Interoperability Events Update and IBC 2019 IP Showcase

VSF Meeting
Microsoft Technology Center
New York, NY
October 21 and 22, 2019

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Types of Events

- Dirty Hands Workshops
  - Validate SMPTE ST 2110 and ST 2059 standards
  - Help ensure the interoperability between compliant vender equipment
  - Provides live environment to test and demonstrate multi-vendor interoperability

- JT-NM Tested Events
  - Testing conformance to the standards
  - Snapshot in time of how vendor equipment conforms to key parts of ST 2110, ST2059 and TR1001-1
  - http://jt-nm.org/jt-nm_tested/

- Prestaging Events
  - Prepare for IP Showcase
  - Stage equipment and demonstrations that will be shown at the IP Showcase

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Summary of Dirty Hands, JT-NM Tested and Prestaging Events ST 2059 and ST 2110

Date	Location	Dirty Hands ST 2059	Dirty Hands ST 2110 & Associated Technologies	JT-NM Tested	Prestaging Events	Number of Companies	Number of Participants
Nov 9 to 13, 2015	Fox, Houston, TX	X				12	15
Jan 18 to 22, 2016	Fox, Houston, TX		X			21	37
Jun 13 to 17, 2016	Fox, Houston, TX	X				21	35
Aug 22 to 26, 2016	Fox, Houston, TX	X	X		X	39	50
Feb 6 to 10, 2017	Fox, Houston, TX	X	X			30	55
April 3 to 6, 2017	Fox, Houston, TX				X	43	70
Aug 14 to 18, 2017	Fox, Houston, TX				X	49	100
Feb 5 to 10, 2018	Fox, Houston, TX	X	X			17	24
Feb 11 to 16, 2018	Fox, Houston, TX	X	X			60	130
Mar 18 to 23, 2018	Fox, Houston, TX				X	53	100
Aug 18 to 24, 2018	Riedel, Wuppertal, Germany				X	61	118
Feb 18 to 22, 2019	Fox, Houston, TX	X	X			38	73
Mar 18 to 22, 2019	Fox, Houston, TX			X	X	50	90
Aug 19 to 23, 2019	Riedel, Wuppertal, Germany		X	X	X	37	80

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First Dirty Hands Event for ST 2059 / ST2110
November 2015

12 Companies

15 Participants

Fox, Houston, TX

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Dirty Hands, JT-NM Tested and Prestaging Events for ST 2059 / ST2110 February 2018

60 Companies

130 Participants

Fox, Houston, TX

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Dirty Hands, JT-NM Tested and Prestaging Events for ST 2059 / ST2110 August 2018

61 Companies

118 Participants

Riedel, Wuppertal, Germany

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Dirty Hands, JT-NM Tested and Prestaging Events for ST 2059 / ST2110 August 2019



37 Companies

80 Participants

Riedel Wuppertal, Germany

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JT-NM Tested Program

Snapshot in time of how vendor equipment conforms to key parts of ST 2110 and ST2059

JT-NM Tested Program Catalog
Administered by the EBU and IRT

- Badges for participating vendors equipment
- March 18-22, 2019
- August 19-23, 2019

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Dirty Hands, JT-NM Tested and Prestaging Events

Many Powerful Minds at the Events

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JT-NM Tested Experts Group

Test Plans were prepared by the JT-NM Tested Experts Group:

- Alun Fryer (Ross Video)
- Andy Rayner (Nevion)
- Bill McLaughlin (EEG)
- Felix Oberhardt (IRT)
- Franz Baumann (IRT)
- Nadege Nzoyem (IRT)
- Ievgen Kostiukevych (EBU)
- Willem Vermost (EBU)
- Jack Douglass (PacketStorm Communications)
- Jean Lapierre (Matrox)
- Andrew Bonney (BBC)
- Peter Brightwell (BBC)
- Leigh Whitcomb (Imagine Communications)
- John Mailhot (Imagine Communications)
- Mike Overton (Tektronix)
- Mike Waidson (Tektronix)
- Pedro Ferreira (Bisect)
- Robert Welch (Arista Networks)
- Serge Grondin (Grass Valley)
- Sonja Langhans (IRT)
- Thomas Kernen (Mellanox Technologies)
- Hugo Caviedes (Riedel)
- Arne Boenninghoff (Riedel)
- Claudio Becker-Foss (DirectOut)

