



*VSF Fall Meeting Series Webinar - Tuesday September 22, 2020*

# EBU PYRAMID UPDATE & JT-NM TESTED PROGRAM PLANS

Félix Poulin, Director of Media Transport Architecture and Lab (CBC/Radio-Canada)  
Willem Vermost, Design + Engineering Manager (VRT)





# THE TECHNOLOGY PYRAMID FOR MEDIA NODES

Minimum User Requirements to Build and Manage an IP-Based Media Facility using Open Standards & Specifications.



Tech 3371 Version 2 - 2020  
[tech.ebu.ch/pyramid](https://tech.ebu.ch/pyramid)



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Partially available

Rarely available



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## I. Media Transport

Based on SMPTE ST 2110 system

## II. Time and Sync

Based on Precision Time Protocol (PTP)

# ST 2110 IS NECESSARY, BUT NOT SUFFICIENT

## III. Operational Control

Based on AMWA Networked Media Open Specifications (NMOS)

## IV. Configuration and Monitoring

Enabling agile facilities

In order to build and moreover to maintain operational a large Media-over-IP facility

We need a "Full Stack" of technologies and best practices to complement ST 2110

## V. Security

Implementing best practices

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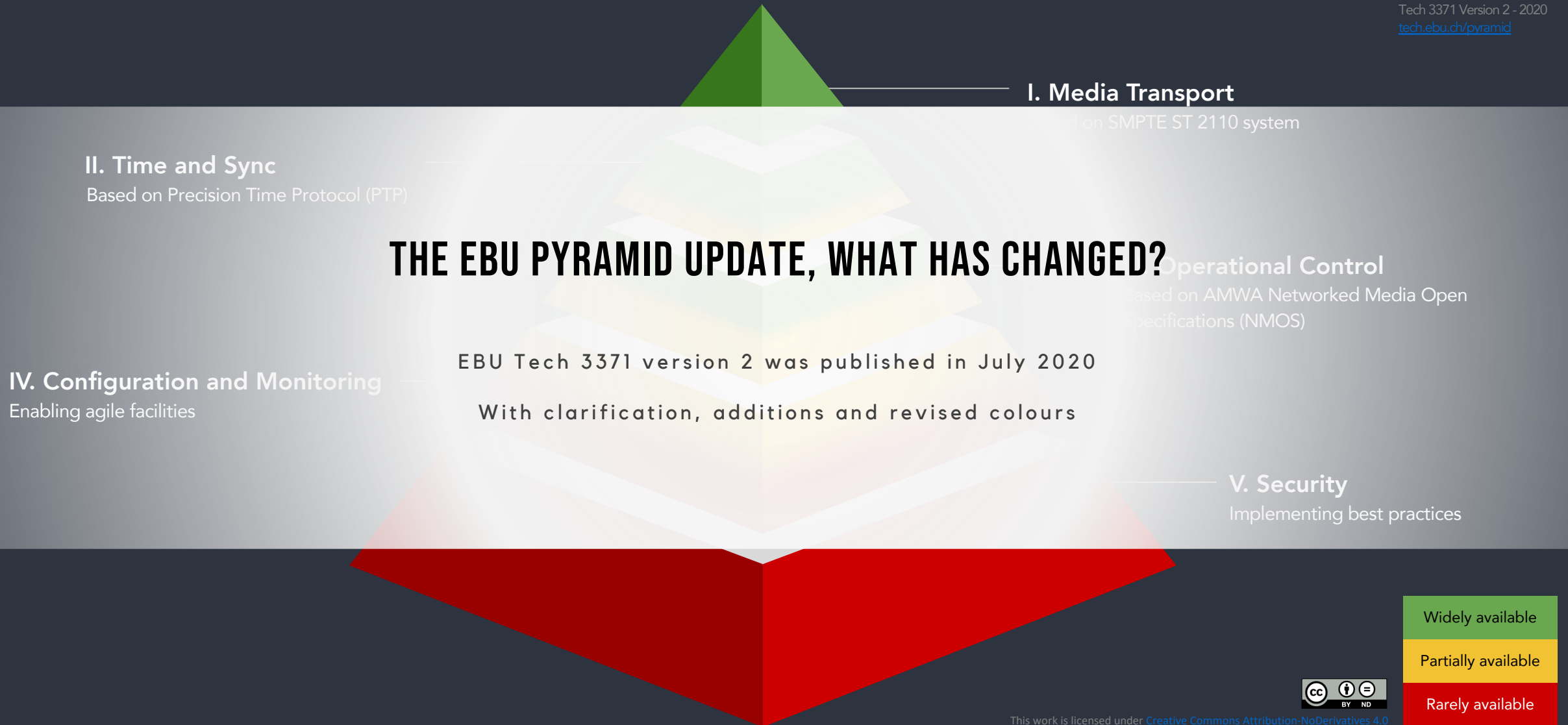


