SLOVENSKI STANDARD
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Dostop, priključki, prenos in multipleksiranje (ATTM) - Tretja generacija prenosnih sistemov za storitve interaktivne kabelske televizije - IP-kabelski modemi - 1. del: Splošno - DOCSIS 3.0

Access, Terminals, Transmission and Multiplexing (ATTM) - Third Generation Transmission Systems for Interactive Cable Television Services - IP Cable Modems - Part 1: General - DOCSIS 3.0

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ICS:

35.180	Terminalska in druga periferna oprema IT	IT Terminal and other peripheral equipment

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Keywords
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Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

The present document is part 1 of a multi-part deliverable covering the Third Generation Transmission Systems for Interactive Cable Television Services - IP Cable Modems, as identified below:

Part 1: "General; DOCSIS 3.0";

Part 2: "Physical Layer; DOCSIS 3.0";

Part 3: "Downstream Radio Frequency Interface; DOCSIS 3.0";

Part 4: "MAC and Upper Layer Protocols; DOCSIS 3.0";

Part 5: "Security Services; DOCSIS 3.0".

This multi-part deliverable is based on the CableLabs DOCSIS set of specifications which are also standardized in the United States by SCTE. Table 1 indicates for the specifications in this series the equivalent CableLabs DOCSIS specifications and SCTE Standards.

Table 1

ETSI Standards	CableLabs DOCSIS Specifications	SCTE Standards
EN 302 878-1 (V1.1.1)	None	None
EN 302 878-2 [1] (V1.1.1)	CM-SP-PHYv3.0-I09-101008 [i.7]	ANSI/SCTE 135-1 [i.3]
EN 302 878-3 [2] (V1.1.1)	CM-SP-DRFI-I10-100611 [i.8]	ANSI/SCTE 133 [i.6]
EN 302 878-4 [3] (V1.1.1)	CM-SP-MULPIv3.0-I14-101008 [i.9]	ANSI/SCTE 135-2 [i.4]
EN 302 878-5 [4] (V1.1.1)	CM-SP-SECv3.0-I13-100611 [i.10]	ANSI/SCTE 135-3 [i.5]

Historically, these were also standardized in the ITU-T Recommendations J.210 [i.1] and the J.221.x series [i.2].

National transposition dates	
Date of adoption of this EN:	14 November 2011
Date of latest announcement of this EN (doa):	29 February 2012
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2012
Date of withdrawal of any conflicting National Standard (dow):	31 August 2012

1 Scope

The present document is part 1 of a multi-part series of specifications that define the third generation of high-speed data-over-cable systems. This series was developed for the benefit of the cable industry, and includes contributions by operators and vendors from North America, Europe, and other regions. All documents in this series are required to implement the third-generation transmission system for interactive cable television services.

1.1 Technology Options

This multi-part deliverable includes two technology options that have equal priority and are not required to be interoperable. One technology option is based on the downstream multi-program television distribution that is deployed in North America using 6 MHz channelling. The other technology option is based on the corresponding European multi-program television distribution. Both options have the same status. Compliance with the present document requires compliance with the one or the other of these implementations, not with both. It is not required that equipment built to one option will interoperate with equipment built to the other.

These technology options allow operators flexibility in mandated areas of operation, including any frequency planning, EMC (electromagnetic compatibility), and safety requirements. For instance, the 6 MHz downstream based option defined in EN 302 878-2 [1] might be deployable within an 8 MHz channel plan.

Backwards compatibility with earlier versions of that technology is only ensured within the same technology options referred to above and not between the two options.

1.2 Background

1.2.1 Broadband Access Network

A coaxial-based broadband access network is assumed. This may take the form of either an all-coax or Hybrid Fibre/Coaxial network. The generic term "cable network" is used here to cover all cases.

A cable network uses a tree-and-branch architecture with analog transmission. The key functional characteristics assumed in the present document are the following:

- Two-way transmission.
- A maximum optical/electrical spacing between the CMTS and the most distant CM of 100 miles (160 km) in each direction, although typical maximum separation may be 10 miles to 15 miles (16 km to 24 km).
- A maximum differential optical/electrical spacing between the CMTS and the closest and most distant modems of 100 miles (160 km) in each direction, although this would typically be limited to 15 miles (24 km).

