

STREAMING UNIVERSITY

THE TELOS ALLIANCE®

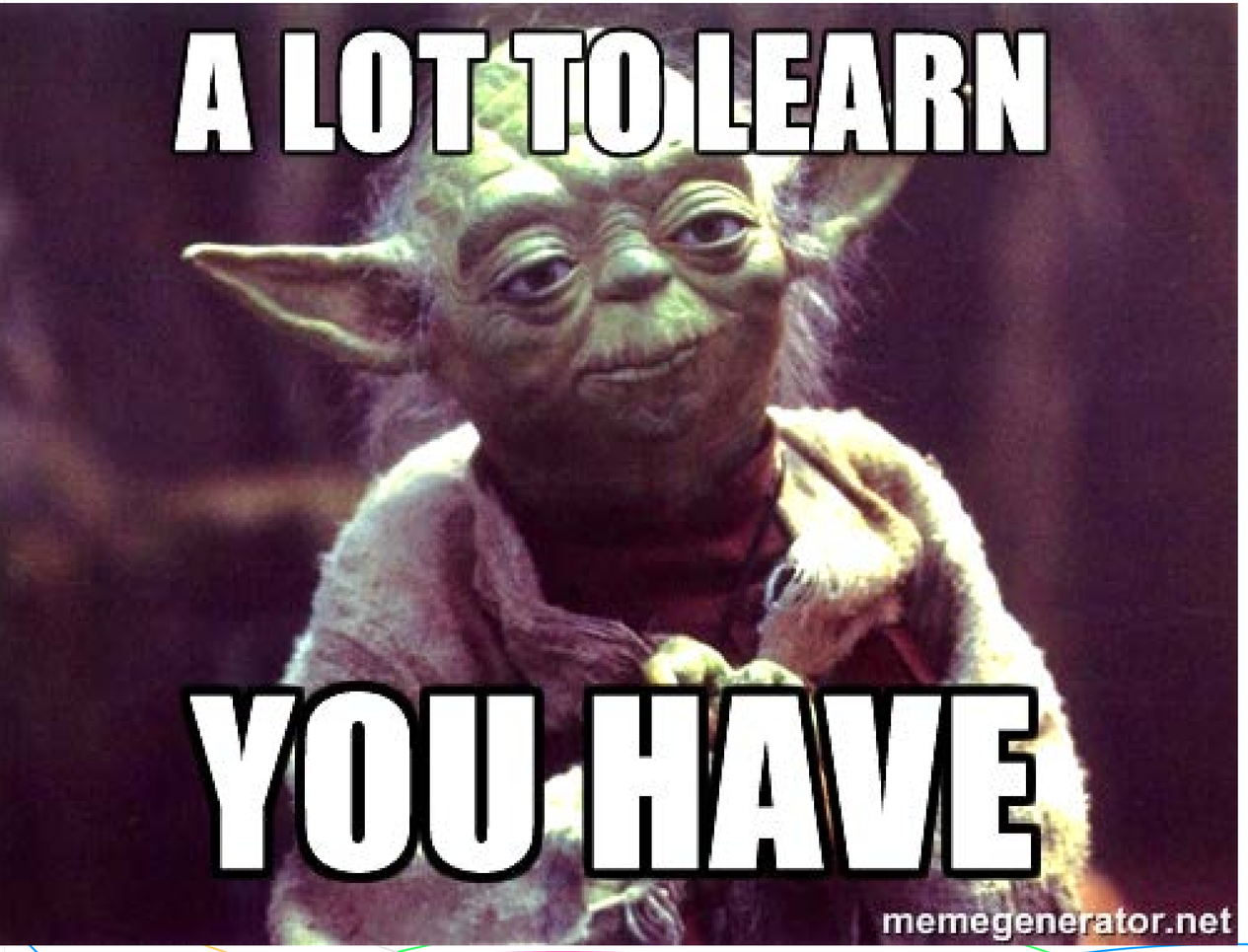
Streaming University

Adaptive Multi-Rate Streaming

- Kirk Harnack - The Telos Alliance

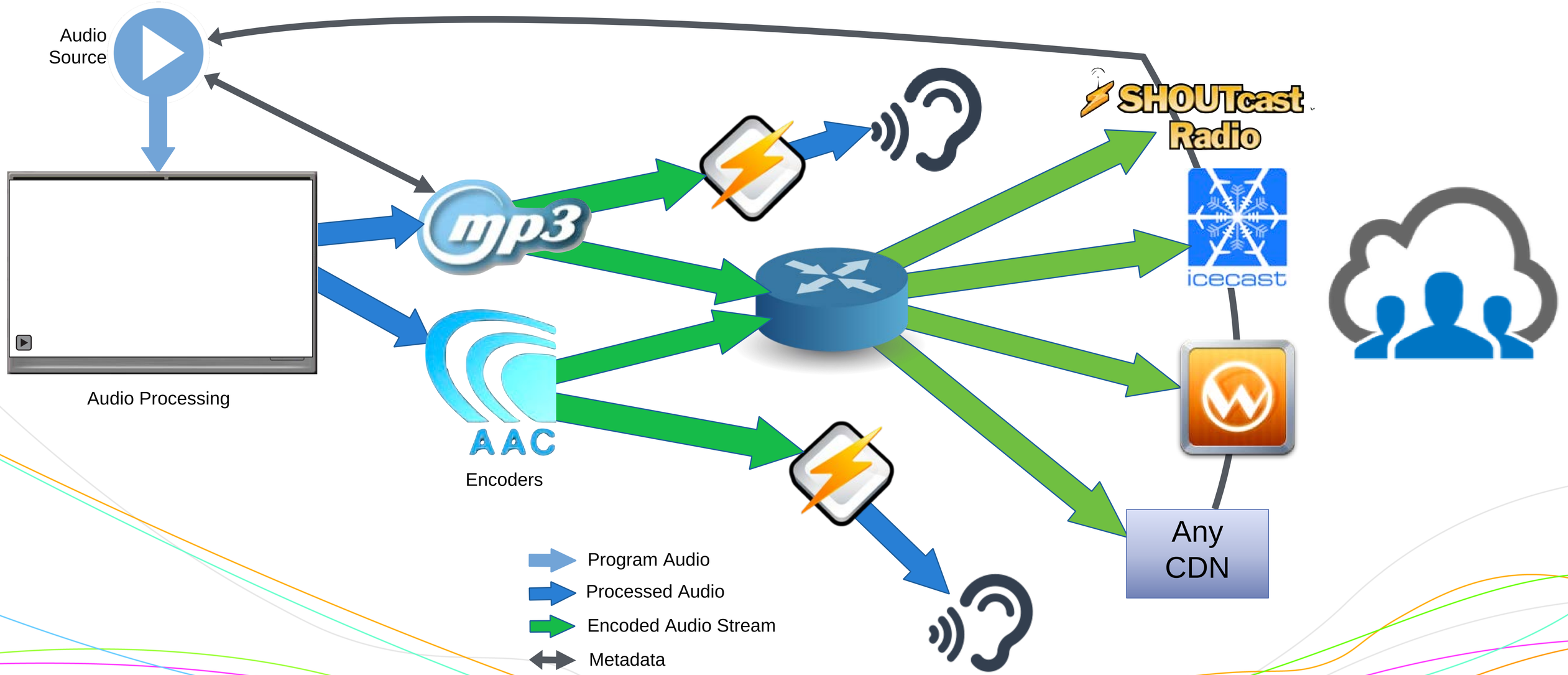


Tech Topics

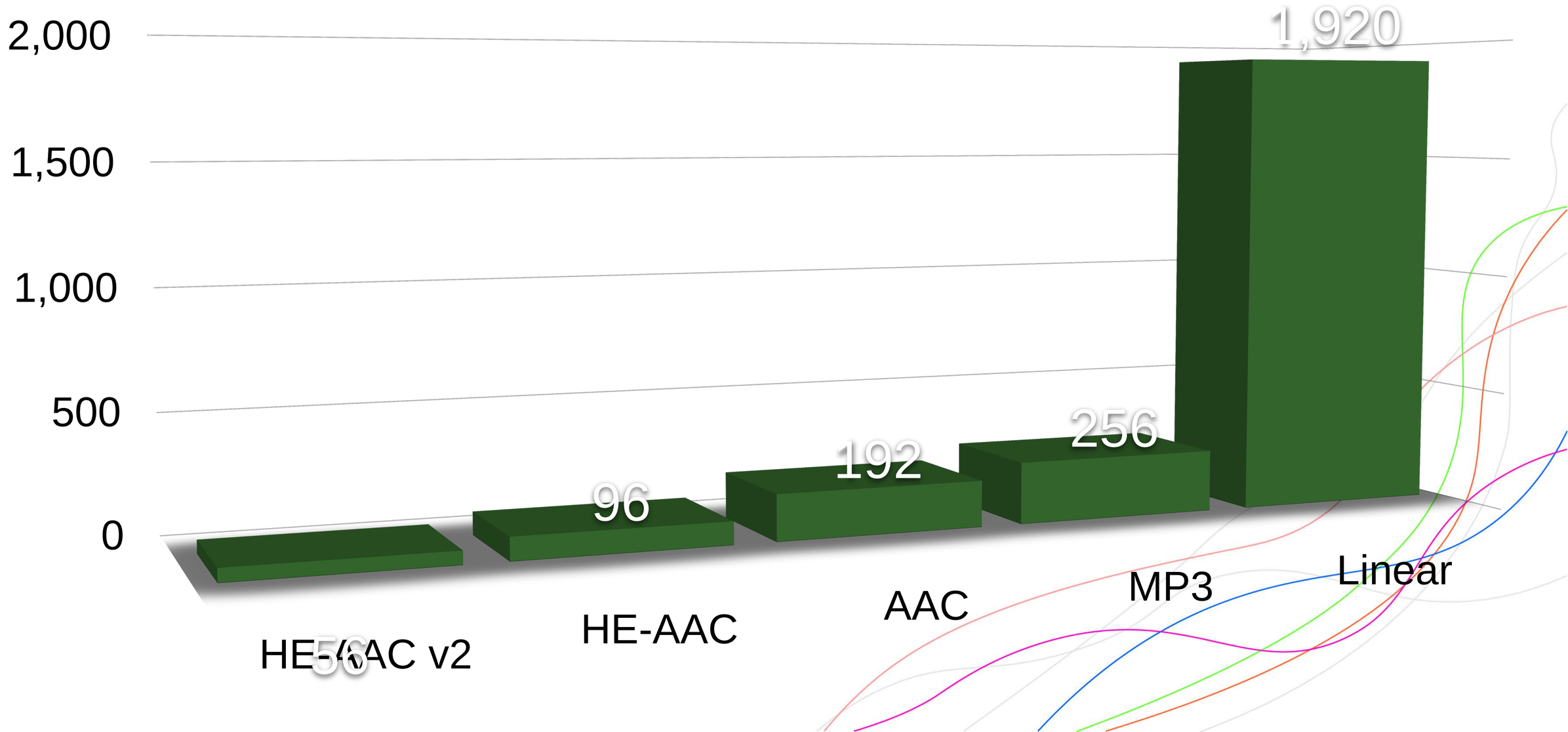


- Audio Processing for Coding
- Audio Bit Rate Reduction
- Codecs, Bit Rates, & Quality
- Hardware vs. Software
- Metadata
- Content Distribution Networks
- Advanced Options

