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OF TELEVISION, SOUND PROGRAMME AND OTHER
MULTIMEDIA SIGNALS

Interactive systems for digital television distribution
(DOCSIS third to fifth generations)

**Fifth-generation transmission systems for
interactive cable television services – IP cable
modems**

Recommendation ITU-T J.224

ITU-T



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Fifth-generation transmission systems for interactive cable television services – IP cable modems

Summary

Recommendation ITU-T J.224 defines the fifth generation of high-speed data-over-cable systems. The fifth-generation transmission systems introduce a number of new features that build upon what was present in previous ITU-T Recommendations namely ITU-T J.112, ITU-T J.122, ITU-T J.222.x-series, and ITU-T J.223.x-series. This Recommendation includes key new features for the physical (PHY) layer and defines full duplex data over cable service interface Specification (DOCSIS) mode of operation, including enhancements to the media access control (MAC) layer protocols as well as requirements for upper layer protocols such as Internet protocol (IP), dynamic host configuration protocol (DHCP), etc. The fifth-generation cable modem specifications fully incorporate the fourth generation specifications.

NOTE – The structure and content of this Recommendation have been organized for ease of use through direct reference to the original source material, based on the recognition of CableLabs by ITU as an A.5 organization (<https://www.itu.int/en/ITU-T/extcoop/Pages/sdo.aspx>).

History

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Recommendation ITU-T J.224

Fifth-generation transmission systems for interactive cable television services – IP cable modems

1 Scope

This Recommendation defines the fifth generation of high-speed data-over-cable systems. The fifth-generation transmission systems introduce a number of new features that build upon what was present in previous ITU-T Recommendations namely [b-ITU-T J.112], [b-ITU-T J.122], [b-ITU-T J.222.x] and [b-ITU-T J.223.x]. This Recommendation includes key new features for the physical (PHY) layer and defines full duplex data over cable service interface Specification (DOCSIS) mode of operation, including enhancements to the media access control (MAC) layer protocols as well as requirements for upper layer protocols such as Internet protocol (IP), dynamic host configuration protocol (DHCP), etc.. The fifth-generation cable modem specifications fully incorporate the fourth generation specifications.

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.

- [DOCSIS CCAP-OSSIV3.1] Cable Television Laboratories, Inc., CM-SP-CCAP-OSSIV3.1-I15-190422 (2019), *DOCSIS 3.1 CCAP Operations Support System Interface Specification*.
- [DOCSIS CM-OSSIV3.1] Cable Television Laboratories, Inc., CM-SP-CM-OSSIV3.1-I15-190422 (2019), *DOCSIS 3.1 Cable Modem Operations Support System Interface Specification*.
- [DOCSIS MULPIV3.1] Cable Television Laboratories, Inc., CM-SP-MULPIV3.1-I18-190422 (2019), *DOCSIS 3.1 MAC and Upper Layer Protocols Interface Specification*.
- [DOCSIS PHYV3.1] Cable Television Laboratories, Inc., CM-SP-PHYV3.1-I16-190121 (2019), *DOCSIS 3.1 Physical Layer Specification*.
- [DOCSIS SECV3.1] Cable Television Laboratories, Inc., CM-SP-SECV3.1-I07-170111 (2017), *DOCSIS 3.1 Security Specification*.

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term.

3.2.1 full duplex DOCSIS mode: An extension of the fourth generation of cable modem specifications that is targeted at significantly increasing upstream capacity by using the spectrum currently used for downstream transmission for simultaneous upstream and downstream communications.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

DHCP	Dynamic Host Configuration Protocol
DOCSIS	Data Over Cable Service Interface Specification
IP	Internet Protocol
MAC	Media Access Control layer
OFDM	Orthogonal Frequency Division Modulation
PHY	Physical layer
QAM	Quadrature Amplitude Modulation

For other abbreviations, see Section 4 – *Abbreviations and Acronyms* in each of the specifications listed in clause 2.

5 Conventions

None.

6 Overview of fifth generation high-speed data-over-cable systems

6.1 Specifications for fifth generation high-speed data-over-cable systems

With the fifth-generation high-speed data-over-cable systems, a global technical specification has been achieved. As such, it is a general practice of cable operators worldwide to reference the same high quality CableLabs specifications when making purchasing decisions. These specifications have been readily and widely available since late 2013 and cable modem devices have achieved certification since 2016.

The fifth-generation high-speed data-over-cable systems specifications are also known as DOCSIS 3.1 specifications. DOCSIS® is a registered trademark of Cable Television Laboratories, Inc. and it is used in ITU-T Recommendations with permission.

The DOCSIS 3.1 specifications introduce a number of features that increase the capability and application of the technology:

- 1) The use of orthogonal frequency division modulation (OFDM) in both upstream and downstream increasing the transmission efficiency (bits/hertz) over single carrier quadrature amplitude modulation (QAM). This enables higher bandwidth capacity over the same amount of spectrum over previous generations of DOCSIS with the potential for 10 Gbps service tiers over coax.
- 2) The specification of a full duplex mode of operation enabling the concurrent use of spectrum for both upstream and downstream transmission, greatly increasing the upstream capacity. This provides the ability to provide symmetric multi-gigabit services over coax.
- 3) The specification of multiple modulation profiles enabling cable modems to operate at different modulation orders and to dynamically optimize the transmission capacity for the channel conditions it is experiencing. This improves the operational efficiency by not

constraining all cable modems to operate at the lowest modulation order supported by the network.

- 4) The specification of full-band spectrum capture that enables analysis of the full spectrum as measured from the cable modem enabling sophisticated proactive diagnostics of network issues prior to customer impacting events.
- 5) The specification of additional security features to enhance the robustness of the DOCSIS network in the face of malicious cyberattacks.

This Recommendation is comprised of the specifications identified in clause 2. Preceding relevant ITU-T Recommendations are provided in Appendix I. Other references for the specifications listed in clause 2 are provided in the bibliography of this Recommendation.

6.2 CableLabs DOCSIS certification programme

In addition to developing the specifications for DOCSIS, CableLabs also conducts interoperability and compliance testing to validate products that implement the DOCSIS specifications. Details on the CableLabs certification programme can be found at: <https://www.cablelabs.com/specs/certification/>.

The DOCSIS specifications are living documents and are updated three to four times per year under a strict engineering change request and document control process. Consequently, it is important that manufacturers of DOCSIS products understand exactly the requirements against which they are being tested for certification. The CableLabs specification and certification process links engineering change requests with certification testing with sufficient time allowed for manufacturers to implement the required changes. In this way, knowing when a product has been certified, it is possible to know exactly what version of the DOCSIS specifications were used.

