STANDARDS AND INFORMATION DOCUMENTS

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STANDARDS

AES standards project report - Guidelines for AES standard for digital audio - Digital input-output interfacing - Transmission of digital audio over asynchronous transfer mode (ATM) networks, AES47

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AES standards project report — Guidelines for AES standard for digital audio — Digital input-output interfacing — Transmission of digital audio over asynchronous transfer mode (ATM) networks, AES47

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Abstract

This document is intended to provide background information of use to implementers of AES47, both information on why certain decisions were made and also hints on aspects of the construction of conformant equipment.

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Foreword

[This foreword is not a part of *AES standards project report — Guidelines for AES standard for digital audio — Digital input-output interfacing — Transmission of digital audio over asynchronous transfer mode (ATM) networks, AES47,* AES-R4-2002.]

The draft of this report was prepared by J. Grant for task group SC-02-02-E.

The membership of the task group was K. Brown, C. Chambers, J. Dunn, P. Eastty, C. Gaunt, J. Grant, U. Horbach, H. Lemcke, G. Mills, M. Schindele, J. M. Strawn, T. Thompson, and M. Yonge.

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SC-02-02
2002-01-14

Foreword to 2007 edition

The text has been revised to correspond to the 2006 edition of AES47 and to take account of other events such as the publication of AES51, AES52, and AES53.

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0 Introduction

This document is intended to provide background information of use to implementers of AES47, both information on why certain decisions were made and also hints on aspects of the construction of conformant equipment.

As such it is purely informative. If any part of it conflicts with any provision of AES47, then AES47 takes precedence.

Within this document, each clause or subclause has the same number as the clause or subclause in AES47, though the headings are not always identical. In some cases this document has an additional level of subclauses (as in 4.1.3), or fewer (as in 4.2).

When there is an additional level of subclauses (with headings), the numbers on those subclauses may coincide with the numbers of paragraphs (without headings) in AES47. However, the subclause does not apply just to the paragraph that has the same number.

0.1 Background

This clause is intended to provide a justification for the choice of ATM in anticipation of the question “why not use IP?”

It is unfortunate that ATM has been very poorly marketed. Its name is an abstruse reference to the idea that it is a halfway house between synchronous transfer mode as in ISDN and packet transfer mode as in IP. The alternative broadband ISDN would have been better but does not seem to be used in the marketplace. More importantly, ATM was originally promoted simply as a faster medium for data processing applications; much effort was put into developing LAN emulation, with the idea that users could get the same service from ATM as from the Ethernet and Token Ring networks it would gradually replace, and once they had ATM everywhere they could then think about developing applications that would use the services that only ATM could provide. The result was that users never had a reason to install ATM rather than the much cheaper fast Ethernet.

A better strategy would have been to make it possible to access broadband ISDN services, albeit with inferior performance, via LAN infrastructures such as Ethernet. Then users would see an immediate benefit in installing ATM. In the core network it would enable new services, particularly video and high-quality audio; migrating ATM to the desktop would enhance the quality of those services. The cells-in-frames initiative led by Cornell University, which published a specification in 1996-10, was not pursued; but AES51 is now available for use in such applications.

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At present there is a large amount of ATM equipment installed particularly in wide-area networks; but much of it does not offer ATM services, and IP is being used for telephony and video in spite of being unsuitable for those traffics and offering very poor performance except in some special circumstances (and in spite of the IP being run over an infrastructure that would be ideal for them if the IP layer did not get in the way).

The audio industry needs to be aware that, although IP is fine for file transfer , ATM is the only technology currently available that is adequate for live transmission of professional audio.

AES51 (transmission of ATM cells over Ethernet physical layer) allows equipment to be designed with an Ethernet interface which will carry either IP packets or ATM cells, depending on the kind of network it is plugged into, thus taking advantage of the superior performance of ATM networks where they are available while also being able to use IP when required.

1 Scope

AES47 specifies in clause 4 how PCM audio samples are packed into ATM cells so that one manufacturer's equipment can decode signals sent by another manufacturer's equipment; in clauses 5 to 7, how the sending equipment signals to the receiving equipment the encoding and sampling frequency of the audio data so that systems will be as plug-and-play as possible, not requiring the format to be configured at each end with all the opportunity for misconfiguration that that implies; and in clause 8, a minimal management interface which allows a controlling device to request the setting up and tearing down of audio connections or "calls", by analogy with telephone calls.

The physical interface to the network is not specified because, like ISDN, ATM provides a number of different interfaces supporting different data rates which will be appropriate for different situations, and two pieces of equipment do not need to have the same physical interface in order to communicate. In addition to traditional ATM interfaces at multiples of 155,52 MHz over fibre and at 25,6 and 155,52 MHz over standard twisted-pair building wiring, AES51 may be used to carry ATM cells in Ethernet packets, thus taking advantage of the superior performance available at lower cost (1 Gb/s instead of 155.52 Mb/s over Cat5, for instance).

The other aspect that is not specified is the ordering of channels on multichannel connections. Often the connection will be conveying a bundle of channels between, for example, one AES10 (MADI) interface and another, so channel ordering is not an issue for the network. For some applications, other standards (such as SMPTE 320M and 323M) specify channel ordering. The question of channel ordering needs to be addressed on other networks also (for instance, IEEE 1394.1), and it is therefore more properly the subject of a separate standard.

4 Format of audio data on the ATM virtual circuit

4.1 Format of audio samples

4.1.1 Subframes

4.1 defines how each PCM audio sample is encoded. Here and in 4.2, there are conflicting needs to avoid closing off options that would be useful for particular applications, and to limit the complexity of conformant equipment.

The format provides for the PCM audio data themselves, the extra information that is used in AES3 and similar formats, and the detection of lost and corrupt cells in addition to that provided by the UI bit in the cell header (see 4.5).

It does not provide directly for AES3 auxiliary sample bits, but these bits may be transferred as the least significant four bits of a 24-bit sample word or via a separate virtual circuit.

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