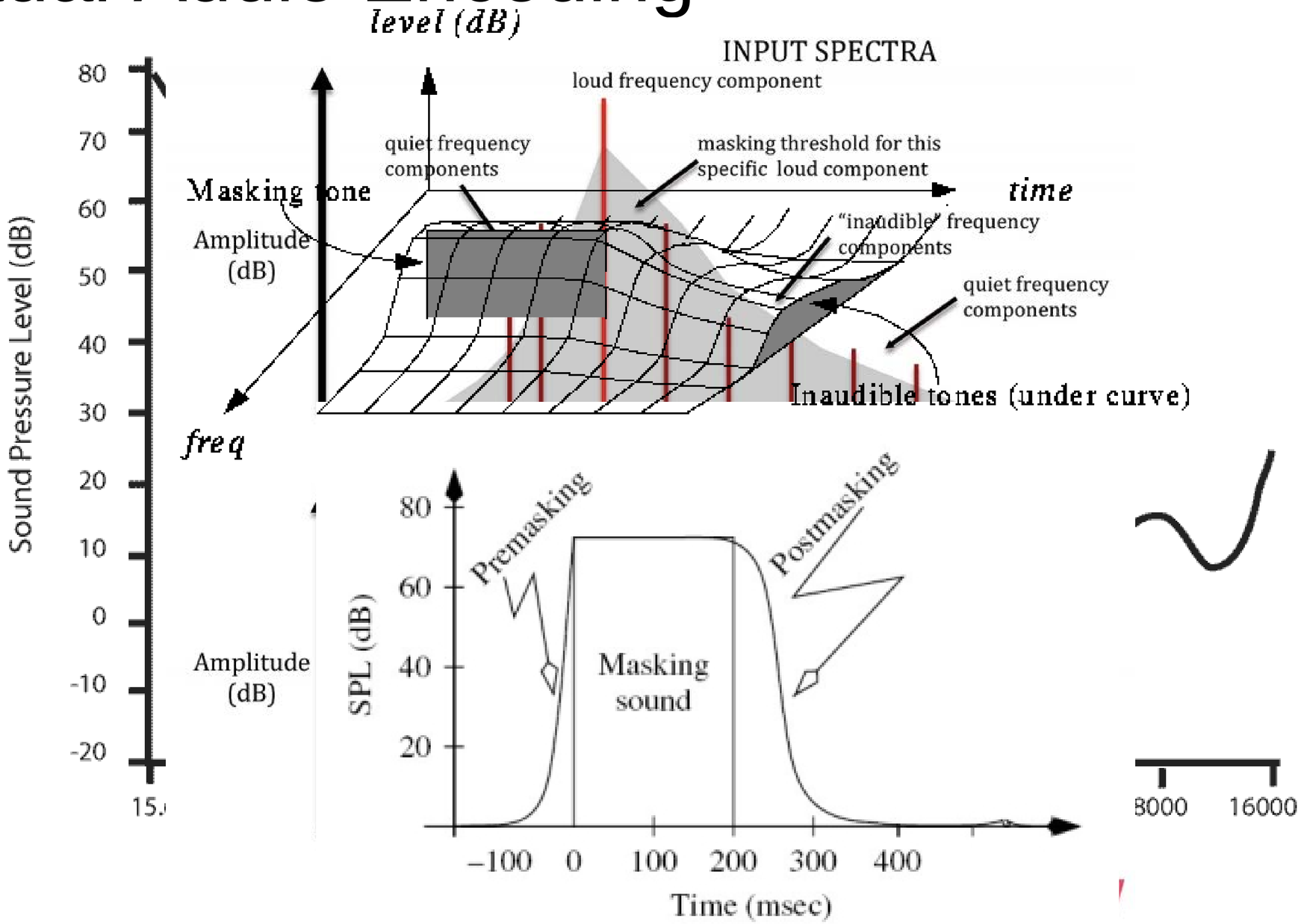
Streaming Process Overview



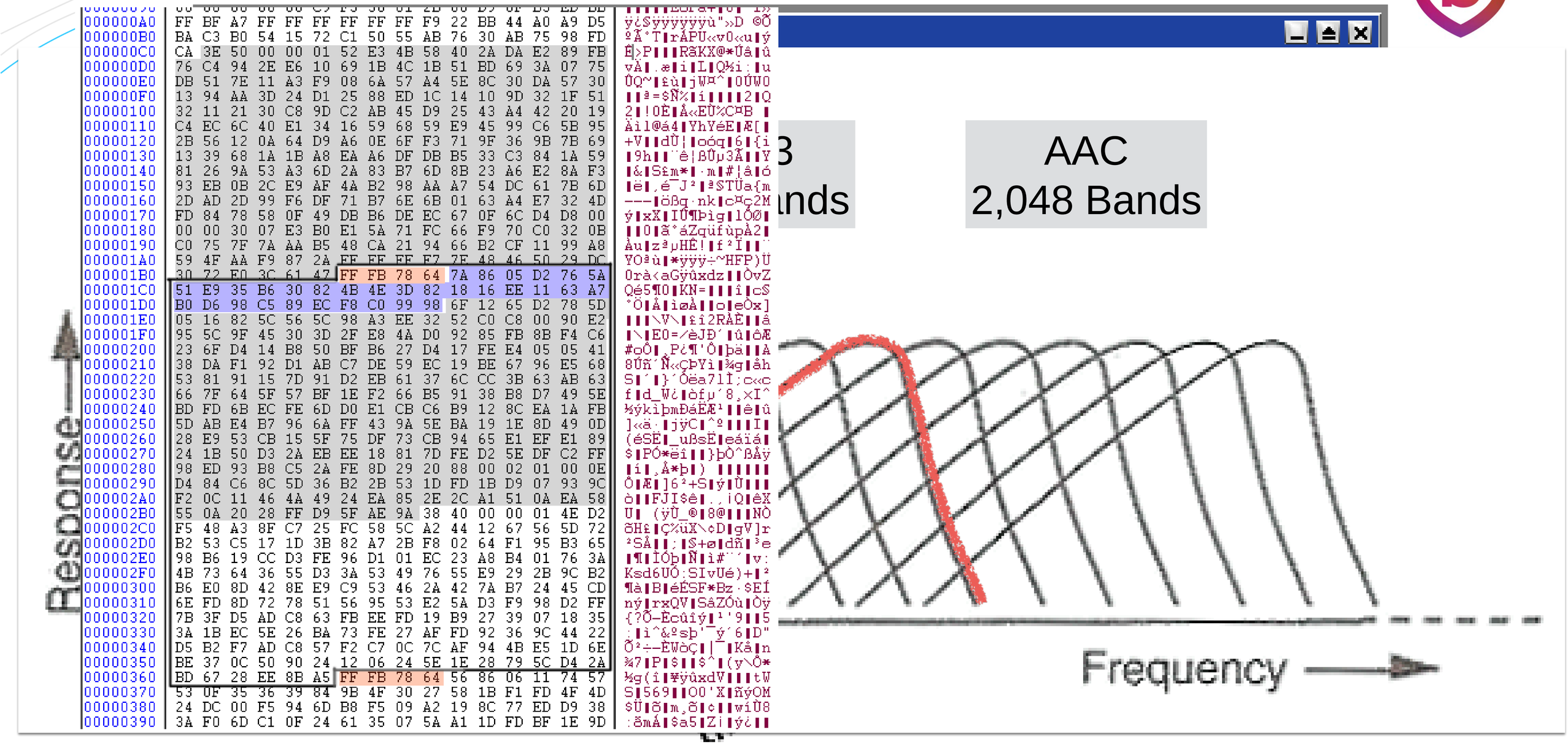
Data Savings from Bit Rate Reduction



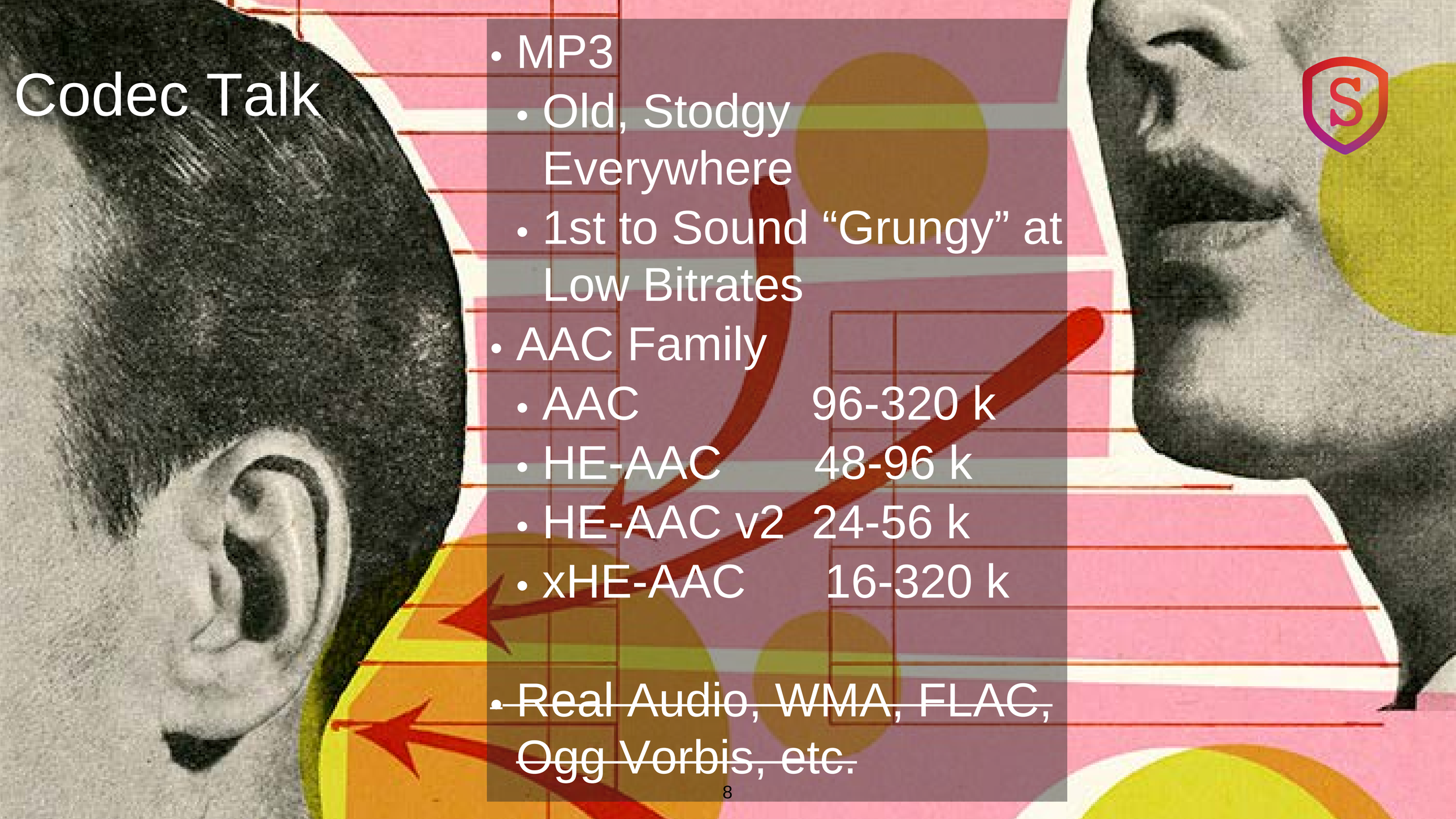
Perceptual Audio Encoding



Perceptual Audio Encoding



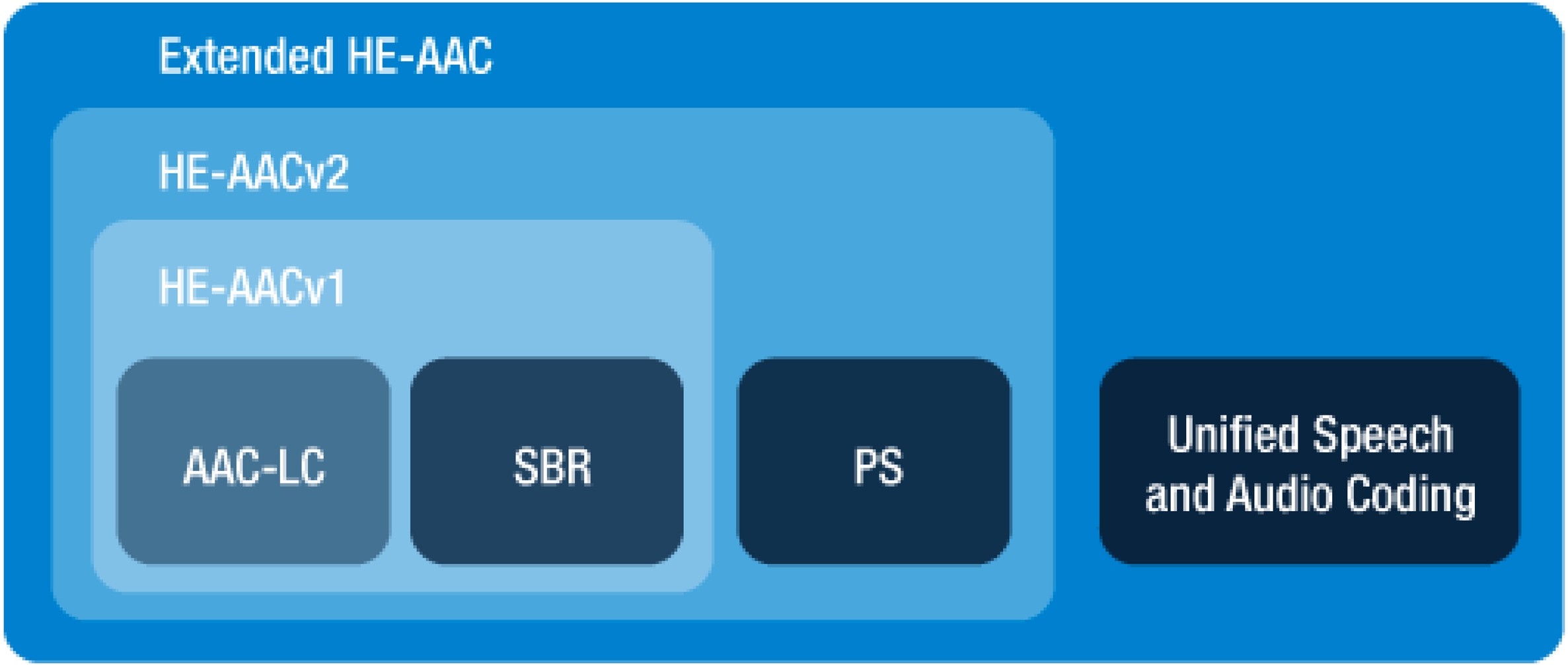
Codec Talk



- MP3
  - Old, Stodgy Everywhere
  - 1st to Sound “Grungy” at Low Bitrates
- AAC Family
