NMOS

Networked Media Open Specifications

The key to Wide Adoption of IP Infrastructures

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AIMS
Alliance for IP Media Solutions

RIEDEL

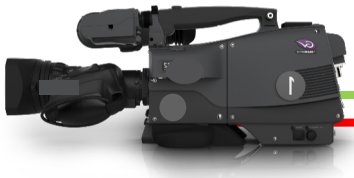
Topics:

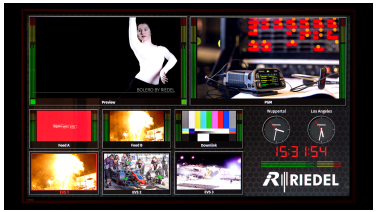
- NMOS Introduction – Why its required
- The Segments
- Where we are now
- Where we plan to be

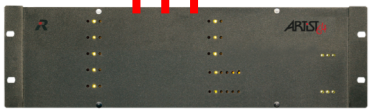
ST2110

ST 2110-20

ST 2110-30







- 2110 allows individual routing of Video and audio
- “Elementary“ Streams

Time to play a little Football!

ST 2110 is all about…..

Senders

Receivers

Many signals on the network….
How to connect Receivers to proper Senders?

Senders

Receivers

Anyone remember to old days……
Looking for Websites

Yahoo

[What's New? | What's Cool? | What's Popular? | A Random Link]

[*Yahoo* | Up | Search | Suggest | Add | Help]

- Art *(619)* [new]
- Business *(8546)* [new]
- Computers *(3266)* [new]
- Economy *(898)* [new]
- Education *(1839)* [new]
- Entertainment *(8814)* [new]
- Environment and Nature *(268)* [new]
- Events *(64)* [new]
- Government *(1226)* [new]
- Health *(548)* [new]
- Humanities *(226)* [new]
- Law *(221)* [new]
- News *(301)* [new]
- Politics *(184)* [new]
- Reference *(495)* [new]
- Regional Information *(4597)* [new]
- Science *(3289)* [new]
- Social Science *(115)* [new]
- Society and Culture *(933)* [new]

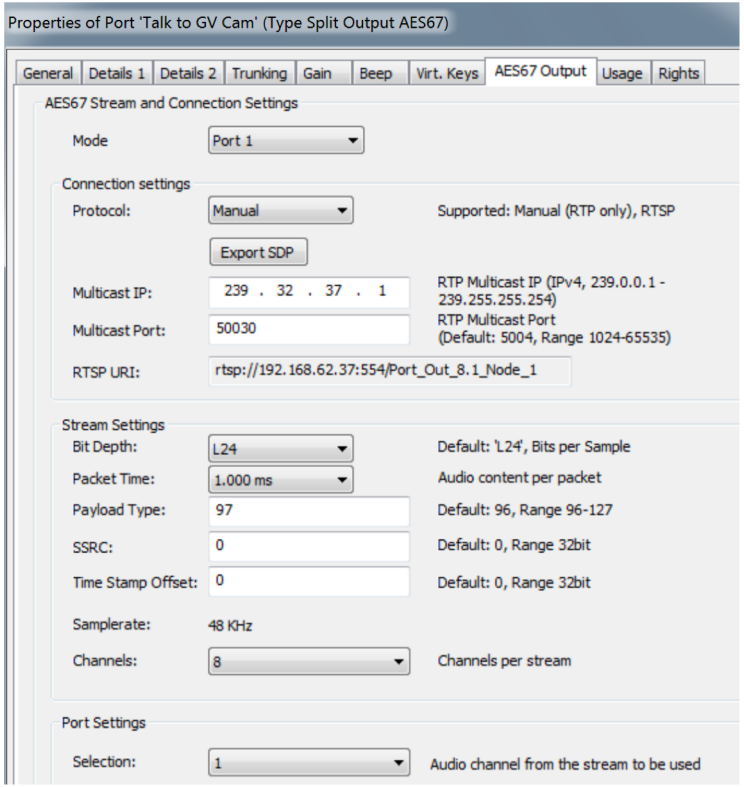
*There are currently **31897** entries in the Yahoo database*

ST 2110 SDP (Session Description Protocol)

ST2110's BBS/FTP!

```
v=0
o=AES67-108_G2 0 1 IN IP4 192.168.62.35
s=Port_Out_6.6_Node_1
a=mediaclk:direct=0
m=audio 50030 RTP/AVP 97
c=IN IP4 239.32.35.1/10
a=rtpmap:97 L24/48000/2
a=ts-refclk:ptp=IEEE1588-2008:00-04-b3-ff-fe-f0-12-3c:42
a=ptime:1.000
```

Build your sender…..



