AWS re:Invent

MDS301-R

WarnerMedia/HBO's cloud-based linear playout system

Matt Azzarto
Director, Media Technology Engineering
WarnerMedia

Amir Abu-Akeel
Sr. Architect, Media & Entertainment
Amazon Web Services

AWS re:Invent

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Agenda

Cloud linear playout

WarnerMedia's business problem

WarnerMedia's playout architecture

- Stage 1 – POC
- Stage 2 – HBO's BCP architecture
- Stage 3 – Final WarnerMedia 30-channel architecture for on-air + BCP

Lessons learned/future plans

Cloud linear playout

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Linear playout

What it is

- Transmission of television channels to distributors and, ultimately, customers (traditional air and cable offerings) using fixed bitrate service

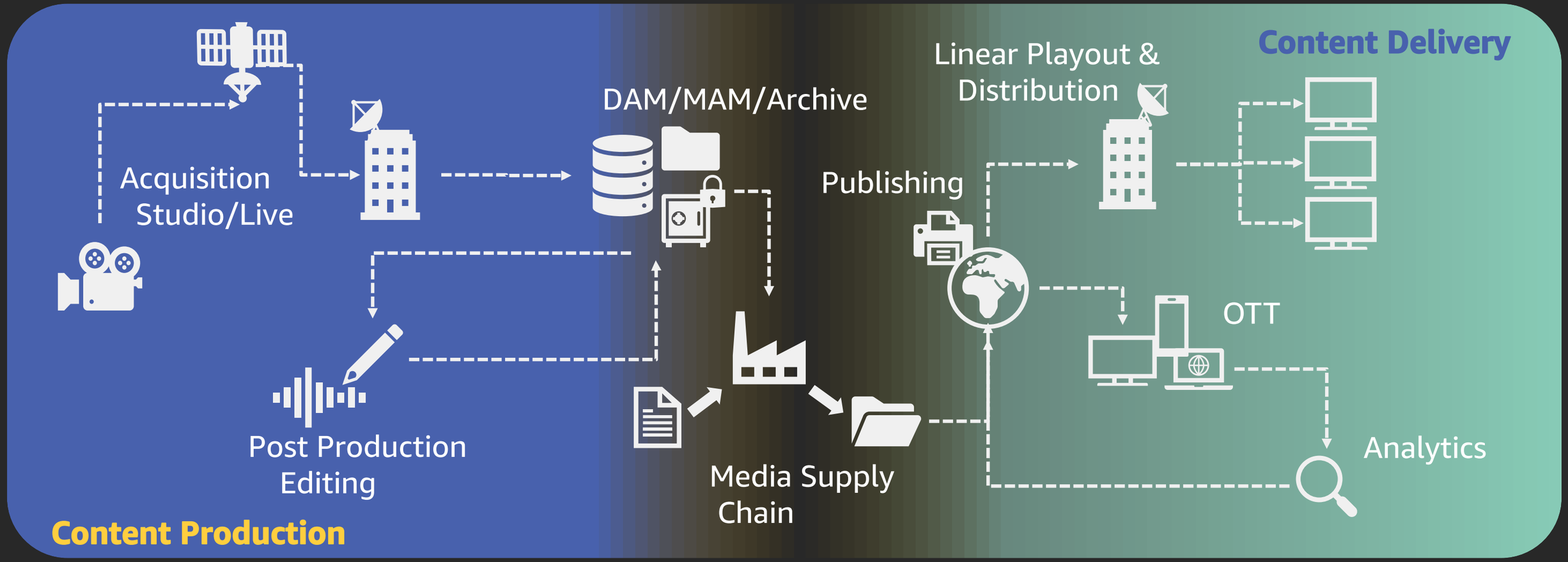
What it isn’t

- Video on-demand or OTT!

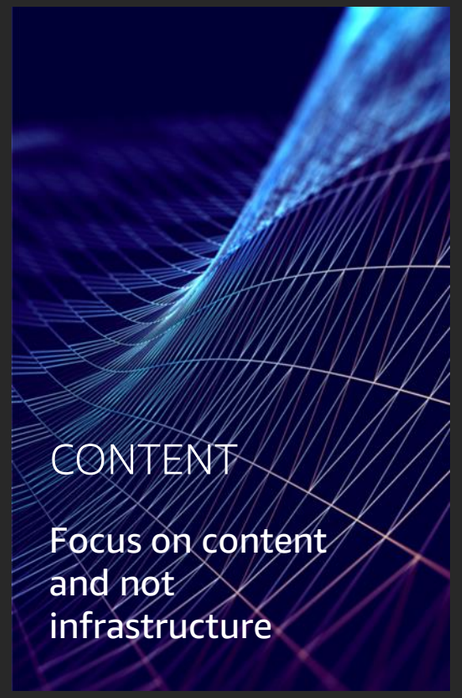
Important steps in linear playout

- Management of assets for distribution
- Scheduling of assets
- Insertion of graphics, subtitles, and audio
- Generation of final video
- Reliable transmission system

