

# User Requirements beyond SMPTE ST 2110

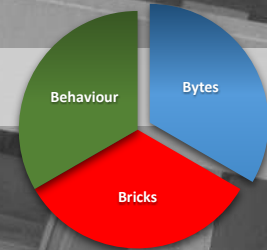
Willem Vermost – Senior Media over IP Architect  
European Broadcasting Union



# EBU – NEW BUILDERS INITIATIVE



MEANWHILE, THROUGHOUT EUROPE AND BEYOND ...



Many broadcasters have buildings from the early sixties.  
Financially speaking: buildings have been written off.  
They start costing too much and need to be replaced.

# NEW BUILDERS

EBU Technology & Innovation

https://tech.ebu.ch/groups/nbi

## NEW BUILDING INITIATIVE

A Members-only forum for... workflows and technologies

IP PRODUCTION SECURITY

### Behaviour

### Bytes

### Bricks

JOIN OUR GROUP >

THE WORKSPACE >

Nathalie Jaquet (RTS)

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The new BBC Wales HQ in Cardiff, UK.

New Buildings Initiative Events and Visits



# MEMBERS NEW BUILDINGS: NO LEGACY PLEASE!

Behaviour

Bytes

Bricks

**New buildings**  
limited legacy

**Downsized**  
facility

**Flexible, Scalable,  
Shareable,  
Reliable, Secure**

Savings **not**  
expected

**Integrated**  
production

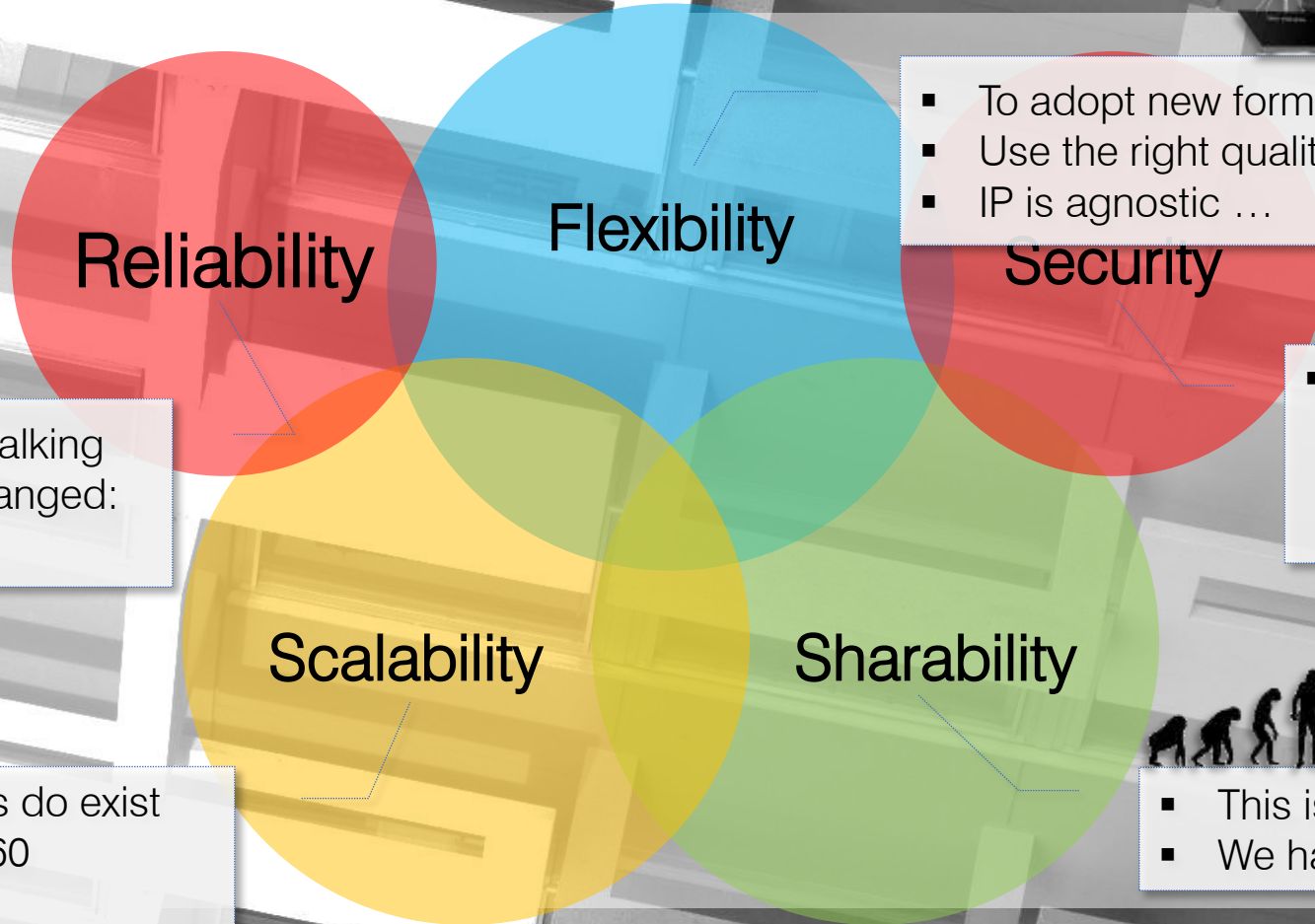
## Common Challenges

- Standardisation moving
- Cost model
- Skills and tools
- Organisational structure
