

Texas AM University IP Production Case Study

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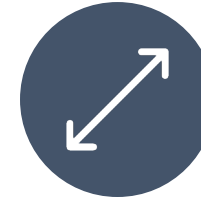
Texas A&M University Athletics – 12th Man Productions



Broadcast and post-production house for A&M Athletics



110 events per year



Increasing number of linear broadcasts to SECN



In-venue big screen shows



7 venues with fiber connectivity back to central facility



Studio built as part of football stadium rebuild in 2014, \$12M



On-going plan for updates and reinvesting



Workflow Highlevel

- 7 venues with an ever-increasing demand for sources and destinations
- Centralized Control of productions
 - 4 Control Rooms allows us to produce 2 big screen shows and 2 broadcasts
 - Lots of feeds back and forth, POVs, Wireless, monitor feeds, concourse, videoboard, replay, home and visiting teams
 - Previously point-to-point CWDM, limiting and not flexible



Challenges : Technical and Business

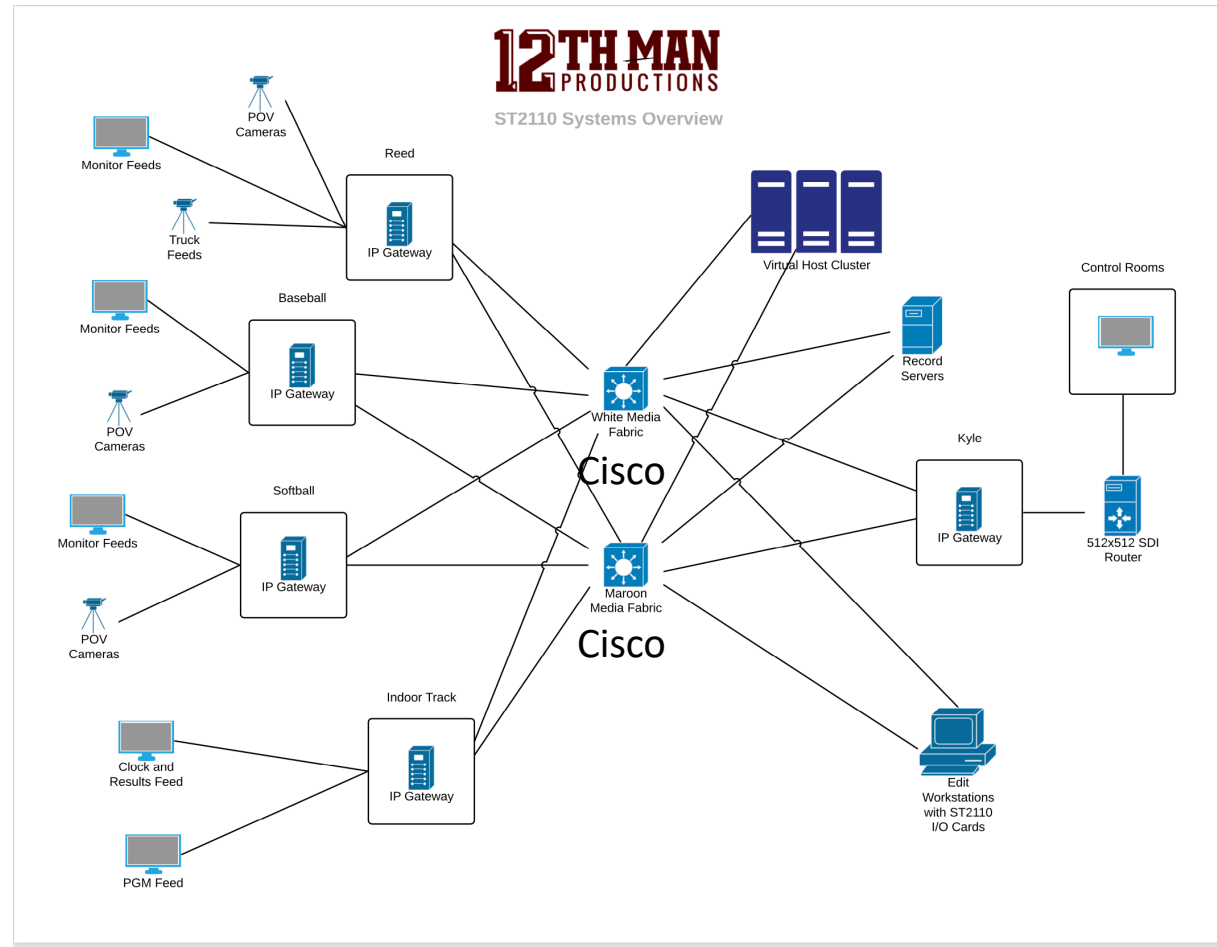
- With the increasing demand of centralized replay back to conference headquarters, having replay systems at each venue or physical relocation: inefficient, room for error, manpower
 - Ex - Basketball Arena : Truck for broadcast, limited pathways for replay signals
 - With 2110 infrastructure, capacity between venues is no longer an issue
 - Can relocate and centralize official replay encoders
- Fully routed inter-venue
- Capacity for inter-venue transport
- Virtualization
 - Predicting a major move towards VMs and leveraging IP I/O



