What's the METexpo IP Showcase All About?

Stan Moote

CTO - IABM

Introduction

IABM is the international trade association for suppliers of broadcast and media technology. We support member companies with a comprehensive range of services across market intelligence, training, technology, exhibitions and best practices – all designed to help members do better business.

Stan Moote is CTO of IABM, Stan began his television career in 1977 as a plant engineer for CFTO-TV in Toronto, Canada. Mr. Moote was involved in the original SMPTE Digital Video Standards Committee meetings creating CCIR-601 and continues by coordinating activities within the industry for standards groups. Through his domain knowledge working with video and audio, Mr. Moote developed several patents and focuses on workflow solutions, new technology and interoperability. Stan is a recipient of the SMPTE Digital Processing Medal Award and a SMPTE Fellow.

IP Showcase Sponsors

IP Showcase Comes Down Under!

By Stan Moote, CTO, IABM

WHEN I RECEIVED A CALL ABOUT having IP Showcase at METexpo, I realised it was a great opportunity -

We all want to see examples, and this is where the case studies come in, including real life operations and how they are

In quick discussions with some of the participants various questions came up, such as "One of the largest installs of SMPTE ST 2110 in the world has been running successfully in Australia. Do we need to promote IP Showcase in the region at all?". The counterpoint was quickly raised by many of the contributors. This is exactly why we need to be there, they said. "IP isn't solely about large solutions; it's about the future, irrespective of size. We need the opportunity to continue education about IP for all levels and sizes of installations and facilities."

a little complex, however to be successful within our industry you need to know about dematerialization too. Microservices are the future and the best way to maintain our five 9's reliability in these quickly changing times.

To get everyone synced up, in the theatre I will be presenting a general overview of the "IP parts" and lingo you need to know. For the more technically inclined the theatre will present some deep dives into topics like synchronising and timing.

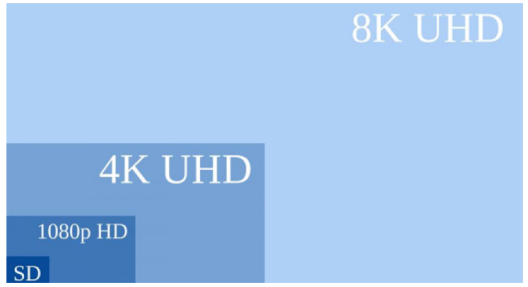
is happening with IP on a global basis.

Stan Moote, a SMPTE Fellow, has worked worldwide in the industry for over four decades and is the CTO for IABM, www.theIABM.org. IABM is the international trade association for suppliers of broadcast and media technology. Stan has a clear understanding of technology combined with a solid business twist.

Why IP?

- The ***pace of change*** is faster than ever

Multi-platform



Increasing resolutions/frame rates

Wide Color Gamut/ High Dynamic Range

- IP has been proven to deliver greater ***flexibility, agility and efficiency*** in multiple industries
- It is now doing the same in all facets of broadcast, even in ***live production***

Benefits of Media Over IP

- Common medium for all workflows
  - Real time & file-based as we as config, monitoring, management and control
- Enables COTS networking and compute for media workflows
  - Removes the need for dedicated hardware
- Supports migration to virtualized and cloud based platforms
  - Software based solutions to solve more media workflows
- Leverages IT budgets and purchasing power
  - Manage CAPEX and OPEX spend with IT budgets, amortization, etc
- Integrate broadcast and OTT and other media operations with common platforms
  - Easier live and media asset sharing for multi-platform delivery

SDI vs IP

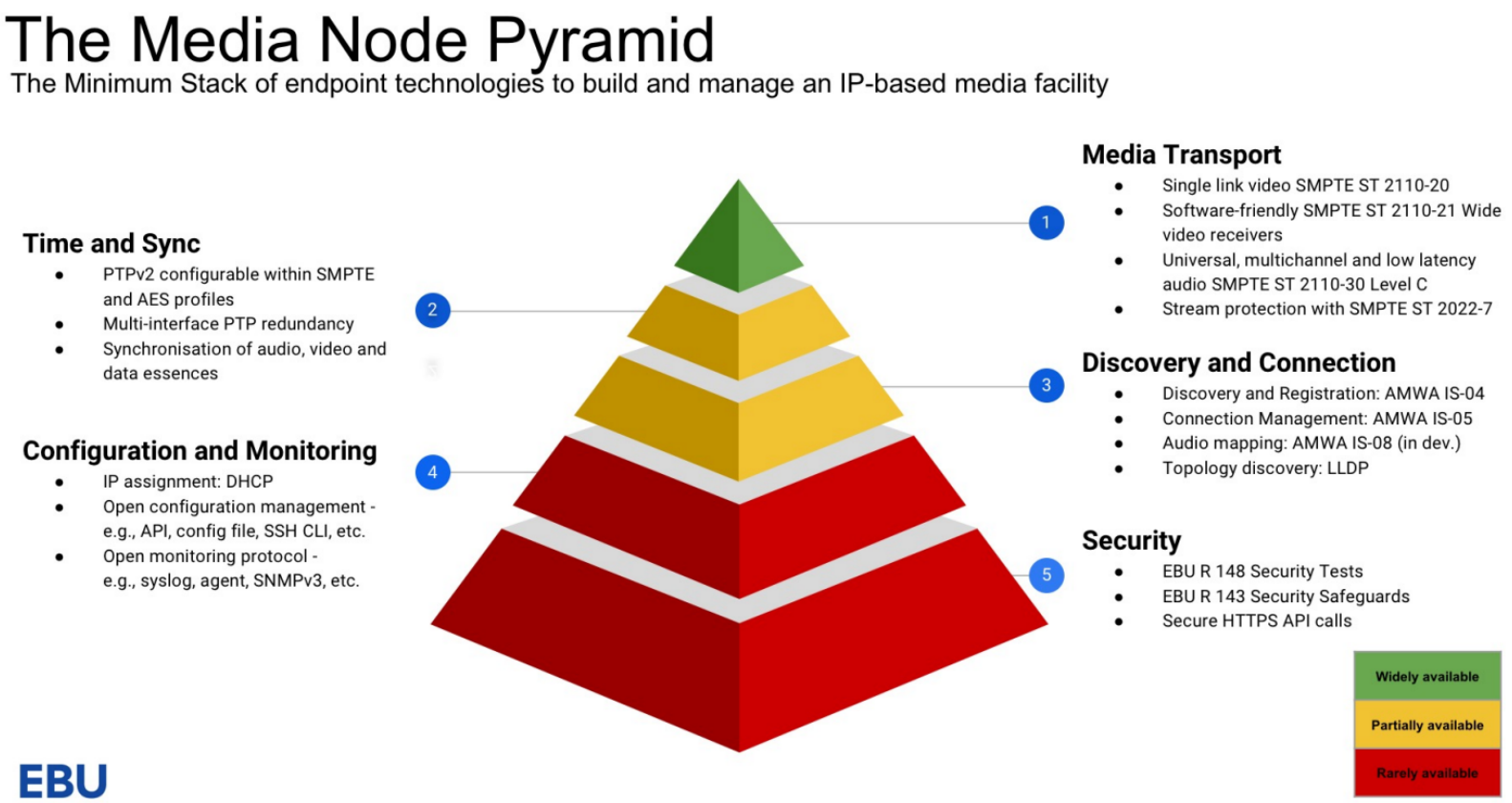
The SMPTE ST 2110 suite has established itself as the defacto set of standards for migrating video, audio and data workflows from SDI to IP

IP offers many advantages over SDI including:

- Standard IT connectivity
- Greater density / link aggregation
- Faster (higher bandwidth) switching fabric
- Shared resource for I/O, control, monitoring, management etc

EBU Diagram – TR 1001

"For the purposes of engineering, constructing and maintaining professional media facility infrastructures… the industry requires the ability to easily integrate equipment from multiple vendors into a coherent system"



Introducing SMPTE ST 2110

- **SMPTE ST 2110**, is the common, worldwide standard for Professional Media over IP Networks
- **Essence** Based
  - Video, Audio and Ancillary Data are separately addressable IP streams
- Ideal for **Studio/Production** Applications

SMPTE ST 2110 is comprised of multiple documents

System Timing and Definitions: SMPTE ST 2110-10

- Covers the system as a whole, the timing model, and common requirements across all essence types

Uncompressed Active Video: SMPTE ST 2110-20

- Documents the IP transport of uncompressed active video using an RTP format based on IETF RFC 4175

Video Sender Traffic Shaping: SMPTE ST 2110-21

- Specifies the traffic shaping model for senders and corresponding requirements on receivers of SMPTE ST 2110-20 (video) streams

SMPTE ST 2110 is comprised of multiple documents

PCM Digital Audio: SMPTE ST 2110-30

- Documents and constrains the use of IP-encapsulated PCM audio in a manner ***based on and compatible with AES67*** in such systems

