

# Using AES70

## A Technology Overview



*Jeff Berryman*  
*Bosch Communications Systems*  
*Vice-chair, AES Standards Committee*  
*Chair, OCA Alliance Technical Committee*

# What is AES70?

# AES70 Scope

- What is AES70?
  - An architecture for comprehensive **control** and **monitoring** of media devices over networks.
- What isn't AES70?
  - A media transport protocol
  - A device implementation framework
  - A user interface specification
  - A controller implementation framework

## What's "OCA"?

*The name "OCA" (Open Control Architecture) refers to the technology on which AES70 is based, and has now been expanded to mean the whole ecosystem of tools and documentation surrounding AES70.*

Why is AES70 a good control solution?

# Why is AES70 a good control solution?

- Industrial strength
  - Professional applications
  - Multivendor systems
  - Multicontroller systems
  - Networks of all sizes up to thousands of nodes
  - Ability to support mission-critical (including life-safety) applications
  - Secure or insecure systems

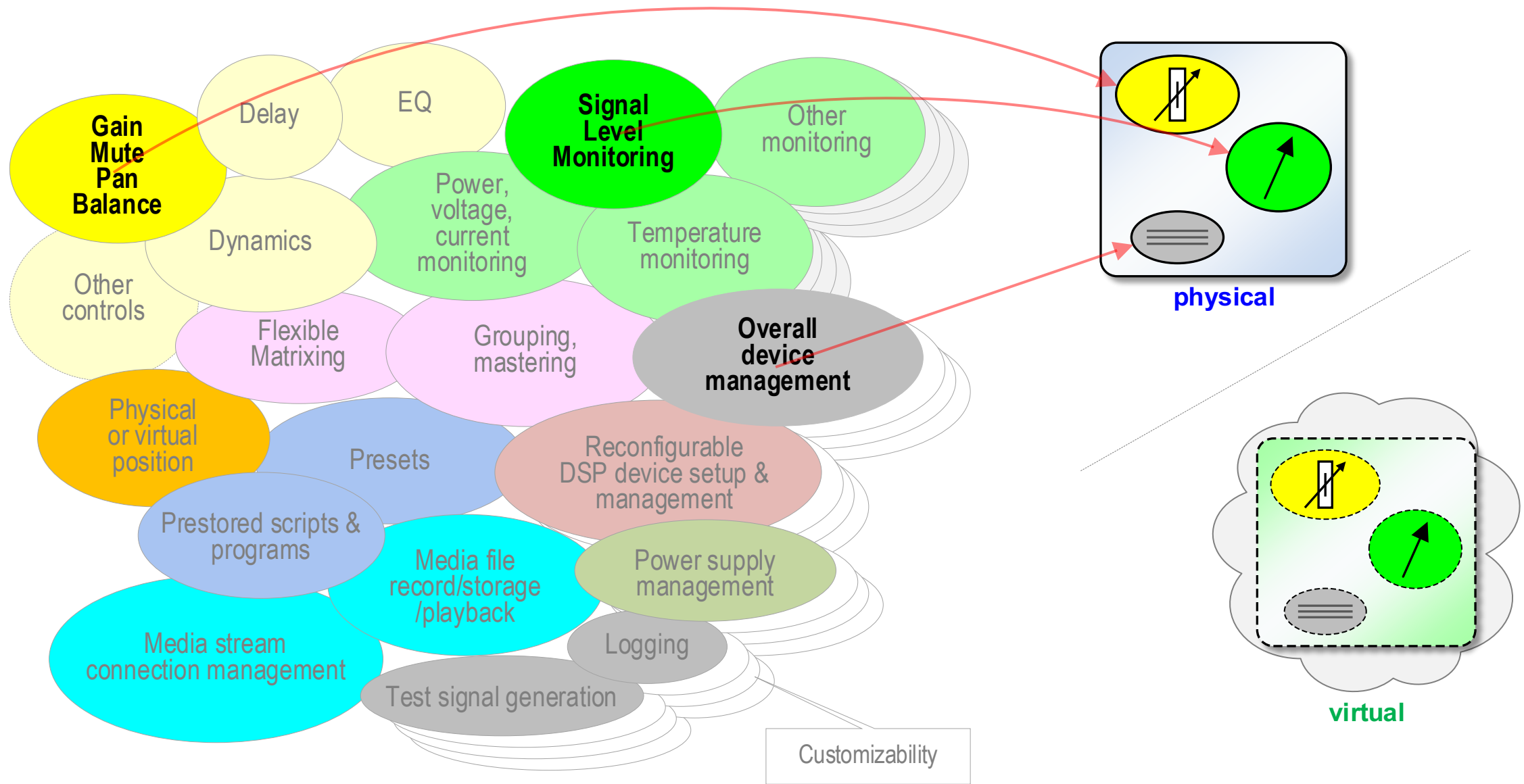
# Why is AES70 a good control solution?