Appendix I

Preceding relevant ITU-T Recommendations

(This appendix does not form an integral part of this Recommendation.)

The following list provides preceding relevant ITU-T Recommendations:

- [b-ITU-T G.8275.1] Recommendation ITU-T G.8275.1/Y.1369.1 (2016), *Precision time protocol telecom profile for phase/time synchronization with full timing support from the network.*
- [b-ITU-T J.83] Recommendation ITU-T J.83 (2007), *Digital multi-program systems for television, sound and data services for cable distribution.*
- [b-ITU-T J.112] Recommendation ITU-T J.112 (1998), *Transmission systems for interactive cable television services.*
- [b-ITU-T J.122] Recommendation ITU-T J.122 (2007), *Second-generation transmission systems for interactive cable television services – IP cable modems.*
- [b-ITU-T J.126] Recommendation ITU-T J.126 (2007), *Embedded Cable Modem device specification.*
- [b-ITU-T J.162] Recommendation ITU-T J.162 (2007), *Network call signalling protocol for the delivery of time-critical services over cable television networks using cable modems.*
- [b-ITU-T J.163] Recommendation ITU-T J.163 (2007), *Dynamic quality of service for the provision of real-time services over cable television networks using cable modems.*
- [b-ITU-T J.179] Recommendation ITU-T J.179 (2005), *IPCablecom support for multimedia.*
- [b-ITU-T J.210] Recommendation ITU-T J.210 (2006), *Downstream RF interface for cable modem termination systems.*
- [b-ITU-T J.211] Recommendation ITU-T J.211 (2006), *Timing interface for cable modem termination systems.*
- [b-ITU-T J.212] Recommendation ITU-T J.212 (2006), *Downstream external Physical layer interface for modular cable modem termination systems.*
- [b-ITU-T J.213] Recommendation ITU-T J.213 (2006), *Layer 2 virtual private networks for IP cable modem systems.*
- [b-ITU-T J.222.x] Recommendations ITU-T J.222.x-series (2007), *Third-generation transmission systems for interactive cable television services – IP cable modems.*
- [ITU-T J.223.x] Recommendation ITU-T J.223.x-series (2016), *Cabinet DOCSIS (C-DOCSIS) requirements and specifications.*
- [b-ITU-T X.25] Recommendation ITU-T X.25 (1996), *Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit.*
- [b-ITU-T X.509] ITU-T Recommendation X.509 (2012), *Information Technology – Open Systems Interconnection – The Directory: Public key and attribute certificate frameworks.*

[b-ITU-T X.690] ITU-T Recommendation X.690 (2015) | ISO/IEC 8825-1:2002, *Information Technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*.

Bibliography

Other references for specifications listed in clause 2

The following is a list of other references for the specifications listed in clause 2 of this Recommendation.

- [b-CAN/CSA CISPR 22-10] *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement* (Adopted IEC CISPR 22 (2008), sixth edition, 2008-09).
- [b-CANN] *CableLabs Assigned Names and Numbers* (2019), CL-SP-CANN-I19-190422, Cable Television Laboratories, Inc.
- [b-CANN DHCP-Reg] *CableLabs DHCP Options Registry Specification* (2018), CL-SP-CANN-DHCP-Reg-I15-180509, Cable Television Laboratories, Inc.
- [b-C-DOCSIS] *C-DOCSIS System Specification (2015), Data-Over-Cable Interface Specifications*, CM-SP-CDOCSIS-I02-150305, Cable Television Laboratories, Inc.
- [b-CCAP-CONFIG-YANG] CCAP YANG Configuration Module.
<http://www.cablelabs.com/YANG/DOCSIS/3.1>
- [b-CCAP-EVENTS-YANG] CCAP YANG, Module for Event Messaging,
CCAPEvents.yang, <http://www.cablelabs.com/YANG/DOCSIS>
- [b-CCAP-MIB] Converged Cable Access Platform MIB, CCAP-MIB,
<http://www.cablelabs.com/MIBs/DOCSIS>
- [b-CLAB-DEF-MIB] CableLabs Definition MIB Specification (2016), CL-SP-MIB-CLABDEF-I12-160325, Cable Television Laboratories, Inc.
- [b-CLAB-TOPO-MIB] CableLabs Topology MIB, CLAB-TOPO-MIB,
<http://www.cablelabs.com/MIBs/common>
- [b-CMCIv3.0] DOCSIS Cable Modem to Customer Premise Equipment Interface Specification (2017), CM-SP-CMCIv3.0-I03-170510, Cable Television Laboratories, Inc.
- [b-DOCS-BPI2EXT-MIB] CableLabs DOCSIS DOCS-BPI2EXT-MIB SNMP MIB Module, DOCS-BPI2EXT-MIB,
<http://www.cablelabs.com/MIBs/DOCSIS/>
- [b-DOCS-DIAG-MIB] DOCSIS Diagnostic Log MIB, DOCS-DIAG-MIB,
<http://www.cablelabs.com/MIBs/DOCSIS>
- [b-DOCS-IF3-MIB] DOCSIS Interface 3 MIB Module, DOCS-IF3-MIB,
<http://www.cablelabs.com/MIBs/DOCSIS>
- [b-DOCS-IF31-MIB] DOCSIS Interface 3.1 MIB Module, DOCS-IF31-MIB,
<http://www.cablelabs.com/MIBs/DOCSIS>
- [b-DOCS-IFEXT2-MIB] DOCSIS Interface Extension 2 MIB Module, DOCS-IFEXT2-MIB, <http://www.cablelabs.com/MIBs/DOCSIS>
- [b-DOCS-LOADBAL3-MIB] DOCSIS Load Balancing 3 MIB Module, DOCS-LOADBAL3-MIB, <http://www.cablelabs.com/MIBs/DOCSIS>
- [b-DOCS-MCAST-MIB] DOCSIS Multicast MIB Module, DOCS-MCAST-MIB,
<http://www.cablelabs.com/MIBs/DOCSIS>