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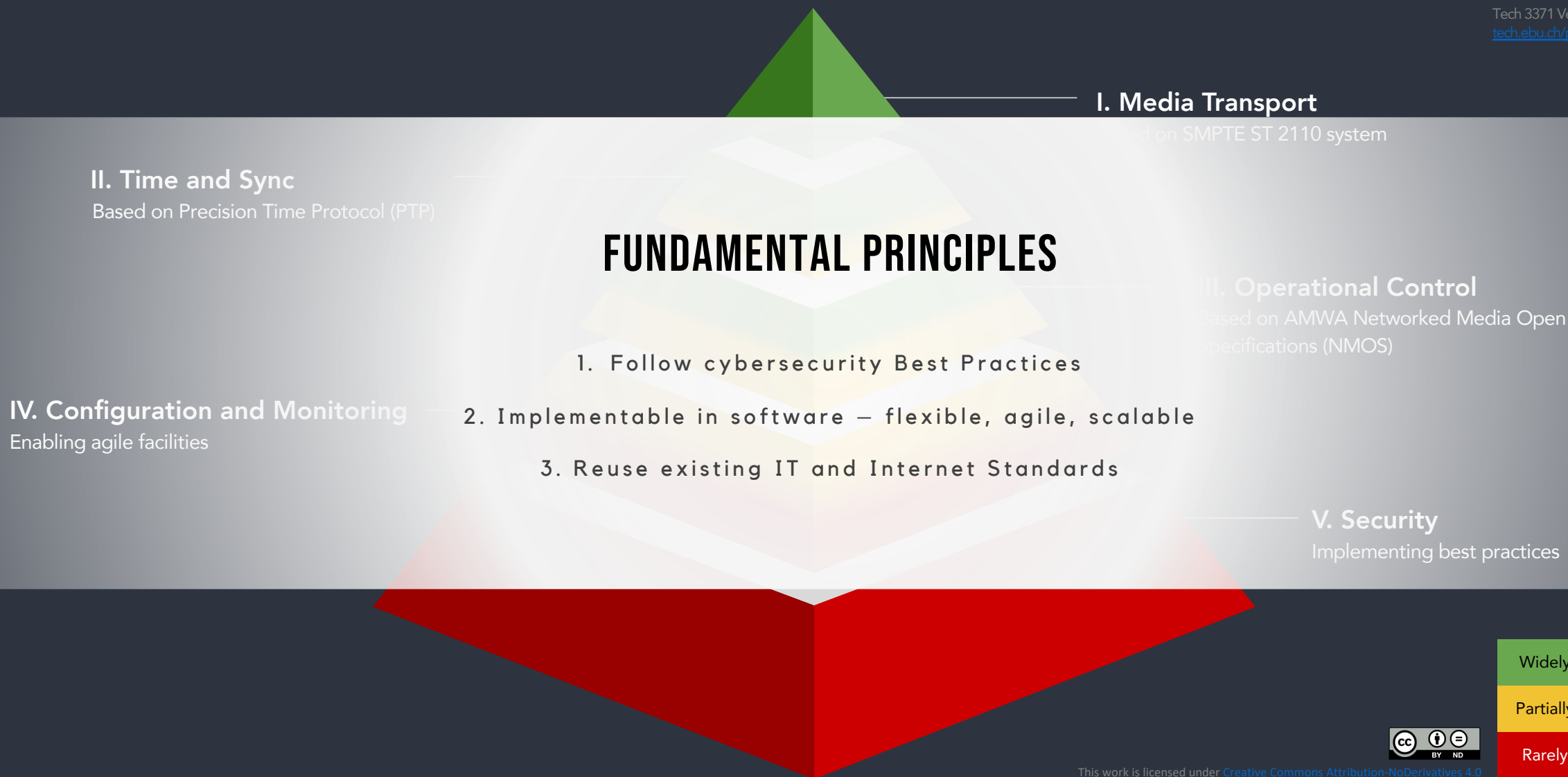