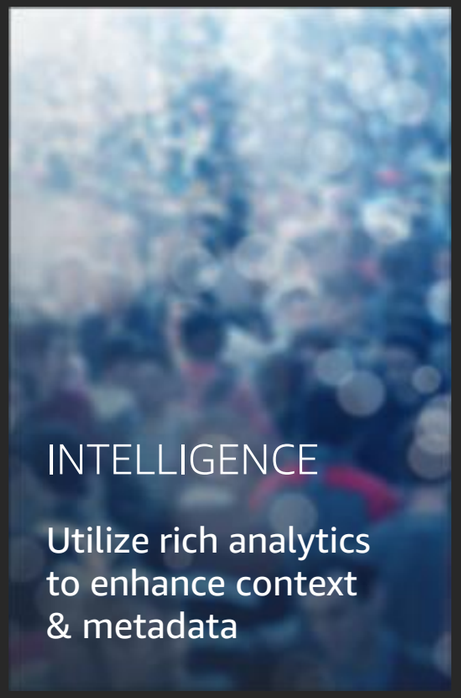
Lifecycle segments

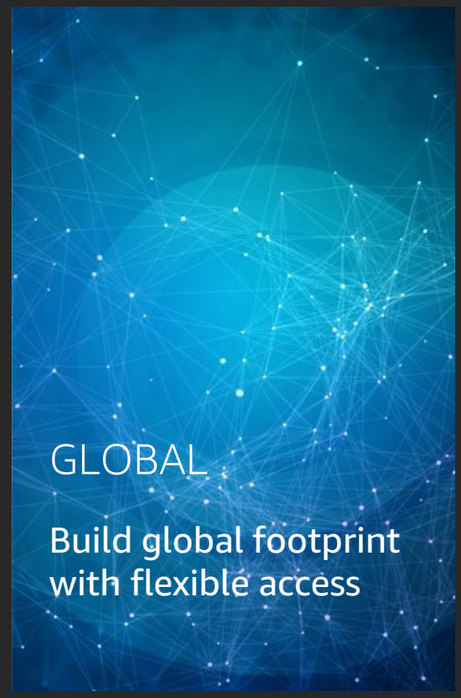


Cloud-based playout
Move faster, smarter, and more efficiently











A platform flexible enough to support building your way

Build media workflows on top of AWS core services using AWS media products, leveraging our partner ecosystem, and/or directly through customized solutions

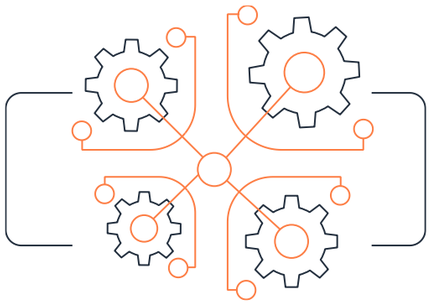
AWS Media Products



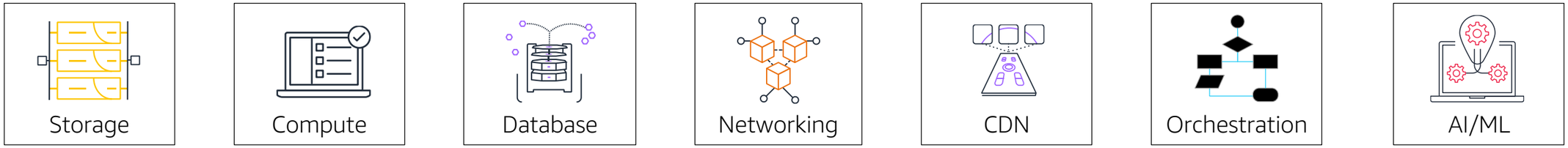
Partner Ecosystem

aspera, telestream, ZADARA, ACQUIA, SIGNIANT, Digimetrics, VENUE, technicolor, sohonet, GLUSTER, NetApp, Adobe, data EXPEDITION, lustre, SONY, beamr video, sundog, Tektronix, BEBOP TECHNOLOGY, encoding.com, evertz, sdvi, AUTODESK, harmonic, AUTODESK MAYA, WAZEE DIGITAL, sferastudios, zencoder, interra systems, mediasilo, Alfresco, veset, AVERE, vidispine, Hybrik