[b-DOCS-MCAST-AUTH-MIB]	DOCSIS Multicast Authorization MIB Module, DOCS-MCAST-AUTH-MIB, http://www.cablelabs.com/MIBs/DOCSIS
[b-DOCS-PNM-MIB]	DOCSIS PNM MIB Module, DOCS-PNM-MIB, http://www.cablelabs.com/MIBs/DOCSIS
[b-DOCS-QOS3-MIB]	DOCSIS Quality of Service 3 MIB Module, DOCS-QOS3-MIB, http://www.cablelabs.com/MIBs/DOCSIS
[b-DOCS-SEC-MIB]	DOCSIS Security MIB, DOCS-SEC-MIB, http://www.cablelabs.com/MIBs/DOCSIS
[b-DOCS-SUBMGT3-MIB]	DOCSIS Subscriber Management 3 MIB, DOCS-SUBMGT3-MIB, http://www.cablelabs.com/MIBs/DOCSIS/
[b-DOCSIS-CM]	DOCSIS CM Information Schema, DOCSIS-CM_3.5.1-A.3.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CM
[b-DOCSIS-CMTS]	DOCSIS CMTS Information Schema, DOCSIS-CMTS_3.5.1-A.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS
[b-DOCSIS-OFDM]	DOCSIS CMTS CM Downstream OFDM Information Schema, DOCSIS-CMTS-CM-DS-OFDM_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-CMTS-CM-DS-OFDM
[b-DOCSIS-PROFILE-STATUS]	DOCSIS CMTS CM Downstream OFDM Profile Status Type Schema, DOCSIS-CMTS-CM-DS-OFDM-PROFILE-STATUS-TYPE_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-CMTS-CM-DS-OFDM-PROFILE-STATUS-TYPE
[b-DOCSIS-STATUS]	<i>DOCSIS CMTS CM Downstream OFDM Status Type Schema</i> , DOCSIS-CMTS-CM-DS-OFDM-STATUS-TYPE_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-CMTS-CM-DS-OFDM-STATUS-TYPE
[b-DOCSIS-CMTS-CM-NODE-CH]	<i>DOCSIS CMTS CM Node Channel Information Schema</i> , DOCSIS-CMTS-CM-NODE-CH_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS-CM-NODE-CH
[b-DOCSIS-CMTS-CM-PARTIAL]	DOCSIS CMTS CM Partial Service/Channel Information Schema, DOCSIS-CMTS-CM-PARTIAL_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-CMTS-CM-PARTIAL
[b-DOCSIS-REG]	DOCSIS CMTS CM Registration Status Type Schema, DOCSIS-CMTS-CM-REG-STATUS-TYPE_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-CMTS-CM-REG-STATUS-TYPE
[b-DOCSIS-SERVICE-FLOW]	DOCSIS CMTS CM Service Flow Type Schema, DOCSIS-CMTS-CM-SERVICE-FLOW-TYPE_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-CMTS-CM-SERVICE-FLOW-TYPE
[b-DOCSIS-CMTS-CM-US]	DOCSIS CMTS CM Upstream Information Schema, DOCSIS-CMTS-CM-US_3.5.1-A.3.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS-CM-US
[b-DOCSIS-OFDMA]	DOCSIS CMTS CM Upstream OFDMA Information Schema, DOCSIS-CMTS-CM-US-OFDMA_3.5.1-B.1.xsd,

	http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-CMTS-CM-US-OFDMA
[b-DOCSIS-OFDMA-PROFILE]	DOCSIS CMTS CM Upstream OFDMA Profile Status Type Schema, DOCSIS-CMTS-CM-US-OFDMA-PROFILE-STATUS-TYPE_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-CMTS-CM-US-OFDMA-PROFILE-STATUS-TYPE
[b-DOCSIS-OFDMA-STATUS]	DOCSIS CMTS CM Upstream OFDMA Status Type Schema, DOCSIS-CMTS-CM-US-OFDMA-STATUS-TYPE_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-CMTS-CM-US-OFDMA-STATUS-TYPE
[b-DOCSIS-CM-US-STATS]	DOCSIS CMTS CM Upstream Status Schema, DOCSIS-CMTS-CM-US-STATS-TYPE_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS-CM-US-STATS-TYPE
[b-DOCSIS-CMTS-DS-UTIL]	DOCSIS CMTS Downstream Utilization Information Schema, DOCSIS-CMTS-DS-UTIL_3.5.1-A.4.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS-DS-UTIL
[b-DOCSIS-DS-UTIL-STATS]	DOCSIS CMTS Downstream Utilization Status Schema, DOCSIS-CMTS-DS-UTIL-STATS-TYPE_3.5.1-A.3.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS-DS-UTIL-STATS-TYPE
[b-DOCSIS-CMTS-TOPOLOGY]	DOCSIS CMTS Topology Type Schema, DOCSIS-CMTS-TOPOLOGY-TYPE_3.5.1-A.3.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS-TOPOLOGY-TYPE
[b-DOCSIS-CMTS-US-UTIL]	DOCSIS CMTS Upstream Utilization Schema, DOCSIS-CMTS-US-UTIL_3.5.1-A.3.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS-US-UTIL
[b-DOCSIS- US-UTIL-STATS]	DOCSIS CMTS Upstream Utilization Status Schema, DOCSIS-CMTS-US-UTIL-STATS-TYPE_3.5.1-A.5.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CMTS-US-UTIL-STATS-TYPE
[b-DOCSIS-CPE]	DOCSIS CPE Information Schema, DOCSIS-CPE_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CPE
[b-DOCSIS-CPE-TYPE]	DOCSIS CPE Type Schema, DOCSIS-CPE-TYPE_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-CPE-TYPE
[b-DOCSIS-DIAG-LOG]	DOCSIS Diagnostic Log Information Schema, DOCSIS-DIAG-LOG_3.5.1-A.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-DIAG-LOG
[b-DOCSIS-DIAG-LOG-DETAIL]	DOCSIS Diagnostic Log Detail Schema, DOCSIS-DIAG-LOG-DETAIL_3.5.1-A.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-DIAG-LOG-DETAIL
[b-DOCSIS-DIAG-LOG-DETAIL]	DOCSIS Diagnostic Log Detail Type Schema, DOCSIS-DIAG-LOG-DETAIL-TYPE_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-DIAG-LOG-DETAIL-TYPE

