NMOS – the key to Wide Adoption of IP Infrastructures

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Topics:

- ST 2110 is here and being deployed
- NMOS Introduction – Why its required
- 3 Segments
- Where we are now
- Where we plan to be

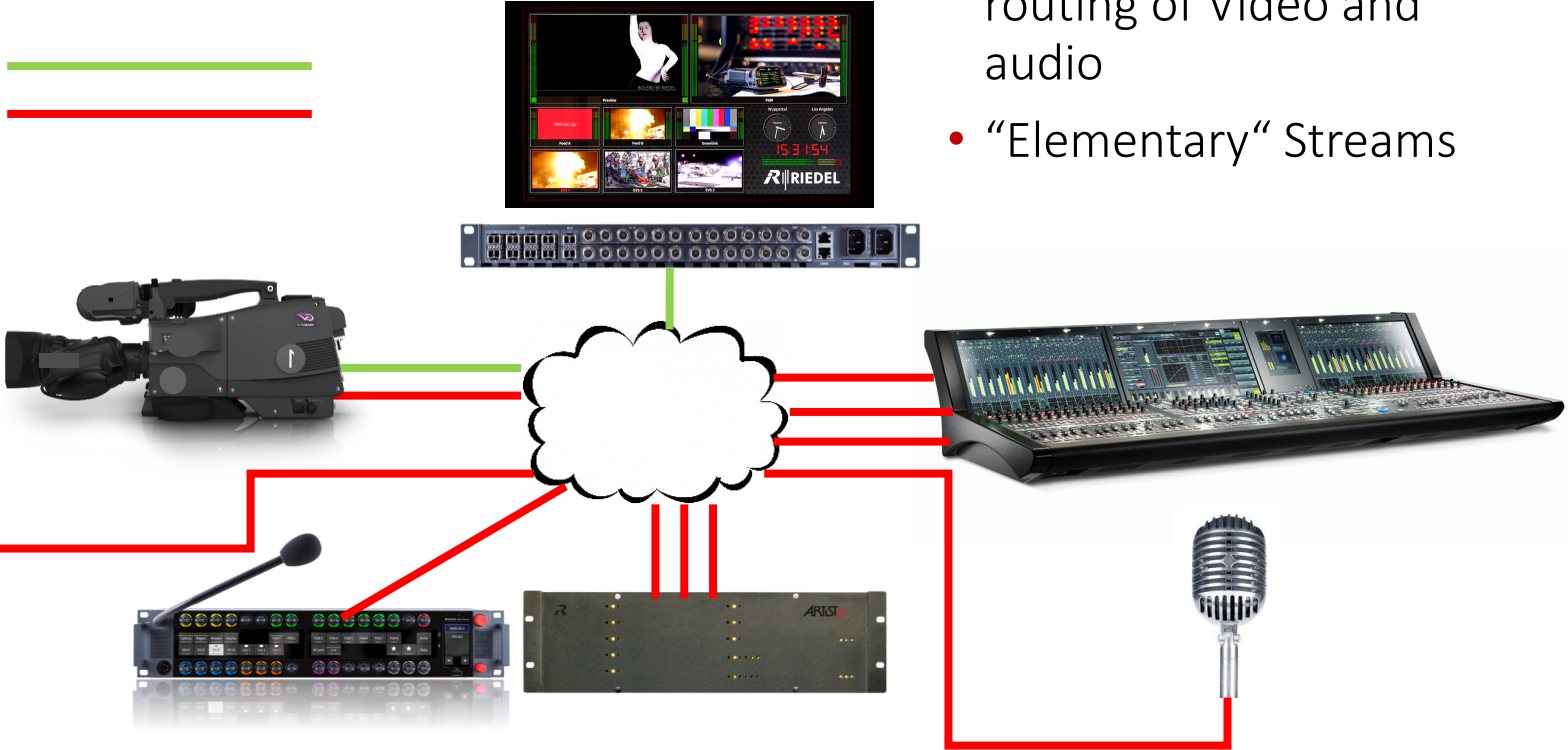Now that we are connected (to the switch) ……
What next?

RIEDEL

Now that we are connected (to the switch) ……
What next?

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
Sources

Receivers
Destinations

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

Senders
Sources

Receivers
Destinations

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)**

Then, take this information…..

