VOD folder that have not been indexed during startup of the Zixi Broadcaster.
4. Select **HLS indexing** to enable indexing of HLS streams. The indexing creates an M3U8 playlist file.
5. Select **MPEG-DASH indexing** to enable indexing of MPEG-DASH streams. The indexing creates a .mpd (MPEG-DASH Media Presentation Description) file.
6. Click **Apply**.

Accelerated File Transfer

Zixi Broadcaster features the ability to transfer files between two Zixi components (Zixi Broadcaster to Zixi Receiver or to another Zixi Broadcaster), using the Zixi protocol. The transfer can also be to a non-Zixi component with a Zixi Proxy or with a Zixi Plugin. This enables the reliable and fast transfer of large files over a wireless/wifi connections.

File Transfer Configuration

Before using the file transfer feature, you will need to activate the file transfer feature and configure the following file transfer settings.

➡ **To activate and configure the file transfer feature:**

1. In the **Settings** page, click **File Transfer & VOD**.
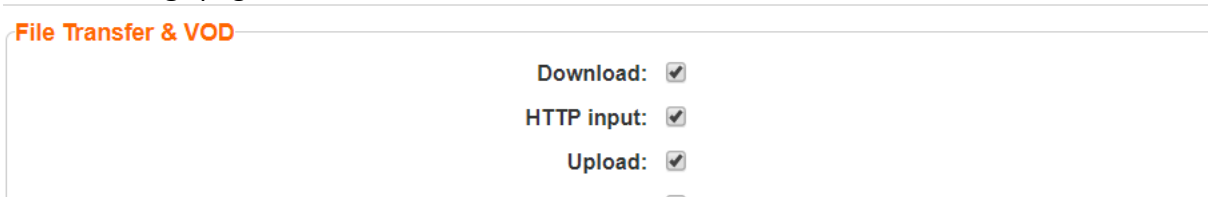
2. Select the **Download** checkbox to enable the download of files from the current Zixi Broadcaster.
3. Select **HTTP Input** checkbox to enable HTTP forwarding.
4. Select the **Upload** checkbox to enable the uploading of files by registered users to the current Zixi Broadcaster.
5. Specify additional optional **file transfer setting parameters** (see File Transfer Setting table below).
6. Click **Apply**.

File Transfer Settings

Parameter	Description
Download	Enables the file transfer download from this Zixi Broadcaster.
HTTP Input	Enables HTTP acceleration mode. In this mode, instead of specifying a file location on the server's hard disk, the Zixi Broadcaster receives an HTTP address from which it will retrieve the file and then transfer it to the Client.
Upload	Enables the file transfer upload to this Zixi Broadcaster server.
Encrypt Downloads	Enables the Zixi auto encryption for all file transfer downloads.

Uploading Files for File Transfer

Max download speed [kbps]	Specifies the maximal download speed in Kbps for file transfer.
Max upload speed [kbps]	Specifies the maximal upload speed in Kbps for file transfer.
Initial bitrate [kbps]	Specifies the initial download bitrate. The recommended bitrate can be the bitrate of the stream.
HTTP/Origin cache size [MB]	This setting is relevant for HTTP acceleration mode and/or Origin/Edge architecture, where the Zixi Broadcaster retrieves the file from another Origin or HTTP server and then delivers it to the Client. This setting determines the cache size allocation on the Zixi Broadcaster. The cache is used to accelerate the delivery of files that have been previously requested.

Uploading Files for File Transfer

You can upload files to the server on which Zixi Broadcaster is installed to make them available for download using Zixi protocol. The location of the files that will be uploaded is relative to the Root folder that was specified in the **Settings > General** screen.

> Before you upload a file, make sure Zixi Proxy is installed on your computer. If it is not installed, you will be prompted with a notification and a link for download and installation.

➡ **To upload a file for file transfer:**

1. In Zixi Broadcaster, click the **Files** tab.
1. Click **New Upload**.
   The **Select Files to Upload** dialog opens:
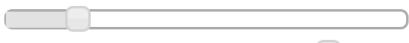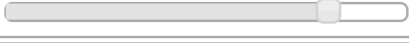
Downloading Files
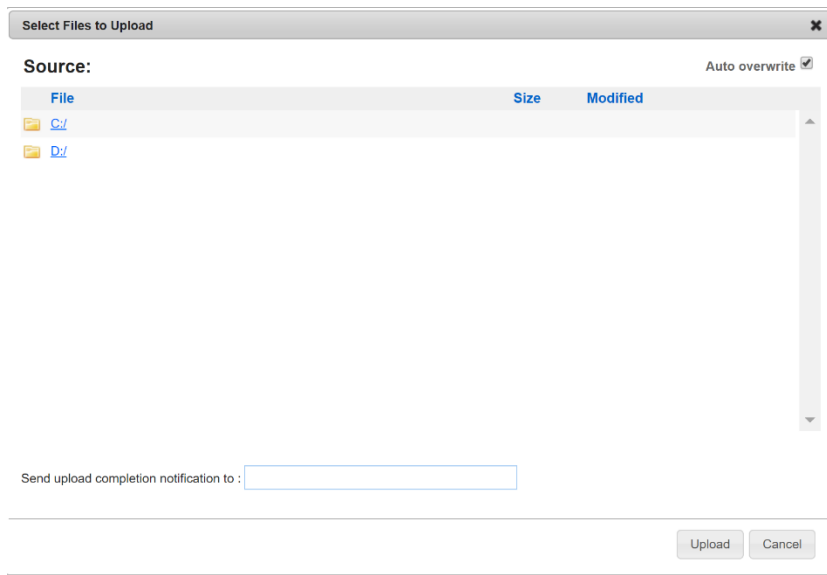
2. Navigate to the path in which the files is located and select the file.
3. For very large files, it is possible to receive an email notification when the upload process was completed. To enable this feature, type the desired email address, or multiple email addresses separated by commas in the **Send upload completion notification to** field.
4. Click **Upload**.
   The file will be uploaded using the Zixi protocol. The upload process is displayed at the bottom of the screen (**Files Transfer Queue** tab). When the upload is complete, it will be recorded in the **File Transfer Log** tab.

You can limit the upload speed by dragging the **Upload Speed Limit** slider.

The overall maximal limit determined by the **Max upload speed [kbps]** setting in the **Settings > File Transfer & VOD** screen.

Downloading Files

The files can be downloaded using the Zixi Protocol, through the Zixi Broadcaster UI.

➡ **To download a file:**

1. In Zixi Broadcaster, click the **Files** tab.
2. Under **Destinations**, navigate to the desired file.

3. Hover your mouse over the desired file and click **Download**.
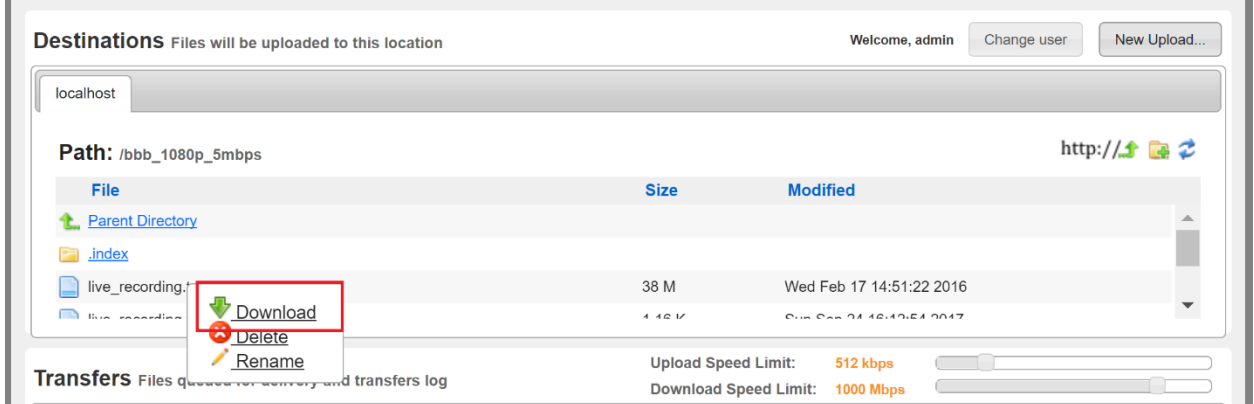
4. In the **Select Download Destination** window, select the local folder as a destination for the file download.
   The file will be downloaded using the Zixi protocol. The download process is displayed at the bottom of the screen (**Files Transfer Queue** tab). When the download is complete, it will be recorded in the **File Transfer Log** tab.

You can limit the download speed by dragging the **Download Speed Limit** slider.

The overall maximal limit determined by the **Max download speed [kbps]** setting in the **Settings > File Transfer & VOD** screen.
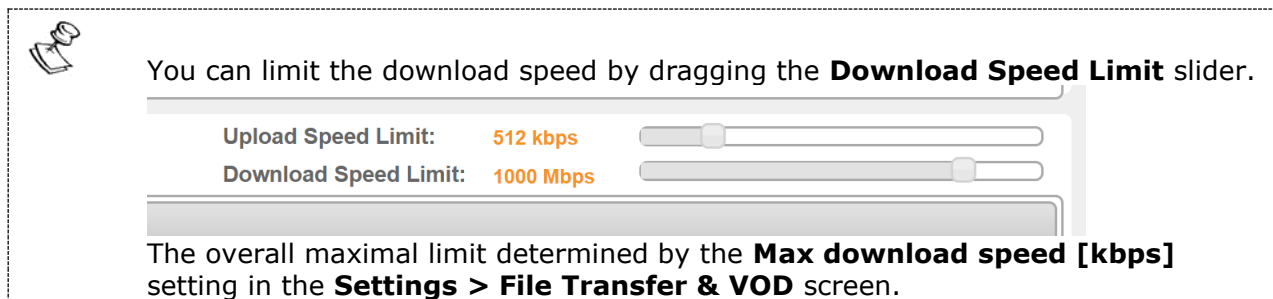
Generating Accelerated URLs

Instead of downloading files from the server on which Zixi Broadcaster is installed, it is possible to use Zixi Broadcaster to retrieve the file from a remote HTTP server. Zixi Broadcaster converts the remote server URL to an Accelerated URL. By using this accelerated URL to download the file, Zixi Broadcaster will retrieve the file from the remote server and use the Zixi Protocol to transfer the file to the Client.

➡ **To generate an accelerated URL:**

1. In Zixi Broadcaster, click the **Files** tab.

2. Under **Destinations**, click the ![http icon] icon.
   The following window appears:

Convert remote HTTP URL to a localhost URL for accelerated download	✖
URL: _____ ⟳	
Type a URL and press the 'refresh' button to generate accelerated URLs	
	Close
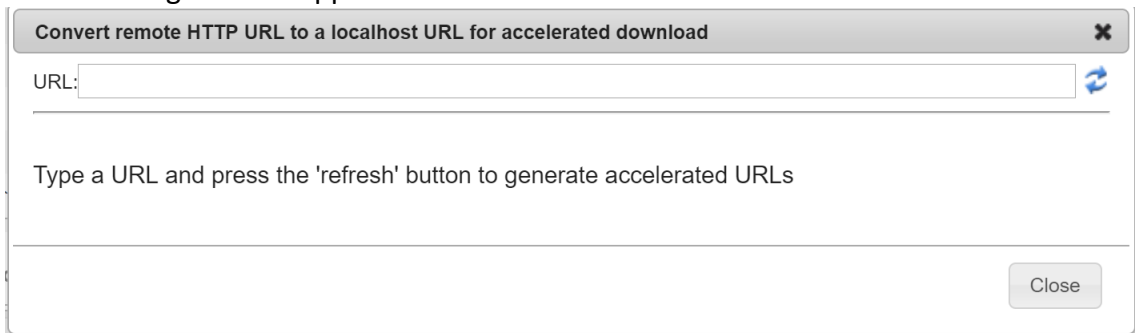
3. In the **URL** field, type the URL of file in the remote HTTP server.

4. Click the ⟳ icon.
   Two URLs are generated:

Convert remote HTTP URL to a localhost URL for accelerated download	✖
URL: http://zixi.dkpplfl/dkoffk.htm ⟳	
http://127.0.0.1:4500/HOST_localhost/HTTP_zixi.dkpplfl/PORT_2077/ZiXi_params_end/dkoffk.htm	
https://localproxy.zixi.com:4501/HOST_localhost/HTTP_zixi.dkpplfl/PORT_2077/ZiXi_params_end/dkoffk.htm	
	Close

   The top URL is an HTTP URL and the bottom is an HTTPS URL.

Creating a New Folder

You can use the Zixi Broadcaster UI to create folders on the server on which Zixi Broadcaster is installed.

➡ **To create a new folder:**

1. In Zixi Broadcaster, click the **Files** tab.

2. Under **Destinations**, click the ![folder icon] icon.
   The following window appears:

localhost:4444 says:	✕
New folder name	
| _____	
	OK Cancel
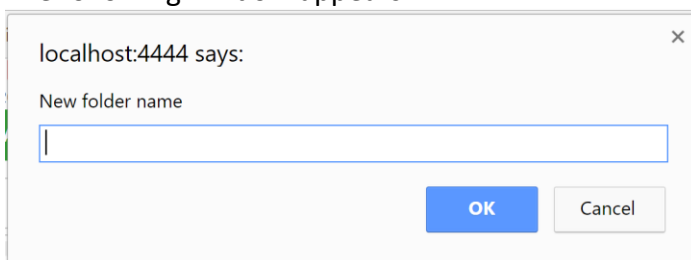
3. In the **New folder name** field, type a name for the folder.
   The folder is created.

Renaming a File/Folder

You can rename a folder or a file through the Zixi Broadcaster UI.

➡ **To rename a folder/file:**

1. In Zixi Broadcaster, click the **Files** tab.
Under **Destinations**, navigate to the desired file.
   2. Hover your mouse over the desired file and click **Rename**.
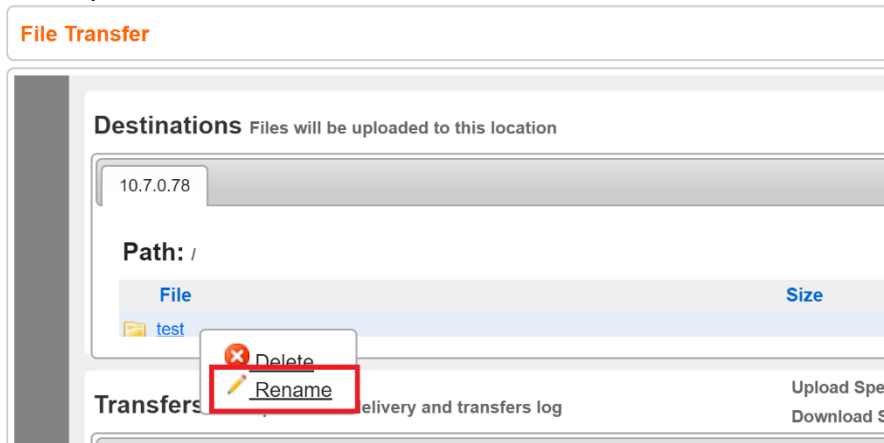
3. In the field, enter the new folder/file name. The location of the files/folder is relative to the Root folder that was specified in the **Settings > General** screen.
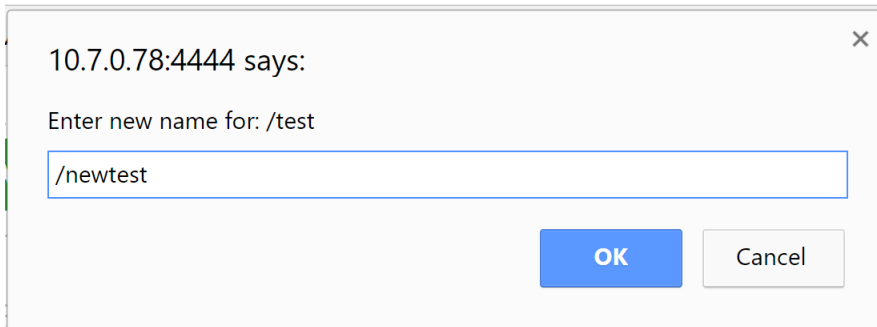
4. Click **OK**.

Deleting an Existing File/Folder

You can delete a folder or a file through the Zixi Broadcaster UI.

Deleting an Existing File/Folder

➡ **To delete a folder/file:**

1. In Zixi Broadcaster, click the **Files** tab.
Under **Destinations**, navigate to the desired file.
2. Hover your mouse over the desired file and click **Delete**.
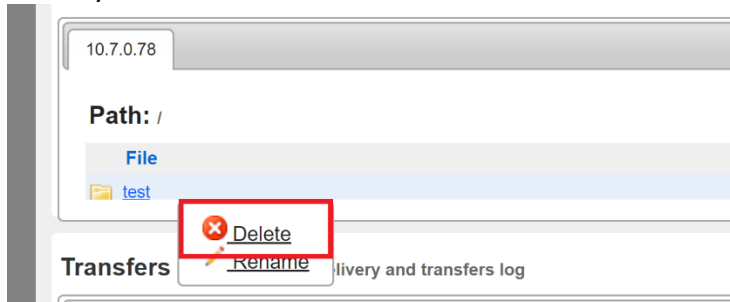
The following dialog is displayed:
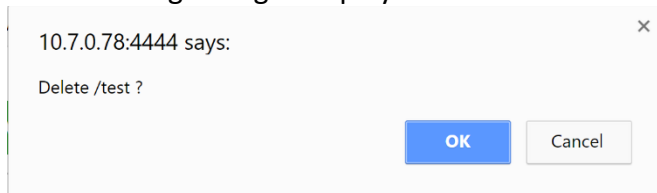
3. Click **OK**.

