JT-NM TESTED EVENT 08/19

RIEDEL Communications , Wuppertal, Germany - August 19 - 23, 2019

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CONTENT

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

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JT-NM Tested Programme – What is it?

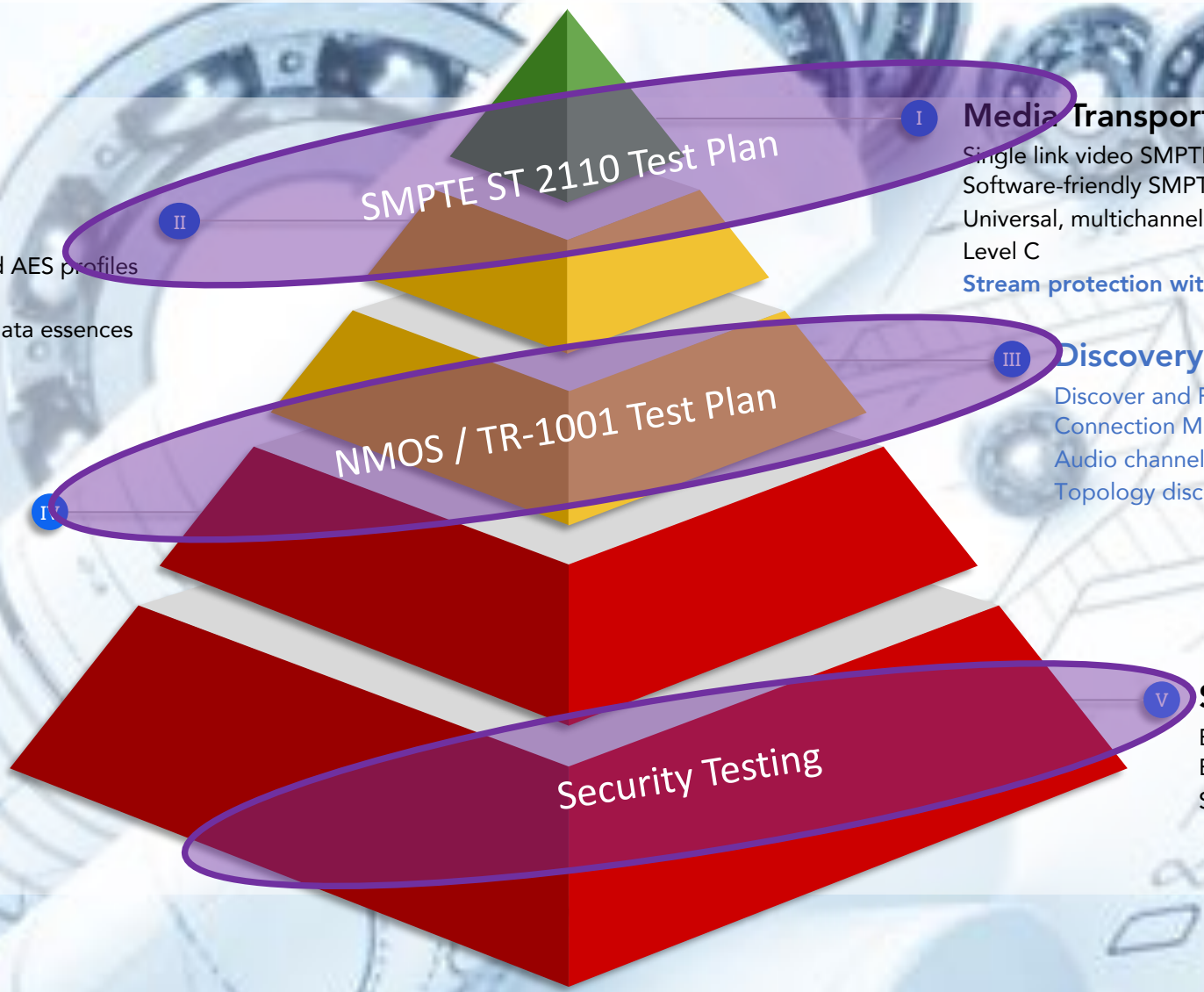
- Offers more documented insight into how vendor equipment aligns with the SMPTE ST-2110 and SMPTE ST-2059 standards.
- Added testing of JT-NM TR-1001-1 and AMWA NMOS specifications at this event
- Documents: the test procedures, test equipment and results.
- This program is not a certification program;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