SMPTE 2110 benefits

- Previously, each venue would be set-up/torn-down each season
 - 2110 with new equipment, all venues stay online year round
- Limited feeds with CWDM
 - Much greater bandwidth and density on same fiber
 - Venues can share feeds through network instead of point-to-point
- Outward-In approach for transition
 - Convert outer segments of infrastructure and start moving in
 - Slowly start transitioning equipment closer in to the core
 - Best bang for the buck in our use-case

High-Level Diagram





Tech Stack | Interoperability

SMPTE 2110 elements : Network, PTP Clocks, IPGs, Recording, Multiviews

- IPGs
 - Imagine Communications SNP : Qty 4
 - Riedel MicroN: Qty 1
- PC I/O
 - AJA KonaIP: Qty 6 SMPTE 2110 PC in / out
- Multiview
 - Grass Valley Kaleido IP VM
- Clocks
 - Evertz 5601MSC | IEEE1588 annexJ
- Switches
 - Nexus 9000: Qty 5

Dante devices

Formats : 1080i, 720p, long term evolution to 3G HDR (Driven by industry)



End point management : Growing Pains

- End point management
- implemented using vendor control/mgmt. to get the project rolling
- Challenges with operations and scale in multi-vendor
- Clear benefits of ISO4/05 for the future
- Controllers that support ISO4/05

