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WHAT'S UP & WHAT'S NEW WITH ATSC

September, 2023

AGENDA

ATSC 3.0 Progress

Latest Trends in ATSC 3.0

Latest Trends in ATSC 1.0

Harmonic ATSC Strategy
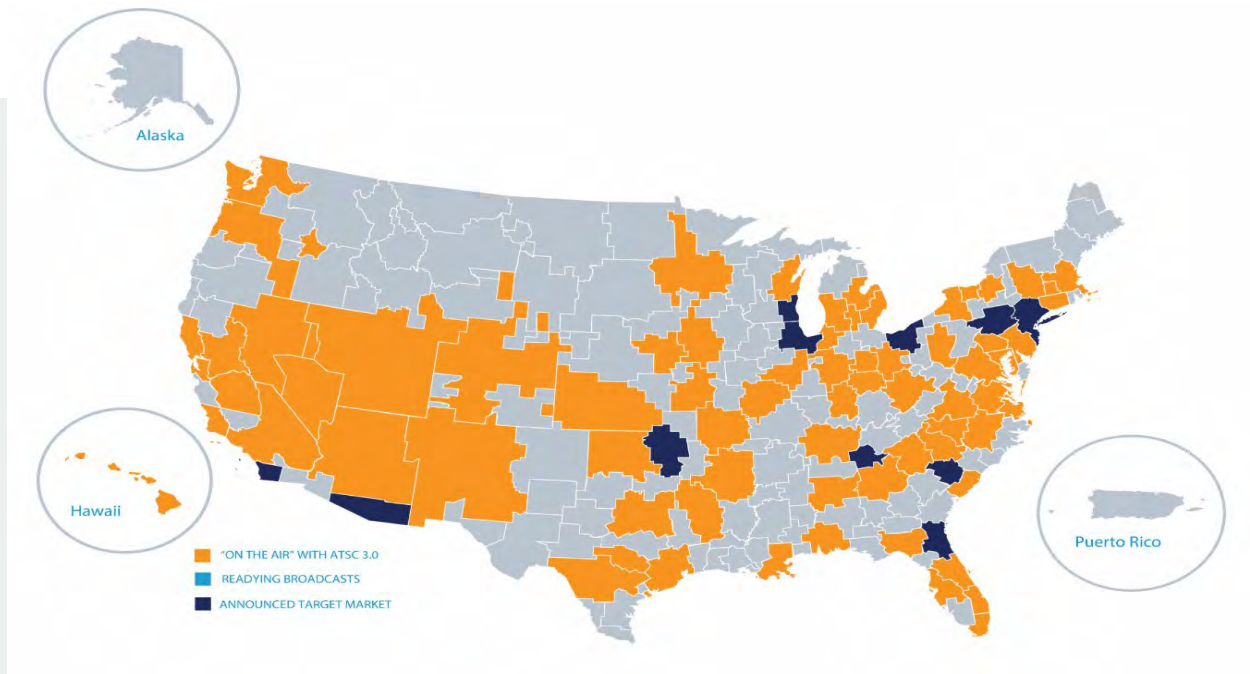
Q&A

ATSC 3.0 PROGRESS

FCC-NAB NEXTGENTV Task Force

Demonstrate Commitment to ATSC 3.0

Now Available In

nextgentv

The Future of TV

LEARN MORE ▶

Dedicated Task Force

| More Receiver Options | More Effective Marketing | Address Issues Timely |

ATSC 3.0 Deployment

"ON THE AIR" WITH ATSC 3.0
READYING BROADCASTS
ANNOUNCED TARGET MARKET

Alaska

Hawaii

Puerto Rico

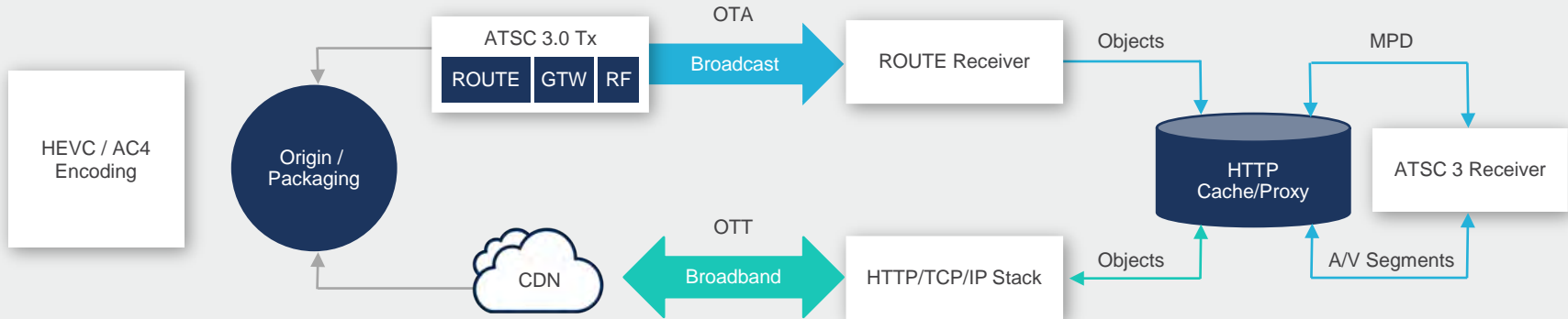| 26 New in 2023	66 In Total	Miami, Boston, SF, Philly

