Open Standards in Pro Audio: AES70

Conrad Bebbington
Focusrite
Pro Audio

Studio
Live Sound
Theatre
Broadcast
House of Worship
Audio Network Devices

Microphones

Preamplifiers

Mixers

Effects

Interfaces

Amplifiers

Speakers
Motivations

Equipment location

In recording room
On/around the stage

Poor integration between proprietary control protocols

Hardware controllers + custom controllers

Complement AES67 with a control protocol
AES70 and OCA

OCA - framework + protocols for controlling audio devices

AES70 - standard documents for OCA
Areas Covered By AES70

Control framework (OCF)

Object class structure (OCC)

Communication protocols (OCP)
Framework

Object Oriented

Devices composed of objects

Single inheritance
Classes

Methods, properties and events

All classes inherit from OcaRoot

Class id numbering based on class hierarchy (eg. OcaGain Class Id: 1,1,1,5)

Optional proprietary subclasses
Example: OcaGain

- **OcaRoot**
  - **Class Id:** 1

- **OcaWorker**
  - **Class Id:** 1,1

- **OcaActuator**
  - **Class Id:** 1,1,1

- **OcaGain**
  - **Class Id:** 1,1,1,5
Methods

Retrieve properties or perform actions

Single inheritance means every method has a level in the hierarchy

Method calls indicate a level and a method number
Example: OcaGain

OcaRoot

- GetClassIdentification(), GetLockable(), Lock() ...

OcaWorker

- GetEnabled(), SetEnabled() ...

OcaActuator

OcaGain

- GetGain(), SetGain()
Example: OcaGain

OcaRoot

GetClassIdentification(), GetLockable(), Lock() ...

OcaWorker

GetEnabled(), SetEnabled() ...

OcaActuator

OcaGain

GetGain(), SetGain()

To call set gain, call method 04m02
OcaRoot

Base class for everything

Object number

Role - name string

Class Identification

Property Change Notification

Locking
Built In Classes

Workers - signal processing

Sensors - Measure signals

Actuators - Process signals

Blocks, Matrices - Grouping

Managers - device housekeeping

Agents - non-signal processing controls
Sensors

Boolean Sensor

Int8 Sensor etc

Level Sensor

String Sensor

Bit String Sensor
Actuators

Boolean Actuator

Int8 Actuator etc

Gain

Switch

Delay

Filters (Classical, FIR, Parametric, Polynomial)
Blocks

For logical grouping

Contain other workers (including blocks)

Provide enumeration of contents

Describe signal flow

Mandatory root block (object number 100)
Signal flow

Workers may have ports

Input

Output

Containing block provides a list of connections between workers
Managers

Mandatory

Device - Model information, overall state

Firmware - Firmware version information, may allow updates

Subscription - Allows controllers to subscribe to events

Network - Information on network interfaces and configuration
Managers

Optional

Security - Authentication and security controls
Power - Monitors power supplies
Media Clock - Controls clocking/synchronization
Audio Processing - Provides global parameters for audio processing
Library - Stores and recalls presets
Device Time - Local clock settings
Agents

Mandatory

Stream Network - connections to control and media networks
Agents

Optional

Grouper - groups controls so they can be changed together

Ramper - affects a control over a time period

Observers - watch a parameter and report when it hits a value

Media Clock - describes the media clock used by the device

Event Handler - receives notifications from other devices
Event handling

OCA controllers are also OCA devices

Controllers implements Event Handler agents

Controllers subscribe to object events using the Subscription Manager

When object values change, the controlled device sends a notification

Notifications are method calls to the Event Handler
Protocols

Defined in OCP

Currently only 1 protocol

OCP.1 TCP/IP

More planned

UDP

USB
OCP.1

Discovery

Message format

Optional TLS

Heartbeat mechanism
Discovery

DNS-SD and mDNS

_oca._tcp plaintext OCA

_ocasec._tcp encrypted OCA

TXT records contain protocol versions

txtvers version of the TXT record

protovers version of OCA
Message Format

Binary format

Message types

Command

Command Requiring Response

Notification

Response

Keep Alive

Data marshalling rules
Organisations

AES handles standardisation and technical discussion

OCA Alliance promotes adoption and handles discussion of practical implementation
<table>
<thead>
<tr>
<th>Adoption - Current OCA Alliance Members</th>
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<tbody>
<tr>
<td>1602 Group</td>
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<tr>
<td>Atlas Sound, LP/Innovative</td>
</tr>
<tr>
<td>Electronic Designs, LLC</td>
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<tr>
<td>Bosch Communications Systems</td>
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<tr>
<td>Deuso GmbH</td>
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<td>Harman Professional Group</td>
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<tr>
<td>TC Group</td>
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<tr>
<td>The Telos Alliance</td>
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Implementations

Oca Micro
  Embedded
  Sample implementation

OCA.js
  Javascript implementation
  Controller applications
Benefits

Specialised protocol for audio control

Open standard allows interop

OO structure is extensible

Custom integrations possible

Can be used with AES67 for fully open audio networking
More Information

http://ocaalliance.com

http://www.aes.org/publications/standards

https://github.com/DeutscheSoft/OCA.js

http://ocaalliance.com/oca-microdemo-download/