Custom



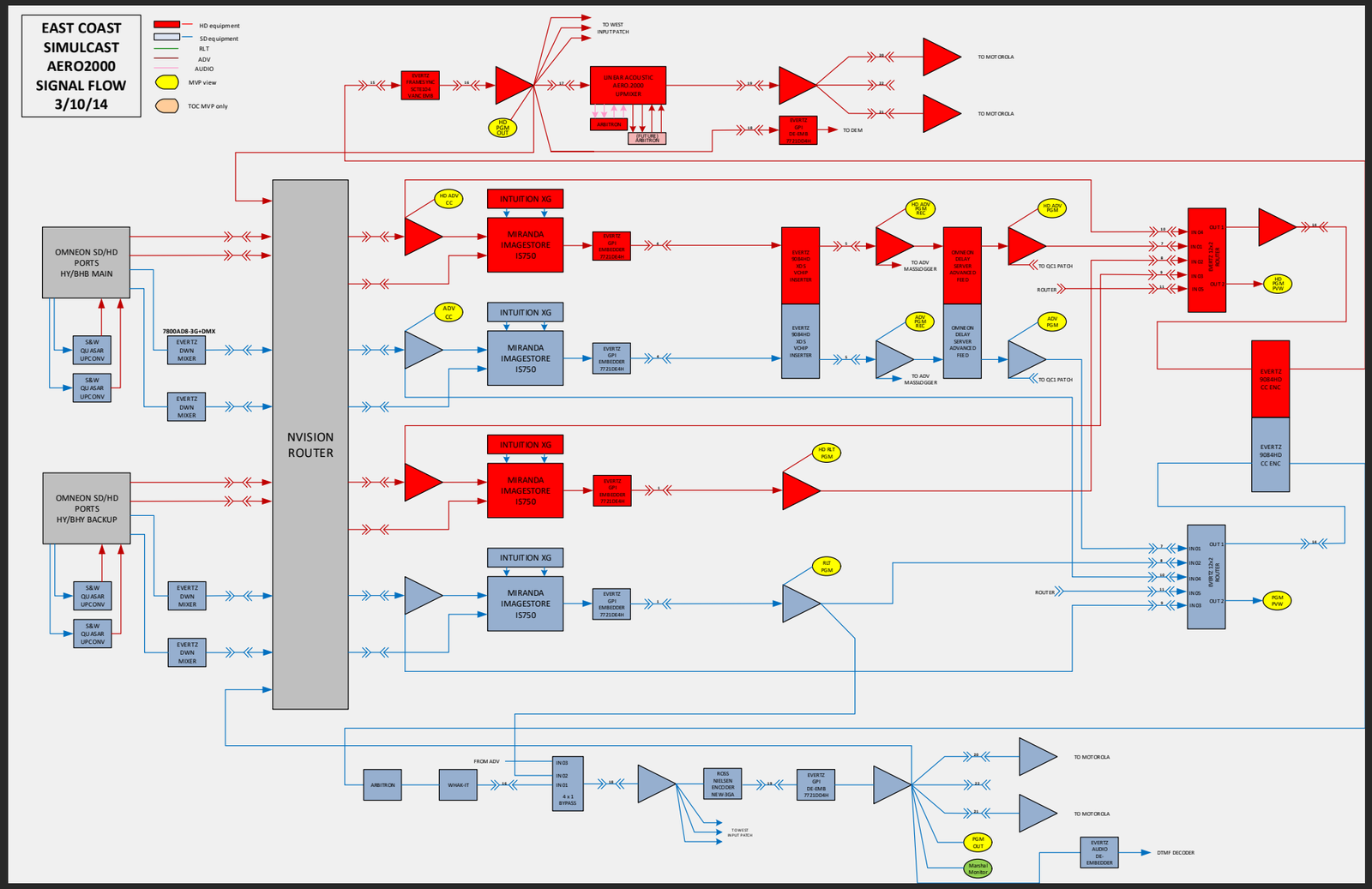
AWS Core Services



Legacy hardware

- This diagram represents a single channel/air chain
- Each of the 64 icons represents a device
- Represents hundreds of thousands in capital investment
- Takes months to deploy
- Support complexity
- Exiting equipment is end of life and end of support

Sample on-premises architecture



WarnerMedia's business problem

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The previous system

30-channel linear distribution

- Broadcast facilities in Hauppauge, NY, and Turner Broadcasting in Atlanta, GA

On-premises hardware

- Harmonic Omneon servers purchased in 2012

Broadcast format

- A MPEG-2/MXF format





The forcing function

Infrastructure refresh

- WarnerMedia's on-premises playout servers were approaching end-of-life
- Change in distribution centers (Hauppauge decommission/Hudson Yards completion)

Lack of flexibility

- On-premises hardware did not support emerging standards such as UHD/4K and HDR
- Bandwidth restrictions



Sensitivity to capital costs

- A new on-premises solution would require significant capital cost during a time of extreme variability at WarnerMedia due to the AT&T/TimeWarner acquisition

"We should not need any boxes for this"

Cloud-based playout – why and what benefits?

Growing experience and history of performance

- Increased internal experience in internet-based distribution and access to improved terrestrial fiber resource
- Cloud services maturing for media
- Increase flexibility and speed to deployment
- Geo-diversity
- Capex vs. Opex
- TCO



WarnerMedia's playout architecture

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CLP POC design

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3 vendor scenarios, cloud to site signal flow, HBO site (multiplex and monitor)

Vendor A :

