TR-1001 : Replacing Video By Spreadsheet

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Outline

- Review : what is the TR-1001 document?

- How does TR-1001 intersect with ST 2110?

- What IP video problems exist without a well-defined "Full Stack" system?

- Improving on SDI facility "video by spreadsheet"

What is the TR-1001 document?

- "Technical Recommendation"
- "System Environment and Device Behaviors for SMPTE ST 2110 Media Nodes in Engineered Networks"
- Colloquially: "Full Stack"
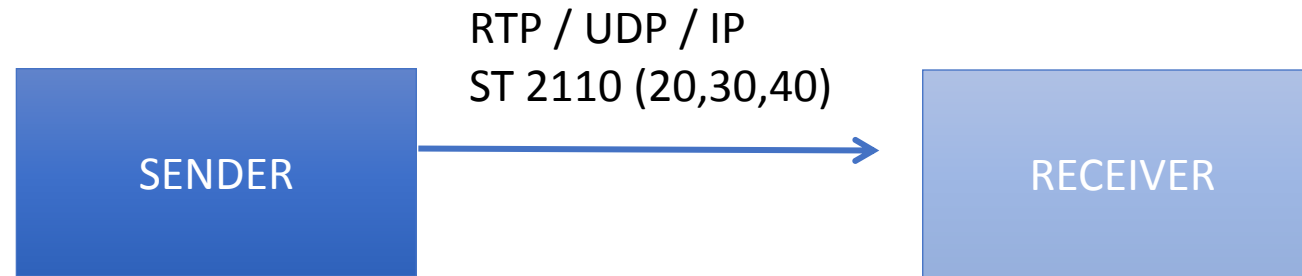
Why a TR-1001 "Full Stack" Document?

- SMPTE 2110 family defines essence format, not system context
- How to manage new challenges in IP video production
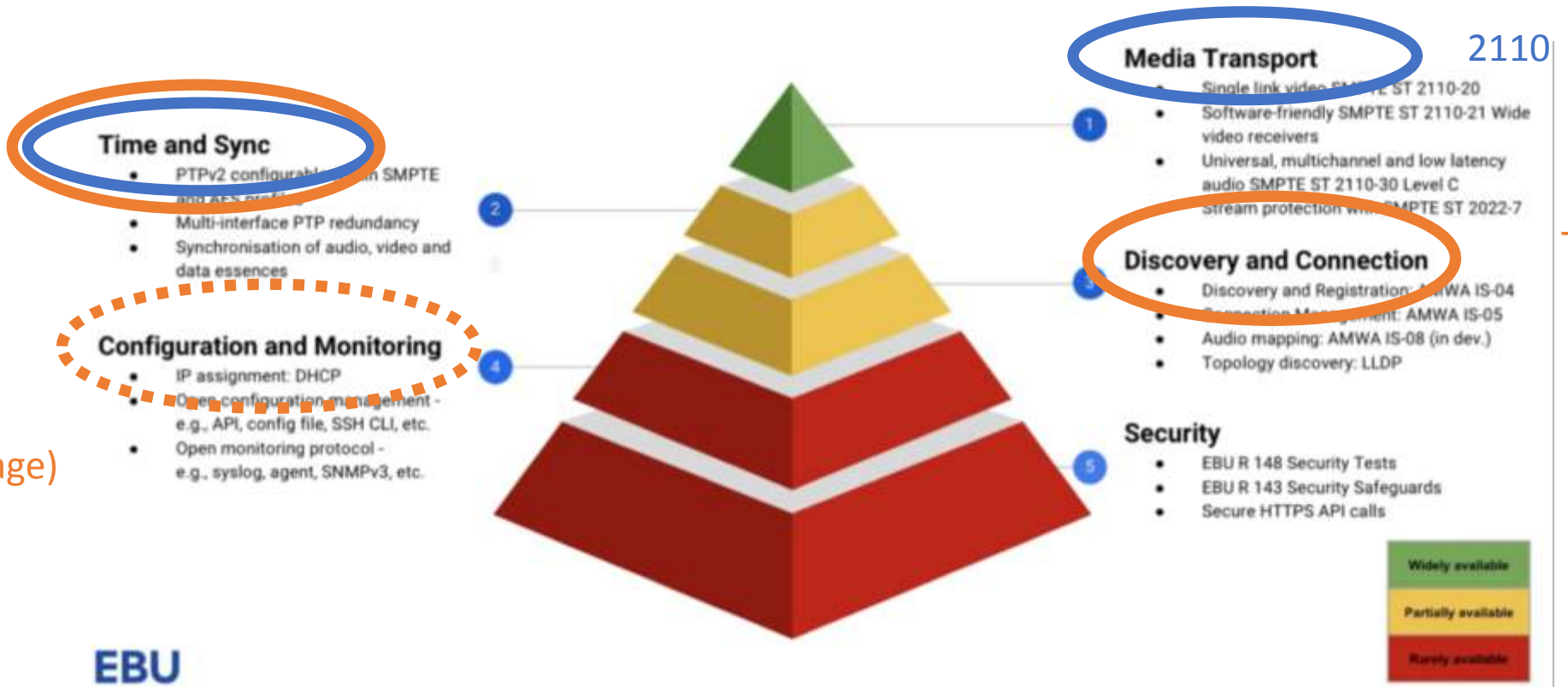- Opportunity for IP facility to be more organized than traditional SDI