[b-DOCSIS-DIAG-LOG-EVENT]	DOCSIS Diagnostic Log Event Type Schema, DOCSIS-DIAG-LOG-EVENT-TYPE_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-DIAG-LOG-EVENT-TYPE
[b-DOCSIS-DIAG-LOG-TYPE]	DOCSIS Diagnostic Log Type Schema, DOCSIS-DIAG-LOG-TYPE_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-DIAG-LOG-TYPE
[b-DOCSIS-DS-PROF-STATS]	DOCSIS Downstream OFDM Profile Stats Type Schema, DOCSIS-DS-OFDM-PROFILE-STATS-TYPE_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-DS-OFDM-PROFILE-STATS-TYPE
[b-DOCSIS-IP-MULTICAST]	DOCSIS IP Multicast Information Schema, DOCSIS-IP-MULTICAST_3.5.1-A.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-IP-MULTICAST
[b-DOCSIS-IP-MULTIC-STATS]	DOCSIS IP Multicast Statistics Type Schema, DOCSIS-IP-MULTICAST-STATS-TYPE_3.5.1-A.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-IP-MULTICAST-STATS-TYPE
[b-DOCSIS-MD-NODE]	DOCSIS MAC Domain Node Information Schema, DOCSIS-MD-NODE_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-MD-NODE
[b-DOCSIS-OFDM-PROFILE]	DOCSIS OFDM Profile Information Schema, DOCSIS-OFDM-PROFILE_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-OFDM-PROFILE
[b-DOCSIS-QOS]	DOCSIS QoS Information Schema, DOCSIS-QOS_3.5.1-A.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-QOS
[b-DOCSIS-REC]	DOCSIS Record Information Schema, DOCSIS-REC_3.5.1-A.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-REC
[b-DOCSIS-SAMIS-TYPE-1]	DOCSIS SAMIS Type 1 Schema, DOCSIS-SAMIS-TYPE1_3.5.1-A.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-SAMIS-TYPE-1
[b-DOCSIS-SAMIS-TYPE-2]	DOCSIS SAMIS Type 2 Schema, DOCSIS-SAMIS-TYPE-2_3.5.1-A.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-SAMIS-TYPE-2
[b-DOCSIS-SERVICE-FLOW]	DOCSIS Service Flow Information Schema, DOCSIS-SERVICE-FLOW_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-SERVICE-FLOW
[b-DOCSIS-SPECTRUM]	DOCSIS Spectrum Measurement Information Schema, DOCSIS-SPECTRUM_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-SPECTRUM

[b-DOCSIS-SPECTRUM-MEAS]	DOCSIS Spectrum Measurement Type Schema, DOCSIS-SPECTRUM-MEASUREMENT-TYPE_3.5.1-A.2.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.0/xsd/ipdr/DOCSIS-SPECTRUM-MEASUREMENT-TYPE
[b-DOCSIS-US-PROF-STATS]	DOCSIS Upstream OFDMA Profile Stats Type, DOCSIS-US-OFDMA-PROFILE-STATS-TYPE_3.5.1-B.1.xsd, http://www.cablelabs.com/namespaces/DOCSIS/3.1/xsd/ipdr/DOCSIS-US-OFDMA-PROFILE-STATS-TYPE
[b-DOCSIS BPI+]	Data-Over-Cable Service Interface Specifications, Baseline Privacy Interface Specification (2008), CM-SP-BPI+-C01-081104, Cable Television Laboratories, Inc.
[b-DOCSIS DEPI]	DOCSIS Downstream External-PHY Interface (2010), CM-SP-DEPI-I08-100611, Cable Television Laboratories, Inc.
[b-DOCSIS DRFI]	DOCSIS Downstream Radio Frequency Interface (2017), CM-SP-DRFI-I16-170111, Cable Television Laboratories, Inc.
[b-DOCSIS DSG]	DOCSIS Set-Top Gateway (DSG) Specification (2017), CM-SP-DSG-I25-170906, Cable Television Laboratories, Inc.
[b-DOCSIS DTI]	DOCSIS Timing Interface (2015), CM-SP-DTI-I06-150305, Cable Televisions Laboratories, Inc.
[b-DOCSIS eDOCSIS]	eDOCSIS Specification (2019), CM-SP-eDOCSIS-I30-190213, Cable Television Laboratories, Inc.
[b-DOCSIS L2VPN]	DOCSIS Business Services over DOCSIS (2015), <i>Layer 2 Virtual Private Networks</i> , CM-SP-L2VPN-I15-150528, Cable Television Laboratories, Inc.
[b-DOCSIS MULPIv3.0]	DOCSIS 3.0, MAC and Upper Layer Protocols Interface Specification (2017), CM-SP-MULPIv3.0-C01-171207, Cable Television Laboratories, Inc.
[b-DOCSIS OSSIV2.0]	DOCSIS 2.0, Operations Support System Interface Specification (2008), CM-SP-OSSIV2.0-C01-081104, Cable Television Laboratories, Inc.
[b-DOCSIS OSSIV3.0]	DOCSIS 3.0, Operations Support System Interface Specification (2017), CM-SP-OSSIV3.0-C01-171207, Cable Television Laboratories, Inc.
[b-DOCSIS PHYv3.0]	DOCSIS 3.0, Physical Layer Specification (2017), CM-SP-PHYv3.0-C01-171207, Cable Television Laboratories, Inc.
[b-DOCSIS R-DEPI]	DOCSIS Remote Downstream External PHY Interface Specification (2019), CM-SP-R-DEPI-I12-190307, Cable Television Laboratories, Inc.
[b-DOCSIS-R-PHY]	DOCSIS Remote PHY Specification (2019), CM-SP-R-PHY-I12-190307, Cable Television Laboratories, Inc.
[b-DOCSIS RFIv1.1]	DOCSIS 1.1, Radio Frequency Interface Specification (2005), CM-SP-RFIv1.1-C01-050907, Cable Television Laboratories, Inc.