LATEST ATSC 3.0 TRENDS

ATSC 3.0 VIRTUAL CHANNEL

XOS / VOS360 encodes in HEVC / AC4 DASH

Feeds both OTA and OTT

ATSC 3.0 receiver uses MPD to retrieve and play

ATSC 3.0: When OTA meets OTT

XOS encodes both ATSC 1.0, 3.0 & streaming channels

SRT output of XOS for ingesting streaming channels

Packaging, Origin, DAI & CDN delivery are done by VOS360

VIRTUAL CHANNEL PROS VS. CONS

ATSC 3.0 for everyone

Improved experience

Revenue generator

Time Based only

Requires Broadband

PROs significantly outweigh CONs

1080p SDR TO HDR CONVERSION

Wide Color Gamut (WCG)
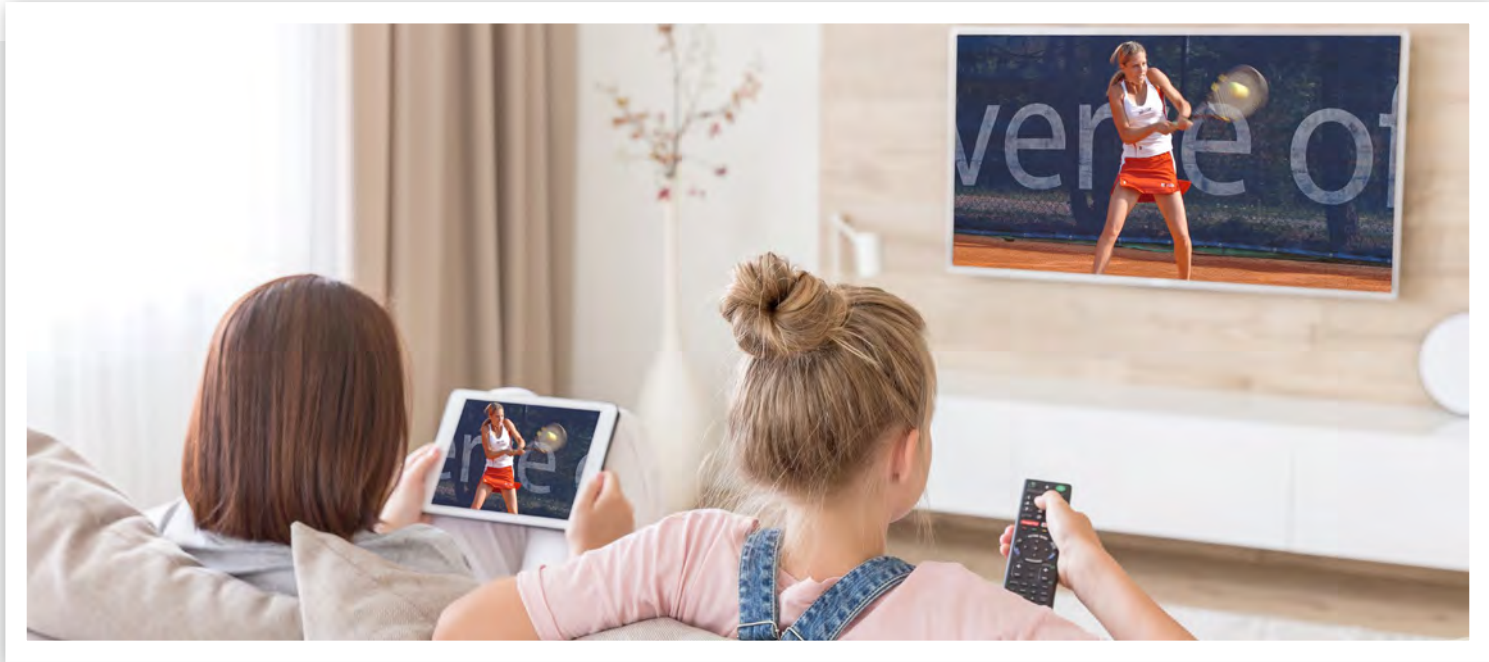
Dark/Light Balance