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

Configuration and Monitoring

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

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

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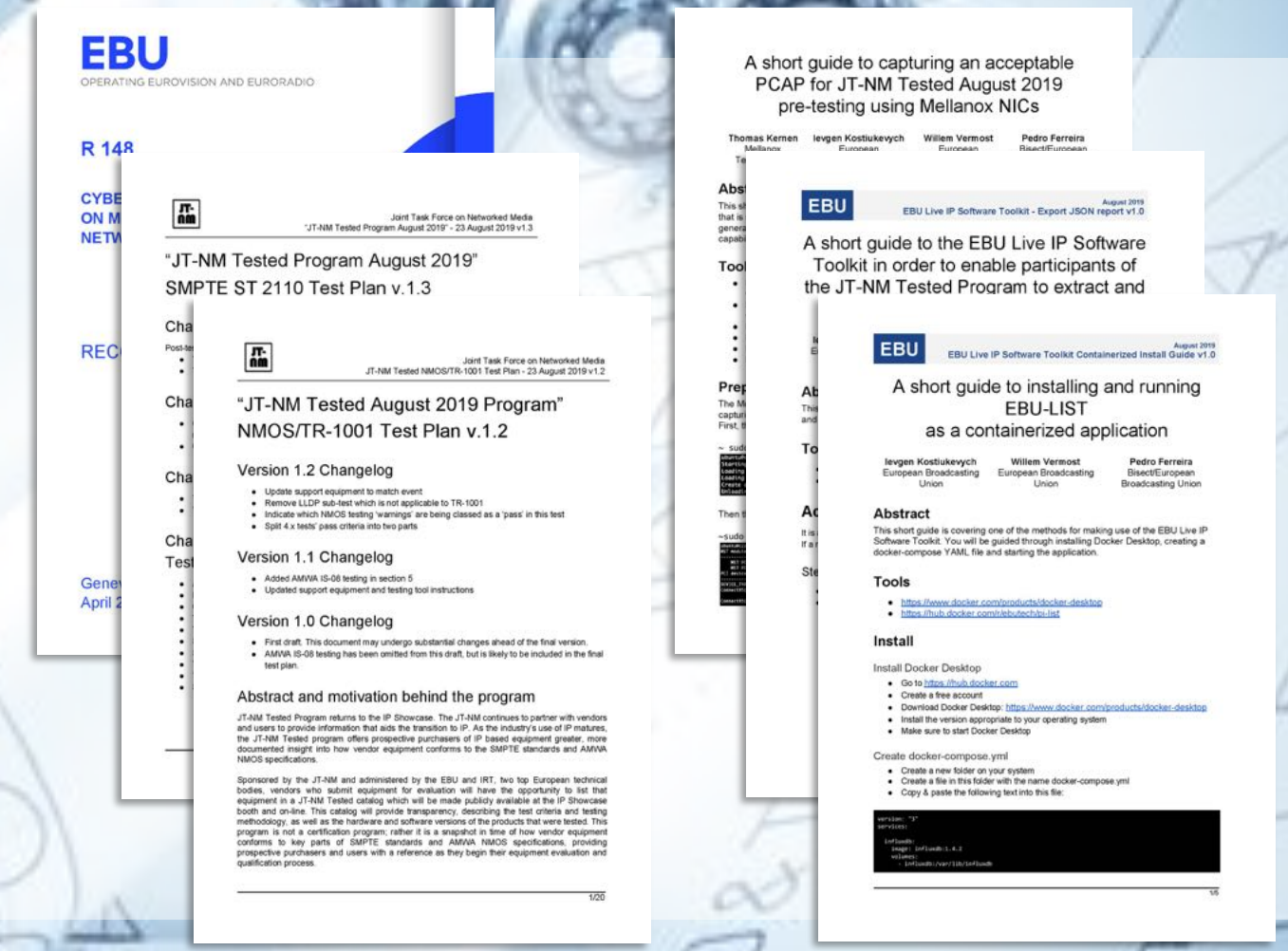
tech.ebu.ch/publications/tech3371

