

# JT-NM TESTED EVENT 08/19

RIEDEL Communications , Wuppertal, Germany - August 19 - 23, 2019 http://jt-nm.org/jt-nm\_tested/



# CONTENT

- What is JT-NM Tested?
- What tests did we perform?
- Test plan tools
- Findings
- Results
- Survey
- Conclusions





JT-NM Tested Programme – What is it?

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- Offers more documented insight into how vendor equipment aligns with the SMPTE ST-2110 and SMPTE ST-2059 standards.
- Added testing of JT-NM TR-1001-1 and AMWA NMOS specifications at this event
- Documents: the test procedures, test equipment and results.
- This program is not a certification program; it is a snapshot in time of how vendor equipment conforms to key parts of standards and specifications.

JT-NM Tested Programme – What did we test?

- 3 type of tests:
  - Data plane: Basic SMPTE 2110 behaviour
  - Control plane: AMWA NMOS and JT-NM TR-1001-1 behaviour
  - Cyber Security Vulnerability Assessment
- Who attended:
  - 32 different vendors attended at Riedel
  - 71 different products were tested for the data plane basics
  - a subset of 34 products for the control plane test

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## THE TECHNOLOGY PYRAMID FOR MEDIA NODES

Minimum User Requirements to Build and Manage an IP-Based Media Facility

#### Time and Sync

PTPv2 configurable within SMPTE and AES profiles Multi-interface PTP redundancy Synchronisation of audio, video and data essences

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NMOS / TR-1001 Test Plan

SMPTE ST 2110 Test Plan

### **Configuration and Monitoring**

#### IP assignment: DHCP

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Open configuration management - e.g., API, config file, SSH CLI, etc. Open monitoring protocol e.g., syslog, agent, SNMPv3, etc.

Security Testing

#### Media Transport

Single link video SMPTE ST 2110-20 Software-friendly SMPTE ST 2110-21 Wide video receivers Universal, multichannel and low latency audio SMPTE ST 2110-30 Level C Stream protection with SMPTE ST 2022-7

### Discovery and Registration

Discover and Registration: AMWA IS-04 Connection Management: AMWA IS-05 Audio channel mapping: AMWA IS-08 Topology discovery: LLDP

Security

EBU R 148 Security Tests EBU R 143 Security Safeguards Secure HTTPS API calls

Widely available

Partially available

Rarely available

## JT-NM Tested Programme – Test Plan & Tools

- Test Plans:
  - SMPTE ST 2110 Test plan
  - NMOS/TR-1001 Test plan
  - EBU R 148
- Pre-testing documents:
  - Capturing guide
  - How to use EBU LIST
  - How to use the NMOS test suite

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- Tools:
  - EBU LIST
  - NMOS Testing Tool

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#### EBU OPERATING EUROVISION AND EURORADIO R 148 CYBE This sl that is genera capabi ON M Joint Task Force on Networked Media "JT-NM Tested Program August 2019" - 23 August 2019 v1.3 NET "JT-NM Tested Program August 2019" Too SMPTE ST 2110 Test Plan v.1.3 REC Post-te лт. 6m Joint Task Force on Networked Media JT-NM Tested NMOS/TR-1001 Test Plan - 23 August 2019 v1 2 Preg Cha "JT-NM Tested August 2019 Program" captur First, 1 NMOS/TR-1001 Test Plan v.1.2 Version 1.2 Changelog · Update support equipment to match event Remove LLDP sub-test which is not applicable to TR-1001 Indicate which NMOS testing 'warnings' are being classed as a 'pass' in this test Split 4 x tests' pass criteria into two par Version 1.1 Changelog Added AMWA IS-08 testing in section 5 Gene Updated support equipment and testing tool instruction April Version 1.0 Changelog · First draft. This document may undergo substantial changes ahead of the final version AMWA IS-08 testing has been omitted from this draft, but is likely to be included in the final test plan Abstract and motivation behind the program JT-NM Tested Program returns to the IP Showcase. The JT-NM continues to partner with vendors and users to provide information that aids the transition to IP. As the industry's use of IP matures, the JT-NM Tested program offers prospective purchasers of IP based equipment greater, more documented insight into how vendor equipment conforms to the SMPTE standards and AMVVA Sponsored by the JT-NM and administered by the EBU and IRT, two top European technical bodies, who have been administering the second of the second seco booth and on-line. This catalog will provide transparency, describing the test criteria and testing audur and our-me: "This Stationg time provide transportancy, beedlinging the test Chienia and desiring methodology, as well as the hardware and software versions of the products that were tested. This program is not a certification program, insther it is a snapshot in time of how vendor equipment conforms to key parts of SMPTE standards and AMWA NMOS specifications, providing prospective purchasers and users with a reference as they begin their equipment evaluation and