Layer 2 vs Layer 3 Network

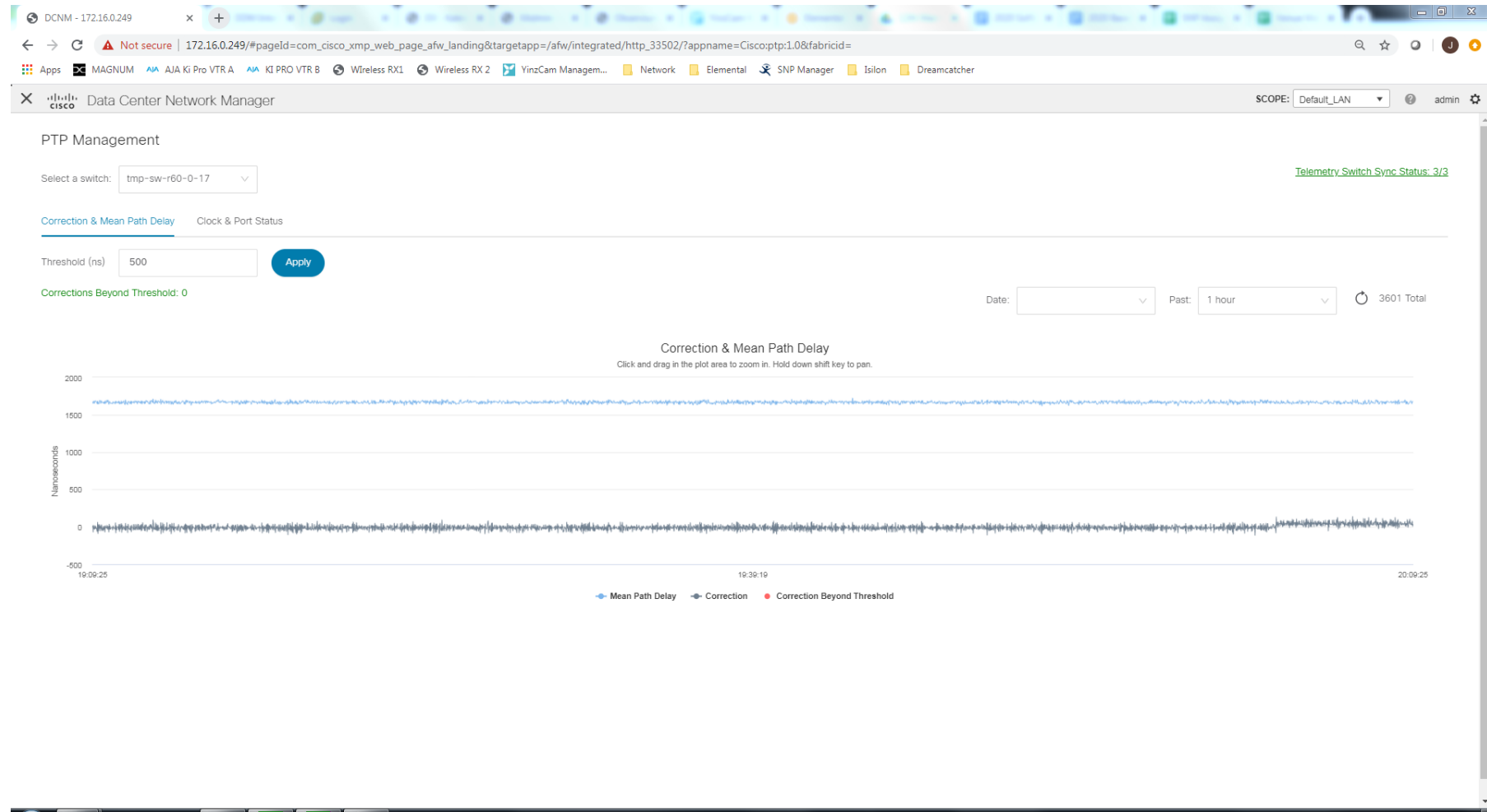
Layer 2

- Large Fault Domain
- Unoptimized BW usage
- Filtering is difficult

Layer 3

- Small Fault Domain
- Optimal BW usage
- Granular Filtering

PTP measurements



Streaming Telemetry

Software

Software Streaming Telemetry

- Captures Environmental, Protocol States, Interface Statistics and Resource Utilization data
- Streaming via GRPC, UDP, HTTP with Protobuf/JSON/YANG models

Data-Plane

Hardware Streaming Telemetry

- Captures flow information and metadata
- Triggers notifications when packet flows meet thresholds or other criteria
- Captures ASIC Statistics

In network video monitoring

Dashboard

Inventory

Monitor

Configure

Media Controller

Administration

Media Controller / RTP / RTP Flow Monitor

Telemetry Switch Sync Status: 4/4

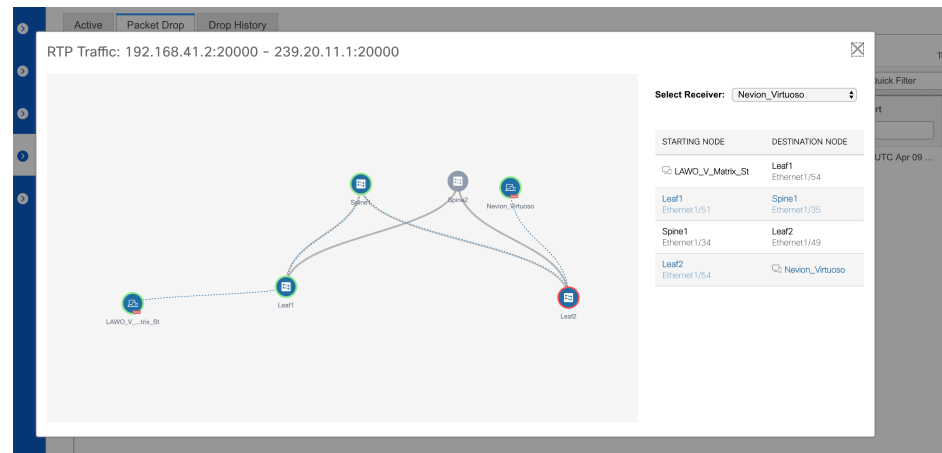
ActivePacket DropDrop History

Packet Drop History

Total 275

ShowQuick Filter

Source Port	Destination IP	Destination Port	Byte Rate	Packet Loss	Loss Start	Loss End	Packet Count	Start Time	Protocol
20000	239.20.11.1	20000	147.0 MB/Sec	102887355	23:00:43 UTC Apr 07 ...	23:06:51 UTC Apr 07 ...	1812577707	00:13:02 UTC Apr 07 ...	UDP (17)
20000	239.20.11.5	20000	45.5 MB/Sec	62368	00:14:22 UTC Apr 08 ...	00:14:50 UTC Apr 08 ...	588279746	20:03:50 UTC Apr 07 ...	UDP (17)
20000	239.30.11.5	20000	1.9 MB/Sec	55874	00:14:22 UTC Apr 08 ...	00:14:50 UTC Apr 08 ...	630364250	22:08:38 UTC Apr 06 ...	UDP (17)





Roadmap / Next steps

- Increase native ST2110 devices in the facility
- Drive vendors towards virtualization adoption
- Tighter integration :
 - Dante <> SNP
 - Dante << PTP 1588 profiles