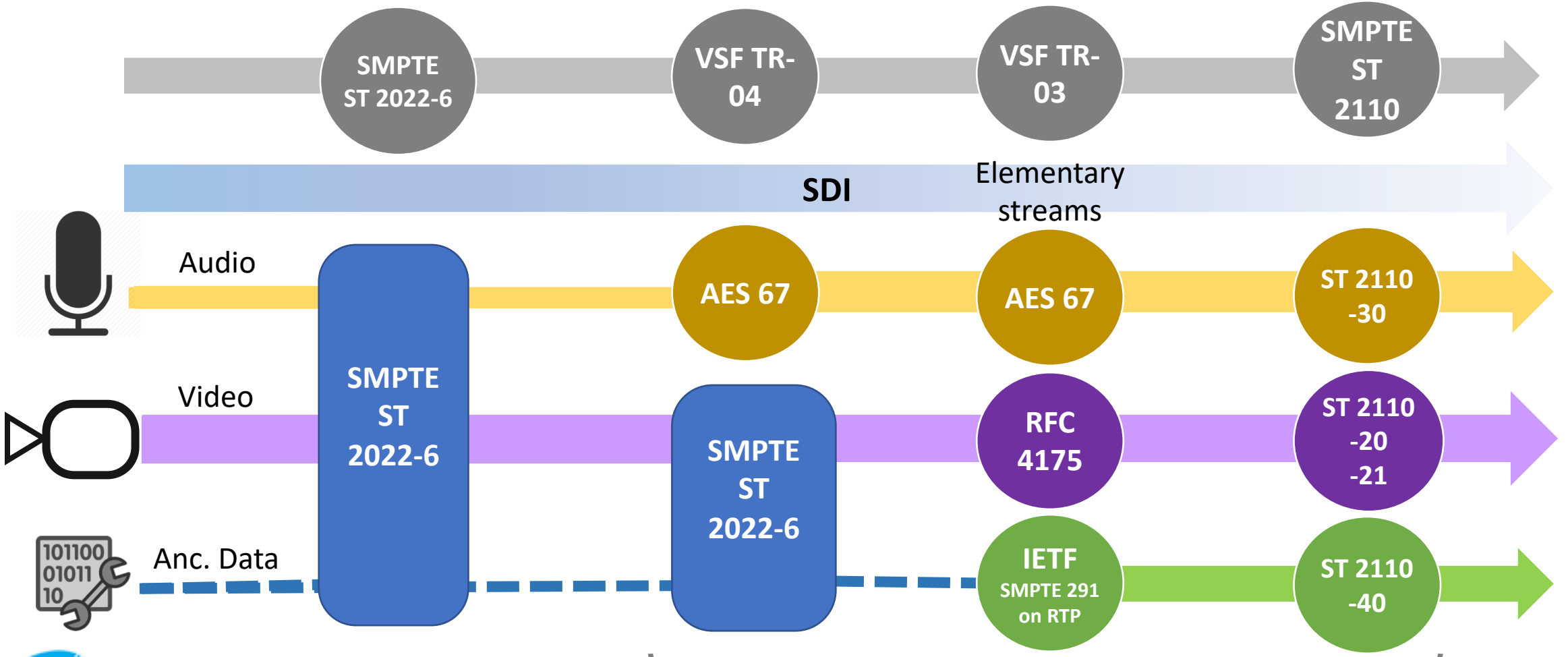
Ancillary Data: SMPTE ST 2110-40

- Documents the IP transport of SMPTE ST 291 ancillary data using an RTP mapping based on an IETF draft

Breaking it Down – Media Transport

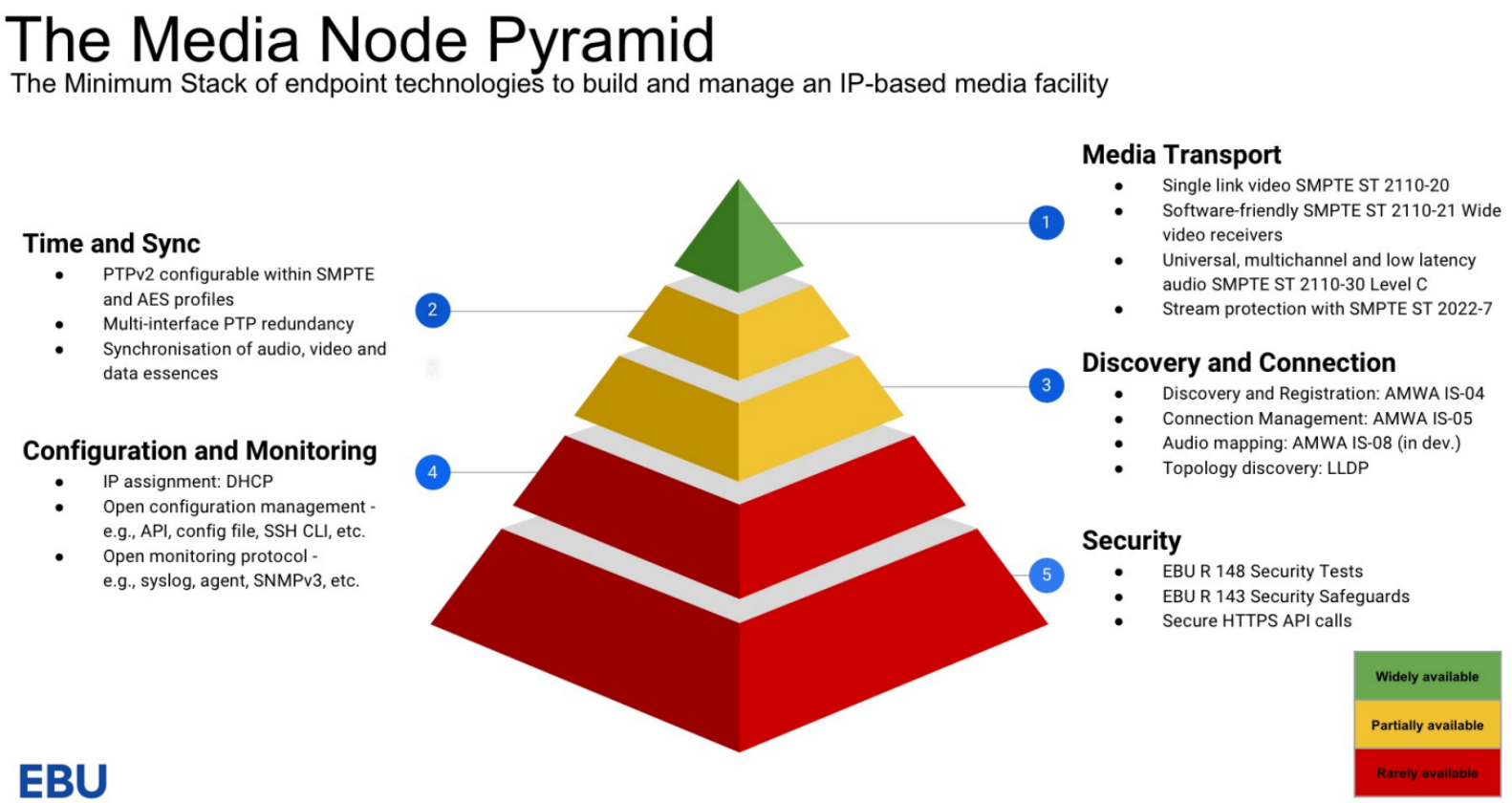
- SMPTE ST 2022-6 is established as the baseline for interoperability
  - Simple SDI over IP implementation
- SMPTE ST 2110 adds greater flexibility, separating video, audio and data into different flows
  - Greater flexibility in your workflow
  - Bandwidth efficiency

IP Connectivity Progression



EBU Diagram – TR 1001

"For the purposes of engineering, constructing and maintaining professional media facility infrastructures… the industry requires the ability to easily integrate equipment from multiple vendors into a coherent system"



Breaking it Down – Timing & Sync

- PTP based timing (SMPTE ST 2059) defines the timing and sync requirements for media over IP
- Grand master clock and redundant master clocks ensure an available valid network timecode source
- Receivers on a network are able to sync incoming video, audio and data flows based on time stamping in each flow and the grand master reference
  - This includes caching to ensure frame alignment as need by each device

We can now make…

Most Basic Working System

Media Transport

- Pick SMPTE ST 2022-6 or SMPTE ST 2110

Timing and Sync

- Standard Timecode or NTP for 2022-6
- PTP (SMPTE ST 2059) for 2110

Transport layer only
A literal replacement of SDI

But..

- Configuration is manual and time consuming
- Routing control requires device dependent drivers
- There is not defined security or monitoring protocols/specifications