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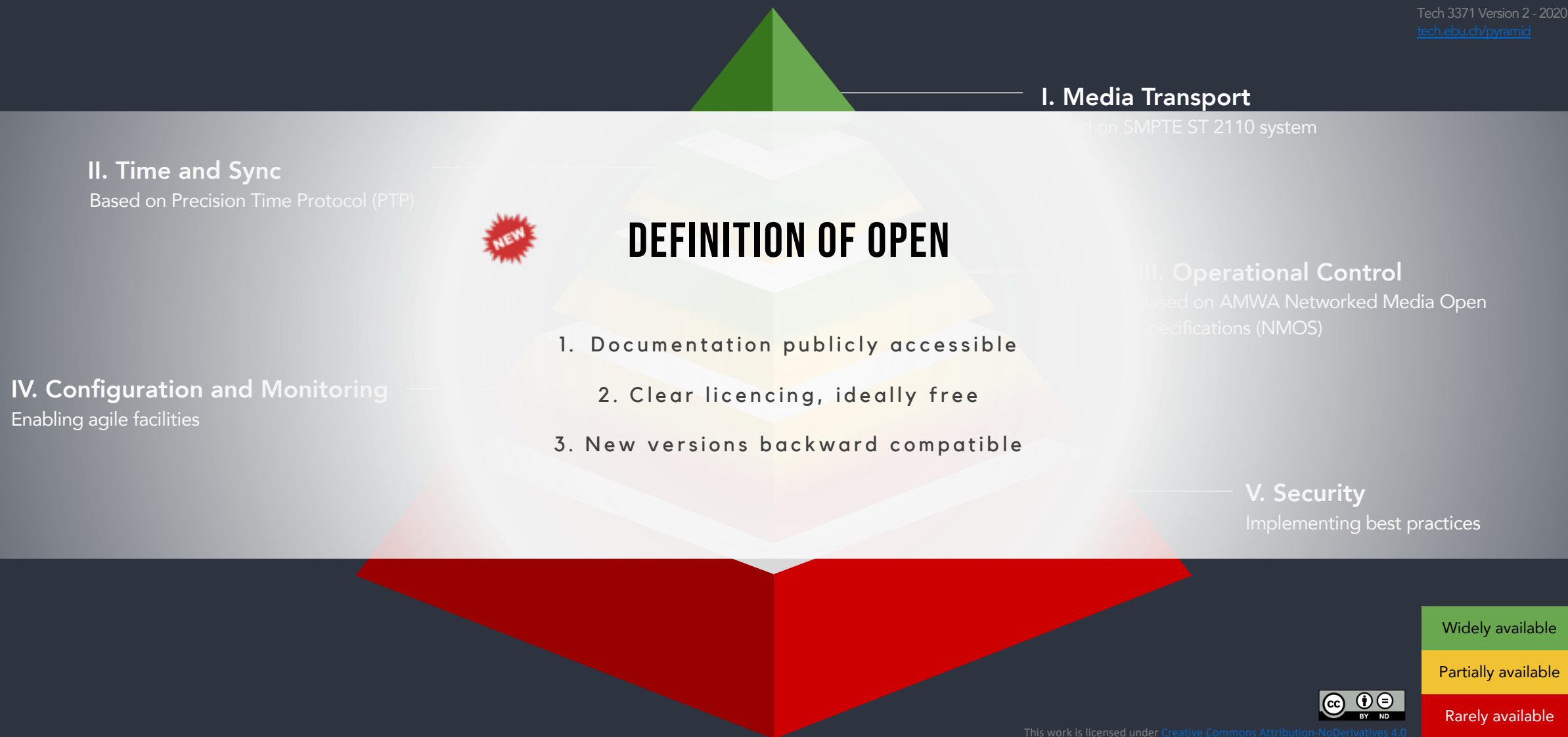


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## I. Media Transport

1. Single link video SMPTE ST 2110-20
2. Software-friendly SMPTE ST 2110-21 Wide video receivers
3. Universal, multichannel and low latency audio SMPTE ST 2110-30 Level B
4. Stream protection with SMPTE ST 2022-7:2018

ST 2110 Interoperability is good.



Relaxed audio ST 2110-30 from Level C to B.

Most important is to bundle phase related channels into the same streams

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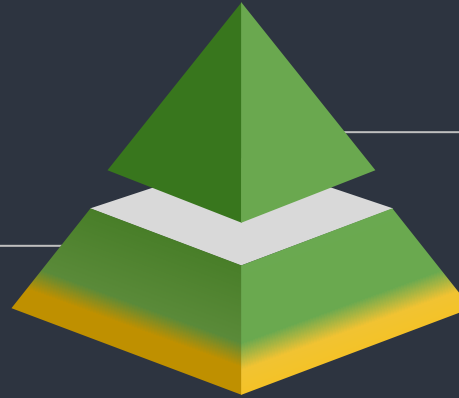
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## II. TIME AND SYNC

### II. Time and Sync

1. PTP monitoring with IETF RFC 8575 or RFC 8173
2. PTPv2 configurable within SMPTE and AES profiles
3. Multi-interface PTP redundancy
4. Synchronisation of audio, video and data essences



### I. Media Transport

Based on SMPTE ST 2110 system



Added PTP monitoring and locking performance

Inter-Essence Synchronisation is still unaddressed, we hope on ST 2110-10 revision

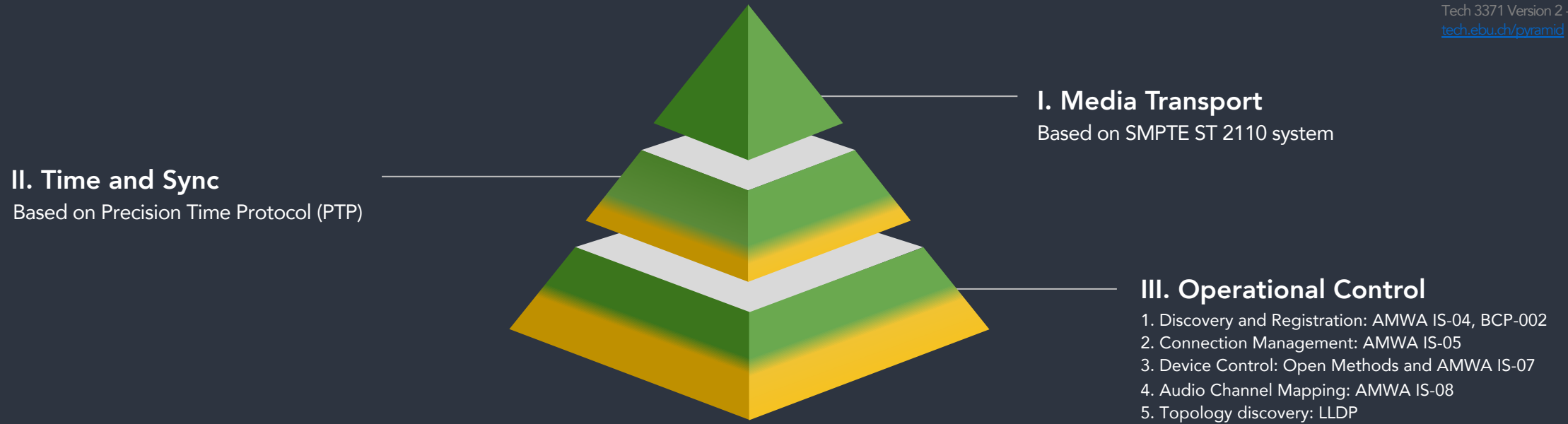
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## III. OPERATIONAL CONTROL



Adoption of NMOS has made progressed!



