CKN Webinar:
The Future of M&E Infrastructures
Media Data Center and beyond

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Broadcast Industry in Transition
happens: ongoing transformation in media industry
Studios are hardwired for single use

Control Rooms are connected to studios by lots of SDI cables

Production Data Centers consist of lots of physical appliances that are often used for just one show
Control rooms and Production DC no longer need to be wired directly into the studios.

A single Production DC supports multiple Control Rooms and multiple Studios.

Everything can be connected over an IP network.
First step of Lift & Shift to virtual appliances allows for move into Cloud Native

Cleaner/
Fewer Wires

On-Site or Remote
Software Defined Studios

Live Hybrid Cloud
Shared & Elastic Resources
Why hasn’t this happened earlier?

- SDI to IP could not have happened until network interface support 10/40/100Gbps for uncompressed media
- CPUs are now fast and cheap enough
- SDN maturity, orchestration platforms in production
- Data Centers and Cloud originated from enterprise use-case needs. No network guarantees and no GPUs – 2 key requirements for video production
- Real-Time use-cases (no black screen, zero packet loss) have not been well served by generic infrastructure.
WHOLE STACK CAN’T FIT IN EVERYONE’S HEAD

Need for intelligent orchestration
Media Data Center
Cisco Media Data Center

Cisco Media Data Center is a prepackaged turn-key hardware/software pod enabling customers for professional virtualized media production.
What’s in the package

- Cisco Media Data Center
  - Orchestration Layer
  - Infrastructure
- Pre-integrated multi-cloud orchestration and governance
- Media production ready compute, network, and storage
Infrastructure layer

**IP Fabric for Media**
- Nexus 9300 series spine/leaf fabric
- Media specific management functions
- Up to 100Gbps for uncompressed media flows
- Unified or redundant Fabric

**Regular IP fabric**
- UCS Fabric Interconnects 6300 series
- Up to 40Gbps for regular networking and storage access
- Ready for 16Gbps Fiber Channel storage access

**Regular compute node**
- HX240C M5 compute nodes
- 40Gbps access to regular IP fabric
- Designed to run virtual control and auxiliary media workloads
- Convertible to media-ready compute nodes for maximum flexibility

**Media-ready compute nodes**
- HX240C M5 compute nodes
- 40Gbps access to regular IP fabric
- Up to 100Gbps access to media fabric through Mellanox Connext-5 NIC with hardware based packet pacing
- Equipped with Nvidia Tesla P40 GPU for graphics acceleration
- Designed to run virtual graphics intensive media workloads
Orchestration layer

Cisco CloudCenter → DCNM (IPFM) → Broadcast Controller

Configure applications

Orchestration features
- Application modelling and deployment
- Application lifecycle control
- Workflow engine
- Cost control and Governance

Media specific capabilities
- GPU virtualization control
- PCI passthrough for NIC direct access
- Media workload intelligent Placement

Pre-built integrations
- IPFM/DCNM integration
- Support for multiple private and public clouds

API and additional integrations
- Northbound API
- Easy integration with Broadcast Controllers
- Ready to onboard media functions to be orchestrated
The Future Of Media & Entertainment Infrastructures: What’s Coming Next
New Plateau of internet bandwidth

**5G**
- Massive MIMO, Beam forming

**Wi-Fi 6**
- Super Fast Wi-fi, lower latency, increased density, improved scheduling

**Full Duplex to the home**
- DOCSIS 3.1
- XG.FAST DSL
- FTTx
Wi-Fi 6 and 5G: It’s a HetNet world

Wi-Fi 6 (802.11ax) provides more speed, lower latency, and increased device density.

5G, is the latest cellular technology, engineered to increase the speed and capacity of wireless networks.

The Internet appears to still be popular ➔ every increase of bandwidth in the past has been immediately saturated.
5G and Wi-Fi 6 are built from the same foundation and will co-exist to support different use cases.

- Wi-Fi 6 will continue to be the access choice for indoor networks
- 5G will be the designated choice for outdoor networks.
5G and Wi-Fi 6 will enable...

Enhanced mobile broadband for immersive experience via augmented and virtual reality

Industries such as hospitality, retail, and education are driving immersive experiences for their business

More screens in every home/car/office, more antennas bringing more data into and out of the home

All this means more screens, more content and more immersive experiences --> more OTT
From Screens to Immersive Experiences

IMMERSIVE COLLABORATIVE SPACES BUILT OF TILED DISPLAYS
From Screens to Immersive Experiences

FLEXIBILITY IN SCREEN ARRANGEMENT
From Screens to Immersive Experiences

SEAMLESS DISPLAY TILE RELATIVE POSITIONING CONFIGURATION USING ‘DISPLAY & SNAP’ ALIGNMENT GRID
Immersive Collaboration Experiences...
Immersive Collaboration Experiences...
Screen testing setting
Screen testing setting
Film conceptualization setting
Film conceptualization setting
In film exec, project oversight setting
In film exec, project oversight setting
Immersive Experiences in Movie Review

* Mark & Enlarge portions from ‘kanban’ screen to ‘shot review tracking’ screen
Immersive Experiences in Movie Review

* Mark & Enlarge portions from ‘screener’ screen to ‘shot annotation’ screen
EXPANDING OUR HORIZONS

Developing the Harry Butler Environmental Education Centre
Mixed Reality
T-Shirt ad placement

Original

Various options

[Images of different T-shirts with ad placements]
This is a **real** ‘vanishing’ bus advert which ran in Lithuania
(shows a wolf, which is a spiritual animal of Vilnius, crossing the street...)
It has become a social media hit...
With advanced media processing it could be treated as **native**, dynamic ad real-estate...
One friend sees Burger King...
The other friend sees McDonalds...
Mixed reality sports