Transcoder

Zixi Broadcaster offers live transcoding, enabling users to create multiple bitrate streams from a single input stream. The transcoding converts the video and audio live streams to a variety of profiles and bitrates. SCTE-35 markers will be preserved by the transcoder.
The transcoder is typically employed in the following cases:

- Where a target device does not support the source format.
- Where a target has limited storage capacity that requires a reduced file size.
- To convert incompatible obsolete data to a better-supported or modern format.
- You can add video (H.264, H.265, MPEG2, Raw) and audio (AAC, OPUS, Raw) profiles.

Transcoding Templates
Instead of manually selecting input streams to be transcoded, you can optionally define templates with rules for automatic transcoding of input streams according to the settings of a pre-defined Transcoding Template.

NDI Transcoding
For details about NDI transcoding, see **Configuring NDI Streams** section.

WebRTC Transcoding
For details about WebRTC transcoding, see section **Configuring WebRTC Streams**.

Creating New Profiles

In order for the Broadcaster to switch from one encoding to another, different transcoding profiles must be configured first. These transcoding profiles include the transcoding settings that can be used for the transcoding of streams.
Supported Video and Audio formats include:

- Video Decoding – MPEG2, H.264/AVC , H.265/HEVC, Raw
- Video Encoding – MPEG2, H.264/AVC , H.265/HEVC, Raw
- Audio Decoding – AAC, MPEG-1 Audio Layer I / II / III, MPEG-2 Audio Layer I / II / III, AC-3 (Dolby Digital), Opus

> For AC-3, which can contain up to six discrete channels of sound, the transcoder only supports the left and right channels and will ignore the other channels.

- Audio Encoding – AAC, AAC-HE (High Efficiency) and AAC-HEv2; Pass-through (no encoding) – any audio codec (MPEG1/2 / AAC / AC-3, E-AC-3 (Dolby Digital Plus), Opus.

> AAC-HE and AAC-HEv2 are only supported for Zixi Broadcasters, v13 and up.

Creating New Profiles

The transcoder comes with the following pre-set common video profiles:
1080i60 / 1080i59.94, 1080p30 / 1080p25, 720p60, 720p50 / 720p30, 576i60 / 576p25, 480i60 / 480p29.97
You can also define your own custom profiles.

> For downstream satellite workflows, you will probably need to generate constant bitrate (CBR) streams. This setting is configured at the individual input level (not the transcoding profile level). To set a CBR, enter the desired Transport Stream Bitrate (Kbps) as described in the **Transcoding an Input Stream** section.

➡ **To Create a New Profile:**

1. In the **Transcoder** page, click [+ New Profile].
    The **Add New Profile** window is displayed:

Select the desired **Codec type** - MPEG2, H.264 or H.265, or Raw Video for a video profile or select AAC, Opus, or Raw Audio for an audio profile.
Enter the desired fields in the **Profile configuration** (see table below for additional parameters).
Select a specific **Preset** profile to automatically fill in the default settings for that profile, OR select **Custom** to create a new profile from scratch.

Creating New Profiles

> ☞ You can edit specific fields of a preset configuration while creating the profile.

If you want to configure the **Advanced options** for the video profiles, select **Advanced options** and fill in the respective fields (see table below for additional parameters).
Click **Apply**.
The newly configured profile is created and appears on the screen.

Parameter	Description
Profile configuration	**For Video - MPEG2, H.264, H.265, Raw Video**
Preset	Select one of the pre-configured presets or select **Custom** to create a new profile from scratch. Even if you select a preset configuration, you can still change its settings. Default: **Custom**
Name	Enter a unique name for the profile.
Encoder	Select one of the following options: • X264 – software-based encoder (available for H.264 only). • Intel – Intel-based hardware encoder. • NVIDIA – NVIDIA-based hardware encoder.

Encoding Profile	Select the relevant encoding profiles: **For H.265 video profiles with hardware acceleration:** • Main (default) – this profile supports 8 Bit Per Pixel encoding (BPP). • Main 10 – this profile supports 10 Bit Per Pixel encoding (BPP). • Main SP - The Main Still Picture profile allows for a single still picture to be encoded with the same constraints as the Main profile. As a subset of the Main profile the Main Still Picture profile allows for a bit depth of 8-bits per sample. **For H.264 video profiles:** • High - The primary profile for broadcast and disc storage applications, particularly for high-definition television applications. • Main - This profile is used for standard-definition digital TV broadcasts that use the MPEG-4 format as defined in the DVB standard. • Baseline - Primarily for low-cost applications that require additional data loss robustness, this profile is used in some video conferencing and mobile applications. **For MPEG2 video profiles:** • High – supports SNR and Spatial Scalability and Intra DC Precision of 8, 9, 10, and 11. • Main - supports I and P and B Picture Coding Types and Intra DC Precision of 8, 9, 10. • Simple – supports I and P Picture Coding Types and Intra DC Precision of 8, 9, 10.
Resolution	Enter the new resolution in pixels, if resizing the video.
Keep Source Aspect Ratio	Select this checkbox (default) to maintain the original aspect ratio.
Frames per Second	Select a new frame rate or select **Original** to use the original frame rate of the stream. Default: Original Note: When a new frame rate is specified, it is applied using "Smooth frame rate conversion". Note: When the frame rate is converted, captions in the elementary stream are preserved.
Average Bitrate (kbps)	Specify the average bitrate for the profile.
Max Bitrate (kbps)	Specify the maximum bitrate for the profile. Available only if the Bitrate Mode is set to VBR.

Creating New Profiles

Performance	Select the performance of the transcoding. Possible values range from *Ultra Fast* which provides the best quality while utilizing high CPU/GPU to *Slower* which has the lowest quality but uses much less CPU/GPU. Default: *Very Fast*
Advanced Options	
Copy GOP from source	Select this checkbox if you want to maintain the source GOP length (not structure). Enabling this option will generate an I-frame in the transcoded stream with the exact timestamp as in the source stream. The **Copy GOP from source** option is only available when selecting the **Original** option in the **Frames per Second** field. If you want to change the source GOP length specify the new GOP length in the **GOP [Frames]** parameter.
GOP [frames]	Specify the number of frames in a **GOP** (Group of Pictures). Default:60
GOP Settings	• Closed – for a GOP in which the previous pictures do not need data from the subsequent GOP for bidirectional coding, select the **Closed** checkbox (default). • Fixed – to always use the specified number of frames in the GOP (as opposed to allowing the encoder to override), select the **Fixed** checkbox (default).
B-Frames	Specify the maximal number of consecutive B frames in the **GOP**. Default: 0
Frame Type	Specify the frame type – progressive or interlaced. Default: Progressive
Reference Frames	Specify the number of frames that can be referenced for each frame. Default: 2
HRD buffer length (seconds)	Specify the length of the HRD buffer in MPEG-2.
CRF	The Constant Rate Factor (CRF) is the default quality (and rate control) setting for x264 and x265 encoders. You can set the values between 0 and 51, where lower values would result in better quality, at the expense of higher file sizes. Higher values mean more compression, but at some point you will notice the quality degradation.

Creating New Profiles

MAX QP	The QP (Quantization) parameter controls how the compression rate. Ranging from 0 (No compression) and 51 (Max compression). Max QP - controls the maximum value the encoder can set for QP. For example, a low number will result in a lower compression rate causing the video to look better, however requiring a higher bitrate. A higher max QP value may reduce the visual quality but results in a lower bitrate.
Bit Depth	Conversion of the 10-bit HDR color encoding source to 8 BPP. This feature is enabled for the following configurations: • H.264 – Encoder: X264; Encoding Profile: High 10. • H.265 – Encoder: Nvidia; Encoding Profile: Main 10. If the source is 10-bit, select one of the following: • **As Source** – to maintain a 10-bit color encoding. • **8 BPP** – to converted down/encod to 8-bit color.
Profile configuration	**For Audio – AAC, OPUS, Raw Audio.**
Name	Enter a unique name for the profile.
Bitrate	Specify the bitrate for the profile.
Sampling Rate	You can convert the audio sampling rate from 44.1kHz to 48kHz and vice versa. Select one of the following options: • Copy from source – if you do not wish to make any changes. • 44.1kHz – to convert a 48kHz audio stream to 44.1kHz. • 48kHz – to convert a 44.1kHz audio stream to 48kHz.
Encoding Profile (for AAC)	• AAC-LC (default) - AAC Low Complexity. The simplest and most widely used and supported profile. • HE-AACv1 - AAC High Efficiency 1. This profile uses spectral band replication (SBR) to enhance the compression efficiency in the frequency domain. • HE-AACv2 - AAC High Efficiency 2. couples SBR with Parametric Stereo (PS) to enhance the compression efficiency of stereo signals. It is a standardized and improved version of the eAAC+ codec.
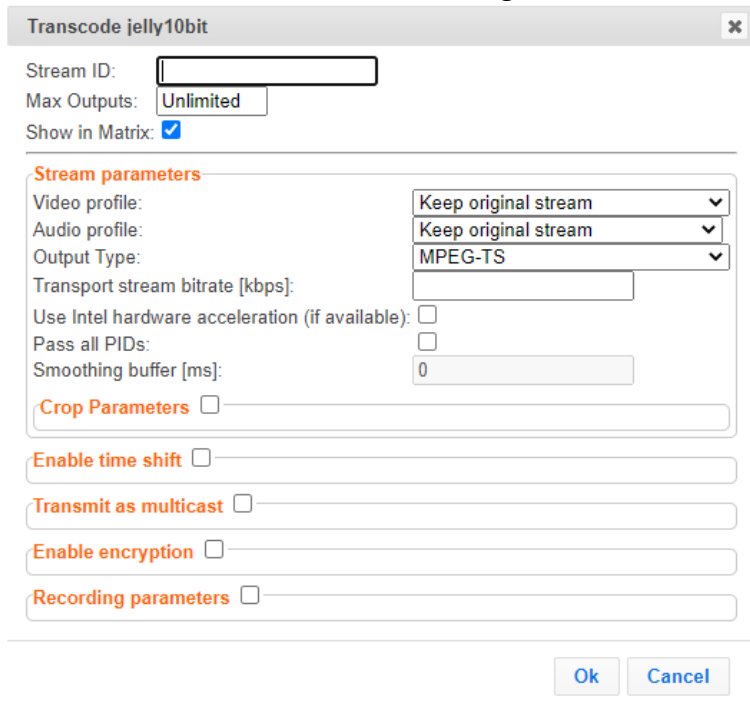
Transcoding an Input Stream

Once you have created the profile, you can use it to transcode an input stream.

➡ **To Transcode an Input Stream:**

1. On the **Inputs** page of Zixi Broadcaster, click the desired row of the input stream that you want to transcode.

Click the [⚙▾] button on the right end of the selected row and then **Transcode**. The **Transcode <input stream name>** window with the settings of the selected input stream is displayed.

Enter the unique **Stream ID** for the new transcoded input stream.

Under **Stream Parameters**, in the Video profile and Audio profile fields, do one of the following:

- Select the desired Video Profile and/or Audio Profile that you have configured.
- Select **Keep original stream** - if you have not configured a video or audio profile or do not want it transcoded or you want to set specific transcoding parameters for the specific stream. In this case the video or audio input will not be transcoded.
- Select **Remove stream** – you can use the transcoder to remove the video or audio track from the stream.

Fill in additional fields (see table below for additional parameters).

Click **OK**.

The transcoded input stream is created and appears in an embedded window labeled **Transcoded sources** under the original input stream from which it was created.

Transcoding an Input Stream

Parameter	Description
Stream Parameters	
Video Profile	Select an existing profile, select **Keep original stream** if you do not wish to transcode the video stream, or select **Remove stream** if you want to remove the video track.
Audio Profile	Select an existing profile, select **Keep original stream** if you do not wish to transcode the audio stream, or select **Remove stream** if you want to remove the audio track.

Output Type	Select one of the following output types. The outputs are configured as part of the transcoding process, so there is no need to create the Output from the Zixi Broadcaster Outputs screen:
	
	• MPEG-TS – the output will be available as MPEG Transport Stream.
	
	• NDI – the output will be available as NDI. When selecting NDI output, you can select the following video/audio profiles:
	    ○ Video profile – remove stream or a Raw profile.
	    ○ Audio profile - remove stream or a Raw profile.
	
	• WebRTC – the output will be available as WebRTC. When selecting NDI output, you can select the following video/audio profiles:
	    ○ Video profile – remove stream, keep original stream, Raw video profile, or if the input stream is not WebRTC compliant, a transcode to WebRTC compliant profile (e.g. H.264 codec with Baseline or Main profile and no B frames).
	    ○ Audio profile - remove stream, keep original stream, Raw audio profile, or if the input stream is non-Opus, transcode to Opus.

Transport Stream Bitrate (Kbps)	Specify the bitrate of the transport stream. This parameter is optional. If you do not specify a TS Bitrate, the stream will be VBR. If you specify a bitrate, the stream will be CBR. Note – CBR is recommended for downstream satellite workflows.
Use Hardware Acceleration (if available)	Select this checkbox to use hardware acceleration component (e.g. NVIDIA or Intel) if it has been installed.
Pass all PIDs	Select this checkbox to pass-through all non-transcoded PIDs.
Smoothing Buffer (ms)	Specify how much of the transcoded stream (in milliseconds) to store before transmitting it back to the server in order to prevent bursts. If the **Transport stream bitrate [kbps]** field is empty, the smoothing buffer is disabled. If the **Transport stream bitrate [kbps]** field is NOT empty, it is recommended to enter around 200ms, which should be enough to prevent bursts.

Transcoding an Input Stream

Parameter	Description
Crop Parameters	Select this checkbox to set the cropping parameters.
Cropping Mode	Set the units used for defining the crop. Options are: *Pixels* or *Percentages*. Note: Depending on the type of content, in some cases using different crop values for low resolution outputs might be appropriate. For example, if the content includes both video content and textual content, the text would not be readable at lower resolutions and thus might be better to exclude. Another use case for using different crop values for each output would be to slice a 360 or VR input video.
Left, Top	Specify the left and top positions for the crop.
Width x Height	Specify the width and height values for the crop.
Enable time shift	
Maximum delay [hh:mm:ss]	Specify the time of the delayed transmission of this stream. Maximum: 24 hours.
Transmit as multicast	Selecting this checkbox enables the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings. This setting requires enabling Multicast Pool (Settings > Multicast Pool).
Multicast Only	Selecting this checkbox will force the transmission of this stream only in multicast.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see Encrypting an Input Stream in Zixi Broadcaster.
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk –** the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.

Parameter	Description
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional

Parameter	Description
	• %M=month - optional
	• %D=day - optional
	• %T=HH.MM.SS creation time - mandatory
	For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Transcoding Templates

Instead of manually selecting input streams to be transcoded, you can define templates with rules for automatic transcoding of input streams according to the settings of a pre-defined Transcoding Template. Every time a new input stream, which matches the conditions of the template, is added, it will be automatically transcoded into the transcoded streams defined in the template's settings. The input streams are identified by system according to naming patterns.

> The transcoding profiles used in the transcoding templates have to be created in advance (for more information see Creating New Profiles).

➡ **To create a new transcoding template:**

1. Click the **Inputs** tab at the top of the Zixi Broadcaster administrative screen.

In the Menu bar, click the Templates ( ) button.

Transcoding Templates

The **Transcoding Templates** window is displayed:
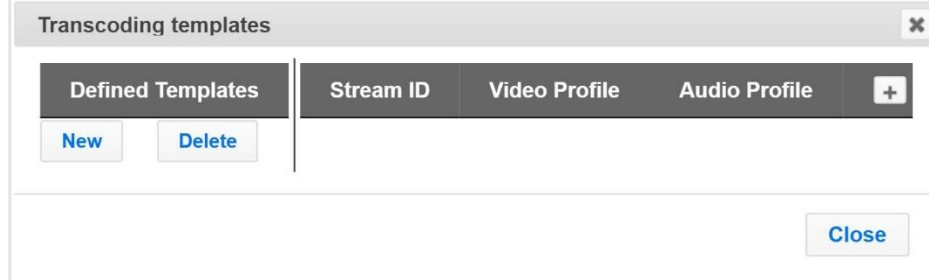
Click **New** to define a new template.

The following window is displayed:
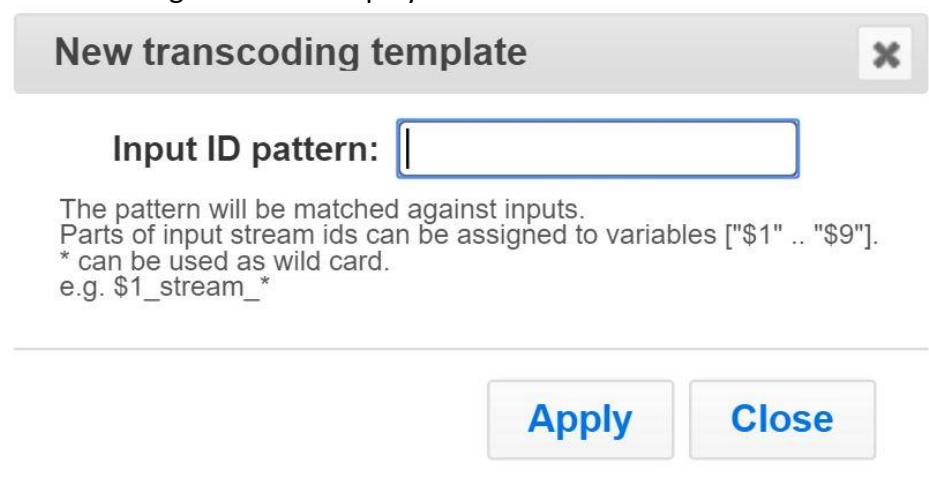
In the **Input ID pattern** field, enter a pattern for the Stream ID of the input stream that will be automatically transcoded. This pattern will be used to identify the input stream and can include variables that are marked with the "$" sign followed by a number (e.g. $1, $2, etc.) and/or with an asterisk "*" wildcard. The patterns should also include a part of the string that requires an exact match. For example, the pattern "$1_stream_$2kbps" will match an input stream "talk_show_stream_600kbps".

