

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

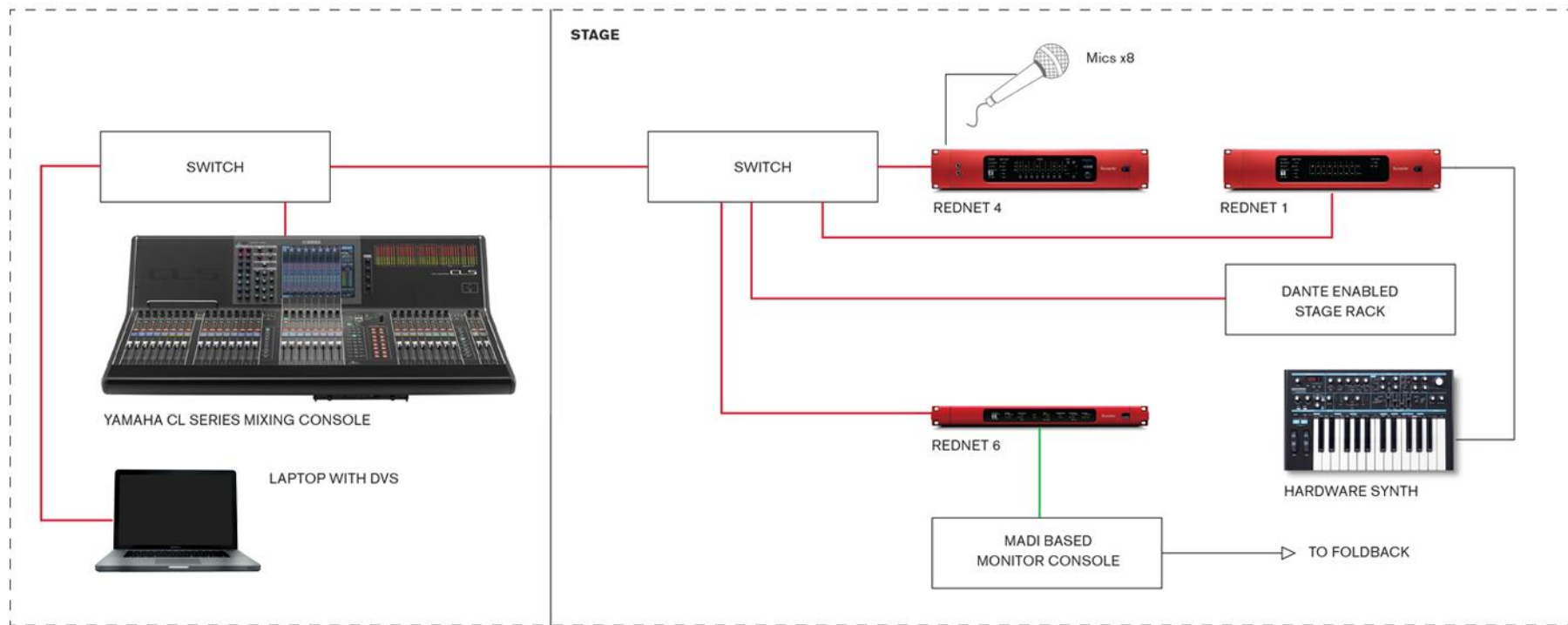
Interfaces

Amplifiers

Speakers



LIVE SOUND



CABLE KEY

-  CAT5e or CAT6
-  MADI
-  ANALOGUE

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

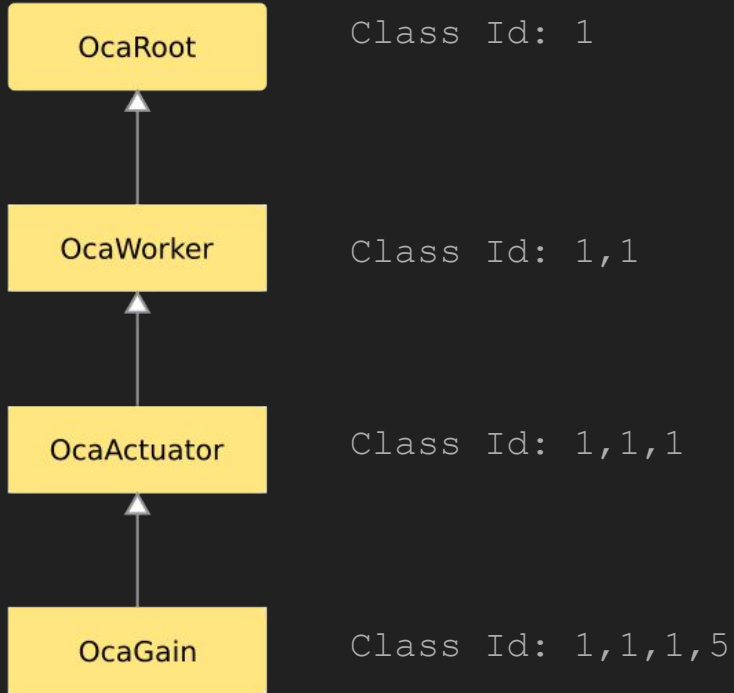
Methods, properties and events

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



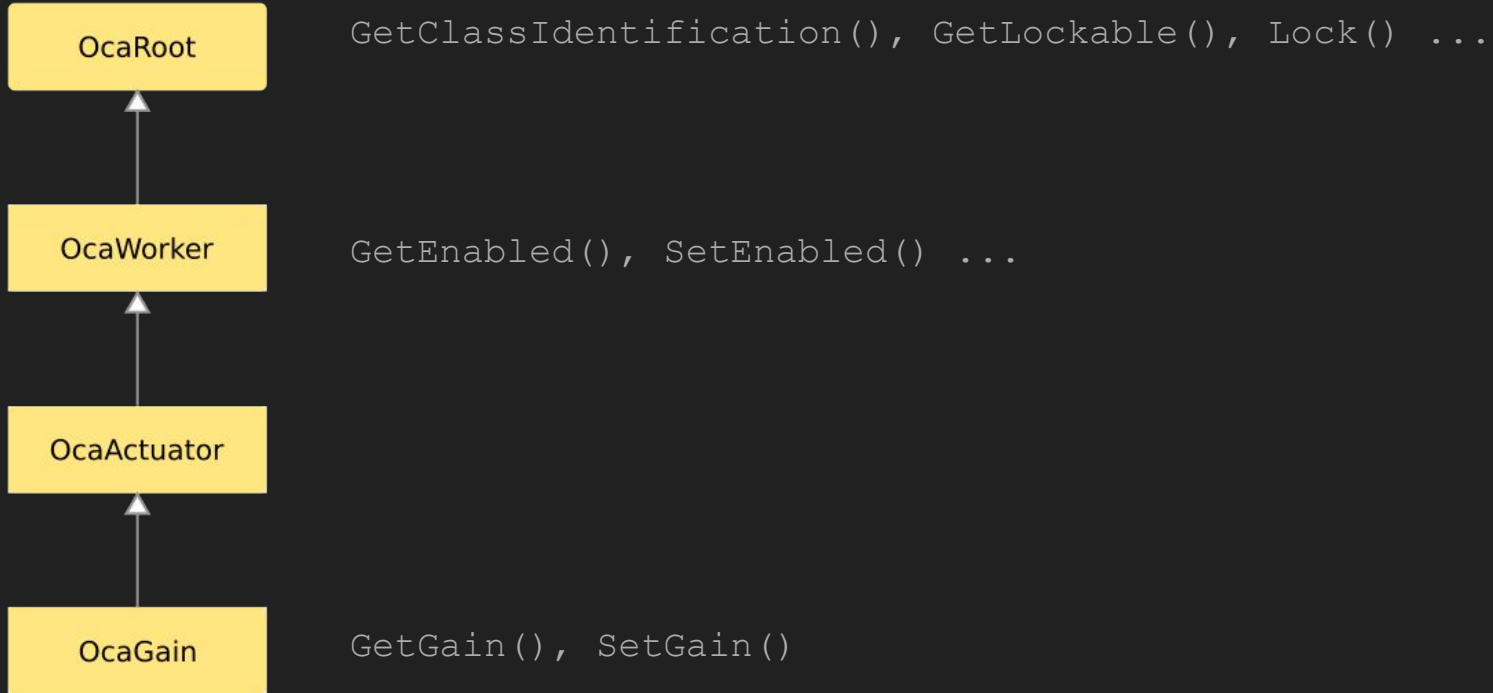
Methods