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Tests Performed

General Tests	Network connectivity, PTP timing, IGMPv3 (join and leave multicasts) and SDP (device's I/O configuration) files
SMPTE ST 2110-20	Receive and transmit video, including SMPTE ST 2110-21 buffering support and video free of artifacts
SMPTE ST 2110-30	Receive and transmit audio, including no audible artifact being heard
SMPTE ST 2110-40	Ancillary data support, including DID/SDID support, caption presence and no stream payload errors
SMPTE ST 2022-7	Seamless protection switching, including sending audio, video & data, and receiving audio, video & data with 25% errors, packet delay and packet delay variation

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JT-NM Tested Program Test Plan

1. General Network Interface Tests
    - Management Network Interface Test
    - Media Network Interface Test
2. Media Network Related Tests
    - Basic PTP Configuration Test
    - Manual PTP Configurability Test
    - BMCA Master/Slave Test
    - One Step/Two Step Master Lock Test
    - Basic Multicast Configuration Test
    - Extended Multicast Range Configurability
3. ST 2110-10 Tests
    - IGMPv3 Test for a Receiver
    - SDP Verification for a Sender
4. TX – ST 2110-20 Tx Tests
    - Stream Basic Test Tx
    - Stream Visual Validation Tx
    - ST2110-21 Profile Sender Compliance Test Tx
    - RTP-Timestamp-Test
4. RX – ST 2110-20 Rx Tests
    - ST2110-21 Profile Receiver Compliance Test Rx
    - Stream Visual Validation Rx
5. TX – ST 2110-30 Tx Tests
    - Stream - Basic Test
    - Stream - Audible Validation Tx
    - RTP-Timestamp-Test
5. RX – ST 2110-30 Rx Tests
    - Stream – Audible Validation Rx
6. TX – ST 2110-40 Tx Tests
    - Stream -40 Validation Tx
6. RX – ST 2110-40 Rx Tests
    - Stream -40 Validation Rx
7. ST 2022-7 Tests (Hitless)
    - Stream - Basic Test Tx
    - Stream - Basic Test Rx
    - Redundancy Test – 25% Synchronized Packet Loss, Packet Delay and Packet Delay Variation

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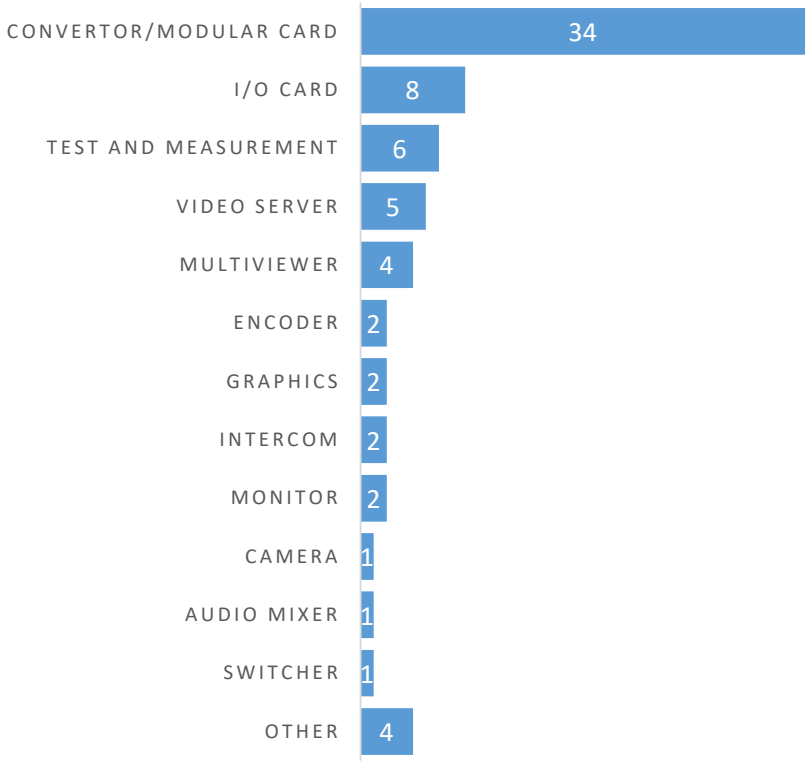
Product Categories Tested March 2019