Click **Apply**.

The new template is added to the list of transcoding templates. However, the transcoding will not be active until you define transcoded stream rules.
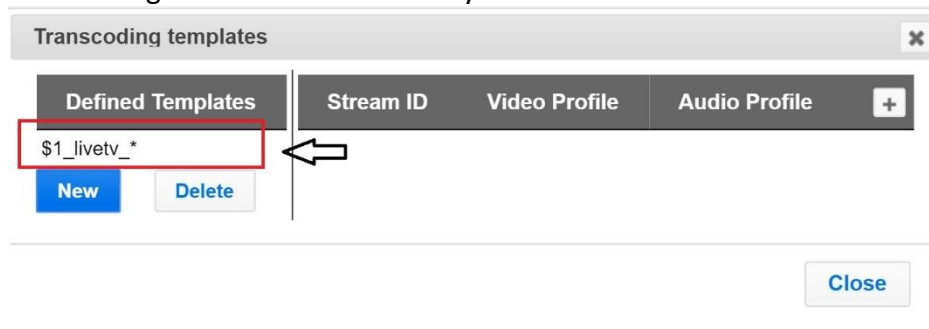
Select the newly created template and click the ⊞ button, located at the right-hand corner to define a transcoded stream rule.

Transcoding Templates

> The **Transcode <template_name>** window opens:

Enter the unique **Stream ID.** for the transcoded stream.

In the **Max Outputs** field, define the maximal number of outputs that can be connected to the stream.

Under **Stream Parameters**, select the desired Video Profile and/or Audio Profile that you have configured. If you have not configured a video or audio profile you can select **Keep original stream**. In this case the video or audio input will not be transcoded. You can also set specific transcoding parameters for the specific stream (see table below for more details).

Click **OK**.

> The transcoded input stream rule is created and appears as follows:

If an input stream enters Zixi Broadcaster and matches the **Input ID pattern**, it will be transcoded according to all the transcoded input stream rules that were created.

Transcoding Templates

Parameter	Description
Video Profile	Select an existing profile or select **Keep original stream** if you do not wish to transcode the video stream.
Audio Profile	Select an existing profile or select **Keep original stream** if you do not wish to transcode the audio stream.
Transport Stream Bitrate (Kbps)	Specify the bitrate of the transport stream. This parameter is optional. If you do not specify a TS Bitrate, the stream will be VBR. If you specify a bitrate, the stream will be CBR.
Use Hardware Acceleration (if available)	Select this checkbox to use hardware acceleration component if it has been installed.
Pass all PIDs	Select this checkbox to pass-through all non-transcoded PIDs.
Enable time shift	**Select to enable delayed transmission.**
Maximum delay [hh:mm:ss]	Specify the time of the delayed transmission of this stream. Maximum: 24 hours.
Transmit as multicast	Selecting this checkbox enables the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings. This setting requires enabling Multicast Pool (Settings > Multicast Pool).
Multicast Only	Selecting this checkbox will force the transmission of this stream only in multicast.
Recording Parameters	
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours

Repeat steps 6-10 above to create additional transcoded input stream rules.

Server Settings

Zixi Broadcaster is pre-configured with default settings, so generally there is no need to change the server settings. However, some users may want to change specific settings to meet their specific needs.

General

The General Settings screen includes basic configuration parameters for the server including the server's ID, access ports, authorizations, security, and storage.
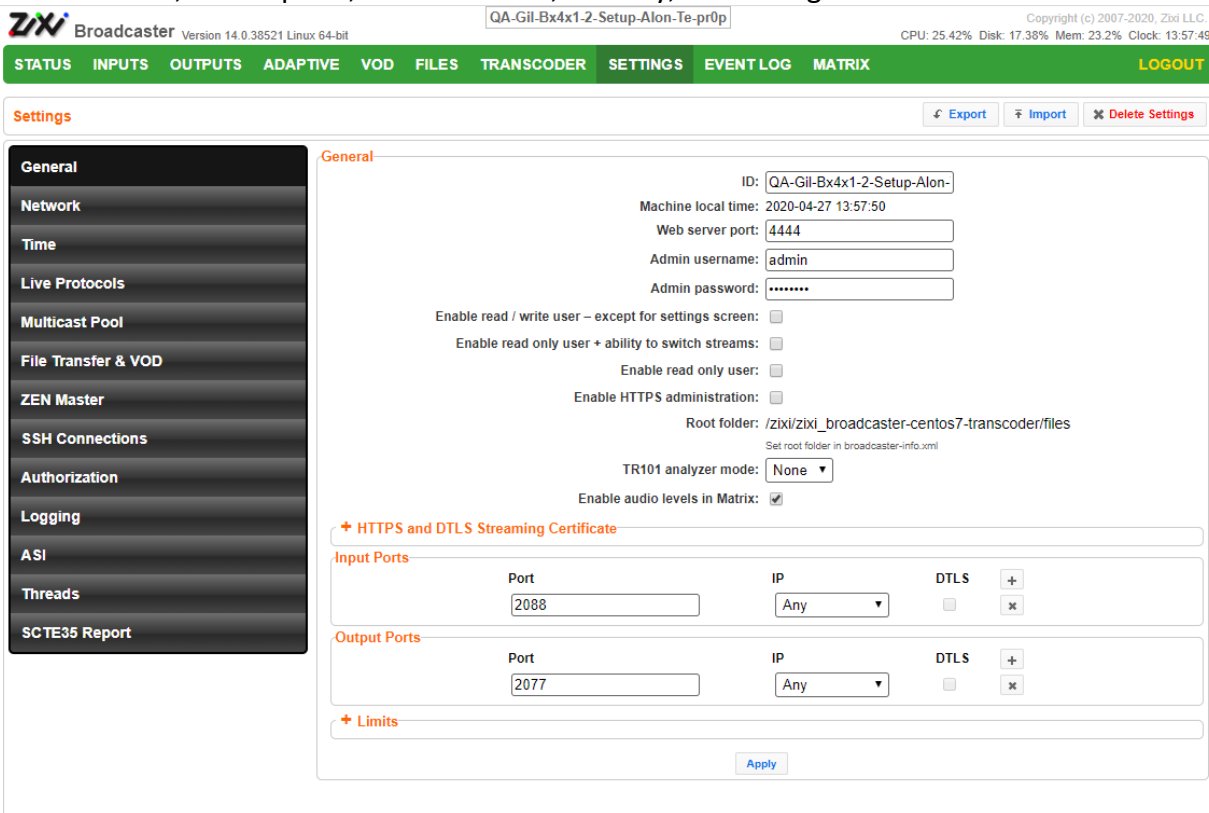
Field	Description
General	
ID	The unique (alphanumeric) name of the Zixi Broadcaster server. Typically: host name. This field is editable.
Machine local time	Shows the current time for the machine.

General

Web Server Port	The port number of the web server administration. You can configure this parameter to any legal port number which is supported by your Firewall. Default: 4444
Admin User Name	The user name of the administrator. The administrator is authorized to modify all parameters in the system as well as manage all the outputs and inputs on the server.
Admin Password	The password of the administrator.
Enable read / write user - except for settings screen	Select this checkbox to enable an "Operator" user. This type of user can read and write throughout all of the screens, except for the screens under the Settings menu. You can modify the user name (i.e. enter another name instead of Operator) and password.
Enable read-only user +ability to switch streams	Select this checkbox to enable a "User" user. This type of user can read throughout all of the screens as well as the ability to switch between existing streams. You can modify the user name (i.e. enter another name instead of User) and password.
Username	The account Username.
Password	The account password.
Enable read only user	Select this checkbox to enable an "Observer" user. This type of user can read throughout all of the screens. You can modify the user name (i.e. enter another name instead of Observer) and password.
Enable HTTPS administration	Enables secure HTTPS connection to the server for administration. Enabling HTTPS requires the relevant certificates and private keys. To enable HTTPS, click on the checkbox and upload the required files.
HTTPS certificate uploaded (for HTTPS enabled)	If no certificate has been uploaded, click **Upload** and navigate to the file location.
HTTPS private key uploaded (for HTTPS enabled)	If no private key has been uploaded, click **Upload** and navigate to the file location.
HTTPS private key passphrase (for HTTPS enabled)	Enter the Private key passphrase for your HTTPS account.
SSL Setup Status	Displays the status of the SSL certificate upload process. Incomplete – the SSL setup process is incomplete.

	OK – the SSL setup process is complete.
Root folder	Displays the configured root folder. You can modify the root folder by modifying the broadcaster-info.xml, which is located in the Zixi Broadcaster installation folder (<Broadcaster_Installation_Folder>\Zixi\Broadcaster\)
TR101 analyzer mode	Select the mode in which the TR101 analyzer will operate: None – no TR101 analysis ATSC – based on the Advanced Television Systems Committee recommendations. DVB – based on the Digital Video Broadcasting specifications.
Enable audio levels in matrix	Select this option to enable audio in Matrix view. When not selected the audio will be turned off.
HTTPS and DTLS Streaming Certificate	
Certificate uploaded (for DTLS enabled)	If no certificate has been uploaded, click Upload and navigate to the file location. **Note:** This is the same certificate as the HTTPS certificate.
Private key uploaded (for DTLS enabled)	If no private key has been uploaded, click Upload and navigate to the file location.
Private key passphrase (for DTLS enabled)	Enter the Private key passphrase for your DTLS account.
Input ports	
Port	The port that is used for Input streams. You can modify the port number and/or add additional ports by adding a "," between them. Adding additional ports may be necessary when there is a chance that the ISP will block a certain port. Click '+' to add additional ports. Default: 2088
IP	Enter an IP address. The default enables **Any** IP address.
DTLS	Click the DTLS check box to activate DTLS automatic encryption of the streams.
+ (add ports)	Click + to add additional ports. **Note:** For each port you can select whether or not to activate DTLS encryption. This enables streaming of non-encrypted streams on one port and encrypted streams on a separate port.
Output ports	

General

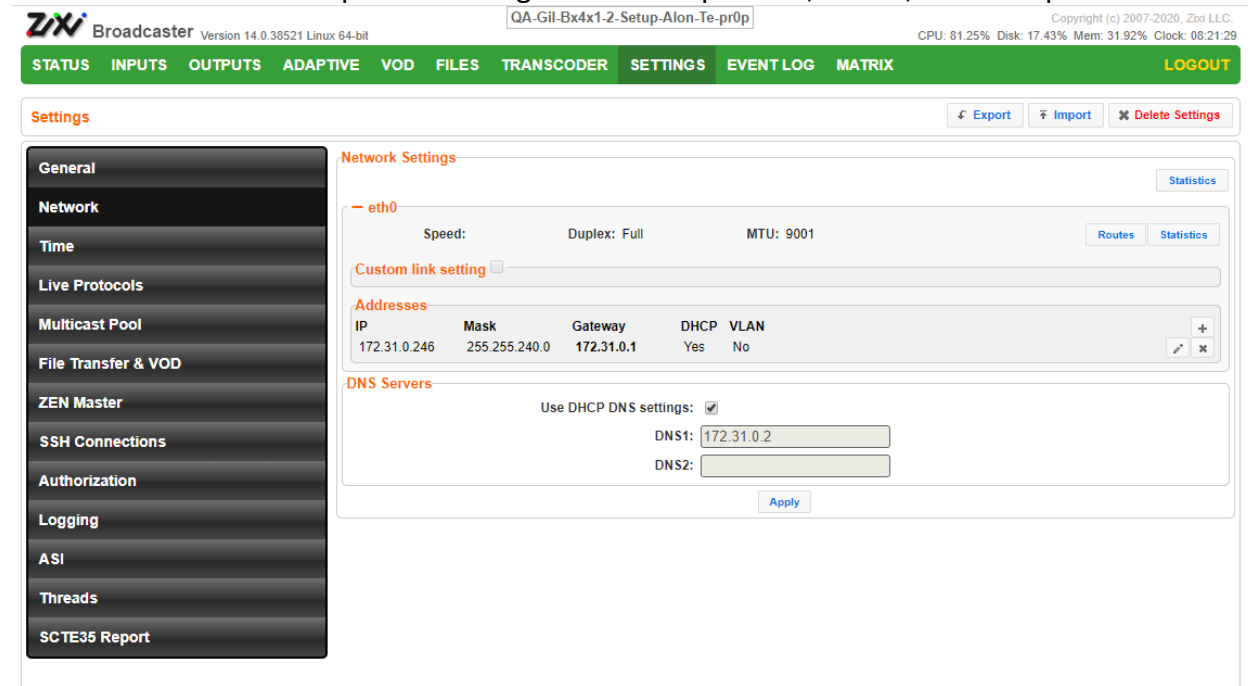|	
Port	The port that is used for the Output streams. Displays the Output port(s). You can modify the port number and/or add additional ports by adding a ",", between them. Adding additional ports may be necessary when there is a chance that the ISP will block a certain port. Click '+' to add additional ports. Default: 2077
IP	Enter an IP address. The default enables **Any** IP address.
DTLS	Click the DTLS check box to activate DTLS automatic encryption of the streams.
+ (add ports)	Click + to add additional ports. **Note:** For each port you can select whether or not to activate DTLS encryption. This enables streaming of non-encrypted streams on one port and encrypted streams on a separate port.
Limits	Select to configure thresholds for generating an alarm.
CPU [%]	The CPU utilization threshold. If this limit is exceeded, the CPU indicator at the top of the screen will appear in red, and an alarm will be generated in the event log. Default: 90
Memory [%]	The memory utilization threshold. If this limit is exceeded, the Memory indicator at the top of the screen will appear in red, and an alarm will be generated in the event log Default: 90
GPU [%]	The GPU utilization threshold. If this limit is exceeded, the GPU indicator at the top of the screen will appear in red, and an alarm will be generated in the event log. Default: 0
Input Bandwidth [kbps]	Bandwidth utilization threshold for input streams. Default: Unlimited.
Output Bandwidth [kbps]	Bandwidth utilization threshold for output streams. Default: Unlimited.

Network

The Network screen enables the configuration of the network settings of the Zixi Broadcaster. The screen includes the option to configuration multiple NICs, VLANs, and multiple DNS Servers.

Field	Description
Network Settings	
eth0	Click to configure the specified NIC. Displays the following parameters: • Speed – the network card speed • Duplex – whether the network card is full-duplex or half-duplex • MTU - the size of the largest protocol data unit (PDU) that can be communicated in a single network layer transaction.
Custom link settings	Select this checkbox to configure different link settings than the default settings.
Addresses	Displays the current IP address that is configured for the link. You edit these settings by clicking the Edit (pencil icon) button. Click the '**+**' button to add another link.
DNS Servers	
Use DHCP DNS settings	Select this option to use the DHCP settings instead of the DNS. If not selected, configure at least one DNS server.

Network

➡ **To Display Network Statistics:**

1. From the Settings page of the Zixi Broadcaster, click **Network** on the left-hand side. The various Network settings are displayed.

Click [Statistics] on the right-hand side.
The **UDP statistics** window is displayed.