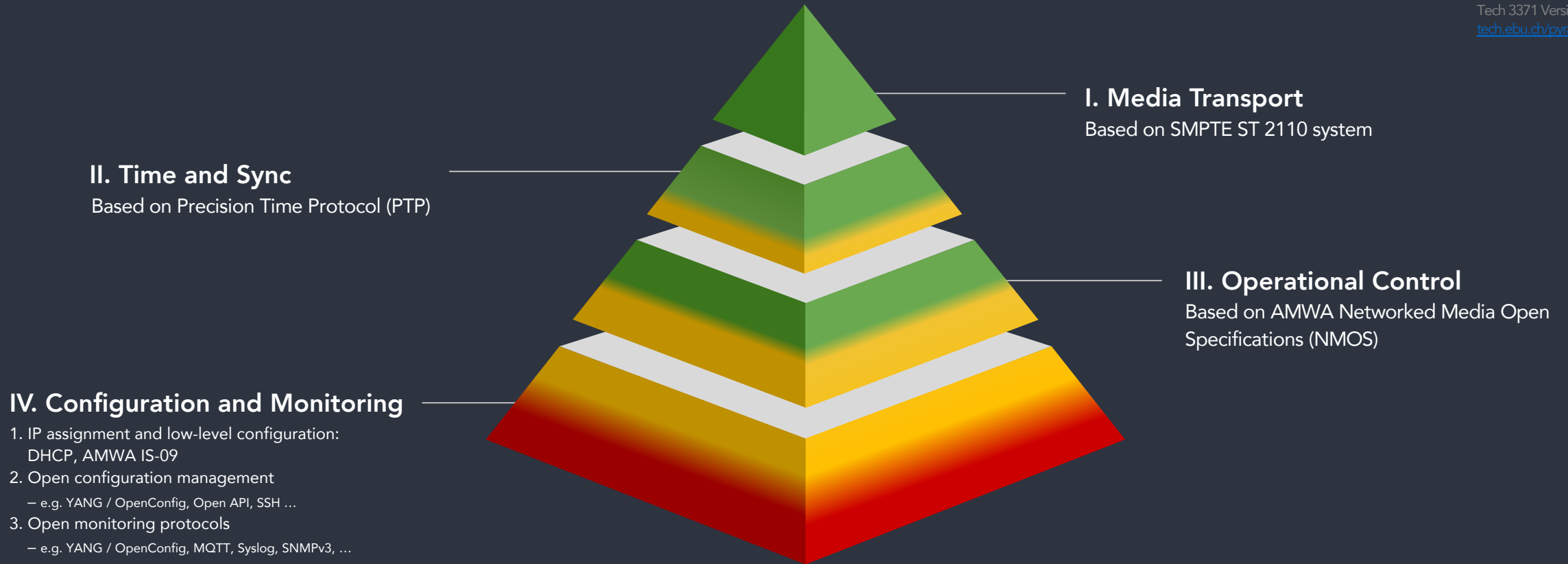
Added Device Control: Open Methods and AMWA IS-07 for event & tally

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## IV. CONFIGURATION AND MONITORING



