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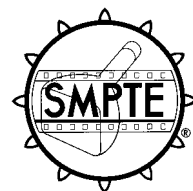
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SMPTE STANDARDfor Television and Audio Equipment —
ESlan-1 Remote Control System

Page 1 of 12 pages

1 Scope

This standard defines the services and protocols contained within the physical, data link, network, transport, and session layers of ESlan-1, a control and data network for use in television and audio program production, post-production, and distribution equipment. ESlan-1 is intended for application in small- to moderate- sized facilities requiring modest levels of performance. A study to determine limiting parameters on the size of ESlan-1 installations is currently being undertaken by the SMPTE.

This standard is to be read in conjunction with SMPTE EG 29, SMPTE EG 30, and with other documents listed in clause 2 and annex C.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ANSI/IEEE 802.3-1993, Information Technology — Local and Metropolitan Area Networks — Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications

SMPTE EG 29-1993, Remote Control of Television Equipment

SMPTE EG 30-1995, Implementation of ESlan Standards

RFC 768, User Datagram Protocol (UDP)*

RFC 791 updated by RFC 1349, Internet Protocol (IP)*

RFC 826, Ethernet Address Resolution Protocol (ARP)*

RFC 1349, Type of Service in the Internet Protocol Suite (IPS)*

*For information on obtaining RFC documents, contact the SMPTE Engineering Department.

3 Introduction

In order to simplify as much as possible the interface between audio and television equipment and computer systems used to establish medium- to large-scale remote-control networks, ESlan-1 employs, wherever possible, standard or industry-standard networking services and protocols. Its architecture complies with the model for open systems interconnection (OSI) defined by the International Organization for Standardization (ISO). (See ISO 7498.)

The section ordering of this standard follows that described in the model for open systems interconnection of the ISO, starting at the physical and rising to the session layer. The content of the presentation layer, the virtual machine, is contained within other SMPTE documents (see annex C). The content of the application layer, which is proprietary to users, is outside the scope of the ES hierarchy of network standards.

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4 Structure of the ESlan-1 addressing scheme

4.1 ESlan-1 provides for layered addressing from individual machines to the full wide-area network.

4.2 Each individual node on the network has a specific CSMA/CD address. The CSMA/CD (6-octet, 8-bit byte) destination and (6-octet) source addresses are transmitted first within a message packet.

4.3 The Internet (IP) (4-octet) source address and (4-octet) destination address contained within the IP header follow the CSMA/CD addresses.

4.4 Each individual item of equipment on the network is allocated one of the 8064 (2-octet) device addresses fully compliant with existing ESlan systems.

4.5 A device group addressing scheme is provided. This operates in conjunction with the delegation bitmap (see 8.4).

4.6 The data structure of the ESlan-1 message packet is shown in figure 1.

5 Physical and data link layers and access control

5.1 The physical connection and data link services shall be provided by a 10 Mb/s data communication highway operating under ANSI/IEEE 802.3.

The physical medium and its access shall be in accordance with accepted CSMA/CD practice. It may include AUI, 10Base2, 10BaseT, etc. Any limitation in segment length for a particular medium can be overcome by the use of bridges and repeaters. However, the latency of such devices and multipaths to a