  - AAC 96-320 k
  - HE-AAC 48-96 k
  - HE-AAC v2 24-56 k
  - xHE-AAC 16-320 k

- ~~Real Audio, WMA, FLAC, Ogg Vorbis, etc.~~

Codec Lesson

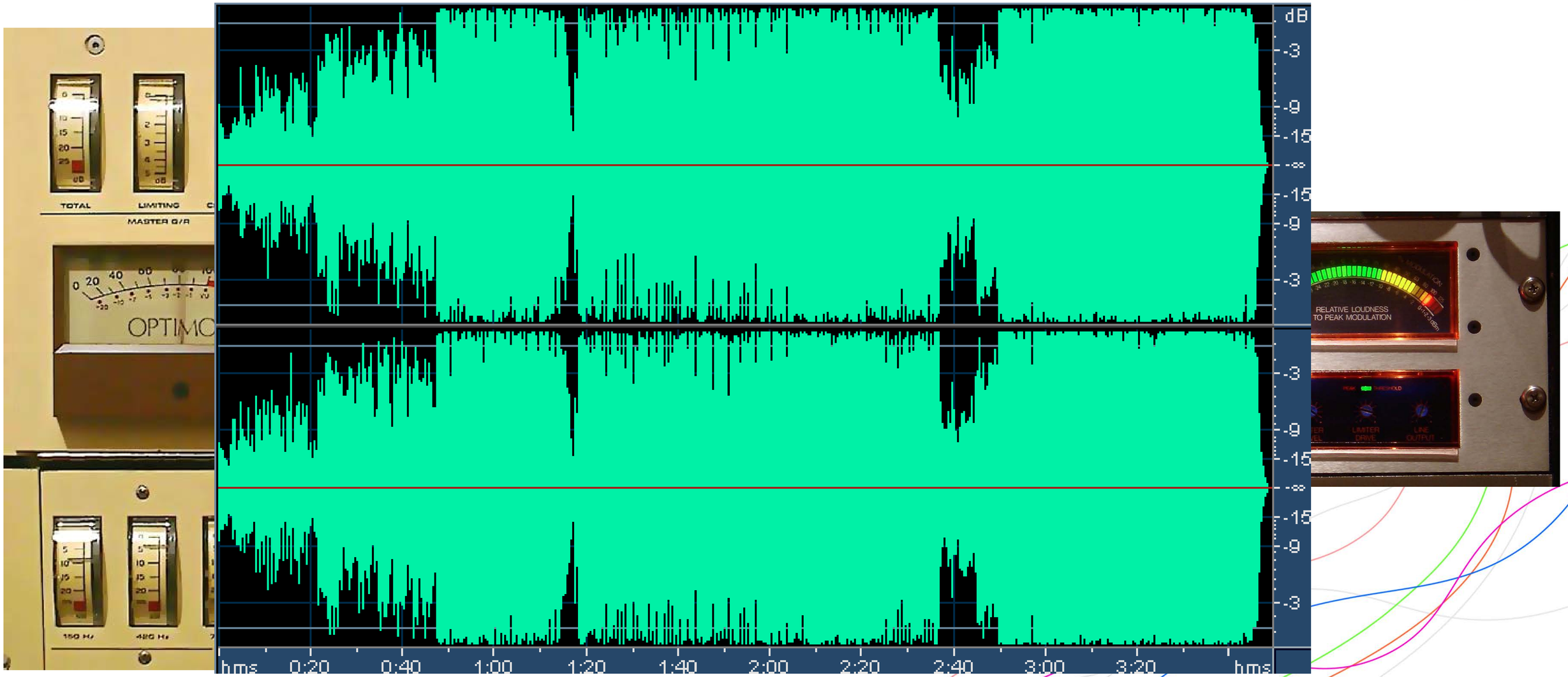


Path to Audio Quality



- Contemporary Codec - AAC family
- Limit transcoding
- Contribution audio - high bit rate or linear
- Delivery audio - lowest bitrate
- Offer coding choices or detect automatically