72 products were tested

Products covering all the key areas important to production and playout workflows

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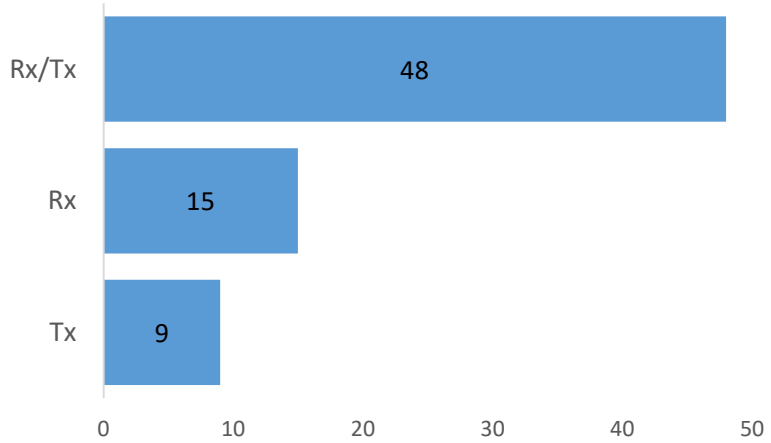
Receivers & Transmitters March 2019



The majority of products could receive and transmit SMPTE ST 2110

Receive only products were made up of convertors, test and measurement, multiviewer and monitoring products

Transmit only products were primarily convertors

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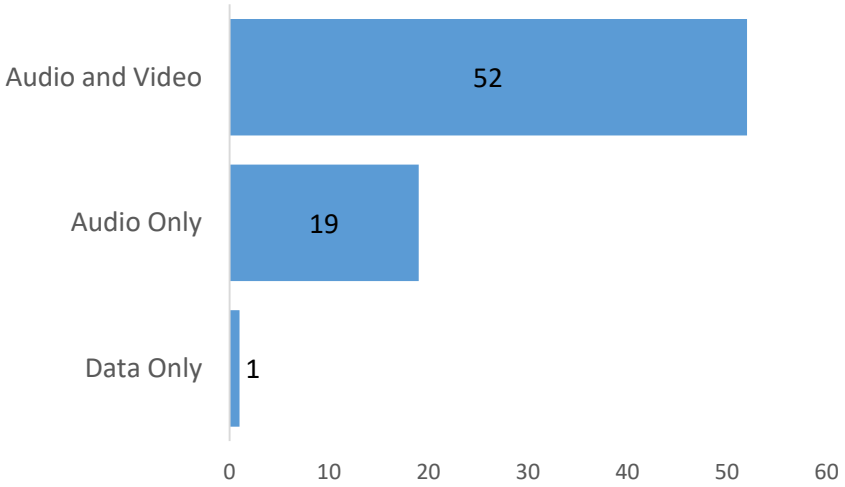
Audio, Video & Data March 2019



Most products supported audio, video and ancillary data services

A substantial number of audio only products were tested and were convertors, monitoring, intercoms and mixers

