

SIMULTANEOUS MIGRATION OF CODECS, FORMATS AND DRM

Jason Burgess

June 12, 2018

The background features a light blue gradient on the right side, transitioning from white on the left. A pattern of small, semi-transparent white dots is scattered across the right half, with a higher density in the lower right quadrant. The word "BACKGROUND" is centered horizontally in a bold, black, sans-serif font.

BACKGROUND

OVERVIEW OF XFINITY TV



LIVE TV

VIDEO ON DEMAND

CLOUD DVR

AVAILABLE BOTH IN AND OUT OF HOME

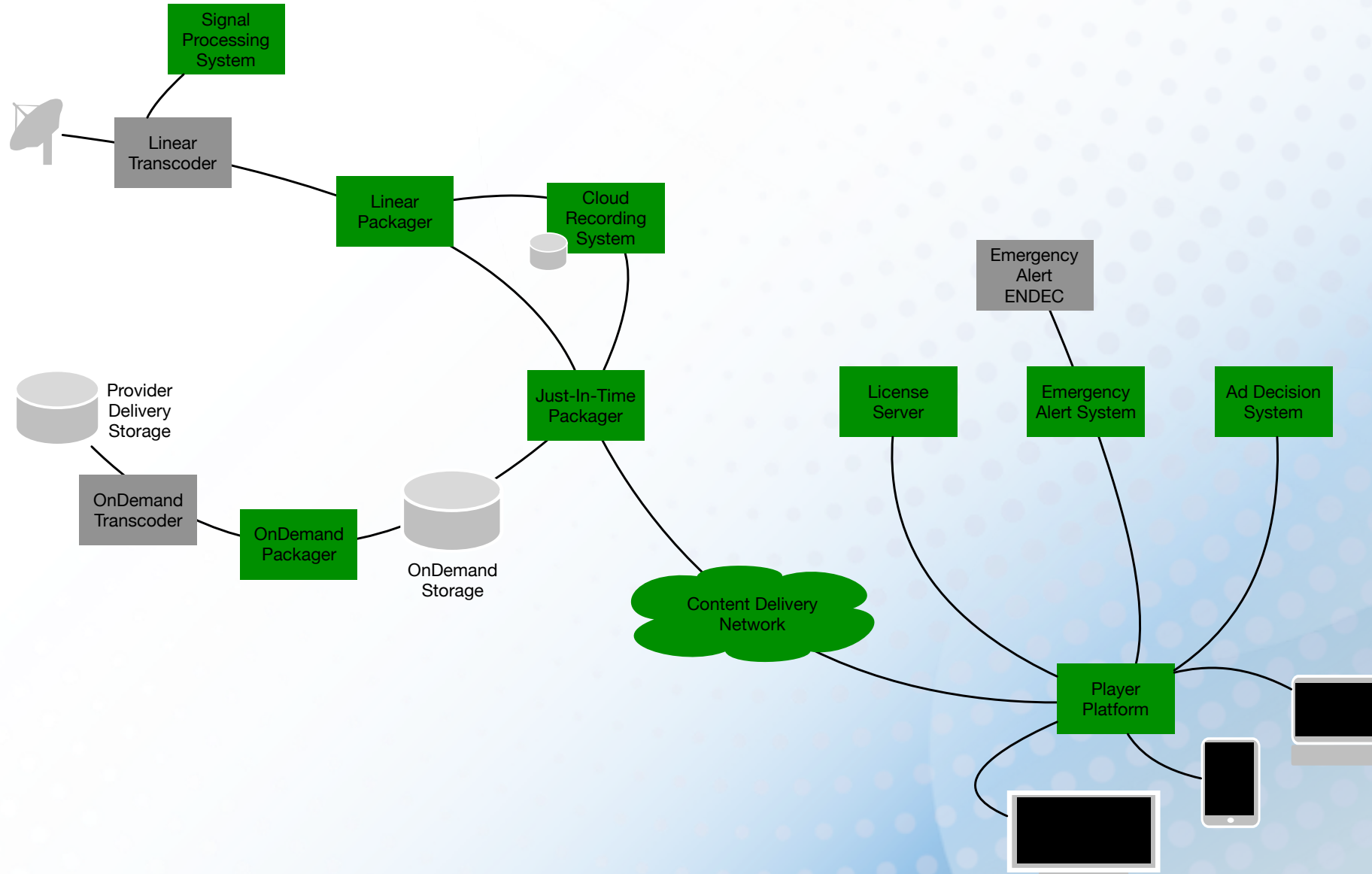
OVER 14,000 LIVE STREAMS

OVER 900,000 ON DEMAND ASSETS

OVER 800 MILLION HOURS OF VIDEO STREAMED THUS FAR



XFINITY IP VIDEO ARCHITECTURE



AUDIO & VIDEO CODECS

VIDEO

MPEG-4 (H.264)