Field	Description
####Packets received	Number of packets on network received.
####packets to unknown port received	Number of packets to unknown port on network received.
####packet receive errors	Number of packets on network which received errors
####packets sent	Number of packets on network sent.
####SndbufErrors	Number of Sent buffer errors

Click the **Refresh** button to update the data or **Close** to close the window

Time

The Time screen enables the configuration of the system time synchronization for the system. The time can be synchronized with the machine local time or to an external NTP server.
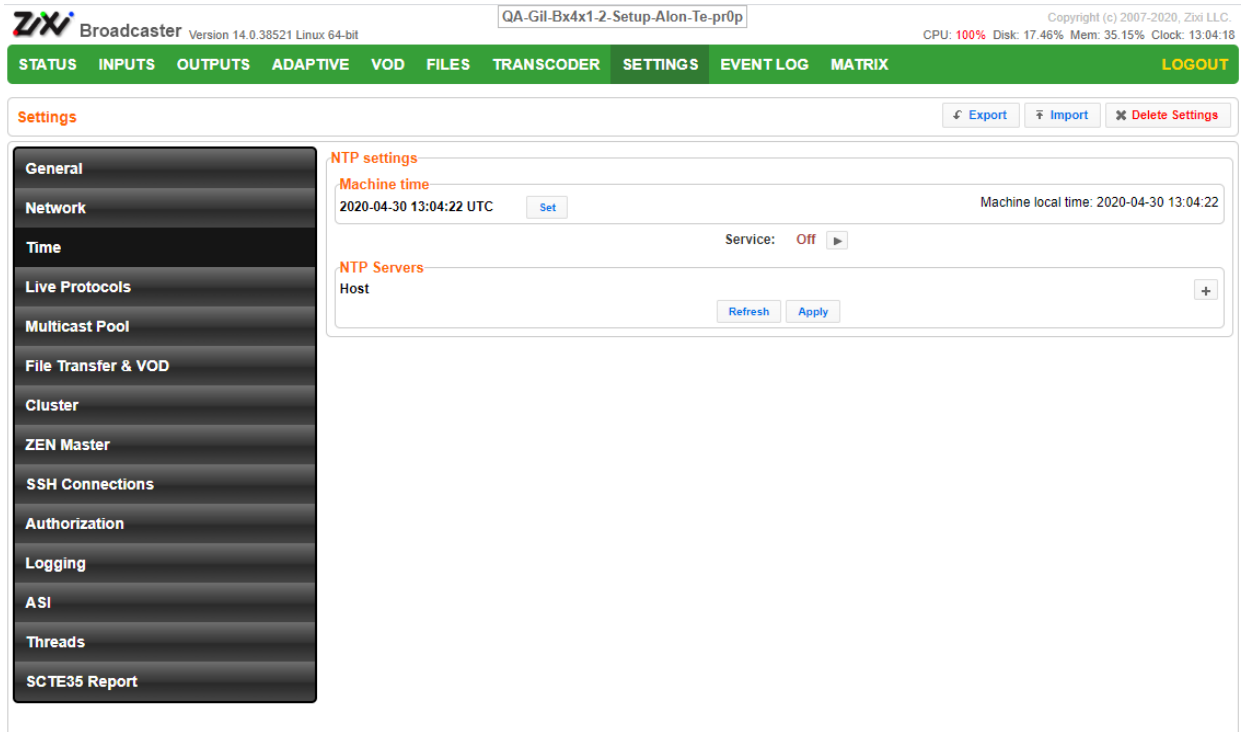
Field	Description
NTP Settings	
Machine Time	Displays the current machine local time. To set the time click **Set** and modify the values.
Service	
NTP Servers	Configure external NTP servers for time synchronization. Click the + button to add an NTP server and specify the Host IP address.

Live Protocols

The Live Protocols screen enables the configuration of the HTTP/HTTPS/RTMP/WebSocket server that will broadcast the streams using live streaming protocols, particularly for adaptive streaming and internet protocols.

Field	Description
HTTP Server	
HTTP/HTTPS Server Public IP	Override the Zixi IP (e.g. download.Zixi.com) with a public IP.
Enable HTTP Server	Enable a non-secure connection over HTTP.
HTTP Server Port	Defines the HTTP Server Port. Default:7777
Enable HTTPS Server	Enable a secure connection over HTTPS.

Live Protocols

HTTPS Server Port	Defined the HTTPS server port. Default: 443
HTTPS certificate uploaded (for HTTPS enabled)	If no certificate has been uploaded, click Upload and navigate to the file location.
HTTPS private key uploaded (for HTTPS enabled)	If no private key has been uploaded, click Upload and navigate to the file location.
HTTPS private key passphrase (for HTTPS enabled)	Enter the Private key passphrase for your HTTPS account.
SSL Setup Status	Displays the status of the SSL certificate upload process. Incomplete – the SSL setup process is incomplete. OK – the SSL setup process is complete.
Enable WebSocket server	Select checkbox to enable the WebSocket server. The WebSocket server uses the WebSocket protocol to stream content. The WebSocket protocol provides full-duplex communication channels over a single TCP connection.
WebSocket Server Port	If you have enabled WebSocket, enter a dedicated port for WebSocket. (Default: 8100)
Enable FLV	Enable the streaming via the FLV protocol.
Enable HLS	Enable the streaming via the HLS protocol.
Enable CMAF (DASH + fMP4 HLS)	Enable the streaming via the CMAF protocol.
Enable SHOUTcast	Enable the streaming via the SHOUTcast protocol.
Enable HLS Fast playback	Enables low latency HLS and DASH. When this setting is enabled, all input streams on the Zixi Broadcaster will be published to the origin server as HLS streams, so only enable this feature if it will be actually used.
Sub GOP HLS Fast playback	Select this option to enable publishing of HLS chunk before the response is complete. This means that Zixi Broadcaster will start sending the HTTP response as chunks of data when they are ready before the complete response is available.
HLS DVR maximum recording duration [HH:MM]:	Defines the maximum recording duration for HLS DVR. Default: 24 hours.

Live Protocols

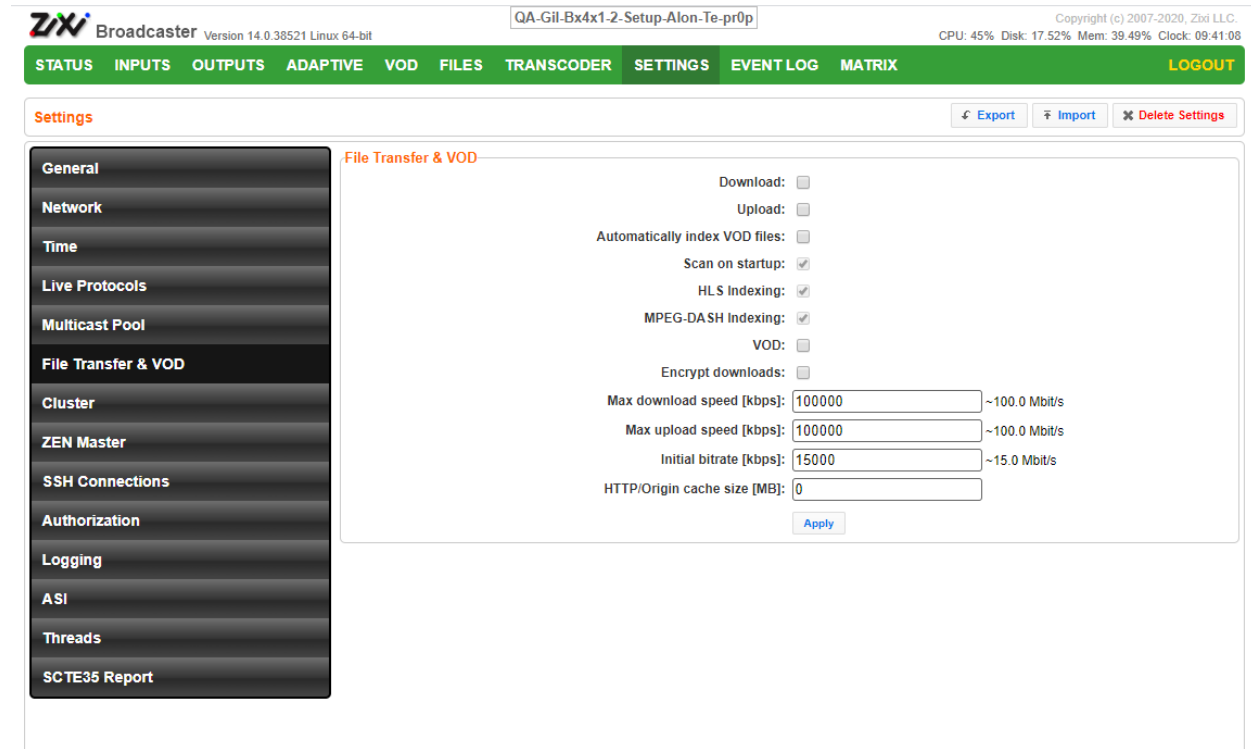|	
Allow Automatic HTTP Push input	Automatically creates an HTTP Push input without the need to define it in the Input screen.
Allow Automatic HTTP Pull output	Automatically creates an HTTP Pull output without the need to define it in the Output screen. This works in tandem with Zixi Feeder (Remote HTTP Pull Output setting, which enables sending a Zixi-protected stream to Zixi Broadcaster and then Zixi Broadcaster automatically outputs the stream as HTTP Pull) and SDK (which includes a zixi_http_pull_out_config option). By enabling this option, the HTTP Pull streams will be automatically created as they arrive into Zixi Broadcaster and displayed in the Output screen.
RTMP Server	
Enable RTMP Server	Enables Zixi Broadcaster to handle incoming RTMP streams.
RTMP Server Port	The port through which the RTMP stream will be transmitted. Default: 1935
Allow Automatic RTMP Input	Automatically creates an RTMP input without the need to define it in the Input screen.
Allow Automatic RTMP Output	Automatically creates an RTMP output without the need to define it in the Output screen. This works in tandem with Zixi Feeder (**Remote RTMP Output** setting, which enables sending a Zixi-protected stream to Zixi Broadcaster and then Zixi Broadcaster automatically outputs the stream as RTMP) and SDK (which includes a **zixi_rtmp_out_config** option). By enabling this option, the RTMP streams will be automatically created as they arrive into Zixi Broadcaster and displayed in the Output screen.

Multicast Pool

Multicast pool is a collection of multicast IP addresses that automatically assign a multicast IP when an input is being pulled out of the Zixi Broadcaster. When the "multicast pool" setting is enabled, you do not have to define a specific multicast IP address for every push stream. Instead, you simply enable the Multicast Only parameter and Zixi Broadcaster will assign the multicast IP automatically when it pulls the stream out. When the multicast stream is connected, it will appear in the Status table at the bottom of the screen.
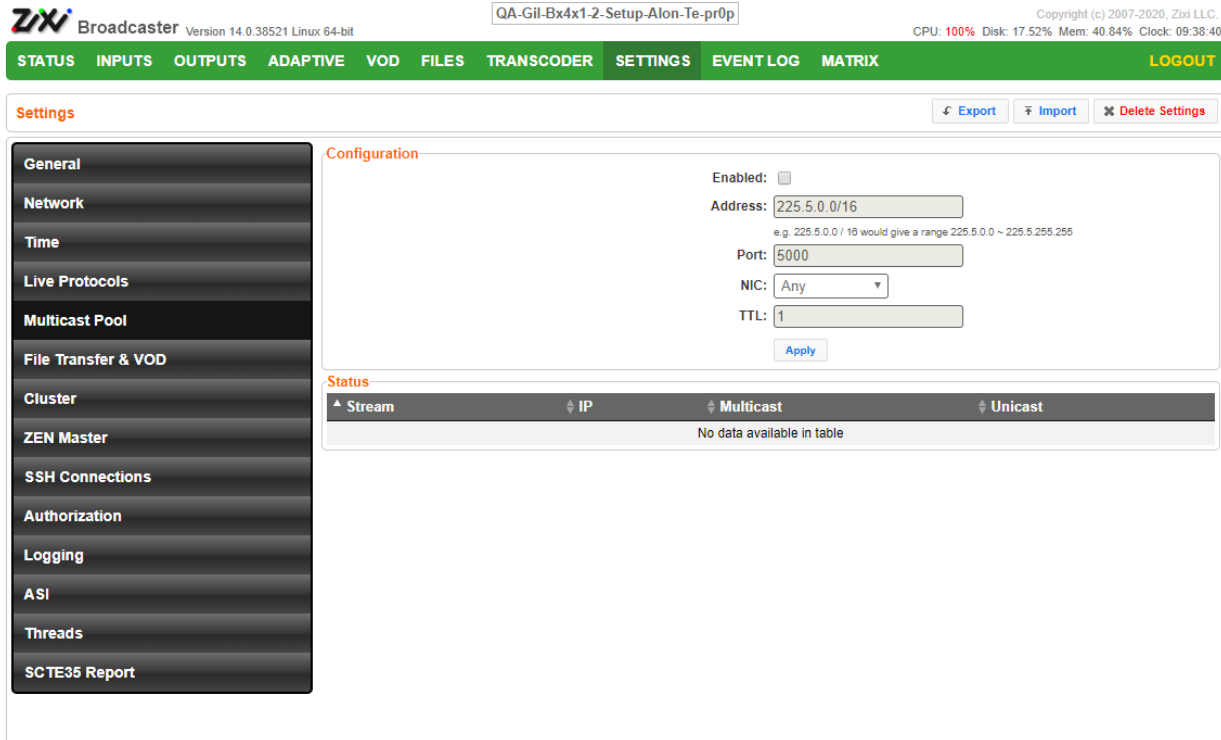
Field	Description
Configuration	
Enabled	Enables multicast pool
Address	Specify the range of IP addresses (CIDR format).
Port	Specify the port that will be shared by all of the members of the pool.
NIC	Specify the network card to use for the outgoing multicast traffic.
TTL	Specify the Time To Live.

File Transfer & VOD

The File Transfer and VOD settings screen enables the download of files and the playback of VOD content and, in addition, specifies the speed limits (download/upload). The settings in this screen are related to the VOD and Files screens.

Field	Description
File Transfer & VOD	
Download	Enables download of files through the Files menu of the Zixi Broadcaster.
Upload	Enables upload of files through the Files menu of the Zixi Broadcaster
Automatically index VOD files	Indexes the VOD files in the various VOD folders. In some cases, the indexing of VOD files can affect performance. Using this control, you can decide when to index the VOD files in order to ensure optimal performance during peak times.
Scan on startup	Indexes the files in the VOD folder that have not been indexed during startup of the Zixi Broadcaster.
HLS indexing	Enables indexing of HLS streams. The indexing creates an M3U8 playlist file.
MPEG-DASH indexing	Enables indexing of MPEG-DASH streams. The indexing creates a .mpd (MPEG-DASH Media Presentation Description) file.

File Transfer & VOD

VOD	Enables the VOD feature.
Encrypt downloads	Encrypts files that are downloaded.
Max download speed [kbps]	Limits the amount of bandwidth used to download files
Max upload speed [kbps]	Limits the amount of bandwidth used to upload files
Initial bitrate [kbps]	Limits the amount of bandwidth used during initial download/upload (before cache)
HTTP/Origin cache size [MB]	Limits the amount of cache memory that can be used for cache

Cluster

Zixi Broadcaster enables two types of configurations:

- **Cluster configuration** - a cluster of Zixi Broadcaster servers in a LAN for load balancing purposes. The different Zixi Broadcaster servers will communicate with each other and are "aware" of the Input/Output traffic of each node in order to redirect the streams to the least occupied Zixi Broadcaster instance. All Zixi Broadcasters should have a separate **Public IP** (NIC #1) and in addition, they all should have an internal IP on the LAN (**Cluster Internal IP**) to communicate over multicast (NIC #2). When a request received by the Zixi Broadcaster, it accepts it, or transmit it internally to another Zixi Broadcaster that is less loaded and has the requested channel. The Cluster feature is currently supported for:
    - Inputs - Zixi Push inputs
    - Outputs - Zixi Pull outputs, HLS outputs

> If you want to use more advanced load balancing and high availability features, instead of configuring the cluster within each Zixi Broadcaster (as described below) it is recommended to configure the cluster within ZEN Master, which requires a single cluster configuration and then automatically manages the load balancing and high-availability, while enabling monitoring, reporting, and other advanced features. For more information, see: https://zixidocumentation.atlassian.net/wiki/spaces/ZMUG/pages/388005967/Adding+a+Broadcaster+Cluster+Automatic+Scaling.

- **Edge-Origin configuration** - the cluster may be used to forward the stream from one Zixi Broadcaster server (origin) to other Zixi Broadcaster servers (edge) which are closer to the user or is located in a less sensitive environment. When the end-user connects to the edge server to view a certain stream, the edge server will retrieve the stream from the origin server and will seamlessly deliver it to the end-user.

Server Settings

Cluster

Field	Description
Origin	
Enabled	Enables Edge-Origin configuration.
Host	The primary host IP address of the origin server.
Port	The port number in the origin server for transmitting the stream. Default: 2088
Alternative Host	The IP address for a secondary server. If the primary origin server is unavailable, the data will be retrieved from the secondary origin server.
Port	The port number for the secondary origin server. Default: 2088
HTTP/origin cache size [MB]	The size of the cache that will be used to serve multiple users. The edge server will retrieve the data from the origin and cache it for additional users in order to save bandwidth and increase performance.
Live Streams	
Latency [ms]	Specify the buffer size between the edge and the origin.
Timeout [s]	Specify the maximum amount of time in which the edge will attempt to connect to the origin. After the timeout period the edge server will attempt a connection with the secondary origin server.

Cluster

Cluster	
Enabled	Enables Cluster configuration.
Public IP	The public-facing IP address of this Zixi Broadcaster server for external access. A unique Public IP must be assigned to each broadcaster in the cluster.
Cluster Internal IP	The internal IP (multi-cast) address for communication between the various servers in the cluster. This address is used to communicate load information forwarding the streams within the cluster. The same multicast IP address should be used across all instances in the cluster.
TTL	Specify the Time To Live parameter.
Port	Specify the port that are used in all the participating Broadcaster servers in the cluster.
Local IP	Specify the local IP address which the network employs for internal communication.
Balance Inputs	Enables the balancing of the inputs.
Balance Outputs	Enables the balancing of the outputs.

Zen Master

The ZEN Master screen is used to add the current Zixi Broadcaster to an existing Broadcaster Cluster in Zen Master that has been configured for "Manual Scaling". This process involves pre-configuring a "manual scaling" Broadcaster Cluster in ZEN Master, then, still in ZEN Master, creating a manual Zixi Broadcaster within this cluster, and then finally from the ZEN screen of the current Zixi Broadcaster UI, selecting the previously created Broadcaster Cluster and Zixi Broadcaster (that we had created though the ZEN Master UI). This process will generate a connection between the logical representation of the Zixi Broadcaster in ZEN Master and the Zixi Broadcaster system.