There was one data only product for caption insertion

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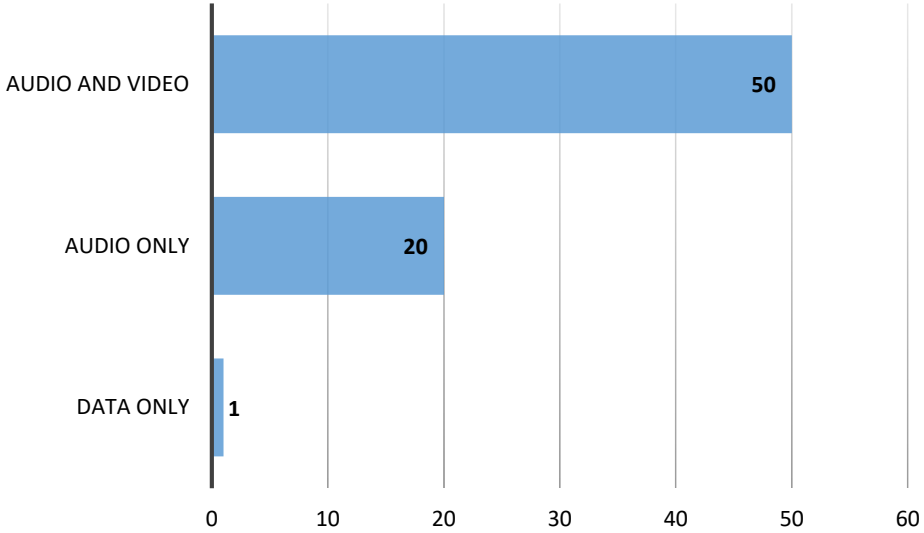
Audio, Video & Data
August 2019



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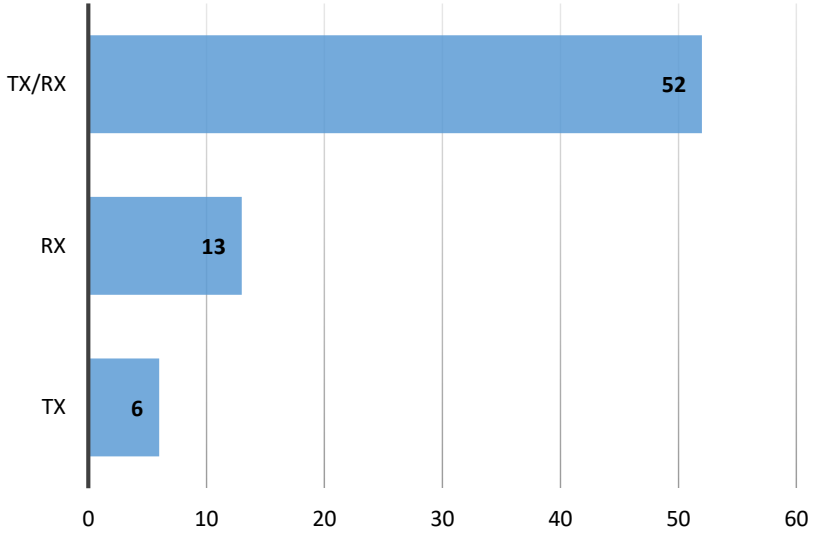
Receivers & Transmitters August 2019



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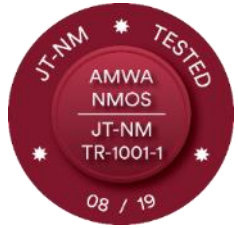
“JT-NM Tested August 2019 Program” NMOS/TR-1001 Test Plan



1. Media Node Startup Behavior
    - DHCP
    - LLDP
    - System Resource Params
    - Using DNS-SD to find the IS-04 Registry
2. Media Nodes & IS-04
    - Schema Conformance
    - Unicast Discovery
    - Basic Registration
    - Advanced Registration
    - Consistency of UUIDs
3. Media Nodes & IS-05
    - Schema Conformance
    - Single Sender Routing
    - Single Receiver Routing
    - Scheduled Activation
    - Buk Sender Routing
    - Bulk Receiver Routing
    - Integration with IS-04
4. Media Node Streaming
    - Configuring Senders and successful reception of configured
    - ST.2110-20/30/40 stream via IS-05
    - Configuring Receivers and successful reception of a ST.2110-20/30/40 stream using an SDP file via IS-05
    - SDP files including source-filters in senders
5. Media Nodes & IS-08
    - Schema Conformance
    - Activations
    - API Behavior
    - Integration with IS-04