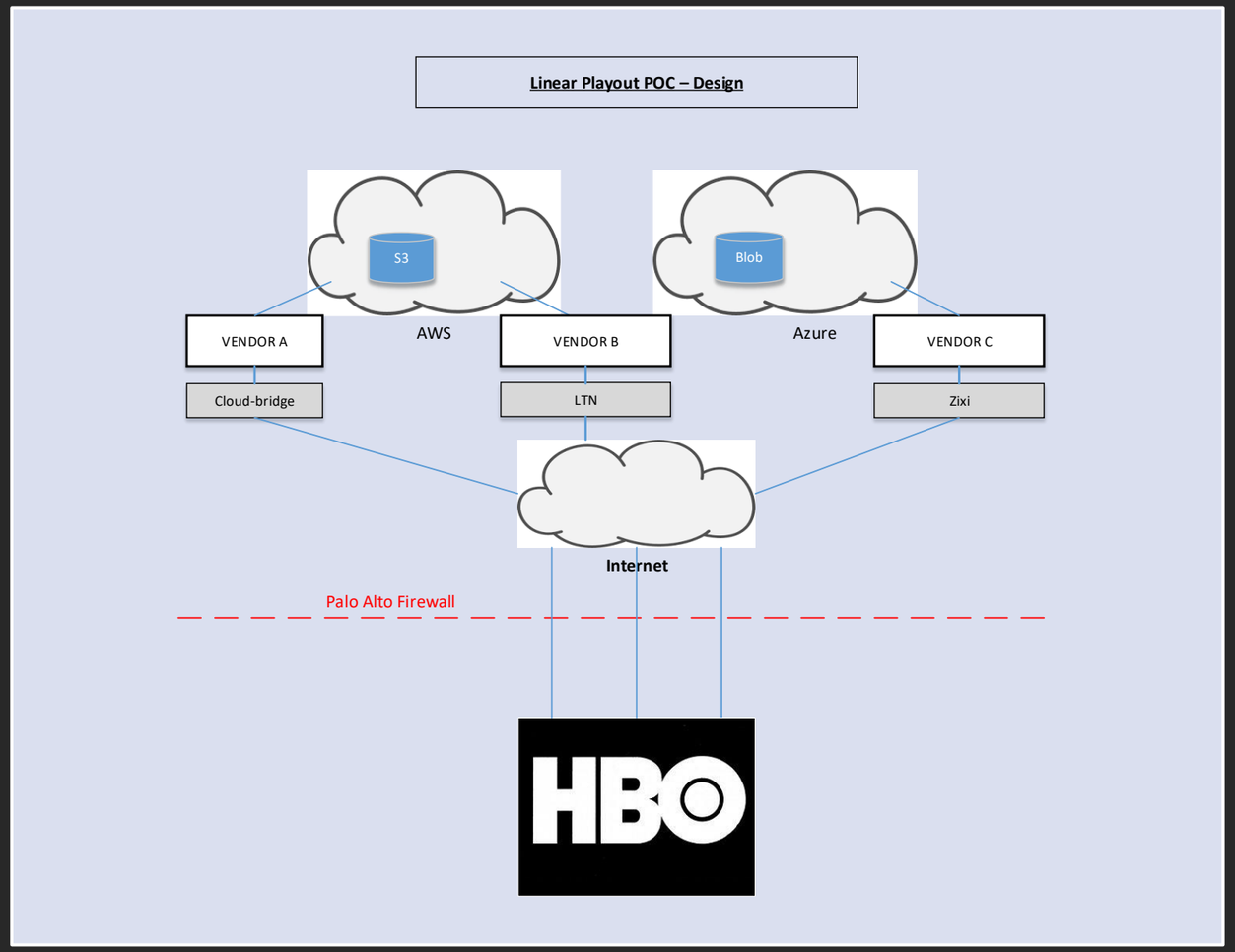
- (2) channels: MXF, AVC (PRO41)
- Content sourced from Amazon S3
- Cloud-bridge transport across internet
- Decode via IRD

Vendor B :

- (2) channels: MXF, AVC (PRO41), HEVC (UHD SDR)
- Content sourced from Amazon S3
- LTN transport across internet
- Decode via IRD

Vendor C :

- (2) channels: MXF, AVC (PRO41)
- Alternate cloud provider
- Zixi/Akamai transport across internet
- Decode via IRD