At a propagation velocity in fibre of approximately 1,5 ns/ft (5 ns/m), 100 miles (160 km) of fibre in each direction results in a round-trip delay of approximately 1,6 ms.

1.2.2 Network and System Architecture

1.2.2.1 The DOCSIS Network

The elements that participate in the provisioning of DOCSIS services are shown in figure 1.

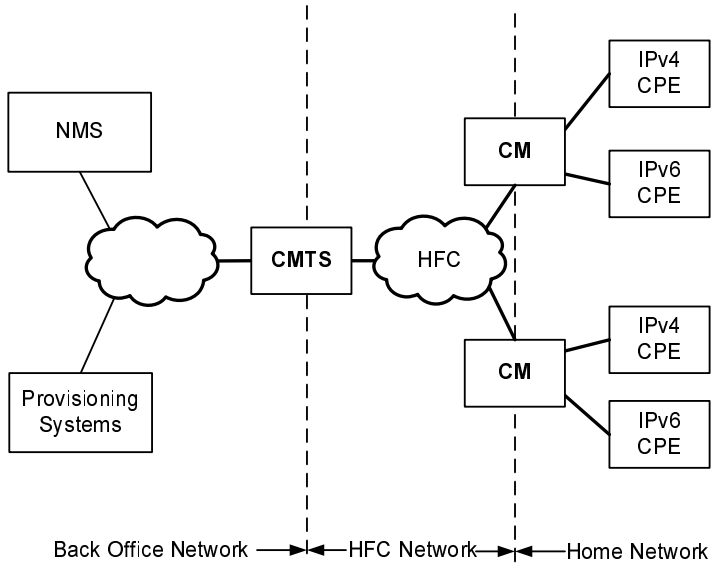

Figure 1: The DOCSIS Network

The CM connects to the operator's cable network and to a home network, bridging packets between them. Many CPE devices can connect to the CM's LAN interfaces. CPE devices can be embedded with the CM in a single device, or they can be separate, standalone devices (as shown in figure 1). CPE devices may use IPv4, IPv6, or both forms of IP addressing. Examples of typical CPE devices are home routers, set-top devices, personal computers, etc.

The CMTS connects the operator's back office and core network with the cable network. Its main function is to forward packets between these two domains, and between upstream and downstream channels on the cable network.

Various applications are used in the back office to provide configuration and other support to the devices on the DOCSIS network. These applications use IPv4 and/or IPv6, as appropriate to the particular operator's deployment. Applications include:

Provisioning Systems

- The DHCP servers provide the CM with initial configuration information, including IP address(es), when the CM boots.
- The Config File server is used to download configuration files to CMs when they boot. Configuration files are in binary format and permit the configuration of the CM's parameters.
- The Software Download server is used to download software upgrades to the CM.
- The Time Protocol server provides Time Protocol clients, typically CMs, with the current time of day.
- Certificate Revocation server provides certificate status.

NMS

- The SNMP Manager allows the operator to configure and monitor SNMP Agents, typically the CM and the CMTS.
- The Syslog server collects messages pertaining to the operation of devices.
- The IPDR Collector server allows the operator to collect bulk statistics in an efficient manner.

1.2.3 Service Goals

As cable operators have widely deployed high-speed data services on cable television systems, the demand for bandwidth has increased. Additionally, networks have scaled to such a degree that IPv4 address space limitations have become a constraint on network operations. To this end, it was decided to add new features to the DOCSIS specification for the purpose of increasing channel capacity, enhancing network security, expanding addressability of network elements, and deploying new service offerings.

The DOCSIS system allows transparent bi-directional transfer of Internet Protocol (IP) traffic, between the cable system head-end and customer locations, over an all-coaxial or Hybrid Fibre/Coaxial (HFC) cable network. This is shown in simplified form in figure 2.