[b-DOCSIS RFIv2.0]	DOCSIS 2.0, Radio Frequency Interface Specification (2009), CM-SP-RFIv2.0-C02-090422, Cable Television Laboratories, Inc.
[b-DOCSIS SECv3.0]	DOCSIS 3.0, Security Specification (2017), CM-SP-SECv3.0-C01-171207, Cable Television Laboratories, Inc.
[b-DOCSIS LLX]	DOCSIS Quality of Service Framework for Applications over DOCSIS Technology Specification (2019), CM-SP-QOS-D01-190228, Cable Television Laboratories, Inc.
[b-DOCSIS M-OSSI]	DOCSIS M-CMTS Operations Support Interface, CM-SP-M-OSSI-I08-081209 (2008), Cable Television Laboratories, Inc.
[b-DOCSIS OSSIV1.0]	DOCSIS Provisioning of EPON OSSI Specification (2016), DPoE-SP-OSSIV1.0-C01-160830, Cable Television Laboratories, Inc.
[b-DOCSIS OSSIV2.0]	DOCSIS Provisioning of EPON OSSI Specification (2018), DPoE-SP-OSSIV2.0-I12-180228, Cable Television Laboratories, Inc.
[b-DOCSIS RMI]	DOCSIS Resource Management Interface (2015), <i>Service Discovery and Registration Specification</i> , CM-SP-RMI-SDR-I02-150528, Cable Television Laboratories, Inc.
[b-CENELEC EN 50083-1]	CENELEC EN 50083-1 (2002), <i>Cable networks for television signals, sound signals and interactive services – Part 1: Safety requirements.</i>
[b-CENELEC EN 50083-2]	CENELEC EN 50083-2 (2005), <i>Cable networks for television signals, sound signals and interactive services -- Part 2: Electromagnetic compatibility for equipment.</i>
[b-CENELEC EN 50083-7]	CENELEC EN 50083-7 (1996), <i>Cable networks for television signals, sound signals and interactive services – Part 7: System performance.</i>
[b-CENELEC EN 61000-6-4]	CENELEC EN 61000-6-4 (2001), <i>Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments.</i>
[b-CENELEC EN 61000-6-3]	CENELEC EN 61000-6-3 (2003), <i>Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments.</i>
[b-ETSI EN 302 769]	ETSI EN 302 769 V1.2.1 (2011), <i>Digital Video Broadcasting (DVB) – Frame structure channel coding and modulation for a second generation digital transmission system for cable systems (DVB-C2).</i>
[b-ETSI EG 201 212]	ETSI EG 201 212 V1.2.1 (1998), <i>Electrical safety; Classification of interfaces for equipment to be connected to telecommunication networks.</i>
[b-ETSI EN 300 429]	ETSI EN 300 429 V1.2.1 (1998), <i>Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for cable systems.</i>

[b-FCC15]	Code of Federal Regulations (2005), Title 47, Part 15.
[b-FCC76]	Code of Federal Regulations (2005), Title 47, Part 76.
[b-FIPS 46-3]	Federal Information Processing Standards Publication (FIPS PUB) 46-3 (1999), <i>Data Encryption Standard</i> .
[b-FIPS 140-2]	Federal Information Processing Standards Publication (FIPS PUB) 140-2 (2001), <i>Security Requirements for Cryptographic Modules</i> .
[b-FIPS 180-1 SHA]	FIPS PUB 180-1, Secure Hash Standard (1993).
[b-FIPS 180-4]	Federal Information Processing Standards Publication (FIPS PUB) 180-2 (2014), <i>Secure Hash Standard</i> .
[b-FIPS 197]	Federal Information Processing Standards Publication (FIPS PUB) 197 (2001), <i>Advanced Encryption Standard</i> .
[b-GB 8898-2011]	GB 8898-2011, <i>Audio, video and similar electronic apparatus-Safety requirements, Standardization Administration of People's republic of China (SAC)</i> , www.sac.gov.cn
[b-IEEE 802.1D]	IEEE 802.1D (2004), <i>IEEE standard for local and metropolitan area networks – Media access control (MAC) Bridges (Incorporates IEEE 802.1t-2001 and IEEE 802.1w)</i> .
[b-IEEE 802.1ad]	IEEE Std. 802.1ad (2005), <i>IEEE Standard for Local and Metropolitan Area Networks – Virtual Bridged Local Area Networks Amendment 4: Provider Bridges. Former amendment to 802.1Q, now part of 802.1Q-2011</i> .
[b-IEEE 802.1Q]	IEEE Std. 802.1Q (2011), <i>IEEE Standard for Local and Metropolitan Area Networks – Media Access Control (MAC) Bridges and Virtual Bridge Local Area Networks</i> .
[b-IEEE 802.1ah]	IEEE Std. 802.1ah (2008), <i>IEEE Standard for Local and Metropolitan Area Networks – Virtual Bridged Local Area Networks – Amendment 6: Provider Backbone Bridges. Former amendment to 802.1Q, now part of 802.1Q-2011. [802.1Q]</i> .
[b-IEEE 802.3as]	IEEE Std. 802.3as (2006), <i>IEEE Standard for Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications</i> .
[b-IEEE 1588]	IEEE Std. 1588 (2008) (Revision of IEEE Std 1588-2002), <i>IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems</i> .
[b-IETF RFC 768]	IETF RFC 768/STD0006 (1980), J. Postel, User Datagram Protocol.
[b-IETF RFC 826]	IETF RFC 826/STD0037 (1982), D.C. Plummer, <i>Ethernet Address Resolution Protocol: Or converting network protocol addresses to 48.bit Ethernet address for transmission on Ethernet hardware</i> .

- [b-IETF RFC 868] IETF RFC 868/STD0026 (1983), J. Postel, K. Harrenstien, *Time Protocol*.
- [b-IETF RFC 1042] IETF RFC 1042 (1988), J. Postel, J.K. Reynolds, *Standard for the transmission of IP datagrams over IEEE 802 networks*.
- [b-IETF RFC 1112] IETF RFC 1112 (1989), *Host Extensions for IP Multicasting*.
- [b-IETF RFC 1157] IETF RFC 1157 (1990), *A Simple Network Management Protocol (SNMP)*.
- [b-IETF RFC 1191] IETF RFC 1191 (1990), J. Mogul, S. Deering, *Path MTU Discovery*.
- [b-IETF RFC 1350] IETF RFC 1350/STD0033 (1992), *The TFTP Protocol (Revision 2)*.
- [b-IETF RFC 1493] IETF RFC 1493 (1993), E. Decker, P. Langille, A. Rijssinghani, K. McCloghrie, *Definitions of Managed Objects for Bridges*.
- [b-IETF RFC 1700] IETF RFC 1700 (1994), J Reynolds, J. Postel, *Assigned Numbers*.
- [b-IETF RFC 1812] IETF RFC 1812 (1995), F. Baker, Ed., *Requirements for IP Version 4 Routers*.
- [b-IETF RFC 1832] IETF RFC 1832 (1995), *XDR: External Data Representation Standard*.
- [b-IETF RFC 1901] IETF RFC 1901 (1996), *Introduction to Community-based SNMPv2*.
- [b-IETF RFC 1945] IETF RFC 1945 (1996), T. Berners-Lee, R. Fielding, H. Frystyk, *Hypertext Transfer Protocol – HTTP/1.0*.
- [b-IETF RFC 1981] IETF RFC 1981 (1996), J. McCann, S. Deering, J. Mogul, *Path MTU discovery for IP version 6*.
- [b-IETF RFC 2104] IETF RFC 2104 (1997), H. Krawczyk, M. Bellare, R. Canetti, *HMAC: Keyed-Hashing for Message Authentication*.
- [b-IETF RFC 2131] IETF RFC 2131 (1997), R. Droms, *Dynamic Host Configuration Protocol*.
- [b-IETF RFC 2132] IETF RFC 2132 (1997), S. Alexander, R. Droms, *DHCP Options and BOOTP Vendor Extensions*.
- [b-IETF RFC 2133] IETF RFC 2133 (1997), *Basic Socket Interface Extensions for IPv6*.
- [b-IETF RFC 2236] IETF RFC 2236 (1997), *Internet Group Management Protocol, Version 2*.
- [b-IETF RFC 2309] IETF RFC 2309 (1998), *Recommendations on Queue Management and Congestion Avoidance in the Internet*.
- [b-IETF RFC 2347] IETF RFC 2347, G. Malkin, A. Harkin; *TFTP Option Extension*.
- [b-IETF RFC 2348] IETF RFC 2348 (1998), *TFTP Blocksize Option*.