Cloud playout POC

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Purpose

- Test multiple vendors and clouds against specific KPIs

Clouds and vendors

- Vendor A – AWS
- Vendor B – AWS
- Vendor C – alternate

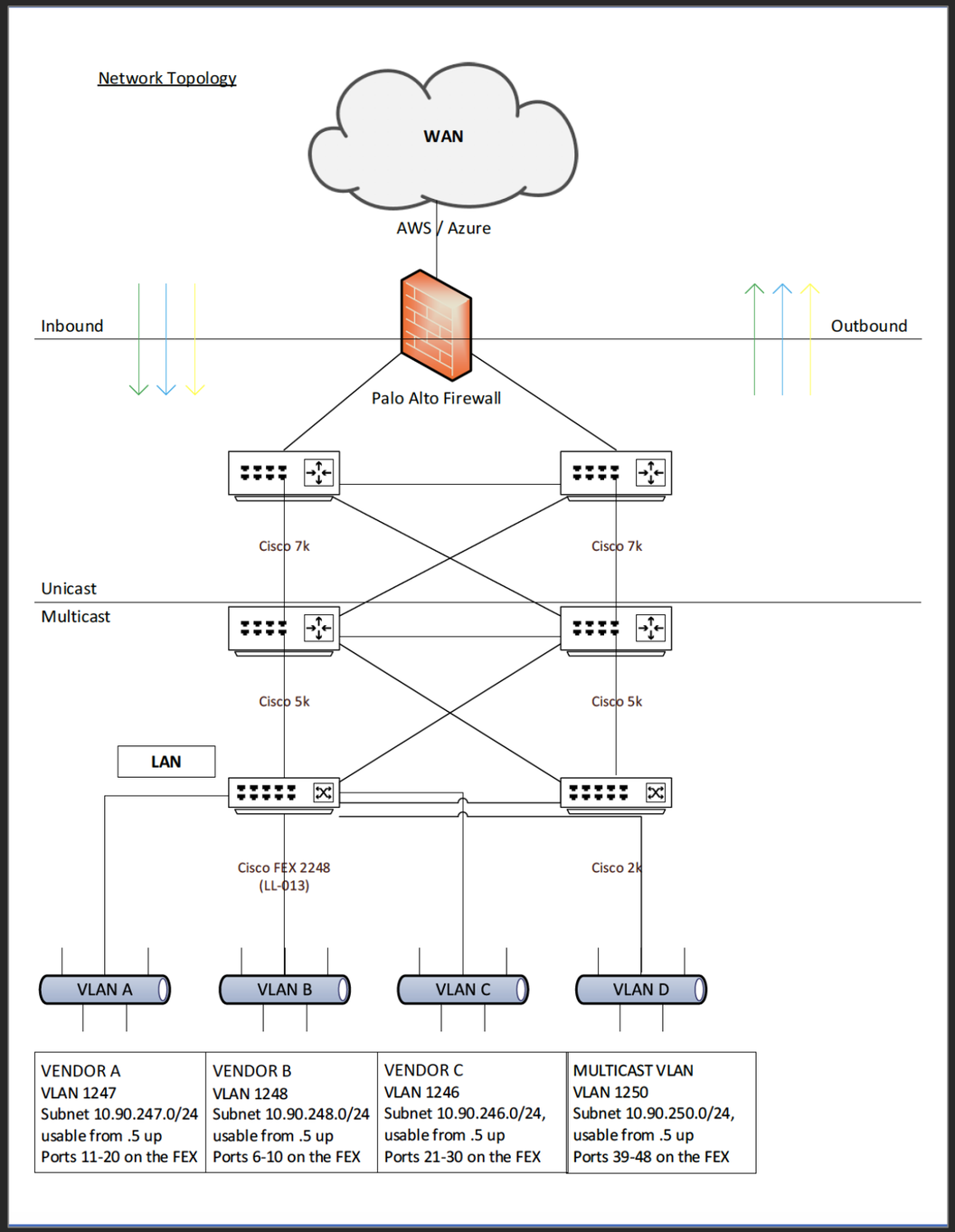
Tested content

- MPEG-2 H.262
- MPEG-4 AVC H.264
- HEVC H.265

Key Performance Indicators Used	
File-Based Playout	Graphics
Transport Latency	Nielsen Watermarking
Appending Lists	Audio Processing
Breakaway Lists	SCTE Triggers
Missing Content	AFD
Primary/Backup Switching	XDS / V-Chip
Editing Events	H.264 Encode
Secondary Events	Reliability
Content Tally Status	Availability
Add/Remove Channels	Video Quality
File Playout	Time to Provision
Closed Captioning	Failover
Automation	Live Events

POC on-premises network topology

- VLAN segmentation
- Cisco 2k, 5k, 7k stack
- Palo Alto firewall
- Unicast across WAN
- Multicast local



POC results

1

Scenario A

- Pros – High performance, highest quality audio & video, lowest price
- Cons – Limited UI and automation

Scenario B

- Pros – Good quality audio & video; significant automation and content management support
- Cons – Cost, support team resources

Scenario C

- Pros – Good quality audio & video; solid support from solutions architects
- Cons – Sub-optimal automation; Windows interface causes performance and connection issues; graphics requires sperate application; CC problems; no monitoring solution

POC results

1

WarnerMedia chose Evertz running on AWS

They provided the most comprehensive solution by addressing:

- Content management (movement, registration, and status)
- Flexible playout, with easily configurable controls for Ops
- A level of IP monitoring capabilities, integrated to support a broadcast-like environment for operations and engineering

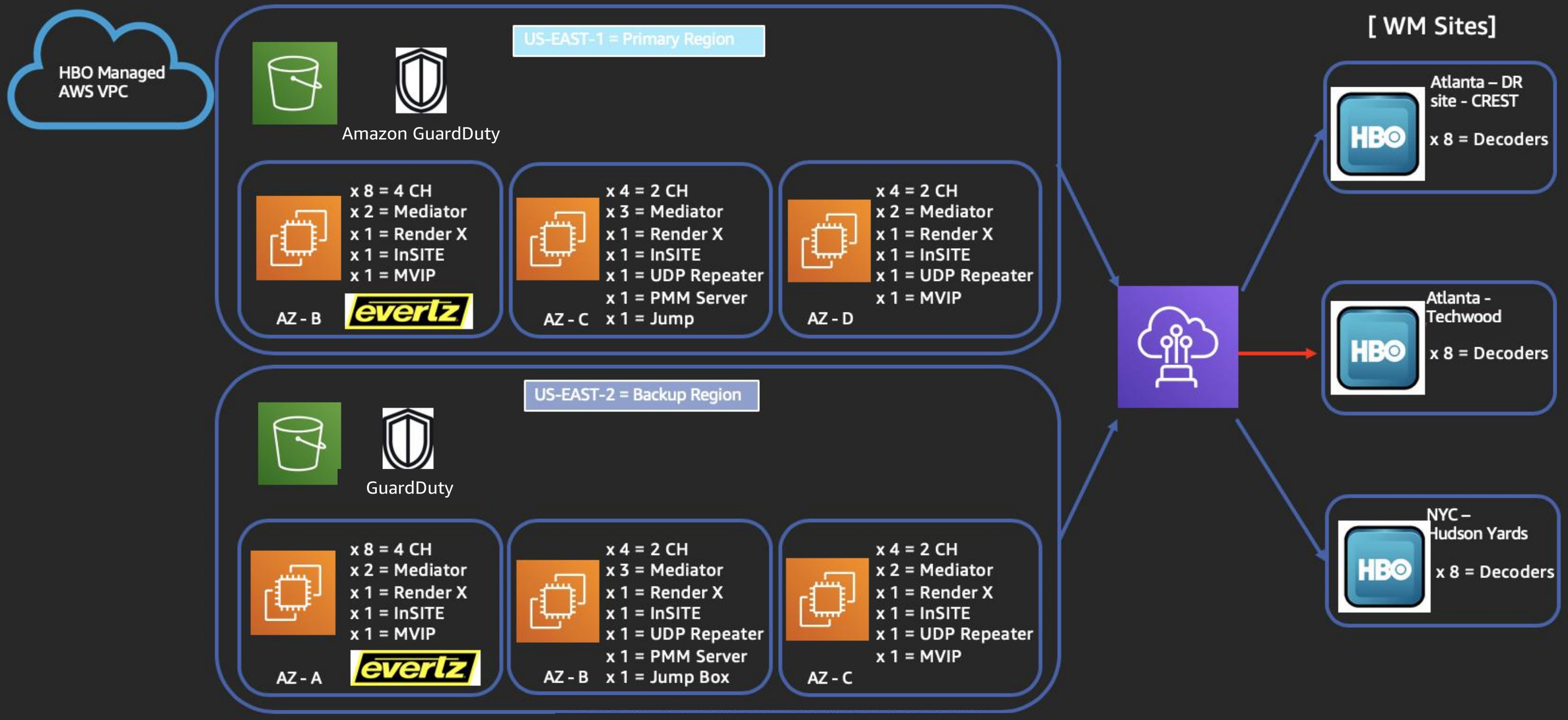




HBO Cloud Architecture

8 ch. BCP (HA Model)

