



AM-TR-NIS-000137

AMERITECH SERIAL COMPONENT VIDEO SERVICE INTERFACE SPECIFICATIONS

A technical description of the User/Network Interface for Ameritech's serial component video service.

All Ameritech and Vendor Community

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General

This document describes the User/Network Interface Specifications for Ameritech's Serial Component Video Service (SCVS).

1. Change and Reissue

This document is being re-issued to provide for additional network interfaces, for DS-3/compressed hand-off, and separate interfaces for analog or AES/EBU audio, machine control and time code.

2. Service Description

Serial Component Video Service is a broadband video transport (270 Mbps) of high quality video and audio materials as defined in the Society of Motion Picture and Television Engineers (SMPTE) Standard 259M.

This interface describes a serial digital interface for system M (525/60) NTSC digital television equipment operating with 4:2:2 serial component signals. Serial Component video Service provides one-way transmission capability for transporting digital signals that conform to ANSI/SMPTE 259M-1993 serial digital video format. SCVS employs digital network facilities between customer designated premises through serving wire centers and has one or more channel termination designations. Hubbed service is also available between customer premises and an Ameritech hub or switching location.

Delivery or receipt at the network interface of a serial component video signal may include multiplexed (embedded) digital audio, machine control information and time code information as created and requested by the customer.

The serial digital interface conforms to ANSI/SMPTE 259M-1993. This transport is intended to transport System M 10-Bit 4:2:2 Component Serial Digital Television information for 270 Mbps

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signals. The 45 Mbps (DS-3) interface is in compliance with Ameritech **AM TR-TMO-000101**, Ameritech OPTINET Digital Service Transmission Parameters, Issue 2, 1992.

When one end of the service is a 45 Mbps (DS-3) interface, the other network interface must have separate digital video, audio, machine control, and time code Channel interfaces.

2.1. Channel Interfaces

This service offers several different channel interfaces. The Serial Component Video Service channel interfaces are:

270 Mbs Interface

Channel interface will receive or deliver serial digital component video signals to or from the network interface. Embedded audio, machine control, and time code will be transported.

MULTIPLEXED INTERFACE

Channel interface with separate digital video, analog or AES/EBU digital audio, machine control, and time code that will receive or deliver the above signals to or from the network.

COMPRESSED INTERFACE

Channel interface that will receive or deliver DS-3 signals to or from the network. The other end of this circuit must be ordered with the interface defined directly above.

Several of the Analog Audio input/output configurations allow for interoperability with AES/EBU digital audio. For a single termination/NI, all audio must be either analog or AES/EBU digital. If the protocol option code is 20A or 20D it is permissible to mix these thus permitting analog-to/from - analog, AES/EBU - to/from - AES/EBU, and analog - to/from - AES/EBU. If the protocol option code is 15A at one end, the other end must be DS-3. The 15A protocol option code defines an audio interface on a video codec that has limited availability and is being phased out.

The digital audio channel interface (for AES/EBU) input/out configurations) for inserting/extracting embedded audio complies with AES3-1992 (ANSI S4.40-1992) Revision of AES3-1985 (ANSI S4.40-1985), "AES Recommended Practice for Digital Audio Engineering."

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2.2. *Transmission Quality*

A digitized video signal is defined for the purposes of Serial Component Video Service as the use of digital methods for the transmission of digital video signals from one point to another to complete a transmission service.

A digital channel termination for Serial Component Video Service transmits or receives at 270 Mbps. Customers are cautioned to verify performance of their receive CPE as some manufacturers specify other performance limits. The Ameritech receive performance is based on 30 dB of loss at 135 MHz due to coaxial cable.

Serial Component Video Service provides network capability that meets the digital interface and performance objectives specified in ANSI/SMPTE 259M-1993.

Analog and digital audio signals have terminating impedance of 600 Ohms and 110 Ohms (respectively), resistive and balanced to ground.

Digital transport performance is consistent with **AM TR-TMO-000101**. Currently no active error detection and handling (EDH) is incorporated in this transport.

2.3. *Circuit Architecture - Serial Component Video*

Serial Component Video accepts serial component digital video signals with or without multiplexed (embedded) video, audio, machine control, and time code information in one serial bit stream. Options are available to provide separate physical interfaces for digital video, analog or digital AES/EBU audio, machine control, and time code.