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
- Tools:
  - EBU LIST
  - NMOS Testing Tool



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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
- ST 2110-30 testing, including audible validation
- ST 2110-40 testing
- ST 2022-7 testing, both basic and recovery
- UHD testing

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

FINDINGS AND RESULTS

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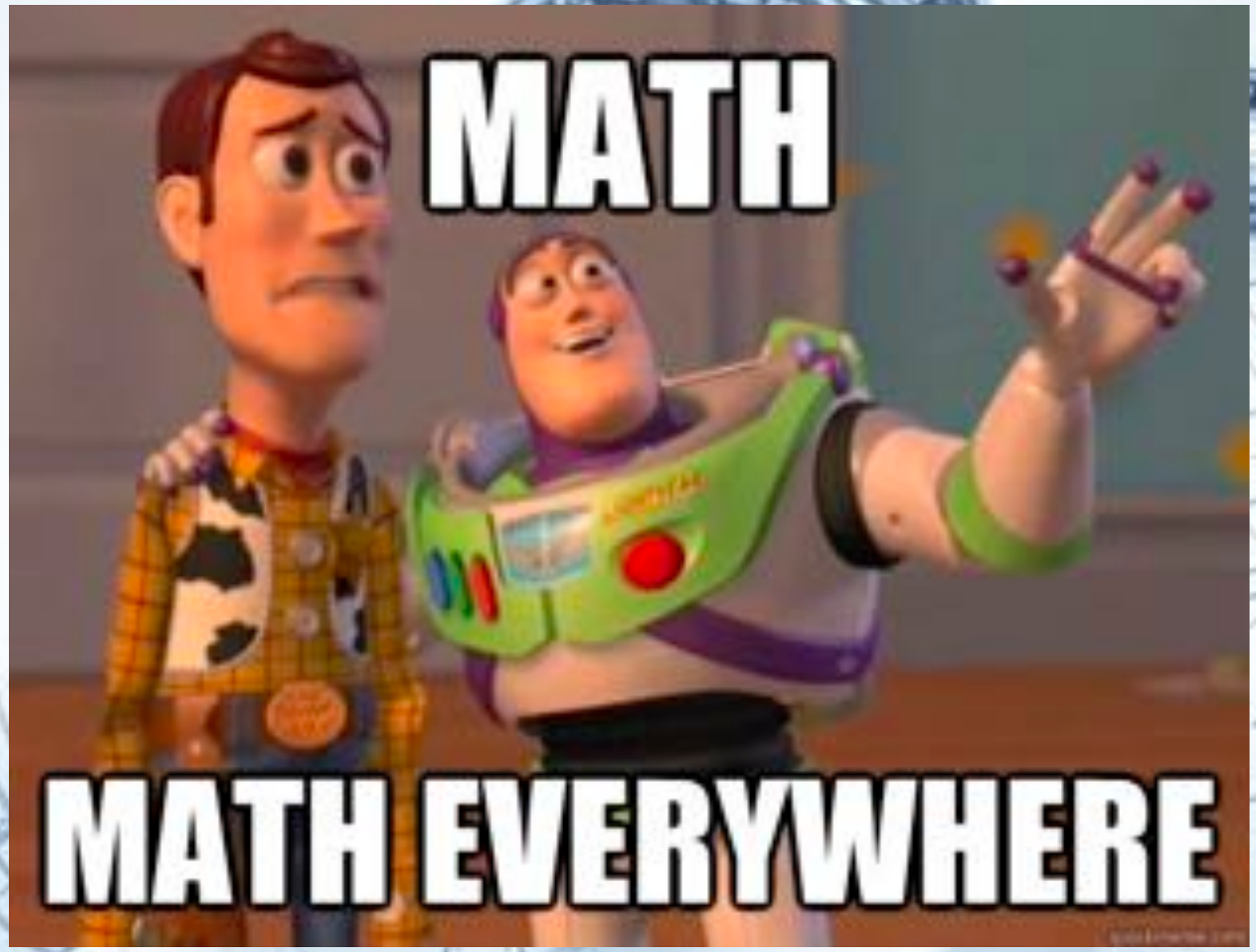

