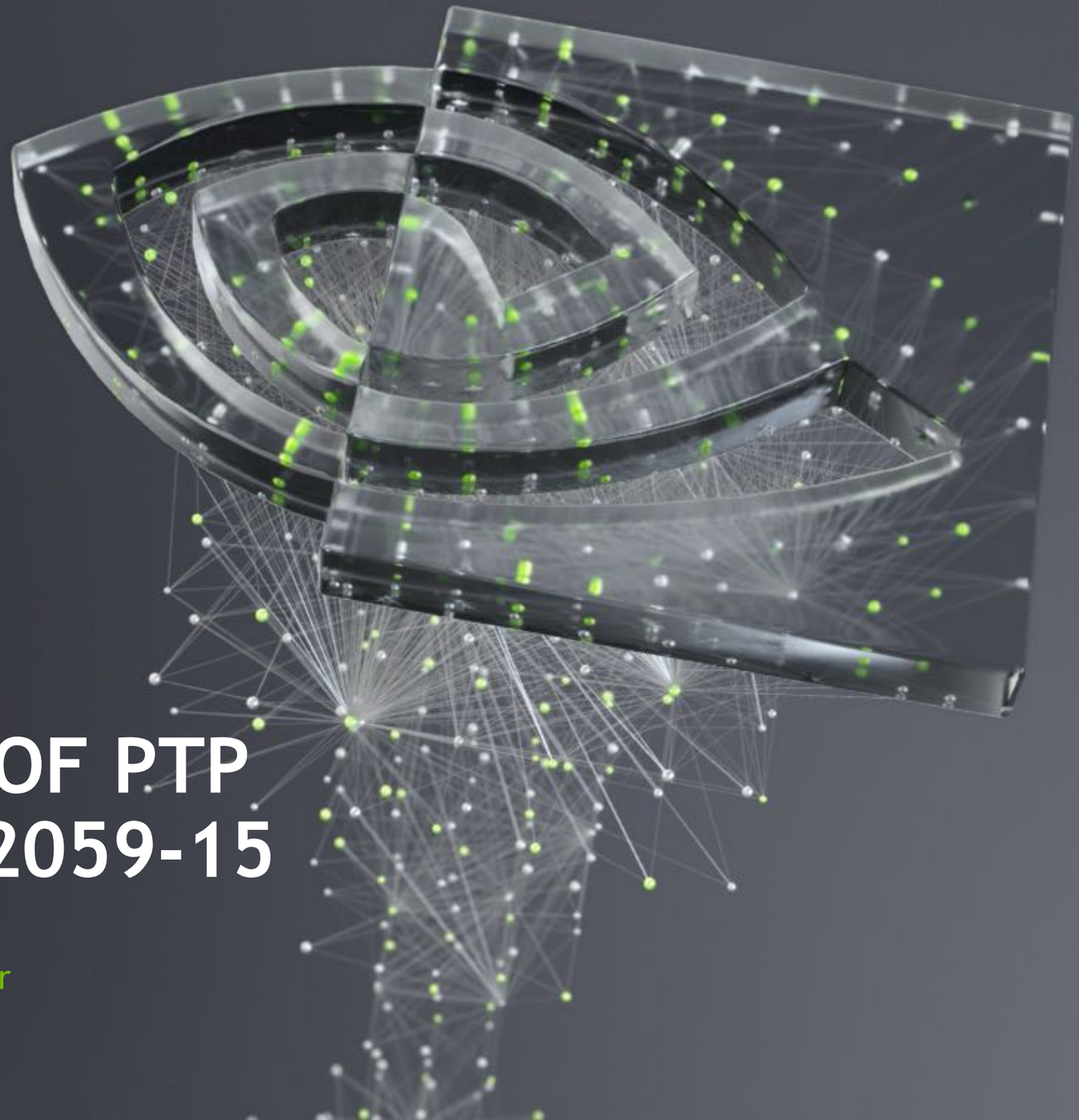


UNIFIED MONITORING OF PTP NODES VIA SMPTE RP 2059-15

Thomas Kernen

SMPTE Fellow, 32NF TC Chair & ST 2059-15 DG Chair

PTP MONITORING – MOTIVATION

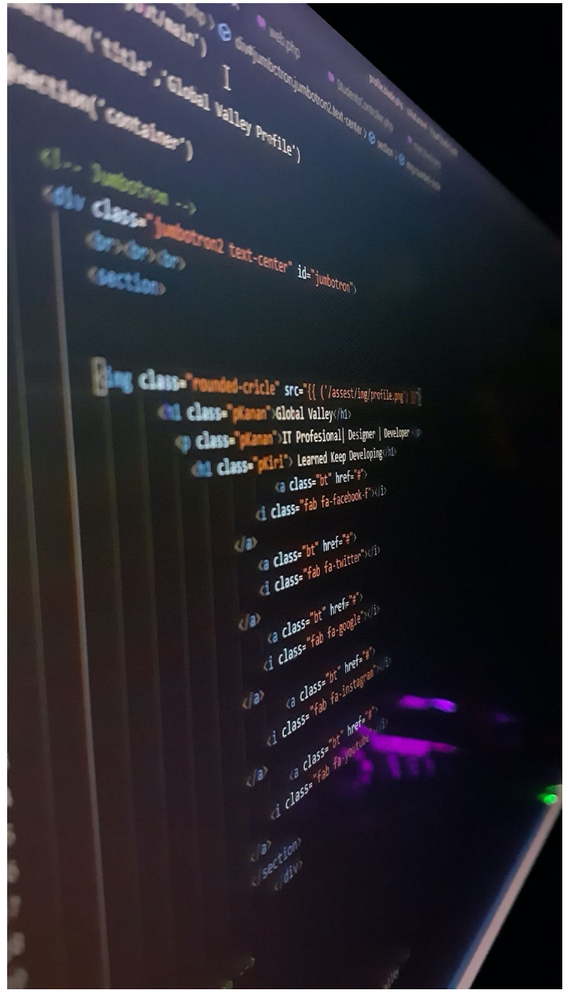
- For PTP to be successful we need to have network wide monitoring of the status of PTP enabled devices:
  - OC, BC, TC, Masters, Followers, Grand Masters
- We have many different implementations – some based on Open Source e.g., PTPd or linuxptp/PTP4L, others proprietary
- From a PTP network health problem – we have a ‘Tower of Babel’ problem with equipment talking different languages or different measurement methods or time intervals
- ST 2059 interop testing logging information proved very hard to analyse due to differences in parameters and meanings of values

PTP MONITORING GROUP – SCOPE

- Creation of a SMPTE Recommended Practice (RP) tailored to meeting the requirements of ST 2059-2
- Restricted to the Monitoring of PTP in a Broadcast Environment
  - Control is out of Scope
- Do not re-invent the wheel
  - Reuse and Adapt wherever possible
- Align with Industry Trends/Direction

UNIFIED MONITORING MODEL (I)