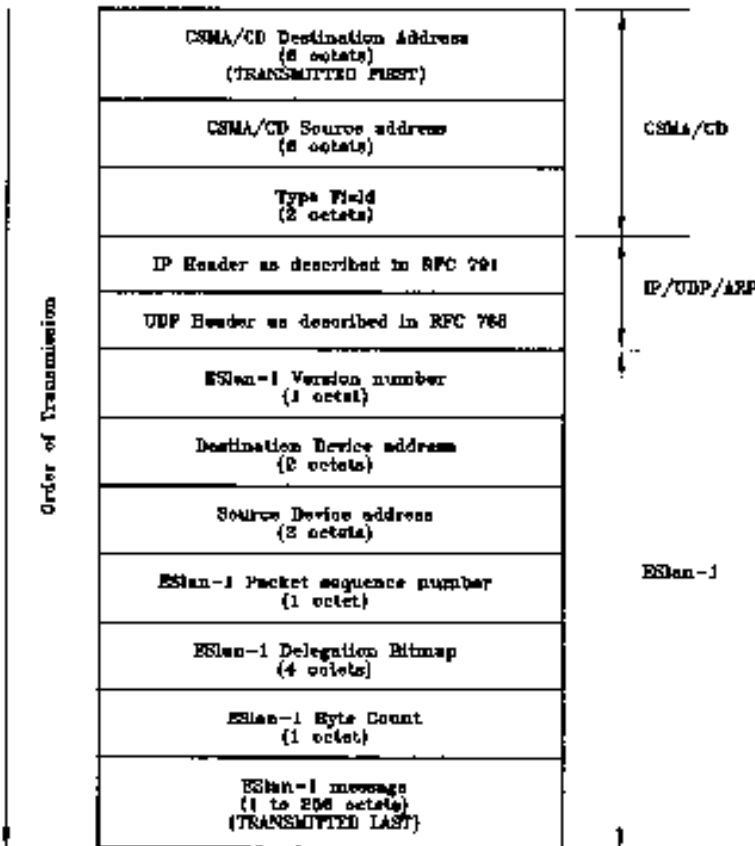


Figure 1 – Data structure of message packet (excluding preamble and postamble)

receiver within large networks must be considered within any network design. In networks extended by the use of such devices, it may prove necessary to use a protocol capable of higher granularity in order to avoid timing errors in the receipt of messages.

5.2 The data packet shall be a CSMA/CD packet, except that the "length" field (as defined in ANSI/IEEE 802.3) shall be replaced by a 2-octet "type" field whose value shall be set to 0800_h, defining it as an Internet packet.

6 Network layer

6.1 The network layer of ESlan-1 shall employ the RFC 791 Internet protocol (IP), as updated by RFC 1349.

6.2 RFC 826 address resolution protocol (ARP) shall be used to determine the CSMA/CD address of a device for which only the IP address is known.

7 Transport layer

The transport layer of ESlan-1 shall employ RFC 768 user datagram protocol (UDP).

8 Session layer

8.1 Version number

A single octet field within each message block is used to determine the ESlan-1 version number in order to allow for future developments. The version described by this standard is version zero (0).

8.2 ESlan-1 addressing

8.2.1 Association directory

By the use of IP/UDP and ARP, it is possible to communicate with any ESlan-1 device by the use of sockets or streams.

The addressing mechanisms provided by the IP and UDP protocols enable peer-to-peer communication sessions between devices. A device specifies the IP address and the port required when seeking connection. For ESlan-1, the UDP port field shall be set to 420 (1A4_h).

The IP address identifies the particular node connected to the ANSI/IEEE 802.3 network; the unique UDP port field XXXX (bound to a specific socket) identifies this as ESlan-1 traffic, and the device address identifies the specific machine within the local area network.

To establish a link with an ESlan-1 device, an association between the IP address and the device address is required.

Each network device shall establish and maintain an association directory, in order to map device addresses to IP addresses.

The mapping of device addresses to IP addresses shall be aged. The aging mechanism used in ARP shall be followed. Address mappings older than those specified by the aging period shall be deleted.

System service commands (see clause 9) are provided which enable the association directory to be constructed and modified, and for the association status to be determined.

8.2.2 Individual machine selection

An ESlan-1 device requiring communication with another ESlan-1 device shall first look for an IP address association in its association directory.

If no association information exists, then the device shall issue the system service command ASSOCIATION REQUEST.

This command shall be transmitted as a network broadcast, since the IP address is generally unknown. The UDP ESlan-1 socket shall be specified, and the network destination address set to broadcast format (all bits set to 1). The ESlan-1 destination address shall be used to specify the ESlan-1 device for which the association is required.

Alternatively, the command may be directed to a specific network address to obtain the ESlan-1 device address connected to a known IP address. In this case, the ESlan-1 address field shall be set to zero.

A network device that receives the ASSOCIATION REQUEST command at its ESlan-1 UDP port connection shall check the ESlan-1 destination address field.