v=0

o=ARTIST AES67-108_G2 0 1 IN IP4 192.168.62.37 **Device NAME/IP**

s=Talk_GV_CAM **Signal Description/Name**

a=mediaclk:direct=0 **Time Stamp Offset**

m=audio 50030 RTP/AVP 97 **Type of signal / Multicast Port / Payload Type**

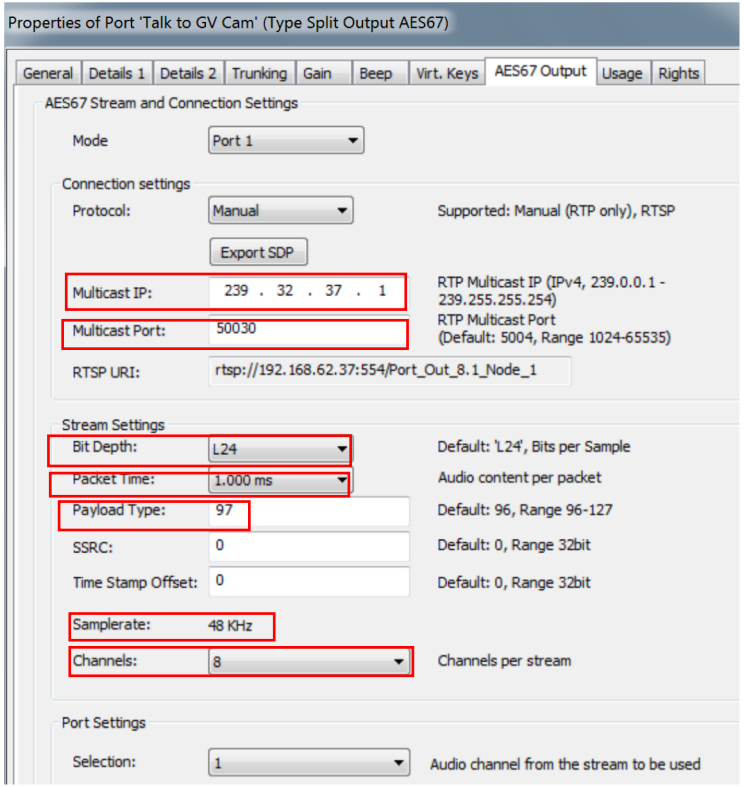
c=IN IP4 239.32.37.1/10 **Multicast IP Address**

a=rtpmap:97 L24/48000/8 **Sample Rate/Bit Depth/Number of Channels**

a=ts-refclk:ptp=IEEE1588-2008:08-00-11-ff-fe-21-de-ee:42 **PTP Clock**

a=ptime:1.000 **Packet Time (ms)**

Take this information…..



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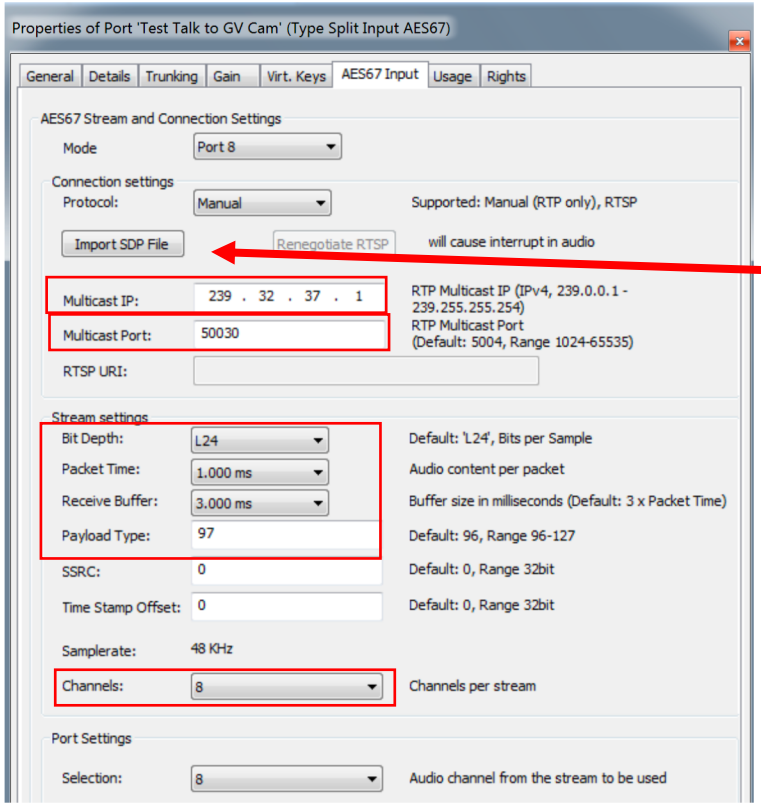
And enter into here….



….or click here!

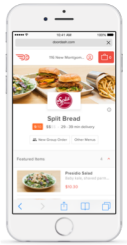
Don’t be scared!