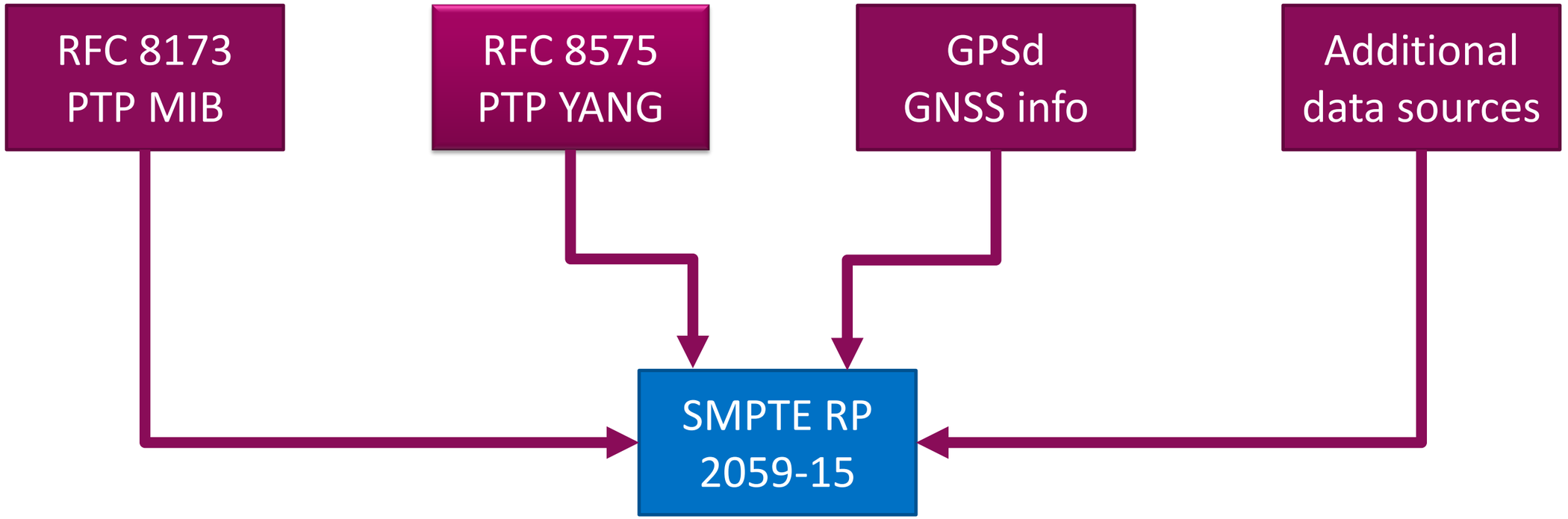
- Many methods for collecting & aggregating PTP information
  - Vendor specific implementations
  - IETF RFC 8173 (SNMP MIB for PTP)
  - IETF RFC 8575 (PTP YANG Data model)
- PTP monitoring requires consistency:
  - Data definition and representation
  - Compare and validate collected data
- Requirement's analysis:
  - Model that can scale for large data sets
  - Pull/push/stream at scale (10s of thousands of nodes)



UNIFIED MONITORING MODEL (II)

- Trend towards YANG Data model definitions
- IEEE 802 & ITU-T SG15 Joint Workshop (Jan 2020)
  - Session on YANG data modeling
- IEEE Standards Association approved P1588 WG PAR for MIB and YANG Data model (Sept 2020)
- SMPTE for broadcast & media
  - Focused on monitoring end to end PTP capabilities

UNIFIED MONITORING MODEL (III)