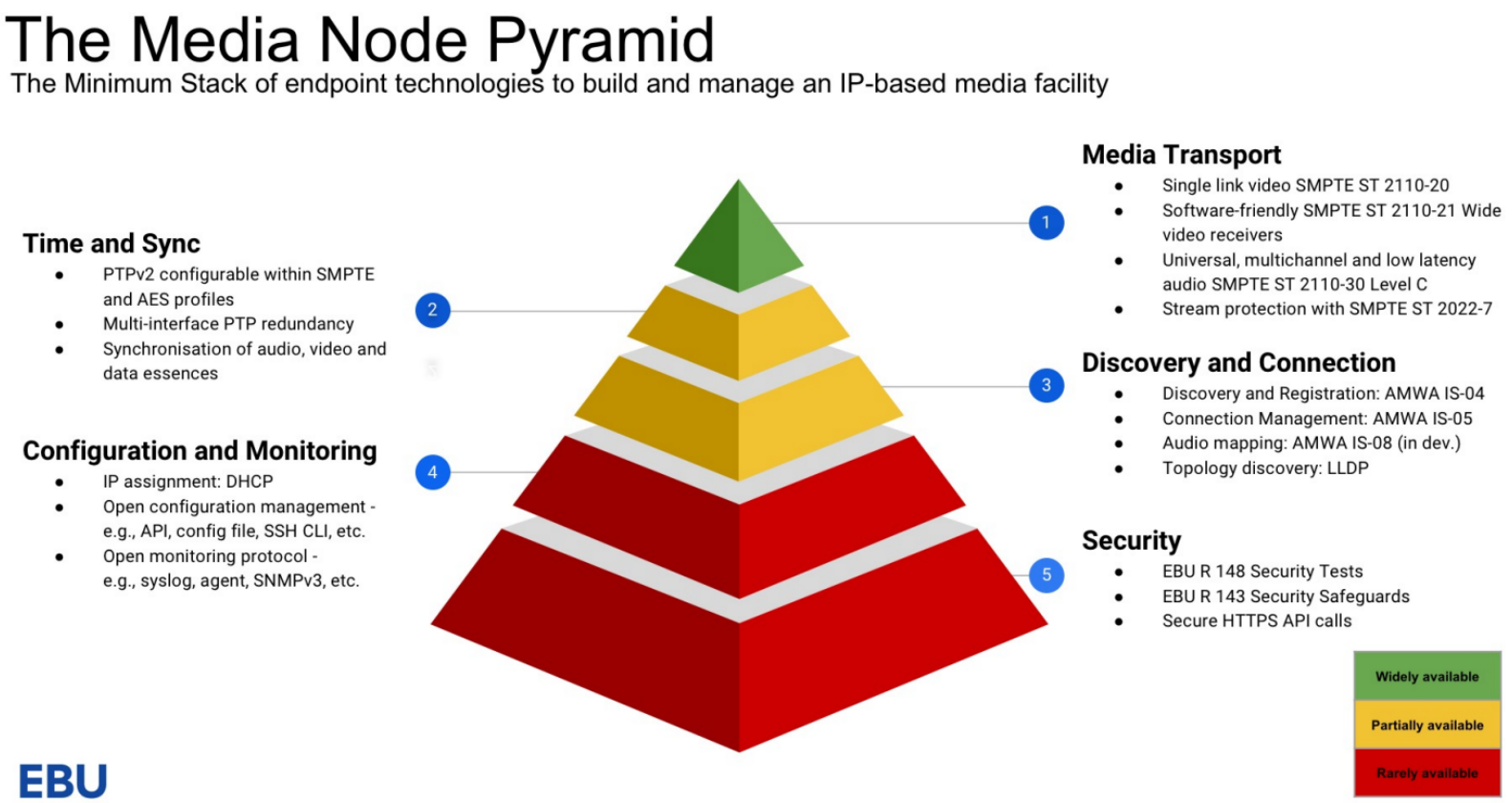
Now We Have a Viable Transport Layer

SMPTE ST 2110 + PTP = Transport layer for video + audio + data

- Route video, audio and data to any destination on a network
- Use IGMP to start (make) and stop (break) those connections
- Network set up for Multicast to allow one to many routing
- Use “Make before Break” to ensure a seamless switch every time

EBU Diagram – TR 1001

"For the purposes of engineering, constructing and maintaining professional media facility infrastructures… the industry requires the ability to easily integrate equipment from multiple vendors into a coherent system"



Making it Plug and Play

- IT based systems can be deployed quickly at scale
- Media over IP systems should be the same
- We need a plug and play mechanism that enables this
- Key enabling technologies
  - AMWA NMOS IS-04 and IS-05
  - SDP (Session Descriptor Protocol)

Breaking it Down – Discovery & Connection

IS-04
Discovery and Registration

AWMA defined methods for device discovery by DNS on a network and registration of flows with a central registration server

Easy method to identify when flows are available or not as devices are connected and disconnected from a network

+

IS-05
Connection Management

AMWA defined APIs for managing connection between compliant devices with compatible flows

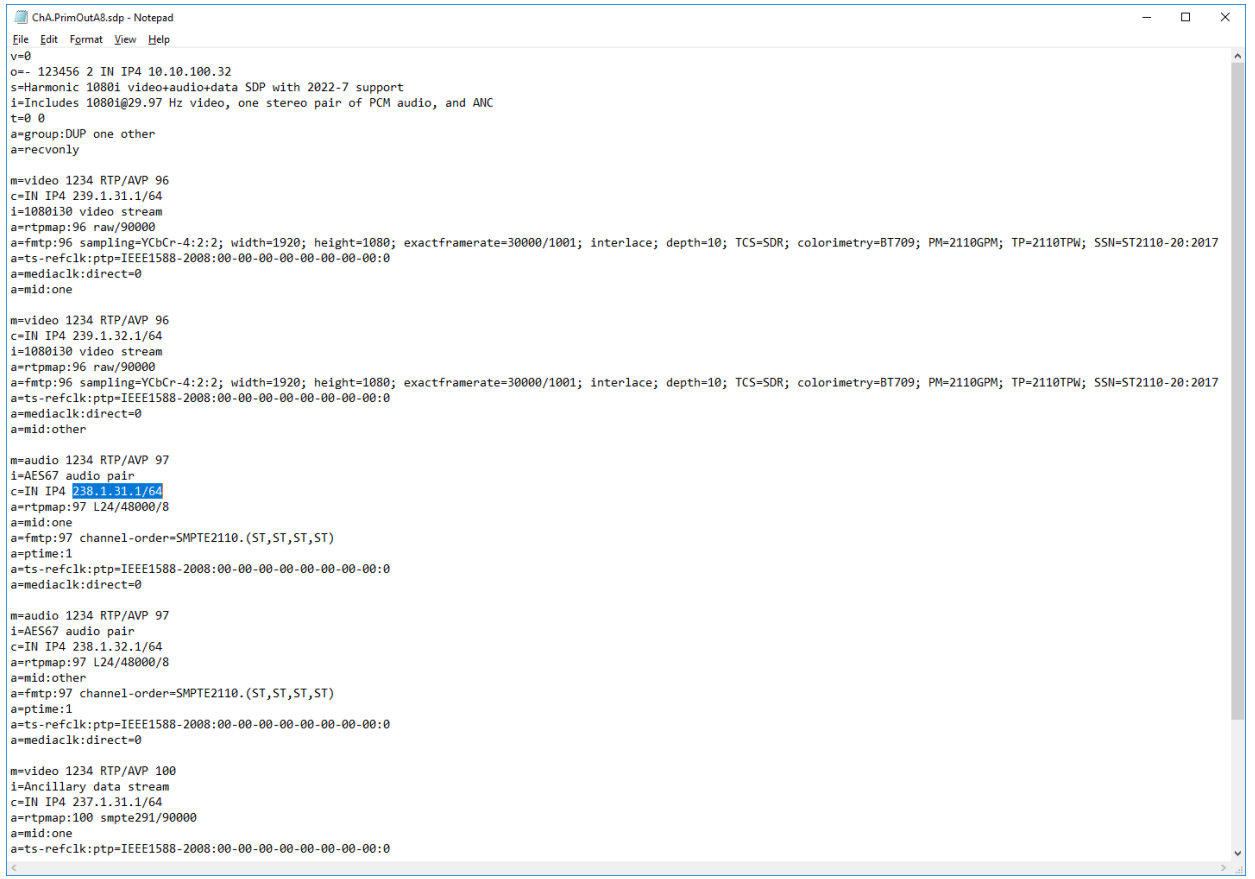
=

Plug and Play

Turn on devices and with minimal user intervention connect them to a network and route signals between compliant devices

SDP (Session Description Protocol) Behind The Scenes of IS-04 and IS-05

- SDP Files define a device input and flow characteristics
  - Number and type of flows
    - Video, audio, ancillary data
  - IP address(es)
  - Video characteristics
    - Raster, frame rate, sampling, bit depth etc
  - Audio characteristics
    - Sample rate, frequency, channels etc
  - Ancillary data
    - Anc data standard, grand master etc



We can now make…

Plug and Play Systems

Media Transport and Timing

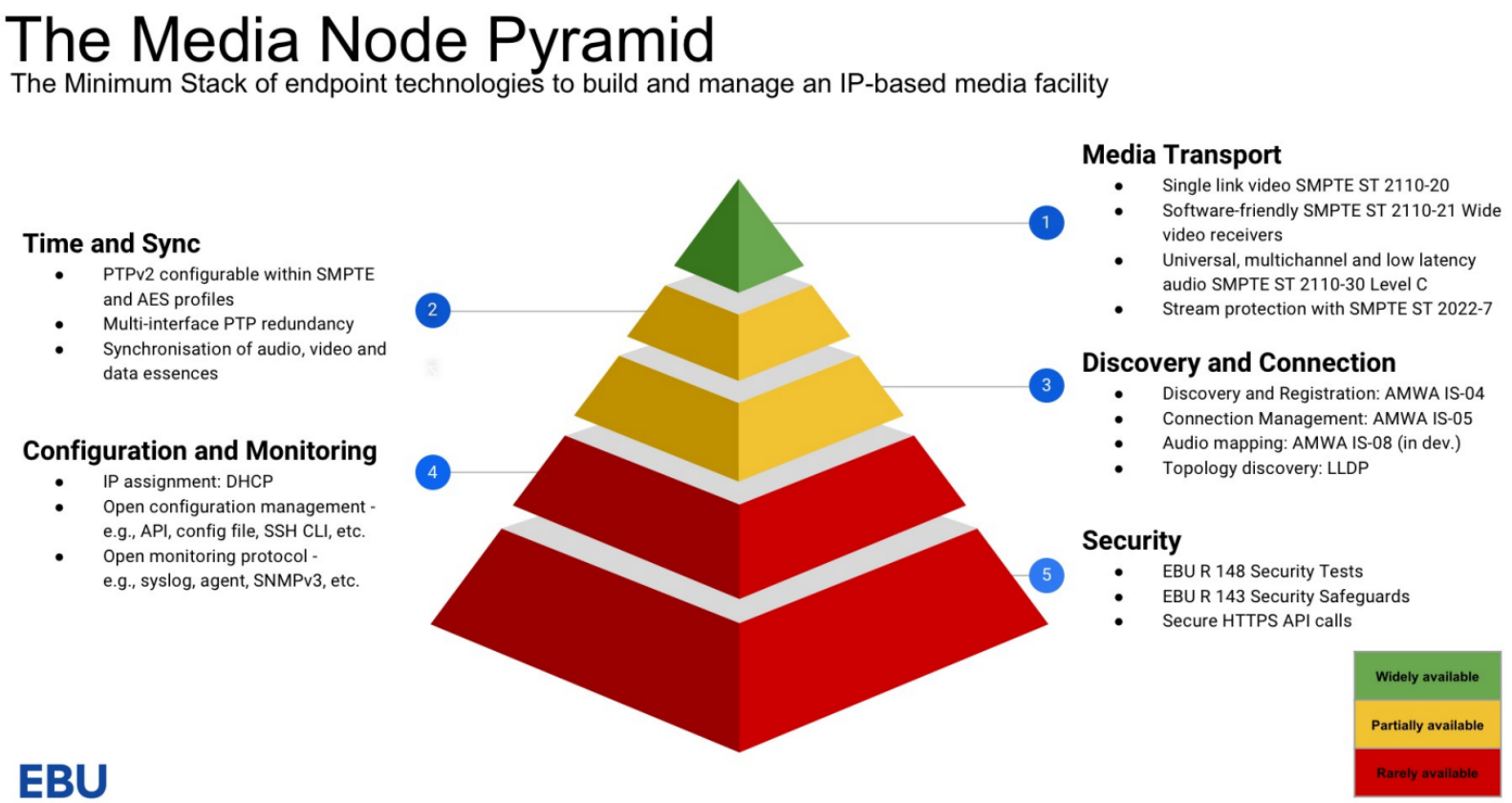
- SMPTE ST 2022-6 or ST 2110 + PTP (ST 2059)