Enhanced Depth of Field

DRM IN PRODUCTION

| Anti Piracy | Pay Per View | Safeguard Revenue |

LATEST ATSC 1.0 TRENDS

PSIP FETCH & REBRANDING

| TITANTV / Gracenote | Myers ProTrack | PSIP Editing & Rebranding |

True Audio Upmix

Missing Audio Replacement

EAS Audio Consistency

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XOS

ATSC

- Premium MPEG-2 & AVC VQ up to 1080P
- High Efficiency Statmux **w/ SRT**
- Dolby AC3 Support & Loudness Adjustment
- Nielsen Watermarking
- PSIP **Carousel**, **Injection**, & **Rebranding**
- **EAS-NET** Text Crawl w/ Audio Alert
- **Built-in** Logo/Legal ID Insertion **Scheduler**

ATSC 3.0

- Premium HEVC VQ up to UHD
- **Interactive** High Efficiency Statmux
- MPEG-DASH Packaging
- Dolby AC4 Encoding & IMSC1 Captions
- HDR – WCG Cross-Conversion
- **Virtual Channel** Implementation
- DRM Encryption

Harmonic Strategy for ATSC

BROADBAND & VIDEO
Two market-leading business units

REVENUE 2022
$625M | 23% yoy growth

MARKET CAPITALIZATION*
$1.7B

SILICON VALLEY
Headquarters

CLOUD NATIVE INNOVATION LEADER

> 5,000 MEDIA CUSTOMERS
Worldwide

Revolutionizing broadband networks and cloud streaming

* Market Capitalization as of March 1, 2023

ENABLING GIGABIT BROADBAND & STREAMING TRANSFORMATIONS

CLOUD STREAMING

Premium live, linear, on-demand video streaming SaaS

Increased operational agility

Industry-leading >99.9999% cloud service uptime

VIDEO BROADCAST

Strong media customer relationships and extensive global deployments

Transforming from broadcast to cloud-based streaming

Addressing advanced playout workflow

BROADBAND

Market leader in cloud-native broadband access

Foundational deployments with industry leaders Comcast and Vodafone

Superior gigabit experience with increased speed and velocity

A TRUSTED PARTNER SERVING THE MEDIA INDUSTRY

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INDUSTRY-LEADING CUSTOMERS

Access Communications Co-Operative · altice · astro · AT&T tv · BBC · Bell · BUCKEYE BROADBAND · CANAL+

CenturyLink · Charter Communications · CJ POWERCAST · CNN · COMCAST · COM HEM

comporium · COX · T·· · dish LATINO · FOX · foxtel · GLOBOSAT

J:COM · LIBERTY GLOBAL · M6 · MEGACABLE · MILLICOM THE DIGITAL LIFESTYLE · NHK · NBC · orange

PCCW 電訊盈科 · peacock · Rakuten · Ritter COMMUNICATIONS · ROGERS · SES · Singtel

sky · SKY Perfect JSAT Group · SPORTS MAX · StarHub · TELKOMSEL · TELE2

Turner · vidgo · vodafone · WESTMAN

INDUSTRY-LEADING PARTNERS

intel · Microsoft · aws · Google · Hewlett Packard Enterprise
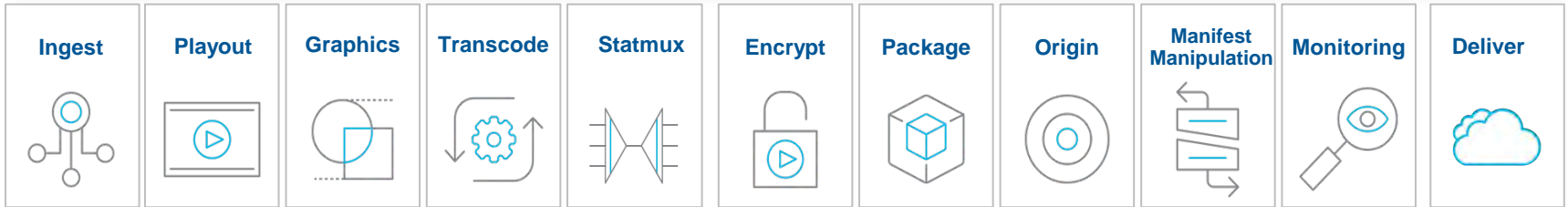
ON-PREMISES & CLOUD SOLUTIONS
ALL LEVERAGING COMMON SOFTWARE FOUNDATION