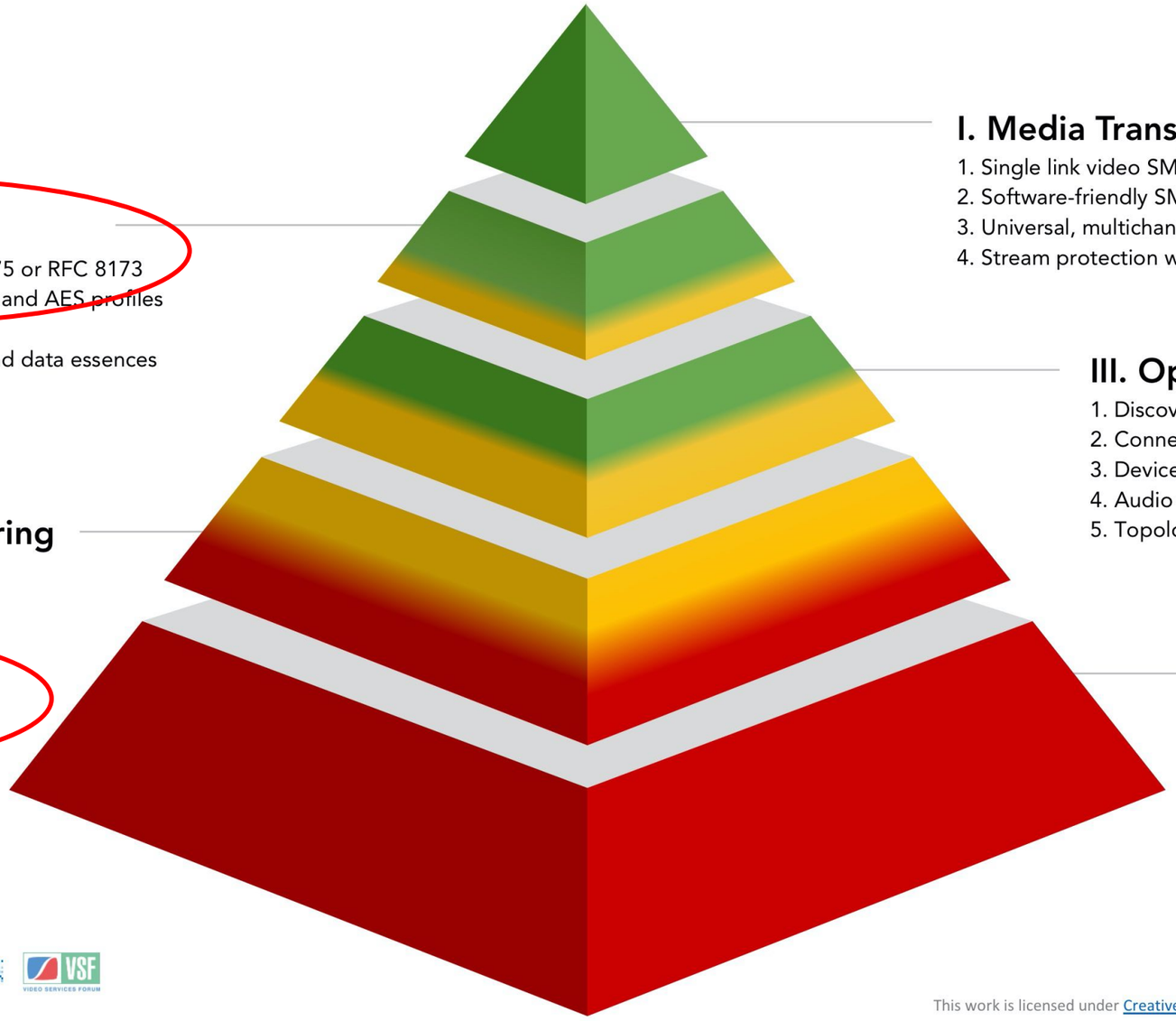
Standardized model for monitoring ST 2059 systems

THE TECHNOLOGY PYRAMID FOR MEDIA NODES

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

EBU

Tech 3371 Version 2 - 2020
tech.ebu.ch/pyramid



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

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

Widely available
Partially available
Rarely available

Endorsed by:

SMPTE RP 2059-15 YANG DATA MODEL (I)