- Less parking space!!!

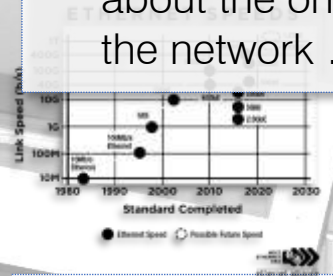
# MEMBERS NEW BUILDINGS: A STORY ABOUT NON-FUNCTIONAL REQUIREMENTS

Behaviour Bytes

Bricks



- Talking about reliability, is talking about the one thing we changed: the network ...



- Switches with 32x400 Gbps do exist
- < 10.000 streams of 720p60
- IP is scalable ...

- To adopt new formats and use multiple formats
- Use the right quality at the right time
- IP is agnostic ...

- The lack of (even basic) cybersecurity hygiene is becoming an adoption blocker ...



- This is an evolutionary story
- We have the JT-NM Roadmap

# JT-NM ROADMAP OF NETWORKED MEDIA OPEN INTEROPERABILITY



**LEGEND:**

- Dematerialized facilities - Enabler of sharability
- Standard / Specification
- Published
- Study / Activity

• Automatic provisioning without human intervention.  
 • Virtualization to spin up functions as required.  
 • Media specific cards not available in a public cloud!!

## IV. Dematerialized facilities\*\*



## III. Network & Resource Management



Network & Resource Management - The control plane...

- AMWA IS-04 – Registration & Discovery
- AMWA IS-05 – Connection Management
- AMWA IS-06 – Network Control
- AMWA IS-07 – Event & Tally