Audio Processing for Encoding

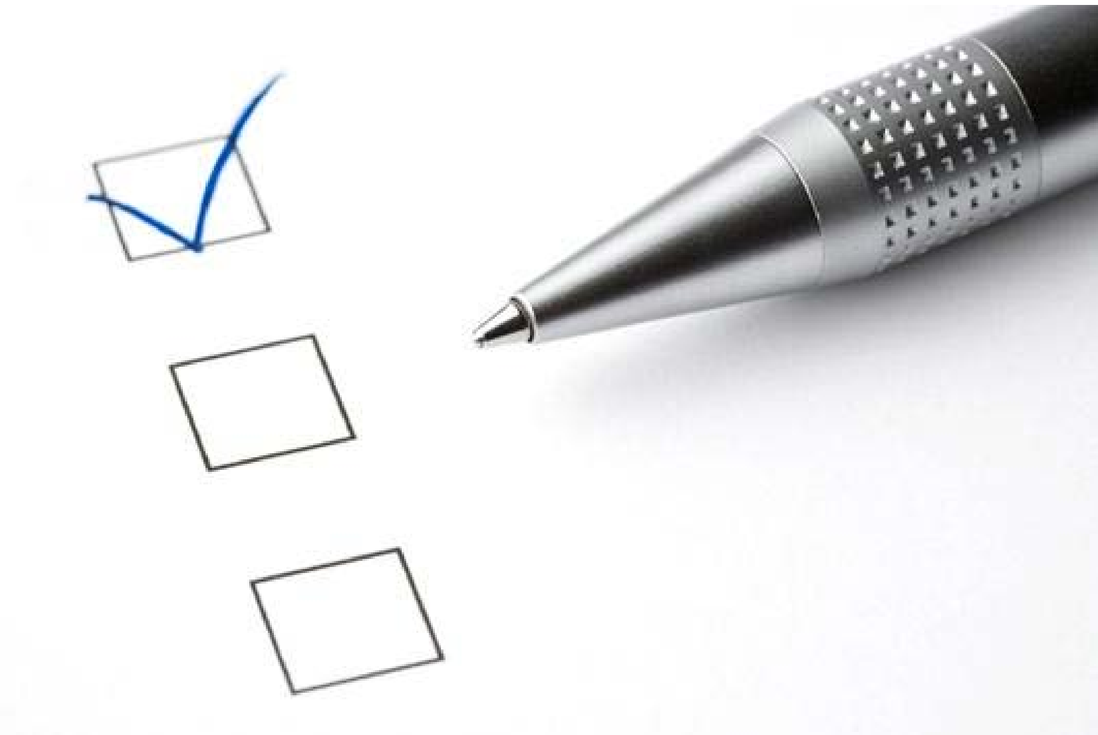


Audio Processing for Encoding



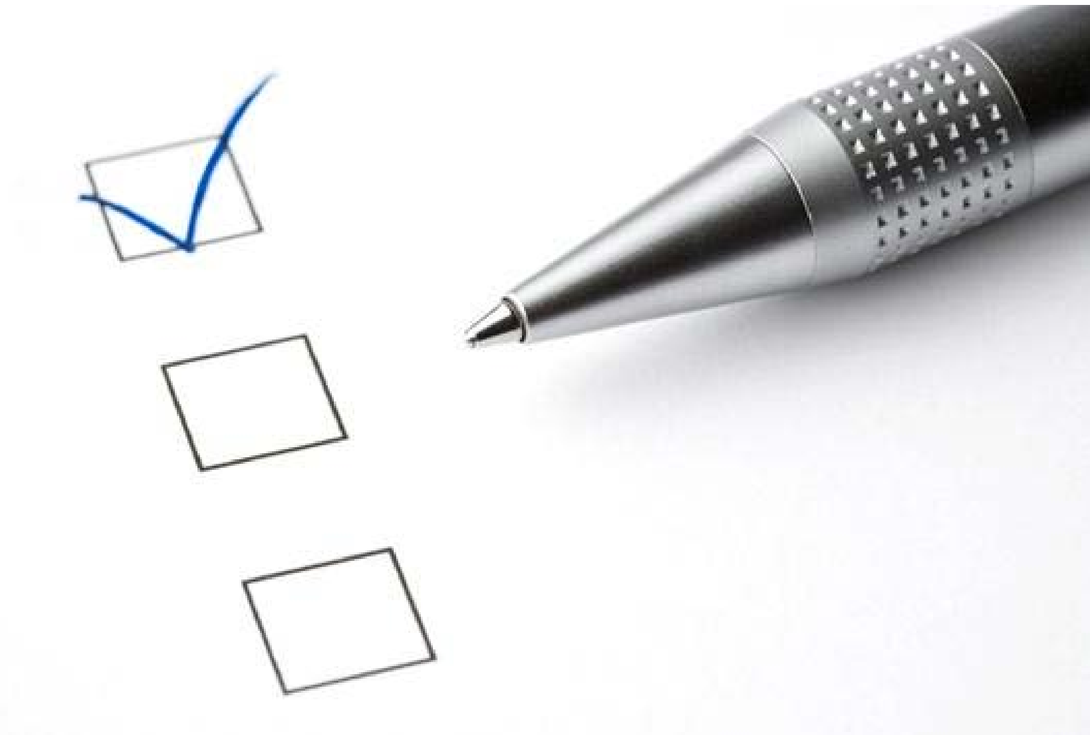
Audio Processing for Encoding

- Avoid DENSE processing.
- Slow down ATTACK and RELEASE times.
- Check for full HEADROOM at input to encoder.



Audio Processing for Encoding

- At low coding bitrates:
  - Reduce audio bandwidth
  - Don’t boost high end energy
- Do NOT use a CLIPPER.
- Precise peak CONTROL using LOOK-AHEAD LIMITING



Audio Processing for Encoding





NOT OK for psychoacoustic encoders.