SCVS service can also be provided using a DS-3 video codec. In this case, only separate physical interfaces for uncompressed digital video, analog or digital AES/EBU audio, machine control, and time code are available at one end delivered via a DS-3 codec; i.e., the single embedded interface cannot be used. The other end of this circuit is a DS-3. It is possible to order two such circuits and have them cross connected at the DS-3 interface in an Ameritech central office, hub, or switch location (in effect creating a hubbed version of the "separate interfaces input" -to- "separate interfaces output" service offering described in the preceding paragraph). Only one end of each such hub circuit (or any single SCVS service in general) can have a DS-3 interface. Since no single standard exists for compression, it is up to the customer to identify a compatible codec; otherwise, compatible operation cannot be guaranteed.

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3. Interface Requirements

The physical interface for the 270 Mbps video signal, at both the customer originating and terminating locations, will be a telephone company provided female "BNC" connector mounted on a rack mounted panel. The "BNC" connector will have a nominal 75 Ohm impedance. This also applies to the DS-3 45 Mbps interface.

The physical interface for the multiplexed (embedded) ancillary data signals, at both the customer originating and terminating locations, will be a telephone company connector block or other suitable connector. The audio input must be specified as either analog or digital. Audio output can be either analog, digital or both.

3.1. Network Channel (NC) Code

The Network Channel (NC) code, as described in Telcordia (formally Bellcore) documents SR STS-000307 and SR STS-000323, is a four-character representation of the channel parameters. It consists of two data elements: 1) a two-character position that specifies the type and quality of the channel; and 2) two positions that specify an available option code for the channel type. The NC code for SCVS is described below.

NC code: **TV - -**

This code supports all the following service arrangements which are detailed in the Network Interface Codes.

270 Mbps with embedded audio, video, machine control and time code, 270 Mbps digital video with separate interfaces for analog or digital audio, machine control, and time code.

DS-3 or 45 Mbps.

3.2. Network Channel Interface (NCI) Code

The NCI code is an encoded representation used to identify five (5) interface elements located at a POT or customer location. The interface elements are: (1) Total Conductors, (2) Protocol, (3) Impedance, (4) Protocol Options, and (5) Transmission Level Point which is ignored in TV services; however, these positions are used to indicate direction of service.

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THE NUMBER OF CONDUCTORS IS AS FOLLOWS:

02 for combined (embedded) video/audio/machine control/time code.

>02 for separate video/analog or digital AES/EBU audio and machine control/time code signals.*

Number of conductors is based on two-wire connectivity. The video is two-conductor (coax), all audio is two wires per channel, and the machine control/time code is handled as a combined service connection of four wires.

Examples:

video + four audio = 10 conductors.

Video + two audio + machine/time = 10 conductors

(Protocol Option below separates these two cases with the same number of conductors.)

THE PROTOCOL CODE IS AS FOLLOWS:

TD Component Digital Video

DS Digital Heirarchy Interface

THE IMPEDANCE CODE IS:

6 (75 ohms)

THE PROTOCOL OPTION CODE IS AS FOLLOWS:

15A Component Digital Video plus one through four Analog 15 KHz audio signals.

20A Component Digital Video plus one through four 20 KHz Analog Audio channels encoded or decoded to be compatible with AES/EBU digital audio in 20D below.

20D Video plus two stereo pairs of AES/EBU digital audio channels.

21A Component Digital Video plus one through four 20 KHz Analog Audio channels encoded or decoded to be compatible with AES/EBU digital audio in 21D below, with machine control/time code signals.

21D Video plus two stereo pairs of AES/EBU digital audio channels with machine control/time code signals.

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WHEN ORDERING 20A/21A ON ONE END AND 20D/21D ON THE OTHER END, THE AUDIO CHANNELS MUST MATCH. ONE AES/EBU STEREO PAIR EQUALS TWO ANALOG AUDIO CHANNELS.

NCI codes 21A and 21D are interim, and pending national approval. This document will be modified should it be necessary.

THE DIRECTION OF SERVICE CAN BE ONE OF TWO OPTIONS:

O- for transmit end

-O for the receive end

Example of NCI with directionality for TV - service follows:

Transmit End: **-02TD6.20A.O-**

Receive End: **-02TD6.20A.-O**

4. Technical Performance Objectives

General

The following specification is presented to describe the special access and local channel services that are offered by Ameritech to Intra LATA customers and Inter Exchange Carriers. These services are high speed digital in nature and are suitable for the one-way transmission of 3:2:2 component 270 Mbps ANSI/SMPTE 259m signals between a customer premises or DS-3 (45 Mbps) interface via appropriate codec.