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The AT&T/Time Warner acquisition

Business unit mergers

- Turner and HBO were combined into a new business unit: WarnerMedia Entertainment
- As part of WarnerMedia, functions between both units were streamlined for efficiency



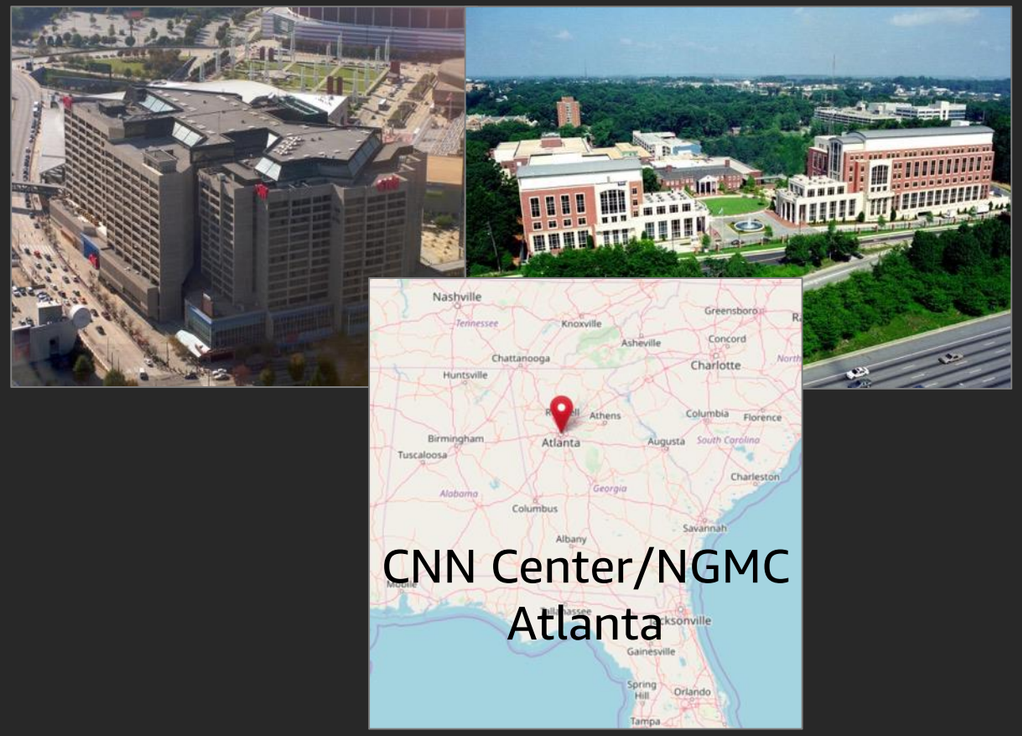


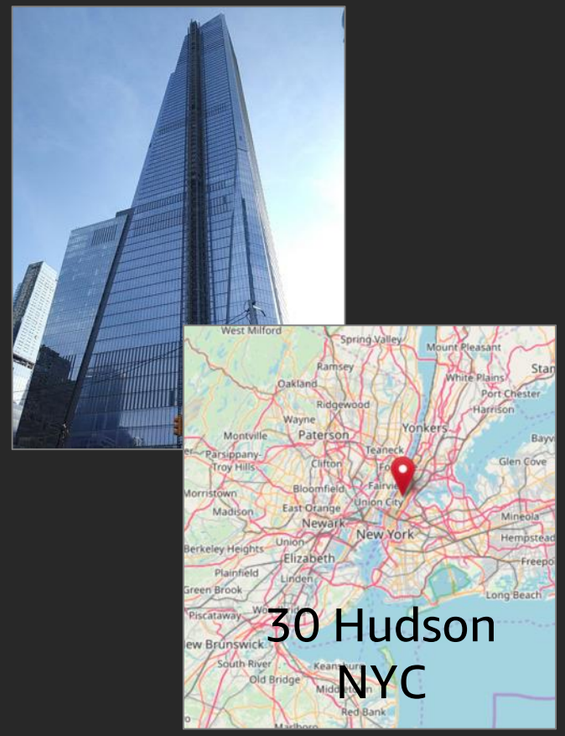


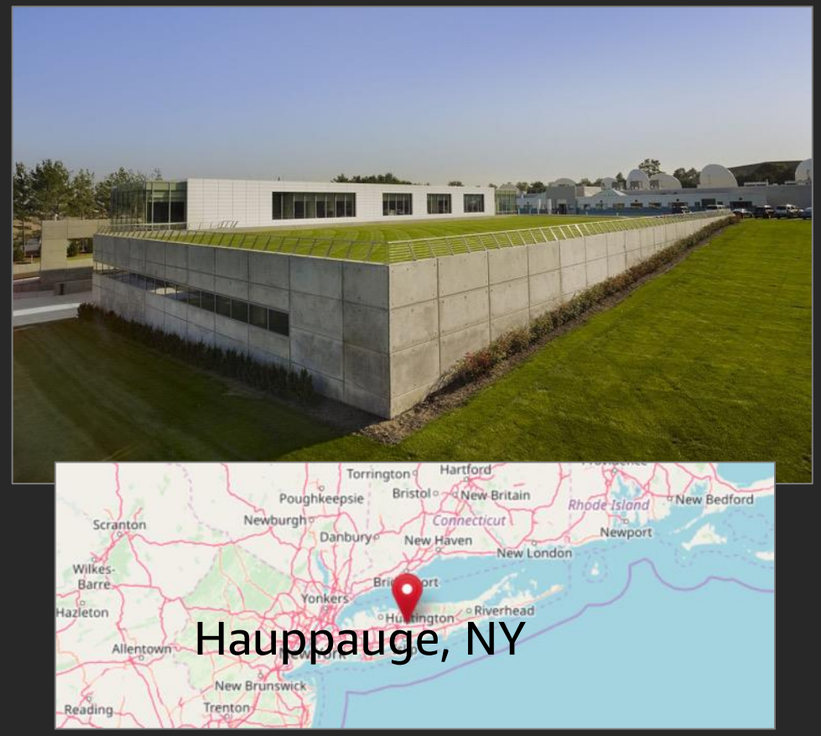
The AT&T/Time Warner acquisition

Datacenter realignment