➡ **To connect the current Zixi Broadcaster to ZEN Master:**

1. In **ZEN Master**, create a "manual scaling" Broadcaster Cluster and add a Broadcaster entity to it by following the procedure described in the **Adding a Broadcaster Cluster – Manual Scaling** section in the **ZEN Master User Guide**.

In ZEN Master, in the main navigation, click **Settings**.

In the **SSH Keys** tab, click **Download** on the relevant SSH Key to download the key to your machine.

Login to the **Zixi Broadcaster** UI (it could be a locally installed Zixi Broadcaster, e.g. http://localhost:4444 or a remote Zixi Broadcaster).

The Zixi Broadcaster UI opens.

Go to **Settings > ZEN Master**.

The ZEN Master login fields are displayed:
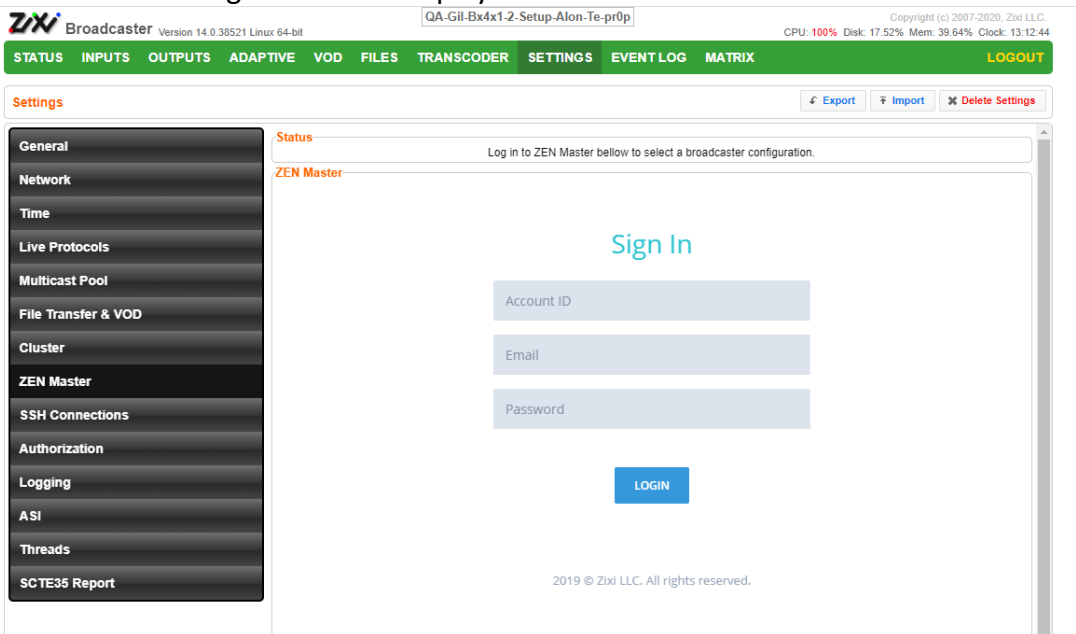
In the **Account ID** field, enter the customer domain of your ZEN Master account (e.g. if you login to ZEN at *demo.zen.zixi.com* then your Account ID is *'demo'*).

Zen Master

> The user cannot be an SSO (Single Sign-On) user. If you are using an SSO account, you will have to create another user to sign in through this screen.

In the **Email** field, enter the username for your ZEN Master account.

In the **Password** field, enter the password from your ZEN Master account.

Click **Login**.

A list of Broadcasters configured in ZEN Master is displayed.

For the Broadcaster that you are adding, which should currently be in **Pending** mode, click **Select**.

Details about the Broadcaster are shown in the **Status**

Click **Refresh.**

The connection is configured automatically.

In **ZEN Master**, in the main navigation, click **Broadcasters**.

Verify that the status of the newly configured Broadcaster cluster is *OK.*

Verify that the status of each Broadcaster that was added to the cluster has changed from *Pending* to *OK.*

SSH Connections

SSH (Secure Shell) is a network protocol that allows a secure access over an encrypted connection. Reverse SSH is a technique that can be used to access systems (that are behind a firewall) from the outside world. As part of the SSH configuration, you can configure a connection to the server and then configure any number of SSH tunnels to the same server.

➡ **To create an SSH connection to a server:**

1. Click the **Add Connections** button.
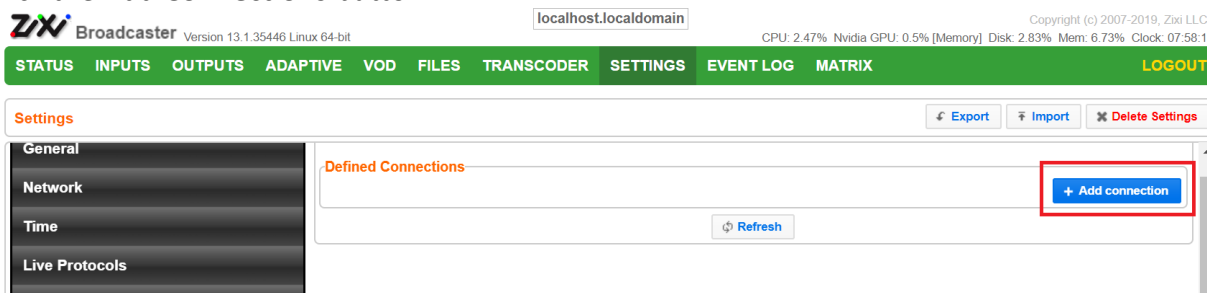
In the **Host** field, enter the IP address or host name of the host that you wish to access.
In the **Port** field, enter the port number to access the host.
Click **Apply**.
The connection to the specified server is configured.

➡ **To create a reverse tunnel to the same server:**

1. Under the destination that you have configured, click **Edit Credentials**.
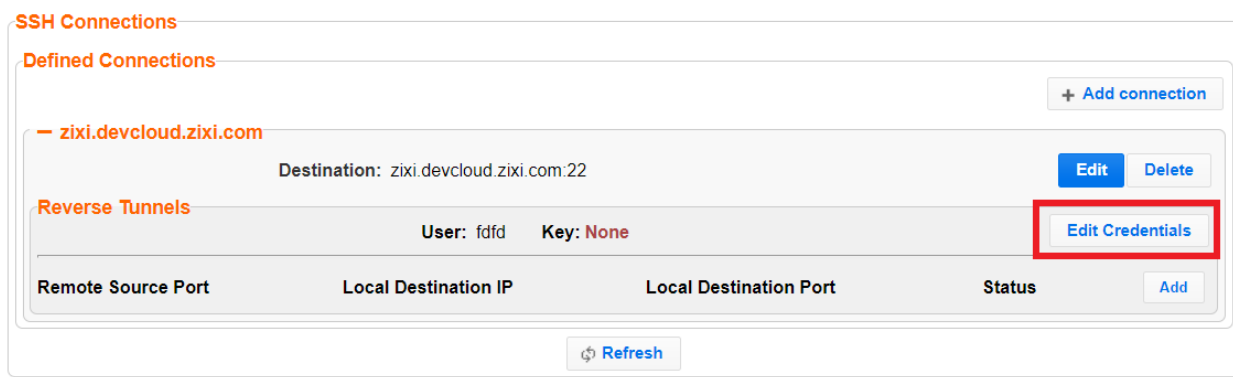
The **Connection Credentials** dialog appears.
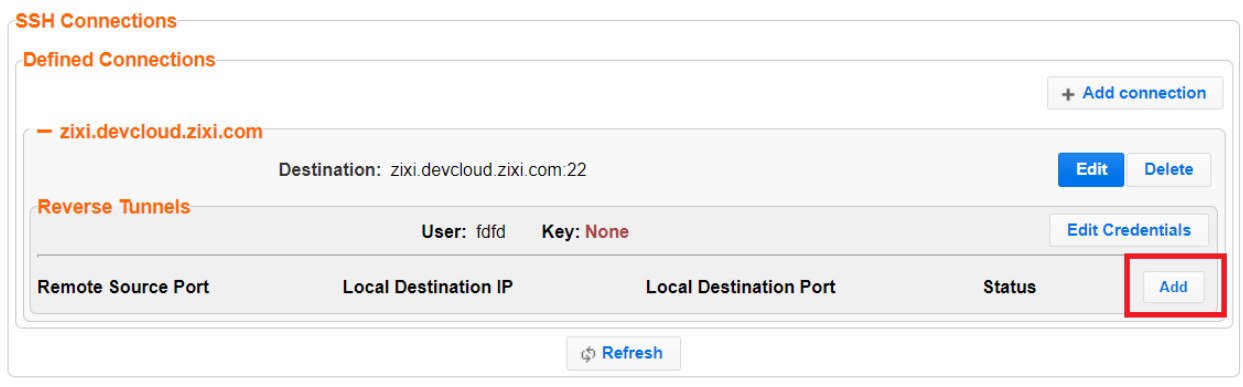In the **User** field, enter the user name to access the tunnel.
Click **Private Key**, navigate to the file location and select the file.
Click **Apply**.

SSH Connections

Click **Add** to add a reverse tunnel.

The **Tunnel details** dialog appears.

In the **Remote Source Port** field, enter the port number of the remote server.

In the **Local Destination IP** field, enter the IP address of the local server.
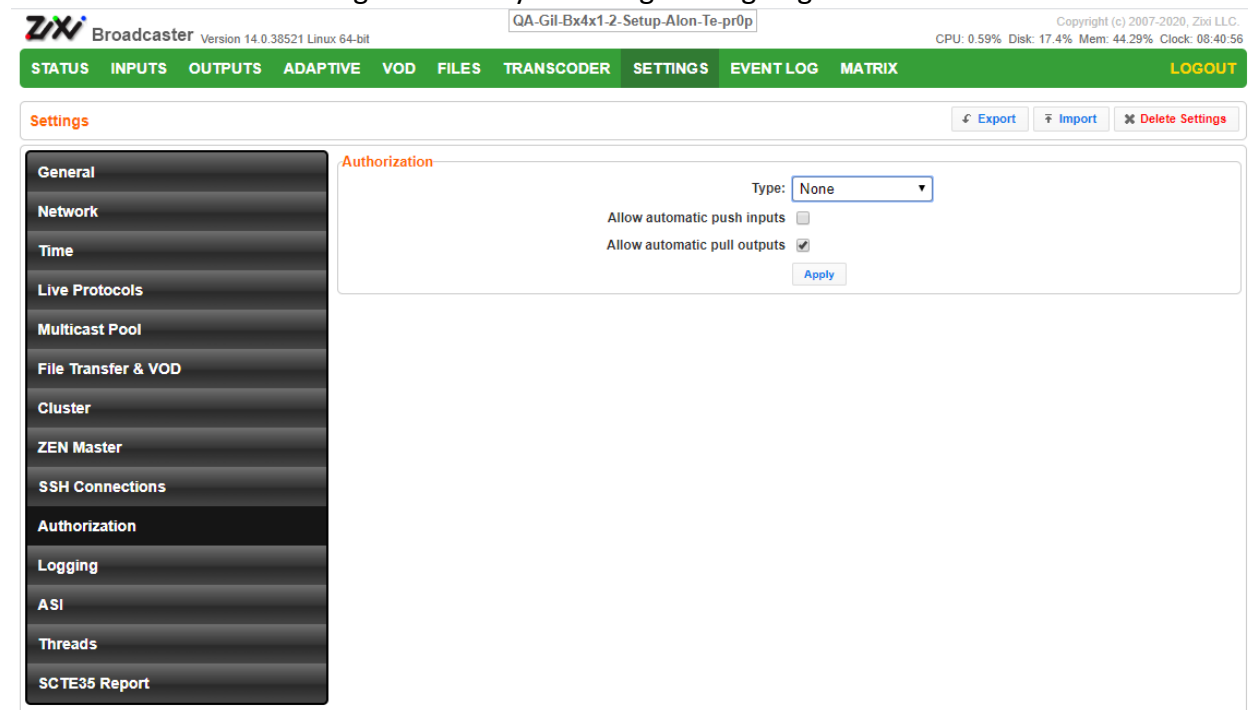
In the **Local Destination Port** field, enter the port number to connect the tunnel.

Click **OK**.

Repeat steps 5-9 to add additional tunnels.

Authorization

Authorization can be configured for any incoming or outgoing streams.

Field	Description
Authorization	
Type	**None (default)** - authorization will be defined in the Input and Output streams. In this case you will need to define the password in the Input and the Output streams. Unless you select the Allow automatic push inputs and/or Allow automatic pull outputs checkboxes (as described below). **Text File** – this option manages authorizations in a text file. This option is useful for large OTT operations, as it does not require configuration for every user. The text file contains pairs of stream name and password that are used for the input streams. For the outputs, it contains the stream name, user and password of the viewer. **Linux Users** – uses the built-in authorization of the Linux operating system. **Global Password** – a single password that will be used for all access requests. **Users Files** - **HTTP Server** – Zixi Broadcaster will generate an HTTP request to an external server on every connection. **Stream access** – access authorization on the stream level. The password needs to be the same as the password to access the stream**.** **Windows Users** – uses the built-in authorization of the Windows operating system.

	Other override authorization techniques are available. For more information contact Zixi support
Parameter	Specify the password that you would like to use for access
Allow Automatic Push inputs	If this checkbox is selected, the Zixi Broadcaster will automatically create an input stream each time it receives a push stream from a source. However, if this checkbox is not selected, only predefined Push Input streams with the defined credentials will be allowed in (this is the default setting and the behavior in previous versions). Default: not selected.
Allow Automatic pull outputs	If this checkbox is selected, any Zixi Receiver that requests a Pull output will be granted access. In this case, a Pull output will be automatically created in the Zixi Broadcaster (this is the default setting and the behavior in previous versions). However, if this checkbox is not selected, only predefined Pull output streams with the defined credentials will be pulled by the Zixi Receiver. Default: selected.
Separate user folders	Select this checkbox to enable access by user folders
Logging	Select the checkbox to enable logging of the connections

Logging

The Logging screen defines the logs location and preferences for debugging purposes.

Field	Description
Logging	
General Level	The Severity Level that will be collected in the log, from Info, Warning, Error, to Fatal. Selection of lower severity levels will include all higher-level logs. Default: None, since Logging is resource-intensive and only enabled when necessary.
Path	The log file name and path where the collected event information will be stored.
Max log files	The maximal number of log files.
Max log file size (MB)	The maximal size of each log file.
Send crash reports	Select the checkbox to send a crash report to Zixi Support.

ASI

The ASI screen is used to configure the ASI interface when there is an ASI card in the machine. You can use this screen to reverse the direction of the ports on the ASI card. The port numbers should correspond to the port numbers on your ASI card.

Field	Description
ASI output stuffing	Select this checkbox to achieve CBR (constant bitrate) by padding the ASI stream with TS null packets.
ASI output PLL	Select this checkbox to enable a phase-locked loop. A phase-locked loop or phase lock loop (PLL) is a control system that generates an output signal whose phase is related to the phase of an input signal. When selecting this option, the system will adjust the bitrate that is sent according to the fullness rate of the output buffer.
ASI fix time	Select this checkbox to adjust input timestamps to local machine time.
Initial buffer time [ms]	To avoid underflows, specify the output buffer size that will be filled before starting the transmission.
Read buffer size [B]	Specify the input read buffer to fill, before passing data to the application. Larger buffer size should be specified for higher bitrates; Smaller buffer size will be more responsive and smoother in lower bitrate streams.

Reversing the directions of the ports

➡ **To Reverse the Direction of the Ports:**

1. From the **Settings** page of the Zixi Broadcaster, click **ASI** on the left-hand side.
   The various **ASI settings** are displayed.

Click the desired **RESET** button to the right of the port that you want to reverse**.**
   A confirmation window is displayed with the notification that the service must first be restarted before the direction is reversed.

Field	Description
Available ports	
Name	Displays the port number used by the ASI protocol.
Data Direction	Displays the direction of the data being transmitted by the ASI protocol.

Threads

The Threads screen enables the configuration of the maximal number of concurrent CPU threads allowed for each component/service. Enter -1 to limit the threads according to the number of cores.

The following elements can be configured:

- Input
- Output
- VOD
- Read
- Pool
- RTMP
- UDP In
- UDP Out
- HTTP In
- Transcoder
- Push Output Receive
- HTTP
- Authorization
- Analyzer

SNMP (Linux Only)

The SNMP screen includes basic configuration parameters for the configuration of Simple Network Management Protocol, which enables monitoring and control of Zixi Broadcaster by a monitoring system. For further information on how to enable and configure SNMP on Zixi Broadcaster, see **Configuring SNMP** section.

Field	Description
Service	Click the button to Start/Stop the SNMP service.
Read-only Community Name	Used in SNMPv1 and SNMPv2, this parameter is used to specify the Community Name to enable read-only access to the Zixi Broadcaster monitored information. If the community string is correct, Zixi Broadcaster will respond with the requested information. If the community string is incorrect, Zixi Broadcaster will simply ignores the request and will not respond.
Read-write Community Name	Used in SNMPv1 and SNMPv2, this parameter is used to specify the Community Name to enable read-write access to Zixi Broadcaster. Read-write objects include, for example, zbiActive, which indicates and/or sets the Active state of an Input stream.
SNMP V3 Users	For SNMPv3 monitoring systems, click the + button to add authentication credentials and fill-in the following fields: • User name - enter the SNMP user name • Write access - select the checkbox to allow Read-Write access rights. If the checkbox is not selected, the user will have Read-only access rights.