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SAAS	SOFTWARE	APPLIANCES

XOS ADVANCED MEDIA PROCESSOR
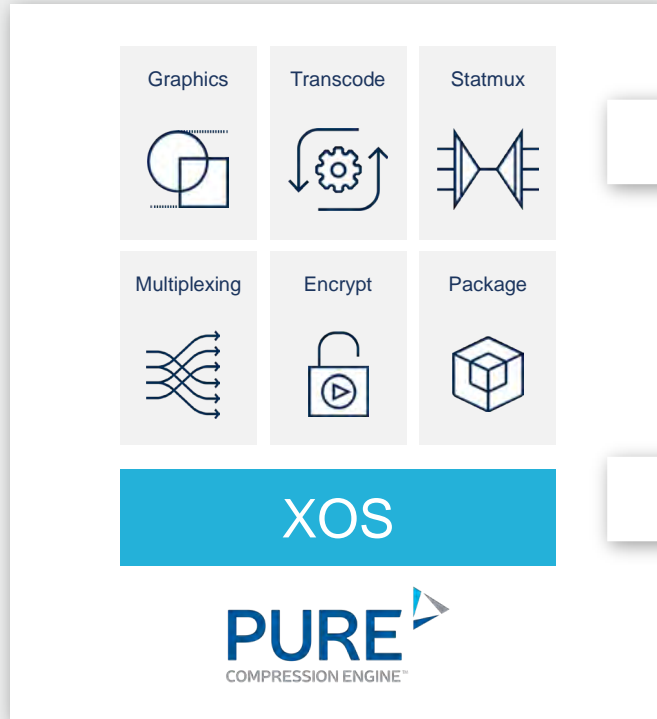
Broadcast

Streaming

XOS ADVANTAGE

XOS APPLIANCE PORTFOLIO

SMALL — SuperMicro (intel)

	2 PCI cards	6 GbE
MPEG2	12 SD	4 HD
H.264 MPEG-4/AVC	12 SD	4 HD
HEVC	6 SD	2 HD

MEDIUM — HPE Gen10 (intel)

	3 PCI cards	8 GbE
MPEG2	24 SD	8 HD
H.264 MPEG-4/AVC	24 SD	8 HD
HEVC	16 SD	6 HD

LARGE — HPE Gen10 (intel)

	3 PCI cards	8 GbE
MPEG2	60 SD	20 HD
H.264 MPEG-4/AVC	40 SD	20 HD
HEVC	24 SD	10 HD
		1 UHD

EXTRA LARGE — HPE Gen10+ (AMD)

	3 PCI cards	4 GbE
MPEG2	106 SD	29 HD
H.264 MPEG-4/AVC	104 SD	34 HD
HEVC	66 SD	20 HD
		2 UHD

Density examples – it varies depending on workflow / application – benchmark is required

XOS APPLIANCE PORTFOLIO

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XOS SMALL

SuperMicro

2 PCI cards | 6 GbE

Decoding

Cloud Downlink (Low Density)

