IP Fabric Architectures for SMPTE 2110

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Cisco Systems
COTS Switches
Deterministic Network
End Point Synchronization
High Availability
Network Security
Scalability
Unchanged Operator Workflow
• **Internal Non-Blocking**  Line Rate Forwarding for Unicast and Multicast
• **Hose Model**  Host Ports BW = Uplink BW
• **Port speed**  10G/25G/40G/100G >>> 400G
• **Port form factor**  Copper vs Fiber
• **Redundancy**  Single or Dual supervisors
SMPTE 2110 End Points

- Native IP Support
  - Cameras
  - Playout Systems
  - Connect directly to the fabric

- SDI endpoints
  - Legacy
  - Requires IPGs
  - IPGs can become SDI aggregation point
Benefits
- Single point to manage
- Fits in a constrained space

Considerations
- Large Failure Domain
- Cabling: Home running
- Forklift upgrade
Benefits
- Scalable
- Flexible placement of end points
- Distributed = Smaller failure domains
- Modern IT Data Centers

Considerations
- Bandwidth Management
- Network Visibility
- Automation
- Security
Deployment Use Cases

- Studio (multiple rooms)
- Sporting Venue
- OB Van/Truck

Spine-Leaf

Single Modular Switch
IGMP = Gateway to IP world

SDI router sets up path

- End Point requests path setup using IGMP
- Fabric sets up path
Multicast Pull Model

Source

First-hop router

Source segment

Multicast data flow

PIM

Last-hop router

IGMP

Receiver segment

Cisco
PIM - Multipathing
Scalable Spine and Leaf Fabric

Benefits
- Scalable
- Flexible placement of Leafs
- Distributed = Small failure domains
- Modern IT Data Centers

Considerations
- Bandwidth Management
- Network Visibility
- Automation
- Security
Multicast Scale

4x - 16x Multicast Route Scale
Redundant Fabrics

- Two Independent Fabric
- Two Independent Network Controller
- Single Broadcast Controller
- End point connected to both fabrics
PTP Considerations

Transparent Clock

GM

Spine

Leaf

Leaf

Sync
Delay Request
Delay Response
PTP Considerations

**Transparent Clock**
- GM
- Spine
- Leaf

**Boundary Clock**
- GM
- Spine
- Leaf

Better Scale
Lower Load on the GM
NON-BLOCKING BANDWIDTH MODEL

FIGURE 4 – LARGER SYSTEMS TEMPLATE
Summary

- Identify End Points: ports, speeds, number of flows,
- Sizing for immediate project and for growth
- COTS switches
- Fabric Architecture
- PTP and advantage of boundary clock
- High Availability
Thank You

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