	• Password - enter the SNMP user's password.
Trap Receivers	Specify SNMP Trap receivers that will listen to the SNMP Traps that will be sent by Zixi Broadcaster. Click the + button to add authentication credentials of the Trap Receiver, by filling-in the following fields: • Community - Specify the community name for access. • Host - Specify the IP address to which the Trap messages will be transmitted. • Port - Specify the Port number to which the Trap messages will be sent transmitted.

Viewing Events Log

The Event Log screen displays all the events (errors, connections, configuration changes, analysis events etc.) that occurred in the Zixi broadcaster. The logs are displayed in the server time (not local time) and can be exported as a .cvs file.
In Linux, the event log is written to a file located in the following location on the disk:
/log/var/messages

➡ **To Clear the Log:**

In the **Event Log** screen, click **Clear** on the upper right-hand corner.
The events on the log screen are deleted.

➡ **To Save the Log as a File:**

In the **Event Log** screen, click **Save** on the upper right-hand corner.
A .cvs file is created and saved to the local destination.

➡ **To Refresh the Screen:**

In the **Event Log** screen, click **Refresh** on the upper right-hand corner.
The data on the screen is updated.

Using the Matrix

The Zixi Matrix view provides a visual-based alternative to managing the streams, by previewing the input and output streams with their current status. Matrix offers drag and drop capabilities to connect input streams to outputs as well as some of the actions that were covered in the Performing Actions on Input Streams and Performing Actions on Output Streams sections above.

Connecting Input to Output

An easier method of connecting inputs to outputs.

➡ **To Connect an Input to an Output:**

Drag the desired input thumbnail and drop it over a specific output thumbnail. The desired input is connected to the selected output.

Disconnecting Output from Input

➡ **Disconnect an Input to an Output:**

1. Click on the **To connected stream** that you want to disconnect.
   The **Input stream data** window is displayed.

Click **Unlink**.
   A confirmation window is displayed.

Click **Confirm**.
   The Output is disconnected from the Input.

Matrix Interface Elements

The Matrix view displays preview thumbnails of the Input and Output streams. Preview thumbnails of input streams are presented in the Inputs pane and preview thumbnails of output streams are presented in the Outputs pane.

- If the stream is active - the live video will be shown in the preview thumbnail.
- If an input stream is not active – the preview thumbnail will include an "Offline" message.
- If an output stream has been created, but has not been connected to an input – the preview thumbnail will include the following message - "Drag Input Here".
- If a connected output stream does not receive a live stream - the preview thumbnail will include a "No Video" message.
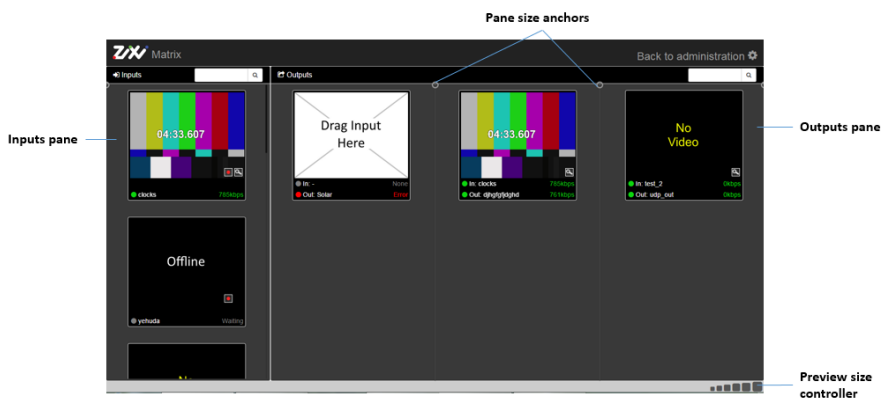
Changing Matrix View

You can modify the size of the panes, the size of the preview thumbnails, and re-arrange the order the preview thumbnails.

➡ **To modify the size of the panes:**

Click on one of the rounded **pane size anchors** (see screenshot above)

➡ **To modify the size of the preview thumbnails:**

Click on one of the sizes in the **preview size controller** (see screenshot above).

➡ **To re-arrange the order the preview thumbnails:**

Drag and drop the preview thumbnail to the desired position within the pane.

Searching for Specific Streams

➡ **To Search for a Specific Stream:**

Type in the specific stream name in the appropriate (Input or Output) search text box on the

top of the console and click [Q].
The relevant stream will be the only one to be displayed in the pane.

Preview Thumbnail Elements

The following stream formats are supported for thumbnail preview:

- Scan Style: Interlaced and Progressive

- Codec: MPEG2, H.264/AVC

- Frame Size: SD, HD (720p), Full HD (1080p), 4K (2160p)

- Frame Rate: 24fps, 25fps, 29.97fps, 30fps, 59.94fps, 60fps

- Chroma Subsampling: 4:2:0

- Bit Depth: 8-bit (MPEG2, H.264/AVC), 10-bit (H.264/AVC)

Viewing Stream Details

The preview thumbnail includes the following elements:

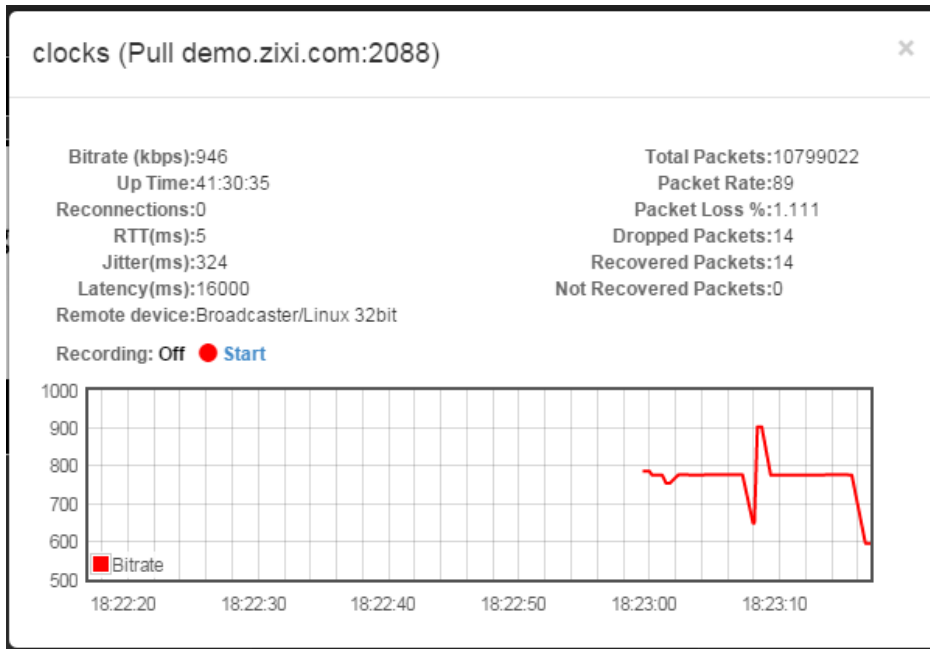| Element	Description	Action
Status Indicator	Displays the unique identifier for this group.	
Stream ID	Displays the unique name for the stream.	
Bitrate [kbps]	Displays the bitrate of the active stream.	
Uptime	Displays the amount of time the stream has been active.	
Record	Stream recording	Click the record button to start recording. Click again to stop recording
Zoom	Opens the stream in a larger preview window with sound	Click the Zoom icon to open the larger preview screen.

Viewing Stream Details

➡ **To View Stream Details:**

Click anywhere on the preview thumbnail.
The Stream Details window opens:

Viewing Stream Details

clocks (Pull demo.zixi.com:2088)   ×

Bitrate (kbps):946   Total Packets:10799022
Up Time:41:30:35   Packet Rate:89
Reconnections:0   Packet Loss %:1.111
RTT(ms):5   Dropped Packets:14
Jitter(ms):324   Recovered Packets:14
Latency(ms):16000   Not Recovered Packets:0
Remote device:Broadcaster/Linux 32bit

Recording: Off ● Start

1000
900
800
700
600
■ Bitrate
500
    18:22:20   18:22:30   18:22:40   18:22:50   18:23:00   18:23:10

Configuring SNMP

Zixi Broadcaster enables monitoring and control via SNMP (on Linux only). The monitoring system can receive SNMP Trap messages from Zixi Broadcaster as well as access monitored objects with read-only and read-write access privileges (objects and their access permissions are defined in the MIB). Zixi Broadcaster supports SNMPv1, SNMPv2, and SNMPv3. Before using SNMP you need to ensure that SNMP is enabled in your Zixi Broadcaster license, run a script, as described below, and configure the SNMP settings in the Settings >SNMP screen.

> The SNMP feature is not enabled by default. If you do not see this screen, please contact Zixi Support.

Activating SNMP

➡ **To Activate SNMP:**

Run the script file `./install_snmp.sh`, located in the Broadcaster folder, where Zixi Broadcaster was installed. The events on the log screen are deleted.

> Note: Running the script may cause Zixi Broadcaster to restart.

Configuring SNMP Settings

➡ **To configure SNMP:**

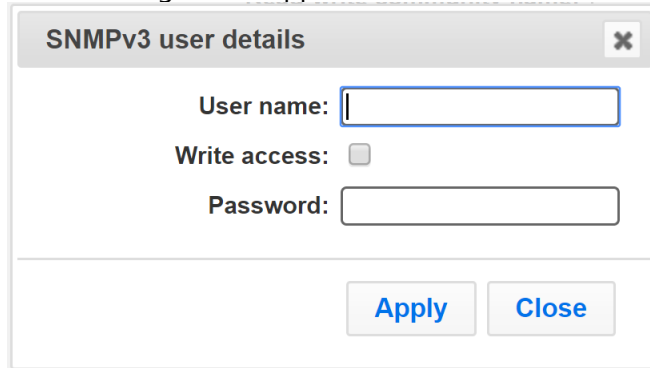1. In Zixi Broadcaster UI, go to **Settings > SNMP**.

Configuring SNMP Settings

In the **Service** field, click the button to activate the service.

Do one of the following:

- For SNMPv1 or SNMPv2, fill in the read-only and/or read-write community name in the **Read only community name**, and **Read-write community name** fields.
- For **SNMPv3**, under the SNMPv3 Users section, click the + button.
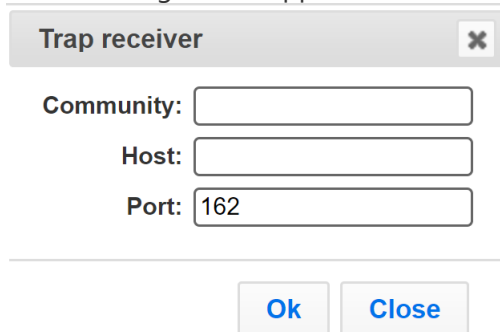 The following screen appears:

  SNMPv3 user details ✖

  User name: |

  Write access: ☐

  Password:

  Apply   **Close**

- In the **User Name** field, enter the SNMP user name.
- In the **Write Access** field, select the checkbox to allow *Read-Write* access rights. If the checkbox is not selected, the user will have *Read-only* access rights.
- In the **Password** field, enter the SNMP user's password.

Under the **Trap Receivers** section, specify SNMP Trap receivers that will listen to the SNMP Traps that will be sent by Zixi Broadcaster, by clicking the **+** button to add a trap receiver.
The following screen appears:

Trap receiver ✖

Community:

Host:

Port: 162

Ok   **Close**

In the **Community** field, specify the community name for access.
In the **Host** field, specify the IP address to which the Trap messages will be transmitted.
In the **Port** field, specify the Port number to which the Trap messages will be sent transmitted.
Click **Apply**.

Viewing MIB Information

You can view the *"Root MIB"* (which defines the Zixi Broadcaster tree root definitions) and the **"Broadcaster MIB"** (which describes the Zixi Broadcaster MIB tree definition, including all its objects).

➡ **To view MIB information:**

1. In Zixi Broadcaster UI, go to **Settings > SNMP**.

At the upper right-hand corner click the **Root MIB** and/or **Broadcaster MIB** links.

SNMP Alerts/Notifications

The SNMP traps are sent when an alert is raised and when alert is cleared on following occasions:

- Input stream alerts (zbtInputStreamAlertRaised = .1.3.6.1.4.1.38369.1.1.1.0.58; zbtInputStreamAlertCleared = .1.3.6.1.4.1.38369.1.1.1.0.60)
  Important parameters:
  $ zbsProgramID (Id of the broadcaster that sends the trap, .1.3.6.1.4.1.38369.1.1.1.1.2)
  $ zbtStreamID (Id of the stream, .1.3.6.1.4.1.38369.1.1.1.0.2)
  $ zbtStreamAlertType (alert type, .1.3.6.1.4.1.38369.1.1.1.0.10)
- TR101 analyser alerts (zbtTR101AlertRaised = .1.3.6.1.4.1.38369.1.1.1.0.90; zbtTR101AlertCleared = .1.3.6.1.4.1.38369.1.1.1.0.91)
  Important parameters:

- $ zbsProgramID (Id of the broadcaster that sends the trap, .1.3.6.1.4.1.38369.1.1.1.1.2)
- $ zbtStreamID (Id of the stream, .1.3.6.1.4.1.38369.1.1.1.0.2)
- $ zbtTR101AlertErrorCode (TR101 alert code, .1.3.6.1.4.1.38369.1.1.1.0.30)
- Output stream alerts (zbtOutputStreamAlertRaised
  = .1.3.6.1.4.1.38369.1.1.1.0.59; zbtOutputStreamAlertCleared
  = .1.3.6.1.4.1.38369.1.1.1.0.61)
  $ zbsProgramID (Id of the broadcaster that sends the trap, .1.3.6.1.4.1.38369.1.1.1.1.2)
  $ zbtStreamID (Id of the input stream where output is
  assigned, .1.3.6.1.4.1.38369.1.1.1.0.2)
  $ zbtOutputID (Id of the output, .1.3.6.1.4.1.38369.1.1.1.0.3)
  $ zbtStreamAlertType (alert type, .1.3.6.1.4.1.38369.1.1.1.0.10)
- Performance alerts (zbtPerformanceAlertRaised
  = .1.3.6.1.4.1.38369.1.1.1.0.80; zbtPerformanceAlertCleared
  = .1.3.6.1.4.1.38369.1.1.1.0.81)

Important parameters:

- $ zbsProgramID (Id of the broadcaster that sends the trap, .1.3.6.1.4.1.38369.1.1.1.1.2)
- $ zbtPerformanceAlertType (alert type, .1.3.6.1.4.1.38369.1.1.1.0.20).

In addition, traps are sent on following events:
- Input stream created (zbtInputStreamCreated = .1.3.6.1.4.1.38369.1.1.1.0.54)
- Output stream created (zbtOutputStreamCreated = .1.3.6.1.4.1.38369.1.1.1.0.55)
- Input stream up (zbtInputStreamUp = .1.3.6.1.4.1.38369.1.1.1.0.50)
- Input stream down (zbtInputStreamDown = .1.3.6.1.4.1.38369.1.1.1.0.50)
- Output stream up (zbtOutputStreamUp = .1.3.6.1.4.1.38369.1.1.1.0.51)
- Output stream down (zbtOutputStreamDown = .1.3.6.1.4.1.38369.1.1.1.0.53)
- Input stream deleted (zbtInputStreamDeleted = .1.3.6.1.4.1.38369.1.1.1.0.56)
- Output stream deleted (zbtOutputStreamDeleted = .1.3.6.1.4.1.38369.1.1.1.0.57)
- Successful broadcaster process start (zbtProgramStartSuccess
  = .1.3.6.1.4.1.38369.1.1.1.0.200)
- Failure to start broadcaster process (zbtProgramStartFailed
 = .1.3.6.1.4.1.38369.1.1.1.0.201)

Important parameters:
- $ zbsProgramID (Id of the broadcaster that sends the trap, .1.3.6.1.4.1.38369.1.1.1.1.2)
- $ zbtStreamID (Id of the input stream, .1.3.6.1.4.1.38369.1.1.1.0.2) applicable for
  inputs' and outputs' events.
- $ zbtOutputID (Id of the output, .1.3.6.1.4.1.38369.1.1.1.0.3), applicable only for
  outputs' events.

Configuring Hitless Failover

Zixi features hitless failover for inputs, enabling undisrupted streaming when switching from one source to another. The hitless failover feature is based on the SMPTE 2022-7 standard, which specifies "seamless" or hitless failover between binary-identical streams with synchronized RTP headers. Zixi's patent-pending hitless failover technology works by comparing the transport stream payload, without relying on sequences being synchronized. Zixi then applies a proprietary sequencing algorithm to identify missing parts and fill-in missing packets.
The Hitless Failover feature is supported in the inputs of Zixi Feeder, Broadcaster, and Receiver.
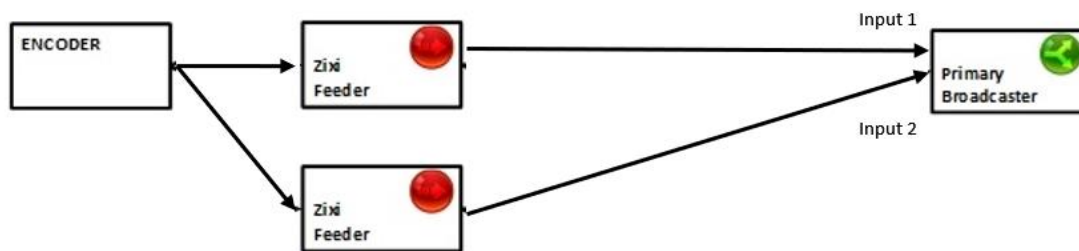
The hitless failover configuration involves grouping two inputs in a "Failover Group". The failover group includes the following configuration options for the merging of binary-identical steams:
The merging of the streams can be achieved using one of the following methods:

- **RTP headers (SMPTE 2022-7)** – if the sources are RTP and the RTP headers were maintained, Zixi will use the SMPTE 2022-7 to compare and merge the two streams in order to allow hitless failover. This option is the most recommended as it will use the sequence and the timestamp in the packets to compare which packets are missing. This method is more accurate than methods that compare the entire payload or methods that use sophisticated DNA sequencing algorithm, which are more error prone, as the payload may have multiple matches.
- **RTP headers or TS content** – if the sources do not have RTP headers, Zixi will try to merge using the MPEG-TS content itself.