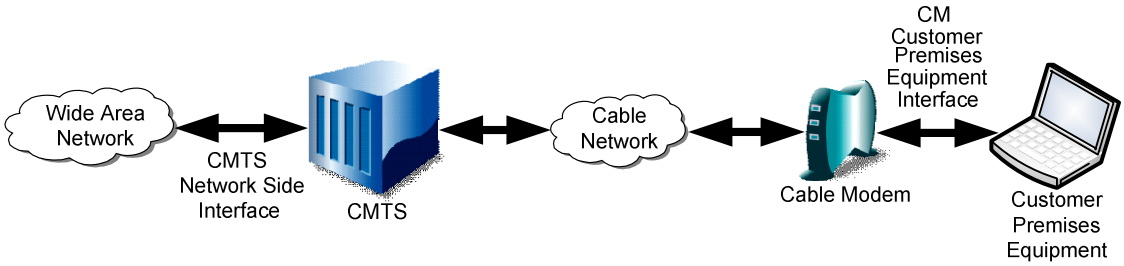

Figure 2: Transparent IP Traffic Through the Data-Over-Cable System

1.2.4 Statement of Compatibility

This specification defines the DOCSIS 3.0 interface. Prior generations of DOCSIS were commonly referred to as DOCSIS 1.0, 1.1 and 2.0. DOCSIS 3.0 is backward-compatible with equipment built to the previous specifications. DOCSIS 3.0-compliant CMs interoperate seamlessly with DOCSIS 2.0, DOCSIS 1.1 and DOCSIS 1.0 CMTSs. DOCSIS 3.0-compliant CMTSs seamlessly support DOCSIS 2.0, DOCSIS 1.1 and DOCSIS 1.0 CMs.

Refer to EN 302 878-5 [4] for BPI/BPI+ compatibility requirements.

1.2.5 Reference Architecture

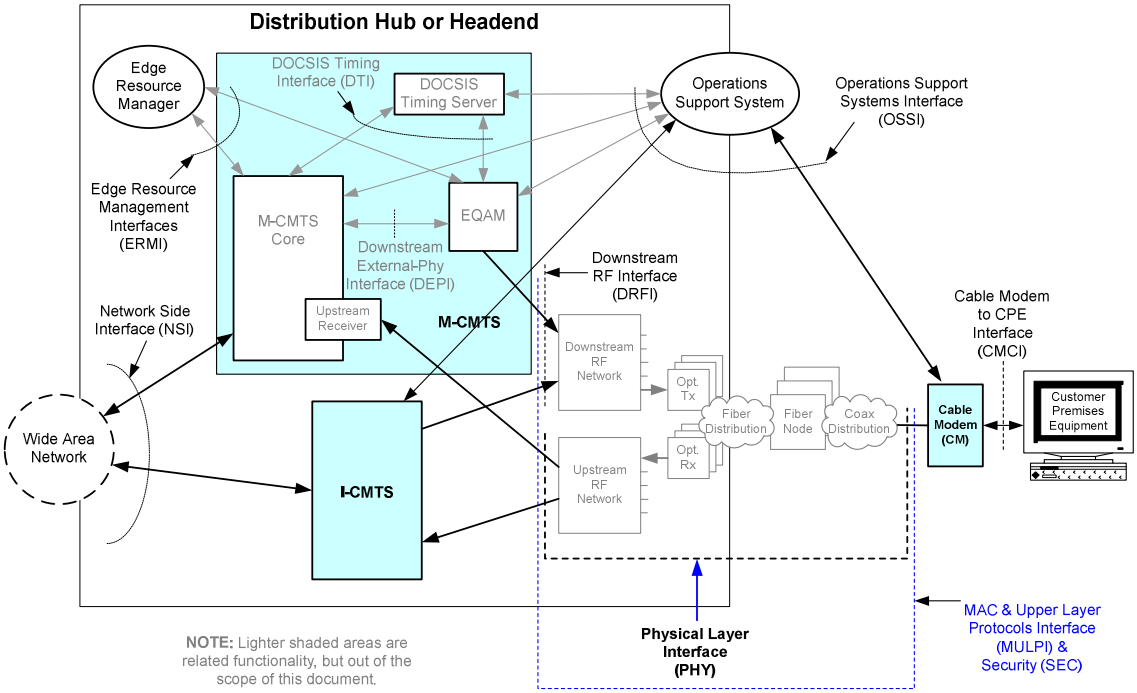

Figure 3: Data-over-Cable Reference Architecture