‘Field’ studio
Immersive Technology can change how we watch
How we play
How we commute
How we commute
How we are entertained outside the home

Madison Square Garden  Sphere in Las Vegas (2021)
How we are entertained outside the home

Madison Square Garden  Sphere in Las Vegas (2021)
How we are entertained in the home
How much data?
Examples of VR Image sizes

- 12×1 cube map (Stereo cubic panorama) ➞ 49152 x 4096 (48K x 4K)
- 6×2 cube map (Stereo cubic panorama) ➞ 24576 x 8192 (24K x 8K)
- 24×2 cube map (Stereo cubic panorama) ➞ 98304 x 8192 (96K x 8K)

- A 12K 360 Video (4K in 120° FOV)
- 12,288 x 6,144 Pixels
- running at 30 fps

⇒ 54.35 Gbps & 24TB/hour (raw format)
What is needed to deliver these experiences?

Super fast network for capture and post-production
- Traditional 2K TV production ➔ 1.6 Gbps (uncompressed)
- 12K 360 Video ➔ 54.3 Gbps (uncompressed)

High capacity and super fast storage for rushes and post-production
- Traditional 2K TV production ➔ 720 GB / hour
- 12K 360 Video ➔ 24.43TB / hour
$180B Gaming industry driving cloud technology transitions

Professional production is moving more and more to the cloud

Content is not only being delivered from the cloud, but more and more being created and edited in the cloud

There are still gaps that need to be solved
• Application experience routing
Hybrid Cloud is changing the game

Edge compute – enable foreground and background image processing, ad–insertion, product placement and more personalized experiences
  • Massive Bandwidth reduction

Cloud is providing access to massive amounts of GPUs for rendering and processing

Cost of moving data in/out of the cloud is still expensive but... content can be edited, processed and delivered from the Cloud (in once)

Cloud provides almost infinite storage and dynamic caching so any data be accessed anywhere

Workloads moving from bare metal machines to Virtual machines, to containers – enabling multi-cloud deployments
  • Broadcast industry already embracing this today
  • OTT content distribution from the cloud
  • Cloud based render
Broadcast Industry Digitization

#SHIFT1
SDI – to – IP
Easier, simpler, future proof

#SHIFT2
Virtualization & Cloud
Cheaper at scale, flexible, faster

#SHIFT3
Re-Imagination
- Creating new IP glass-to-glass media formats
- Rapid iteration/innovation cycles
- Bring new content/rights to the screen faster

#SHIFTHAPPENS
New Content Caching systems are needed

Consumer traffic is driven by explosive growth in video and music content

Emerging, heterogeneous use-cases require new capabilities

Virtual reality  Gaming  Augmented reality
IoT mapping  Social streaming  Social sharing
CDN extended with Edge Compute Solutions

- Peering Node 100G+ Interface
- Aggregation PoD 10/40/100G Interface
- Distribution PoDs 10/40/100G Interface

Multiple Content providers

Content Peering

Traffic Streams Combined and Reduced

Intermediate Distribution Nodes

Shared Edge Content Nodes

Content Peering Point

Content Core Distribution

Traffic Consolidated into Edge Cache

SP

Multi-Content Access Distribution

High Traffic Stream in access only

Clients

⇒ Create new revenue opportunities while improving distribution scale and cost-efficiency
Scaling live OTT nationwide TV is still 10x to 100x from today

Demand for the long tail of Niche/Thematic content is clearly growing

Industry needs to be able to create and deliver JIT personalized content
Security of Distribution

Security is critical to enabling the use of the latest technologies.

What can be done from workflow in production to anti-kodi?

Shared and Pirated credentials

New technology has not been applied, suffering from old legacy solutions.
Media standards industry has to move everything to IP

Distribution content objectification standards need to be adopted by the industry to enable these experiences on the internet

Distribution needs to be open

Analytics need to be accessible

All needs to be tied to the new plateau of bandwidth on the internet and HetNet architecture to improve experience and remove friction

→ If you can’t do it on the Internet, is it worth doing?
Recap: Infrastructure Stack Overview

- Acquire/Create
- Distribute

### Analytics (Infra, Operations, Consumption)
- Content Identity and metadata
- Remote production, Pop-Up Channel, Software-defined studios
- Multi-cloud workloads deployment/orchestration
- Uncompressed/Professional IP video (SMPTE 2110, IP Fabrics, virtual Media Interface)

### Content Preparation & Playout
- Content transcoding/adaptation, personalization/rendering
- Multi-Cloud + edge workloads
- Compressed IP video - H26x Low viewer latency (<3 seconds)

### Efficient Transport Layer
- Network Native content propagation/persistency
- Multi Access & Mobility schemes / 5G / low latency

### End to End Security
Thank You!
IBC Amsterdam
13 - 17 September 2019
Accelerating ideas to audience
Cisco Stand F78, Hall 1
Intelligent IPFM workflow

Secure and Orchestrate Public and Private Cloud Resources:
- Secure Workflows
- Virtualized Processing
- Scale-out Storage
- End-to-end Security
- Hyperflex compute cluster on display

Scalable 2110 Fabric:
- 400G ready!
- Controller integrations
- SMPTE 2110 Flows
- SMPTE 2022-6/7
- PTP Monitoring
- Mixed Workflows
- RTP Monitoring
- Streaming Analytics
- Media Insights

Digital Caricaturist– Live capture via GV professional camera @ IBC

Collaborate Anywhere

Webex Teams In action
- Webex Teams Board
- Webex Team App
- Live conferencing

Meet and collaborate with Cisco experts @ the booth or via video

Learning @ Cisco
New certification programs

Multiple ISVs
- Ask us about partnerships
- Demos at Cisco and partner booths

Accelerating ideas to audience
Cisco Media Ecosystem