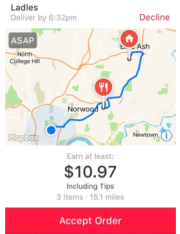
Help is on the way!

NMOS – Networked Media Open Specification

- ST2110‘s Search Engine and more!
- Three Main Components

IS-04	IS-05	IS-06
Discovery & Registration	Connnection Management	Network Control
Pizza place website on internet	Pizzaservice listed in DoorDash	DoorDash tells you the estimated arrival



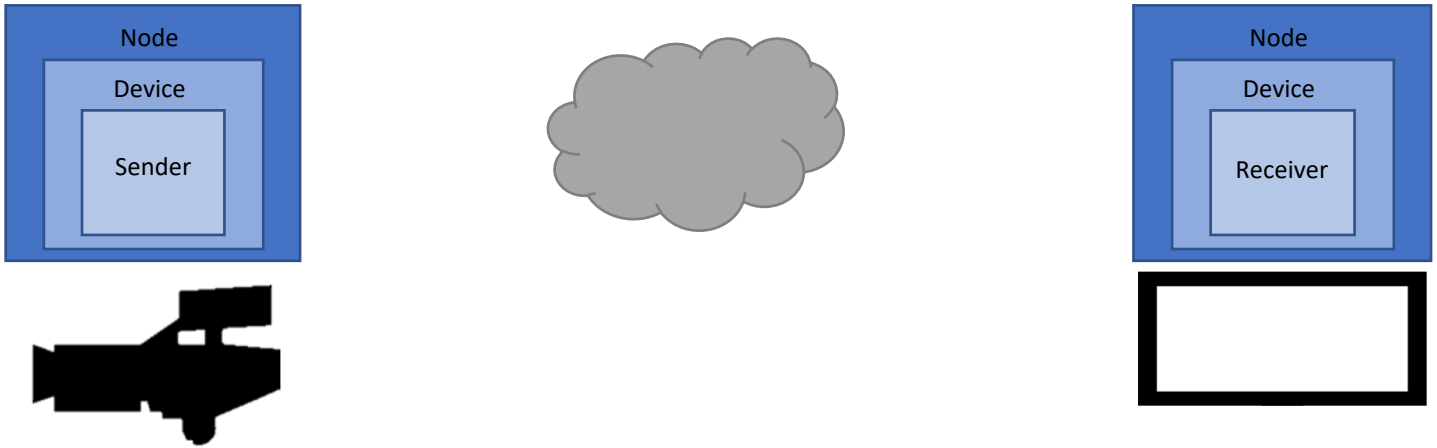


Workflows Explained: IS-04 & IS-05

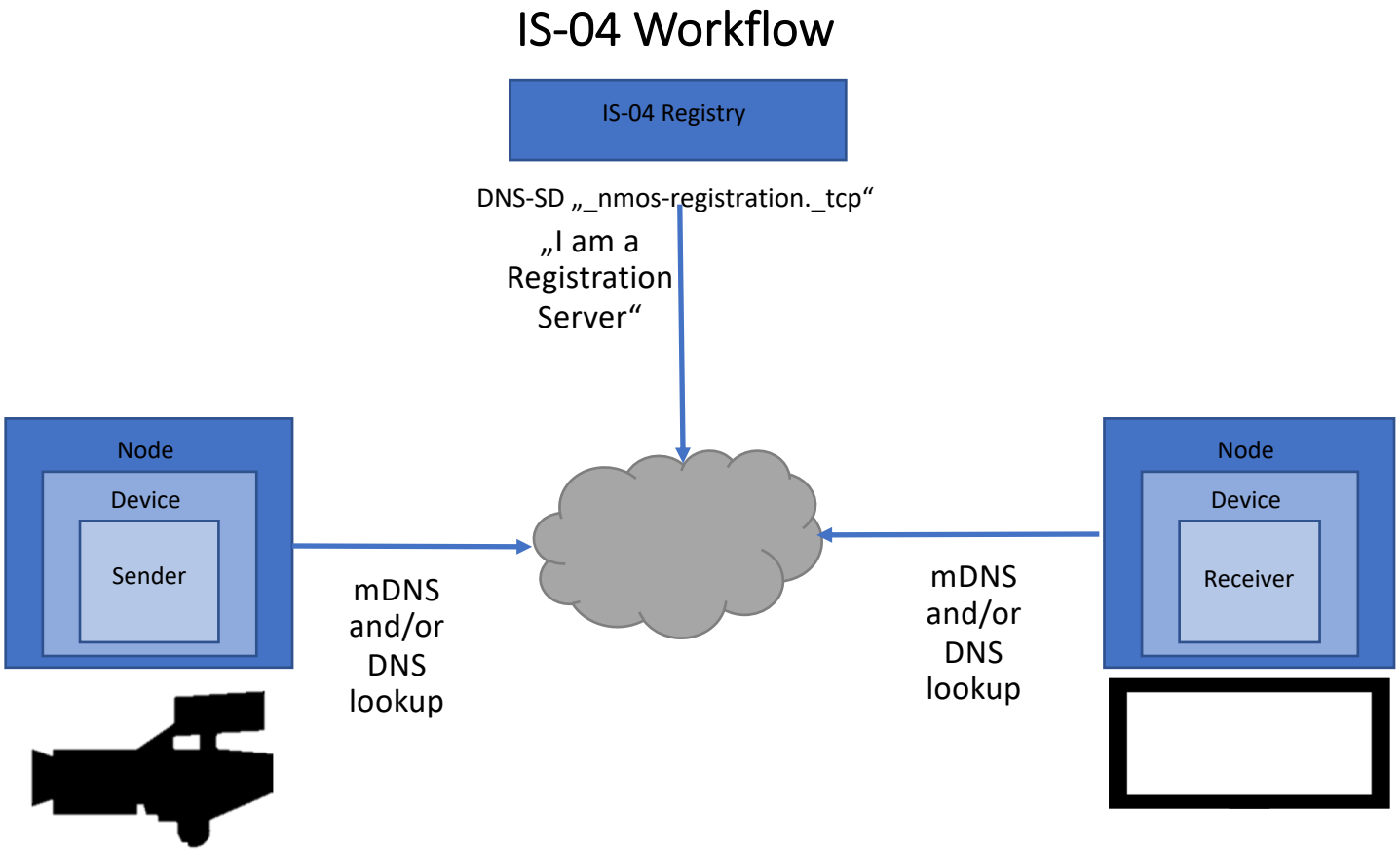