Processing for Coded Audio





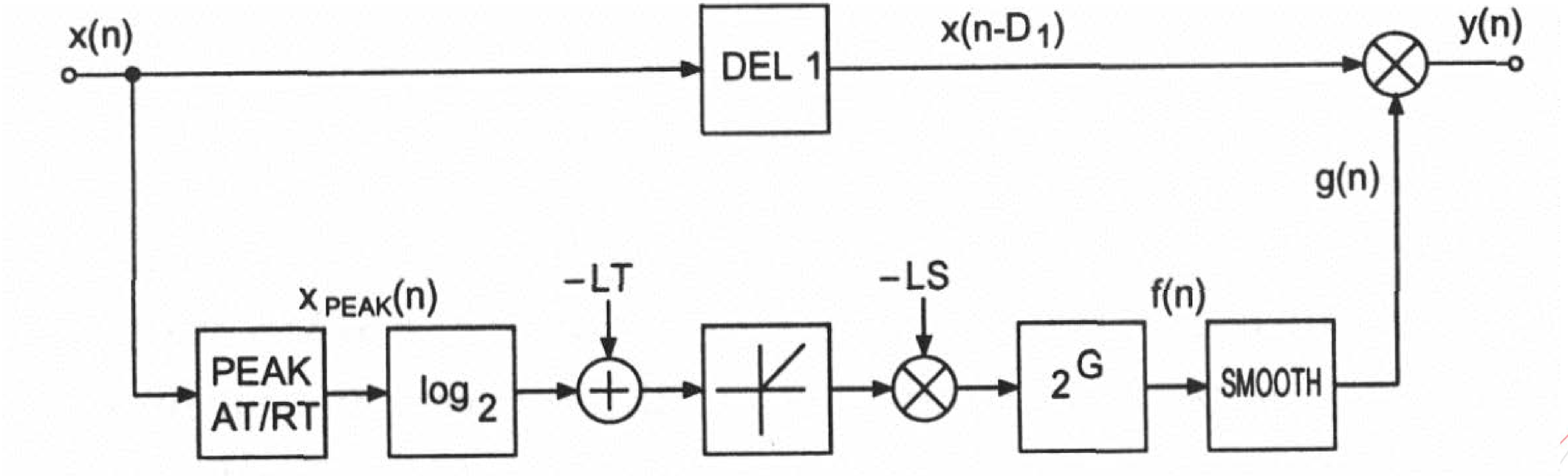
Processing for Coded Audio



Stream Encoders - Software

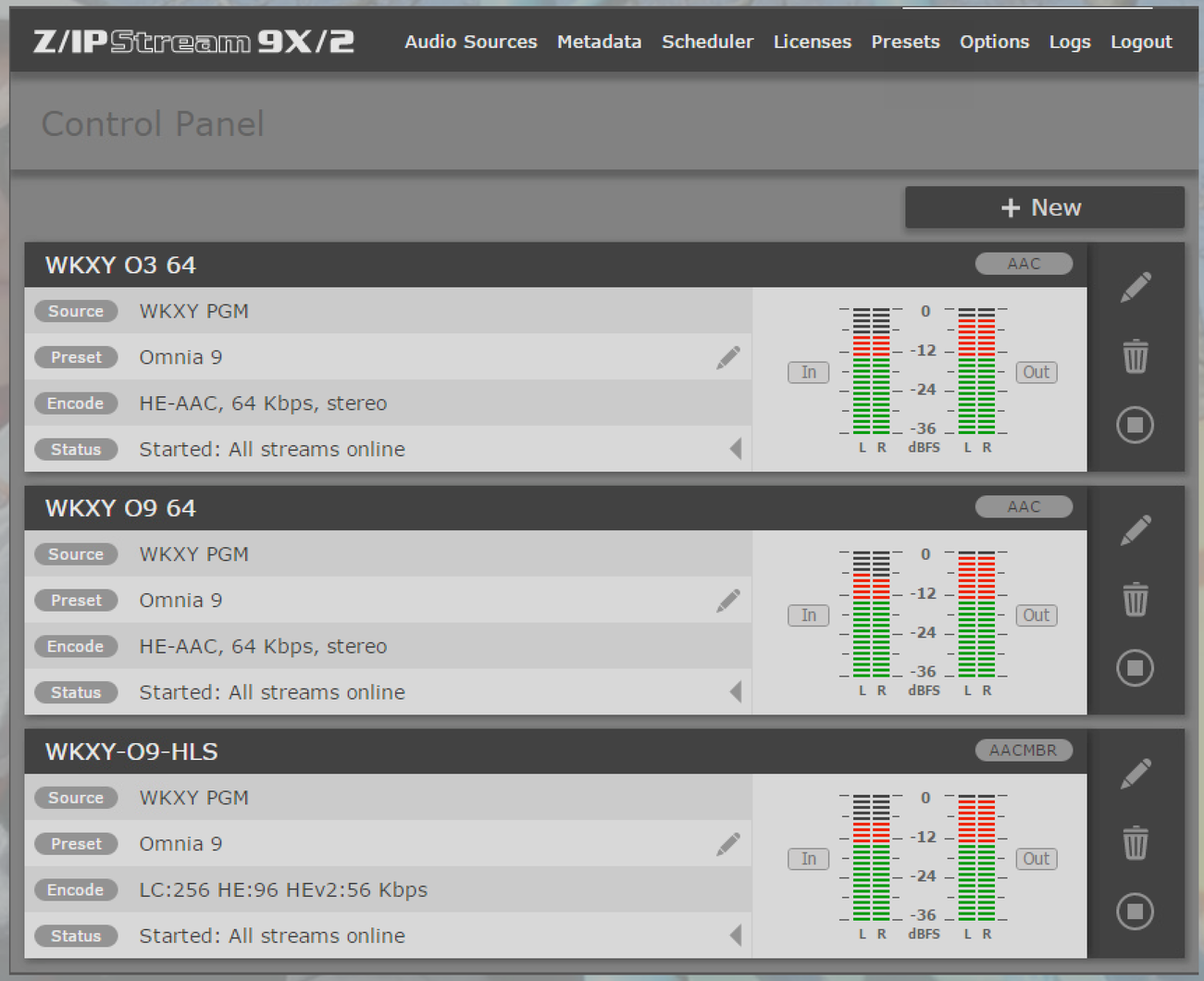


Audio Processing for Encoding

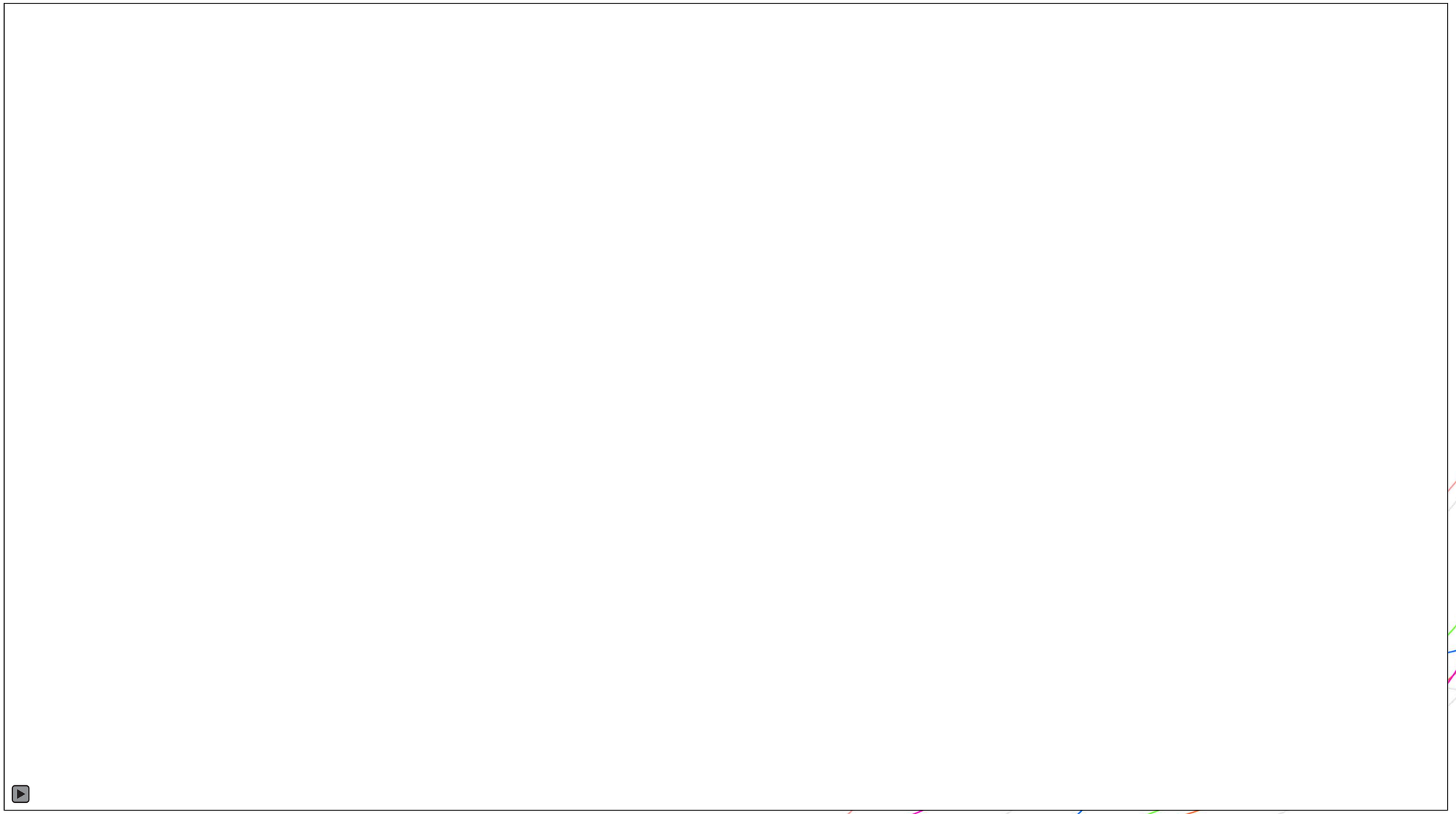


Look-Ahead Processor Block Diagram

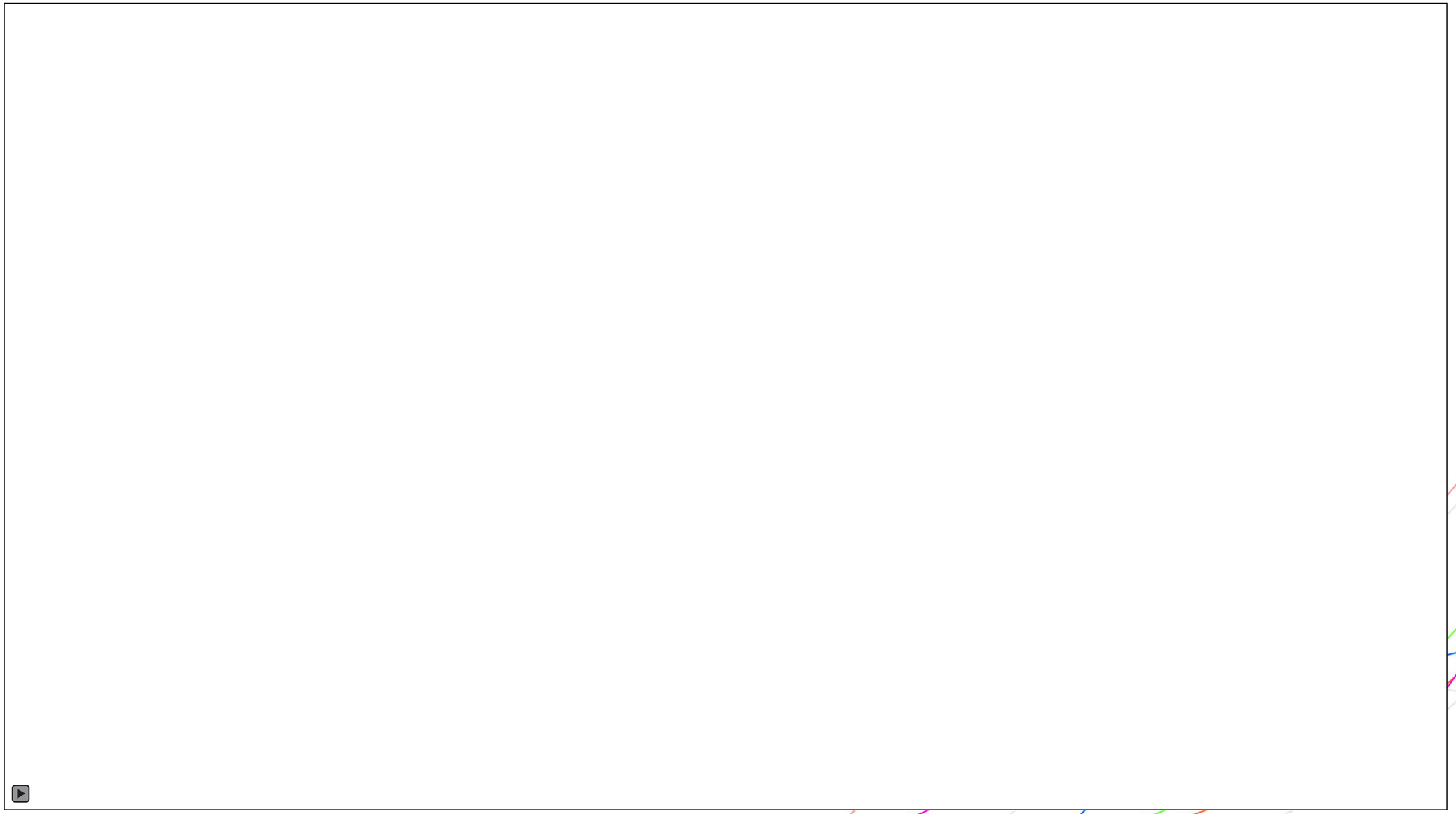

Z/IPStream A/XE
Control Panel
Audio Sources | Metadata | Presets | Scheduler | Licenses | Options | Logs | Help
Create new instance:
Mark1
Livewire
Smooth
Axia Wave01
Test AAC
Livewire
Smooth
--> AAC, 128 kbps, stereo
Test MP3
Livewire
Smooth
--> 96 kbps, 44100 Hz, stereo
Omnia A/XE Version 1.31 - (C) 2009 TLS Corporation. All rights reserved.


Z/IPStream 9X/2
Audio Sources
Metadata
Scheduler
Licenses
Presets
Options
Logs
Logout
Control Panel
+ New
WKXY O3 64
AAC
Source
WKXY PGM
Preset
Omnia 9
Encode
HE-AAC, 64 Kbps, stereo
Status
Started: All streams online
WKXY O9 64
AAC
Source
WKXY PGM
Preset
Omnia 9
Encode
HE-AAC, 64 Kbps, stereo
Status
Started: All streams online
WKXY-O9-HLS
AACMBR
Source
WKXY PGM
Preset
Omnia 9
Encode
LC:256 HE:96 HEv2:56 Kbps
Status
Started: All streams online

Multiple Simultaneous Codecs & Rates



Multiple Simultaneous Destinations



Streaming University



Traditional Streaming

SHOUTcast & ICEcast

- Specific Stream-Server Technology
- Connection-based
  - Each client uses server resources
    - Memory
    - IP stack
    - CPU cycles
  - Standard Streaming Ports are Sometimes Blocked
    - 8000
    - 8888
    - 1935

Traditional Streaming

SHOUTcast & ICEcast

- Bitrates are fixed
  - No auto-selection of bit rate
    - Publisher must make links available for Hi & Low bit rates
    - Listener must select the right stream
      - Excess bandwidth - non-optimal quality
      - Insufficient bandwidth - stuttering audio

Adaptive Multi-Rate Streaming

Apple HLS, Smooth Streaming, MPEG-DASH

- File-based “streaming”
- Ordinary file servers distribute sequential audio files
  - No specialized software
  - Server is optimized to serve files
  - Standard http access using Port 80
    - Never blocked
    - Like serving web page assets



WOWZA STREAMING ENGINE™ 4

Wowza Streaming Engine is robust, customizable, and scalable server software that powers reliable video and audio streaming to any device.



INPUT

Wowza Streaming Engine™ accepts major protocols and codecs. Works With Wowza™ partners have preconfigured settings for easy setup.

TRANSCODE, PREPARE, DELIVER

Wowza Streaming Engine transforms your input stream and delivers it so that it's viewable on any device anywhere. Now includes unlimited use of Transcoder, nDVR, and DRM.

OUTPUT/PLAYBACK

Wowza Streaming Engine supports all playback device formats and common third-party players.