This layer enables manageability of large facilities

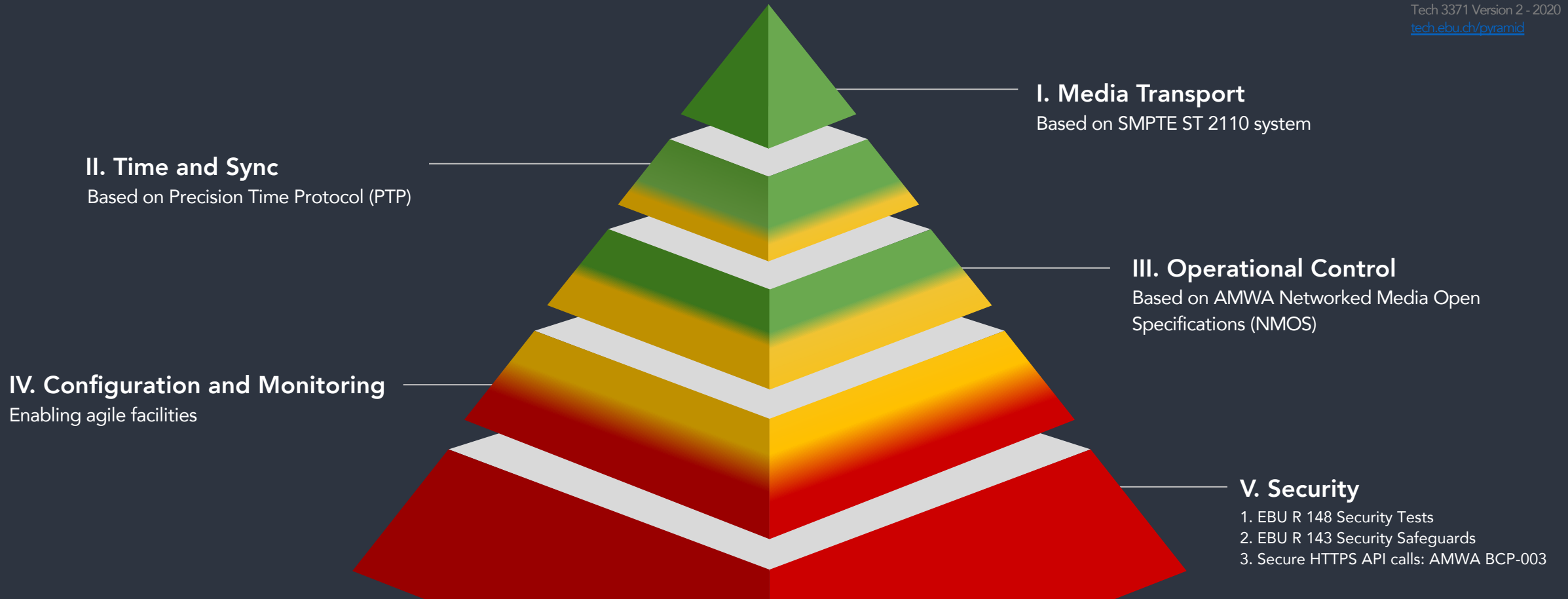


Requirements where clarified and strengthened

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Warning: Low attention by industry!



First part of NMOS Security best practices is published

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1. PTP monitoring with IETF RFC 8575 or RFC 8173
2. PTPv2 configurable within SMPTE and AES profiles
3. Multi-interface PTP redundancy
4. Synchronisation of audio, video and data essential

## IV. Configuration and Monitoring

1. IP assignment and low-level configuration:  
DHCP, AMWA IS-09
2. Open configuration management  
– e.g. YANG / OpenConfig, Open API, SSH ...
3. Open monitoring protocols  
– e.g. YANG / OpenConfig, MQTT, Syslog, SNMPv3, ...



Security

1. EBU R 148 Security Tests
2. EBU R 143 Security Safeguards
3. Secure HTTPS API calls: AMWA BCP-003

## I. Media Transport

1. Single link video SMPTE ST 2110-20
2. Software-friendly SMPTE ST 2110-21 Wide video receivers
3. Multichannel, multichannel and low latency audio SMPTE ST 2110-30 Level B
4. Transport protection with SMPTE ST 2022-7:2018

## III. Operational Control

1. Discovery and Registration: AMWA IS-04, BCP-002
2. Connection Management: AMWA IS-05
3. Device Control: Open Methods and AMWA IS-07
4. Audio Channel Mapping: AMWA IS-08
5. Topology discovery: LLDP

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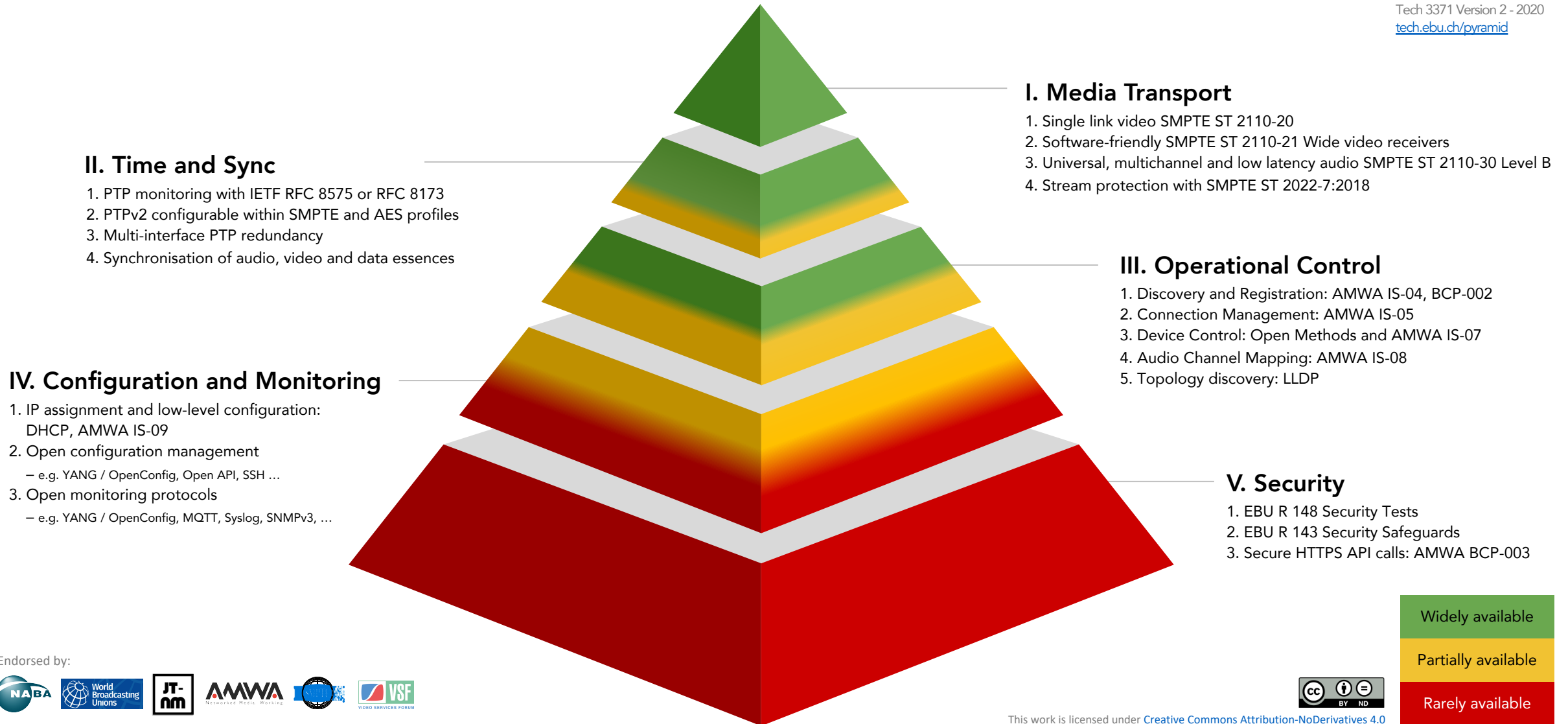
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# EBU