## Elementary flows - The data plane...

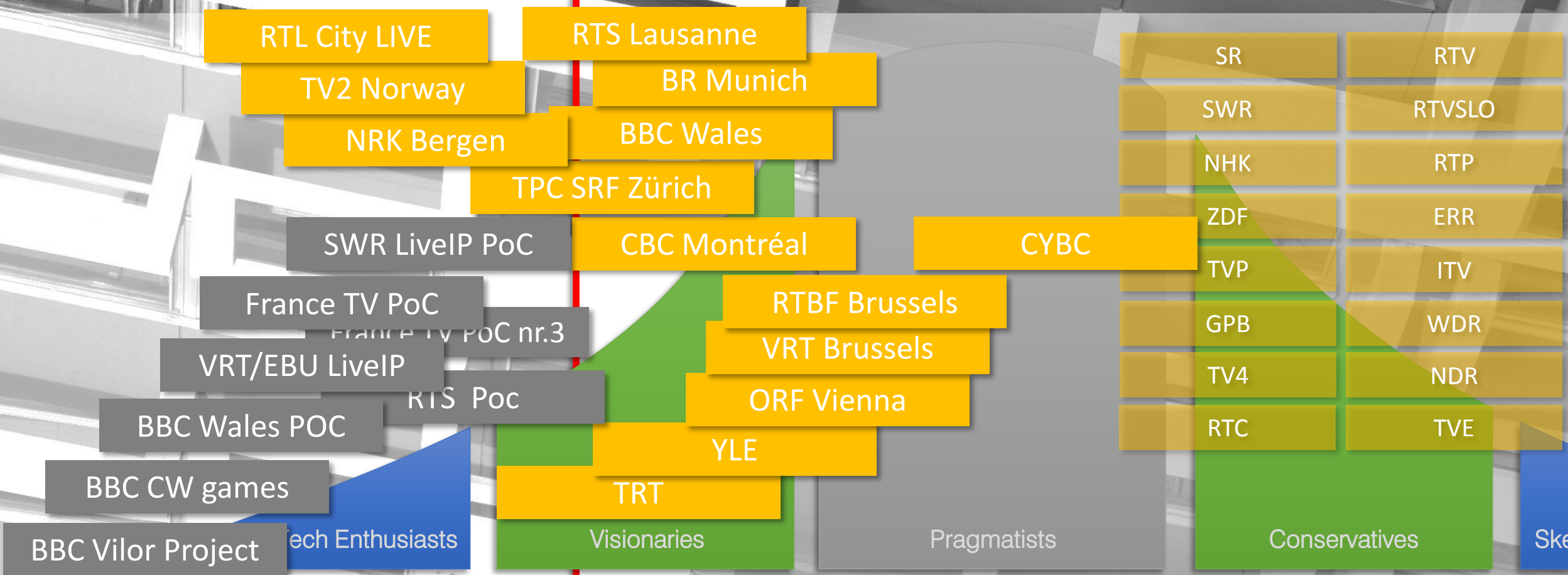
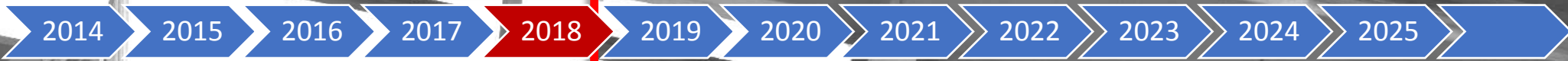
- AMWA IS-04 (Registration & Discovery)
- AMWA IS-05 (Connection Management)
- AMWA IS-06 (Network Control)
- AMWA IS-07 (Event & Tally)
- SMPTE ST 2110-10 - System Timing and Definitions
- SMPTE ST 2110-20 - Uncompressed Active Video
- SMPTE ST 2110-21 - Traffic Shaping and Delivery Timing for Video
- SMPTE ST 2110-22 - Transport of uncompressed video\*
- SMPTE ST 2110-23 - Single Video Essence Transport over Multiple ST 2110-20 Streams
- SMPTE ST 2110-30 - PCM Digital Audio
- SMPTE ST 2110-31 - AES3 Transparent Transport
- SMPTE ST 2110-40 - Transport of SMPTE Ancillary Data
- SMPTE ST 2022-8 (Bridging SDI over IP with Elementary flows)

## II. Elementary flows



## I. SDI over IP

Current and mature technology



SR	RTV
SWR	RTVSLO
NHK	RTP
ZDF	ERR
TVP	ITV
GPB	WDR
TV4	NDR
RTC	TVE







We travel back in time. It's June 19<sup>th</sup>, 2018. 09:00 AM sharp.  
The network technology seminar starts at EBU in lovely Geneva ...

# Network Technology Seminar 2018

## Keynote: Thomas Edwards

VP Engineering & Development at Walt Disney Television


IP: Promise, Progress,  
and the path to perfection.

*“But where are full stack systems?”*

but where are “Full Stack” systems?

Where are the systems that when you plug them into the network:

- DHCP IP Address
- Find registry & register themselves w. IS-04
- Obey IS-05 Connection Management
- Emit LLDP to ensure IS-06 Network Control functionality?



FOX TELEVISION



Where are the systems that when you plug them into the network:

- DHCP IP Address
- Find & register themselves with IS-04
- Obey IS-05 Connection Management
- Emit LLDP to ensure IS-06 Network Control functionality?
- ...

