



***Society of Cable
Telecommunications
Engineers***

**ENGINEERING COMMITTEE
Digital Video Subcommittee**

AMERICAN NATIONAL STANDARD

ANSI/SCTE 40 2004

Digital Cable Network Interface Standard

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Digital Cable Network Interface Standard

1.0 SCOPE

This standard defines the characteristics and normative specifications for the network interface between a cable television plant and commercially available consumer equipment that is used to access multi-channel television programming. The interface is also compatible with existing set-top terminal equipment owned by cable operators and with terminal equipment developed via the OpenCable™ specification process (see www.opencable.com). In this standard the Cable Network Interface is defined as the interface between the cable drop and the input terminals of the first device located on the subscriber's premises regardless of whether that device is owned by the subscriber or the cable operator. A coaxial-based broadband access network is assumed. This may take the form of either an all-coax or hybrid-fiber/coax (HFC) network. The generic term "cable network" is used here to cover all cases. Cable networks typically use a shared-medium, tree-and-branch architecture with analog and/or digital transmission. The key functional characteristics assumed in this document are the following:

- Two-way transmission.
- The maximum optical/electrical spacing between the cable headend and the most distant deployed terminal equipment is 100 miles, although typical maximum separation may be 10-15 miles.
- A maximum differential optical/electrical spacing between the cable headend and the closest and most distant deployed terminal equipment is 100 miles, although this would typically be limited to 15 miles.

The cable network provides services utilizing 6-MHz in-band channel(s), out-of-band forward data channel(s), and out-of-band reverse data channel(s). The 6-MHz in-band channels are used to transport digital services as well as analog services. These services may be either in the clear or scrambled.

A typical channel plan for a cable network places analog services (NTSC AM-VSB channels) in the 54 to 450/550 MHz range; and digital services (QAM MPEG-2 multiplex channels) in the 450/550 to 864 MHz range (*Note 1*). These channels shall all comply with the EIA/CEA-542-A channel-tuning plan. However, the frequency location may change over time such that analog and digital channels may be located anywhere in the downstream operating range.

Note:

1. *Nothing in this standard precludes the use of other modulation modes.*

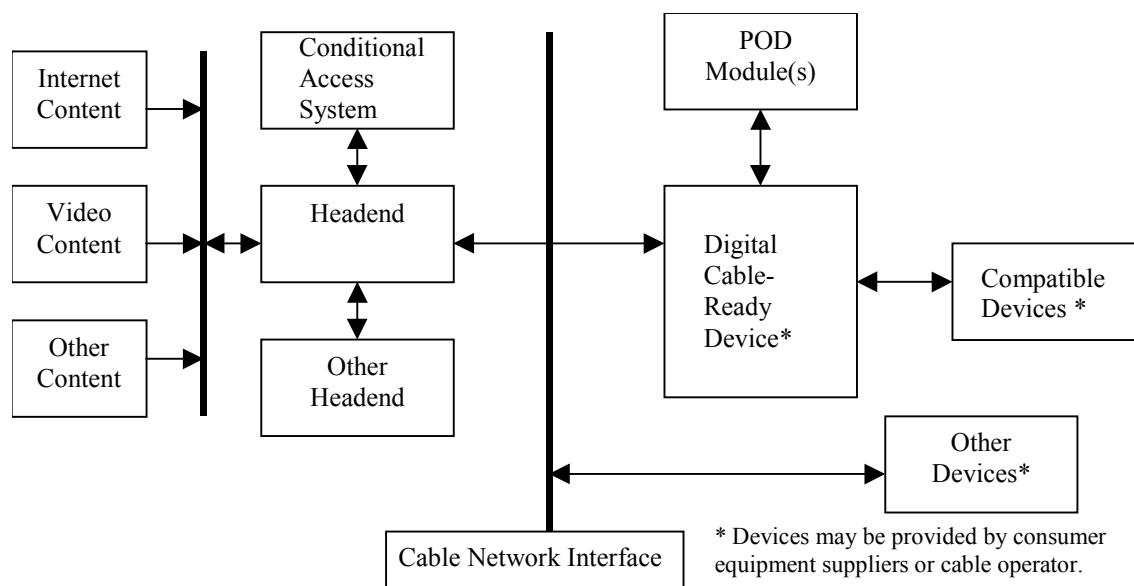


Figure 1 Cable Network Interface

2.0 DEFINITIONS AND ACRONYMS

2.1 Definitions

As used in this document, “*shall*” or “*will*” denotes a mandatory provision of the standard. “*Should*” denotes a provision that is recommended but not mandatory. “*May*” denotes a feature whose presence does not preclude compliance that may or may not be present at the option of the implementer.

