

# STANDARDS AND INFORMATION DOCUMENTS

AES-R17-2017



# PREVIEW ONLY

**Standards project report -  
AES67 Interoperability PlugFest -  
London 2017**

Preview: for full document,  
go to [www.aes.org/publications/standards](http://www.aes.org/publications/standards)

**AUDIO ENGINEERING SOCIETY, INC.**  
551 Fifth Avenue, New York, NY 10176, US.



The **AES Standards Committee** is the organization responsible for the standards programme of the Audio Engineering Society. It publishes a number of technical standards, information documents and technical reports.

Working groups and task groups with a fully international membership are engaged in writing standards covering fields that include topics of specific relevance to professional audio.

Membership of any AES standards working group is open to all individuals who are materially and directly affected by the documents that may be issued under the scope of that working group.

Complete information, including scopes of working groups and project status is available at <http://www.aes.org/standards>. Enquiries may be addressed to [standards@aes.org](mailto:standards@aes.org)

# **Standards project report - AES67 Interoperability PlugFest - London 2017**

Published by  
**Audio Engineering Society, Inc.**  
Copyright ©2017 by the Audio Engineering Society

## **Abstract**

This report summarizes the AES67 interoperability test event ("plugfest") held at the headquarters of British Broadcasting Corporation (BBC), London on 13 to 16 February 2017. Twenty four companies tested 36 products against each other to confirm interoperability. The results are presented, together with the results of a range of tests of optional operational modes described in the standard.

An AES standards project report implies a consensus of those directly and materially affected by its provisions who have approved it as representing the views of their AESSC subcommittee but not of the AES as a whole. It is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an AES report does not in any respect preclude anyone, whether or not he or she has approved the document, from manufacturing, marketing, purchasing, or using products, processes, or procedures not in agreement with the report. Publication does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties using the report. This document is subject to periodic review and users are cautioned to obtain the latest edition.

---

**Audio Engineering Society Inc. 551 Fifth Avenue, New York, NY 10176, US.**

[www.aes.org/standards](http://www.aes.org/standards)    [standards@aes.org](mailto:standards@aes.org)

## Contents

<b>0 Introduction</b> .....	<b>4</b>
0.1 Purpose.....	4
0.2 Approach.....	4
0.3 Participation.....	4
<b>1 General</b> .....	<b>5</b>
<b>2 Test environment</b> .....	<b>5</b>
2.1 Equipment setup.....	5
2.2 IP address assignment and device identification.....	5
<b>3 Primary interoperability tests</b> .....	<b>6</b>
3.1 General.....	6
3.2 Synchronization to a common clock.....	6
3.3 Multicast streaming.....	6
3.4 Unicast/SIP.....	7
3.5 High performance streaming.....	7
3.6 NMOS IS-04.....	8
<b>4 Plugfest Observations</b> .....	<b>8</b>
4.1 General.....	8
4.2 Attendee comments and observations.....	8
<b>5 Conclusions</b> .....	<b>9</b>
<b>6 Recommendations and Future Work</b> .....	<b>9</b>
<b>Annex A: Detailed Test Results</b> .....	<b>11</b>
A.1 PTP Sync.....	11
A.2 Multicast Streaming.....	12
A.3 Unicast SIP.....	13
A.4 High Performance Multicast Streaming.....	14
<b>Annex B: Photographs</b> .....	<b>15</b>

**Foreword**

This foreword is not part of the report.

The interoperability tests described here were discussed and formulated by AES standards task group SC-02-12-M under the leadership of Kevin Gross.

The members of the task group that produced these results are: Roberto Barbieri-Carrera, Claudio Becker-Foss, Richard Bell, Fredrik Bergholtz, Luke Bradshaw, Richard Cabot, Antoni Caceres, Roger Charlesworth, Benjamin Cochran, Andy Cooper, Tom de Brouwer, Jonny Gledhill, Mario Henke, Mickael Henry, Eric Heurtel, Terry Holton, Henry Jesuiter, Atsushi Kitagawa, Aki Makivirta, Camden Mannett, Erik Miehs, Chris Nighman, Bruce Olson, Ola Palm, Chris Roberts, Angelo Santos, Matthias Schuchert, Gregory Shay, Keiichiro Soma, Peter Stevens, Nicolas Sturmel, Jussi Tikkanen, Stephan van Tienen, Lothar Vlach, Chris Ware, Patrick Warrington, Leigh Whitcomb, Kehang Wu.

We would like to express our appreciation to Peter Stevens, Jamie Laundon, Jonny Gledhill, and Chris Roberts of the BBC for valuable help with organizing this event, and to the BBC for its generous hosting of the event. Nicolas Sturmel of Merging Technologies organized the testing and provided much leadership.

Morten Lave

Chair, SC-02-12 Working Group on Audio Applications of Networks

# Standards project report - AES67 Interoperability PlugFest, London 2017

## 0 Introduction

### 0.1 Purpose

The purpose of the plugfest was to demonstrate functional compatibility and interoperability between a number of different implementations of the standard AES67-2015, "AES standard for audio applications of networks - High-performance streaming audio-over-IP interoperability".

One goal was to achieve interoperability success between nodes from different vendors based on the current AES67 standard definitions. Another major goal was to identify ambiguities and shortcomings of the current standard definitions to be addressed in a revision of the AES67-2015 standard. The plugfest was not intended to verify full compliance to all requirements of the standard for each device under test.

This report follows the same pattern as the AES-R12 report of the 2014 AES67 plugfest, held in Munich and the AES-R15 report of the 2015 AES67 plugfest, held in Washington D.C.

### 0.2 Approach

An interoperability test is not the same as a product shoot-out. The purpose is to allow engineers from different companies to meet in a commercially-neutral context to connect their equipment with equipment from other developers and to confirm, through testing, that signals are transmitted and received correctly according to the standard. The spirit is of technical enquiry, not point-scoring, and this is in the practical interests of all participants.

For this reason, this report has been prepared under the Chatham House Rule, which states: "When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed."

### 0.3 Participation

The following manufacturers participated in this plugfest and have agreed to be identified as such:

A.R.G ElectroDesign Ltd	Imagine Communications
ALC NetworX	Merging Technologies
Archwave	Neumann
Audinate	Riedel Communications
Audio-Technica U.S., Inc.	Shure Inc.
Bosch Security Systems	Sonifex
Calrec	Sound4
Coveloz	Tektronix
Digigram	Telos Systems Inc
DirectOut GmbH	Thum+ Mahr+ GmbH
Genelec	Yamaha

A total of 35 separate and independent products implementing AES67 were tested. Implementations varied from software implementations on a PC to hardware-based FPGA solutions. Products were based on prefabricated hardware, prefabricated firmware sub-systems, and bespoke implementations of AES67. Participants also included representatives of broadcast organizations and AES Standards management.