Reference Specification

for

Cable Modems (CM)

IDA RS CM 1
Issue 1, 1 December 1999

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CONTENTS

NOTICE

This Specification is subject to review and revision.

PART A INTRODUCTION

1 SCOPE

1.1 This Specification defines the Cable Modem to Radio Frequency Interface requirements for bi-directional data transmission over hybrid fibre-coax cables. It is based on Annex B of the ITU-T Recommendation J.112 that is an equivalent of the DOCSIS[1] Radio Frequency Interface Specification (SP-RFI-104-980724).

1.2 The intent is to permit deployment of data-over-cable systems in a multi-vendor inter-operable environment. The simplified form of data-over-cable service is as shown in Figure 1 where bi-directional Internet Protocol (IP) traffic is transferred transparently between the cable system head-end and the customer premises, over all-coaxial or hybrid fibre-coax (HFC) cable network.

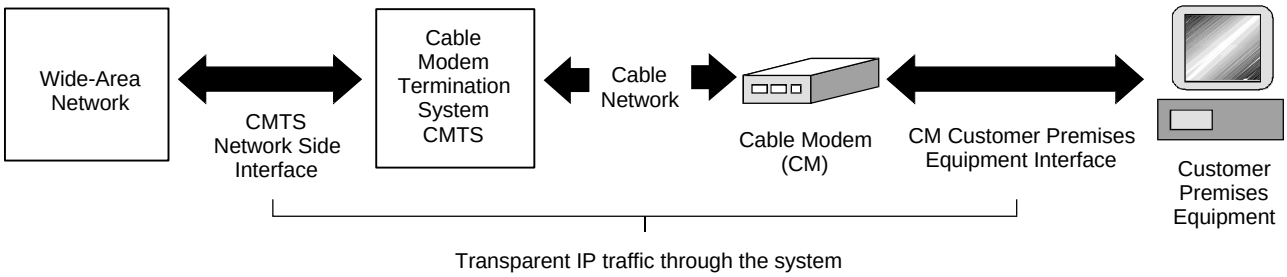

Figure 1 (Figure B.1-1/J.112): Transparent IP traffic through the data-over-cable

2 GENERAL REQUIREMENTS

2.1 Power Supply

The equipment may be a.c. powered or d.c. powered. For an a.c. powered equipment, the Specification shall be complied with when operating from an a.c. mains supply of voltage, 230V ± 10% and frequency, 50 Hz ± 2%. Where external power supply is used, e.g. AC adaptor, it shall not affect the capability of the equipment to meet the Specification.

2.2 Identification of Equipment

The equipment shall be marked with the supplier or manufacturer's name or identification mark, and the supplier or manufacturer's model or type reference. The markings required shall be legible, indelible and readily visible.

NOTE

- The following notations are used in the Specification:
  - CR Conformance requirement defines features and functions that must be supported at minimum.
  - M Mandatory requirements
  - O Optional requirements
  - NA Not Applicable
  - GID General Information and Definitions

[1] Data-Over-Cable Service Interface Specification (DOCSIS)

3	SAFETY OF TERMINAL EQUIPMENT FOR CONNECTION TO TELECOMMUNICATION NETWORKS	CR
3.1	**General**	–
3.1.1	Equipment (mains or battery powered) shall be designed to comply with the principles of Singapore Standards (SS), International Electrotechnical Commission (IEC) or other safety standards e.g. IEC 60950, EN60950, BS EN41003, SS 337. Requirements applicable to the equipment (e.g. class of equipment, type of TNV circuit and types of components) covered in the following sections of IEC 60950[2] shall be identified and complied with: Scope (1.1 of IEC 60950) Definitions (1.2 of IEC 60950) General requirements (1.3 of IEC 60950) General conditions for test (1.4 of IEC 60950) Components (1.5 of IEC 60950) Power interface (1.6 of IEC 60950) Marking and instructions (1.7 of IEC 60950) Protection from hazards (2 of IEC 60950) Wiring, connections and supply (3 of IEC 60950) Physical requirements (4 of IEC 60950) Thermal and electrical requirements (5 of IEC 60950) Connection to telecommunication networks (6 of IEC 60950)	M
3.2	**TNV[3] circuit characteristics and requirements**	–
3.2.1	In a single TNV circuit or interconnected TNV circuits, the voltage between any two conductors of the TNV circuit or circuits and between any one such conductor and earth shall comply with the limits set for TNV-1[4] circuit (refer to 6.2.1.1 (a) of IEC 60950).	M
3.2.2	Requirements for separation from other circuits and from accessible parts are in accordance with Table 19 of 6.2.1.2, IEC 60950.	M
3.2.3	The equipment shall be able to withstand the operating voltages generated externally as described in 6.2.1.3 of IEC 60950.	M
3.2.4	TNV circuits shall be separated from circuits at hazardous voltages by one or both of the methods given in 6.2.1.4 of IEC 60950.	M
3.2.5	If the TNV circuit is connected to other circuits, the requirements as given in 6.2.1.5 of IEC 60950 shall be complied with.	Note 1