Discovery and Registration + Connection Management

- AMWA NMOS IS-04 – Discovery and Registration
- AMWA NMOS IS-05 – Connection Management
- May also use AMWA IS-07 (event and tally) and IS-08 (audio mapping)

EBU Diagram – TR 1001

"For the purposes of engineering, constructing and maintaining professional media facility infrastructures… the industry requires the ability to easily integrate equipment from multiple vendors into a coherent system"



Configuration and Monitoring

- DHCP: Make it easy for new devices to join a network and be assigned an IP Address
  - Seems simple enough, but not all devices support this
- Configuration Management: Lots of tools exist, with a variety of open protocol options
  - API, Configuration files, SSH CLI etc
- Monitoring: There are existing industry accepted mechanism that can be used:
  - Visual monitoring: Multiviewers, waveform monitors etc
  - Data and analytics: SNMP, SysLog etc

EBU Diagram – TR 1001

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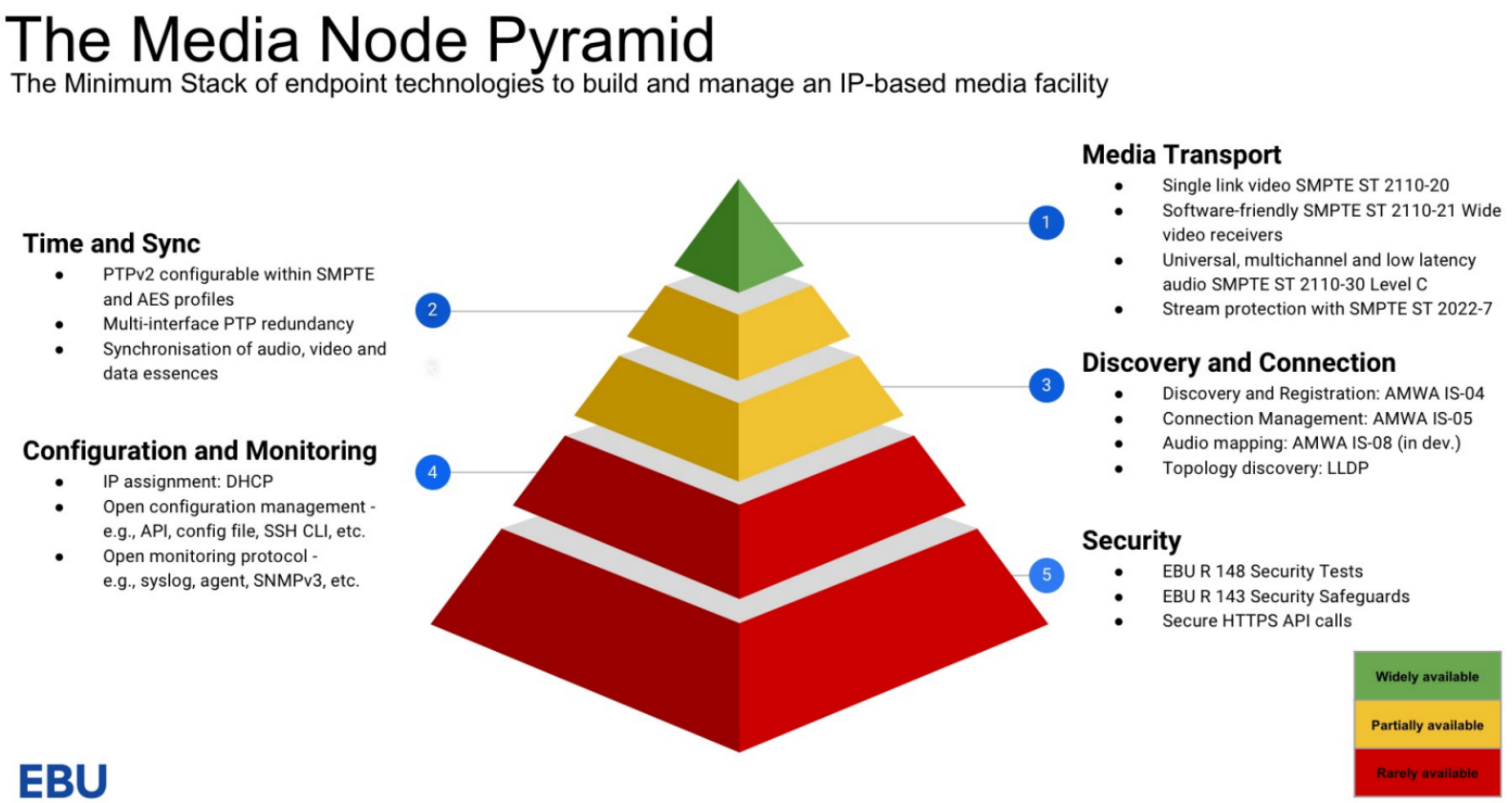


Security

- EBU R 148 – Security Tests
  - Minimum security tests for networked media equipment
  - Includes example tools for exploitation, scanning, fuzzing, credentials etc
- EBU R 143 – Cyber Security Safeguards
  - Recommended practices for vendor systems, software and services
- AMWA BCP 003 – Secure HTTPS API calls
  - Based on best practices used for HTTPS. Intended to promote a secure approach to interoperability

We can now make…

Easy to deploy, manage and maintain systems

We now have everything we need to build and run system at scale

Media Transport and Timing

- SMPTE ST 2022-6 or ST 2110 + PTP (ST 2059)

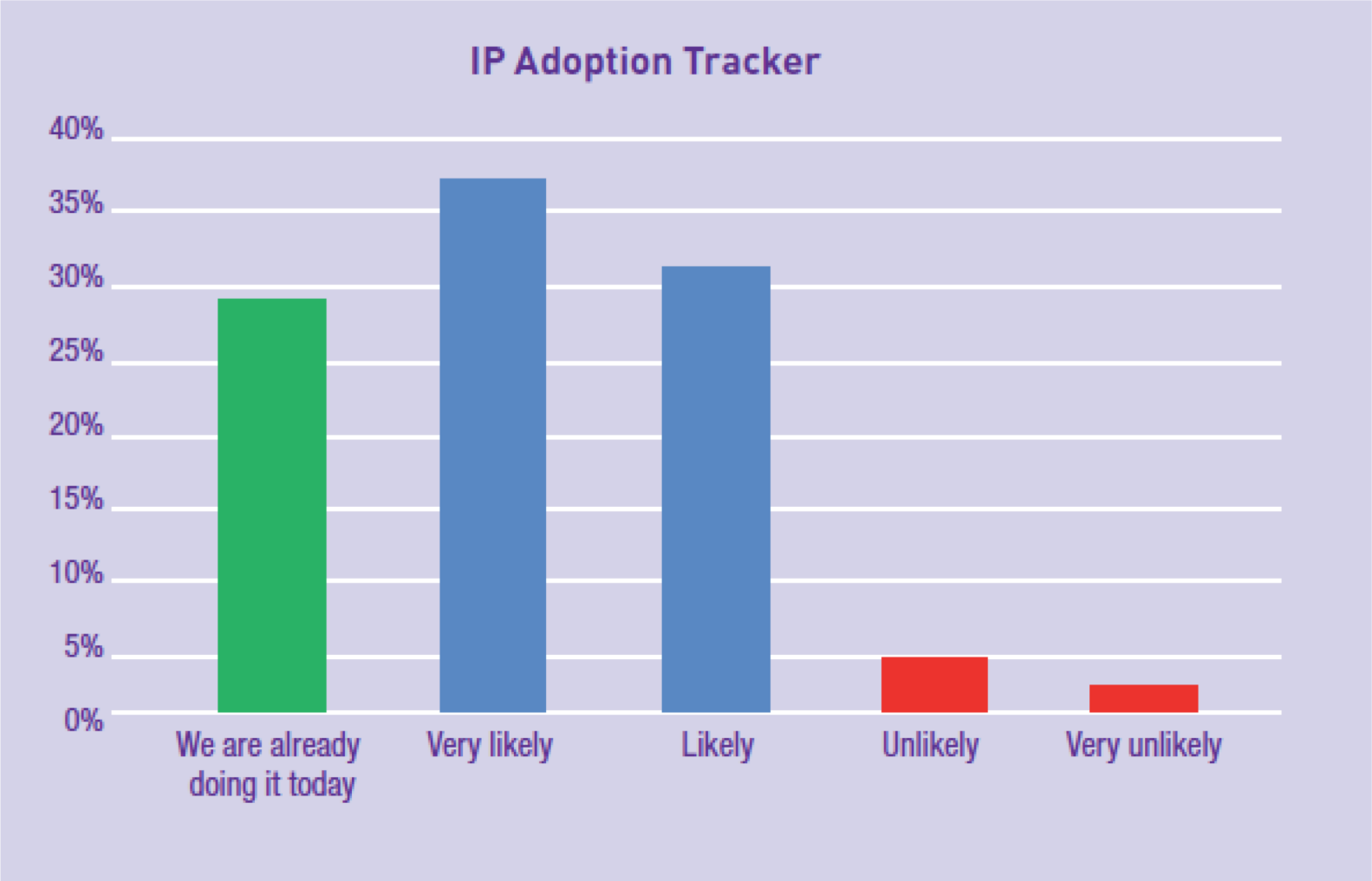
Discovery and Registration + Connection Management