Small SD/HD encoding projects

XOS MEDIUM

HPE Gen10

3 PCI cards | 8 GbE

Medium SD/HD encoding projects

XOS LARGE

HPE Gen10

3 PCI cards | 8 GbE
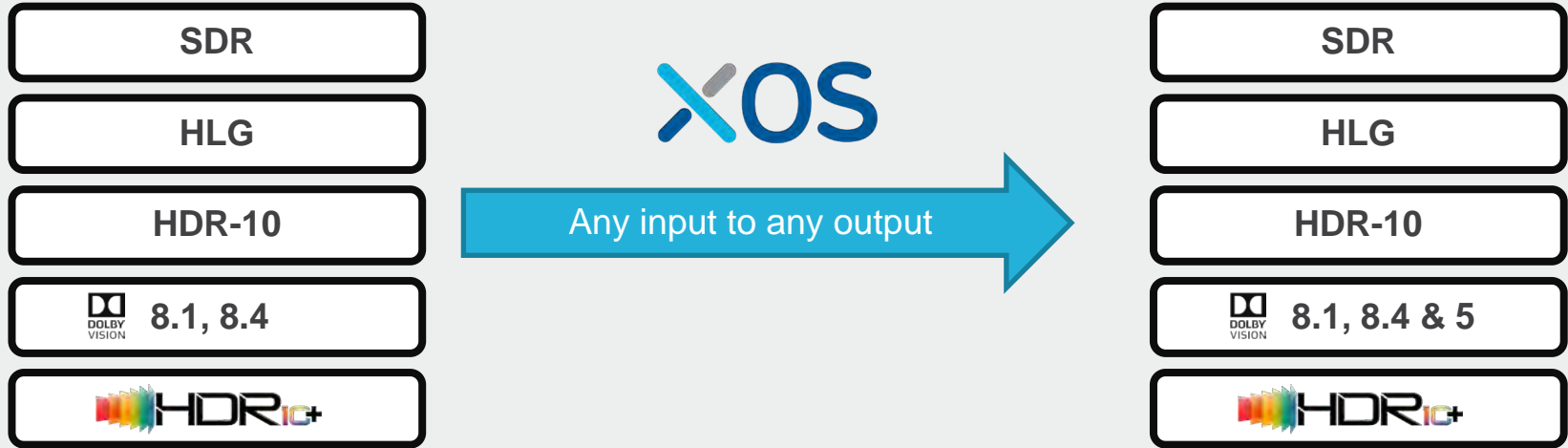
Cloud Downlink (High Density)

UHD & dense SD/HD projects

XOS EXTRA LARGE

HPE Gen10+
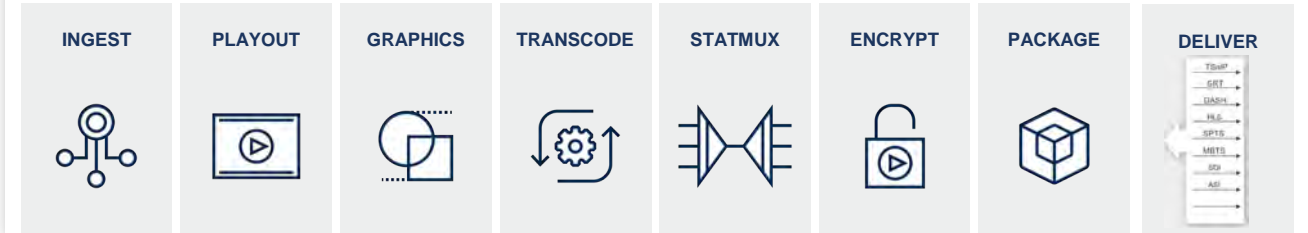
3 PCI cards | **4 GbE**

Dense UHD projects

XOS HDR PROCESSOR INSIDE

SDR

HLG

HDR-10

DOLBY VISION 8.1, 8.4

HDR10+

XOS

Any input to any output

SDR

HLG

HDR-10

DOLBY VISION 8.1, 8.4 & 5

HDR10+

**Simple Usage
(format detection, self-adjusting algos)**

**Round trip
Conversions**

XOS Input/Output Versatility

## Microservices covering broadcast and streaming

INGEST	PLAYOUT	GRAPHICS	TRANSCODE	STATMUX	ENCRYPT	PACKAGE	DELIVER

Inputs:
- DVB-S2X
- 8VSB
- SDI
- TSoIP
- 2110
- 2022-6
- SRT
- HLS
- ASI

Outputs:
- TSoIP
- SRT
- DASH
- HLS
- SPTS
- MBTS
- SDI
- ASI

XOS software-based media processor, running on COTS servers

Supporting any type of input/formats, it is packed with features to address in a flexible way all type of video applications