- [b-IETF RFC 2349] IETF RFC 2349 (1998), G. Malkin, A. Harkin; *TFTP Timeout Interval and Transfer Size Options*.
- [b-IETF RFC 2460] IETF RFC 2460 (1998), *Internet Protocol, Version 6 (IPv6)*.
- [b-IETF RFC 2461] IETF RFC 2461 (1998), T. Narten, E. Nordmark, W. Simpson, *Neighbor Discovery for IP Version 6 (IPv6)*.
- [b-IETF RFC 2462] IETF RFC 2462 (1998), S. Thomson, T. Narten, *IPv6 Stateless Address Autoconfiguration*.
- [b-IETF RFC 2464] IETF RFC 2464 (1998), *Transmission of IPv6 Packets over Ethernet Networks*.
- [b-IETF RFC 2474] IETF RFC 2474 (1998), K. Nichols, S. Blake, F. Baker, D. Black, *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*.
- [b-IETF RFC 2560] IETF RFC 2560 (1999), X.509 *Internet Public Key Infrastructure Online Certification Status Protocol – OCSP*.
- [b-IETF RFC 2573] IETF RFC 2786 (1999), *SNMP Applications*.
- [b-IETF RFC 2575] IETF RFC 2575 (1999), *View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)*.
- [b-IETF RFC 2578] IETF RFC 2578 (1999), *Structure of Management Information Version 2 (SMIv2)*.
- [b-IETF RFC 2580] IETF RFC 2580 (1999), *Conformance Statements for SMIv2*.
- [b-IETF RFC 2616] IETF RFC 2616 (1999), R. Fielding, et al., *Hypertext Transfer Protocol – HTTP/1.1*.
- [b-IETF RFC 2669] IETF RFC 2669 (1999), *DOCSIS Cable Device MIB Cable Device Management Information Base for DOCSIS compliant Cable Modems and Cable Modem Termination Systems*.
- [b-IETF RFC 2710] IETF RFC 2710 (1999), *Multicast Listener Discovery (MLD) for IPv6*.
- [b-IETF RFC 2786] IETF RFC 2786 (2000), *Diffie-Helman USM Key Management*.
- [b-IETF RFC 2790] IETF RFC 2790 (2000), *Host Resources MIB*.
- [b-IETF RFC 2821] IETF RFC 2821 (2001), *Simple Mail Transfer Protocol*.
- [b-IETF RFC 2856] IETF RFC 2856 (2000), *Textual Conventions for Additional High Capacity Data Types*.
- [b-IETF RFC 2863] IETF RFC 2863 (2000), *The Interfaces Group MIB*.
- [b-IETF RFC 2933] IETF RFC 2933 (2000), *Internet Group Management Protocol MIB*.
- [b-IETF RFC 3019] IETF RFC 3019 (2001), *IP Version 6 Management Information Base for the Multicast Listener Discovery Protocol*.

- [b-IETF RFC 3032] IETF RFC 3032 (2001), MPLS Label Stack Encoding., E. Rosen, D. Tappan, G. Fedorkow, Y. Rekhter, D. Farinacci, T. Li, A. Conta.
- [b-IETF RFC 3046] IETF RFC 3046 (2001), M. Patrick, *DHCP Relay Agent Information Option*.
- [b-IETF RFC 3083] IETF RFC 3083 (2001), *Baseline Privacy Interface Management Information Base for DOCSIS Compliant Cable Modems and Cable Modem Termination Systems*.
- [b-IETF RFC 3164] IETF RFC 3164 (2001), *The BSD Syslog Protocol*.
- [b-IETF RFC 3203] IETF RFC 3203 (2001), Y. T'Joens, C. Hublet, P. DeSchrijver, *DHCP reconfigure extension*.
- [b-IETF RFC 3219] IETF RFC 3219 (2002), J. Rosenberg, H. Salama, M. Squire, *Telephony Routing over IP (TRIP)*.
- [b-IETF RFC 3256] IETF RFC 3256 (2002), D. Jones, R. Woundy, *The DOCSIS (Data-Over-Cable Service Interface Specifications) Device Class DHCP (Dynamic Host Configuration Protocol) Relay Agent Information Sub-option*.
- [b-IETF RFC 3289] IETF RFC 3289 (2002), *Management Information Base for the Differentiated Services Architecture*.
- [b-IETF RFC 3306] IETF RFC 3306 (2002), *Unicast-Prefix-based IPv6 Multicast Addresses*.
- [b-IETF RFC 3376] IETF RFC 3376 (2002), *Internet Group Management Protocol, Version 3*.
- [b-IETF RFC 3410] IETF RFC 3410 (2002), *Introduction and Applicability Statements for Internet-Standard Management Framework*.
- [b-IETF RFC 3411] IETF RFC 3411/STD0062 (2002), *An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks*.
- [b-IETF RFC 3412] IETF RFC 3412 (2002), *Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)*.
- [b-IETF RFC 3413] IETF RFC 3413/STD0062 (2002), *Simple Network Management Protocol (SNMP) Applications*.
- [b-IETF RFC 3414] IETF RFC 3414/STD0062 (2002), *User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)*.
- [b-IETF RFC 3415] IETF RFC 3415 (2002), *View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)*.
- [b-IETF RFC 3416] IETF RFC 3416 (2002), *Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)*.
- [b-IETF RFC 3417] IETF RFC 3417 (2002), *Transport Mappings for the Simple Network Management Protocol (SNMP)*.