In these cases, when one of the streams is disrupted or interrupted completely, Zixi Broadcaster will seamlessly use the packets of the other input without any disruptions.

> If the streams are not identical, the failover process will not be seamless and may take up to a second.

A Failover Group can comprise two or more inputs. In a group of three or more, you can define one or more streams as a "Backup". In this case the system will always try to recover packets from "Primary" streams first and only if there are no available primary streams, it will use the backup

streams. When one of the primary streams becomes available, the system will automatically jump to the primary stream.

While the Broadcaster GUI only enables configuration of primary streams at a single priority level, through the Zixi Broadcaster API it is possible to assign different priorities as follows:

- Priority 0 – means backup. It will be used only if all other streams are unavailable.

- Priority greater than 0 - means primary.

The Failover Group has its own Stream ID, just like an Input Stream, and will appear in the Inputs list. Although the topology above shows only one Zixi Broadcaster, it is also possible to have multiple targets (e.g. two or more Zixi Broadcasters), each with its own Failover Group of inputs to enable a more complete system-level redundancy.

To configure a Failover Group, follow the instructions in the **Creating a Failover Group** section.

Configuring HTTPS

Zixi Broadcaster supports HTTPS encryption based on OpenSSL. Zixi Broadcaster expects certificate files in X.509 textual format (sometimes called 'pem') with a full chain of certificates, each one starts with "----BEGIN CERTIFICATE----", and the associated private key file, that starts with "----BEGIN PRIVATE KEY----". The certificate can be provided by an SSL/TLS certificate provider (Certification Authority) where the domain is registered, such as VeriSign, Digicert, etc.. Alternatively, the certificate can be self-signed. A self-signed certificate is a certificate that is signed with its own private key. Self-signed certificates can be used to encrypt data just as well as CA-signed certificates, but your users will be displayed a warning that says that the certificate is not trusted by their computer or browser. Therefore, self-signed certificates should only be used if you do not need to prove your service's identity to its users (e.g. non-production or non-public servers).

Obtaining a CA-signed Certificate

Reach out to the hosting provider for instructions on how to obtain a CA-signed HTTPS certificate. As part of this process, you will be required to generate a certificate signing request (CSR). A CSR consists mainly of the public key of a key pair, and some additional information. Both of these components are inserted into the certificate when it is signed. To learn more about generating a CSR, go to - https://www.digitalocean.com/community/tutorials/openssl-essentials-working-with-ssl-certificates-private-keys-and-csrs.

Creating a Self-signed Certificate

Instead of obtaining a CA-signed certificate, you can create a self-signed certificate.

You can generate self-signed x.509 certs with OpenSSL by using the following command:
```
openssl req -x509 -newkey rsa:2048 -keyout selfsigned_key.pem -out selfsigned_cert.pem
```

To learn more about generating a self-signed certificate, go to:
https://www.digitalocean.com/community/tutorials/openssl-essentials-working-with-ssl-certificates-private-keys-and-csrs.

Uploading the Certificate and Private Key

After obtaining a CA-signed certificate or creating a self-signed one, you will need to upload the certificate and private key to Zixi Broadcaster.

Uploading the Certificate and Private Key

➡ **To upload the certificate and private key:**

1. In **Zixi Broadcaster UI**, go to **Settings > General**.

Click + to expand the HTTPS and DTLS Streaming Certificate section

In the **Certificate Uploaded** field, click **Upload** and select the certificate file.

In the **Private Key Uploaded** field, click **Upload** and select the Private Key.

In the **Private Key Passphrase** field, type the passphrase or leave empty (Default passphrase is empty, ignore the '****').

Click **Apply**.

If the process was successful, the **SSL setup status** field will turn to "**OK**".

Configuring NDI Streams

Network Device Interface (NDI) is a royalty-free software standard developed by NewTek to enable video-compatible products to communicate, deliver, and receive broadcast-quality video in a high-quality, low-latency manner that is frame-accurate and suitable for switching in a live production environment.

NDI was designed to deliver 1080i HD video at VBR data rates typically around 100 Mbit/s. Zixi Broadcaster uses an NDI library to read uncompressed frames from the NDI stream and pushes them to the Zixi Broadcaster's transcoder. The transcoder can then transcode the uncompressed stream into a transport stream using one of the available codecs, such as H.264 or H.265 video and AAC or Opus audio.

Zixi Broadcaster supports the following flows for NDI:

- **NDI Input** – the NDI source stream, which is uncompressed, is transcoded via the Zixi Broadcaster transcoder into any one of the available codecs. The transcoded stream will be available as an Input Stream when creating an Output in Zixi Broadcaster.
- **NDI Output** – Zixi Broadcaster can transcode a TS stream into an NDI output using Raw video and audio profiles. The NDI output is configured in the transcoding profile itself, so there is no need to create an NDI Output. When the input stream is transcoded, it becomes available to be pulled by NDI enabled devices.

NDI Stream Discovery

By default, NDI uses the mDNS (Bonjour / Zeroconf) discovery mechanism to advertise sources on a local area network, such that the NDI receiving device, which in this case is Zixi Broadcaster, can automatically discover and offer those sources. This means that there are different requirements depending on the type deployment:

- **Using NDI within a local area network** – on a local area network NDI will use the discovery mechanism to advertise the sources and Zixi Broadcaster will automatically discover these streams, while listing them in the **Stream** parameter of the NDI input stream.
- **Using NDI in the cloud** – to make the streams discoverable in the cloud, you need to deploy an NDI Discovery Server and configure the NDI plug-in with the settings included in the following example:

```
{
    "ndi": {
        "groups": {
            "recv": "\"public\"",
            "send": "\"public\""
        },
        "multicast": {
```

```
            "recv": {
                "enable": false,
                "subnets": ""
            },
            "send": {
                "enable": false,
                "netmask": "255.255.255.0",
                "netprefix": "239.192.136.100"
            }
        },
        "networks": {
            "discovery": "22.127.94.57",
            "ips": ""
        },
        "tcp": {
            "recv": {
                "enable": false
            },
            "send": {
                "enable": false
            }
        },
        "unicast": {
            "recv": {
                "enable": false
            },
            "send": {
                "enable": false
            }
        }
    }
}
```

NDI config file location

- On Windows: %PROGRAMDATA%\NewTek\NDI\ndi-config.v1.json

- On Linux: $HOME/.newtek/ndi-config.v1.json

On Linux the NDI config files should be placed in the home directory of the user which Broadcaster is running as root. Thus, the file must be located at /root/.newtek/ndi-config.v1.json.

Configuring Transcoding Profiles for NDI Sources

Specifying the NDI Discovery Server

➡ **To specify NDI Discovery Server:**

1. Open ndi-config.v1.json.
2. In the "networks" section, under "discovery" add the discovery server's IP, which is the address of a host where NDI Discovery Server is working. For example, if you have it working on 192.168.0.253, then your config will have this section:

```
"networks": {"ips": "","discovery": "192.168.0.253"},
```

Configuring Transcoding Profiles for NDI Sources

Before creating the NDI Input in Zixi Broadcaster, you must configure at least one transcoding profile that meets the following requirements:

- **Disable Copy GOP from source** - NDI sources can be transcoded using any of the available transcoding profiles, however it is **NOT possible** to enable the **Copy GOP from source** feature. Since all frames in the original NDI source are uncompressed, Zixi cannot know which frames were i-frames in the stream, so the GOP length should be configured in the **GOP [frames]** parameter of the transcoding profile.
- **No Keep Original** - when configuring the stream, it is possible to remove the video or audio from the stream, however it is **NOT possible** to keep the original video or audio, as they are originally uncompressed.
- **No RAW Video/Audio** - transcoding profiles with **RAW Video** and/or **RAW Audio** will be filtered out and will not appear in the **Video profile**/**Audio Profile** fields on the NDI Input screen.

For detailed instructions on how to configure transcoding profiles, see Transcoder section.

Adding an NDI Input to Zixi Broadcaster

The NDI is pulled into Zixi Broadcaster using the auto-discovery mechanism described in the **NDI Stream Discovery** section.

➡ **To Add an NDI Input Stream:**

> Before adding the NDI Input Stream, you must configure the relevant transcoding profiles – See **Configuring Transcoding Profiles for NDI Sources**.

Adding an NDI Input to Zixi Broadcaster

1. In the Zixi Broadcaster Navigation menu, click the **Inputs** tab.

In the Menu bar, click **New Input**. The **Add a new input stream** window is displayed.

Select **NDI** for the input stream.

Select the maximum concurrent connections to this stream from the **Max. Outputs** drop-down list. Default: Unlimited.

Select the **Show in Matrix** check box to display this stream in the Matrix (see Using the Matrix). Default: Selected.

Specify the **Stream Parameters** (see Input Stream Parameter table).

If you want to **Enable time shift**, select this checkbox (see Input Stream Parameter table). The stream will be recorded and broadcasted after the specified delay. The time shift feature is typically used to broadcast a live event across time zones (due to the time differences between locations).

If you want to **Transmit as multicast**, select this checkbox (see Input Stream Parameter table).

If you want to configure the **Recording Parameters**, specify them in the respective fields (see Input Stream Parameter table).

If you want to **Enable encryption**, select this checkbox (see Input Stream Parameters Table). For more information, see Encrypting an Input Stream in Zixi Broadcaster.

Click **OK**. The "Input added" message appears on the top of the screen. The NDI Stream is added to the Zixi Broadcaster and now appears in the list of streams available in Zixi Broadcaster Inputs screen.

Input Stream Parameters table

Parameter	Description
Stream Parameters	

Adding an NDI Input to Zixi Broadcaster

Stream	Select one of the NDI streams available based on your configuration from the drop-down menu. On a local area network NDI will use the discovery mechanism to advertise the sources and Zixi Broadcaster will automatically discover these streams. To make the streams discoverable in the cloud, you need to deploy an NDI Discovery Server and configure the NDI plug-in with the settings mentioned above.
Video Profile	Select an existing transcoding video profile, or select **Remove stream** if you want to remove the video track.
Audio Profile	Select an existing transcoding audio profile, or select **Remove stream** if you want to remove the audio track.
Audio Reference Level [dB]	This parameter attenuates the audio level by the specified level in dB. This setting is used to prevent audio clipping.
Transport Stream Bitrate [kbps]	Specify the bitrate of the transport stream. This parameter is optional. If you do not specify a TS Bitrate, the stream will be VBR. If you specify a bitrate, the stream will be CBR. The bitrate value must be compatible with the selected profile.
Use Intel hardware acceleration (if available)	Select this checkbox to use the Intel hardware acceleration component if it available.
Smoothing buffer	The Smoothing feature uses a buffer to time packets according to the stream's clock. This is useful when there are bursts in the rate in which the stream arrives. The smoothing features creates a queue in the buffer, allowing smoother entry into the Broadcaster. The Smoothing parameter defines the size of the buffer in Milliseconds. A larger the buffer enables smoother entry. However, it may influence the latency rate.
Enable time shift	Select this checkbox to record the stream content and broadcast it after a specified delay. To deploy an input stream that uses the current stream's time shift, you need to configure a "Delayed" input stream. (See **Adding Delayed Streams**).
Maximum delay [hh:mm:ss] (for Time Shift enabled)	Specify the time of a delayed transmission of this stream. Maximum: 24 hours
Transmit as multicast	Select this checkbox to enable the transmission of this stream's outputs as multicast. A Zixi Broadcaster that will pull the stream will receive it in multicast. By default Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling **Multicast Pull** in the **Settings**. This setting can be modified without interrupting an existing stream.

Adding an NDI Input to Zixi Broadcaster

Multicast-Only (for multicast enabled)	If desired, specify multicast-only outputs.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster.**
Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for Encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk –** the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours

Adding an NDI Input to Zixi Broadcaster

Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.
Record to S3 Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated.
	The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows:
	• %S=stream id - optional.
	• %Y=year - optional
	• %M=month - optional
	• %D=day - optional
	• %T=HH.MM.SS creation time - mandatory
	For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Creating an NDI Output
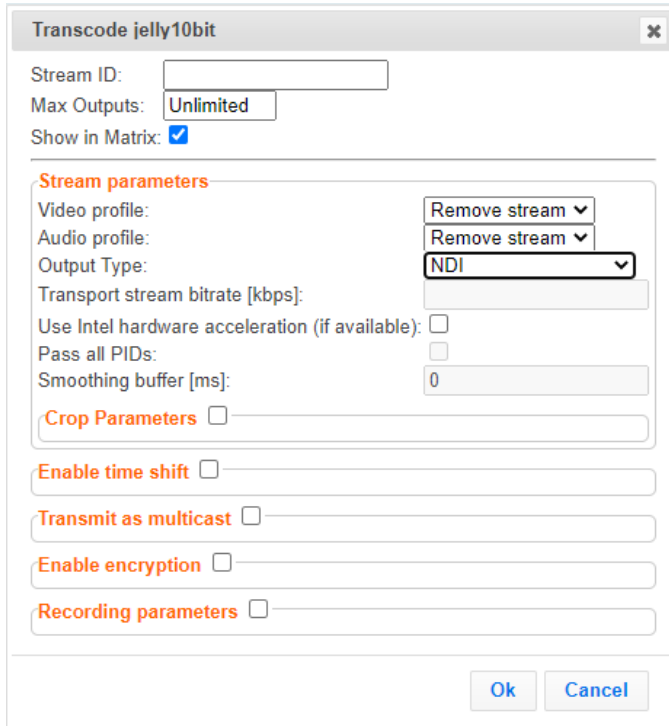
Zixi Broadcaster can transcode a TS stream Input into an NDI output using Raw video and audio profiles. The NDI output is configured in the transcoding profile itself, so there is no need to create an NDI Output from the Zixi Broadcaster Outputs screen. The Raw video profile can be configured to modify the stream's resolution (i.e. upscale/downscale) and frame rates per second. When the input stream is transcoded, it becomes available to be pulled by NDI enabled devices.

➡ **To Create an NDI Output:**

1. Create a Raw video transcoding profile and a Raw audio transcoding profile. For instructions, see Creating **New Profiles** section.
2. Create an input stream by following the instructions in the **Adding Input Streams** section.
3. Click [⚙▾] button on the right end of the input stream row and then **Transcode**. The **Transcode <input stream name>** window with the settings of the selected input stream is displayed.

Enter the unique **Stream ID.**, which will correspond to the new transcoded input that will be added.

Under **Stream Parameters**, in the **Output Type** field, select **NDI**.

Under Stream Parameters, in the **Video profile** and **Audio profile** fields, do one of the following:

- Select the Raw Video profile and Raw Audio Profile that you have configured.

Creating an NDI Output

- Select **Remove stream** – you can use the transcoder to remove the video or audio track from the stream.

Fill in additional fields (see table below for additional parameters).

Click **OK**. The transcoded input stream is created and appears in an embedded window labeled Transcoded sources under the original input stream from which it was created.

Parameter	Description
Video Profile	Select an existing Raw Video profile, or select **Remove stream** if you want to remove the video track.
Audio Profile	Select an existing Raw Audio profile, or select **Remove stream** if you want to remove the audio track.
Use Intel Hardware Acceleration (if available)	Select this checkbox to use hardware acceleration component if it has been installed. When using an Nvidia profile, this setting will be disabled.
Crop Parameters	Select this checkbox to set the cropping parameters.
Cropping Mode	Set the units used for defining the crop. Options are: *Pixels* or *Percentages*. Note: Depending on the type of content, in some cases using different crop values for low resolution outputs might be appropriate. For example, if the content includes both video content and textual content, the text would not be readable at lower resolutions and thus might be better to exclude. Another use case for using different crop values for each output would be to slice a 360 or VR input video.
Left, Top	Specify the left and top positions for the crop.
Width x Height	Specify the width and height values for the crop.
Enable time shift	
Maximum delay [hh:mm:ss]	Specify the time of the delayed transmission of this stream. Maximum: 24 hours.
Transmit as multicast	Selecting this checkbox enables the transmission of this stream's outputs as multicast. A Zixi receiver that will pull the stream will receive it in multicast. By default, Zixi Broadcaster is configured to allow transparent fallback to unicast if it is out of the LAN. Requires enabling Multicast Pull in the Settings. This setting requires enabling Multicast Pool (Settings > Multicast Pool).
Multicast Only	Selecting this checkbox will force the transmission of this stream only in multicast.
Enable Encryption	Select this checkbox to encrypt the Input stream. For more information, see **Encrypting an Input Stream in Zixi Broadcaster**.

