NMOS IS-07
GPI Replacement and Much, Much More...

Miroslav Jeras, CTO
Pebble Beach Systems
What is IS-07?

- AMWA Interface specification
- Full name: AMWA IS-07 NMOS Event & Tally
- A protocol that allows a source to publish its state and communicate its state changes to subscribed receivers
- Published on GitHub:
  - https://github.com/AMWA-TV/nmos-event-tally
  - https://amwa-tv.github.io/nmos-event-tally/
GPI Signals

• What is the traditional GPI?
  – Electrical ON/OFF signal used by the sending device to trigger an action on the receiving device
  – Carried by a physical cable
  – Not very practical for modern IP environments
  – Impossible on virtualized platforms
GPI Replacement

• How does this translate into the modern IT world?
  – Logical (boolean) data type: true/false
  – Carried over the IP network
  – Formatted in a modern message format (JSON)

• But what about timing, networks introduce delays?
  – Messages contain a timing section with PTP (SMPTE ST-2059) based timestamps allowing for frame and sample accurate precision
    • Creation timestamp
    • Origin timestamp
    • Activation timestamp
Extending the GPIs

• Now that we have a nice JSON message, why not use additional types available?
  – string
  – number

• That’s very nice, but how would a receiver know what to expect?
  – Type definition
    • Value lists (enumerations)
    • Ranges
    • Units of measure

"Las Vegas"
3.14159

"John", "Frank", "Mike"

-20°C – 100°C
Example IS-07 Message and Type Definition

```json
{
   "identity": {
      "source_id": "1ea39324-a32b-4e1d-8e99-33f9956ebc68",
      "flow_id": "0d4a3438-ed34-42f2-9242-58099b5cfaa"
   },
   "event_type": "string",
   "timing": {
      "creation_timestamp": "15325042241:104000200"
   },
   "payload": {
      "value": "ok"
   },
   "message_type": "state"
}
```

```json
{
   "type": "string",
   "values": [
      {
         "value": "unknown",
         "label": "Device state is unknown",
         "description": "Device state is unknown. Check extension card is plugged in correctly."
      },
      {
         "value": "ok",
         "label": "Device state is ok",
         "description": "Device state is ok."
      },
      {
         "value": "warn",
         "label": "Device state is warning",
         "description": "Device state is warning. PSU 1 shows signs of failure."
      },
      {
         "value": "fail",
         "label": "Device state is fail",
         "description": "Device state is fail. No PTP reference found."
      }
   ]
}
```
Transport Mechanisms

• We have the JSONs, but how do we carry them across the network?

**MQTT**

• Common IoT protocol
• Broker based
• One-to-many
• Scalable

**WebSocket**

• Existing NMOS protocol
• Brokerless
• One-to-one
• Optimal speed
Routing and Grouping

• So, how does all this fit together with the rest of NMOS?
  – IS-07 uses the NMOS object model
  – Extending the existing senders and receivers with new transports
  – IS-04 registration in the registry
  – IS-05 connection management

• What about linking to the video and audio flows?
  – IS-07 resources are subject to BCP-002-01 – Natural Grouping
    • Signal metadata grouped with audio/video streams
    • Multiple IS-07 signals grouped together
Use cases?

- GPI replacement
- Two-way communication between physical and virtual control panels
  - Buttons and button panels (triggers, labels, colour)
  - Sliders, knobs (position)
- Sensor readings
- Annotation of the media streams and metadata transfer
- Custom communication between devices in a system, controlled by the control system and on top of an open standard
Swiss Army Knife for System Integration
Timeline

• Early 2018: start of the project
• July 2018: the first workshop
• IBC 2018: the first demonstrations
• November 2018: approval by AMWA board
• January 2019: the second workshop with more implementations
• NAB 2019: IP Showcase demo marking the end of Phase 1
• Components:
  – Button panel
  – Playout automation
  – Multiviewer
  – Control system

• Data types:
  – Boolean
    • Button press
  – Number
    • Enumeration
    • Colour (RBG value)
  – String
    • Text
    • Timecode
    • Image (encoded)
What is next?

• Standardizing device models:
  – What is expected from devices of a specific type?

• Complex objects
  – Type definition/validation
  – Incremental updates?

• More use cases
  – Telemetry?

• Tested at the next AMWA workshop
• First projects delivered in summer 2019
• Presented at IBC 2019
Thank You

Miroslav Jeras, Pebble Beach Systems (SL4528)
miroslav.jeras@pebble.tv