



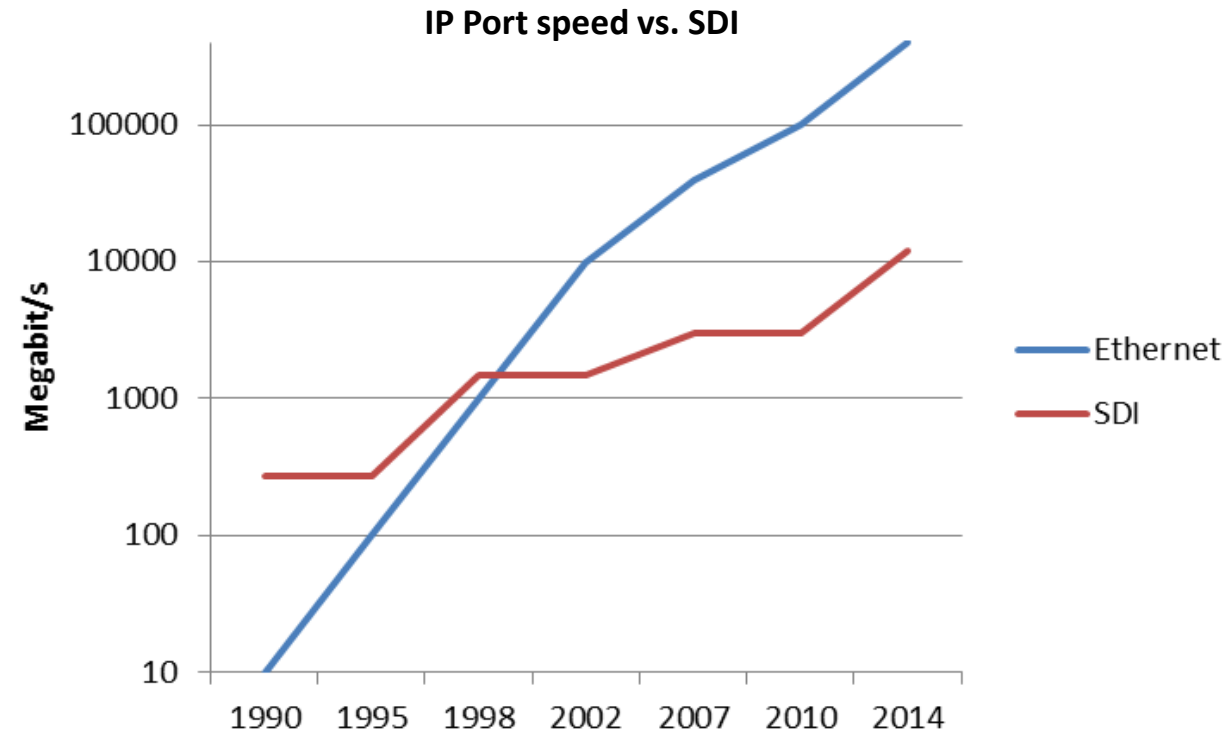
# IP Transport

**JOINT | INTEROPERABILITY**  
D E M O N S T R A T I O N

*Align 2016*

# WHY DO WE NEED IP TRANSPORT?

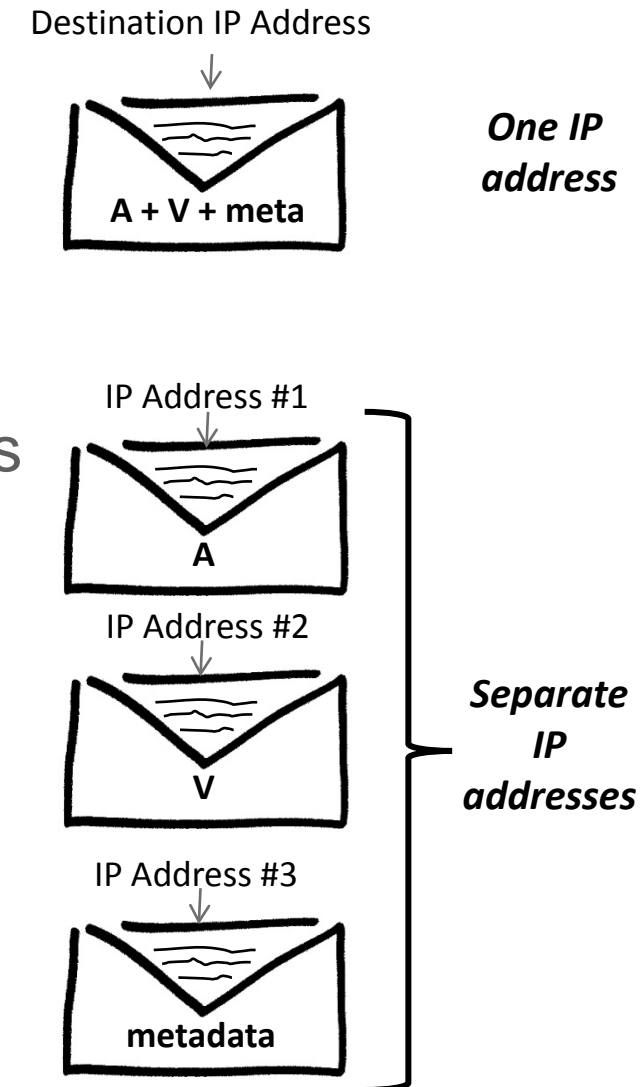
- IP enables
  - Scale to thousands of signals
  - Better resource sharing
  - Path to virtualization
  - COTS Switches, Optics, Cabling
  - Distributed “Top-Of-Rack” architectures
  - Signal-Path redundancy architecture
- SDI has served us well but does not offer the flexibility of IP