NETWORK TECHNOLOGY  
SEMINAR

# Network Technology Seminar 2018

CBC: Felix Poulin

Director - Engineering Lab at CBC/Radio-Canada

Presents:

New Maison de Radio-Canada  
update and lessons learned thus far





*“We demand a full stack solution!”*

**NETWORK TECHNOLOGY**

**EBU**

OPERATING EUROVISION AND EURORADIO

**IP SHOWCASE™**  
THEATER

# Network Technology Seminar 2018

BBC: Mark Patrick

Lead Architect

Presents:

## An Update on the Live IP Implementation for the BBC Wales Cardiff Central Square Project



EBU Design + Engineering

### ST2110 MEDIA TOPOLOGY

- We will have 2 separate (A/B) media networks for IP video and audio flows
- There will be another separate control network (a shared broadcast control network)
- The media networks will use a leaf-spine architecture with 1 spine switch (Cisco 9508) and up to 18 leaf switches (Cisco 9236) per side
- The media networks will be fibre based running at up to 100Gbps
- There will be a pair of leaf switches on every floor
- Network will be controlled using Cisco DCNM (a form of SDN)
- There will be no direct connection to the BBC's business networks





*“We need to see a confident leap from the R&D lab to available product. The delayed implementation of a common control standard is holding up the widespread adoption of ST2110 product.”*

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THEATER

# Network Technology Seminar 2018

TPC: Sandro Furter

Project Manager @ tpc switzerland ag

Presents:

METECHNO

The full IP Future of SRF/tpc







*“Are you able to share your experience? There are a lot of groups at and forums – it’s important that we share this information and that we share it openly.”*

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**IP SHOWCASE™  
THEATER**



The JT-NM Enterprise Profile was announced and an appropriate victim was voluntarily chosen to come up with a first draft.



# Network Technology Seminar 2018

Presenter: Jack Douglas

VP Mkt & Bus Dev, PacketStorm Communications

ST2110 and ST2059

Interop Testing and Demonstrations

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**IP SHOWCASE™  
THEATER**



Tough Question:

*“Why are these test done in a closed room? Other industries do similar events and make results public!”*





first installations suffer a lot ...  
they provide a lot of learnings ...

"We are thinking about using SDI as a firewall"

Jan. 2019: "Hey can you plug our truck? We just need 2x63 Ampère"

"As a user, I need those gaps be filled into shipping products in 2018 so that I can build my new HQ facility."

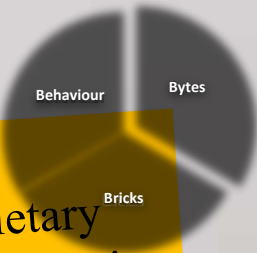
Sep. 2017 "We just had a meeting with vendor X and they said: IS-04, IS-05 is not available. We need to go with their implementation."

Jan. 2019: "Thank you for your email with the SDP file." Email are you serious?"

Dec. 2018: "We just received some equipment, no sign of automatic configuration?!"

News flash!! Vendors created their own proprietary control layer. Looks nice, but it's a major vendor lock in ...

"Hey, we need to configure all 500.000 multicast addresses manually."