Properties of Port 'Talk to GV Cam' (Type Split Output AES67)

General | Details 1 | Details 2 | Trunking | Gain | Beep | Virt. Keys | **AES67 Output** | Usage | Rights

AES67 Stream and Connection Settings

Mode: Port 1

Connection settings

Protocol: Manual — Supported: Manual (RTP only), RTSP

Export SDP

Multicast IP: 239 . 32 . 37 . 1 — RTP Multicast IP (IPv4, 239.0.0.1 - 239.255.255.254)

Multicast Port: 50030 — RTP Multicast Port (Default: 5004, Range 1024-65535)

RTSP URI: rtsp://192.168.62.37:554/Port_Out_8.1_Node_1

Stream Settings

Bit Depth: L24 — Default: 'L24', Bits per Sample

Packet Time: 1.000 ms — Audio content per packet

Payload Type: 97 — Default: 96, Range 96-127

SSRC: 0 — Default: 0, Range 32bit

Time Stamp Offset: 0 — Default: 0, Range 32bit

Samplerate: 48 KHz

Channels: 8 — Channels per stream

Port Settings

Selection: 1 — Audio channel from the stream to be used

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**
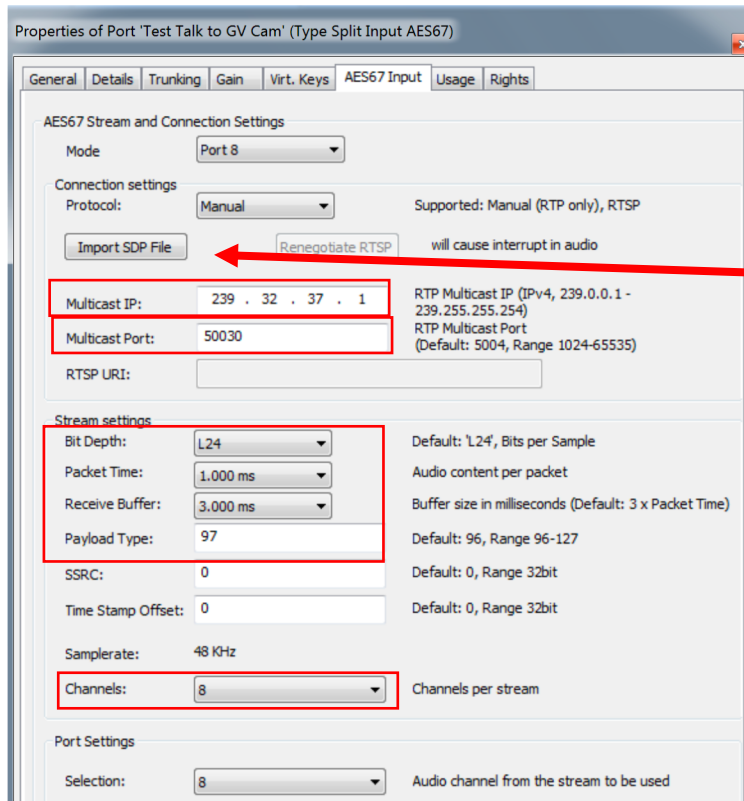m=audio 50030 RTP/AVP 97 **Type of signal / Multicast Port / Payload Type**
c=IN IP4 239.32.37.1/10 **Multicast IP Address**
a=rtpmap:97 L24/48000/8 **Sample Rate/Bit Depth/Number of Channels**
a=ts-refclk:ptp=IEEE1588-2008:08-00-11-ff-fe-21-de-ee:42 **PTP Clock**
a=ptime:1.000 **Packet Time (ms)**

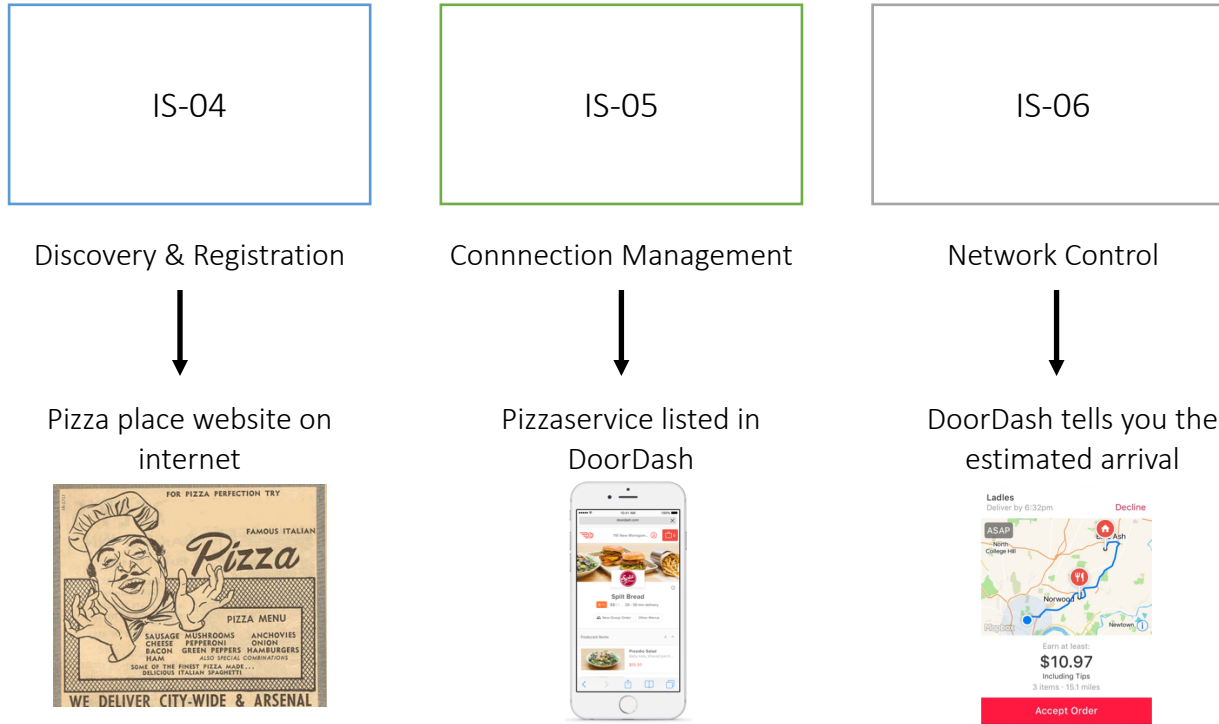# And enter into here….