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



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

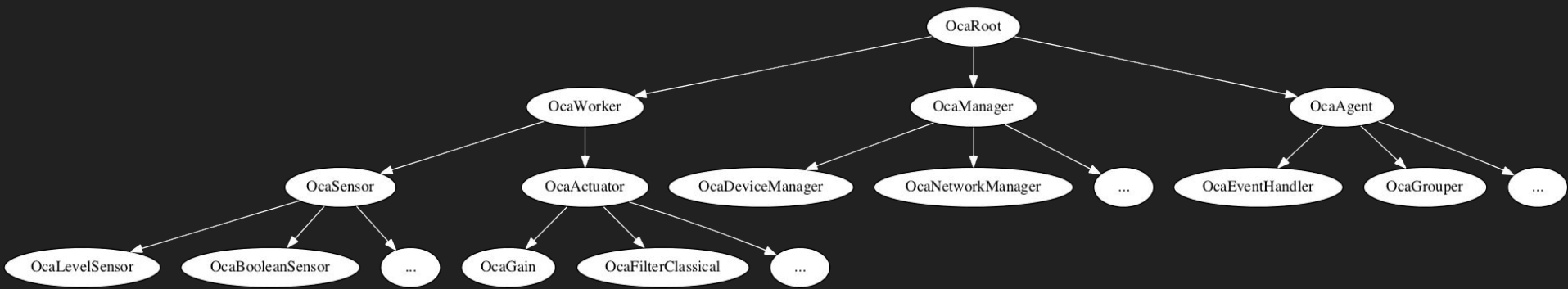
Object number

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)

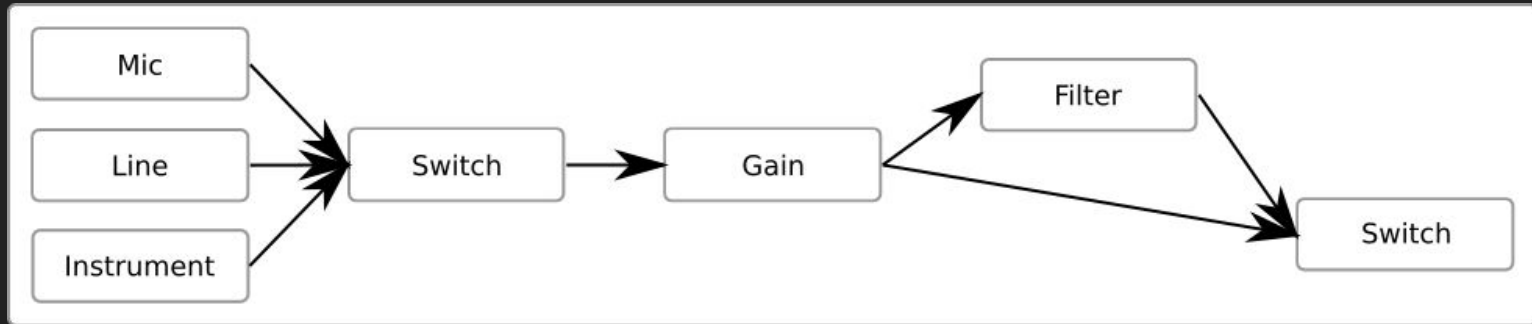
Signal flow

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

Groupier - 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

Adoption - Current OCA Alliance Members

1602 Group

AEQ

Archwave Technologies

Atlas Sound, LP/Innovative
Electronic Designs, LLC

Attero Tech

Bittner Audio Int. GmbH

Bosch Communications
Systems

CB Electronics

d&b audiotechnik GmbH

Deuso GmbH

FBT

Focusrite

Harman Professional Group

Rational Acoustics, LLC

Salzbrenner Stagetec
Mediagroup

TC Group

TOA Corporation

THAT Corporation

The Telos Alliance

Yamaha Commercial Audio

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/>