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## HOW TO USE PYRAMID

Consider all the requirements on the Pyramid in your architecture

Ask for the requirement from Tech 3371 in your tenders

### II. Time and Sync

1. PTP monitoring with IETF RFC 8575 or RFC 8173
2. PTPv2 configurable within SMPTE and AES profiles
3. Multi-interface PTP redundancy
4. Synchronisation of audio, video and data essential

### IV. Configuration and Monitoring

1. IP assignment and low-level configuration:  
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### V. Security

1. EBU R 148 Security Tests
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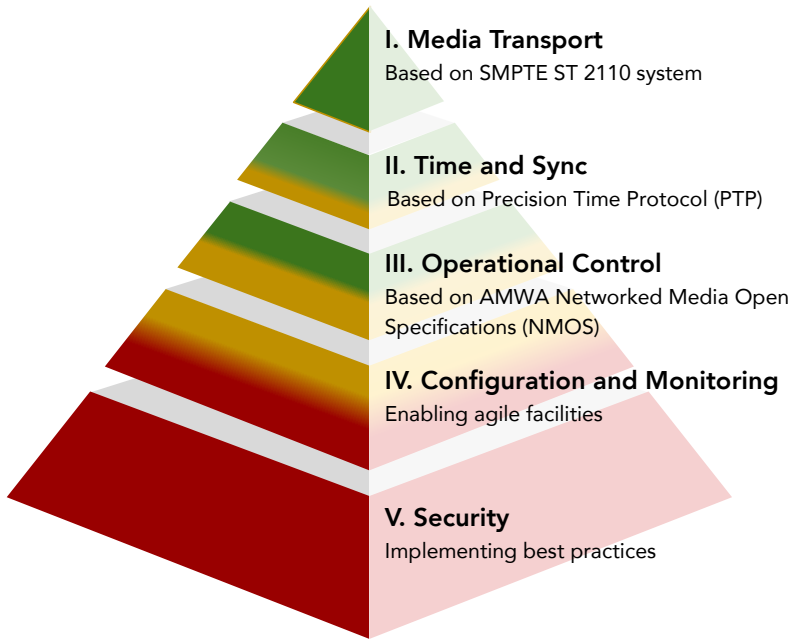
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THE TECHNOLOGY PYRAMID FOR MEDIA NODES

Minimum User Requirements to Build and Manage an IP-Based Media Facility using Open Standards & Specifications



The *Technology Pyramid for Media Nodes* represents the requirements of the user community regarding IP-based facilities. It specifies the ensemble of technologies that SMPTE ST 2110 media devices need to support to enable them to design and build, operate and maintain a real size facility.

The *Media Node Maturity Checklist* at the back is meant to help discussions between customers and vendors and to quickly assess the level of maturity of a product for suitable large deployment.

Details of each criteria are described in the EBU Tech 3371 available at [tech.ebu.ch/pyramid](http://tech.ebu.ch/pyramid).

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MEDIA NODES MATURITY CHECKLIST

Minimum User Requirements to Build and Manage an IP-Based Media Facility using Open Standards & Specifications

Brand / Product / Date:		
I. Media Transport	1. Single link video SMPTE ST 2110-20	
	2. Software-friendly SMPTE ST 2110-21 Wide video receivers	
	3. Universal, multichannel and low latency audio SMPTE ST 2110-30 Level B	
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II. Time and Sync	1. PTP monitoring with IETF RFC 8575 or RFC 8173	
	2. PTPv2 configurable within SMPTE and AES profiles	
	3. Multi-interface PTP redundancy	
	4. Synchronisation of audio, video and data essences	
III. Operational Control	1. Discovery and Registration: AMWA IS-04, BCP-002	
	2. Connection Management: AMWA IS-05	
	3. Device Control: Open Methods and AMWA IS-07	
	4. Audio Channel Mapping: AMWA IS-08	
	5. Topology discovery: LLDP	
IV. Configuration and Monitoring	1. IP assignment and low-level configuration: DHCP, AMWA IS-09	
	2. Open configuration management – e.g. YANG / OpenConfig, Open API, SSH ...	
	3. Open monitoring protocols – e.g. YANG / OpenConfig, MQTT, Syslog, SNMPv3, ...	
V. Security	1. EBU R 148 Security Tests	
	2. EBU R 143 Security Safeguards	
	3. Secure HTTPS API calls: AMWA BCP-003	

Note that any claims from vendors has not been verified by the EBU and it is recommended that the customer make their own tests and verification with the actual implementations before buying.