- AMWA NMOS IS-04, IS-05 (IS-06/07/08…)

Configuration and Monitoring

- Config tools, visual and data based monitoring tools
- Security procedures and policies

Transition to IP Infrastructures



3 IP Highlights

51%
of companies saying less than 40% of their technology infrastructure has transitioned to IP

44%
of companies deployed/plan to deploy IP for UHD content

6%
of companies say they are unlikely to transition to IP

Source: IABM pre-INAB Show 2018 End-User Survey

AIMS Alliance for IP Media Solutions — IP IN ACTION

REPRESENTATIVE INSTALLATIONS

SCAN QR CODE FOR ADDITIONAL INFORMATION

ARD GERMAN RADIO

ARD
NATIONWIDE, GERMANY

DESCRIPTION
Modernization project of the federal radio network introducing AoIP over MAN in a fully redundant design

IP TECHNOLOGY
AES67

IP BENEFITS
Real-time exchange of audio programs over WAN
Seamless redundancy switching
Future-proof technology

ON AIR DATE
February 2018

ARENA

OB X, OB Y, OB Z, OB 12 UHD
OB TRUCKS
based in Surrey, UK

DESCRIPTION
4 Full IP, UHD OB Trucks
32 UHD Cameras each
Hired by BT Sport for English Premier League coverage
Hired by SKY Sports for Rugby Union coverage

IP TECHNOLOGY
SMPTE ST 2022-6
SMPTE ST 2110

IP BENEFITS
Format Flexibility (UHD/HD)
Scale

ON AIR DATE
September, 2016

AP

ASSOCIATED PRESS
New York, USA

DESCRIPTION
New broadcast/ops building, with hybrid HD-SDI/IP infrastructure for studios, newsroom and MCR

IP TECHNOLOGY
SMPTE ST 2022-6
SMPTE ST 2022-7

IP BENEFITS
Ease of expansion
Test case opportunity
Long cable runs

ON AIR DATE
March 2017

BBC cymru wales

BBC WALES, CENTRAL SQUARE
Cardiff, Wales, UK

DESCRIPTION
New Headquarters Building
3 TV Studios
Multiple Radio Studios
Multiple Edit Suites
Flexible Media Areas

IP TECHNOLOGY
SMPTE ST 2110
AMWA NMOS

IP BENEFITS
Future Proofing
Scale
Format Flexibility

ON AIR DATE
Q4 2019

bce broadcasting center europe

BROADCASTING CENTER EUROPE
LUXEMBOURG

DESCRIPTION
Move to new premises: RTL City
IP used for signal routing and distribution

IP TECHNOLOGY
SMPTE ST 2022-7
AES67
PTPv2 and PTPv1
Upgradable to SMPTE ST 2110

IP BENEFITS
Format Agnostic (1080p, 4K)
Flexibility, Redundancy, Reliability
Innovation

ON AIR DATE
April 2017 (Studio Production)
June 2017 (Playout Facility)

CANAL+ GROUP

CANAL+ GROUP
ENGLAND, BELLINGHAM, FRANCE

DESCRIPTION
Live shows broadcast production center:
4 studios, 2 galleries and 18 seats of postproduction

IP TECHNOLOGY
SMPTE ST 2022-6
Moving to SMPTE ST 2022-7 and AES67
Introducing SMPTE ST 2059

IP BENEFITS
Quicker to setup new shows
Easier to create shows back to back

ON AIR DATE
November 2016

CBC Radio-Canada

CBC RADIO-CANADA
MONTREAL, QUEBEC, CANADA

DESCRIPTION
The new Maison De Radio Canada in Montreal is a SMPTE ST 2110 based facility that will serve as the production, playout and distribution hub for French Television, Radio and Web services of CBC/Radio-Canada, Canada's national broadcaster.

IP TECHNOLOGY
SMPTE ST 2110

IP BENEFITS
Reduced cabling "out of rack" and "room to room" connectivity. IP enables Software and COTS driven hardware.
Playout area is projected to be 100% COTS software
Fastest implementation/ Future proof IP infrastructure
Combination of Audio for Radio, Audio for TV, 4K, and UHD 4K signals

ON AIR DATE
Rehearsals Fall 2019
Transfer of operation starting early 2020

CCTV

CCTV
BEIJING, CHINA

DESCRIPTION
Outdoor mobile MCR system for hybrid IP routing, monitoring and control

IP TECHNOLOGY
SMPTE ST 2110 for HD+UHD
SMPTE ST 2022-7

IP BENEFITS
Flexibility and agility
Open, interoperable
Scalable, future-proof
Space-saving

ON AIR DATE
February 2018

CCTV

CCTV
BEIJING, CHINA

DESCRIPTION
Field Live Studio for UHD program in CCTV new building.

IP TECHNOLOGY
SMPTE ST 2022-6/7
SMPTE ST 2059

IP BENEFITS
Simple system structure for UHD
Full redundancy network
Excellent program quality

ON AIR DATE
October 2018

CTC

CTC
MOSCOW, RUSSIA

DESCRIPTION
Broadcaster with fully software-based, multichannel, uncompressed IP playout system

IP TECHNOLOGY
SMPTE ST 2022-6

IP BENEFITS
Open, COTS based
Highly flexible
Significant reduction in hardware footprint
Future-proof environment for quick and easy expansion

ON AIR DATE
July 2018

FOX SPORTS — THE WOODLANDS

FOX SPORTS
THE WOODLANDS, TX USA

DESCRIPTION
Standards-based, hybrid IP routing and control for broadcast production environment

IP TECHNOLOGY
SMPTE ST 2110

IP BENEFITS
Flexible routing ecosystem
Open, interoperable
Highly scalable
Seamlessly incorporates new technologies

FOX NETWORKS

FOX NETWORKS
LOS ANGELES, CA USA

DESCRIPTION
FOX Network Center Los Angeles Video Routing

IP TECHNOLOGY
SMPTE ST 2110
SMPTE ST 2059

IP BENEFITS
Enhanced routing density
Reducing coax cabling with fewer fibers
Expanded & flexible audio & ANC data flows
Easier multi-format sales

ON AIR DATE
April 2018

Global production

GLOBAL PRODUCTION
TURIN, ITALY

DESCRIPTION
UHD HDR OB Truck, supporting up to 30 true 4K cameras for live production

IP TECHNOLOGY
SMPTE ST 2110

IP BENEFITS
Open, interoperable
Highly scalable
Significant rack space savings
Future-proofed infrastructure

ON AIR DATE
September 2016

GLOBOSAT

GLOBOSAT
Rio de Janeiro, BRAZIL

DESCRIPTION
Live production including graphics and video playout over IP

IP TECHNOLOGY
SMPTE ST 2022-6/7
AES67
SMPTE ST 2059

IP BENEFITS
Massive A/V signals transport
Signals utilization flexibility

ON AIR DATE
July, 2016

GLOBOSAT

GLOBOSAT
Rio de Janeiro, BRASIL

DESCRIPTION
IP based compact production galleries

IP TECHNOLOGY
SMPTE ST 2022-6/7
AES67
SMPTE ST 2059

IP BENEFITS
Simple operation for live events with few external sources.
Signals utilization flexibility

ON AIR DATE
March 2018

GRT

GRT
GUANGZHOU, CHINA

DESCRIPTION
The first 8.2K UHD IP Studio Group in APAC.
Four of dozens Studios are shared Camera, IP Infrastructure and Direct IP system at the same time.