- [b-IETF RFC 3418] IETF RFC 3418/STD0062 (2002), *Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)*.
- [b-IETF RFC 3419] IETF RFC 3419 (2002), *Textual Conventions for Transport Addresses*.
- [b-IETF RFC 3433] IETF RFC 3433 (2002), *Entity Sensor Management Information Base*.
- [b-IETF RFC 3484] IETF RFC 3484 (2003), *Default Address Selection for Internet Protocol version 6 (IPv6)*.
- [b-IETF RFC 3633] IETF RFC 3633 (2003), O. Troan, R. Droms, *IPv6 Prefix Options for Dynamic Host Configuration Protocol (DHCP) version 6*.
- [b-IETF RFC 3635] IETF RFC 3635 (2003), *Definitions of Managed Objects for the Ethernet-like Interface Types*.
- [b-IETF RFC 3810] IETF RFC 3810 (2004), *Multicast Listener Discovery Version 2 (MLDv2) for IPv6*.
- [b-IETF RFC 3826] IETF RFC 3826 (2004), *The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model*.
- [b-IETF RFC 3927] IETF RFC 3927 (2005), *Dynamic Configuration of IPv4 Link-Local Addresses*.
- [b-IETF RFC 4022] IETF RFC 4022 (2005), *Management Information Base for the Transmission Control Protocol (TCP)*.
- [b-IETF RFC 4113] IETF RFC 4113 (2005), *Management Information Base for the User Datagram Protocol (UDP)*.
- [b-IETF RFC 4131] IETF RFC 4131 (2005), *Management Information Base for Data Over Cable Service Interface Specification (DOCSIS) Cable Modems and Cable Modem Termination Systems for Baseline Privacy Plus*.
- [b-IETF RFC 4181] IETF RFC 4181 (2005), *Guidelines for Authors and Reviewers of MIB Documents*.
- [b-IETF RFC 4188] IETF RFC 4188 (2005), *Definitions of Managed Objects for Bridges*.
- [b-IETF RFC 4250] IETF RFC 4250 (2006), *The Secure Shell (SSH) Protocol Assigned Numbers*.
- [b-IETF RFC 4251] IETF RFC 4251 (2006), *The Secure Shell (SSH) Protocol Architecture*.
- [b-IETF RFC 4252] IETF RFC 4252 (2006), *The Secure Shell (SSH) Authentication Protocol*.
- [b-IETF RFC 4253] IETF RFC 4253 (2006), *The Secure Shell (SSH) Transport Layer Protocol*.
- [b-IETF RFC 4254] IETF RFC 4254 (2006), *The Secure Shell (SSH) Connection Protocol*.

- [b-IETF RFC 4293] IETF RFC 4293 (2006), *Management Information Base for the Internet Protocol (IP)*.
- [b-IETF RFC 4303] IETF RFC 4303 (2005), S. Kent, *IP Encapsulating Security Payload (ESP)*.
- [b-IETF RFC 4323] IETF RFC 4323 (2006), *Data Over Cable System Interface Specification Quality of Service Management Information Base (DOCSIS-QOS-MIB)*.
- [b-IETF RFC 4361] IETF RFC 4361 (2006), T. Lemon, B. Sommerfeld, *Node-specific Client Identifiers for Dynamic Host Configuration Protocol Version Four (DHCPv4)*.
- [b-IETF RFC 4506] IETF RFC 4506/STD0067 (2006), *XDR: External Data Representation Standard*. M. Eisler, Ed.
- [b-IETF RFC 4546] IETF RFC 4546 (2006), *Radio Frequency (RF) Interface Management Information Base for Data over Cable Service Interface Specifications (DOCSIS) 2.0 Compliant RF Interfaces*.
- [b-IETF RFC 4601] IETF RFC 4601 (2006), *Protocol Independent Multicast – Sparse Mode (PIM-SM): Protocol Specification (Revised)*.
- [b-IETF RFC 4604] IETF RFC 4604 (2006), H. Holbrook, B. Cain, B. Haberman, *Using IGMPv3 and MLDv2 for Source-Specific Multicast*.
- [b-IETF RFC 4605] IETF RFC 4605 (2006), B. Fenner, H. He, B. Haberman, H. Sandick, *IGMP/MLD-based Multicast Forwarding ("IGMP/MLD Proxying")*.
- [b-IETF RFC 4607] IETF RFC 4607 (2006), H. Holbrook, B. Cain, *Source-Specific Multicast for IP*.
- [b-IETF RFC 4639] IETF RFC 4639 (2006), *Cable Device Management Information Base for Data-Over-Cable Service Interface Specification (DOCSIS) Compliant Cable Modems and Cable Modem Termination Systems*.
- [b-IETF RFC 4649] IETF RFC 4649 (2006), B. Volz, *Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Relay Agent Remote-ID Option*.
- [b-IETF RFC 4742] IETF RFC 4742 (2006), *Using the NETCONF Configuration Protocol over Secure Shell (SSH)*.
- [b-IETF RFC 4861] IETF RFC 4861 (2007), *Neighbor Discovery for IP version 6 (IPv6)*. T. Narten, E. Nordmark, W. Simpson, H. Soliman.
- [b-IETF RFC 4862] IETF RFC 4862 (2007), S. Thomson, T. Narten, T. Jinmei, *IPv6 Stateless Address Autoconfiguration*.
- [b-IETF RFC 5132] IETF RFC 5132 (2007), *IP Multicast MIB*.
- [b-IETF RFC 5246] IETF RFC 5246 (2008), *The Transport Layer Security (TLS) Protocol Version 1.2*.
- [b-IETF RFC 5277] IETF RFC 5277 (2008), *NETCONF Event Notifications*.