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Data plane: Basic SMPTE 2110 behaviour

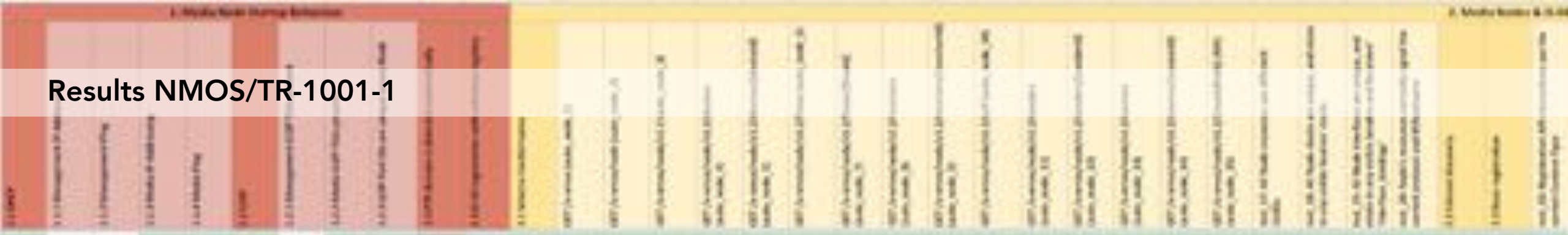
Findings – SMPTE ST 2110 Test Plan

- 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
- Video Tx devices (34):
  - 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

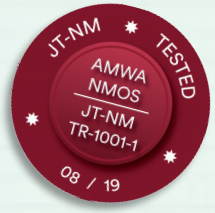
Common Issues – ST 2110

- 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

- 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
- Pod testing can be optimized
- It is critically important to feed the results and findings back into SMPTE for ambiguities resolution



Control plane: NMOS/TR-1001-1 behaviour



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
  - 92% support on management interfaces
  - 78% support for media interfaces
- Almost 8000 individual tests carried out, with around 90% carried out using automated means