- **Efficient**
  - Implementable in small processors with limited memories
  - Low use of network bandwidth
- **Product-friendly**
  - Rich set of ready-to-use functions
  - Full support for proprietary extensions
  - Fully protective of secret device features
- **Stable / Available**
  - Long service life, with engineered forward and backward compatibility
  - Open public license-free standard
  - Published and maintained by an accredited standards organization

# AES70 in your products

# AES70'S CONTROL & MONITORING REPERTOIRE

# YOUR PRODUCTS





# AES70 System Options

- Network sizes
  - Local area
  - Wide area
  - Other (e.g. desktop)
- Device population sizes and types
  - Any number, even thousands
  - Physical
  - Virtual, running in computer or cloud
- Controller population sizes and types
  - Any number
  - Any kind
    - PC, tablet, phone
    - Cloud-based
    - Custom hardware (e.g. wall panel)
- Security options
  - Non-encrypted
  - Encrypted via TLS
- Data protocol choices
  - TCP/IP
  - UDP/IP
  - WebSocket
  - Non-IP (e.g. USB)
- Control protocol formats
  - Binary
  - JSON

# AES70 Technology

# AES70 Technology

- AES70 defines a device's network control and monitoring interface.
- AES70 is object-oriented:
  - An AES70 interface element for a particular function is called an **object**.
  - A template for making Objects is called a **class**.
  - The AES70 standard defines about **100 classes**.