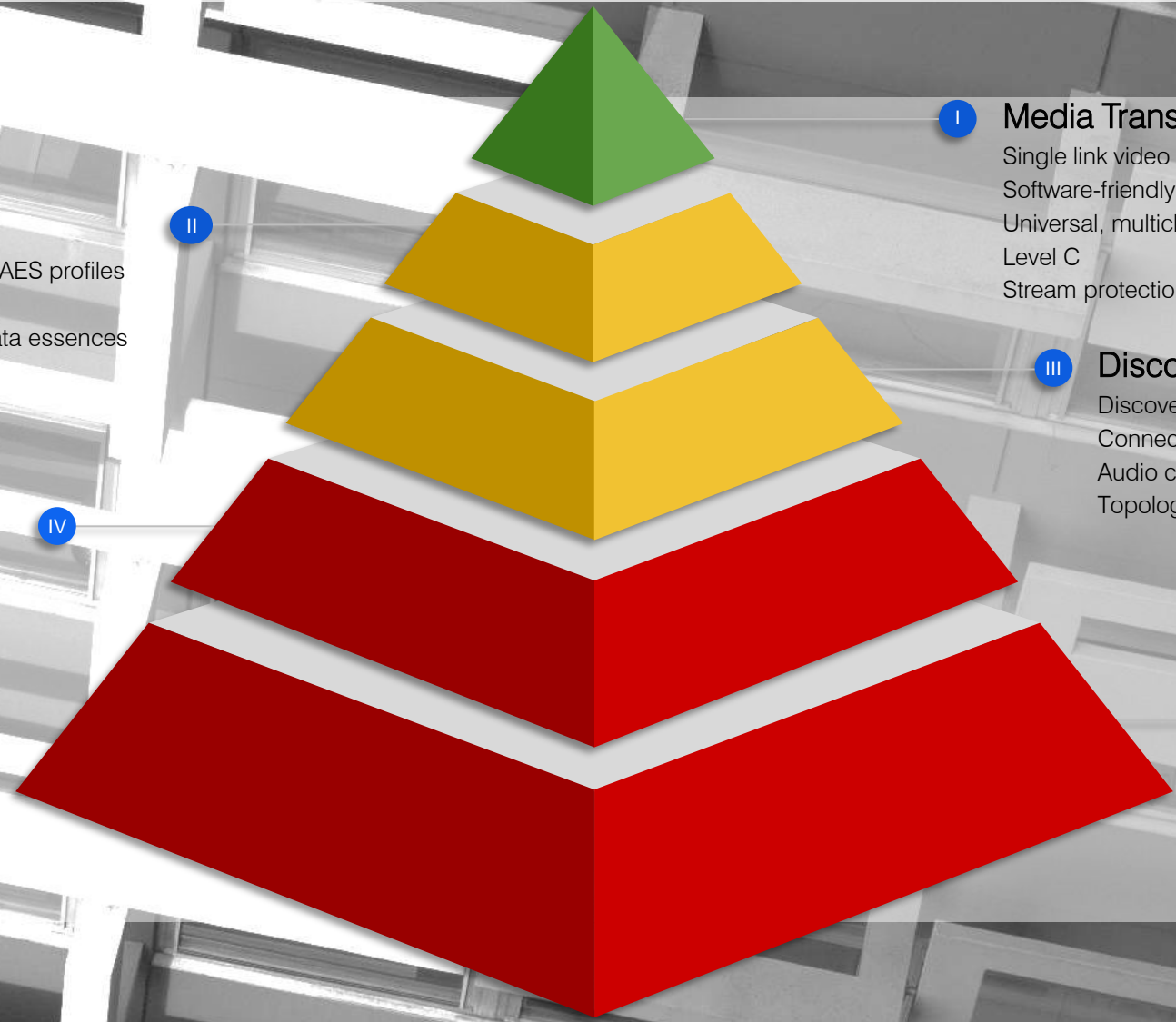


How do we bundle these complaints into a positive contribution?



# 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.

## I Media Transport

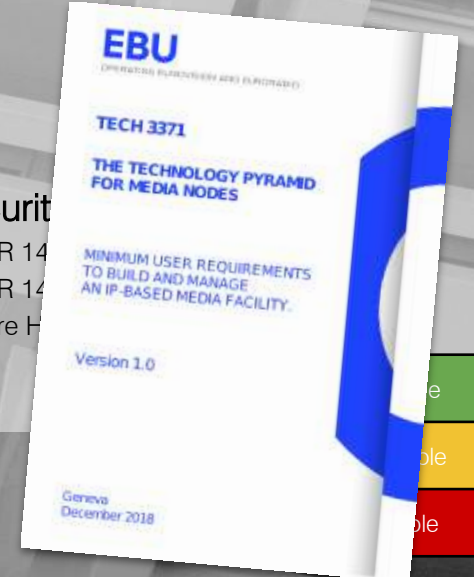
Single link video SMPTE ST 2110-20  
Software-friendly SMPTE ST 2110-21 Wide video receivers  
Universal, multichannel and low latency audio SMPTE ST 2110-30 Level C  
Stream protection with SMPTE ST 2022-7

## III Discovery and Registration

Discover and Registration: AMWA IS-04  
Connection Management: AMWA IS-05  
Audio channel mapping: AMWA IS-08 (in dev.)  
Topology discovery: LLDP