[2] IEC 60950, 2nd Edition, 1991 + Amend. 1, 1992 + Amend. 2, 1993 + Amend. 3, 1995 + Amend. 4, 1996

[3] Telecommunication Network Voltage (TNV) as defined in 1.2.8.8, IEC 60950 Amend. 4, 1996

[4] Only TNV-1 circuits are permitted for connection to the Singapore telecommunication network. Operating voltages of TNV-1 circuits do not exceed 42.4 V peak or 60 V d.c. under normal operating conditions ((refer to 1.2.8.9 and 2.3.2 of IEC 60950 Amend. 4, 1996).

3	**SAFETY OF TERMINAL EQUIPMENT FOR CONNECTION TO TELECOMMUNICATION NETWORKS** (Continued)	**CR**
3.3	**Protection of telecommunication network service personnel, and users of other equipment connected to the network, from hazards in the equipment**	–
3.3.1	Circuitry intended to be directly connected to a telecommunication network shall comply with the requirements for an SELV[5] circuit or a TNV-1 circuit (refer to 6.3.1 of IEC 60950).	M
3.3.2	Where protection of telecommunication network relies on the protective earthing of the equipment, the equipment installations instructions and other relevant literature shall state that integrity of protective earthing must be ensured (refer to 6.3.2 of IEC 60950).	Note 2
3.3.3	There shall be insulation between circuitry intended to be connected to a telecommunication network and any parts or circuitry that will be earthed (refer to 6.3.3 of IEC 60950).	M
3.3.4	The leakage current to a telecommunication network originating from a mains powered equipment shall not exceed 0.25 mA r.m.s. (refer to 6.3.4.1 of IEC 60950). This requirement does not apply to equipment where the circuit to be connected to a telecommunication network is connected to an earthing terminal in the equipment.	Note 2
3.4	**Protection of equipment users from over voltages on telecommunication networks**	–
3.4.1	Equipment shall provide adequate electrical separation between TNV-1 circuit and certain parts of the equipment (refer to 6.4.1 of IEC 60950).	M
3.4.2	Compliance with 3.4.1 is checked by the electric strength test procedure of 6.4.2 of IEC 60950.	M
3.5	**Protection of the telecommunication wiring system from overheating**	–
3.5.1	Equipment intended to provide power over the telecommunication wiring system to remote equipment shall limit the output current to a value that does not cause damage to the telecommunication wiring system (refer to 6.5 of IEC 60950).	Note 2
Note 1	Requirements are mandatory if TNV circuits are connected to other circuits.	
Note 2	Requirements are mandatory if clause is applicable.	

[5] Safety Extra Low Voltage (SELV) circuit is so designed and protected that under normal and single fault conditions, its voltages do not exceed a safe value of 42.4 V peak or 60 Vd.c. under normal operating conditions.

PART B DATA-OVER-CABLE RADIO FREQUENCY INTERFACE

(Annex B to ITU-T Recommendation J.112, Mar 1998)

TABLE 1 : SCOPE AND PURPOSE				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS SP RFI**	**COMMENTS**	**CR**
Scope and purpose	**B.1**	**1**		GID
Scope	**B.1.1**	**1.1**		GID
Requirements	**B.1.2**	**1.2**		GID
Background	**B.1.3**	**1.3**		GID
Service goals	B.1.3.1	1.3.1		GID
Reference architecture	B.1.3.2	1.3.2		GID
Server location	B.1.3.3	1.3.3		GID

TABLE 2 : FUNCTIONAL ASSUMPTIONS				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS SP RFI**	**COMMENTS**	**CR**
Functional assumptions	**B.2**	**2**		GID
Broadband access network	**B.2.1**	**2.1**		GID
Equipment assumptions	**B.2.2**	**2.2**	Compatibility with Other Services	–
Frequency plan	B.2.2.1	2.2.1		GID
Compatibility with other services	B.2.2.2	2.2.2	The CM MUST coexist with the other services on the cable network	M
Fault isolation impact on other users	B.2.2.3	2.2.3	Fault-isolation procedures MUST take into account the potential harmful impact of faults and fault-isolation procedures on numerous users of the data-over-cable and other services.	M
RF channel assumptions	**B.2.3**	**2.3**		GID
Transmission downstream	B.2.3.1	2.3.1		GID
Transmission upstream	B.2.3.2	2.3.2		GID
Availability	B.2.3.2.1	2.3.2.1	>99%	GID
Transmission Levels	**B.2.4**	**2.4**		GID
Frequency Inversion	**B.2.5**	**2.5**		GID