What does 2110 Constrain?

RTP / UDP / IP
ST 2110 (20,30,40)

SENDER

RECEIVER

- Essence packet payload (2110-20,30,40, etc)
- Well-defined RTP timestamps (PTP, SMPTE epoch)
- Constraints on packet bursting (ST 2110-21)
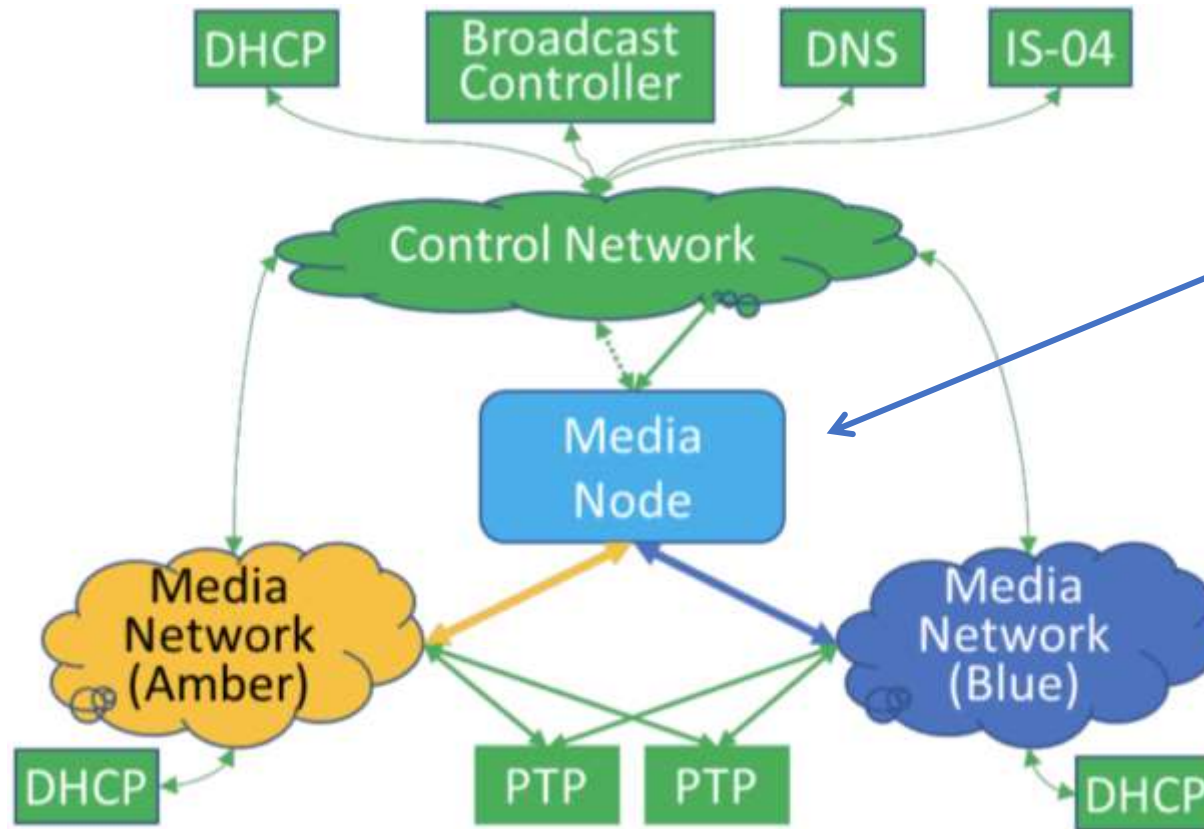- Description of the transmission in an SDP file
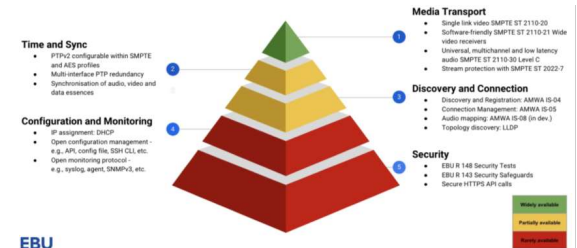
EBU: "Minimum Stack to Build and Manage"