Adaptive Multi-Rate Streaming

HLS - HTTP Live Streaming



Microsoft Smooth Streaming

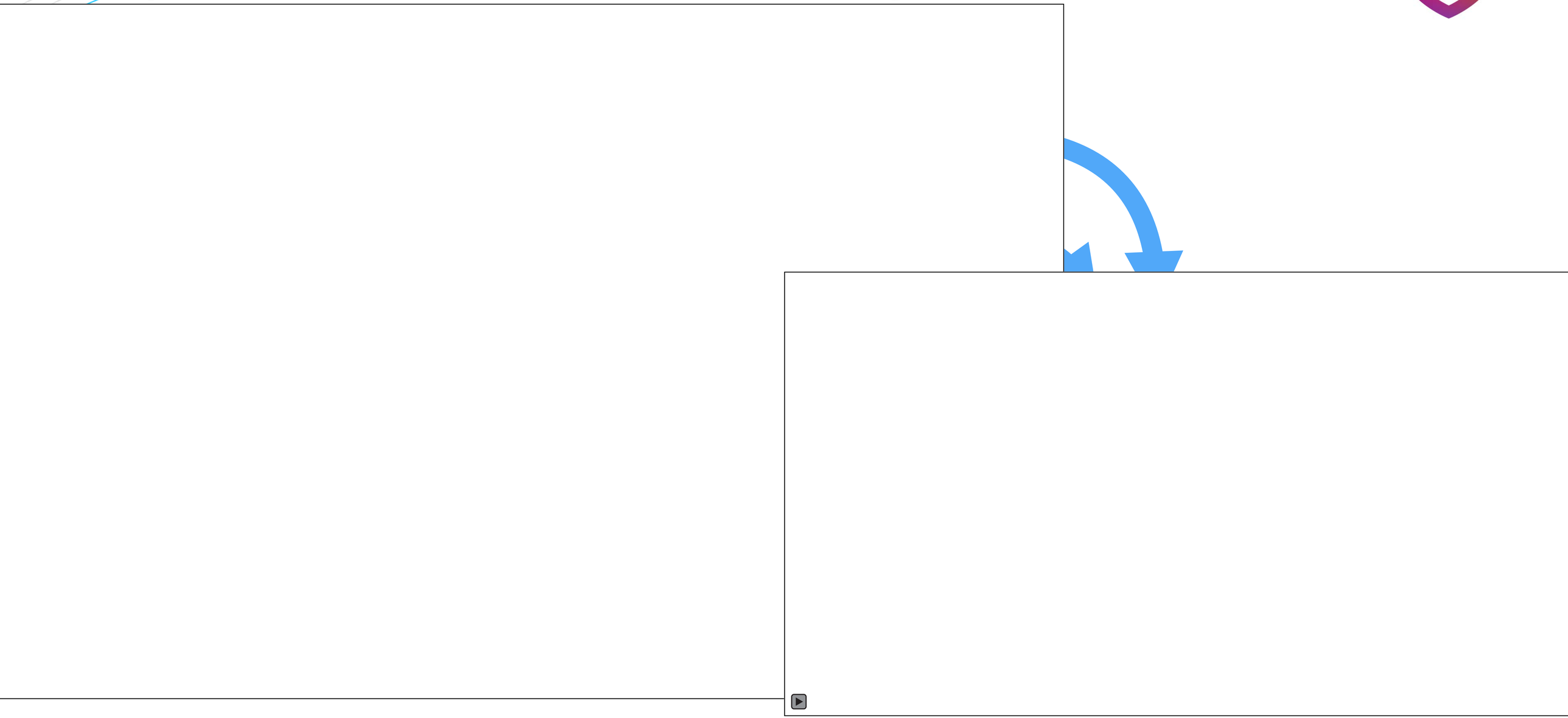


MPEG - DASH
Dynamic Adaptive Streaming
over HTTP

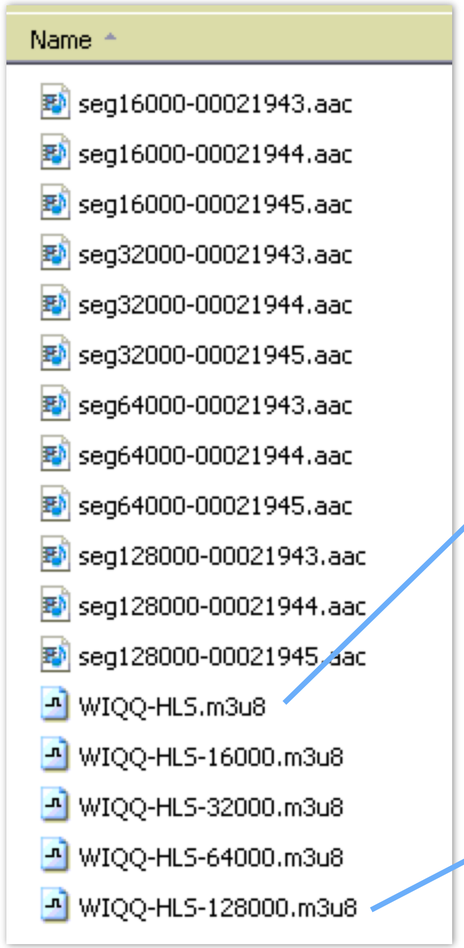


Adaptive Multi-Rate Streaming

Adaptive Multi-Rate Streaming



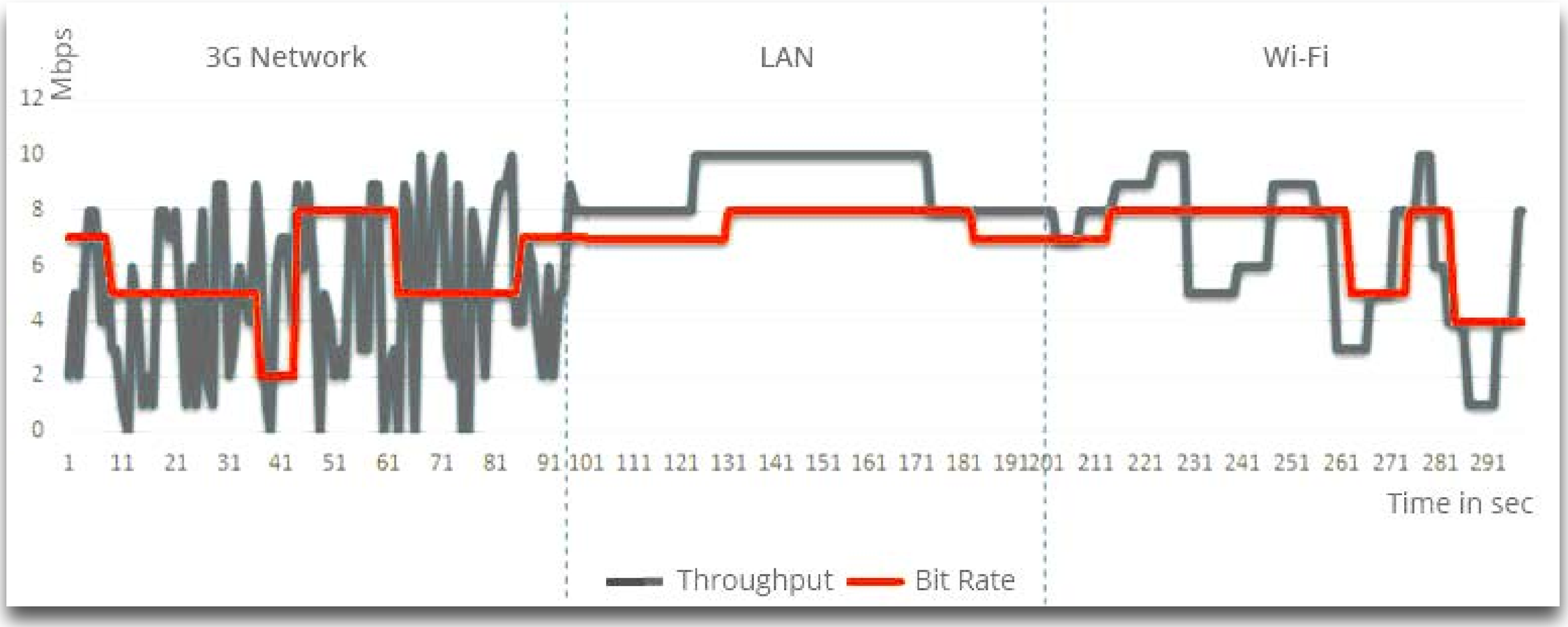
Adaptive Multi-Rate Streaming




```
#EXTM3U
#EXT-X-VERSION:1
#EXT-X-ALLOW-CACHE:NO
## Created with ProSTREAM X/2 v1.08
#EXT-X-STREAM-INF:PROGRAM-
ID=1,BANDWIDTH=134343,CODECS="mp4a.40.5"
WIQQ-HLS-128000.m3u8
#EXT-X-STREAM-INF:PROGRAM-
ID=1,BANDWIDTH=42801,CODECS="mp4a.40.5"
WIQQ-HLS-32000.m3u8
#EXT-X-STREAM-INF:PROGRAM-
ID=1,BANDWIDTH=73315,CODECS="mp4a.40.5"
WIQQ-HLS-64000.m3u8
#EXT-X-STREAM-INF:PROGRAM-
ID=1,BANDWIDTH=27544,CODECS="mp4a.40.5"
WIQQ-HLS-16000.m3u8
```

```
#EXTM3U
#EXT-X-VERSION:1
## Created with ProSTREAM X/2 v1.08
#EXT-X-MEDIA-SEQUENCE:5965
#EXT-X-TARGETDURATION:4
#EXT-X-PROGRAM-DATE-TIME:2015-08-22T02:47:17Z
#EXTINF:5, no desc
seg128000-00005965.aac
#EXTINF:5, no desc
seg128000-00005966.aac
#EXTINF:5, no desc
seg128000-00005967.aac
```