# AES70 Technology

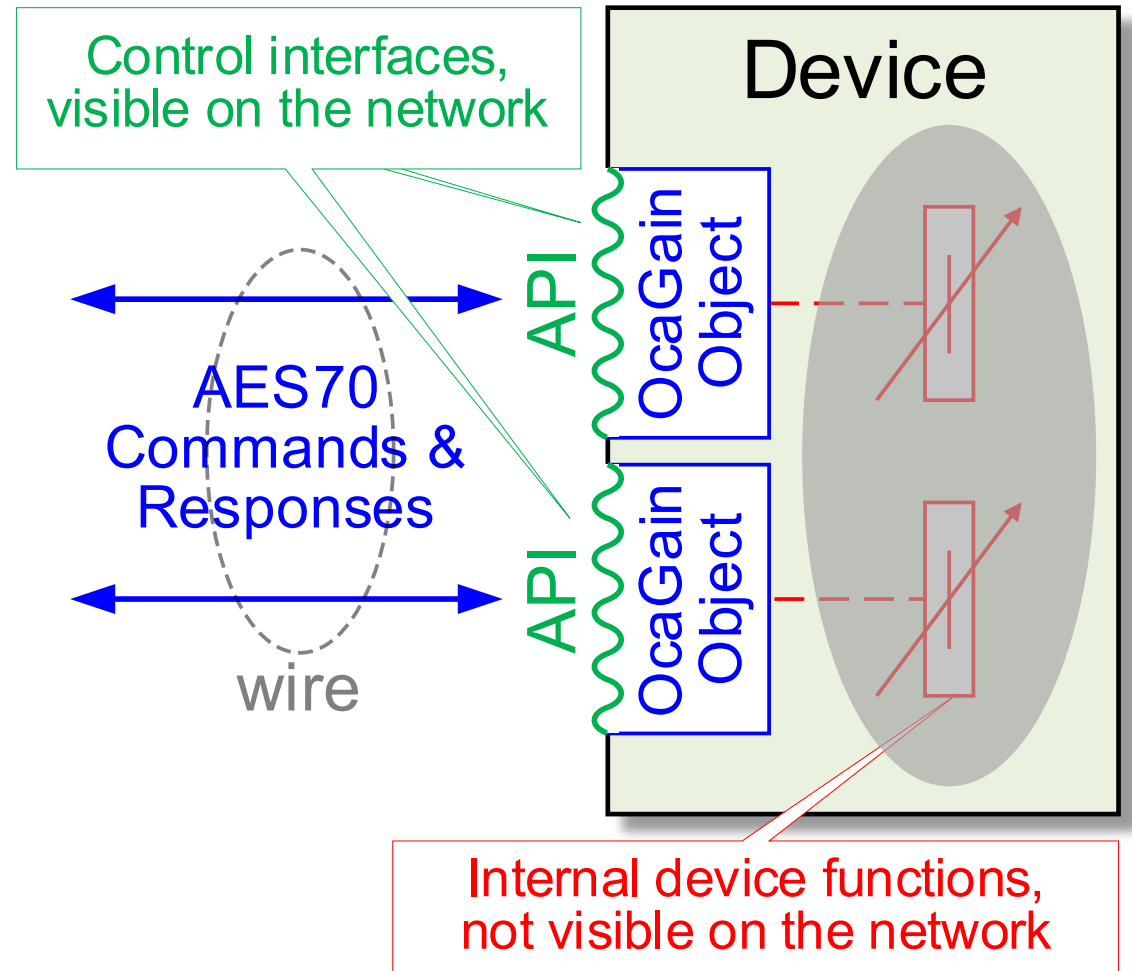
## Some AES70 classes

<b>OcaMute</b>	Signal mute
<b>OcaPolarity</b>	Signal inversion
<b>OcaSwitch</b>	1 of n selector
<b>OcaGain</b>	Simple gain in dB
<b>OcaPanBalance</b>	Pan or balance control
<b>OcaDelay</b>	Signal delay in mSec
<b>OcaFrequencyActuator</b>	Frequency
<b>OcaFilterClassical</b>	Bessel, Butterworth, etc.
<b>OcaFilterParametric</b>	Peaking or shelving parametric filter
<b>OcaFilterPolynomial</b>	Rational polynomial filter
<b>OcaFilterFIR</b>	FIR specified by coefficients
<b>OcaFilterArbitraryCurve</b>	Magnitude vs freq curve
<b>OcaDynamics</b>	Generalized compressor/expander
<b>OcaSignalGenerator</b>	Multi-waveform signal generator
<b>OcaSignalInput</b>	Device signal input port
<b>OcaSignalOutput</b>	Device signal output port

*... and about 80 more*

# AES70 Technology

- What actually goes along the wire?
  - Every **object** implicitly defines a protocol interface, aka **API**.
    - **API** = **A**pplication **P**rogram **I**nterface
    - Each **object's API** controls an internal device function
  - Once you know all of a device's **objects**, you know its entire **API**.
  - Once you have the device's **API**, you know everything that can go along the wire.
  - Traffic on the wire does not reveal device internals.