TABLE 3 : COMMUNICATION PROTOCOLS				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Communication protocols	**B.3**	**3**		GID
Protocol stack	**B.3.1**	**3.1**		GID
CM and CMTS as hosts	B.3.1.1	3.1.1	The CM MUST function as IP hosts.	M
			The CM MUST support IP and ARP over DIX link-layer framing.	M
			The CM MAY also support IP and ARP over SNAP framing.	O
			The CM MUST function as LLC hosts.	M
			The CM MUST respond appropriately to TEST and XID requests.	M
Data forwarding through the CM and CMTS	B.3.1.2	3.1.2	Heading	–
General	B.3.1.2.1	3.1.2.1	Data forwarding through the CM is link-layer transparent bridging.	M
			Forwarding of IP traffic MUST be supported.	M
			The ability to restrict the network layer to a single protocol such as IP is REQUIRED.	M
			Support for the 802.1d spanning tree protocol with the modifications described in Section 3.1.2.3 is OPTIONAL for CMs intended for residential use.	O
			CMs MUST include the ability to filter 802.1d BPDUs.	M
CMTS forwarding rules	B.3.1.2.2	3.1.2.2		GID
CM forwarding rules	B.3.1.2.3	3.1.2.3	Data forwarding through the CM is link-layer bridging.	M
Address learning	B.3.1.2.3.1	3.1.2.3.1	The CM MUST acquire Ethernet MAC addresses of connected CPE devices, either from the provisioning process or from learning Newly discovered CPE addresses MUST NOT replace previously acquired addresses.	M
			The CM MUST allow configuration of CPE addresses during the provisioning process.	M
			Addresses that are provided during the CM provisioning MUST take preference over learned addresses.	M
			CM MAY retain any provisional addresses over a reset.	O

TABLE 3 : COMMUNICATION PROTOCOLS (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Forwarding	B.3.1.2.3.2	3.1.2.3.2	CM forwarding in both directions MUST conform to the following general 802.1d guidelines: – Link-layer frames between a given pair of end-stations MUST be delivered in order. – Link-layer frames MUST NOT be duplicated. – Stale frames (those that cannot be delivered in a timely fashion) MUST be discarded.	M
			Cable Network-to-Ethernet forwarding MUST follow the following specific rules: – Frames addressed to unknown destinations MUST NOT be forwarded from the cable port to the Ethernet port. – Broadcast frames MUST be forwarded to the Ethernet port. – Multicast frames MUST be forwarded to the Ethernet ports in accordance with filtering configuration settings specified by the cable operator's operations and business support systems.	M
			Ethernet-to-Cable Network forwarding MUST follow the following specific rules: – Frames addressed to unknown destinations MUST be forwarded from the Ethernet port to the cable port. – Broadcast frames MUST be forwarded to the cable port. – Multicast frames MUST be forwarded to the cable port in accordance with filtering configuration settings specified by the cable operator's operations and business support systems. – Frames from source addresses other than those provisioned or learned, as supported CPE devices MUST NOT be forwarded. – If a single-user CM has acquired a MAC address, it MUST NOT forward data from a second source. – If a single-user CM has acquired MAC address A as its supported CPE device and learned B as a second device connected to the Ethernet port, it MUST filter any traffic from A to B.	M

TABLE 3 : COMMUNICATION PROTOCOLS (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
The MAC Forwarder	**B.3.2**	**3.2**		GID
Example rules for data-link layer of forwarding	B.3.2.1	3.2.1		GID
Network Layer	**B.3.3**	**3.3**		GID
Above the Network Layer	**B.3.4**	**3.4**	The subscribers will be able to use the transparent IP capability as a bearer for higher-layer services. Use of these services will be transparent to the CM.	GID
			In addition to the transport of user data, there are several network management and operation capabilities, which depend upon the Network Layer. These include: – SNMP (Simple Network Management Protocol) – TFTP (Trivial File Transfer Protocol) – DHCP (Dynamic Host Configuration Protocol) – A security management protocol as defined in [MCNS2]	GID
Data Link Layer	**B.3.5**	**3.5**		GID
LLC sublayer	B.3.5.1	3.5.1	The LLC sublayer MUST be provided.	M
			Address resolution MUST be used.	M
Link-layer security sublayer	B.3.5.2	3.5.2	Link-layer security MUST be provided.	M
MAC sublayer	B.3.5.3	3.5.3		GID
Physical Layer	**B.3.6**	**3.6**		GID
Downstream transmission convergence sublayer	B.3.6.1	3.6.1		GID
PMD sublayer	B.3.6.2	3.6.2		GID