Adaptive Multi-Rate Streaming



Adaptive Multi-Rate Streaming



Adaptive Multi-Rate Streaming

http://drn-greenville.ddns.net:10280/streams/hls/WIQQ-HLS/WIQQ-HLS.m3u8

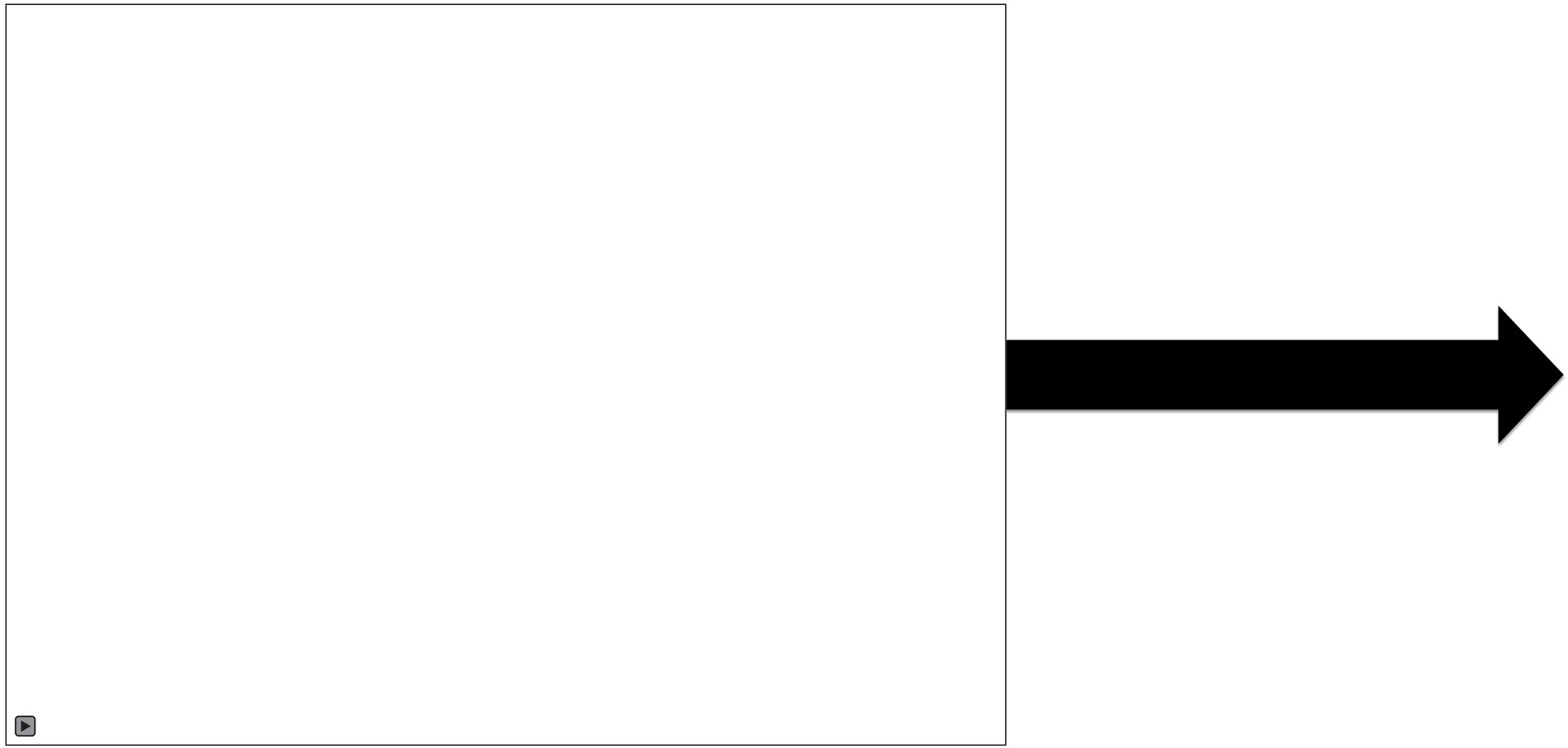
bit.ly/wiqq-hls



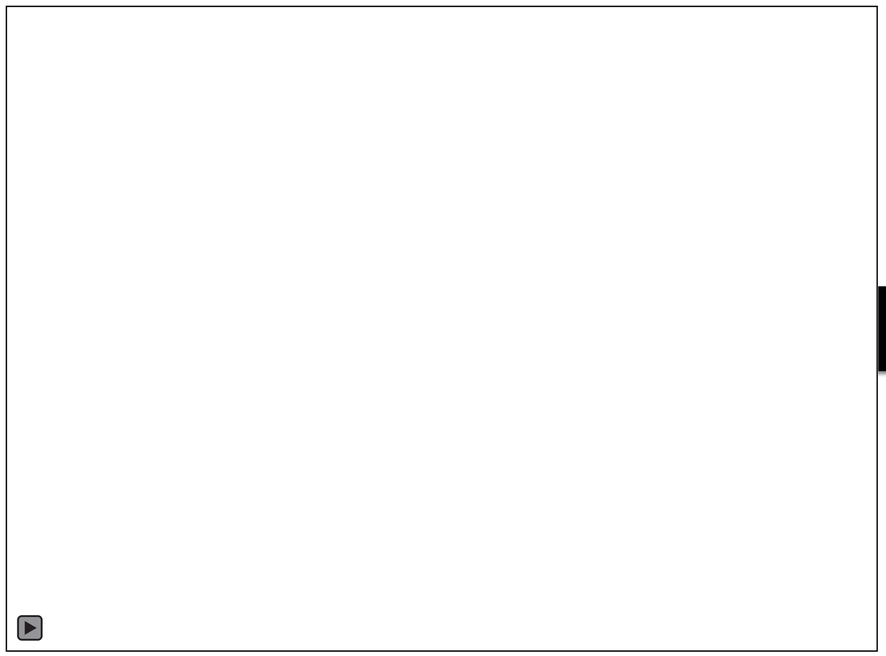
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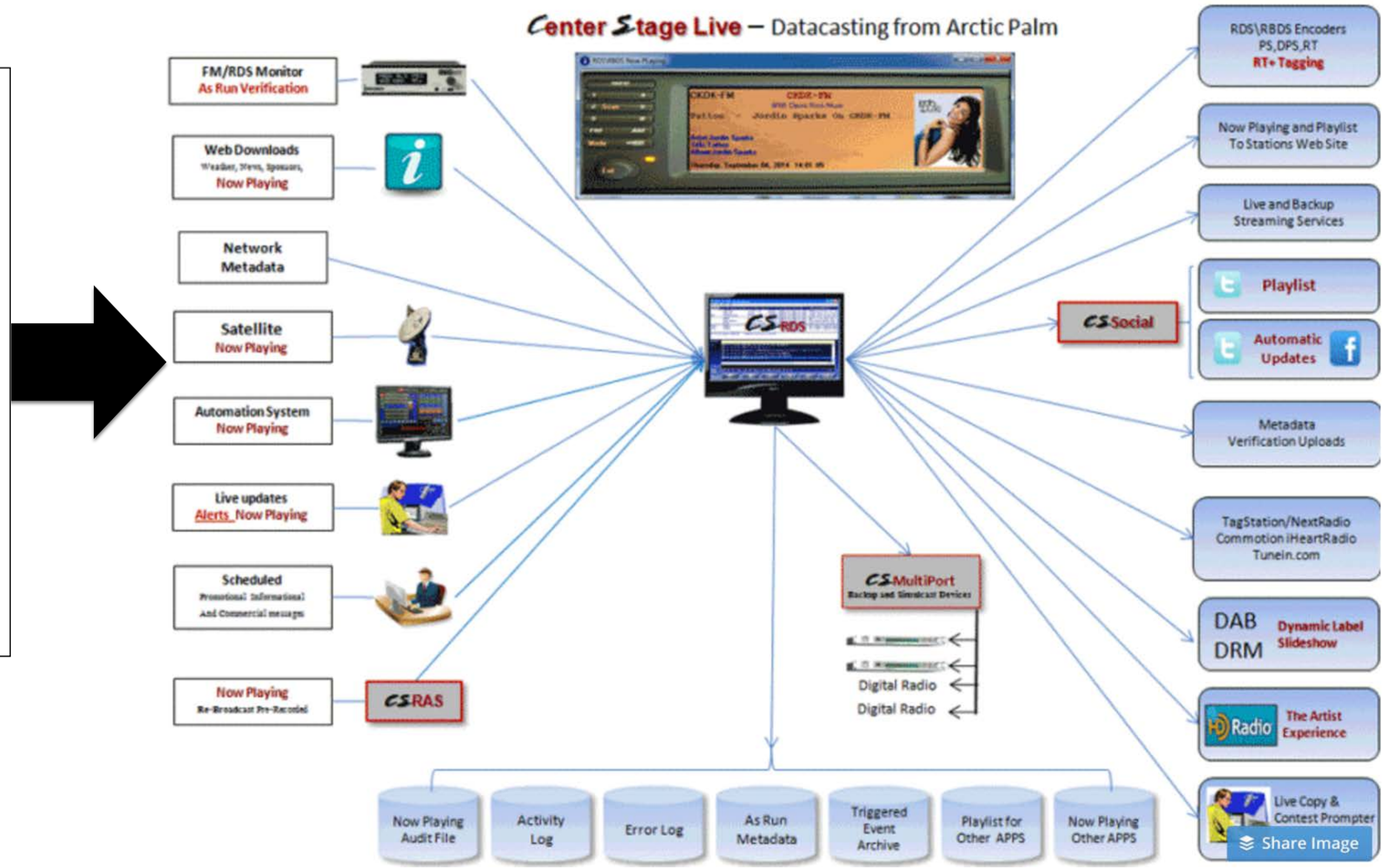


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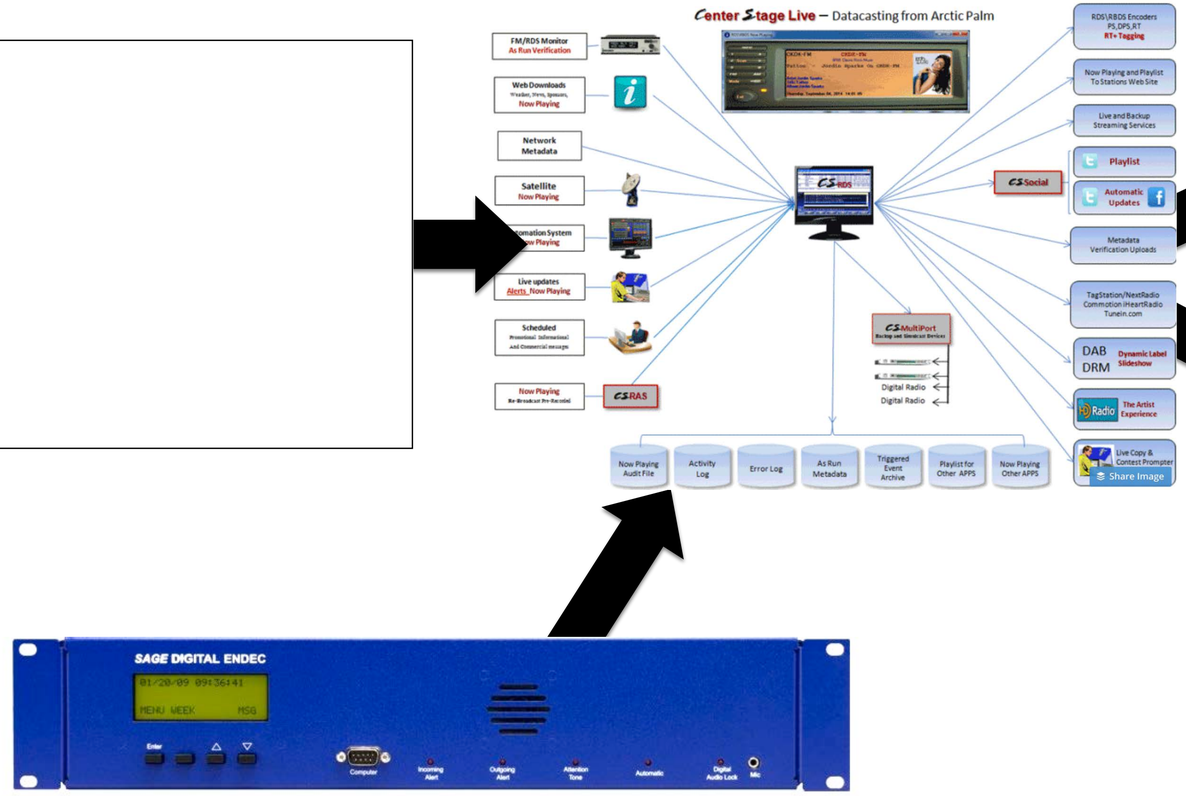


Metadata




Center Stage Live – Datacasting from Arctic Palm
FM/RDS Monitor
As Run Verification
Web Downloads
Weather, News, Sponsors,
Now Playing
Network
Metadata
Satellite
Now Playing
Automation System
Now Playing
Live updates
Alerts, Now Playing
Scheduled
Promotional Informational
And Commercial messages
Now Playing
Re-Broadcast Pre-Recorded
CS RAS
CS RDS
CS MultiPort
Backup and Simulcast Devices
Digital Radio
Digital Radio
CS Social
RDS\RBDS Encoders
PS,DPS,RT
RT+ Tagging
Now Playing and Playlist
To Stations Web Site
Live and Backup
Streaming Services
Playlist
Automatic
Updates
Metadata
Verification Uploads
TagStation/NextRadio
Commotion iHeartRadio
TuneIn.com
DAB
DRM
Dynamic Label
Slideshow
HD Radio
The Artist
Experience
Live Copy &
Contest Prompter
Share Image
Now Playing
Audit File
Activity
Log
Error Log
As Run
Metadata
Triggered
Event
Archive
Playlist for
Other APPS
Now Playing
Other APPS