Distribution / Edge applications come now easy with powerful edge processing. Graphics, transcoding, statmux, decoding.
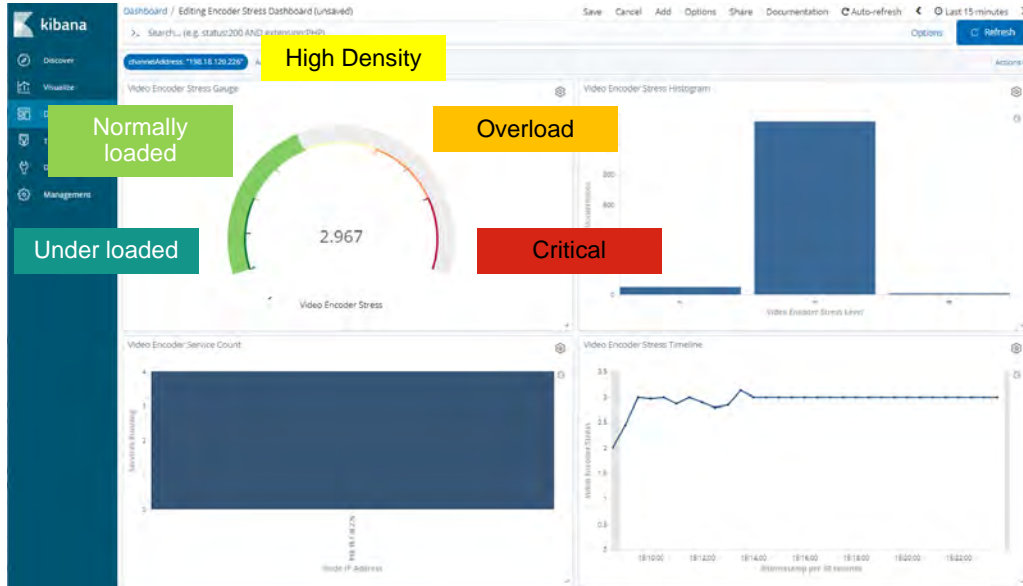
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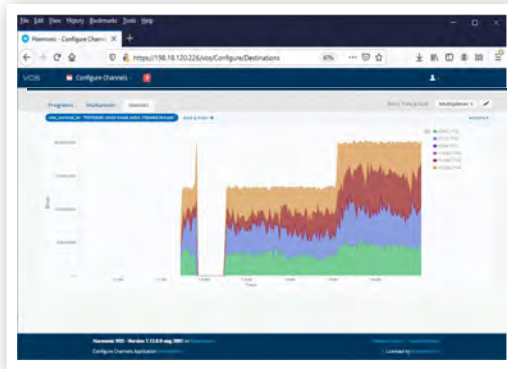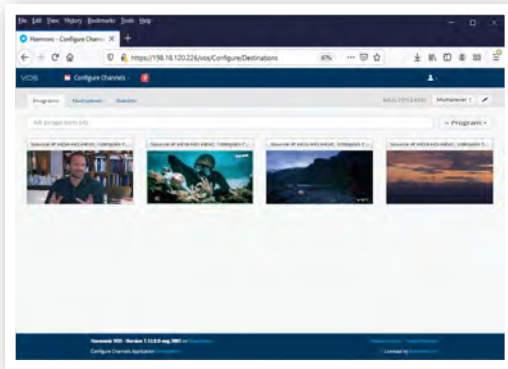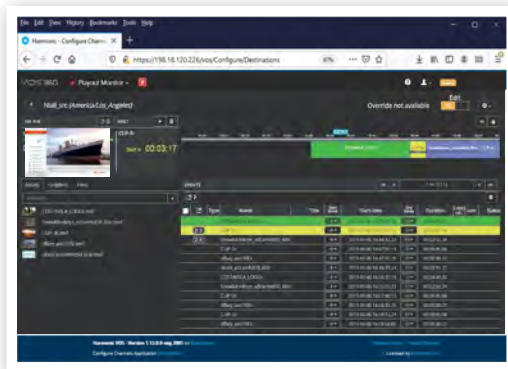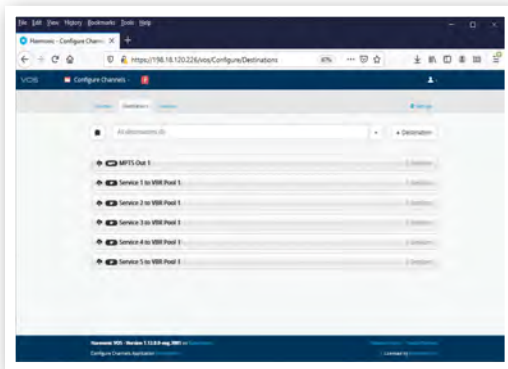
Configure & Monitor with or without External Management System

Shared Interface with VOS

Traditional Management System available with NMX
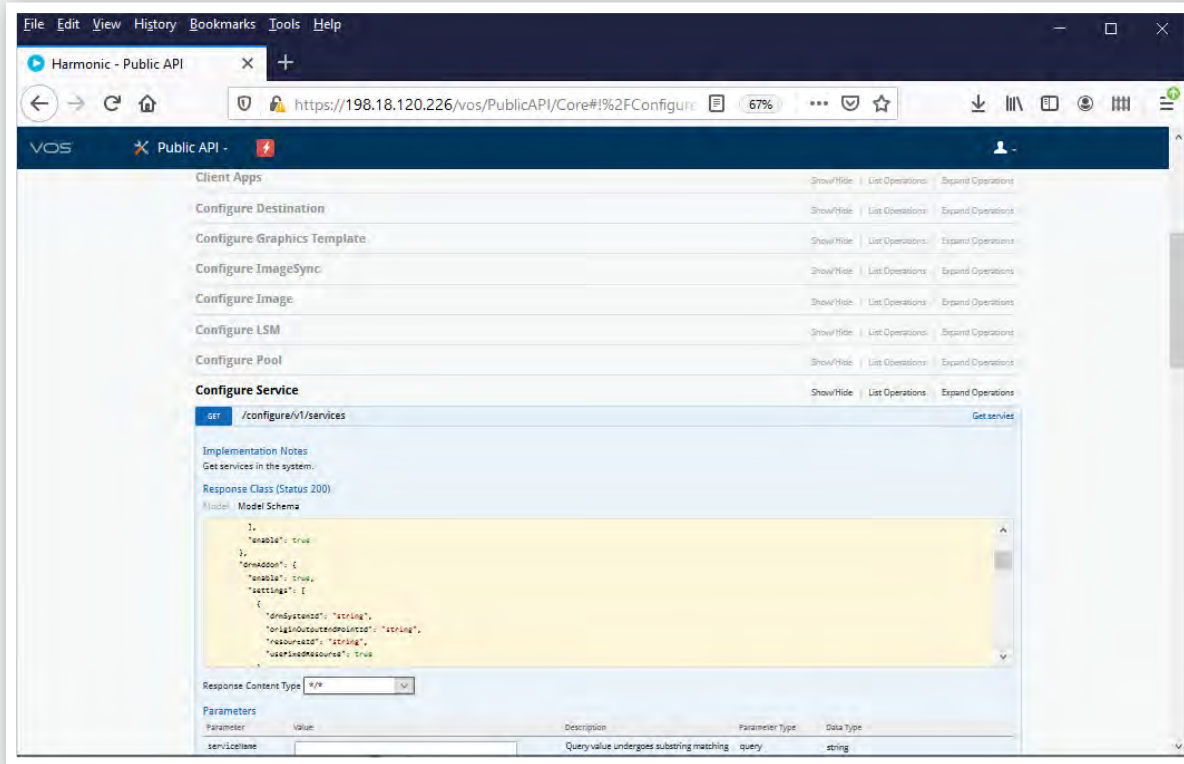
METRICS TO CHECK PERFORMANCE