IP TECHNOLOGY
SMPTE ST 2022-6/7
SMPTE ST 2110-10
SMPTE ST 2110-20
SMPTE ST 2110-30

IP BENEFITS
Flexible system structure
Full IP systems include AES67
Shred IP for UNIDAD Live Sports Events

ON AIR DATE
Phase1 Q3 2017
Phase2 Q2 2018

HTB

HTB
MOSCOW, RUSSIA

DESCRIPTION
Television network with IP playout platform in a virtualized environment

IP TECHNOLOGY
SMPTE ST 2022-6
SMPTE ST 2022-7

IP BENEFITS
Open, COTS-based
Flexibility, and ease of distribution of key HI inputs
Significant reduction in hardware footprint

ON AIR DATE
November 2016

HUARUI RADIO

HUARUI RADIO
Haimen, China

DESCRIPTION
Master control system project for signal transmission, monitor and auto switch in the emergency situation
distributor based on AES67

IP TECHNOLOGY
AES67

IP BENEFITS
Ease of signal monitor and control, interoperability;
Low latency

ON AIR DATE
July 2016

HUZHOU RADIO

HUZHOU RADIO
Huzhou, China

DESCRIPTION
Master control system project provides signal monitor and control functions for 4 live channels, 10 satellite channels

IP TECHNOLOGY
AES67

IP BENEFITS
High efficiency in signal monitor and control
Improved security with network redundancy
Ease of installation and maintenance

ON AIR DATE
July 2016

iQIYI

iQIYI
BEIJING, CHINA

DESCRIPTION
UHD program production studio group which include 4 studios shading one IP core system.

IP TECHNOLOGY
SMPTE ST 2022-6/7
SMPTE ST 2110-10
SMPTE ST 2110-30

IP BENEFITS
Flexible system structure
Full IP systems include AES67
Flexible switching of UHD/3G program format

ON AIR DATE
In system installations

KBS Media

KOREAN BROADCASTING SYSTEM
Seoul, Korea

DESCRIPTION
2UHD studios and 2 signal control rooms (SCR) in the KBS new building.
Each D2I backup each others and able to control both studios.

IP TECHNOLOGY
SMPTE ST 2022-6/7/7
SMPTE ST 2110 & AES67

IP BENEFITS
Flexibility
Scalable
Interconnectivity between Studios

ON AIR DATE
February 2018

LinkedIn

LINKED IN MULTI-CAMPUS PRODUCTION
San Francisco/Mountain View/ Bangalore/Dublin/Chicago/New York

DESCRIPTION
Multiple production facilities which are interoperable, remotely managed and controlled. Control room which can produce shows from various venues

IP TECHNOLOGY
SMPTE ST 2022-6 (currently)
SMPTE ST 2110 / AES67 (2018)
SMPTE ST 2059 (2018)

IP BENEFITS
Long-term infrastructure
Format Flexibility

ON AIR DATE
June 2016 – 2018 (various)

LIANYUNGANG RADIO

LIANYUNGANG RADIO
Lianyungang, China

DESCRIPTION
Master control system project for second transmission for 7 channels

IP TECHNOLOGY
AES67

IP BENEFITS
High efficiency of signal monitor and control, improved security with network redundancy;
Low latency

ON AIR DATE
September, 2017

LUOYANG RADIO

LUOYANG RADIO
Luoyang, China

DESCRIPTION
Master control system integrators project for live evening center room, live voice and director room coordination for 5 live channels' monitor and control

IP TECHNOLOGY

IP BENEFITS
Ease of signal monitor and control, improved security with network redundancy;
Low latency

ON AIR DATE
February 2016

Mobile TV Group

MOBILE TV GROUP
DENVER CO, USA

DESCRIPTION
Mobile Production Unit 45 FLEX designed for live regional sports production

IP TECHNOLOGY
SMPTE ST 2110
AES67

IP BENEFITS
Scalable 1Rx/2Tx IP core enabling 1080p production today, and full resolution 4K in future.
Switcher, Replay and Camera. Interconnect via native IP, eliminating expensive coax gateways.

ON AIR DATE
April 2019

NBCUniversal Owned Television Stations

WCAU & WRSI
Comcast Technology Center Philadelphia, PA USA

DESCRIPTION
New ST 2059 IP facility housed in Comcast's new flagship technology center
Full IP core infrastructure

IP TECHNOLOGY
SMPTE ST 2022-6/7
AES67
SMPTE ST 2059
AMWA NMOS IS-04

IP BENEFITS
Format Flexibility
Resource Sharing
Easy local and remote expansion/scaling

ON AIR DATE
2016

NDR

NDR ELBPHILHARMONIE
Hamburg, Germany

DESCRIPTION
Fully networked concert hall
4 mixing desks
15 stagebox units
1 main router
4000+ audio channels

IP TECHNOLOGY
AES67

IP BENEFITS
Flexible signal management
Shared infrastructure
Integrated access rights management

ON AIR DATE
January 2017

NEP

NEP BROADCAST SOLUTIONS
Singapore

DESCRIPTION
Playaway OB Mini for Live Production
Air major sport event coverage.

IP TECHNOLOGY
SMPTE ST 2022-6
AES67

IP BENEFITS
Scale
Flexibility

ON AIR DATE
March 2017

NEP

CLOUD PRODUCTION PLATFORM
The Netherlands

DESCRIPTION
Centralized, shared production platform enabling productions across multiple locations

IP TECHNOLOGY
SMPTE ST 2022-6

IP BENEFITS
Better Equipment Utilization
Reduced Travel Budget
Flexibility

ON AIR DATE
November 2015

NEP

THE HUB
Sydney and Melbourne, Australia

DESCRIPTION
Two, centralized and resource sharing production centers, allowing for remote production from 29 country wide venues

IP TECHNOLOGY
SMPTE ST 2110

IP BENEFITS
Resource sharing
Reduced Travel Budget
Flexibility
Anyone Anywhere on the network

ON AIR DATE
March 2018

NOTRE DAME UNIVERSITY

DESCRIPTION
The 130,000 sq. ft. facility at Notre Dame Stadium enables campus video production units to realize their creative vision for live and recorded story-telling.

IP TECHNOLOGY
AoIP using AES67 production equipment

IP BENEFITS
Flexible workflows, inter-operability, and a future-proofed infrastructure.

ON AIR DATE
Fall 2017

now TV

PCCW NOW'S NEWS
Hong Kong, China

DESCRIPTION
IP infrastructure for 24 hours Live News Production

IP TECHNOLOGY
SMPTE ST 2022-6 & AES67

IP BENEFITS
Scale
Flexibility

ON AIR DATE
August 2018

QVC

QVC
CHIBA CITY, JAPAN

DESCRIPTION
IP based production system, including IP routing system, multiviewers, production switcher, and audio mixer

IP TECHNOLOGY
SMPTE ST 2110

IP BENEFITS
Flexibility and agility
Open, interoperable
Highly scalable

ON AIR DATE
2018

RBC

BEIJING RADIO
Beijing, China

DESCRIPTION
Master control system integration project for 11 live channels' monitor and control with MOIP devices from different manufacturers

IP TECHNOLOGY
AES67

IP BENEFITS
Ease of signal monitor and control, improved security with network redundancy; interoperability

ON AIR DATE
April 2017

RU TV

RU TV
Moscow, Russia

DESCRIPTION
Russian Media Group built 5 radio stations using AoIP technology, later adding AoIP to the TV studios simply by extending the IP infrastructure.

IP TECHNOLOGY
AoIP including AES67

IP BENEFITS
Operational flexibility, enhanced production workflow, future-proofed infrastructure.

ON AIR DATE
Spring 2013

910 AM

RUIAN RADIO
Ruian, China

DESCRIPTION
Master control system project for signal transmission, monitor and auto switch in the emergency situation for 2 channels (1 backup) with AES67 devices

IP TECHNOLOGY
AES67

IP BENEFITS
High efficiency of signal monitor and control, improved security with network redundancy;
Low latency

ON AIR DATE
June 2017

sky

SKY
Milan, Italy

DESCRIPTION
Large-scale audio/video routing system in a hybrid SDI/IP environment

IP TECHNOLOGY
SMPTE ST 2022-6/7

IP BENEFITS
Flexible routing ecosystem
Open, interoperable
Highly scalable

ON AIR DATE
February 2017

SMG

SHANGHAI MEDIA GROUP
Shanghai, China

DESCRIPTION
UHD OB truck

IP TECHNOLOGY
SMPTE ST 2110 & AES67

IP BENEFITS
Scale
Flexibility

ON AIR DATE
May, 2018

腾讯视频

TENCENT VIDEO
Beijing, China

DESCRIPTION
Full IP 4K UHD OB Van

IP TECHNOLOGY
SMPTE ST 2022-6/7, TR-03

IP BENEFITS
Scale
Scalability
Flexibility

ON AIR DATE
December 2016

Broadcast Anywhere Timeline TV

TIMELINE
London, UK

DESCRIPTION
Timeline's triple expanding, IP-4K HDR outside broadcast truck delivers large scale complex OBs simultaneously in uncompressed 4K UHD HDR and 4K UHD SDR

IP TECHNOLOGY
SMPTE ST 2110
SMPTE ST 2022-6
SMPTE ST 2022-7
SMPTE ST 2059

IP BENEFITS
Enables large scale complex OB's
Removes traditional SDI matrix limitations

ON AIR DATE
May 2017

tpc

TPC
Zurich, Switzerland

DESCRIPTION
Standards-based, uncompressed, IP-UHD mobile production truck
New technology bakking (not Master Switching)

IP TECHNOLOGY
SMPTE ST 2110
AES67

IP BENEFITS
Open architecture, Compact and flexible, Seamlessly incorporates new technologies, Future proofed

ON AIR DATE
August 2018

TV GLOBO RECIFE

DESCRIPTION
Uncompressed IP-based routing system and multiviewers for live, studio and news production

IP TECHNOLOGY
SMPTE ST 2022-6/7
AES67
ST 2110

IP BENEFITS
Flexible routing ecosystem
Open, interoperable
Highly scalable

ON AIR DATE
January 2018

TV2

TV2
Bergen and Oslo, Norway

DESCRIPTION
Convergent IP / UNIVERS, software defined network (SDN) that enables distributed production across two new facilities in Bergen and Oslo (approximately 250 miles apart)

IP TECHNOLOGY
SMPTE ST 2022-6 + AES67 + PTP initially
SMPTE ST 2110 (planned H2 2018)
SDN

IP BENEFITS
Enables resources (talent, equipment and studios' control rooms) to be shared within and across sites
Can evolve and grow to meet changing needs

ON AIR DATE
September 2017 (Bergen)

VICE

VICE
Brooklyn, NY, USA

DESCRIPTION
IP based production system, including IP routing system, multiviewers, production switcher, and audio mixer

IP TECHNOLOGY
SMPTE ST 2022-6
AES67
SMPTE ST 2059

IP BENEFITS
Completely distributed facility
Flexible to future needs
Separate video/audio routing
End-of-lines products connected via IP standards

ON AIR DATE
December 2016

CBC Radio-Canada

CBC RADIO-CANADA
MONTREAL, QUEBEC, CANADA

DESCRIPTION
The new Maison De Radio Canada in Montréal is a SMPTE ST-2110 based facility that will serve as the production, playout and distribution hub for French Television, Radio and Web services of CBC/Radio-Canada, Canada's national broadcaster.