MAIN & HIGH PROFILES

AUDIO

HE-AAC

- STEREO ONLY

DOLBY DIGITAL PLUS

- STEREO

- SURROUND SOUND

DELIVERY FORMATS

HTTP LIVE STREAMING (HLS)

- ORIGINALLY APPLE SPECIFICATION
- NOW IETF RFC 8216


CURRENTLY SUPPORT V4 OF THE SPECIFICATION

DIGITAL RIGHTS MANAGEMENT



PROVIDES ASSURANCE TO CONTENT PROVIDERS
ENCRYPTS CONTENT WITH UNIQUE KEYS PER ASSET/STREAM
VENDOR PROVIDED SYSTEMS
MUST HAVE CLIENT SUPPORT

CURRENTLY UTILIZING ADOBE ACCESS DRM
- AES-128/CBC WITH WHOLE SEGMENT ENCRYPTION

The background features a low-angle view of several skyscrapers on the left side, rendered in a light, semi-transparent style. On the right side, there is a blue circular area containing a pattern of small, light-colored dots. The overall color palette is light and airy, with shades of white, light blue, and pale yellow.

CH-CH-CH-CHANGES

AUDIO & VIDEO CODEC CHANGES

BEFORE

VIDEO

MPEG-4 (H.264) MAIN & HIGH PROFILES

AUDIO

HE-AAC

- STEREO ONLY

DOLBY DIGITAL PLUS

- STEREO

- SURROUND SOUND

AFTER

VIDEO

MPEG-4 (H.264) MAIN & HIGH PROFILES

HEVC MAIN10 PROFILE

AUDIO

HE-AAC

- STEREO ONLY

DOLBY DIGITAL PLUS

- STEREO

- SURROUND SOUND

DOLBY ATMOS

DELIVERY FORMAT CHANGES

BEFORE

HLS V4

AFTER

DYNAMIC ADAPTIVE STREAMING
HTTP (DASH)

HLS V7

DRM CHANGES

BEFORE

ADOBE ACCESS

- AES-128/CBC WHOLE SEGMENT

AFTER

WIDEVINE (DASH)

PLAYREADY (DASH)

FAIRPLAY (HLS V7)