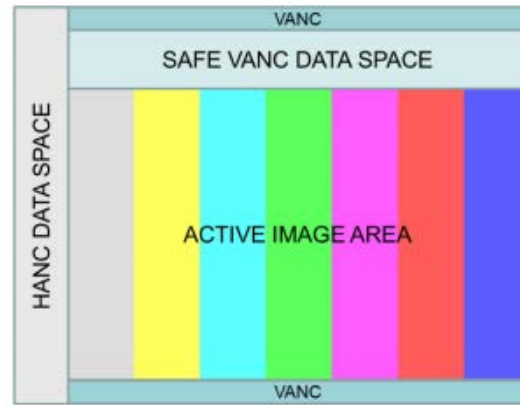
# TWO FUNDAMENTAL APPROACHES TO IP TRANSPORT

- Bundled (Audio, Video, Metadata together)
  - Audio/Video/Metadata/Sync travel **coherently**
  - Requires extra work to “unpack” separate essences
  - Well suited for **Playout/Distribution** workflows
  - Well suited for **WAN/Contribution** across timing domains
- Essence Based (Audio, Video, Metadata separate)
  - Ideal for **Studio/Production** workflows
  - Individual essence kept in sync using PTP timing



# SMPTE ST 2022-6

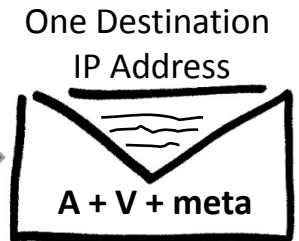
- SMPTE Standard
- Bundled Transport (as like SDI)
- Ideal for WAN/Contribution Applications



SDI Raster

*IP Packetization of SDI Raster*  
Method: **SMPTE ST 2022-6**

- Audio (from HANC)
- Video (from active area)
- Metadata (from VANC)
- Sync/Timing (from frame)



# VSF TR-03

- VSF Technical Recommendation 03\*



- Essence Based Transport

- Active Video
- Multiple Audio Streams
- Ancillary Data/Metadata



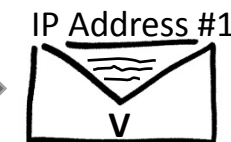
Active Video



Audio

Metadata

**IP Packetization of Active Video**  
Method: IETF RFC 4175



**IP Packetization of Audio Channels**  
Method: AES-67



**IP Packetization of ANC Data**  
Method: IETF draft ANC291

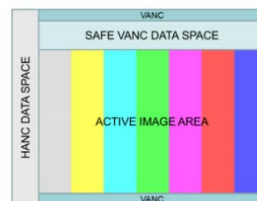


- Ideal for Studio/Production Applications

\* VSF TR-03 forms the basis of SMPTE ST 2110 (currently in drafting)

# VSF TR-04

- VSF Technical Recommendation 04\*
- Integration Between Full “Bundled” and Essence Based
  - Whole package available together
  - Can access audio separately
- Ideal for systems which require ST 2022-6 compatibility but still need separate audio in some instances



SDI Raster



Audio

## ***IP Packetization of SDI Raster***

Method: **SMPTE ST 2022-6**

- Audio (from HANC) if present
- Video (from active area)
- Metadata (from VANC)



## ***IP Packetization of Audio Channels***

Method: **AES-67**



\* VSF TR-04 also forms the basis of SMPTE ST 2110, particularly 2110-50 (currently in drafting)



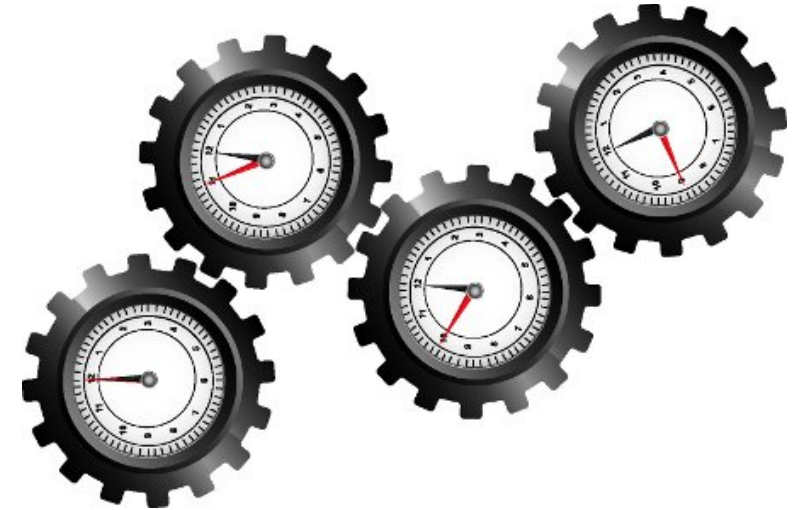
# AES 67

- Audio-over-IP Standard
- Widely Deployed in the Audio Industry
- Foundational to JT-NM Roadmap
  - Used in VSF TR03
  - Used in VSF TR04
  - Proposed in SMPTE ST 2110  
(currently in drafting)