[b-IETF RFC 5280]	IETF RFC 5280 (2008), <i>Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile</i> .
[b-IETF RFC 5460]	IETF RFC 5460 (2009), <i>M. Stapp, DHCPv6 Bulk Leasequery</i> .
[b-IETF RFC 5462]	IETF RFC 5462 (2009), <i>Multiprotocol Label Switching (MPLS) Label Stack Entry: "EXP" Field Renamed to "Traffic Class" Field</i> , L. Andersson, R. Asati.
[b-IETF RFC 6241]	IETF RFC 6241 (2011), <i>NETCONF Configuration Protocol</i> .
[b-IETF RFC 6243]	IETF RFC 6243 (2011), <i>With-defaults Capability for NETCONF</i> .
[b-IETF RFC 6933]	IETF RFC 6933 (2013), <i>Entity MIB (Version 4)</i> .
[b-IETF RFC 6960]	IETF RFC 6960 (2013), <i>X.509 Internet Public Key Infrastructure Online Certificate Status Protocol – OCSP</i> . S. Santesson, M. Myers, R. Ankney, A. Malpani, S. Galperin, C. Adams.
[b-IETF RFC 6991]	IETF RFC 6991 (2013), <i>Common YANG Data Types</i> .
[b-IETF RFC 7559]	IETF RFC 7559 (2015), <i>S. Krishnan, D. Anipko, D. Thaler, Packet-Loss Resiliency for Router Solicitations</i> .
[b-IETF RFC 8311]	IETF RFC 8311 (2018), <i>D. Black, Relaxing Restrictions on Explicit Congestion Notification (ECN) Experimentation</i> .
[b-IETF RFC 8415]	IETF RFC 8415 (2018), <i>T. Mrugalski, M. Siodelski, B. Volz, A Yourtchenko, M. Richardson, S. Jiang, T. Lemon, T. Winters, Dynamic Host Configuration Protocol for IPv6 (DHCPv6)</i> .
[b-IPDR/BSR]	IPDR Business Solution Requirements – Network Data Management Usage (NDM-U) (2009), Version 3.7, TM Forum.
[b-IPDR/CAPAB]	IPDR/Capability File Format (2009), Version 3.9, TM Forum.
[b-IPDR/SP]	IPDR Streaming Protocol (IPDR/SP) Specification, TMF8000-IPDR-IIS-PS (2011), Version 2.7, TM Forum.
[b-IPDR/SSDG]	IPDR Service Specification Design Guide (2009), Version 3.8, TM Forum.
[b-IPDR/XDR]	IPDR/XDR File Encoding Format (2009), Version 3.5.1, TM Forum.
[b-ISO/IEC-61169-24]	ISO/IEC-61169-24 (2001), <i>Radio-frequency connectors – Part 24: Sectional specification – Radio frequency coaxial connectors with screw coupling, typically for use in 75 ohm cable distribution systems (type F)</i> .
[b-ISO/IEC 8802-2]	ISO/IEC 8802-2:1998, <i>Information technology, Telecommunications and information exchange between systems, Local and metropolitan area networks, Specific requirements. Part 2: Logical link control</i> .

- [b-ISO/IEC 8802-3] ISO/IEC 8802-3:2000, *Information technology, Telecommunications and information exchange between systems, Local and metropolitan area networks, Specific requirements, Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications.*
- [b-ISO/IEC 8825-1] ISO/IEC 8825-1 (2008), *Information technology, ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER), Ed. #4.*
- [b-ISO 8859-1] ISO/IEC 8859-1 (1998), *8-bit single-byte coded graphic character sets -- Part 1: Latin alphabet No.1.*
- [b-ISO/IEC10038] ISO/IEC 10038 (1993), *Information technology - Telecommunications and information exchange between systems – Local area networks – Media access control (MAC) bridges.*
- [b-ISO/IEC 13818-1] ISO/IEC 13818-1 (2007), *Information technology – Generic coding of moving pictures and associated audio information: Systems.*
- [b-MMH] S. Halevi and H. Krawczyk, MMH: *Software Message Authentication in Gbit/sec Rates, Proceedings of the 4th Workshop on Fast Software Encryption (1997)*, Vol. 1267 Springer-Verlag, pp. 172-189.
- [b-NIST-800-38A] NIST-800-38A (2001), *Recommendation for Block Cipher Modes of Operation, Methods and Techniques, Morris Dworkin.*
- [b-PCMM] PacketCable Multimedia Specification, PKT-SP-MM-I07-151111 (2015), Cable Television Laboratories, Inc.
- [b-PKCS_7] RSA Laboratories, PKCS _7: *Cryptographic Message Syntax Standard (1993)*, An RSA Laboratories Technical Note, Version 1.5.
- [b-PKT-DQOS] PacketCable Dynamic Quality of Service Specification, PKT-SP-DQOS-C01-071129 (2007), Cable Television Laboratories. Inc.
- [b-PKT-MGCP] PacketCable Network-Based Call Signaling Protocol Specification, PKT-SP-EC-MGCP-C01-071129 (2007), Cable Television Laboratories, Inc.
- [b-PKT-SEC] PacketCable™ Security Specification, PKT-SP-SEC-C01-071129 (2007), Cable Television Laboratories, Inc.
- [b-PORT NUMS] Port Numbers, IANA, <http://www.iana.org/assignments/port-numbers>.
- [b-RSA1] RSA Laboratories (1993), *PKCS #1: RSA Encryption Standard. Version 1.5*, RSA Security, Inc., Bedford, MA.
- [b-RSA3] RSA Laboratories (1999), *PKCS #1 v2.0: RSA Cryptography Standard.*
- [b-SCTE 02] ANSI/SCTE 02 (2015), *Specification for "F" Port, Female Indoor.*

[b-SCTE 52]	ANSI/SCTE 52 (2013), <i>Data Encryption Standard Cipher Block Chaining Pocket Encryption</i> .
[b-SCTE 91]	ANSI/SCTE 91 (2015), <i>Specification for 5/8-24 RF & AC Equipment Port, Female</i> .
[b-SCTE 154-2]	ANSI SCTE 154-2 (2008), <i>SCTE-HMS-QAM-MIB</i> .
[b-SCTE 154-4]	ANSI SCTE 154-4 (2008), <i>MPEG Management Information Base – SCTE-HMS-MPEG-MIB</i> .
[b-SCTE 154-5]	ANSI SCTE 154-5 (2008), <i>SCTE-HMS-Headend/Ident Textual Conventions MIB</i> .
[b-SCTE RMP]	TS46 (2012), <i>SCTE Measurement Recommended Practices for Cable Systems, Fifth Edition</i> . http://www.scte.org/ItemDetail?iProductCode=TS46 .
[b-USB]	Universal Serial Bus Specification (2000), <i>Compaq, Hewlett-Packard, Intel, Lucent, Microsoft, NEC, Philips, Revision 2.0</i> . http://www.usb.org
[b-W3XML1.0]	Extensible Markup Language (XML) 1.0, (Third Edition) (2004), <i>W3C Recommendation 04</i> .
[b-W3XSD1.0]	XML Schema Part 1: Structures Second Edition (2004), <i>W3C Recommendation 28</i> .

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