A short guide to capturing an acceptable PCAP for JT-NM Tested August 2019 pre-testing using Mellanox NICs levnen Kostiukewich Willem Vermost Pedro Ferreira EBU August 2015 EBU Live IP Software Toolkit - Export JSON report v1.0 A short quide to the EBU Live IP Software Toolkit in order to enable participants of the JT-NM Tested Program to extract and EBU August 2019 EBU Live IP Software Toolkit Containerized Install Guide v1.0 A short guide to installing and running EBU-LIST as a containerized application evgen Kostiukevvo Broadcasting Unio Union Union Abstract This short guide is covering one of the methods for making use of the EBU Live IP Software Toolkit. You will be guided through installing Docker Desktop, creating a docker-compose YAML file and starting the application. Tools https://www.docker.com/products/docker-desktop
https://hub.docker.com/r/ebutech/pi-list Instal Install Docker Desktor Go to https://hub.docker.com Create a free account Download Docker Desktop: https://www.docker.com/products/docker-desktop Install the version appropriate to your operating system Make sure to start Docker Desktop Create docker-compose.vml Create a new folder on your system Create a file in this folder with the name docker-compose.yml Copy & paste the following text into this file

Lon: ")" Loogi Flandb: Volume: - influendb:/way/llb/Lofloodb - influendb:/way/llb/Lofloodb

## SMPTE ST 2110 Test Plan

- Basic management and media network configurability and behaviour
- ST 2059 Basic PTP configurability and behaviour
- ST 2110-10 testing, including IGMP and SDP and timestamping
- ST 2110-20 testing, including visual validation
- ST 2110-21 testing, C and VRX

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• ST 2110-30 testing, including audible validation

- ST 2110-40 testing
- ST 2022-7 testing, both basic and recovery
- UHD testing

## NMOS/TR-1001 Test Plan

- Dynamic Host Configuration Protocol (DHCP)
- Link Layer Discovery Protocol (LLDP)
- TR-1001-1 System Resource (future IS-09)

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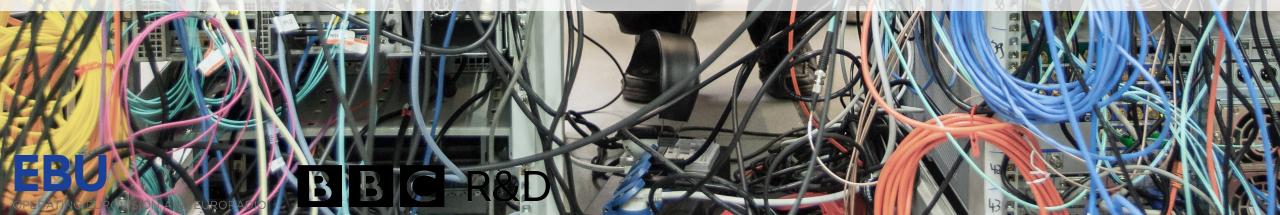
- PTP configuration discovery
- IS-04 Discovery & Registration
  - Using unicast DNS Service Discovery (DNS-SD)
- IS-05 Connection Management
  - Including stream tests
- IS-08 Audio Channel Mapping
  - Where implemented

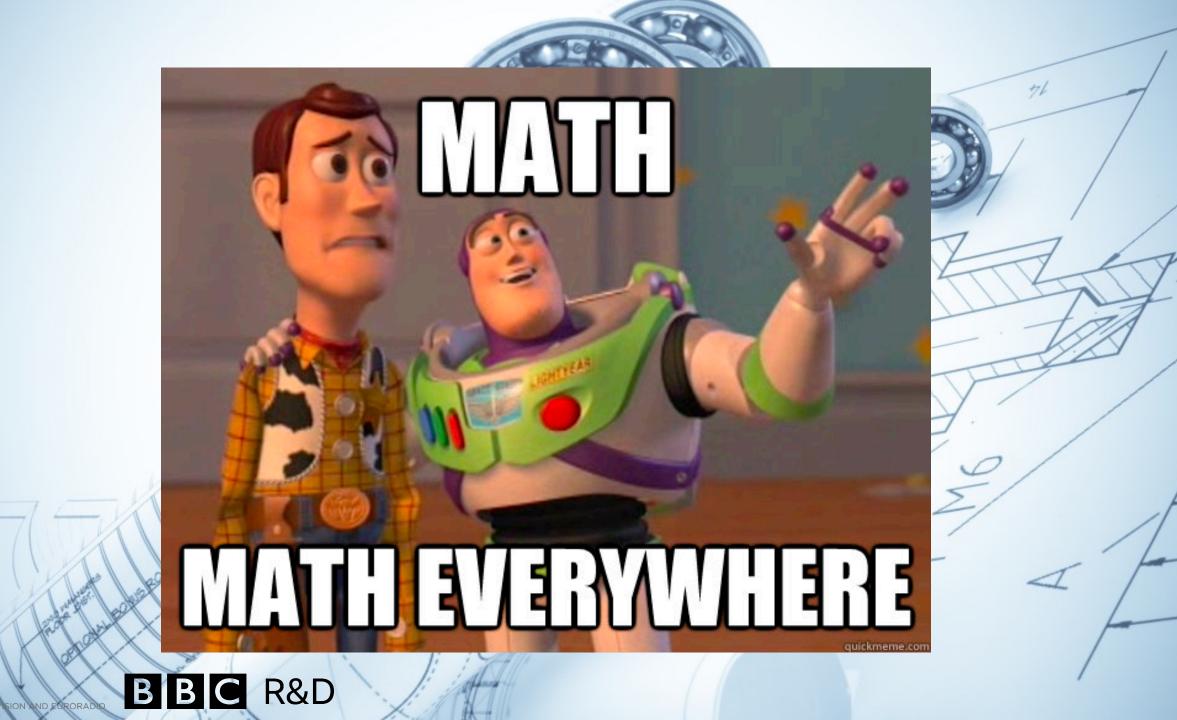
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# FINDINGS AND RESULTS