Assess real conditions

Insight for capacity extension

Check Stress Evolution in time

API
FOR EASY INTEGRATION

REST API

Easy to test API

Accessible via WEB UI
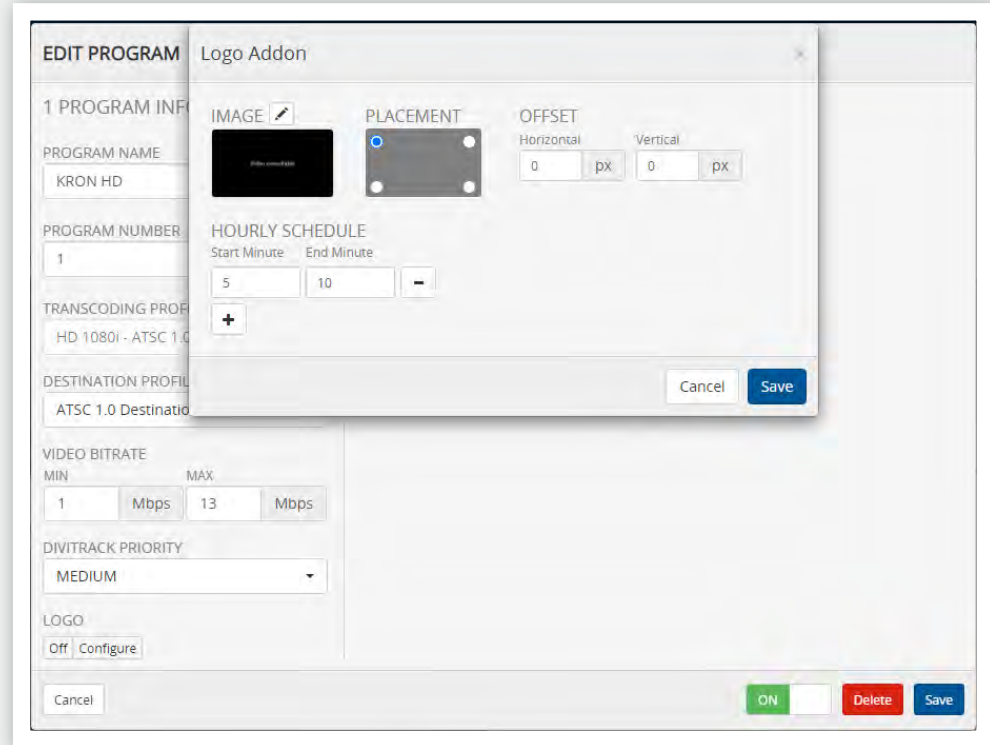
Develop Once

Shared API with VOS

XOS **GRAPHICS ENGINE**

- Inherited from Spectrum X playout server
- Text crawl with external data source
- Still Image or Animated logos
- Direct Scheduling on XOS UI or API