4.1. Performance Objectives

Video with multiplexed (embedded) audio, machine control and time code. Component Signal Transmission 4:2:2 component serial transmission as described in ANSI/SMPTE 125M Appendix G and ANSI/SMPTE 259M

Output Impedance: 75 Ohms Unbalanced to ground (Resistive Load connected directly to output with a return loss greater than 15 dB over a frequency range of 5 MHz to 270 MHz)

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Input Impedance: 75 Ohms Unbalanced to ground with a return loss greater than 15 dB over a frequency range of 5 MHz to 270 MHz

Signal Amplitude: 800 mV +/- 10% (Measured across 75 Ohm Res.)

DC Offset: 0.0V+/-0.5V (Measured at mid amplitude point of signal)

Rise and Fall Times: .75 ns to 1.50 ns +/-0.5 ns (measured between the 20% and 80% amplitude points and measured across a 75 Ohm resistive load)

Rising Edge Timing: Within +/-0.25 ns of the average timing of rising edges as determined over a period of one line

Transmission Order: Least Significant Bit (LSB) first

Coding: NRZI scrambled

Scrambling Polynomial: (NRZ) $G1(X) = X^9 + X^4 + 1$

NRZI Sequence: (polarity free) $G1(X) = X + 1$ (See ANSI/SMPTE 259M - 1993 Annex A)

Data Word Length: 10 bits

Bit Rate: 270 Mbps nominal

Ancillary Data: If present, shall be passed transparently if the conductor code ordered is 02. (see ANSI/SMPTE 272M - 1994)

Embedded Audio: If present, shall be passed transparently if the conductor code ordered is 02. (see ANSI/SMPTE 272M - 1994)

5. References

Normative References

Telcordia (formally Bellcore) SR STS-000307, NC/NCI Code Dictionary, Issue 4, February 1993

Telcordia (formally Bellcore) SR-STIS-000323, NC/NCI Compatibility Guide, Issue 3, February 1993

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Telcordia (formally Bellcore) GR-338-CORE, Television Special Access and Local Channel Services Transmission Parameter Limits and Interface Combinations, Issue 1, December 1995

ANSI/SMPTE 259M - 1993, Television - 10 - Bit 4:2:2 Component and 4 fsc NTSC Composite Digital Signals - Serial Digital Interface

ANSI/SMPTE 12M - 1995 for Television, Audio, and Film Time and Control Code

ANSI/SMPTE 272M - 1994 for Television - Formatting AES/EBU Audio and Auxiliary Data into Digital Video Ancillary Data Space

ANSI/SMPTE 272M - 1994 for Television - Formatting AES/EBU Audio and Auxiliary Data into Digital Video Ancillary Data Space

AES11 - 1991 (ANSI S4.44 - 1991) AES Recommended Practice for Digital Audio Engineering - Synchronization of Digital Audio Equipment in Studio Operations

AES3 - 1992 (ANSI S4.40 - 1992) AES Recommended Practice for Digital Audio Engineering - Serial Transmission Format For Two-Channel Linearly Represented Digital Audio Data

Informative References

Telcordia (formally Bellcore) GR-337-CORE, Program Audio Special Access and Local Channel Services, Issue 1 December 1995

ANSI/SMPTE 125M - 1992, Television - Component video signal 4:2:2 - Bit - Parallel Digital Interface

ANSI/SMPTE 170M - 1994, Television - Composite Analog Video Signal - NTSC for Studio Applications

ANSI/SMPTE 244M - 1993 Television - System M/NTSC Composite Video Signals - Bit - Parallel Digital Interface

ANSI/SMPTE 244M - 1993, Television - System M/NTSC Composite Video Signals - Bit - Parallel Digital Interface

ANSI/SMPTE 276M - 1995 for Television - Transmission of AES/EBU Digital Audio Signals Over Coaxial Cable

ANSI/SMPTE 291M - 1996 for Television Ancillary Data Packet and Space Formatting

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SMPTTE Recommended Practice RP 188 - 1996 Transmission of Time Code and Control Code in the Ancillary Data Space of a Digital Television Data Stream

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Document Order Center, (847) 248-4324.

TO ORDER SMPTE REFERENCE DOCUMENTS, CONTACT:

Society of Motion Picture & Television Engineers

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6. SCVS Block Diagrams

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