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o receivers  
MPTE ST 2110-30 Level B

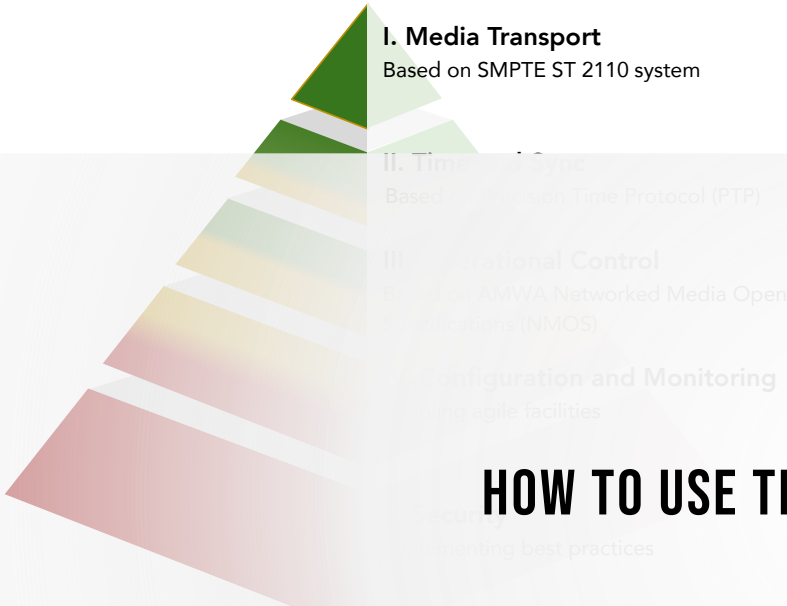
A IS-04, BCP-002  
IS-05  
and AMWA IS-07  
IS-08

y Tests  
y Safeguards  
calls: AMWA BCP-003

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HOW TO USE THE MATURITY CHECKLIST

Use the Maturity Checklist when you shop for you equipment

The more the customers will ask the same, the more likely the industry will offer it!

The Technology Pyramid for Media Nodes is the outcome of the user community regarding IP-based media. It specifies the ensemble of technologies that SMPTE ST 2110 media nodes need to support to enable them to design and build, operate and manage a real size facility.

The Media Node Maturity Checklist at the back is meant to help discussions between customers and vendors and to quickly assess the level of maturity of a product for suitable large deployment.

Details of each criteria are described in the EBU Tech 3371 available at [tech.ebu.ch/pyramid](http://tech.ebu.ch/pyramid).



Brand / Product / Date:		
I. Media Transport	1. Single link video SMPTE ST 2110-20	
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	3. Universal, multichannel and low latency audio SMPTE ST 2110-30 Level B	
	4. Stream protection with SMPTE ST 2022-7/2016	
II. Time and Sync	1. PTP monitoring with IEEE P1588-2008 RFC 8173	
	2. PTPv2 configurable within SMPTE 2110 profiles	
	3. Multi-interface PTP redundancy	
	4. Synchronisation of audio, video and data essences	
III. Operational Control	1. Discovery and Registration: AMWA IS-04, BCP-002	
	2. Open configuration management: AMWA IS-05	
	3. Device Control: Open Methods and AMWA IS-07	
	4. Audio Channel Mapping: AMWA IS-06	
	5. Topology discovery: AMWA IS-08	
IV. Configuration and Monitoring	1. Open configuration management: AMWA IS-05	
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to receivers  
SMPTE ST 2110-30 Level B

A IS-04, BCP-002  
IS-05  
and AMWA IS-07  
IS-08

Tests  
Safeguards  
calls: AMWA BCP-003

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# JT-NM TESTED PROGRAM PLANS

Willem Vermost, Design + Engineering Manager (VRT)



## J-NM TESTED PROGRAM – WHAT IS IT?

- Documented insight into how vendor equipment aligns with the SMPTE ST 2110 and SMPTE ST 2059 standards, JT-NM TR-1001-1 and AMWA NMOS specifications.
- Testing of NMOS registries and controllers were added at this event 
- It is not a certification program; it is a snapshot in time

## JT-NM TESTED PROGRAM – INTRODUCING “SELF-TESTED” BADGES

- Face-to-face: cancelled!
- Pivot to Self-testing
- According To JT-NM Test Plan
- SMPTE ST 2110 → Self-tested
- NMOS/TR-1001-1 → Self-tested
- NMOS controllers → Tested via the cloud

