AMWA NMOS IS-04 & IS-05: Things You Might Not Know

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Background

• IS-04 and IS-05 are becoming available in an increasing number of products

• Whilst any implementation will support the basics, some features are optional, and the purpose of others isn’t necessarily obvious at first glance
What are IS-04 and IS-05?

• IS-04: Discovery & Registration
  – Allows Media Nodes and their capabilities to be discovered

• IS-05: Connection Management
  – Allows Media Nodes to be configured to send and receive IP streams

• They share a common data model
  – Nodes, Devices, Sources, Flows, Senders, Receivers

• They are built upon proven Internet technologies
  – RESTful APIs accessible via HTTP and discovered via DNS
What are IS-04 and IS-05?

Application Logic

IS-04 Registry

Node

Device

Sender

Node

Device

Receiver

Query

Create IS-05 Connection

Registration
Multi-Format & Multi-Stream

- UHD, HD, SD, HDR, HFR, Codecs, Data
- ST.2110, ST.2022-6, ST.2022-7, AES67, RTP, WebSocket, MQTT
- **Flow** attributes indicate resolutions, codecs and similar
- **Sender** attributes indicate stream types
- **Receiver** capabilities inform control systems of what is acceptable
Multi-Format & Multi-Stream
Multi-Version Support

• Technology doesn’t stop moving, but it’s impossible to upgrade everything in a facility at the same rate

• API versioning ensures that the latest equipment can be used alongside older components without adversely affecting operation

• You should only have to upgrade when you need to take advantage of a new feature
Multi-Version Support

GET /x-nmos/query/v1.2/nodes?query.downgrade=v1.1
Clustering & Failover

• Registration API, Query API and registry data store components can be scaled independently
• Nodes can dynamically switch between available registry instances upon failure, with zero downtime
• Priority mechanism allows specific APIs to be favoured
Scalable Discovery

• All approaches aim for zero or near-zero configuration, with flexibility in the architecture to suit different deployments
  – Multicast DNS provides a simple approach for small setups, including a peer to peer mode
  – Unicast DNS enables scalability and tighter control over configuration for larger deployments, as required by JT-NM TR-1001-1

• Example
  – Subdomains can provide logical segmentation within a shared network
  – Priorities ensure Nodes can still find a registry if their preferred one fails
Scalable Discovery

Studio A
studio-a.myfacility.com

IS-04 Registry

Node

Registration

Cluster Data

Studio B
studio-b.myfacility.com

IS-04 Registry

Node

Cluster Data

Studio C
studio-c.myfacility.com

IS-04 Registry

Node

Registration
Query Language

• The Query API provides filtering mechanisms to aid client scaling
  – Pagination avoids API responses becoming too large to send or receive
    • GET /x-nmos/query/v1.2/nodes?paging.limit=50
  – Basic and advanced query languages allow clients to restrict the volume of data they process
    • GET /x-nmos/query/v1.2/flows?frame_width=1920&frame_height=1080
  – Downgrade queries allow data to be consumed from multiple API versions
  – Ancestry queries allow content processing operations to be tracked
• Filtering can be performed using one-shot HTTP GETs, or persistent WebSocket connections
Connection Mapping

- IS-04 and IS-05 advertise which Senders connect to which Receivers, including indication of connections to non-NMOS devices.
Bulk & Scheduled Routing

- Multiple Senders or Receivers can be re-configured at the same time via ‘bulk’ mode
- Connections can be made immediately, after a relative time offset or at an absolute time instant
Extensibility

• Services, controls and tags
  – The Grouping specification builds upon IS-04 without changing it
  – IS-05/07/08 are advertised using the Device ‘controls’ array

• Opportunities to add value
  – The specifications only define the interfaces

```json
"controls": [
  {
    "href": "ws://172.29.80.31:38714/",
    "type": "urn:x-ipstudio:control:iws.ipp_rptxt"
  },
  {
    "href": "ws://172.29.80.31:39278/",
    "type": "urn:x-ipstudio:control:iws.ipp_simulticapture"
  },
  {
    "href": "http://172.29.80.31/x-nmos/connection/v1.1/",
    "type": "urn:x-nmos:control:sr-ctrl/v1.1"
  },
  {
    "href": "http://172.29.80.31/x-nmos/connection/v1.0/",
    "type": "urn:x-nmos:control:sr-ctrl/v1.0"
  }
],
```
Common Ground

• All NMOS specifications share common components
  – Including: API structure, versioning, discovery and data models
  – Work is underway to provide these common specification elements as a separate entity (NMOS Core) in order to avoid duplication

• This means we can apply a common approach to security
  – IS-04 v1.1+ and IS-05 v1.0+ support Transport Layer Security (TLS) via BCP-003-01, with authorisation coming soon via BCP-003-02
  – There’s no need to worry about how to secure each individual control endpoint given a shared approach
Summary

• Multi-format and multi-stream support
• Multi-version support to aid upgrades and compatibility
• Registry clustering and failover mechanisms
• Scalable discovery and querying options
• Connection mapping
• Bulk and scheduled routing
• Common foundations
More Information

• What does each implementation support?
  – Enquire with manufacturers, or test them out for yourself using the test suite

• Which features might I need to ask for explicitly?
  – The wiki details each specification along with any optional features

• I have another question!
  – Ask away, find me after this presentation, or if you can’t find what you need in the wiki or documentation, then we’d welcome an issue report via GitHub

Further documentation @ https://amwa-tv.github.io/nmos
Thank You

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