Standardized Connection Management for Essences and Network Flows in SMPTE ST 2110 and AES67

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Background

- Internal Wiki Page for Interoperability with 3rd party
- Houston Interop
- Customer Installations

➢ AES67 and 2110 flows are fine, but connecting differs from vendor to vendor.
➢ sdp mandatory in standard, but how to exchange?
From IP Showcase Theatre at IBC 2018

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HTTP POST Resources
(Node / Device / ...)

Node
Device
Sender

Node
Device
Receiver

IS-04 JSON Node Object

```json
{
   "api": {
      "endpoint": {
         "http": "10.90.4.196",
         "post": "ISO",
         "socket": "http"
      },
      "version": {
         "version": "nl.3.0"
      },
      " CAPT
      "close": {
         "user": "nl.04",
         "nf_type": "internal"
      },
      "description": "",
      "hostname": "media",
      "http": "http://10.30.4.196:3000/",
      "isp": "11100:2b0:23e9-1:160-809-002575ux7721",
      "location": {
         "channel_id": "xml",
         "node": "subset",
         "timestamp": "2016-01-01-01-01"
      },
      "status": "Microsoft IP 1 (links 196)",
      "services": [],
      "type": [],
      "version": "122707535312"
   }
}
```
Control System / UI

"I am a Query Service"

IS-04 Registry

Node
Device
Sender

Node
Device
Receiver

HTTP GET Resources
(Nodes / Devices / Senders)

IS-04 Registry

Node
Device
Sender

Node
Device
Receiver
From IP Showcase Theatre at IBC 2018

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SDP File?

{  "description": "",  "device_id": "41159c3b-239e-11e8-b001-00197c004971",  "flow_id": 41159c3b-239e-11e8-a707-00197c004971",  "id": "41159c3b-239e-11e8-9707-00197c004971",  "interface_bindings": [],  "schema": [],  "label": "Out 10",  "manifest_href": "http://10.30.6.196:3000/a-nmcs/node/v1.2/senders/41159c3b-239e-11e8-9707-00197c004971/stream.wsp",  "subscription": {  "active": true,  "receives_id": null  },  "tags": []},  "transport": "urn:schemas:transports:iptp",  "version": "1.522767131296"}
Problem trying to solve:

„How do I configure and connect senders and receivers of different vendors via a common interface?“
IS-04 JSON Device Object

```json
{
    "controls": [
        {
            "type": "unix-eoms:controller-ctrl/v1.0"
        }
    ],
    "description": "",
    "id": "41159C3B-239e-11e8-3001-0017c004721",
    "label": "MicroH IP 1 [link 196] Device",
    "node_id": "41159C3B-239e-11e8-3001-0017c004721",
    "receivers": [
        {"1159C3B-239e-11e8-8000-0017c004721",
        "1159C3B-239e-11e8-9000-0017c004721",
        "1159C3B-239e-11e8-9001-0017c004721",
        "1159C3B-239e-11e8-9002-0017c004721",
        "1159C3B-239e-11e8-9003-0017c004721"},
    ],
    "senders": [
        {"1159C3B-239e-11e8-8000-0017c004721",
        "1159C3B-239e-11e8-9000-0017c004721",
        "1159C3B-239e-11e8-9001-0017c004721",
        "1159C3B-239e-11e8-9002-0017c004721",
        "1159C3B-239e-11e8-9003-0017c004721"},
    ],
    "exp": {},
    "type": "unix-eoms:device:generic",
    "version": "102423910496"
}
```
IS-05 Workflow

Control System / UI

HTTP GET
(SenderID) Staged
Transport Parameters

HTTP GET
(SenderID) Staged
Transport Parameters

JSON

Node
Device
Sender

Node
Device
Receiver

IS-04 Registry

JSON

Node
Device
Sender

Node
Device
Receiver

IS-04 Registry
IS-05 Staged Parameters Object

```json
{
    "activation": {
        "node": null,
        "requested_time": null,
        "scheduled_time": null
    },
    "master_enable": false,
    "receiver_id": null,
    "transport_params": {
        "destination_ip": "239.255.0.1",
        "destination_port": 5004,
        "rtp_enabled": true,
        "source_ip": "10.22.192.6",
        "source_port": "auto"
    }
}
```

IS-05 Workflow

Control System / UI

HTTP POST/PATCH

Node
Device
Sender

IS-04 Registry

Node
Device
Receiver
IS-05 Workflow

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SDP referenced via URL

https://github.com/Streampunk/sdpoker
IS-05 Workflow

Control System / UI

Node
Device
Sender

IS-04 Registry

Node
Device
Receiver

SDP

HTTP POST SDP
### Comparisons

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<th>Start Stop</th>
<th>Video and Audio</th>
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<tr>
<td>Ravenna</td>
<td>✓ Local</td>
<td>✓ EmBER+</td>
<td>✓ Can be done</td>
<td>✓ Unicast and multicast</td>
</tr>
<tr>
<td>Dante</td>
<td>✓ Local (limited)</td>
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</tr>
<tr>
<td>AES70</td>
<td>✓ Sender and receiver</td>
<td>✓ Always on / Immediate</td>
<td>✓ Audio only</td>
<td>✓ multiple</td>
</tr>
<tr>
<td>IS-04/IS-05</td>
<td>✓ Sender and receiver</td>
<td>✓ Immediate and scheduled</td>
<td>✓ 2110-20, -30, 2022-6 Compressed</td>
<td>✓ Unicast and multicast</td>
</tr>
</tbody>
</table>

**“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?“
„Plug ‘n’ play workflow“

Control System / UI

Node
Device
Sender

IS-04 Registry

Node
Device
Receiver

DHCP and DNS Server

„Plug ‘n’ play workflow“

Control System / UI

Node
Device
Sender

IS-04 Registry

Node
Device
Receiver

DHCP and DNS Server
“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. The control system learns via IS-04 Query API of all senders and receivers and can automatically define Multicast Addresses for all senders via IS-05 staged transport parameters
5. 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
6. After interaction of a user (drag/drop or push destination and source buttons), the control system retrieves the transportfile of the sender representing the source and PATCHes it to the desired receiver.
Further Steps

• Security

„How can I prevent my IS-05 API to be used by non-authorised control systems?“

About standards

• Great for nailing down vague options in rfcs
  – AES67
  – ST2022 / 2110
  – PTP

• Not well suited for higher level protocols
  – Standard way of transport for IS-04/05/06 is set in spec
  – Difficulties arise in specific values for timeouts, blocking vs. Non-blocking activations etc.
  – Standardisation would slow down quick updating of the spec to accommodate new types of transport
Conclusion

• AMWA IS 04-05 greatly completes ST2110 suite, as well as AES67 for missing handles to configure and connect
• Plug and play workflow can add value to IP for ad hoc installations
• IS-04 also complements larger routing systems
• Open questions remain in specific implementation details
• Engineering Guideline an option instead of a standard

Links

• Documentations:
  – https://amwa-tv.github.io/nmos/
• Open Source implementations:
  – https://github.com/AMWA-TV/nmos/blob/master/Implementations.md
• Freeware NMOS Explorer:
  – https://myriedel.riedel.net/
Thank You

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