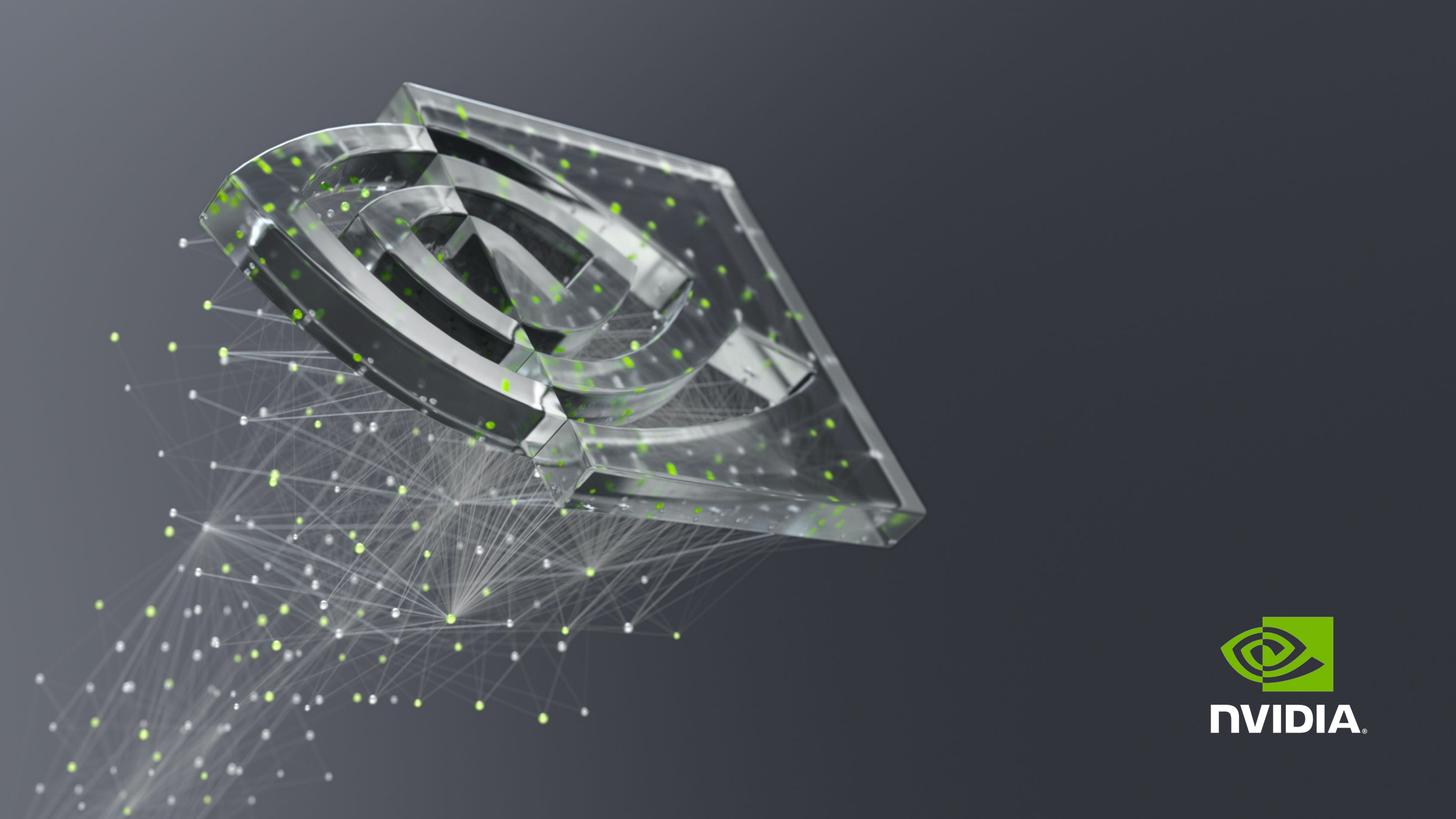
- YANG data model approach
  - Include PTP, GNSS and ST 2059 specifics
- Work in progress: Public Committee Draft (PCD) posted on GitHub
  - Anyone can review and contribute
  - Allows for feedback beyond SMPTE Technology Committee members
  - To be shared with SDOs, SW developers, implementers
- Provide consistent & repeatable monitoring method
  - Across all PTP capable devices

SMPTE RP 2059-15 YANG DATA MODEL (II)

- Containers: child nodes define the data sets
  - ptp (read-write)
  - gnss-monitoring-ds (read only data set)
  - st-2059-2-monitoring-ds (read only data set)
  - grandmaster-monitoring-ds (read only data set)
  - rfc-8173-ds (read only data set)
- R/O focused for monitoring
  - Not preventing R/W usage of the data sets where applicable

SUMMARY

- Establish a common End to End PTP monitoring framework
- Minimize uncertainties for reported information: values & fields
- Data collection for reactive, proactive and historical use cases
- Critical for successful validation, verification and supervision
- Share work with other 1588 industry initiatives around monitoring
- Converge efforts to reduce overlapping or duplicate solutions
- Industry collaboration & feedback welcomed


NVIDIA