STANDARDS AND INFORMATION DOCUMENTS

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STANDARDS

AES standard for audio applications of networks - Open Control Architecture - Part 1: Framework

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AES standard for audio applications of networks - Open Control Architecture - Part 1: Framework

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Abstract

AES70 is a suite of standards for control and monitoring of devices in professional media networks. This standard, *AES standard for Audio applications of networks - Open control architecture - Part 1: Framework* defines AES70's concepts and mechanisms. Other standards in the AES70 suite specify control and monitoring repertoire, control protocols, and media transport management applications.

AES70 does not specify a media transport scheme. Rather, it is designed to operate with media transport schemes such as the one specified by AES67.

AES70's intended range of use spans networks of all sizes. This includes mission-critical applications, high-security applications, IP and non-IP networks, and local and wide-area applications. AES70 can control real or virtual devices located on premises or hosted by cloud services. AES70 consumes little computing power and uses network bandwidth lightly.

AES70 architecture is network-agnostic. Current AES70 standards define protocols for use over IP networks and simple byte-stream networks, but other network types may readily be accommodated.

AES70 is based on the Open Control Architecture (OCA), originally developed by the OCA Alliance.

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Foreword

This foreword is not part of this document, *AES standard for Audio applications of networks - Open Control Architecture - Part 1: Framework*.

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Review and revision. This document is subject to periodic review and possible revision. Users are cautioned to obtain the latest edition.

AES70 Structure

The AES70 standard is a suite of standards, classified into two divisions. The ***Core Standards*** division, contains standards essential to all implementations of AES70; the ***Adaptation Standards*** division contains application-specific standards. This standard, *AES standard for Audio applications of networks - Open Control Architecture - Part 1: Framework*, is a Core Standard.

AES70-1 Version history

Original standard (AES70-1-2015). The members of the writing group that developed this document in draft were: J. Berryman, K. Dalbjorn, H. Hamamatsu, T. Head, T. Holton, S. Jones, M. Lave, N. O'Neill, M. Renz, P. Stevens, S. van Tienen, E. Wetzell, and U. Zanghieri. Additional contributions were made by M. Smaak, and G. van Beuningen of the OCA Alliance.

2018 revision. The members of the writing group that developed this document in draft were: F. Bergholtz, J. Berryman, K. Dalbjorn, A. Gödeke, J. Grant, T. Holton, S. Jones, A. Kuzub, M. Lave, G. Linis, S. Price, M. Renz, A. Rosen, G. Shay, P. Stevens, P. Treleaven, S. van Tienen, E. Wetzell, and U. Zanghieri. Additional contributions were made by T. de Brouwer and M. Smaak of the OCA Alliance.

2023 revision. The standards in this revision are collectively known as AES70-2023. For AES70-2023, all standards in the suite have been updated. New features in the Core Specification include: a new connection management architecture, large dataset storage and retrieval, documentation improvements, and numerous small additions and enhancements. More details can be found in Annex G.

The members of the writing group that developed this document in draft were: J. Berryman, B. Escalona Espinosa, A. Gödeke, E. Hoehn, S. Jones, M. Lave, G. Linis, M. Renz, A. Rosen, S. Scott, P. Stevens, P. Treleaven, S. van Tienen, M. Versteeg, and E. Wetzell.

2024 revision. The AES70-2024 suite comprises new releases of AES70-1, AES70-2, and AES70-3. It contains a number of adjustments, corrections, and enhancements to the AES70-2023 version. New AES70 elements specified in this AES70-1 Standard include a new class OcaGroup that replaces the previous OcaGrouper, a revised and simplified version of OcaMatrix, and a new class OcaCommandSetAgent.

The members of the writing group that developed this document in draft were: J. Berryman, B. Escalona Espinosa, A. Gödeke, E. Hoehn, S. Jones, M. Lave, G. Linis, M. Renz, A. Rosen, S. Scott, P. Stevens, P. Treleaven, S. van Tienen, M. Versteeg, and E. Wetzell.

J. Berryman led the task group for all four revisions.

Morten Lave
Chair, AES SC-02-12, *Working Group on Audio Applications of Networks*
2023-09-28

Note on normative language

In AES standards documents, sentences containing the word "shall" are requirements for compliance with the document. Sentences containing the verb "should" are strong suggestions (recommendations). Sentences giving permission use the verb "may". Sentences expressing a possibility use the verb "can".