- Hauppauge, NY, facility was identified to close in Q4 2019
- CNN and Turner Broadcast facilities in Atlanta became the primary transmission center for HBO and Cinemax channels







The AT&T/Time Warner acquisition

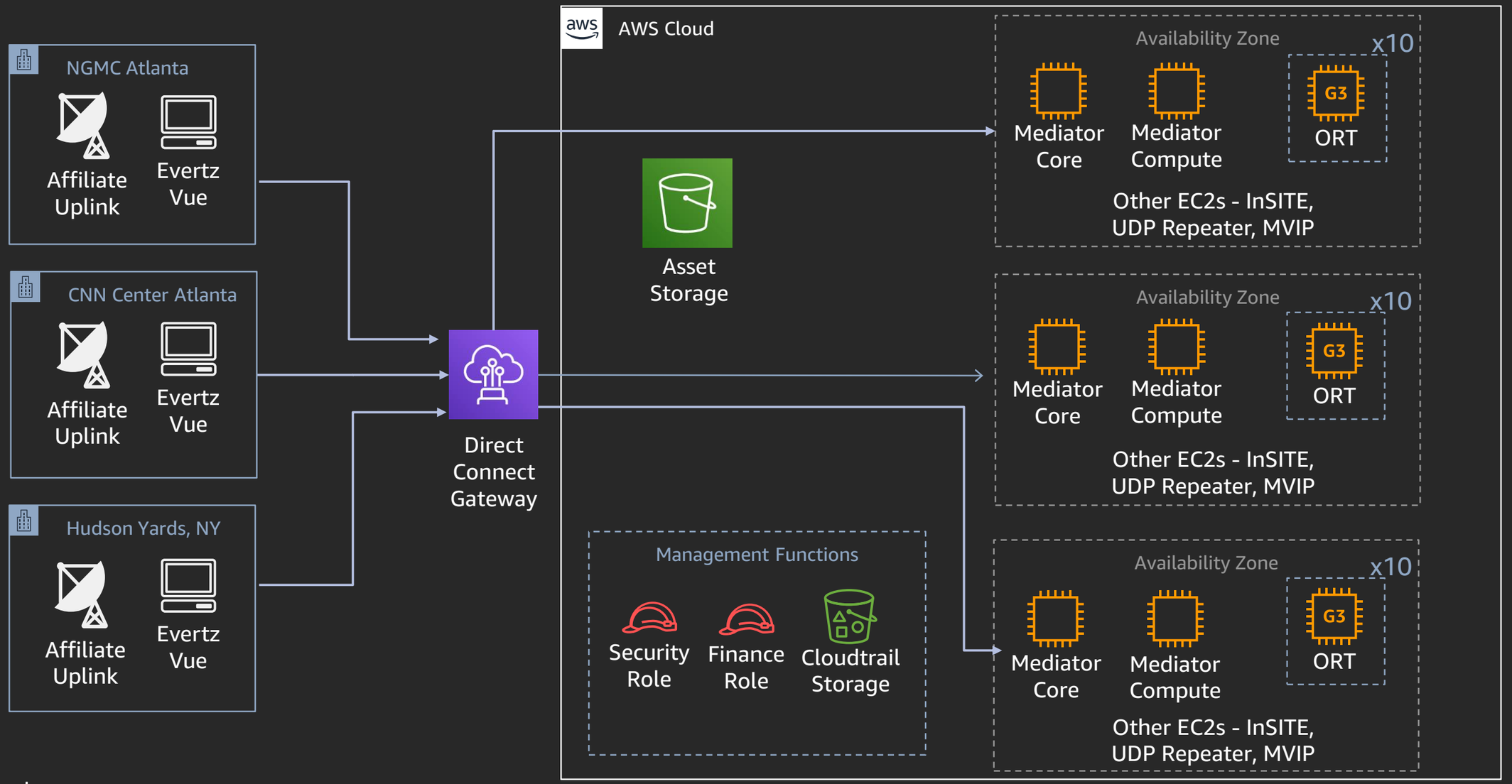
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AWS adjustments

- Turner accounts became the primary cloud assets for the WarnerMedia entity. HBO would need to re-align under the old Turner cloud organization



