JT-NM TR-1001-1

System Environment and Device Behaviors For SMPTE ST 2110 Media Nodes in Engineered Networks - Networks, Registration and Connection Management
The PROBLEM to be SOLVED by TR-1001-1

• SMPTE 2110 describes the packet formats
• AMWA IS-04 provides a registry for organizing resources
• AMWA IS-05 describes the stream switching API
• Each of these also includes options and optional features, and sometimes incompatible choices are possible

• There are remaining details and behavior questions when building a system, and the industry benefits when these details are specified clearly and consistently
What is covered in TR-1001-1? (1 of 3)

• Use the Standards from SMPTE and AMWA
  – SMPTE ST 2110-10/20/21/30/31/40
  – AMWA NMOS IS-04, IS-05, BCP-002

• Use the Standards in a specific way
  – In some cases this TR constrains the standards

• How devices start-up and integrate into systems
  – This TR specifies some start-up behaviors and network services, so that device makers and system builders have a common expectation about the system
What is covered in TR-1001-1? (2 of 3)

• Network Services which must be present
  – DHCP on the Management and Media Networks
  – DNS including DNS Service Discovery (DNS-SD)
  – IS-04 (NMOS) Registration and Query Services
  – System Resource Service (system constants)
  – Precision Time Protocol (PTPv2) as in SMPTE 2059
  – Unicast Routing between Management and Media Networks
What is covered in TR-1001-1? (3 of 3)

• System Startup Behaviors for Media Nodes
  – How nodes find the System Resource (via DNS-SD)
  – How nodes find the IS-04 Registry (via DNS-SD)
  – How nodes suggest grouping using BCP-002-01
  – How to identify if the current configuration is valid, out-of-date, or out-of-place (via System Resource)
  – How senders get their TX information (via IS-05)
Network Services – DHCP and DNS

• DHCP for Management and Media Networks
  – Eliminates the need to set host IP addresses by hand
  – Avoids errors and duplications
  – Tells the nodes how to find the DNS servers
  – Can securely register the node’s hostnames into DNS

• DNS (Domain Names Service)
  – Nodes use DNS Service Discovery (DNS-SD) to find the IS-04 registration service and the system resource
  – Finding the System Resource and Registration Service are vital to system startup and system resiliency
Network Architecture Flexibility

- **Unicast Routing between Management and Media Networks**
  - Enables a mix of devices, some with management on the media networks, and others with separate management networks

- **Separate Subnets for Main and Protect Media Nets**

- **Specific “Network Hygiene” rules**
  - Every interface has unique MAC
  - Every interface has its own Host IP
  - Must support Echo-Request (ping)
Network Services
– System, NMOS, and PTP

- System Resource Service (provides global system constants)
  - Includes the PTP domain number and other PTP constants
  - Includes the registry timeout settings
  - Avoids needing to configure these by hand for every device in the system

- IS-04 (NMOS) Registration and Query Services
  - Nodes find the Registration Service using DNS-SD (not MDNS)
  - Nodes must register into the IS-04 Registry
  - Nodes should use the BCP-002 “grouphint” to signal natural groupings
  - Controllers look in the IS-04 Registry to find the nodes
  - Nodes update the Registry to signal switching events and other changes

- Precision Time Protocol (PTP)
  - as required by SMPTE ST 2110
System Startup Behaviors

- How nodes find the System Resource
  - Look up "_nmos-system._tcp" using DNS Service Discovery (DNS-SD)

- How nodes find the IS-04 Registration Service
  - Look up "_nmos-registration._tcp" using DNS Service Discovery (DNS-SD)

- How nodes identify if their current config is valid, or out-of-date, or out-of-place
  - Check the stored "system-ID" against the current system resource (to figure out if this is a new system and the configuration is invalid)
  - Check the time of the last saved configuration against the current system resource version timestamp (in case the node spent a long time in storage)
System Startup Behaviors

• How senders get their transmit configuration
  – If the config is current and from the same system ID, use the settings you have stored and start up
  – If the config is out of date or it’s a new system:
    • Mute the transmitters
    • Disconnect the receivers
    • Wait for instructions

• Nodes shall support TX configuration via IS-05
  – A controller will configure new nodes
Industry Benefits of TR-1001-1

• Add New Media Nodes to a System Easily
  – DHCP (automatically) provides network addresses
  – DNS-SD (automatically) discloses the services
  – Devices follow specified configuration start-up behaviors
  – IS-04 registration and IS-05 controls integrate the system

• Gives Users a uniform set of requirements language
  – TR-1001-1 should be referred to in RFI, RFP, RFQ
  – Eliminates customers needing to create their own unique requirements documents covering these system basics

• Gives Vendors a consistent set of requirements to develop against when making IP Media System products
JT-NM TR-1001-1  Demo Participants
A Special Thanks to

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