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TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

SERIES J: CABLE NETWORKS AND TRANSMISSION OF TELEVISION, SOUND PROGRAMME AND OTHER MULTIMEDIA SIGNALS

Interactive systems for digital television distribution

Functional requirements for Cabinet DOCSIS (C-DOCSIS)

Recommendation ITU-T J.223.1

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Functional requirements for Cabinet DOCSIS (C-DOCSIS)

Summary

Recommendation ITU-T J.223.1 specifies the functional requirements of C-DOCSIS over coaxial network in cable industry. This Recommendation contains descriptions for functional requirements of general system, physical layer and MAC layer function over coaxial network.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T J.223.1	2016-03-15	9	11.1002/1000/12769

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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Functional requirements for Cabinet DOCSIS (C-DOCSIS)

1 Scope

This Recommendation specifies the functional requirements of Cabinet DOCSIS (C-DOCSIS) for high-speed data transmission over coaxial network in cable industry.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T J.112 Annex B] Recommendation ITU-T J.112 Annex B (2004), *Transmission systems for interactive cable television services. Annex B: Data-over-cable service interface specifications: Radio-frequency interface specification.*

[ITU-T J.222.1] Recommendation ITU-T J.222.1 (2007), *Third-generation transmission systems for interactive cable television services – IP cable modems: Physical layer specification.*

[ITU-T J.222.2] Recommendation ITU-T J.222.2 (2007), *Third-generation transmission systems for interactive cable television services – IP cable modems: MAC and Upper Layer protocols.*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 service flow [ITU-T J.112 Annex B]: A MAC-layer transport service which: – provides unidirectional transport of packets from the upper layer service entity to the radio frequency (RF); – shapes, polices, and prioritizes traffic according to quality of service (QoS) traffic parameters defined for the Flow.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 access control: Access control is used to control the cable modems (CMs) defined in this document to access networks. It is a process for connecting cable media converters (CMCs) and controlling data communication.

3.2.2 aggregation and forwarding: An aggregation network device, such as a passive optical network (PON) optical line terminal (OLT), a router, or a switch, receives data from CMCs and forwards the data to different uplinks for transmission based on the preset QoS priorities.

3.2.3 C-DOCSIS system: The C-DOCSIS system consists of the CMC controller, CMC, and C-DOCSIS CM. It implements broadband data access and forwarding, service configuration, as well as management and maintenance of coaxial cable networks.

3.2.4 CMC: The cable media converter (CMC) converts data from a coaxial cable network to a packet digital optical network (such as PON or Ethernet). The CMC connects to a cable modem (CM) through the coaxial cable network in the downstream direction and to the CMC controller through the packet digital optical network in the upstream direction.

3.2.5 CMC controller: The CMC controller forwards upstream and downstream service data and manages the configuration of the CMC.

3.2.6 service flow tagging: The service flow tagging is a method of using tags to indicate the service flow to which a packet has been classified.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

C-DOCSIS	Cabinet DOCSIS
CM	Cable Modem
CMC	Cable Media Converter
CMTS	Cable Modem Termination System
CPE	Customer Premises Equipment
DHCP	Dynamic Host Configuration Protocol
DOCSIS	Data over Cable Service Interface Specification
DTV	Digital Television
MAC	Media Access Control
NMS	Network Management System
OLT	Optical Line Terminal
PHY	Physical Layer
PON	Passive Optical Network
QoS	Quality of Service
RF	Radio Frequency
RFI	Radio Frequency Interface
S-CDMA	Synchronous Code Division Multiple Access
SNMP	Simple Network Management Protocol
VoIP	Voice over IP

5 Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this Recommendation is to be claimed.

The keywords "is recommended" indicate a requirement which is recommended but which is not absolutely required. Thus this requirement need not be present to claim conformance.

The keywords "is prohibited from" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this Recommendation is to be claimed.

The keywords "can optionally" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

In the body of this Recommendation and its annexes, the words *shall*, *shall not*, *should*, and *may* sometimes appear, in which case they are to be interpreted, respectively, as *is required to*, *is prohibited from*, *is recommended*, and *can optionally*. The appearance of such phrases or keywords in an appendix or in material explicitly marked as *informative* are to be interpreted as having no normative intent.

6 Architecture

The logic architecture model of C-DOCSIS refers to Figure 1.