## V Security

EBU R 14  
EBU R 14  
Secure H

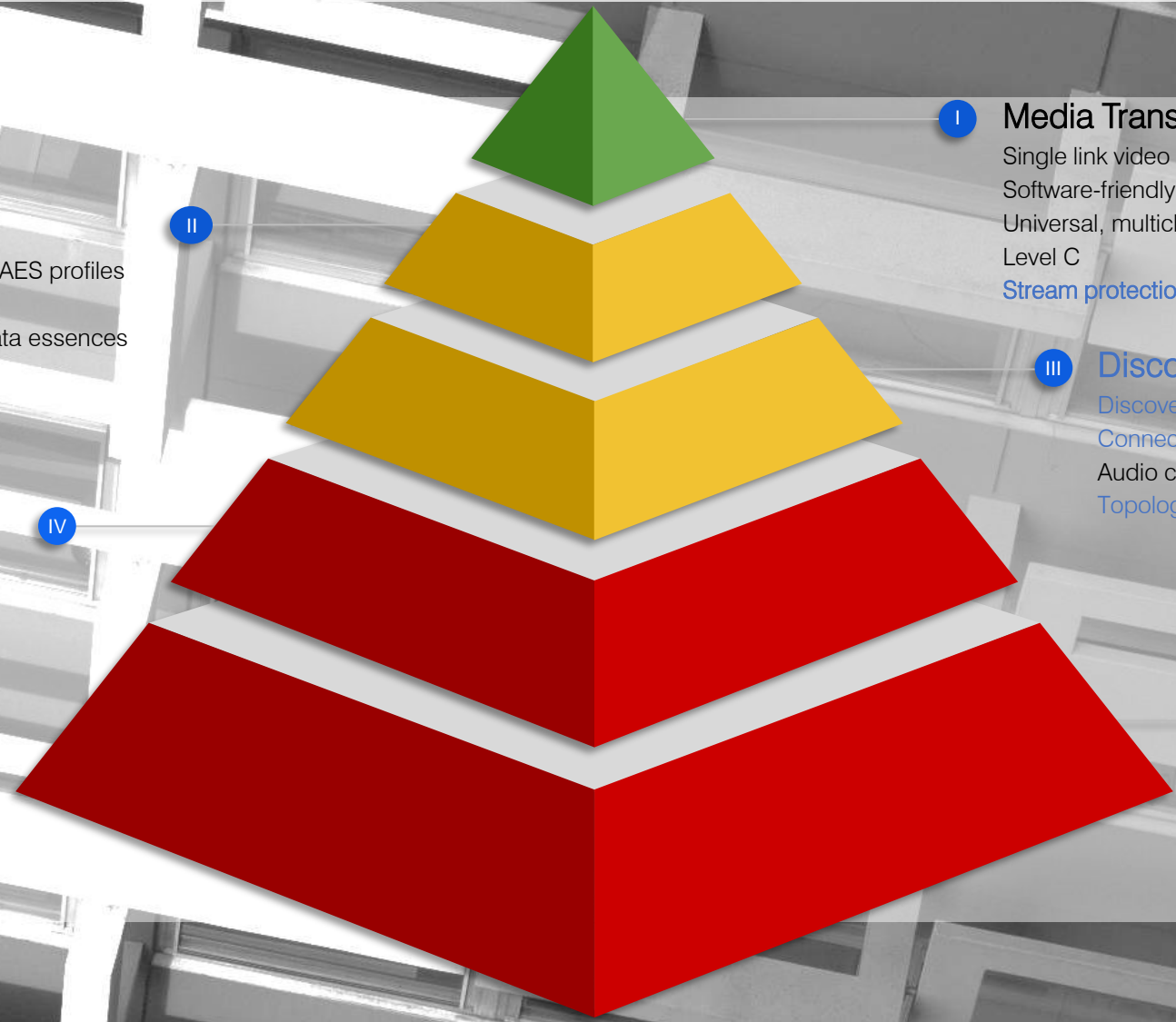


- With great flexibility comes great complexity
- This is a key moment in time to get it right
- Strategic Program Production Infrastructures delivered
  - the pyramid
  - EBU Tech 3371 - <https://tech.ebu.ch/publications/tech3371>



- JT-NM Technical Recommendation TR-1001-1:2018
- System Environment and Device Behaviours For SMPTE ST 2110 Media Nodes in Engineered Networks - Networks, Registration and Connection Management





**I 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](#)

**III Discovery and Registration**  
Discover and Registration: [AMWA IS-04](#)  
Connection Management: [AMWA IS-05](#)  
Audio channel mapping: [AMWA IS-08 \(in dev.\)](#)  
[Topology discovery: LLDP](#)

**V Security**  
[EBU R 148 Security](#)  
[EBU R 143 Security](#)  
[Secure HTTPS API](#)

**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.



# Technology Pyramid for Media Nodes Media Node Maturity Checklist

Go and ask your favourite vendor: What product covers what part of the pyramid ....