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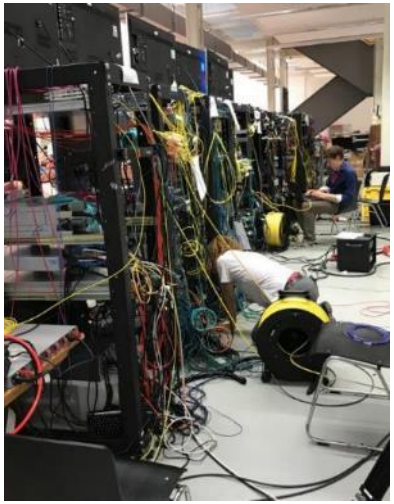
Prestaging Events

- Logistically it is necessary to pre-stage it because of the size and complexity of the demonstration
- Determine rack layout, graphics and underfloor cabling
- Off-site preparation – cable labels, power, adaptors, tools, last minute gotchas
- Analyze all the components necessary for event
  - Cable, optic, elevations, wire run list, equipment that will be used, demonstration that will be shown
- Back-up plans



IP Showcase Events

- IBC 2016
- NAB 2017
- IBC 2017
- NAB 2018
- IBC 2018
- NAB 2019
- IBC 2019

IBC 2019 IP Showcase
Amsterdam

Approximately 800 People Scanned

IBC 2019 IP Showcase Theatre

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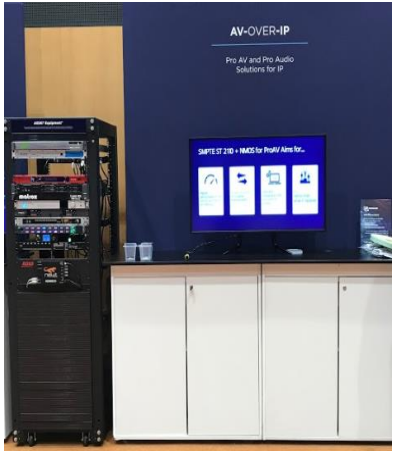
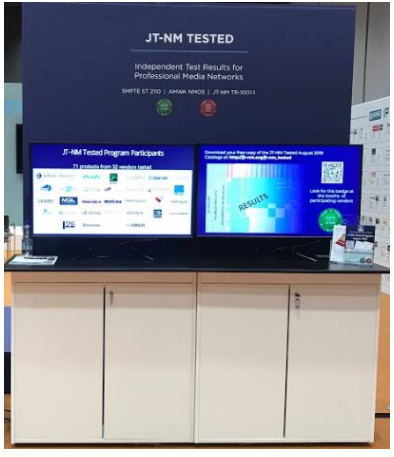
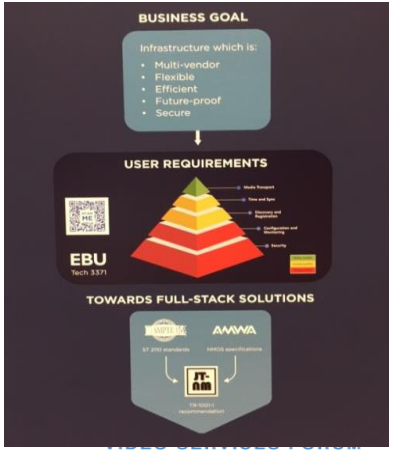
IBC 2019 IP Showcase
PODs







Conclusions

- Most of the standards and specs have been validated
- The industry has achieved a high level of interoperability
- The JT-NM Tested program has helped achieve this
- JT-NM Tested results should be considered when making equipment purchasing decisions
- Some future workshops will be required to validate some of newest standards
- Need Protocol Implementation Conformance Statement (PICS) and Standardize Test Plans

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Future Events / Workshops

- JT-NM Tested Event
  - February / March 2020 – TBD
  - Location – TBD

- Dirty Hands Event – TBD
  - ST 2059
  - ST 2110
  - TR 1001-1

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