2.2 Glossary

AAL5	ATM Adaptation Layer 5
AC-3	Audio Code 3 – A Dolby digital audio encoding scheme. The audio encoding format adopted by the ATSC.
AM	Amplitude Modulation
AM-VSB	Amplitude Modulation – Vestigial Sideband - used to broadcast analog NTSC video signals.
Application	Software function
ATM	Asynchronous Transfer Mode - A switching and transport protocol that allows data, voice, and video to be carried over a single physical network. ATM is ideal for interactive applications that require dynamic routing and resource allocation.
ATSC	Advanced Television Systems Committee

BER	Bit Error Rate - The number of erroneous bits divided by the total number of bits over a stipulated period of time. Usually expressed as a number and a power of 10.
Bit	An indivisible unit of digital data represented as 1 or 0.
bps	Bits per second
Broadcast	A service that is delivered to all subscribers. Each subscriber may select a particular broadcast channel out of many.
Byte	An octet of associated bits
Cable	Cable Television Systems
Carrier	An RF signal used to carry information (video, audio, data) by some modulation scheme.
CAT	Conditional Access Table
CFI	Call For Information
CFR	Code of Federal Regulations
Closed Captioning	A textual description of dialog in a video program, this information is carried in Line 21 of the NTSC signal.
Coax	Coaxial Cable
Complete Main	A complete audio program (dialogue, music and effects)
Composite video	A baseband representation of a video signal containing luminance and chrominance information.
Conditional Access System	A system that controls and permits access to video, audio, and data that is being transmitted.
Content Advisory Descriptor	A defined method for describing the contents of a program based on a number of rating scales.
C/N	Carrier to Noise Ratio
CTB	Composite Triple Beat – a third order distortion caused by mixing three carriers (A+B-C) that falls on the fundamental of a carrier.
CSO	Composite Second Order – The sum effect of all second order distortion products.
CVCT	Cable-Virtual Channel Table: Digital Program Naming and Navigation information in a cable specific format.
dB	Decibel - A logarithmic value of a ratio
dBc	Decibels relative to carrier amplitude
dBm	Decibels relative to one milliwatt

dBmV	Decibels relative to one millivolt across a given impedance (75 ohms in North American cable systems)
Downstream	Transmission from Headend to terminal device
DSM-CC	Digital Storage Media-Command and Control (ISO/IEC 13818-6)
DTV	Digital Television – A general term for the digital coding and transmission of an Audio / Video Program.
DTVCC	Digital Television Closed Captioning
DVS	Digital Video Subcommittee
EAS	Emergency Alert System
ECM	Entitlement Control Message – Private Conditional Access information that specifies control words and possibly other stream-specific, scrambling, and/or control parameters.
EIA	Electronic Industries Alliance
EIT	Event Information Table
EMM	Entitlement Management Message – Private Conditional Access information that specifies the authorization level or services of specific decoders.
ES	Elementary Stream – A generic term for a stream of data of one particular type. Typically these streams are of Video or Audio Types.
ETT	Extended Text Table
FAT	(Forward Application Transport) Channel - A data channel carried from the headend to the terminal device in a modulated channel at a rate of 27 or 36 Mbps. MPEG-2 transport is used to multiplex video, audio, and data into the FAT channel. The FAT Channel is also considered the “In-band” channel . The FAT channel is used for: • MPEG-2 compressed video and audio • Application download • Variable Bit rate (VBR) application download • Entitlement control messages • Broadcast data
FCC	Federal Communications Commission.

FDC	Forward Data Channel - A data channel carried from the headend to the terminal device in a modulated channel at a rate of 1.544 to 3.088 Mbps. The FDC carries IP traffic only for: • Conditional access for analog signals • Entitlement management messages for digital signals • General messaging • Application download • PC data services • Variable bit rate (VBR) download • Broadcast data • Network management
Headend	The control center of a cable television system, where incoming signals are amplified, converted, processed, and combined into a common cable, along with any locally originated programming, for transmission to subscribers.
HFC	Hybrid Fiber Coax - A cable network featuring optical fiber from a headend location to a neighborhood node, and coaxial cable from the node to individual homes.
Host	The part of a generic terminal device that does not contain the network specific characteristics.
HRC	Harmonically Related Carrier
ID	Identifier
IF	Intermediate Frequency. A signal processing stage between RF and baseband.
Interleaving	A communications technique for spreading associated bytes over a longer period of time to reduce the effects of burst noise.
IP	The network layer (layer 3) of the OSI Internet protocol, providing connectionless datagram service.
IRC	Incrementally Related Carrier
ITU	International Telecommunications Union
kbps	Kilobits per second- bits per second in thousands
kHz	Kilohertz - Cycles per second, in thousands
MAC	Media Access Control
Mbps	Megabits per second- bits per second in Millions
MGT	Master Guide Table
MHz	Megahertz - Cycles per second, in Millions