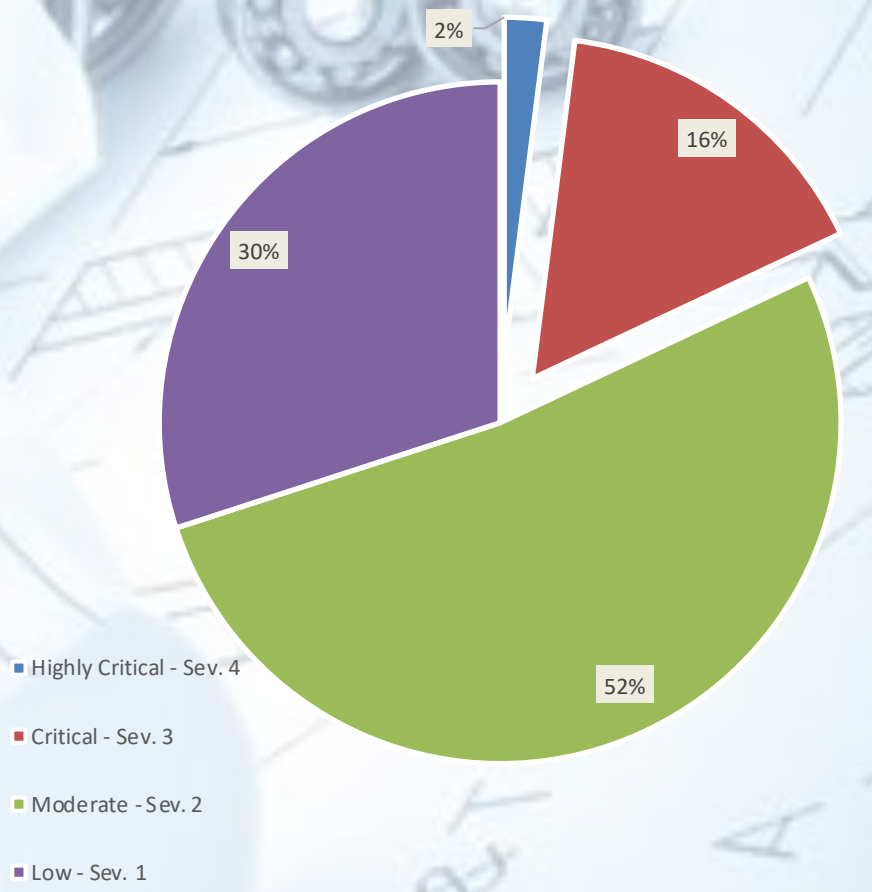
Common Issues – NMOS / TR-1001-1

- Very few common failures across devices beyond items which simply hadn't been implemented
- There were some issues with:
  - IS-04 UUID consistency
  - IS-05 changes taking effect in streams & use of IGMPv3 source filters
- We observed DHCP configuration confusion across Nodes with multiple network interfaces

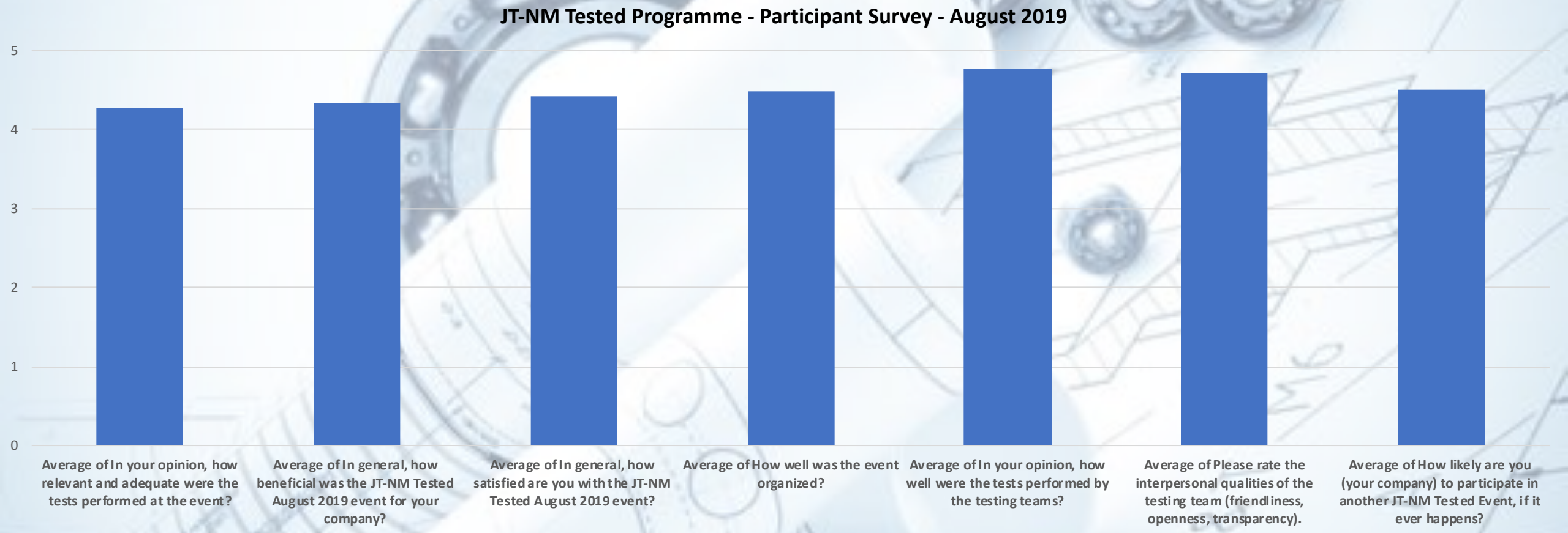
- Stream and discovery testing
  - Slow, but valuable – some of the most important test results to observe
  - We aim to further automate this process
- Pre-testing makes a big difference!
  - Vendors could work on issues well in advance and become familiar with the process
  - Issues were quickly identified 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.
- Find out more by attending their talk!



Participants Feedback Survey



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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
  - Configuration consistency between vendors' UIs, IS-0X and SDP files
- More serious PTP testing has to be considered
- 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 Members:
  - Getting the current state of implementations
  - Improving the implementations
  - Safeguarding the investments for new facilities

Thank you!

Willem Vermost, Ievgen Kostiukevych – EBU

Andrew Bonney – BBC

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