# The AES70 Standards Family

# The AES70 Standards Family

- AES70-1 **AES70 Framework.** Text document that defines the basic AES70 mechanisms for control and monitoring.
- AES70-2 **AES70 class structure.** Text + UML document that defines AES70's control & monitoring repertoire. UML stands for Universal Modeling Language.
- AES70-3 **AES70 binary protocol.** Text + UML document that defines OCP.1, a binary protocol for using AES70 over IP networks.
- AES70-4 **AES70 JSON. NEW.** Text + UML document that defines OCP.2, a JSON protocol for using AES70 over IP networks.
- AES70-21 **AES67 / ST 2110-30 Adaptation. NEW.** This standard will specify the use of AES70 connection management for controlling AES67 and SMPTE ST 2110-30 stream transport connections.
- AES70-22 **MILAN Adaptation. NEW.** This standard will specify the use of AES70 connection management for controlling MILAN stream transport connections.

# AES70 Releases, current and upcoming

AES70-1-2018	Framework	Current versions
AES70-2-2018	Class Structure	
AES70-3-2018	Binary Protocol	
AES70-1-2023	Framework	May-June 2023
AES70-2-2023	Class Structure	
AES70-3-2023	Binary Protocol	
AES70-21-2023	AES67 / SMPTE 2110-30 Connection Management	July-August 2023
AES70-22-2023	MILAN Connection Management	
AES70-4-2023	JSON Protocol	Fall 2023



# AES70 Developer Resources

*from the OCA Alliance and its member companies*

# AES70 Libraries

- **javascript** - for web-based controllers. Open source.  
[deuso.de/aes70/js/](https://deuso.de/aes70/js/)
- **c++** - for devices or controllers. Commercial license. Low footprint.  
[deuso.de/aes70/cpp/](https://deuso.de/aes70/cpp/)
- **C#.NET** - for controllers. For Visual Studio / MonoDevelop. Commercial license.  
[deuso.de/aes70/cs/](https://deuso.de/aes70/cs/)

# AES70 Hardware/Software Kits

- Products on display in the OCA Alliance booth at ISE 2023
  - Resolute Audio *by* Profusion PLC  
[www.profusionplc.com/index.html](http://www.profusionplc.com/index.html)
  - Joyned GmbH  
[www.joyned.at](http://www.joyned.at)

# AES70 Software Tools

- Developer software
  - **AES70 Explorer** development UI builder - free or commercial license  
[deuso.de/aes70/explorer/](https://deuso.de/aes70/explorer/)
  - **AES70 Compliancy Test Tool** - free AES70 device compliance checker  
[github.com/OCAAlliance/Downloads.html](https://github.com/OCAAlliance/Downloads.html)
  - **OCA Wireshark plugin** - free plugin for Wireshark, decodes AES70 traffic  
[github.com/OCAAlliance/Downloads.html](https://github.com/OCAAlliance/Downloads.html)
- Virtual devices
  - **Focusrite RedNet Virtual OCA Device** - Windows-based virtual device  
[github.com/OCAAlliance/Downloads.html](https://github.com/OCAAlliance/Downloads.html)
  - **Aes70x.net virtual device networks** - online virtual devices for testing controllers  
[aes70x.net/](https://aes70x.net/)

# AES70 Reference Implementations

- **OCA Microdemo**
  - Demonstrates OCA on very small device.
  - Open source.
  - [github.com/OCAAlliance/Downloads.html](https://github.com/OCAAlliance/Downloads.html)
- **Bosch OCA Reference Implementation**
  - Fully-engineered c++ AES70 implementation.
  - Commercial license.

# AES70 Links

# AES70 Links

- [ocaalliance.com](https://ocaalliance.com)

OCA Alliance main site. The OCA Alliance is the trade association that develops and maintains the AES70 specification for the AES.

- [ocaalliance.com/products/](https://ocaalliance.com/products/) contains a list of current products that use AES70.

- [ocaalliance.github.io](https://ocaalliance.github.io)

OCA Alliance technical site. Resources for AES70 product and tool developers.

- [aes.org/publications/standards](https://aes.org/publications/standards)

Where to purchase and download AES70 standards documents.



*Jeff Berryman*  
*+1 952 457 5445*  
*[JA.Berryman@us.bosch.com](mailto:JA.Berryman@us.bosch.com)*