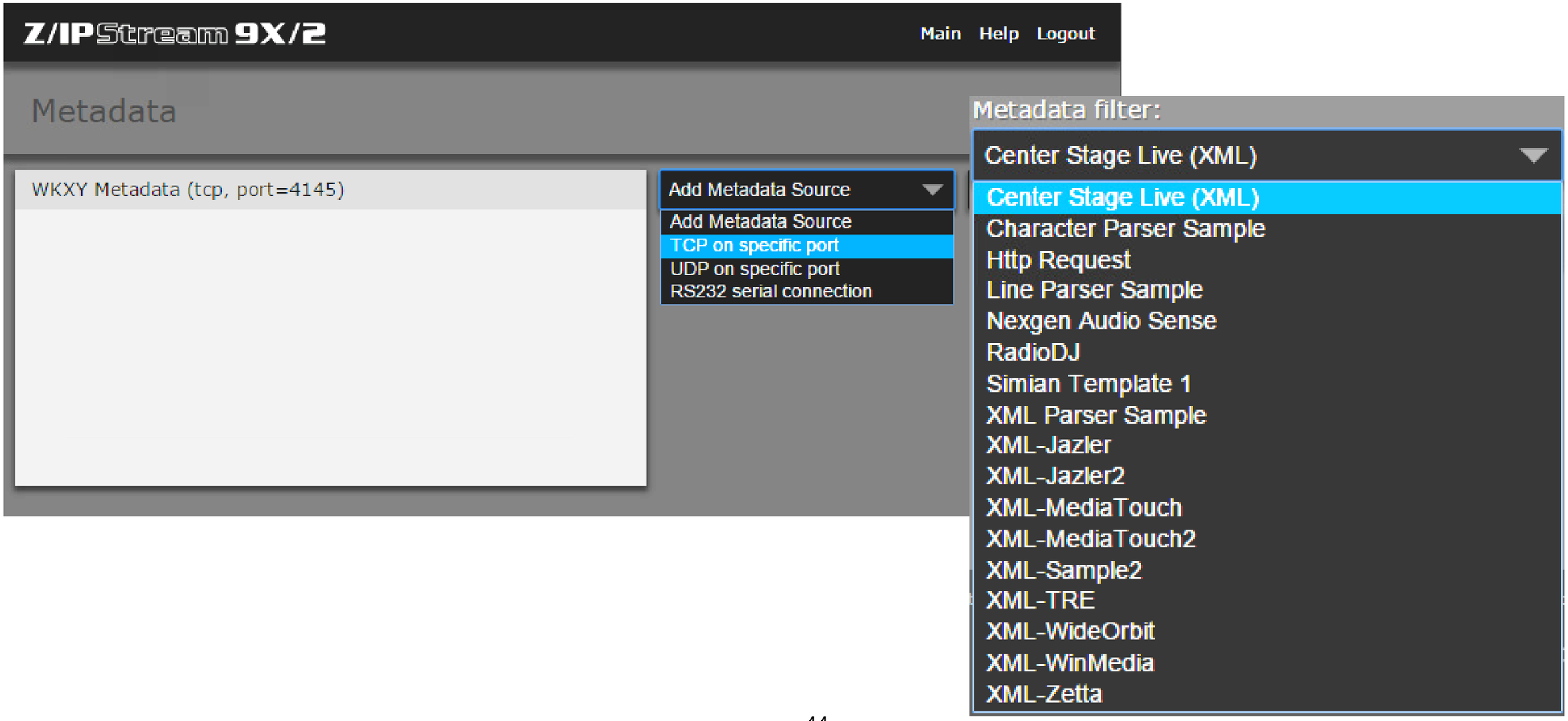
Metadata


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Satellite
Now Playing
Live updates
Alerts, Now Playing
Scheduled
Now Playing
CSRAS
CSRDS
CSMultiPort
Digital Radio
Digital Radio
RDS\RBDS Encoders
PS,DPS,RT
RT+ Tagging
Now Playing and Playlist
To Stations Web Site
Live and Backup
Streaming Services
CSSocial
Playlist
Automatic
Updates
Metadata
Verification Uploads
TagStation/NextRadio
Commotion iHeartRadio
Tunein.com
DAB
DRM
Dynamic Label
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Now Playing
Other APPS
SAGE DIGITAL ENDEC
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MENU WEEK MSG
Enter
Computer
Incoming
Alert
Outgoing
Alert
Attention
Tone
Automatic
Digital
Audio Lock
Mic

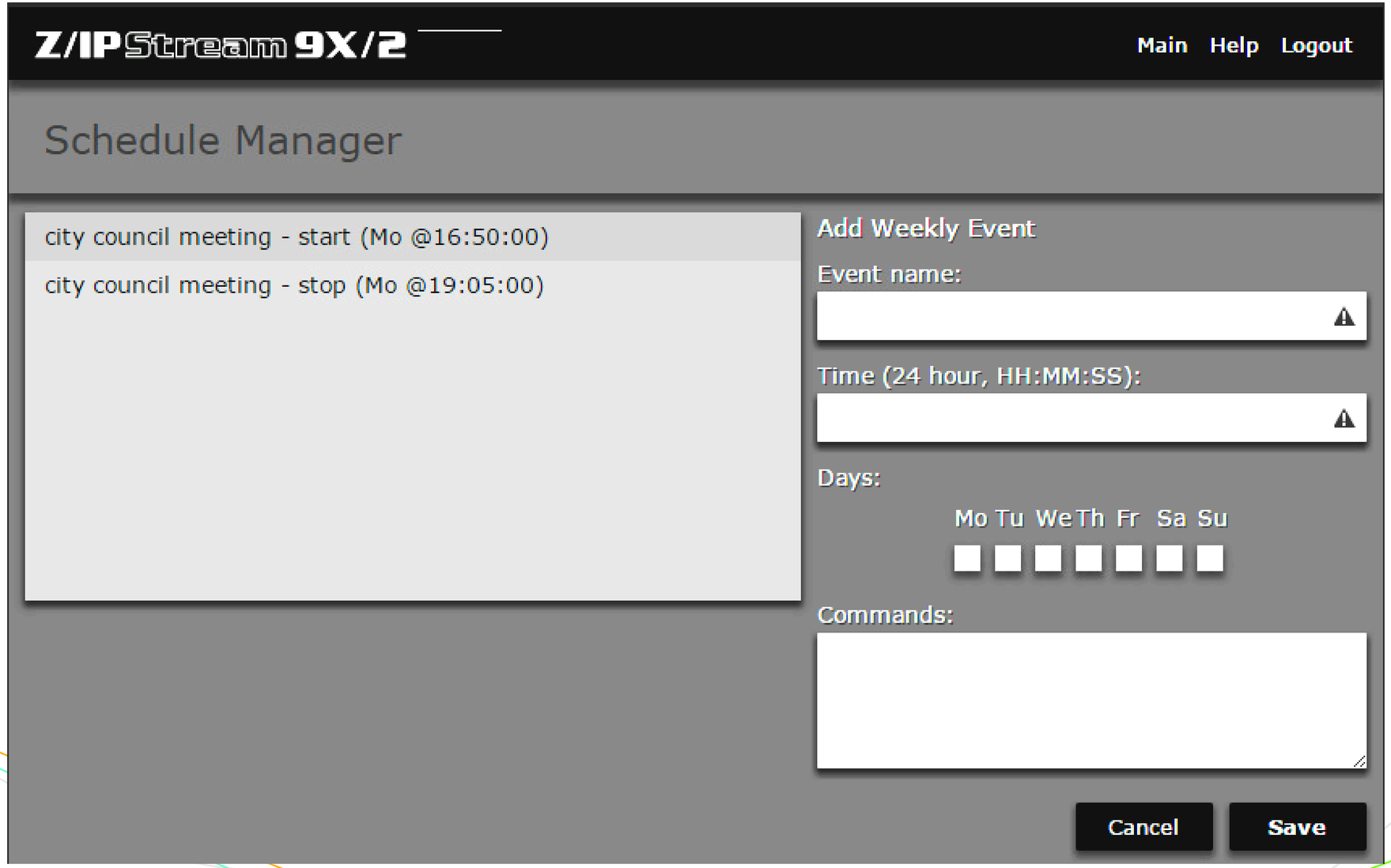
Metadata


Z/IP Stream 9X/2
Main
Help
Logout
Metadata
WKXY Metadata (tcp, port=4145)
Add Metadata Source
Remove
Add Metadata Source
TCP on specific port
UDP on specific port
RS232 serial connection

Metadata


Z/IPStream 9X/2
Main Help Logout
Metadata
WKXY Metadata (tcp, port=4145)
Add Metadata Source
Add Metadata Source
TCP on specific port
UDP on specific port
RS232 serial connection
Metadata filter:
Center Stage Live (XML)
Center Stage Live (XML)
Character Parser Sample
Http Request
Line Parser Sample
Nexgen Audio Sense
RadioDJ
Simian Template 1
XML Parser Sample
XML-Jazler
XML-Jazler2
XML-MediaTouch
XML-MediaTouch2
XML-Sample2
XML-TRE
XML-WideOrbit
XML-WinMedia
XML-Zetta

Scheduling


Z/IPStream 9X/2
Main Help Logout
Schedule Manager
city council meeting - start (Mo @16:50:00)
city council meeting - stop (Mo @19:05:00)
Add Weekly Event
Event name:
Time (24 hour, HH:MM:SS):
Days:
Mo Tu We Th Fr Sa Su
Commands:
Cancel
Save

Streaming Options



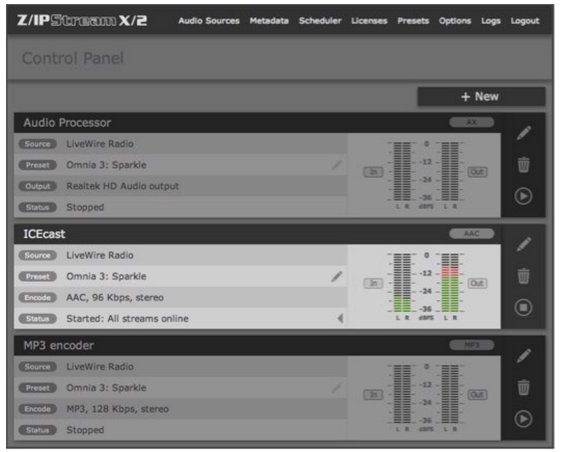
Z/IPStream R/1



Z/IPStream A/XE



Z/IPStream R/2



Z/IPStream X/2



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