….or click here
and import SDP File!

Don't be scared!

Help is on the way!

NMOS – Networked Media Open Specification

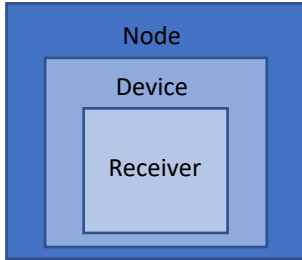- ST2110's Search Engine and more!

- Three Components
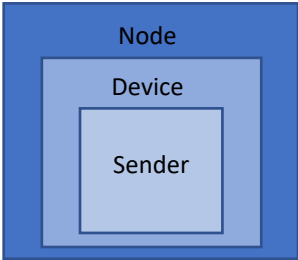
IS-04	IS-05	IS-06

Discovery & Registration   Connnection Management   Network Control

↓   ↓   ↓

Pizza place website on internet

Pizzaservice listed in DoorDash

DoorDash tells you the estimated arrival

14

Workflows Explained: IS-04 & IS-05

IS-04 Workflow

IS-04 Registry

DNS-SD „_nmos-registration._tcp"

Node

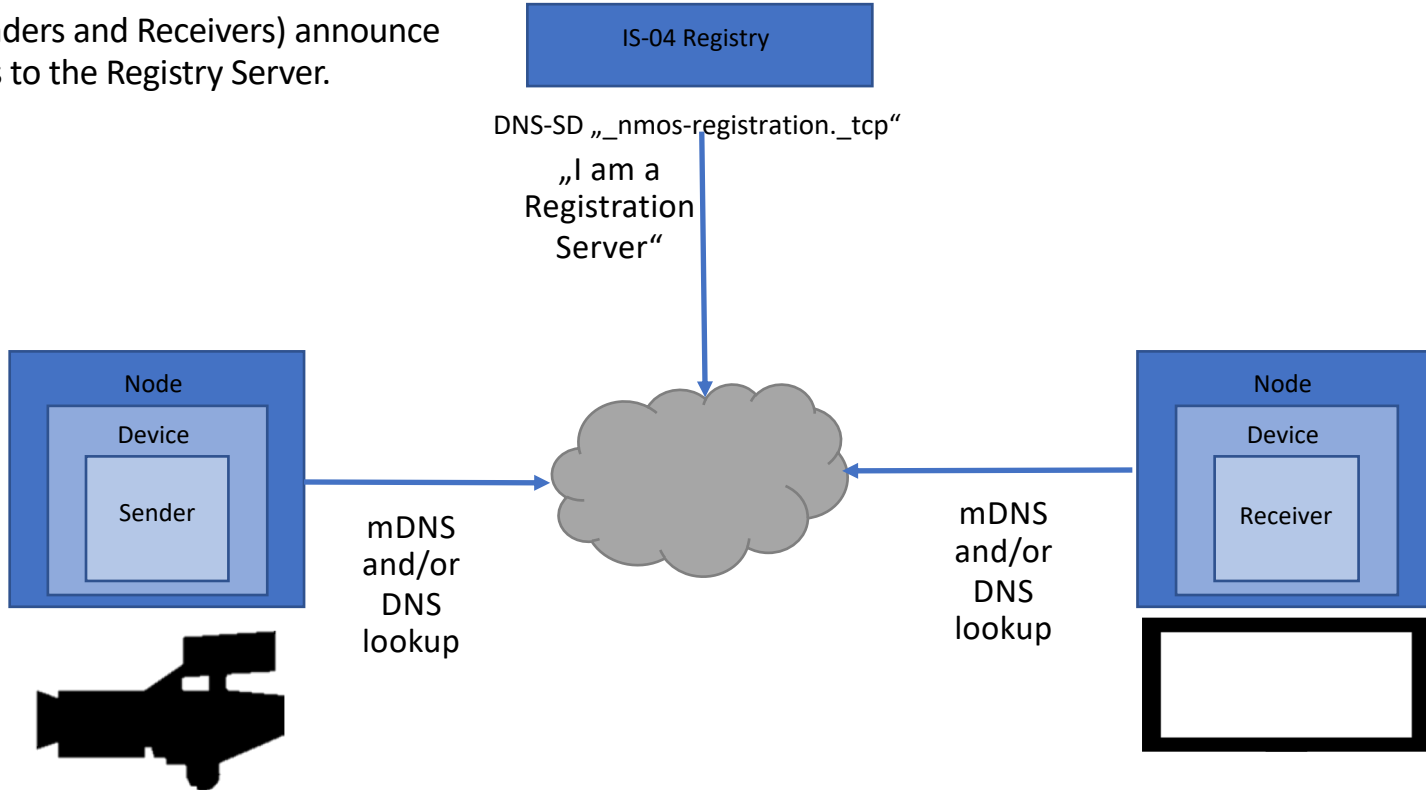Device

Sender

Node

Device

Receiver

Three devices: Senders, Receivers
and IS-04 Registry server

Workflows Explained: IS-04 & IS-05

IS-04 Workflow

Nodes (Senders and Receivers) announce themselves to the Registry Server.

IS-04 Registry

DNS-SD „_nmos-registration._tcp"

„I am a Registration Server"

Node

Device

Sender

mDNS and/or DNS lookup

Node
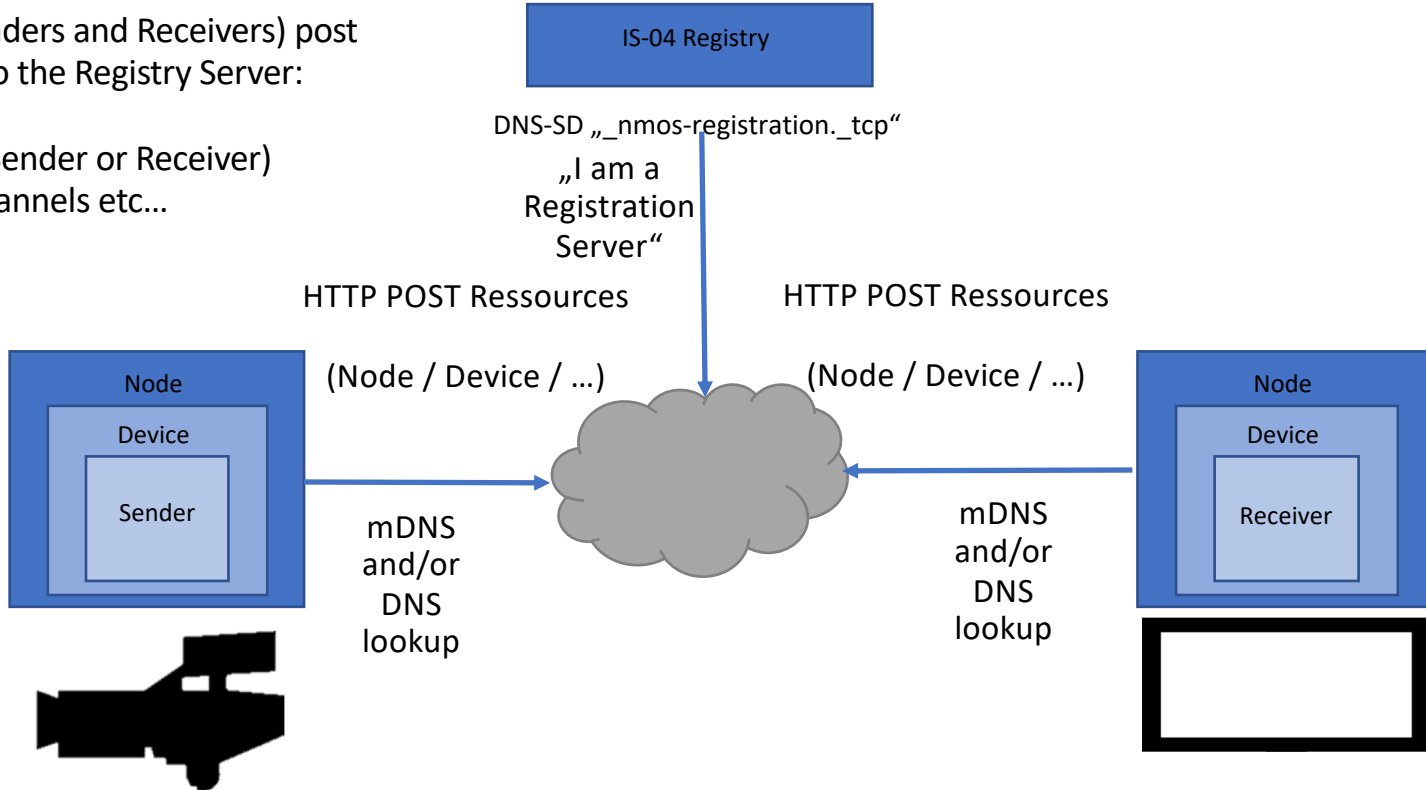
Device

Receiver

mDNS and/or DNS lookup

Workflows Explained: IS-04 & IS-05

IS-04 Workflow

Nodes (Senders and Receivers) post their info to the Registry Server:

- Name
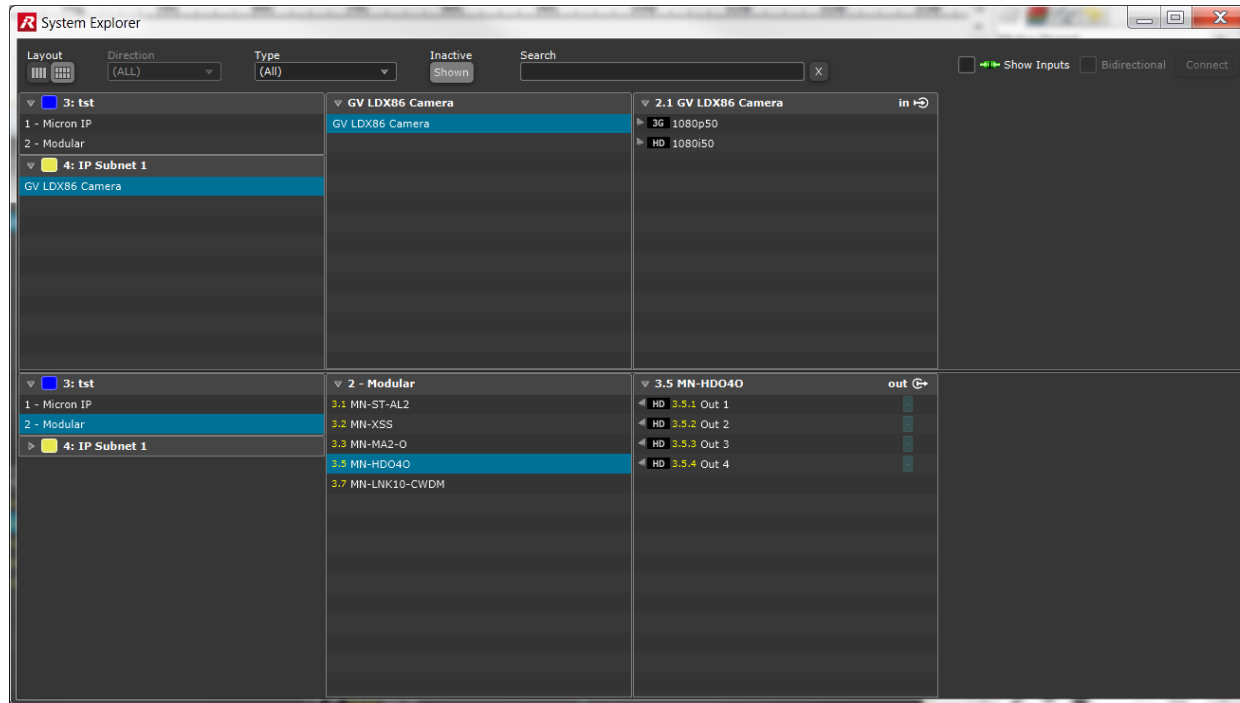- Type (Sender or Receiver)
- # of channels etc…

IS-04 Registry

DNS-SD „_nmos-registration._tcp"

„I am a Registration Server"

HTTP POST Ressources

(Node / Device / …)

HTTP POST Ressources

(Node / Device / …)