# SYNCHRONIZATION ACROSS FLOWS

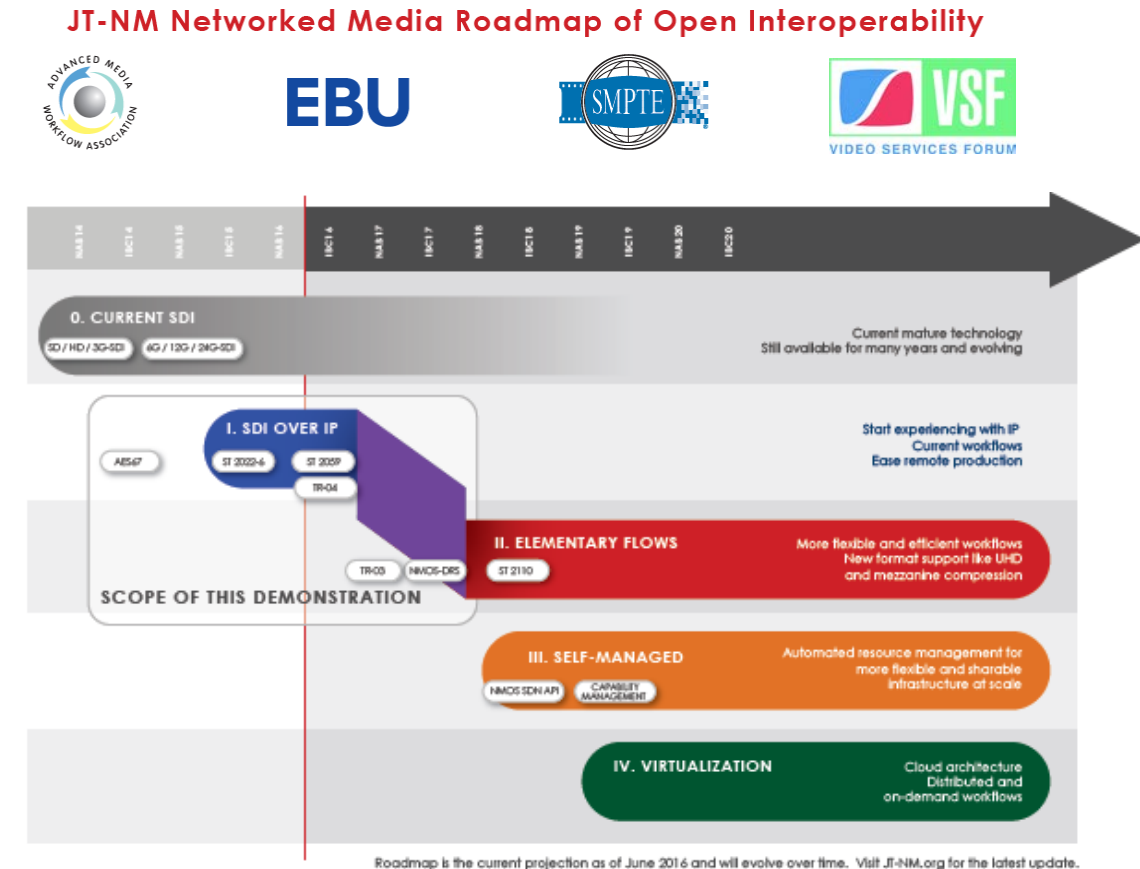
- Precision Time Protocol (PTP)
  - Proven technology across multiple industries (IEEE 1588)
  - Can replace Black Burst, or work alongside it
  - Enables *time alignment* of separately transported essences
  - Mandatory part of VSF TR03, VSF TR04 and AES-67
  - SMPTE ST 2059 & AES R16 define our industry's operating point for PTP





# JT-NM ROADMAP FOR IP TRANSPORT SUMMARIZED

- **SMPTE 2022-6** ideal for Contribution/Distribution/WAN
- **VSF TR03** ideal for Studio/Production
- **VSF TR04** provides an integration point between the two
- **SMPTE ST 2110** (currently in drafting) is based on VSF TR03 & VSF TR04



# COMPANIES DEMONSTRATING IP TRANSPORT INTEROPERABILITY



ARISTA



COBALT

COVELOZ  
COCREATE



harm<sup>o</sup>nic



MACNICA

matrox

MEDIA LINKS  
Media Defined Networking



nevi<sup>o</sup>n

Panasonic



ROSS  
Production Technology Experts



SONY

Tektronix



Wheatstone

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DEMONSTRATION

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