WarnerMedia Architecture

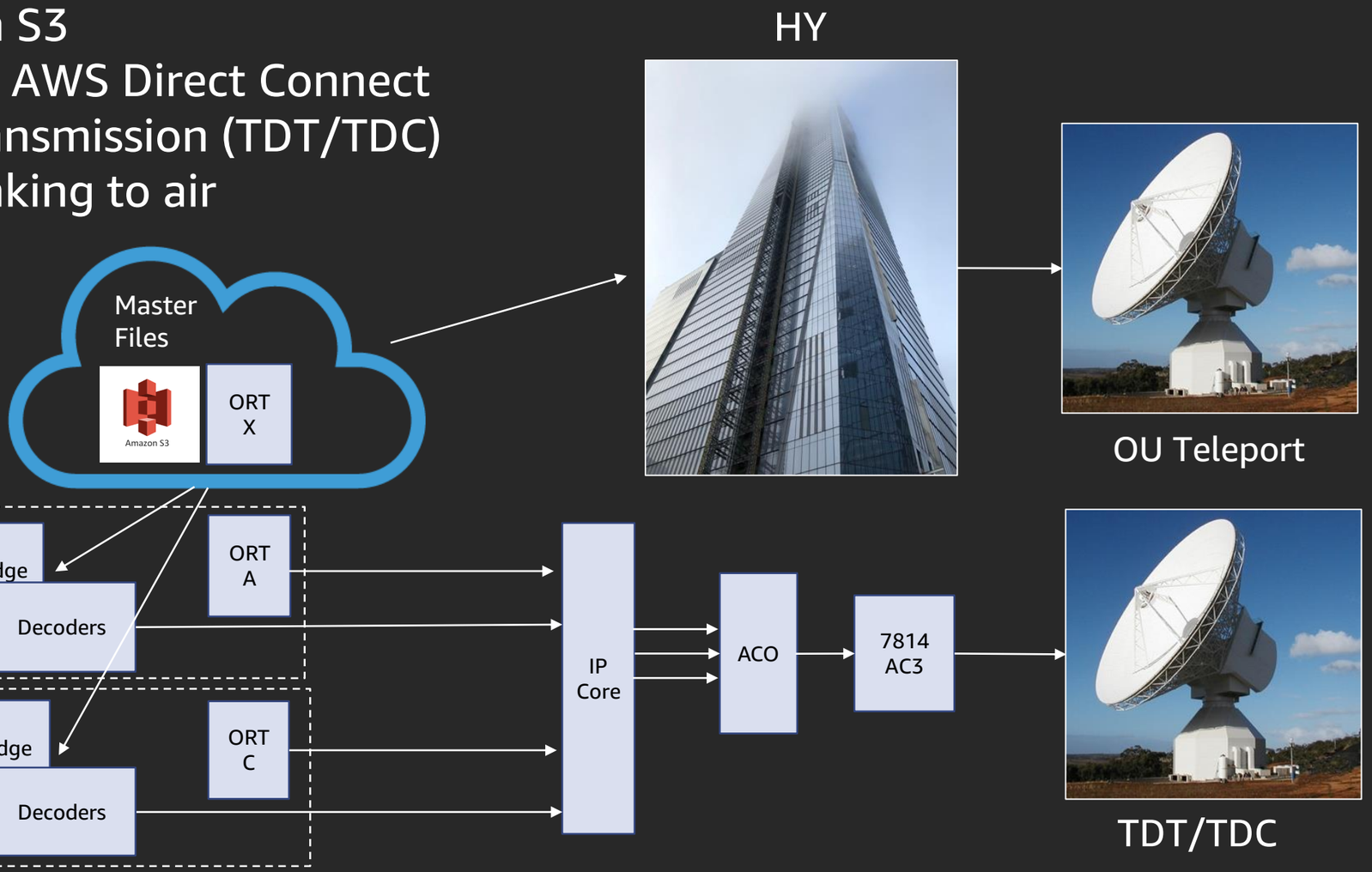


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Cloud linear playout: Signal flow for X-chain + BCP

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- Content sourced from Amazon S3
- (30) channels to TWD/CNN via AWS Direct Connect
- Signals (A, C, X) hit ACO for transmission (TDT/TDC)
- Egress from AWS only when taking to air (ignite/extinguish)



Lessons learned/future plans

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Lessens learned

Security

- Engage your CISO and internal security team early in the process and keep them a part of the project meetings

Finance

- Build a financial model looking @ Opex vs Capex
- Work with your AWS team to validate numbers and analyze various options (i.e., RIs vs Spot)
- Took longer to buy than build …

Testing

- Beyond a POC – continue to test throughout your deployment and look for ways to optimize your systems (Render X –> Evertz I/O example)

Future plans

Flex channels

- Potentially leverage CLP for OU and/or pop-up channels

StatMUX

- Working on POC for multiplexing services together and creating unique bouquets of channels

VPC hand-offs

- Look at ways to directly entitle distribution to authorized endpoints B2B partners

Live events

- Sports and news events straight from venue to cloud

Summary

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Summary

Key takeaways

- Took longer to execute the purchase than to deploy – compressed project timeline
- Able to create hybrid/scalable playout system between cloud and on-premises
- Various options for monitoring
- Multipurpose design (X-chain for on-air + BCP)
- Able to minimize Egress costs with custom solution (Evertz Magnum + VUE)

Thank you!

Matt Azzarto
Matthew.azzarto@hbo.com

Amir Abu-Akeel
aaabuake@amazon.com

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