In a C-DOCSIS system, the CMC controller manages the configuration of the CMC and/or forwards upstream and downstream service data. The CMC converts and forwards the upstream and downstream service data and the management and configuration data of the CMs. The CM terminates the upstream and downstream service data, as well as receive and respond to management and configuration data. The CMC controller connects to the CMC through a digital optical packet network. The CMC connects to the CMs through a coax RF network or HFC network.

The configuration system configures services and devices on the C-DOCSIS system. It generates and issues configuration files and upgrades the software of the CMs. The configuration system consists of the dynamic host configuration protocol (DHCP) server, configuration file server, software downloading server, and time protocol server. The network management system (NMS) consists of the simple network management protocol (SNMP) management system and the Syslog server.

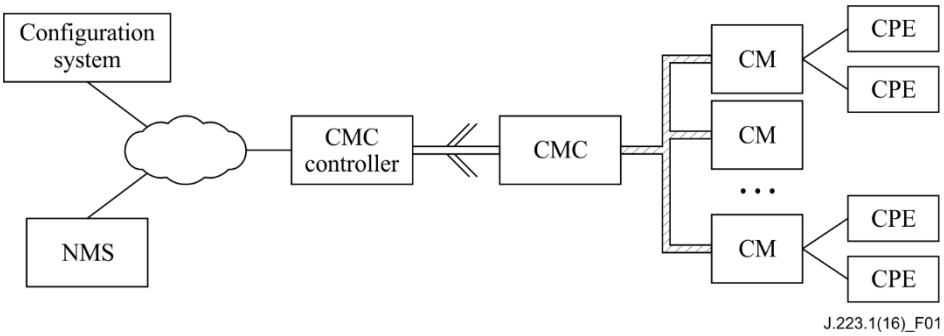

Figure 1 – C-DOCSIS System

C-DOCSIS specifies three different types of CMC controllers and CMCs to implement the C-DOCSIS cable modem termination system (CMTS).

- Type I CMC implements all the DOCSIS CMTS functions, and type I CMC controller implements high-level and partial-system management and configuration functions.
- Type II CMC implements the data forwarding and CM access functions, and Type II CMC controller implements the system management, configuration, and scheduling functions.
- Type III CMC only implements the C-DOCSIS, CMTS, 0PHY) function and the CMC controller implements the rest of the functions of the C-DOCSIS CMTS.

7 Requirement

7.1 Functional requirement

[C-DOCSIS-Gen-1] C-DOCSIS is required to be applied to the coaxial access network or HFC network.

[C-DOCSIS-Gen-2] C-DOCSIS is required to support centralized network administration.

[C-DOCSIS-Gen-3] C-DOCSIS is required to have an interface for service flow tagging among different modules, and provide a QoS guarantee for the system.

[C-DOCSIS-Gen-4] C-DOCSIS is required to support any IP-based services such as IPTV, interactive services, voice over IP (VoIP), and Internet access.

[C-DOCSIS-Gen-5] C-DOCSIS is required not to affect any existing analogue television, digital television (DTV) or data services.

[C-DOCSIS-Gen-6] C-DOCSIS is required to support channel bundle.

[C-DOCSIS-Gen-7] C-DOCSIS is required to be compatible with a DOCSIS 1.x or DOCSIS 2.0 cable modem.

7.2 Requirement of PHY Layer

[C-DOCSIS-PHY-1] The PHY layer of C-DOCSIS is required to be compatible with DOCSIS 3.0 in [ITU-T J.222.1], except that the synchronous code division multiple access (S-CDMA) is optional.

7.3 Requirement of MAC Layer

[C-DOCSIS-MAC-1] The media access control (MAC) layer of C-DOCSIS is required to be compatible with DOCSIS 3.0 in [ITU-T J.222.2].

Bibliography

[b-ITU-T J.222.0]	Recommendation ITU-T J.222.0 (2007), *Third-generation transmission systems for interactive cable television services – IP cable modems: Overview.*
[b-ITU-T J.222.3]	Recommendation ITU-T J.222.3 (2007), *Third-generation transmission systems for interactive cable television services – IP cable modems: Security services.*
[b-CM-SP-CDOCSIS-I02-150305]	CM-SP-CDOCSIS-I02-150305 (2015), *C-DOCSIS System Specification*
[b-ETSI ES 203 312]	ETSI ES 203 312 V1.1.1 (2015), *Integrated broadband cable telecommunication networks (CABLE); Cabinet DOCSIS (C-DOCSIS) System Specification.*

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