Node

Device

Sender

Node

Device

Receiver

mDNS and/or DNS lookup

mDNS and/or DNS lookup

Workflows Explained: IS-04 & IS-05
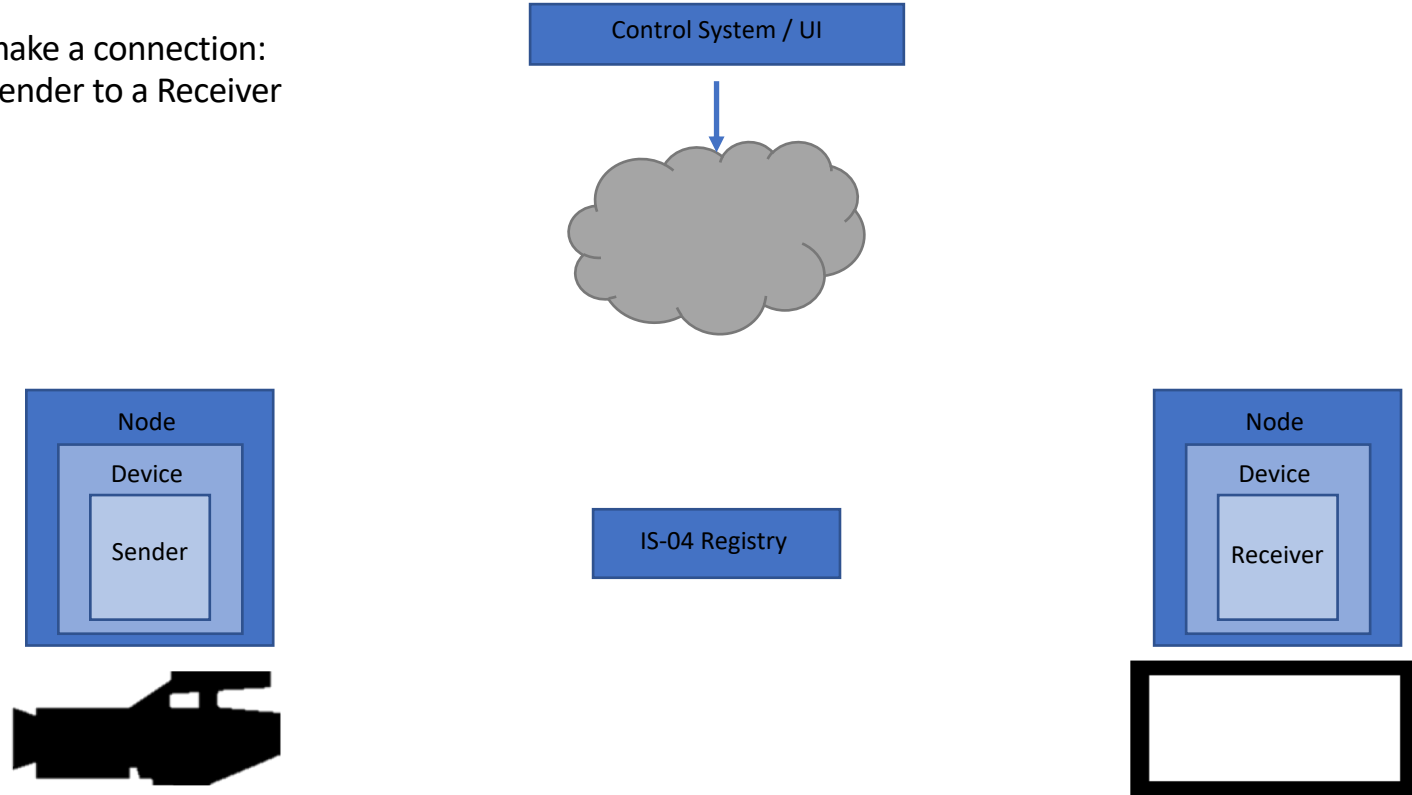
IS-04 Workflow

