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Digital Cable Network Interface Standard

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Digital Cable Network Interface Standard

1.0 SCOPE

NOTE: This document is identical to SCTE 40 2011 except for informative components such as the title page, NOTICE text, headers and footers. No changes have been made to any text in the document beyond this point, other than headers and footers.

This standard defines the characteristics and normative specifications for the digital network interface between a cable television system and commercially available digital cable products that are used to access multi-channel television programming (See Figure 1). The network interface is also compatible with existing analog and digital set-top terminal equipment owned by cable operators and with terminal equipment developed via the OpenCable™ specification process (See www.opencable.com). All specifications in this document apply at the Demarcation Point except as specifically noted. Specifications noted to apply at the terminal device are applicable regardless of whether that device is owned by the subscriber or the cable operator. The key functional characteristics assumed in this document are the following:

- 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 follow the CEA-542-C channel-tuning plan. However, the frequency location can change over time such that analog and digital channels could be located anywhere in the downstream operating range. Nothing in this standard precludes the use of other narrowband or wideband digital signals.
- The 6 MHz in-band channels are used to transport digital services (QAM modulated MPEG-2 transport streams) as well as analog services (NTSC AM-VSB channels). Nothing in this standard precludes the use of other modulation modes.
- Services are either in the clear or protected using conditional access technology.

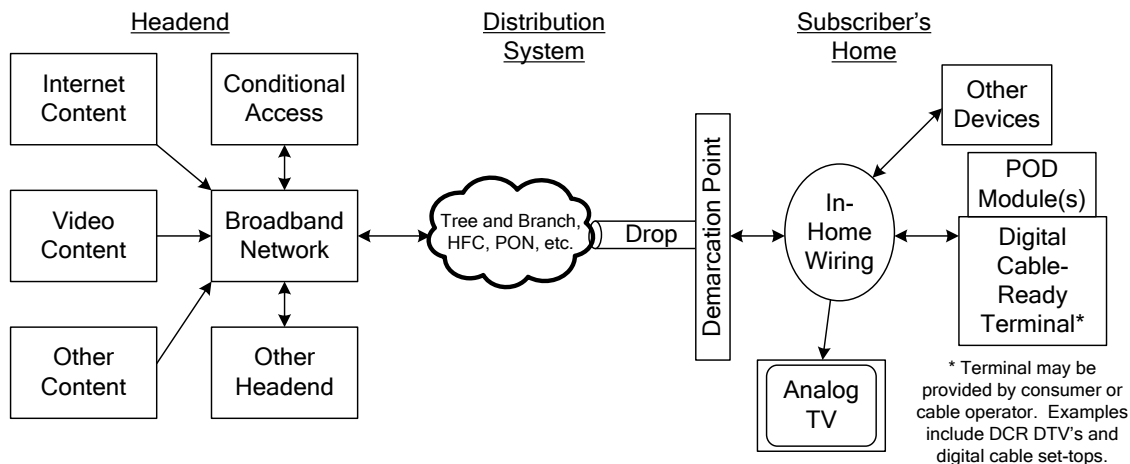


Figure 1 Cable Network Interface

2.0 DEFINITIONS AND ACRONYMS

2.1 Compliance Notation

“SHALL”	This word or the adjective “REQUIRED” means that the item is an absolute requirement of this specification.
“SHALL NOT”	This phrase means that the item is an absolute prohibition of this specification.
“SHOULD”	This word or the adjective “RECOMMENDED” means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.
“SHOULD NOT”	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
“MAY”	This word or the adjective “OPTIONAL” means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.

2.2 Glossary

64 QAM	Quadrature Amplitude Modulation with 64 constellation points
256 QAM	Quadrature Amplitude Modulation with 256 constellation points
AAL5	ATM Adaptation Layer 5
AC-3	A digital audio encoding scheme. The audio encoding format adopted by the ATSC, standardized in A/52[9].
AM	Amplitude Modulation
AM-VSB	Amplitude Modulation – Vestigial Sideband - used to broadcast analog NTSC video signals.
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
Cable	Cable Television Systems

Carrier	An RF signal used to carry information (video, audio, data) by some modulation scheme.
CEA	Consumer Electronics Association
CFR	Code of Federal Regulations
Closed Captioning	A textual description of dialog in a video program
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.
Demarcation Point	As specified in FCC Rules 47 CFR Section 76.5(mm), which is typically a point at (or about) twelve inches outside of where the cable wire enters the subscriber's premises.
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). For direct correspondence to normal settings by common test equipment, in this document, all RF signal and power levels are represented in units of dBmV (decibels relative to 1 millivolt RMS, across 75 ohms). Note that this is used independent of the bandwidth of the signal level being noted, although if not noted the bandwidth is considered to be 6 MHz. The dBmV values measured in any given bandwidth are converted directly to units of dBm (decibels relative to one milliwatt) by subtracting 48.75. For example, a +20 dBmV value in this document is equivalent to -28.75 dBm.
DOCSIS	Data Over Cable Service Interface Specifications
Downstream	Transmission from Headend to terminal device

Drop Cable	A coaxial cable from a subscriber tap to the Demarcation Point
DSM-CC	Digital Storage Media-Command and Control (ISO/IEC 13818-6)
DSG	DOCSIS Set-top Gateway
DTV	Digital Television – A general term for the digital coding and transmission of an Audio / Video Program.
EAS	Emergency Alert System
ES	Elementary Stream – A generic term for a stream of data of one particular type. Typically these streams are of Video or Audio Types.
FAT	(Forward Application Transport) Channel - A data channel carried from the headend to the terminal device in a modulated channel at a rate of 26.97 or 38.81 Mbps. See Annex A of SCTE 07[2]. 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.
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.
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.
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 reordering associated bytes over a longer period of time to reduce the effects of burst noise.
IP	The network layer (layer 3) of the <i>Open Systems Interconnection</i> reference model.
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
MHz	Megahertz - Cycles per second, in Millions
MPEG	Moving Picture Experts Group - An international standards-setting group, working to develop standards for compressed full-motion video, audio, and other associated information.
MPEG-2	Refers to the ISO/IEC 13818 multi-part standard
mV	Millivolt – Thousandths of a Volt
Noise	An undesired or unintended element of a signal.
NTSC	National Television Systems Committee – Refers to the Analog Color Television Standard as used in North America
OOB	Out-of-Band – Outside of the programming channels band. The OOB channels provide communication channels between the network and the terminal.
PES	Packetized Elementary Stream
PHY	Physical Layer
PID	Packet Identifier – A unique integer value used to identify the contents of an MPEG-2 Transport Stream packet.
POD / POD Module	Point of Deployment Module (CableCARD™) - A module to be provided by the MSO that contains all of the network specific characteristics for a terminal device.
p-p	Peak to peak
PSI	Program Specific Information – Normative data that is necessary for the demultiplexing of transport streams and the regeneration of programs.
PSIP	Program and System Information Protocol – A method of describing Naming and Navigation data for a multi program transport stream as defined in ATSC A/65[27].
QAM	Quadrature Amplitude Modulation – A radio frequency modulation scheme, defined ANSI/SCTE 07[2] that combines phase and amplitude modulation.
QPSK	Quadrature Phase Shift Keying - A signaling and modulation scheme in which an RF carrier is phase shifted to signal digital data.
Randomization	A coding method that provides for even distribution of the symbols in the QAM constellation, which enables the demodulator to maintain proper lock.