IP TECHNOLOGY
SMPTE ST 2110

IP BENEFITS
Reduced cabling "out of rack" and "room to room" connectivity. IP enables Software and COTS server hardware
Playout area is projected to be 100% COTS software
Format independence/ Future proof IP infrastructure
Combination of Audio for Radio, Audio for TV, HD, and UHD 4K signals

ON AIR DATE
Rehearsals Fall 2019
Transfer of operation starting early 2020

CBC/Radio-Canada World Largest IP Facility

Denis Pare, VP Sales

Embrionix

- Brand new IP facility
- Going from 121,000 m^2 to 37,000 m^2
  - 3 Production Sets (2 Control Rooms)
  - 10 News Production Areas (4 Control Rooms)
  - 40 TV playout channels, 40 WEB channels and 180 Radio channels
  - Broadcast across Canada

- Uses SMPTE ST 2110 across the facility
- HD as well as UHD Content

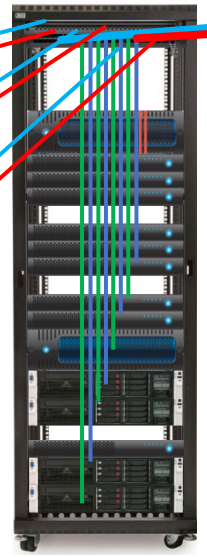
Studio Floors

IP Audio device

IP Video device

HDMI Gateway

14 Closets



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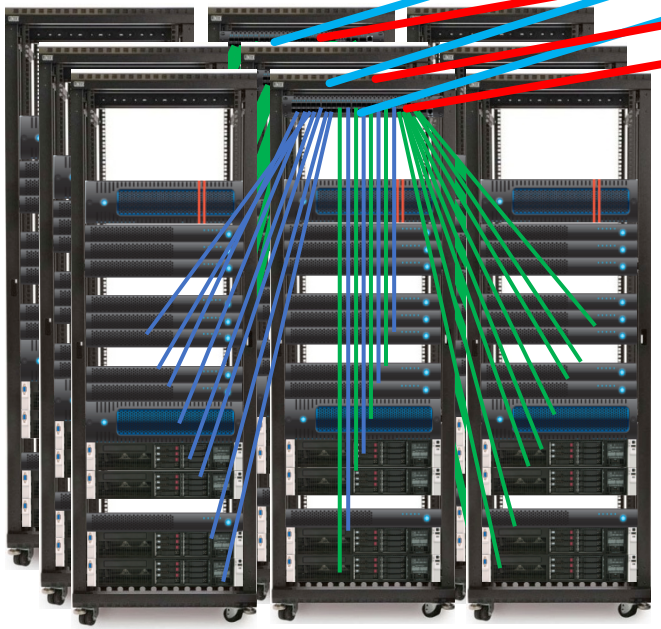

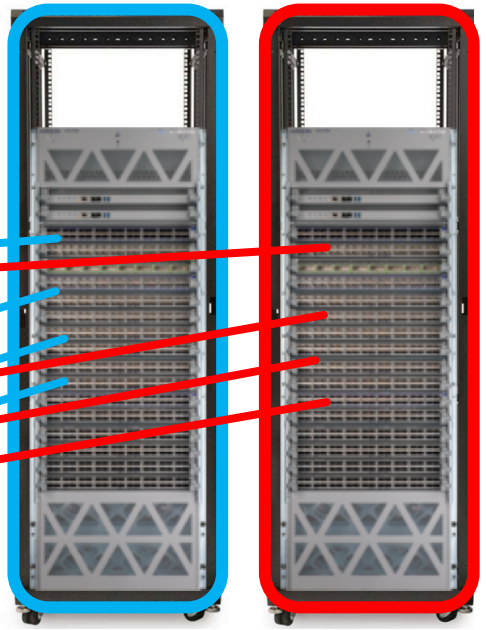

SDI Signal

IP Signal

IP SHOWCASE THEATRE™

SMPTE

The IP Showcase Demo

JT-NM Tested Program

Sponsored by

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Hosted By

Fox Networks

The JT-NM Tested Program provides greater transparency of vendors performance to the SMPTE ST 2110 standards adapted by the industry

The first testing event took place the week of March 18, 2019 at the Fox Networks facility in Woodlands, Texas