IS-04 Workflow

IS-04 Registry

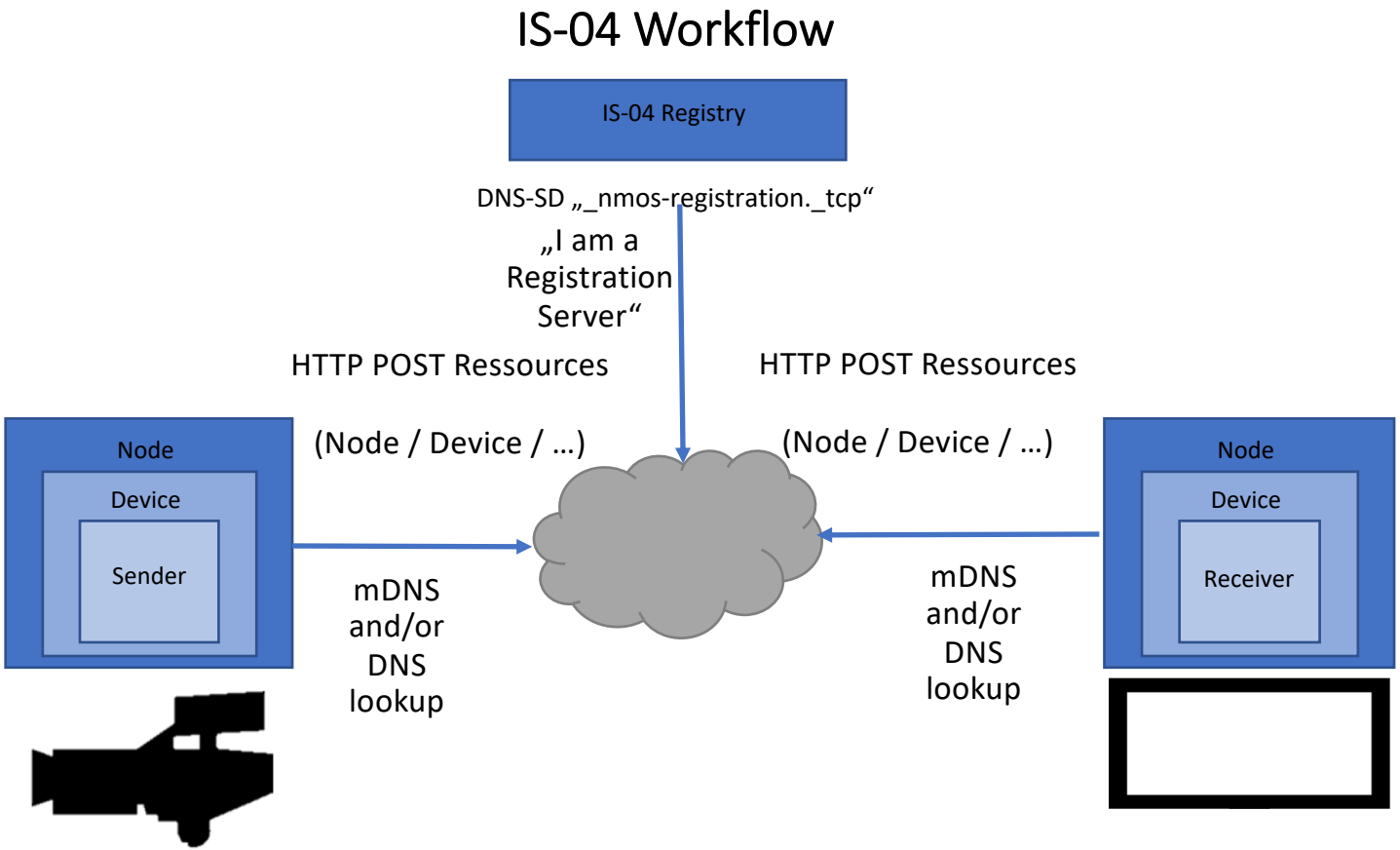
DNS-SD „_nmos-registration._tcp“



Workflows Explained: IS-04 & IS-05

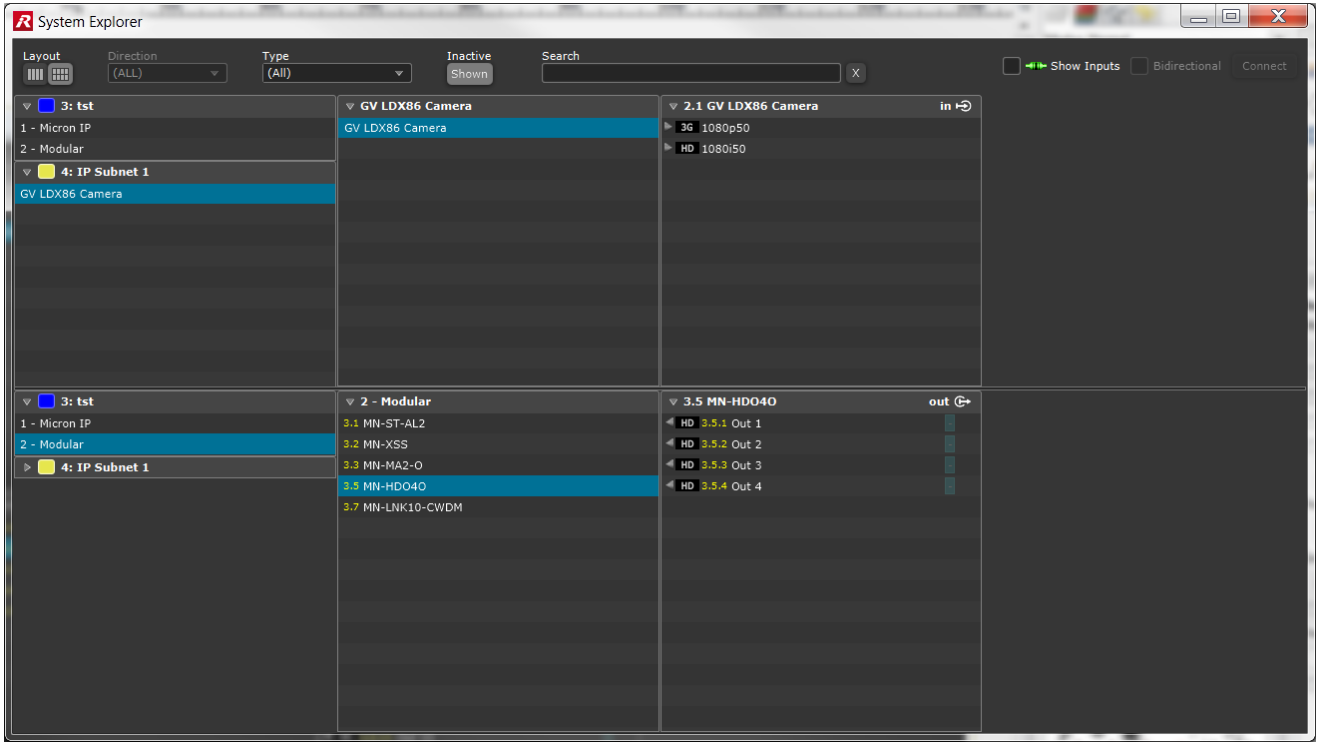


Workflows Explained: IS-04 & IS-05