Nodes are now seen within the Control System

Workflows Explained: IS-04 & IS-05

IS-05 Workflow

Time to make a connection:
Route a Sender to a Receiver

Control System / UI

Node
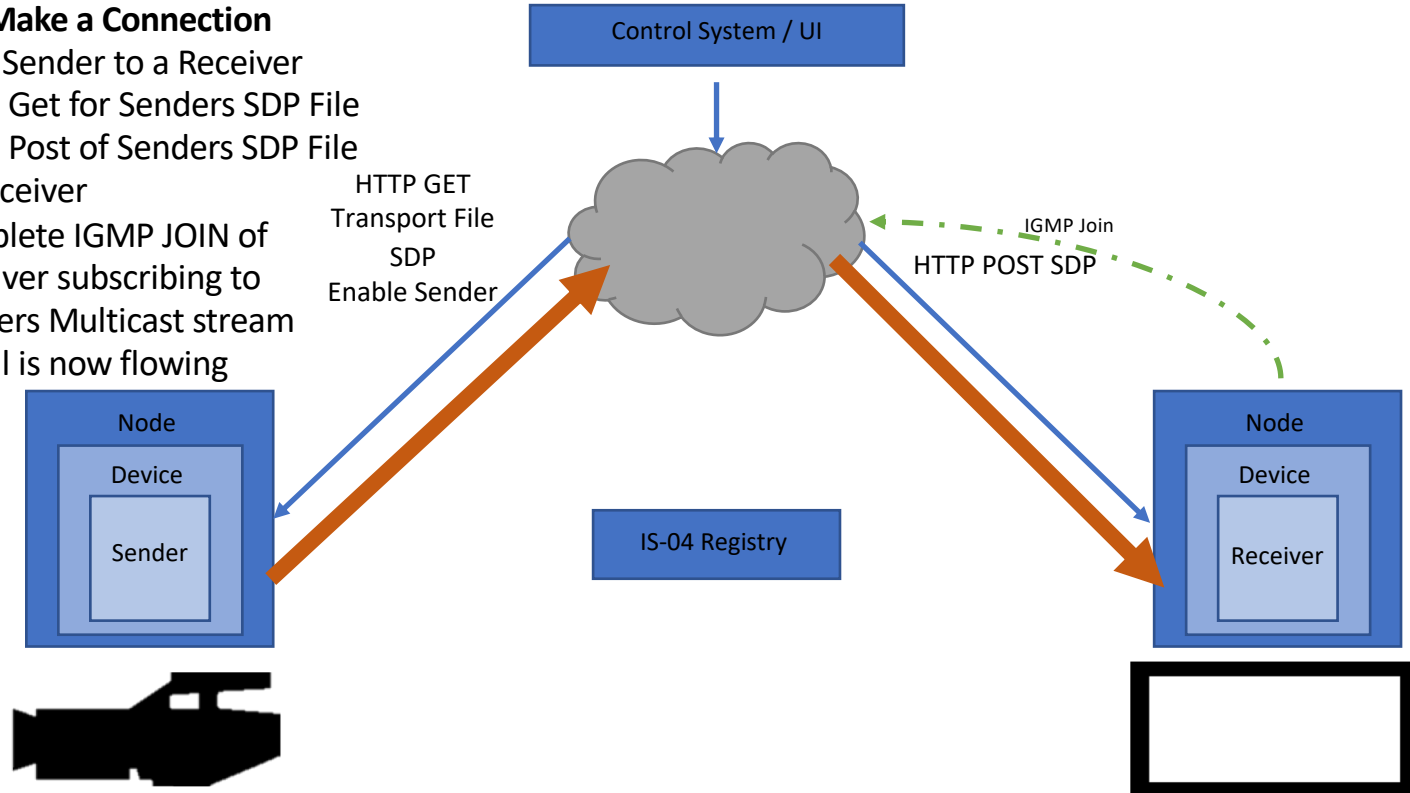Device
Sender

IS-04 Registry

Node
Device
Receiver

Workflows Explained: IS-04 & IS-05

IS-05 Workflow

Time to Make a Connection

- Route a Sender to a Receiver
- HTTP Get for Senders SDP File
- HTTP Post of Senders SDP File to Receiver
- Complete IGMP JOIN of Receiver subscribing to Senders Multicast stream
- Signal is now flowing

Control System / UI

HTTP GET
Transport File
SDP
Enable Sender

IGMP Join

HTTP POST SDP

Node

Device

Sender

IS-04 Registry

Node

Device

Receiver
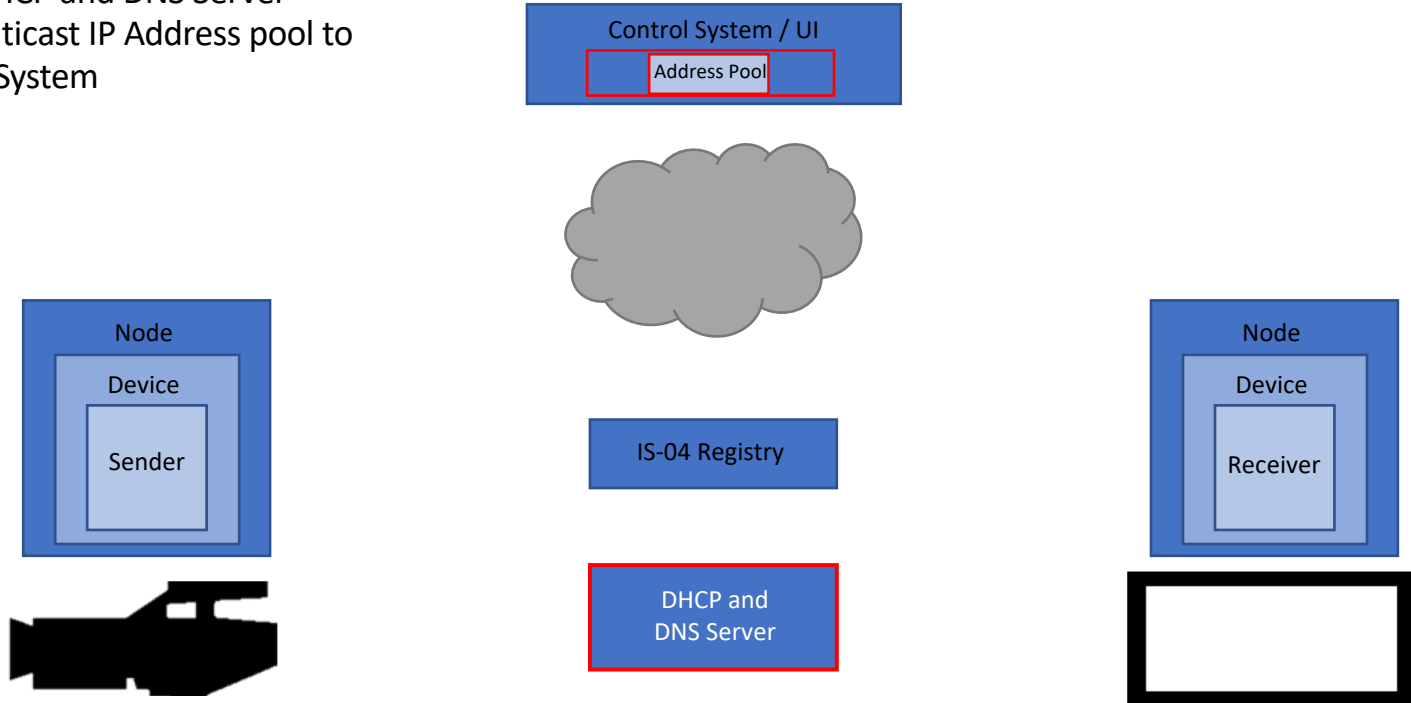
Current State:

„Plug ' n' play workflow"

Problem trying to solve:

How can I connect two devices that have not been preconfigured without typing one single IP address?

Current State: Problems to solve

„Plug 'n' play workflow"

- Add a DHCP and DNS Server
- Add Multicast IP Address pool to Control System

Control System / UI

Address Pool

IS-04 Registry

DHCP and DNS Server

Node

Device

Sender

Node

Device

Receiver

Current State:

„Plug ' n' play workflow"

1. Devices retrieve configuration NIC and media NIC IP addresses via DHCP

2. IS-04 Node Implementation discovers IS-04 registry in the network by mDNS or DNS entry

3. IS-04 Implementation on devices registers all resources including information about IS-05 control

4. A control panel can be populated with all senders and receivers using the connected source and destination information of the Node API as label information

5. After interaction of a user (drag/drop or push destination and source buttons), the control system retrieves the transport-file of the sender representing the source and PATCHes it to the desired receiver.

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.
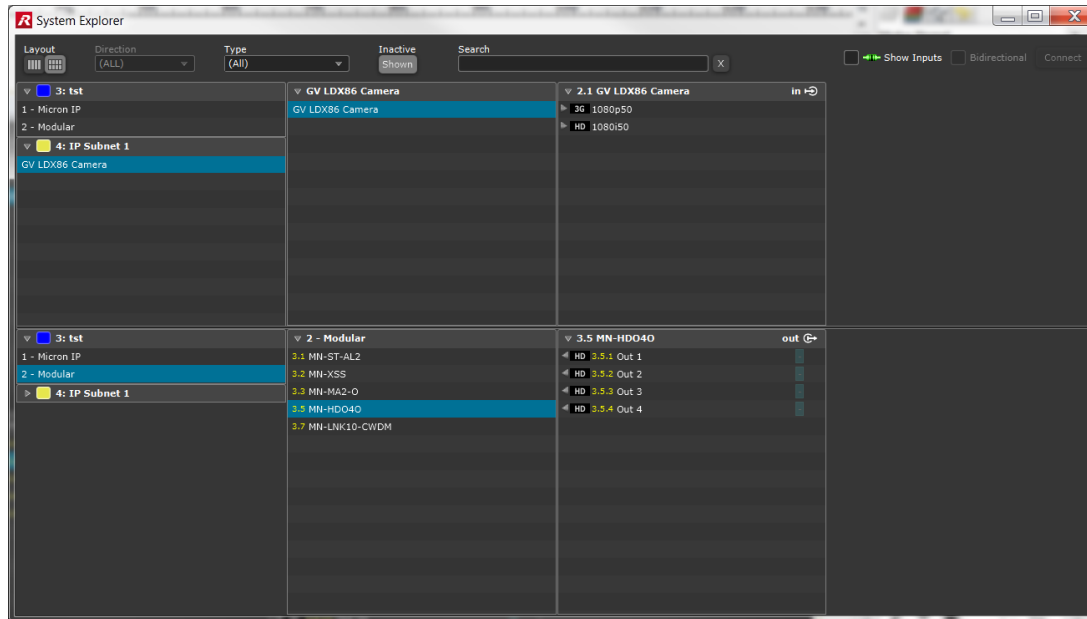
State of NMOS

- 2018 Interop, ~30 companies have NMOS implementations (50% of attendees)
  - More NMOS interops enquired
  - Riedel hosted NMOS interop Workshop

- Riedel released NMOS Explorer Software as Freeware to push and support the development.
  - Available via myriedel.riedel.net

Thank You

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