Elements in TR-1001

2110 mostly describes Media Node

What goes wrong when you set up 2110

- I can't ping the new widget
  - Worse: the new widget is now on the same IP as another widget
- It won't lock to PTP
  - Worse: the new widget is stopping other widgets from locking
- I can't get a media output stream
  - Worse: the stream is using the same multicast as an existing stream

Plus: each of these problems on multiple interfaces per widget! 😡

We wish the new 2110 widget could:

- Automatically get an unused valid IP addresses
- Auto-discover PTP domain and other settings
- Never try to take over as a master clock
- Transmit media on an appropriate multicast (or none at all)
- Pop up quickly in a centralized monitoring system

😌

TR-1001 brings us closer to "plug and play"

- DHCP for IP addressing

- DNS-SD for finding NMOS IS-04 and System Resource JSON

- System Resource provides PTP settings

- System Resource provides a "system" UUID
  - Power-cycling widget can resume operation with last settings
  - Brand new widget should disable transmitter, await instructions

- NMOS IS-04 registry of all Nodes (widgets)

- NMOS IS-05 API to connect transmitters and receivers

Organizing Video: not just an IP problem!

What does the SDI status quo usually look like?

- Spreadsheets of management IP addresses
- Spreadsheets of video router ports
- Stickers on the cables
- Stickers on the front panels
- Spreadsheets of names on the stickers
- A set of Visio and CAD drawings with the logical relationships

Spreadsheets and Stickers

- Do not auto-update when something changes

- Usually do not have direct linkage to control or monitoring systems

- May contain manual errors even at the beginning

- Tend to get less accurate over time

- Are not done in a standardized way between companies and facilities

So maybe this "IP video" thing isn't
so much more difficult after all…
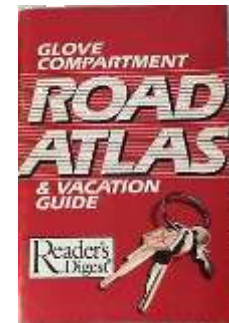
When a TR-1001 system is working:

- All the current widgets/nodes are in your system registry
  - With no dead entries
  - The unicast IP for more detailed management is present and always accurate
- Properties that every device has like PTP are auto-configured
- Introducing a new compliant device can't destabilize existing devices
- A point and click connects one media device to another device
- Every connection point can be monitored (multicast)

Known Limitations / Future Work

- ## Security
  - Humans should approve new widgets joining network
  - Device credentials, stream permissions not in this scope

- ## Labeling concerns
  - The stickers on SDI equipment don't have UUIDs
  - Conventions on hierarchy and human labels vary among vendors

- ## Vendor support of NMOS IS-04/IS-05 is a "work in progress"
  - Competing control protocols exist in both open and proprietary domains

JT-NM Testing: Brief Case Study

- 80 products from 50 vendors tested by a small group led by EBU and IRT engineers over 5 days in March 2019

- Centralized spreadsheet managing IP addressing – why not?
    - Verbal communication and emails also exchanging settings as they change

- Configuration problems the leading cause of delays and time extensions
    - Made compliance with 2110 media standards seem simple…

- Vendor experts had these issues with their own equipment!

For industry end users, less time configuring product-specific interfaces is more time enjoying the benefits of ST 2110 IP video!

Thank You

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