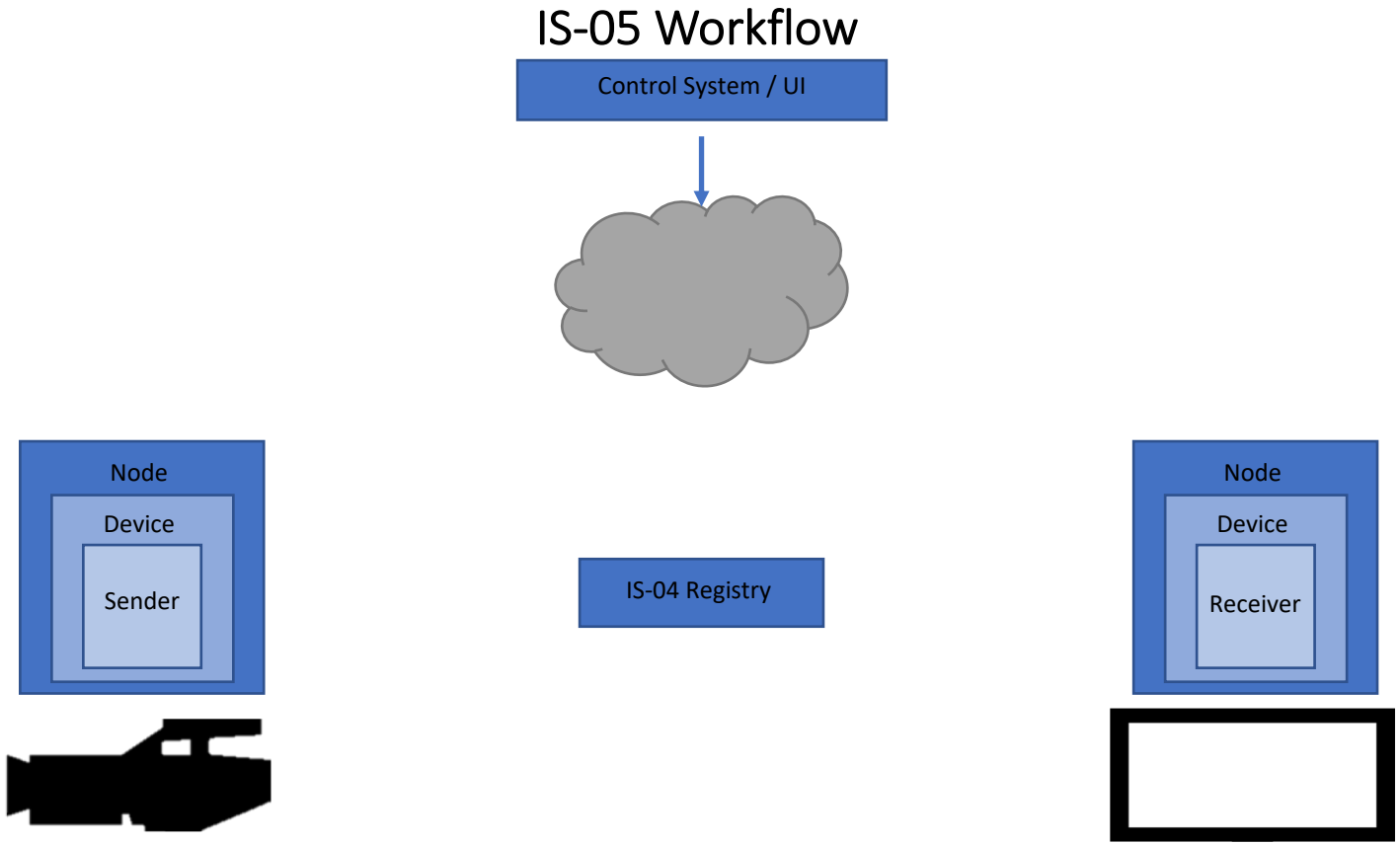


Workflows Explained: IS-04 & IS-05

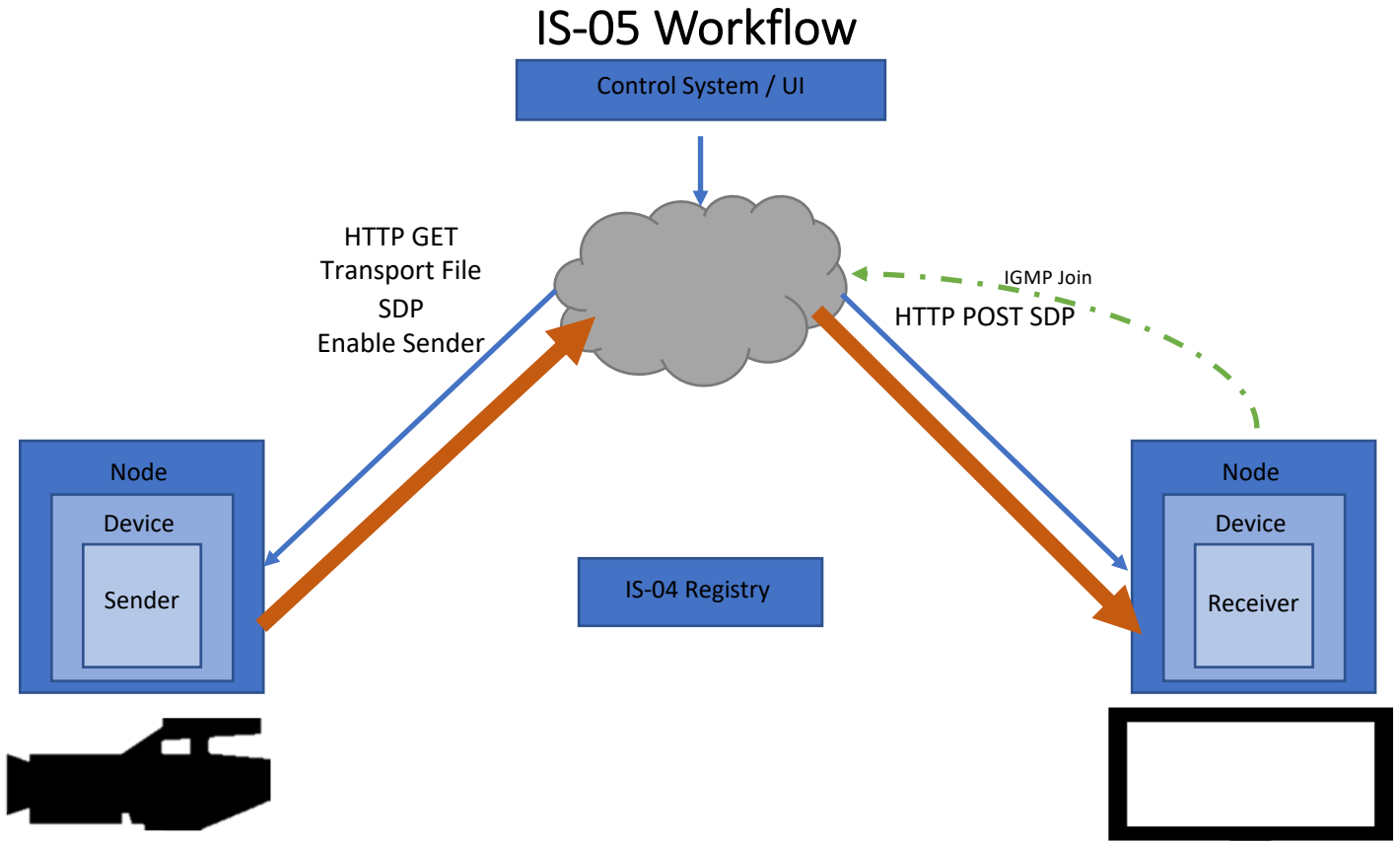
IS-04 Workflow



Workflows Explained: IS-04 & IS-05

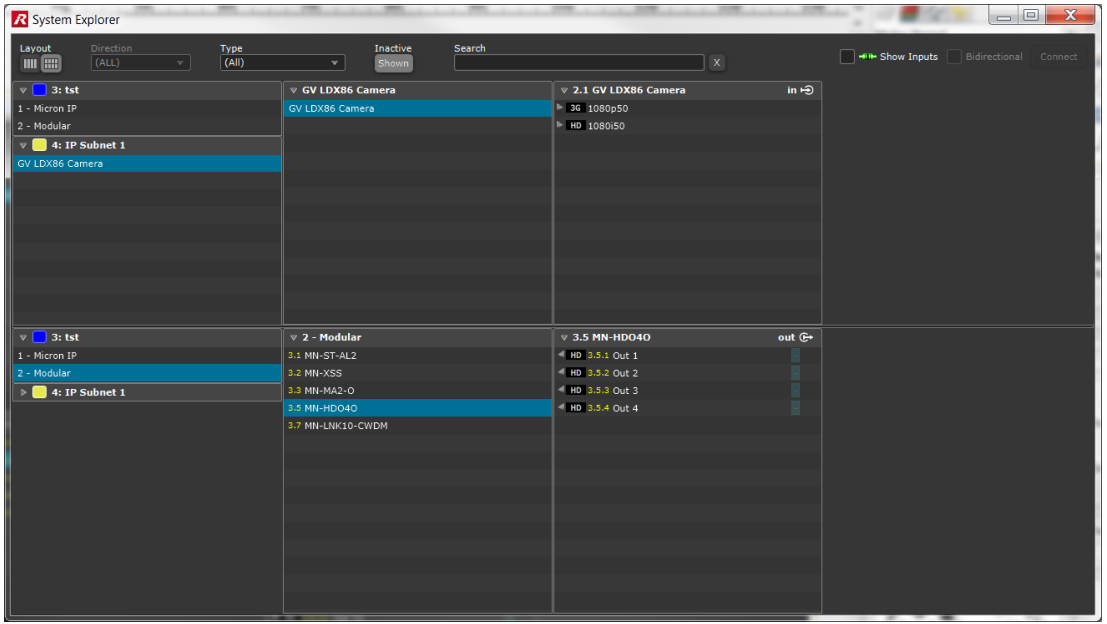


Workflows Explained: IS-04 & IS-05



Objective is to embed NMOS IS-04 and IS-05

- IP signals should not be treated differently than native formats
- SDI, MADI and ANALOG are still being used,
- All signals are just that ….. Signals
- Single interface for all.