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(notes)

AES standard for Audio applications of networks - Open control architecture - Part 1: Framework

0. Introduction

0.1. General

This document defines the AES70 Framework, which is a set of models and mechanisms for the control and monitoring of networked Devices. AES70 focuses on the control of Media Devices. The technology forming AES70 is known as the Open Control Architecture.

AES70 is for system control and monitoring only, and may be integrated with any streaming media transport protocol scheme, as long as the underlying communication network is capable of carrying AES70 control and monitoring traffic.

AES70 does not provide a complete device implementation model. AES70 models the control and monitoring functions of a Device, not its entire signal path. If a particular Device element has no remotely controllable features, then that element need not be represented in the device's AES70 protocol interface.

0.2. Architectural goals and constraints

AES70 is based upon the following features and requirements:

Functionality

AES70 supports the following functions:

1. Discover the Devices that are connected to the network.
2. Define Media Stream paths between Devices.
3. Control operating and configuration parameters of a Device.
4. Monitor operating and configuration parameters of a Device.
5. For Devices with reconfigurable signal processing and/or control capabilities, define and manage configuration parameters.
6. Upgrade software and firmware of controlled Devices. Include features for fail-safe upgrades.

Security

AES70 uses industry-standard security technology to provide the following security measures for control and monitoring data:

1. Entity authentication
2. Prevention of eavesdropping
3. Integrity protection
4. Freshness (see definition 30)

Scalability

AES70 supports networks with up to at least 10,000 Devices. AES70 imposes minimal restriction on the physical distribution of Devices.

Availability

AES70 supports high availability by offering:

1. Active monitoring of Device availability.
2. Supervision of network connections to Devices.
3. Efficient network re-initialization following errors and configuration changes.

Robustness

AES70 supports robustness by offering:

1. A mechanism for operation confirmation.
2. A mechanism for handling loss of control data.
3. A mechanism for handling failure of Devices.
4. Recommendations on network robustness mechanisms that network implementers may use.

Safety compliance

AES70 allows implementations of media networks that conform to life-safety emergency standards.

Compatibility

As AES70 evolves, it will maximize compatibility among its different versions. A Controller based on one version of AES70 operates with a Device based on another version of AES70 in the following manner:

1. For a Device based on an older version of AES70, the Controller which is based on a newer version will function as if it were based on the same version of AES70 as the Device.

2. For a Device based on a newer version of AES70, the Controller which is based on an older version will be able to control and monitor all the functions of the Device defined in the Controller's version of AES70, and will not interfere with functions defined only in the Device's version of AES70.

Diagnostic support

AES70 defines diagnostic functions that allow access to the following information:

1. Version information of all components, hardware and software, of each Device
2. Network parameters of a Device - for example, MAC address, IP address
3. Device status (including status of devices' network interfaces)
4. Media stream parameters (for each active receive and/or transmit Media Stream of a Device)

1. Scope

AES70 defines a scalable control-protocol architecture for the control and monitoring of professional media networks. AES70 addresses device control and monitoring only; it does not define standards for transporting streaming media or for describing media content.

This Part 1 describes the models and mechanisms of the AES70 Open Control Architecture. These models and mechanisms together form the AES70 Framework. This document should be read in conjunction with AES70-2: Class structure, and AES70-3: OCP.1 Binary Protocol.

AES70 architecture is network-agnostic. AES70-3 defines a protocol for use over IP networks and simple byte-stream networks, but other network types may readily be accommodated.

2. Normative References

The following referenced documents are indispensable for the application of AES70 standards. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

This clause is a consolidated list that includes references cited in *all* documents in the AES70 Core Specification (definition 24), not just this document [AES70-1].

AES11. *AES11-2020: AES recommended practice for digital audio engineering - Synchronization of digital audio equipment in studio operations.* Audio Engineering Society, New York, NY., US.

AES17. *AES17-2020. AES standard method for digital audio engineering - Measurement of digital audio equipment*. Audio Engineering Society, New York, NY., US.

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AES70-2. *AES standard for audio applications of Networks - Open Control Architecture - Part 2: Class structure*. Audio Engineering Society, New York, NY., US. Reference denotes the 2023 version of the standard, unless otherwise noted.

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