Creating an NDI Output

Encryption type (for Encryption enabled)	Specify the type of Encryption (AES 128/192/256).
Encryption key (for encryption enabled)	Click **Generate** to generate an encryption key. The generated encryption key must be sent to the end-user to decipher the received encoded stream.
Recording parameters	Select this checkbox to customize the recording parameters.
Destination Type	Select the radio button for the desired storage type and then fill in the relevant parameters. • **Record to disk** – the recording is saved on the local disk. • **Record to S3** – the file is saved to your AWS S3 Bucket.
Record to Disk Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
Keep recorded files for [hours]	Specify the maximum time for storing the recording. Default: 0 hours
Custom Path	Optionally specify a storage location for the recorded files that is relative to the root folder. This location bypasses the location specified as the root folder in the **Settings** > **General** screen.

Record to S3 Parameters	
File Name Template	Specify the file name pattern that Zixi will use to generate when saving the recorded content. A separate file will be generated for each recording up to the time specified in the Max recorded file duration parameter (see above). After this duration a new file will be generated. The file name pattern can include any string and up to five variables listed below. Only the %T=HH.MM.SS creation time is mandatory. You can change the order of these variables and add text as long as you maintain the legitimate structure of the file in Linux and Windows: • %S=stream id - optional. • %Y=year - optional • %M=month - optional • %D=day - optional • %T=HH.MM.SS creation time - mandatory For example, the following pattern %Y_recording%T.ts will generate the following file name 2017_recording15:32:35.ts.
Max recorded file duration [hours]	Specify the maximum time allotted for recording a video stream. Default: 2 hours
URL	Specify the URL of the S3 bucket.
Ignore TLS certificate errors	TLS certificate for S3 bucket might be detected as faulty if bucket name contains dot[s]. When this option is selected, Zixi Broadcaster will ignore the TLS certificate errors and transmit the stream to its destination.
Access Key	The access key that is used for accessing the S3 bucket.
Secret Key	The secret key that is used for accessing the S3 bucket.

Configuring WebRTC Streams

Zixi supports using WebRTC to monitor streams. With WebRTC you can monitor your streams using popular browsers, such as Chrome, without installing any external plugins, such as the Zixi VLC plugin. This guide described the process of transcoding a stream to support WebRTC and how to monitor a stream using the WebRTC browser-integrated player.

Video and Audio Codec Support Options

WebRTC stream delivery requires particular audio and video codecs. In case the streams you are transporting via Zixi Broadcaster do not match these requirements, additional transcoding will be necessary in order to re-encode the stream to become WebRTC compliant.
The following are the requirements for a Zixi stream to be *WebRTC compliant*:

- **Video** - H.264 codec with Baseline or Main profile and no B frames
- **Audio** – Opus codec

The following is a description of the possible methods for processing streams in Zixi for WebRTC viewing:

- **Pass-Through** – if the stream is already fully compliant with WebRTC, then it can be passed through the Zixi Broadcaster to the WebRTC player for viewing.

- **Transcoding** – if the incoming stream is not fully compliant, then you need to first transcode the stream in order to prepare it for delivery to the WebRTC player. There are two methods that can be used for transcoding a stream for WebRTC.

  - **Single Version - Creating a single version of the monitor stream for all users** – in this option the stream will be encoded using Zixi Broadcaster's transcoder (with existing X264 or Nvidia for transcoding). This option allows many users to monitor the stream without encoding for each individual user, which saves CPU capacity. However, the option will still require additional output bandwidth for each user. Since there is only one stream version, it is recommended to encode to a low resolution and low bitrate so that the stream will be viewable by all users monitoring the stream.

  - **Multiple Version - Creating a unique version of the monitor stream for each user** – in this option Zixi Broadcaster will transcode the video, transforming it into RAW frames, which will be passed to the WebRTC library, where it will be re-encoded for each individual user. In this option the stream will match the bitrate available for every particular user. Although this promises the best quality for users' specific network conditions, each re-encode consumes CPU, which

Video and Audio Codec Support Options

> could potentially max out the available CPU resources used to transport the streams. In this case, if the stream will be monitored by a large number of users, it is recommended to host a second Broadcaster and send the stream to the second Broadcaster and have all users monitor the stream from that second Broadcaster. By doing so, there will be no impact on the primary Broadcaster.

Input Codec	Passthrough	Single Version	Multiple Version
Video Codecs			
H.264 with no B-frames (profile Baseline/Main)	Yes	Not Relevant	Not Relevant
H.264 with B-frames	No	Transcode to WebRTC compliant profile (e.g. H.264 codec with Baseline or Main profile and no B frames). Needs transcoding on a server with Nvidia GPUs.	Transcode to a RAW profile and specify a low resolution.
MPEG2	No	Transcode to WebRTC compliant profile. Needs transcoding on a server with Nvidia GPUs.	Transcode to a RAW profile and specify a low resolution.
HEVC	No	Transcode to WebRTC compliant profile. Needs transcoding on a server with Nvidia GPUs.	Transcode to a RAW profile and specify a low resolution.
Audio Codecs			
Opus	Yes	Not Relevant	Not Relevant
AAC	No	Transcode to Opus codec.	Transcode to RAW.
AC-3LC / HE v1 / HE v2	No	Transcode to Opus codec.	Transcode to RAW.
MPEG-2 Audio Layer II	No	Transcode to Opus codec.	Transcode to RAW.

Video and Audio Codec Support Options

MPEG-1 Audio Layer II	No	Transcode to Opus codec.	Transcode to RAW.
E-AC-3 (and other unsupported codecs)	Not supported. The stream will be passed through to WebRTC without audio.	Not relevant	Not relevant
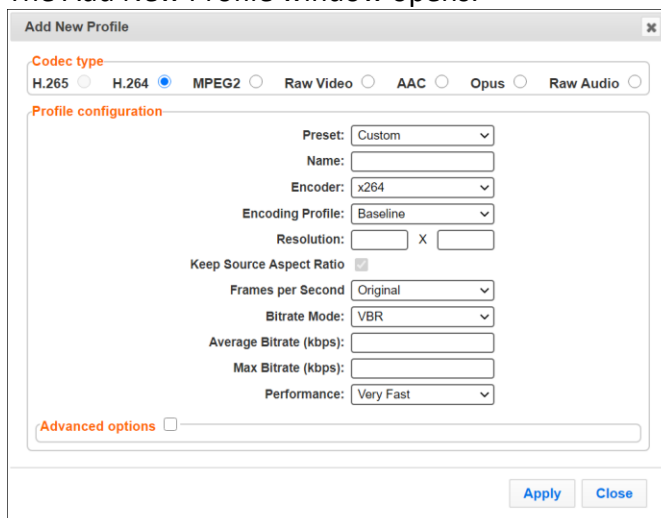
Creating Transcoding Profiles for WebRTC

In order to enable transcoding of non-WebRTC compliant streams you need to first create the relevant Transcoding Profiles. You need to create separate video and audio profiles for use with Single Version and Multiple Version transcoding methods. You will then be able to apply those profiles to your streams as needed.

Creating a Video Profile for "Single Version" Transcoding

➡ **To create a video profile for "Single Version" transcoding:**

1. On the **Transcoder** screen of the Broadcaster UI, click **New Profile**.
   The Add New Profile window opens.

Under **Codec type**, select the **H.264** radio button (default).
In the **Name** field, enter a name that describes this profile (e.g. WebRTCSingleVersionVideo)
In the **Encoding Profile** field, select either *Baseline* or *Main*.
In the **Resolution** fields, enter a low resolution that can be viewed by all of your users.
Configure additional parameters as required, see **Creating New Profiles**.
Click **Apply**.
The new profile is created and it can be used to configure a "Single Version" WebRTC output.

Creating an Audio Profile for "Single Version" Transcoding
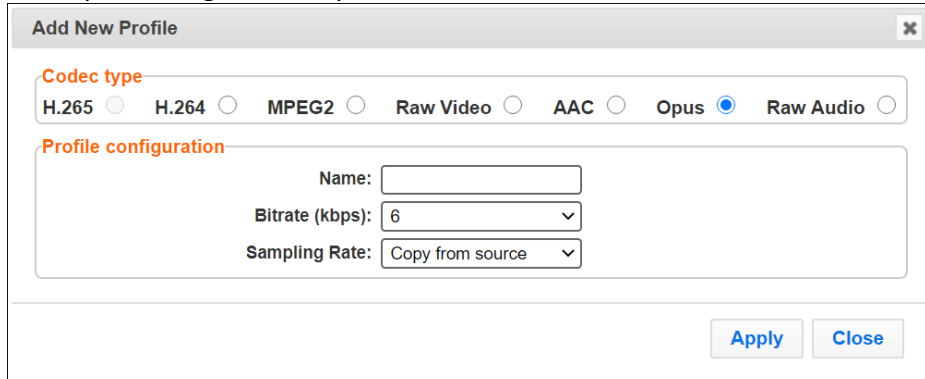
➡ **To create an audio profile for "Single Version" transcoding:**

1. On the **Transcoder** screen of the Broadcaster UI, click **New Profile**.
   The **Add New Profile** window opens.

Creating Transcoding Profiles for WebRTC

2. Under **Codec type**, select the **Opus** radio button (default).
    The Opus configuration options are shown.

3. In the **Name** field, enter a name that describes this profile (e.g. WebRTCSingleVersionAudio)

Configure additional parameters as required, see **Creating New Profiles**.

Click **Apply**.

The new profile is created and it can be used to configure a "Single Version" WebRTC output.
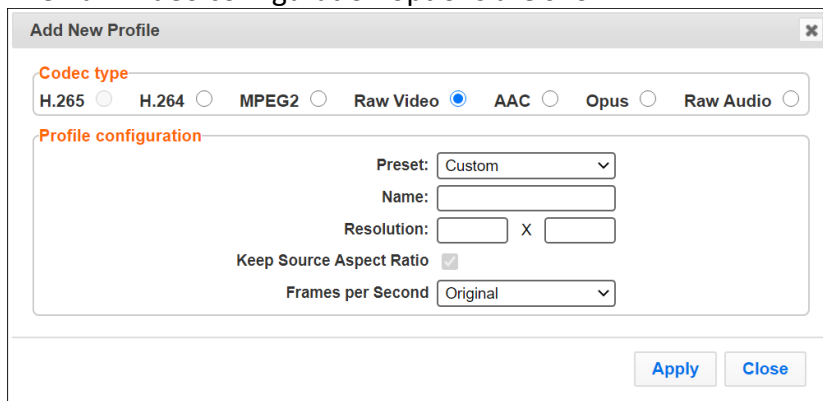
Creating a Video Profile for "Multiple Version" Transcoding

➡ **To create a video profile for "Multiple Version" transcoding:**

1. On the **Transcoder** screen of the Broadcaster UI, click **New Profile**.
    The **Add New Profile** window opens.

Under **Codec type**, select **Raw Video** (default).

The Raw Video configuration options are shown.

In the **Name** field, enter a name that describes this profile (e.g. WebRTCMutipleVersionVideo)

Configure additional parameters as required, see **Creating New Profiles**.

Click **Apply**.

The new profile is created and it can be used to configure a "Multiple Version" WebRTC output.

Creating a WebRTC Output
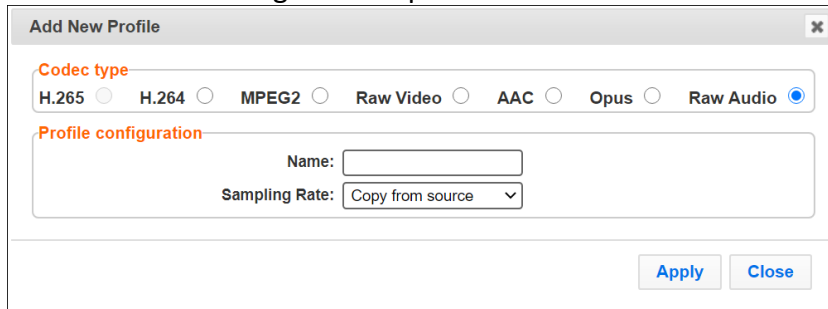
Creating an Audio Profile for "Multiple Version" Transcoding

➡ **To create an audio profile for "Multiple Version" transcoding:**

1. On the **Transcoder** screen of the Broadcaster UI, click **New Profile**.
   The Add New Profile window opens.

Under **Codec type**, select **Raw Audio** (default).
The Raw Audio configuration options are shown.

In the **Name** field, enter a name that describes this profile (e.g. WebRTCMutipleVersionAudio)
Configure additional parameters as required, see **Creating New Profiles**.
Click **Apply**.
The new profile is created and it can be used to configure a "Multiple Version" WebRTC output.

Creating a WebRTC Output

Zixi Broadcaster can transcode a TS stream Input into a WebRTC output using the relevant profiles, depending on the input video and audio, as described in the **Video and Audio Codec Support Options** section. Before creating the WebRTC output, make sure you have configured the relevant transcoding profiles **Creating Transcoding Profiles for WebRTC**.
When the input stream is transcoded, it becomes available to be pulled by the WebRTC player.

➡ **To Create a WebRTC Output:**

1. Create an input stream by following the instructions in the **Adding Input Streams** section of the Broadcaster UG.

Click [⚙▾] button on the right end of the input stream row, and then click **Transcode**.
The **Transcode <input stream name>** window with the settings of the selected input stream is displayed.
Enter the unique **Stream ID.**, which will correspond to the new transcoded input that will be added.

Creating a WebRTC Output

In the **Output Type** field, select **WebRTC**.

Under **Stream Parameters**, in the **Video profile** field, select the desired video profile for the desired method.

- Pass-Through – select **Keep original stream**
- Single Version Transcoding – select a profile that converts to H.264 with Main or Baseline profile and no B Frames
- Multiple Version Transcoding – select a profile that converts to RAW video

In the **Audio profile** field, select the desired audio profile for the desired method.

- Pass-Through – select **Keep original stream**
- Single Version Transcoding – select a profile that converts to Opus
- Multiple Version Transcoding – select a profile that converts to RAW audio

> Only supported profiles are shown. If you would like to remove the video or audio stream completely, select **Remove stream**.

Configure additional parameters as required, see **Transcoding an Input Stream**.
Click **OK**. The transcoded input stream is created and appears in an embedded window labeled Transcoded sources under the original input stream from which it was created.

Playing and input stream with WebRTC player

WebRTC uses a regular browser to play the stream without the need to download and install an external plug in.

➡ **To Play Input Streams with WebRTC:**

1. In the Zixi Broadcaster **Inputs** page, click the desired WebRTC input stream that you want to play.

Click the [⚙▾] button on the right end of the selected row and then **Play WebRTC.**
The **Link Description** window will open with the directory path for the desired file and a link to open a browser window to play the stream.

Copy the link or click the **Open WebRTC player** link to view the stream.

Configuring MultiPath TCP

Developed by the Internet Engineering Task Force's (IETF) Multipath TCP working group, MultiPath TCP (MPTCP) is an effort towards enabling the simultaneous use of several IP-addresses/interfaces by a modification of TCP that presents a regular TCP interface to applications, while in fact spreading data across several subflows. This means that the Linux Kernel should be updated to support MPTCP.

The MPTCP functionality is similar to Zixi's "multi-link bonding" feature, which is available for UDP only, while MPTCP works on TCP.
If both the sending end and the receiving end support MultiPath TCP, Zixi can use this functionality to transmit a stream over TCP using multiple network interfaces (e.g. Wifi + mobile). The multiple links can be configured to:

- **Aggregate** - aggregates the bandwidth of the multiple links in order to use the total capacity of these links. In this case Zixi will use all available bandwidth among all available flows (if needed) to send the stream.
- **Duplicate** - enhance the path's resiliency by duplicating the stream and sending through all links in order to overcome errors and packet loss.

MultiPath Modes

MultiPath TCP can be used in two modes:

- **Pull** – when pulling the stream, the receiving-end has multiple network interfaces (e.g. two NIC) while the sending side has one network interface. When the stream is pulled by the receiving-end using the MultiPath feature, the client (receiving side / puller) creates the sub-flows, (one per nic) and connects to the "source" (the server). The definition of the NICs in the destination is done automatically at the OS socket level. To configure this mode:
    - **In the sending side** - In **Settings > Live Protocols** screen, enable the **Allow automatic Pull output option**. In this option the output will be created automatically when the Pull connection is established. Following the connection, the two links will be displayed as bonded links. When the connection is established, the two links will be displayed as bonded links as shown below.

MultiPath Modes

o **In the receiving side** – Configure a **TS over HTTP Input as Pull**. When the connection is established, only one link is displayed as shown below.

- **Push** – when pushing the stream, the receiving-end has one or more network interfaces (e.g. two NICs) while the sending side can have one network interface. In this case, you should configure it in the following way:
  - o **In the sending side** – you will need to configure a **TCP output** from the Zixi Broadcaster in the sending side. In this case you can configure the two links as **Aggregate** or **Duplicate**, as described above. When the connection is established, the two links will be displayed as bonded links as shown below.

  - o **In the receiving side** - In the receiving-end, if this is also a Zixi Broadcaster, you have two options:
    - Configure a **TS over HTTP Input as Push**. In this option the Push input is ready in advance and will show the bitrates of both TCP connections when the connection has been established.
    - In **Settings > Live Protocols** screen, enable the **Allow automatic Push input option**. In this option the input will be created automatically when the Push connection is established.
      When the connection is established, the two links will be displayed as bonded links as shown below.

MultiPath TCP Setup

Zixi supports MultiPath TCP for Linux based on the OS Kernel support. This means that the Linux Kernel should be updated to support MPTCP.

➡ **To setup MultiPath TCP:**

- Follow the relevant instructions in - https://multipath-tcp.org/pmwiki.php/Users/HowToInstallMPTCP?