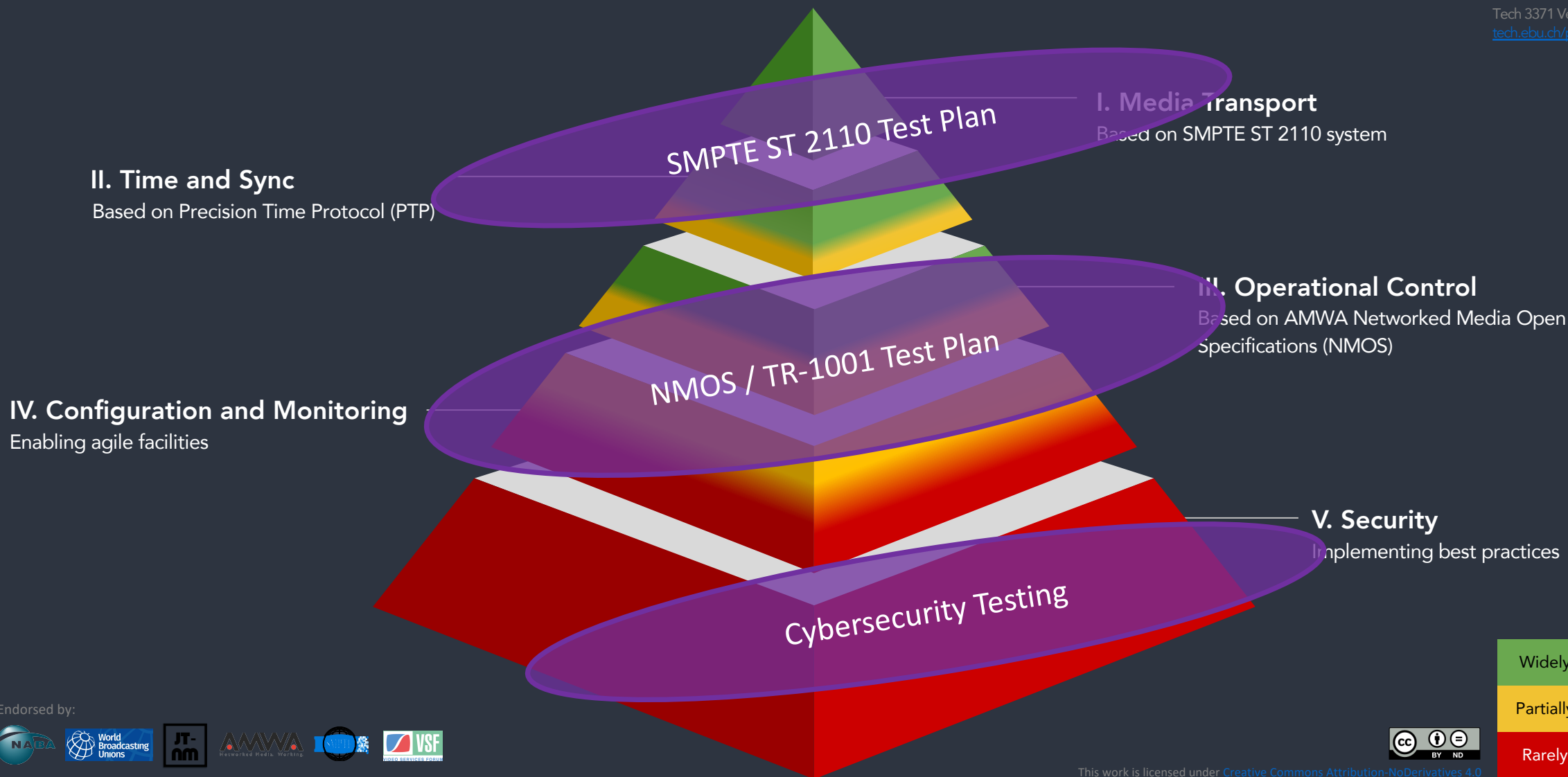


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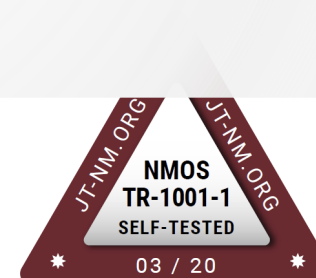
- 34 vendors published their results in the final catalogues:
  - 59 products were tested against the ST 2110 test plan
  - 44 products were tested against the NMOS/TR-1001-1 test plan
  - Including
    - 4 NMOS registries
    - 6 NMOS controllers

## JT-NM TESTED PROGRAM – PUBLISHED CATALOGS



### ALL PYRAMID RESOURCES

[HTTP://JT-NM.ORG/JT-NM\\_TESTED/](http://jt-nm.org/jt-nm_tested/)



## CONCLUSIONS

- Improved results compared to the previous events
- JT-NM Tested team was not able to fully verify self-testing results
- The self-testing is useful for improving implementations
- Remote testing must be worked out for proper validation of results
- JT-NM formed the JT-NM Tested Board to drive the JT-NM Tested program

An aerial photograph of a city skyline, likely San Francisco, with a dense green forest in the foreground. The city's skyscrapers are visible in the background under a clear blue sky. A semi-transparent white rectangular box is centered over the image, containing the text.

# **FUTURE PLANS**

Next round targeted for March-April 2021

With more remote testing and improved Self-Testing (assuming no face-to-face event)





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# EBU PYRAMID UPDATE & JT-NM TESTED PROGRAM PLANS

[Felix.POULIN@cbc.ca](mailto:Felix.POULIN@cbc.ca)  
[Wim.VERMOST@vrt.be](mailto:Wim.VERMOST@vrt.be)

*Thank you*