AMWA NMOS IS-08: Audio Channel Mapping

- Specification includes:
  - Channel mapping
  - Selecting of individual channels within a stream
  - Shuffling of signals within the stream
- Example 5.1 Speaker Monitoring System
  - Easiest method is 6 single channel streams
    - Not Efficient
  - 1 Stream / 6 Channels
    - Sent entire stream to each speaker and speaker knows which channel of the stream to extract

TR-1001: Taking everything into account

The Media Node Pyramid

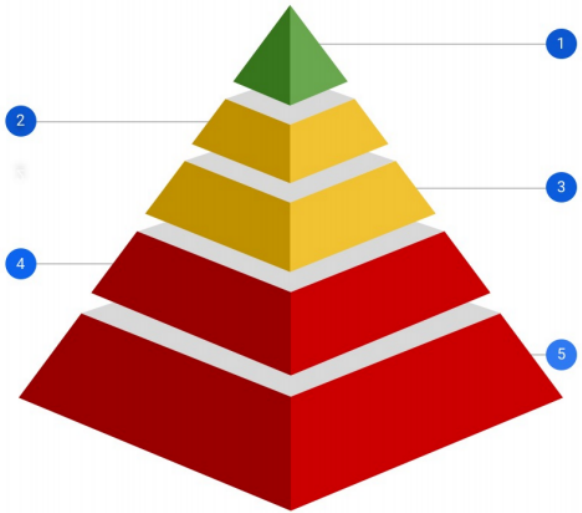
The Minimum Stack of endpoint technologies to build and manage an IP-based media facility

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.



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

Discovery and Connection

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

Security

- EBU R 148 Security Tests
- EBU R 143 Security Safeguards
- Secure HTTPS API calls

Widely available
Partially available
Rarely available

EBU

JT-NM TR-1001: Configuration and Security

„Plug ‘ n‘ play workflow“

The Goal:

- How can I connect two devices that have not been preconfigured without typing one single IP address?
- Yet still keep the network secure! BCP-003

AMWA NMOS IS-07: Event and Tally Specification

- IS-07 Provides a mechanism by which to emit and consume ‘states’ and ‘state changes’
  - Vision mixer selects a Camera for on-air
  - Tally
  - GPIO over IP
- Lets look at EVENTS

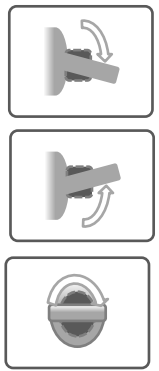
AMWA NMOS IS-07: Event and Tally Specification

- AMWA NMOS IS-04 v1.3
- New source element **event_type**
  - Boolean: On or Off Button, Tally signal,
  - String: UMD Label, Description, Color value (Hex)
  - Number: Temperature, Gain, Encoder value, Metering value
  - Enum: One state of a collection of states, simple list of possibilities
- IS-04 Senders can now send **states** of events
- Similarly visible in NMOS Explorer just like Audio or Video Senders/Receivers

AMWA NMOS IS-07: Example

AMWA NMOS IS-07: Example

- Leveraging IS-04 v1.3
  - Lever Key State Down
  - Lever Key State UP
  - Rotary Encoder

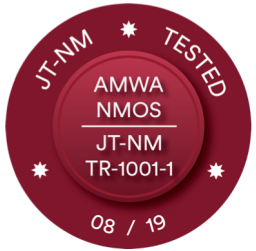


- Expose these via IS-04
- Connect via IS-05
  - 3rd party Control systems
  - Can connect to multiple systems as each element is exposed as its own entity

JT-NM Tested Program

- Two Programs
  - SMPTE ST 2110

  - NMOS/TR-1001



- Results Posted September 2019
  - Hosted @ Riedel Wuppertal Germany

Riedel & NMOS Status Intercom

NMOS		Status of Standard	MicroN IP	ARTIST AES67-108	ARTIST-1024	RSP-1232-HL	Bolero
IS-04 Discovery and Registration		Stable	MN 5.0	In progress Director 8.0	Version 1.0	With Audio Monitor App	Not implemented
IS-05 Connection Management		Stable	MN 5.0	In progress Direcotr 8.0	Version 1.0	With Audio Monitor App	Not implemented
IS-08 Audio Channel Mapping		Public	Under Review	In progress Direcotr 8.0	Version 1.0	With Audio Monitor App	prototyping
IS-06 Network Control		Public	Not Required	Not required	Not required	Not required	Not required
IS-07 Event & Tally		Prototype	Watching	ideas	ideas	Concept	ideas

Thank You

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AIMS
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