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General Network Interface Test	2. Media Network Related Tests	3. ST 2110-10 Tests	4. ST 2110-20 Tests	6. ST 2110-40 Tests	7. ST 2022-7 Tests				
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# Data plane: Basic SMPTE 2110 behaviour



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## Findings – SMPTE ST 2110 Test Plan

- 100% pass rate: 31 out of 71 devices
- All but 22 devices achieved > 90% pass rate across the board
- The worst test results were 2022-7 related

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• Video Tx devices (34):

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- KPI should be 0 devices failing these critical tests:
  - 21% (7) fail the 2110-21 test. This is critical in order to have interoperability and reliability.
  - 26% (9) fail to deliver an SDP file or deliver a faulty SDP file

Common Issues – ST 2110

- Biggest fail rate was in ST 2022-7 testing
- Disturbing fail rate in ST 2110-21 and ST 2110-10 which are fundamental
- A lot of products are still struggling with RTP timestamping can be linked to the ambiguity in the standard
- Still not a lot of UHD-capable products

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Lessons Learned – ST 2110

- Overall the success rate is much better than last time
- Vendors recognized the need and value of mandatory self-testing
- PTP stability was much better this time

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Pod testing can be optimized

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 It is critically important to feed the results and findings back into SMPTE for ambiguities resolution

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Findings – NMOS / TR-1001-1 Test Plan (Results: Andrew Bonney, James Gibson)

- 100% pass rate: 6 out of 34 devices global
- 100% pass rate: 20 out of 34 devices NMOS IS-04 and IS-05
- All but 4 devices achieved >90% pass rate across the board
- LLDP had the worst results
  - 39% pass rate for management interfaces
- DHCP support was better

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• 92% support on management interfaces

- 78% support for media interfaces
- Almost 8000 individual tests carried out, with around 90% carried out using automated means

- Very few common failures across devices beyond items which simply hadn't been implemented
- There were some issues with:
  - IS-04 UUID consistency

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- IS-05 changes taking effect in streams & use of IGMPv3 source filters
- We observed DHCP configuration confusion across Nodes with multiple network interfaces

### Lessons Learned – NMOS / TR-1001-1

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- Stream and discovery testing
  - Slow, but valuable some of the most important test results to observe
  - We aim to further automate this process
- Pre-testing makes a big difference!
  - Vendors could work on issues well in advance and become familiar with the process
  - Issues were quickly identified if devices failed to match their pre-testing results
- Fully featured implementations were quick to test
  - Proving the principles of JT-NM TR-1001-1

Findings – Cyber Security Vulnerability Assessment (Results: Gerben Dierick, Alvaro Santos, Adi Kouadio)

## 387 Vulnerabilities found

- 18% of the vulnerabilities are critical to highly critical and shall be handled immediately by the 10 vendors concerned
- 80% of the vulnerabilities found are moderated but can be exploited to cause harm. Can be fixed by following traditional IT best practices.

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More info in the report!

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Highly Critical - Sev. 4	
Critical - Sev. 3	
Moderate - Sev. 2	F
.ow - Sev. 1	að

30%

16%

52%

## **Participants Feedback Survey**

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JT-NM Tested Programme - Participant Survey - August 2019

3 0 Average of In your opinion, how Average of In general, how Average of In general, how Average of How well was the event Average of In your opinion, how Average of Please rate the Average of How likely are you relevant and adequate were the beneficial was the JT-NM Tested satisfied are you with the JT-NM well were the tests performed by interpersonal qualities of the (your company) to participate in organized? tests performed at the event? August 2019 event for your Tested August 2019 event? the testing teams? testing team (friendliness, another JT-NM Tested Event, if it company? openness, transparency). ever happens?

### **Potential Future Tests**

- ST 2110
  - ST 2110-31, ST 2110-22
- NMOS/TR-1001-1
  - IS-04 registry and client testing
  - IS-08 stream testing

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- Configuration consistency between vendors' Uls, IS-0X and SDP files
- More serious PTP testing has to be considered

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Pod approach can be deprecated in favour of fully routed network

### Conclusion

- Improved results compared to the first test event
- The industry starts to see the need for a common control plane
- Mandatory self-testing is essential for implementations improving
- This event needs to be repeated in order:
  - To get better quality implementations
  - To get for more of the needed features of the pyramid
- Value Created for the industry:
  - Getting the current state of implementations
  - Improving the implementations

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Safeguarding the investments for new facilities



# Thank you!

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