AES-128 COMMON ENCRYPTION

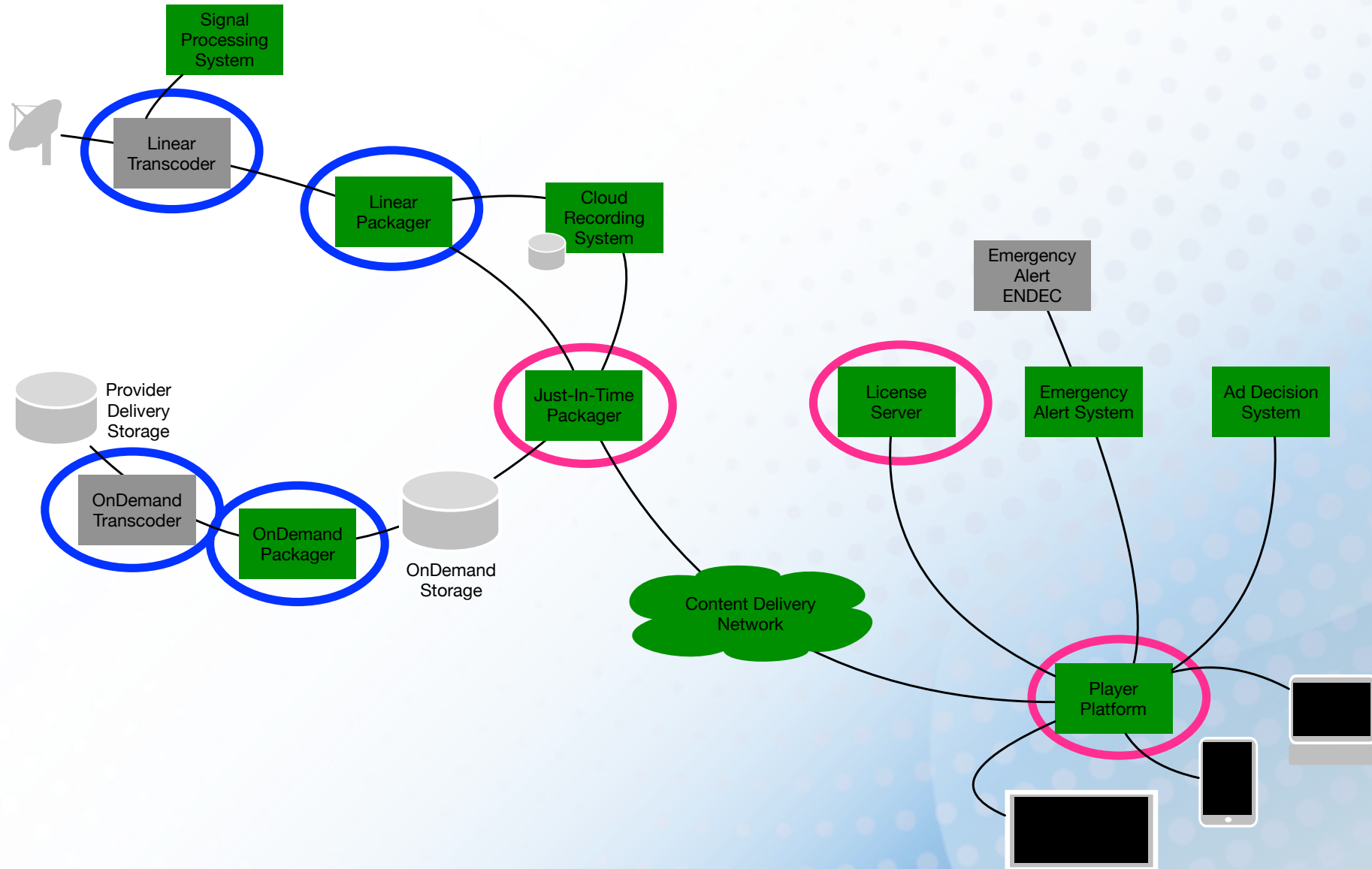
- DASH USES CTR

- HLS USES CBCS



THE PROCEDURE

COMPONENT IDENTIFICATION



LICENSE TO...

EACH FLAVOR OF DRM REQUIRES A NEW LICENSE SERVER

LICENSE SERVERS TIE INTO OTHER SYSTEMS FOR
AUTHORIZATION

DEPLOYING LICENSE SERVERS DOES NOT IMPACT LEGACY



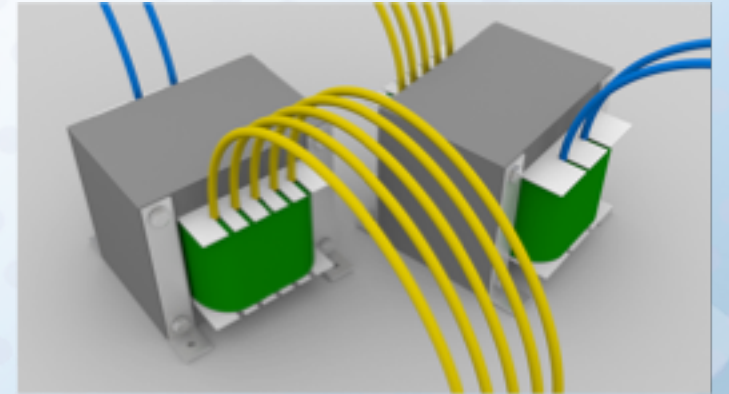
IT'S ALL ABOUT THE TRANSCODE

HEVC REQUIRES TRANSCODER SUPPORT

UHD CONTENT MODELED AS SEPARATE ASSETS & STREAMS

- SIMILAR TO SD VS HD

METADATA TIES UHD TO OTHER VARIANTS



INTERMEDIATES

PACKAGE INTO COMMON INTERMEDIATE FORMAT (CIF)

- BASED ON DASH

- SCTE 214-4

REQUIRED TWEAKS TO RECOGNIZE HEVC AND ATMOS

```
00010100100001001010  
10001010010101010110  
01001100010001010001  
01010000101001010011  
10011010010000001010  
01010010010010010100  
10010010101010101100  
10101010000100010011  
00101000100101001001
```


JITP FTW

UPDATES TO HANDLE NEW DRM METADATA IN MANIFESTS

JITP DESIGNED FOR INTEGRATING NEW FORMATS

DISTINCT URL PATHS FOR EACH FORMAT

SMALL TWEAKS TO EXPRESS HEVC CODEC TO CLIENT



LET THE PLAYER CHOOSE

DETERMINES DEVICE CAPABILITIES

EXCLUDES OPTIONS THAT IT CANNOT PLAY

REQUESTS FORMAT THAT IT SUPPORTS

CHOOSES DRM BASED ON DEVICE SUPPORT



COMPLETING THE PUZZLE

DEPLOY SERVER SIDE CHANGES

- LICENSE SERVERS
- JITP
- INTERMEDIATE PACKAGERS
- TRANSCODERS

UPDATE LEGACY RECORDINGS AND ASSETS

RELEASE/DEPLOY APPS WITH UPDATED PLAYERS

DECOMMISSION LEGACY FORMAT/DRM



SIMULTANEOUS MIGRATION OF CODECS, FORMATS AND DRM



PROBLEM DECOMPOSITION IS KEY TO LARGE SCALE CHANGES

CLEAN INTERFACES BETWEEN COMPONENTS FACILITATED A SMOOTH MIGRATION

STRONG MIGRATION STRATEGY ENABLES FUTURE INNOVATION AND RAPID DEPLOYMENT OF NEW CODECS, FORMATS, AND DRM SYSTEMS

JASON BURGESS

JASON_BURGESS2@COMCAST.COM