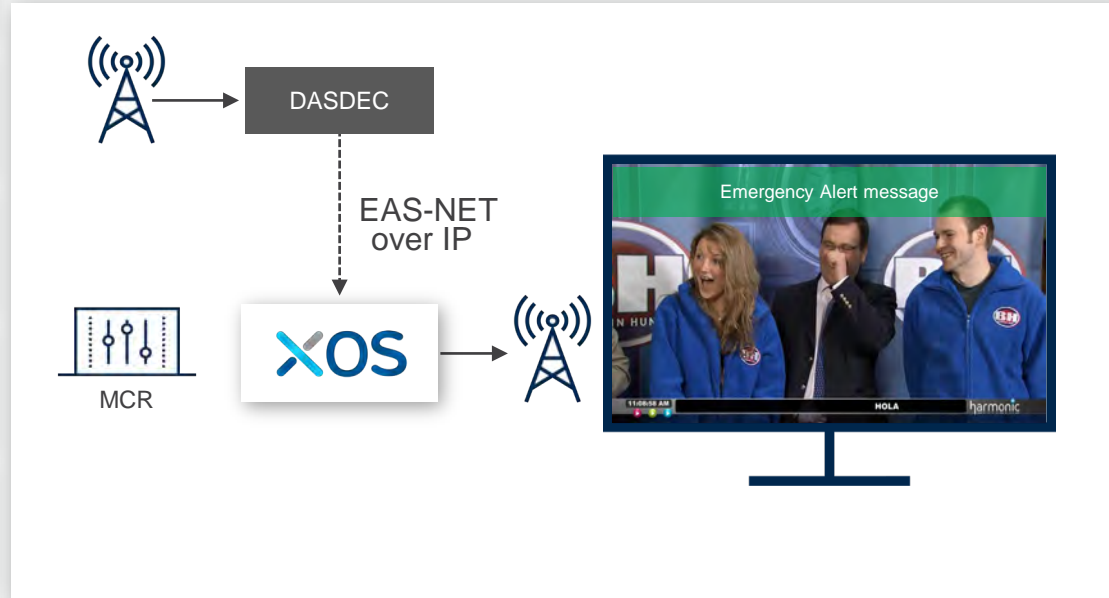# EAS MADE EASY W/ EAS-NET

Money-Saving EAS-NET Protocol

Direct EAS Crawl Text Insertion

Pre-Processed MP3 EAS Audio

Flexible EAS Event Scheduling

Simultaneous Multi-Station Support

Multilingual Support

DASDEC

EAS-NET over IP

MCR

XOS

Emergency Alert message

HOLA

DPI TIER **FILTERING**

Ad & Program Replacement (Group #1)

Headend

Program Replacement (Group #2)

Ad Replacement (Group #3)

- DPI SCTE35 TRIGGERS ALLOWS DOWNSTREAM AFFILIATES TO PERFORM CONTENT REPLACEMENT

- DPI TIER FILTERING PROFILE APPLIED TO SELECTION OF XOS

SCTE35 - XOS set #1

SCTE35 - XOS set #2

SCTE35 - XOS set #3

ONE MORE THING

PLAYOUT IS COMING TO XOS!

Ingest | Playout | Graphics | Transcode | Statmux | Encrypt | Package | Origin | Manifest Manipulation | Monitoring | Deliver

docker
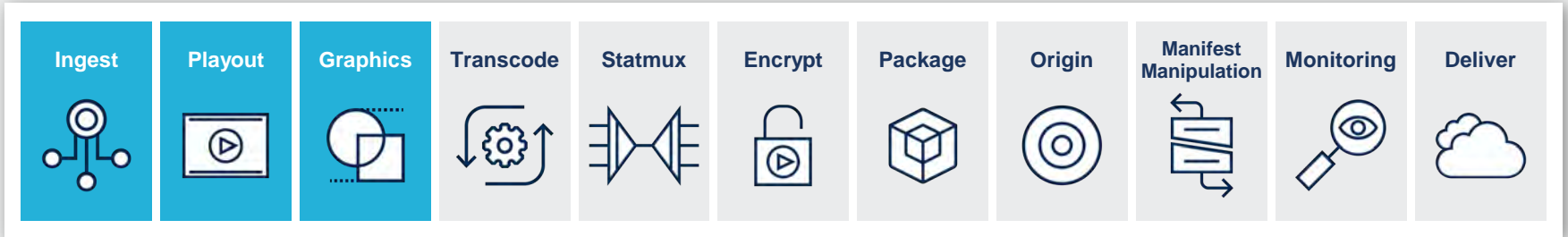
Common Software Foundation (CSF)

kubernetes

XOS

VOS/XOS Media Processor Output Examples

TAKEAWAYS

1	ATSC3 moving forward but more support needed
2	Virtual Channel, HDR, & DRM provide tremendous ATSC3 motivations
3	PSIP & Audio consolidations further streamline ATSC1 workflows
4	Cloud native architecture is critical even for on premises solutions
5	Playout is coming to XOS!
6	Harmonic committed to provide you with future-proof solutions

THANK YOU.