<https://tech.ebu.ch/pyramid>

### Technology Pyramid for Media Nodes Media Node Maturity Checklist

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

- I Media Transport
- II Time and Sync
- III Discovery and Connection
- IV Configuration and Monitoring
- V Security

The Technology Pyramid for Media Nodes represents the requirements of the user community regarding equipment for IP-based facilities. It specifies the ensemble of technologies that SMPTE ST 2110 media facilities need to support in order to enable users to efficiently design, build and maintain operational facilities.

The Media Node Maturity Checklist (second page) is meant to guide discussions between customers and vendors and to quickly assess the level of maturity and suitability of a product for deployment.

The details of each criterion are described in EBU Tech 3371, available at: [tech.ebu.ch/tech/3371](https://tech.ebu.ch/tech/3371)

Note that claims made by vendors are not necessarily verified by the EBU. It is recommended that customers do their own testing and verification before buying.

For more information about the Pyramid, and to contact us, visit: [tech.ebu.ch/pyramid](https://tech.ebu.ch/pyramid)

**EBU**

Version: April 2018

### Media Node Maturity Checklist

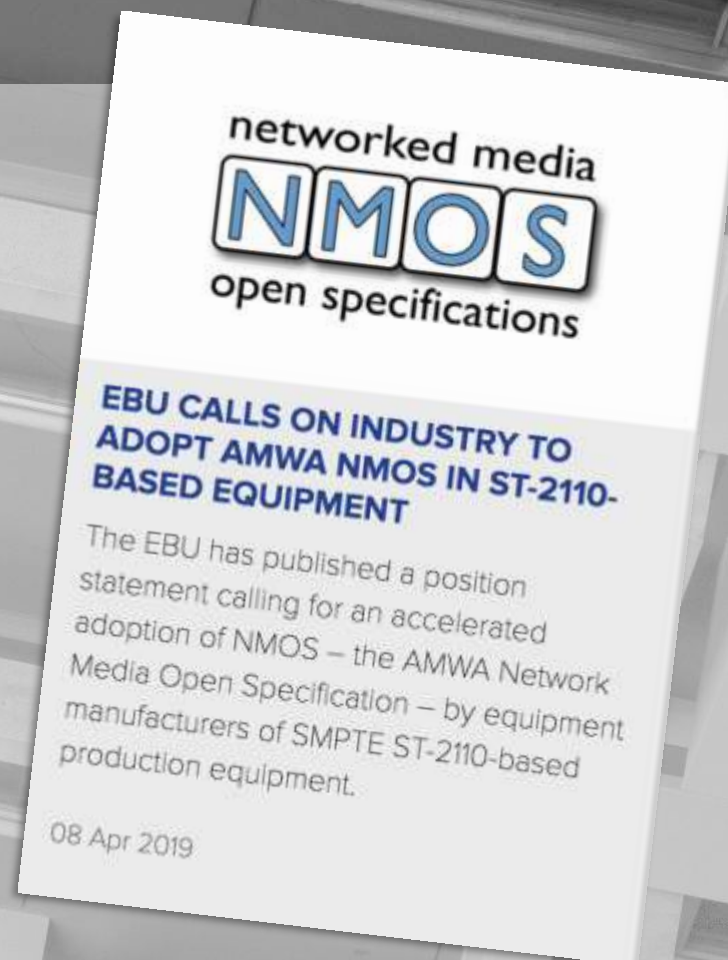
Criteria	Compliance
Video SMPTE ST 2110-20	
Audio SMPTE ST 2110-21 Wide video receivers	
Bi-channel and low latency audio SMPTE ST 2110-22	
Time sync with SMPTE ST 2022-7	
Encryption within SMPTE and AES profiles	
Network redundancy	
Integration of audio, video and data essences	
Registration: AMWA IS-04	
Management: AMWA IS-05	
Mapping: AMWA IS-06	
Discovery: LLDP	
Configuration: DHCP	
Configuration management - e.g., API, config file	
Logging protocol - e.g., syslog, agent, SNMPv3	
Security Tests	
Security Safeguards	
API: AMWA BCP-003	

Shipping Now / 19Q3 shipping Q3 2018 / NP Not Planned at the time / NA Not Applicable to this product

# URL's of interest

Some important URL's

- <https://tech.ebu.ch/pyramid>
- <https://tech.ebu.ch/publications/r152>
- [http://jt-nm.org/jt-nm\\_tested/](http://jt-nm.org/jt-nm_tested/)





ANY QUESTIONS?



# Thank You

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