The Challenge of IP Video: Empower and Educate Staff

Wes Simpson, Telecom Product Consulting
in association with Media180

Real-Life I.T. vs. Broadcast Misunderstandings

• Live event feed needs firewall port opened
  – But all the I.T. Staff have left for the day
• $80 WiFi router takes over DHCP for whole network
• Security “penetration test” shuts down live broadcast
• Firmware upgrade takes primary encoder offline
• IT won’t approve a $30,000 color-grading display
• Connecting two switches took entire network down

As an industry, we need to improve communication
Changes in the All-IP Network

- Multiple signals per cable vs. one signal per cable
- Combined core infrastructure for multiple video, audio and data formats
- Maintaining high standards for video and audio quality on a packet-based network
- Creating and managing multiple workflows to accommodate a variety of distribution platforms
  - Linear, OTT, Subscription VOD

Where do We Find the Right People?

- Hire new people with needed skills? Well, maybe not:
  - Median cost of replacing a worker is 21 percent of an employee's salary
  - Typically takes new hires 5 to 9 months to reach full productivity
  - or -
- Train current employees in new technology/skill areas
  - As of 2017, more than half of employers are focusing on “upskilling” employees
  - 93 percent of millennials see ongoing skills development as important
  - Current employees are also familiar with company culture and practices
  - AT&T HR Executive: “Satisfied employees...give the company a real and substantial competitive edge”

Source: CNBC “AT&T’s $1 billion gambit: Retraining nearly half its workforce for jobs of the future” March 13, 2018
Who Needs Training?

- Broadcasters are accustomed to working with different talent groups
- Crews for video, audio, lighting/staging, engineering, on-screen talent
- IP networking is just another specialty that becomes part of team
- All team members need a common language to allow mutual understanding and to have meaningful technical discussions

Key Learning Objectives, by Group

<table>
<thead>
<tr>
<th>Media Professionals</th>
<th>Networking Professionals</th>
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</thead>
<tbody>
<tr>
<td>Protocol basics: TCP, UDP, RTP, HTTP</td>
<td>Video signal formats, standards</td>
</tr>
<tr>
<td>Addressing: MAC, IP, Ports</td>
<td>Compression, GOPs, profiles/levels</td>
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<tr>
<td>IPv4 vs. IPv6</td>
<td>MPEG2 Transport Streams</td>
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<td>Jumbo frames, packet overhead</td>
<td>Container/file formats, transcoding</td>
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<tr>
<td>Unicasting vs. Multicasting</td>
<td>Metadata, captions, ad insertion</td>
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<td>Subnets and VLANs</td>
<td>Unique hardware/software needs</td>
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<tr>
<td>IGMP, PIM, spoofing</td>
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<tr>
<td>System Security Practices</td>
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</table>
New Material for Everyone

<table>
<thead>
<tr>
<th>Both Media and Networking Professionals</th>
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<tbody>
<tr>
<td>Streaming formats - HLS, DASH</td>
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<tr>
<td>Error detection/correction, FEC, SMPTE 2022</td>
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<tr>
<td>Stream encryption, media key management</td>
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<td>Content delivery networks (CDNs)</td>
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<td>Performance monitoring for time-sensitive streams</td>
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<tr>
<td>IP Network redundancy schemes for live broadcasts</td>
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<tr>
<td>IP Media formats: AES 67, SMPTE ST 2022, ST 2110</td>
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<tr>
<td>IEEE 1588 Precision Time Protocol</td>
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<tr>
<td>Session Description Protocol (SDP)</td>
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<tr>
<td>Software Defined Networking (SDN)</td>
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<tr>
<td>AMWA NMOS IS-04, IS-05, IS-06</td>
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Case Study: NEP Group

- Worldwide supplier of broadcast services for live events
- EIC’s need to become familiar with IP technology
  - Reduce reliance on support from IT staff at headquarters
- On-site training for small groups (6-8 senior-level people per class)
  - 50% PowerPoint lessons, 50% hands-on with actual network equipment
- Topics included
  - IP networks basic concepts
  - Subnets, VLANs, device configuration
  - Multicasting, IGMP, Snooping
  - Layers 1, 2, 3 and 4
  - DNS, DHCP, NAT, Spanning Tree
Case Study Results

- EIC’s much more comfortable with IP technology
- Hands on with actual equipment
- Many questions answered and puzzles solved
- Always fair to ask “Why?”
- Ready to learn IP Video and Audio when needed

The Continuous Learning Paradigm

<table>
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<tr>
<th>KNOWLEDGE</th>
<th>UNDERSTANDING</th>
<th>THEORY</th>
<th>CAPABILITIES</th>
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<tbody>
<tr>
<td>20%</td>
<td>V.S.</td>
<td>80%</td>
<td>V.S.</td>
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</table>

20% LISTENING V.S. 80% DOING
People Generally Remember

10% of what they read
20% of what they hear
30% of what they see
50% of what they see and hear
70% of what they say and write
90% of what they do

...according to Edgar Dale’s Cone of Experience

Where to get Training?

• Media Industry Events
  – Many great seminars, sessions
• Vendor-supplied Training
  – Often included in RFPs
• Professional Organizations
  – SMPTE, IEEE, SBE, etc.
• Training Specialists
Media Industry Events

- Multiple seminars/sessions at trade shows during the year
  - NAB, IBC, NAB East, SMPTE ATC, VidTrans
  - Other regional shows (Dubai, Sydney, Singapore, Sao Paulo)
  - IP Showcase (like this one!)
- Good resource for specialized material
  - Case studies, standards progress, technology deep-dives
  - Advanced topics for experts
  - May also offer tutorial sessions

Vendor-Supplied Training

- Most (all?) vendors will supply basic product operational training
  - “Click button A, enter value B, see result C” etc.
- Some provide enhanced training/certifications
  - Cisco CCENT, CCNA, CCNP, CCIE – general purpose networking
  - Cisco IP Fabric for Media Solutions – specific to Cisco DCNM
- Many cert courses are of limited relevance to media professionals
  - Key topics (e.g. multicasting) only covered in advanced courses
  - Certs require memorization of CLI (command line interface) vocabulary/syntax
Professional Organizations

• IEEE BTS, ATSC and SBE generating new course material on ATSC 3.0
  – SBE releasing series of webinars starting in September 2018
  – IEEE BTS will offer one-day ATSC 3.0 course at multiple locations in USA

• SMPTE currently offers several Virtual Courses
  – On-line course material with weekly instructor coaching sessions
    • Essentials of IP Media Transport for Broadcasters: Moving Real-Time Video and Audio over Packet Networks
    • Understanding SMPTE ST 2110: Standards for Professional Media Over Managed IP Networks
    • Internetworking, Routing & Switching Programs from Cisco Networking Academy

Training Specialists

• Independent organizations offer standardized and customized training
  – Syllabus can be tailored for specific student needs
  – May be individual, training firm, or supplied in partnership with vendors

• Some choices to consider
  – www.media180.fr – Pascal Souclier
  – www.telecompro.tv – Wes Simpson
Thank You

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