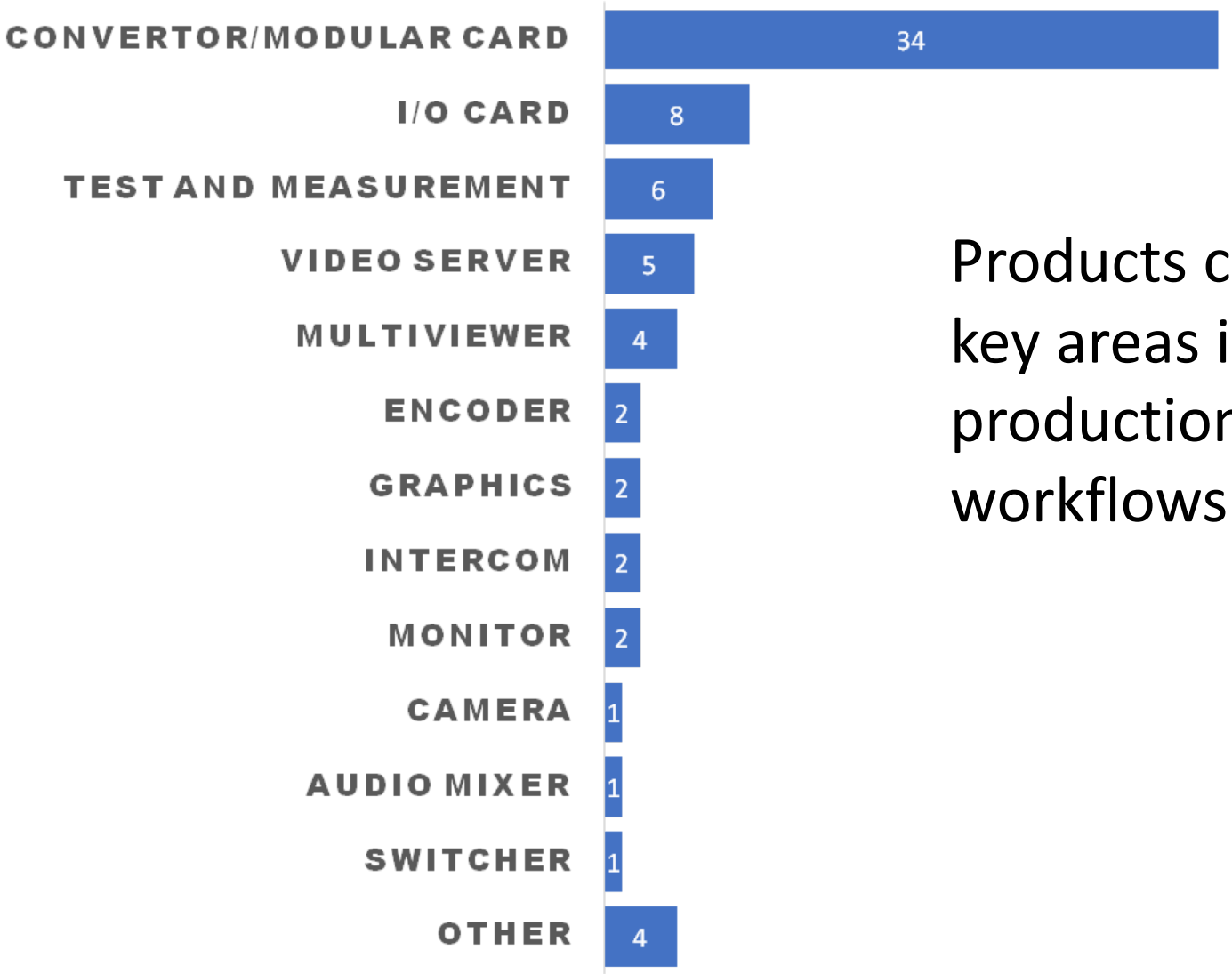
IP SHOWCASE THEATRE™

72 products from 35 vendor products tested

SMPTE

JT-NM Tested Program Participants

72 products from 35 vendor products tested

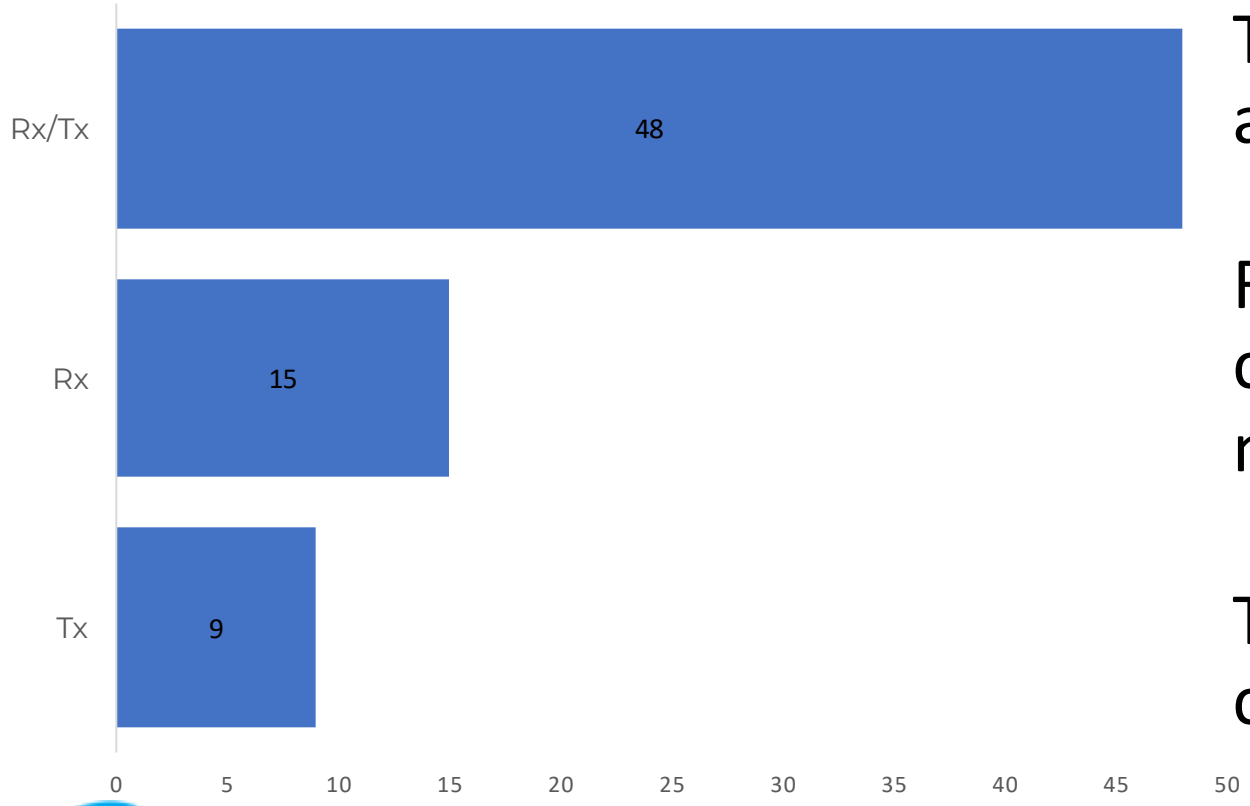


Products covering all the key areas important to production and playout workflows

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

Receivers & Transmitters

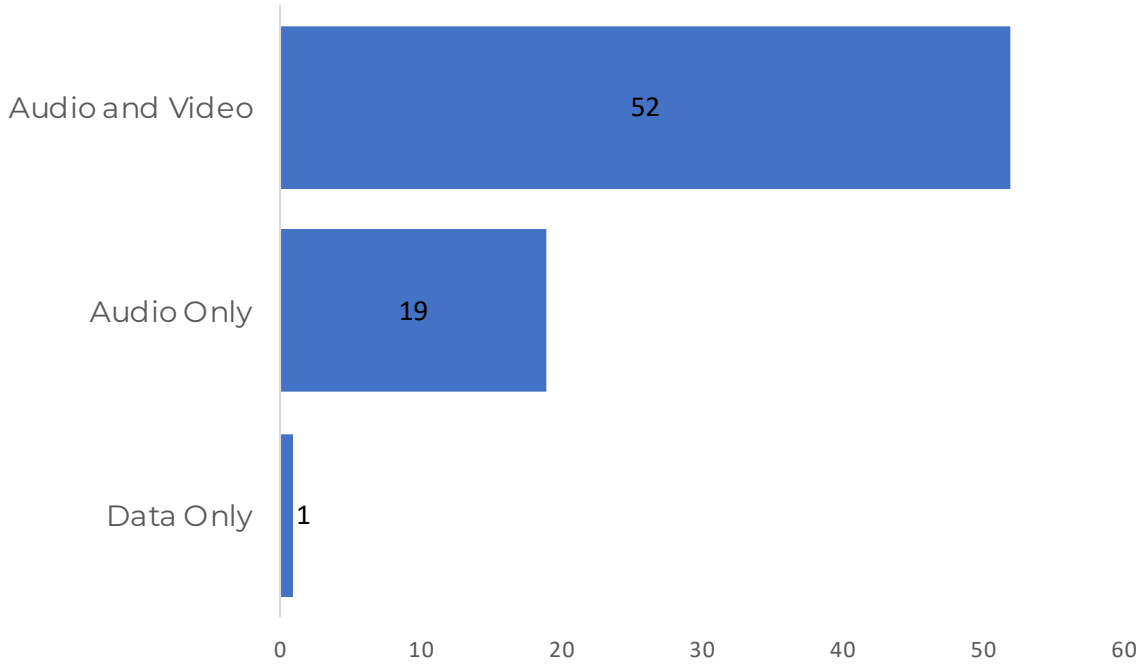


The majority of products could receive and transmit SMPTE ST 2110

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

Transmit only products were primarily convertors

Audio, Video & Data



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

IP SHOWCASE THEATRE™

SMPTE

Wednesday, July 17

Time	Title	Speaker
12:40	What's the METexpo IP Showcase All About?	Stan Moote, IABM
13:00	Full Infrastructure Control	Peter Schut, Axon
13:20	Transporting ST 2110 Over WAN	Patrick Ang, Nevion
13:40	Case study: Video Quality With TICO 4K	Urvashi Pal, Telstra
14:00	Timing for IP Video Networks: Basics	Paul Dengate, OnAir
14:30	Case Study: CBC/Radio-Canada	Denis Pare, Embrionix
15:00	Standardized Connection Management for Essences and Network Flows in ST 2110 and AES67	Cameron O'Neill, Riedel
15:30	Scalable IP Architectures for Media and Broadcast	Paul Druce, Arista Networks
16:00	Rise of IP in Remote Production Networks	Steven Dargham, Telstra
16:30	Timed Switch Implementation Over Programmable Hybrid Pipeline	Michael Schipp, Mellanox
17:00	A Full IP UHD System Camera Solution Supporting SMPTE ST 2110 in Any Operational Mode	Klaus Weber, Grass Valley

Thursday, July 18

Time	Title	Speaker
11:00	The World's Largest SMPTE ST2110 Installation	Mo Goyal, Studiotech
11:30	Case Study: Video Quality With TICO 4K	Urvashi Pal, Telstra
12:00	A Full IP UHD System Camera Solution Supporting SMPTE ST 2110 in Any Operational Mode	Klaus Weber, Grass Valley
12:20	What's the METexpo IP Showcase All About?	Stan Moote, IABM
12:40	Simplifying the Use of AMWA IS-04 Through Dematerialised Microservices	Michael Schipp, Mellanox
13:00	PTP Timing: The Introduction	Paul Briscoe, Televisionary
13:20	Rise of IP in Remote Production Networks	Steven Dargham, Telstra
13:40	Transporting ST 2110 Over WAN	Patrick Ang, Nevion
14:00	Scalable IP Architectures for Media and Broadcast	Paul Druce, Arista Networks
14:30	Standardized Connection Management for Essences and Network Flows in ST 2110 and AES67	Cameron O'Neill, Riedel
15:00	Case Study: CBC/Radio-Canada	Denis Pare, Embrionix
15:30	Best practices on PTP and Media Flow Monitoring for All-IP Infrastructures.	Albert DeWitt, Skyline
16:00	Timing for IP Video Networks: Advanced	Paul Dengate, OnAir
16:30	Full Infrastructure Control	Peter Schut, Axon

IP SHOWCASE THEATRE™

SMPTE

Friday, July 19

Time	Title	Speaker
11:00	Rise of IP in Remote Production Networks	Steven Dargham, Telstra
11:30	Case Study: CBC/Radio-Canada	Denis Pare, Embrionix
12:00	Transporting ST 2110 Over WAN	Patrick Ang, Nevion
12:20	What's the METexpo IP Showcase All About?	Stan Moote, IABM
12:40	Best Practices on PTP and Media Flow Monitoring for All-IP Infrastructures.	Albert DeWitt, Skyline
13:00	Simplifying the Use of AMWA IS-04 Through Dematerialised Microservices	Michael Schipp, Mellanox
13:20	Standardized Connection Management for Essences and Network Flows in ST 2110 and AES67	Cameron O'Neill, Riedel
13:40	Full Infrastructure Control	Peter Schut, Axon
14:00	Timing for IP Video Networks: Advanced	Paul Dengate, OnAir
14:30	Timed Switch Implementation Over Programmable Hybrid Pipeline	Michael Schipp, Mellanox

IP Showcase Sponsors