TABLE 4 : PHYSICAL MEDIA DEPENDENT SUBLAYER SPECIFICATION				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Physical Media Dependent Sublayer Specification	**B.4**	**4**	Heading	-
Scope	**B.4.1**	**4.1**		GID
Upstream	**B.4.2**	**4.2**	Heading	-
Overview	B.4.2.1	4.2.1		GID
Modulation formats	B.4.2.2	4.2.2	The upstream modulator MUST provide both QPSK and 16QAM modulation formats.	M
Modulation Rates	B.4.2.2.1	4.2.2.1	The upstream modulator MUST provide QPSK at 160, 320, 640, 1,280 and 2,560 ksym/sec and 16QAM at 160, 320, 640, 1,280 and 2,560 ksym/sec	M
			The upstream symbol rate MUST be fixed for each upstream frequency	M
Symbol Mapping	B.4.2.2.2	4.2.2.2	The symbols transmitted in each mode and the mapping of the input bits to I and Q constellation MUST be as defined in Table B.4-1/J.112.	M
			If differential quadrant encoding is enabled, then the currently transmitted symbol quadrant is derived from the previously transmitted symbol quadrant and the current input bits via Table B.4-2/J.112.	M
Spectral Shaping	B.4.2.2.3	4.2.2.3	The upstream PMD sublayer MUST support a 25% Nyquist square root raised cosine shaping.	M
			The occupied spectrum MUST NOT exceed the channel widths shown in Table B.4-3/J.112.	M
Upstream Frequency Agility and Range	B.4.2.2.4	4.2.2.4	The upstream PMD sublayer MUST support operation over the frequency range of 5-42 MHz edge to edge.	M
			Offset frequency resolution MUST be supported having a range of ±32 kHz (increment = 1 Hz; implement within ±10 Hz).	M
Spectrum Format	B.4.2.2.5	4.2.2.5	The upstream modulator MUST provide operation with the format $s(t) = I(t)*\cos(\omega t) - Q(t)*\sin(\omega t)$	M

TABLE 4 : PHYSICAL MEDIA DEPENDENT SUBLAYER SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
FEC Encode	B.4.2.3	4.2.3	Heading	–
FEC Encode modes	B.4.2.3.1	4.2.3.1	The upstream modulator MUST be able to provide the following selections: Reed-Solomon codes over GF(256) with T = 1 to 10 or no FEC coding.	M
			The following Reed-Solomon generator polynomial MUST be supported: $g(x) = (x+a^0)(x+a^1)\ldots(x+a^{2T-1})$ where the primitive element alpha is 0x02 hex	M
			The following Reed-Solomon primitive polynomial MUST be supported: $p(x) = x^8 + x^4 + x^3 + x^2 + 1$	M
			The upstream modulator MUST provide codewords from a minimum size of 18 bytes to a maximum size of 255 bytes. The encoded word size can have a minimum of one byte.	M
			In Shortened Last Codeword mode, the CM MUST provide the last codeword of a burst shortened from the assigned length of k data bytes per codeword as described in Section 4.2.10.1.2 of this document.	M
			The value of T MUST be configured in response to the Upstream Channel Descriptor from the CMTS.	M
FEC Bit-to-symbol ordering	B.4.2.3.2	4.2.3.2		M
Scrambler (Randomizer)	B.4.2.4	4.2.4	The upstream modulator MUST implement a scrambler where the 15-bit seed value MUST be arbitrarily programmable.	M
			The scrambler seed value MUST be configured in response to the Upstream Channel Descriptor from the CMTS.	M
			The polynomial MUST be $x^{15} + x^{14} + 1$.	M
Preamble Prepend	B.4.2.5	4.2.5	The upstream PMD sublayer MUST support a variable-length preamble field that is prepended to the data after they have been randomized and Reed-Solomon encoded.	M
			The value of the preamble that is prepended MUST be programmable and the length MUST be 0,2,4…, or 1024 bits for QPSK and 0, 4, 8…, or 1024 bits for 16QAM.	M

TABLE 4 : PHYSICAL MEDIA DEPENDENT SUBLAYER SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
			The preamble length and value MUST be configured in response to the Upstream Channel Descriptor message transmitted by the CMTS.	M
Burst Profiles	B.4.2.6	4.2.6	The CM MUST generate each burst at the appropriate time as conveyed in the mini-slot grants provided by the CMTS MAPs	M
			The CM MUST support all burst profiles commanded by the CMTS via the Burst Descriptors in the UCD and subsequently assigned for transmission in a MAP.	M
			The CM MUST implement the Offset Frequency to within ±10 Hz.	M
			CM MUST implement the correction with resolution of at most 1 symbol duration and with accuracy within ± 0.25 µsec plus ±1/2 symbol owing to resolution.	M
			The CM MUST be capable of switching burst profiles with no reconfiguration time required between bursts.	M
			For Symbol Rate, Offset frequency and Ranging Offset, the CM MUST be able to transmit consecutive bursts as long as the CMTS allocates at least 96 symbols in between the last symbol center of one burst and the first symbol center of the following burst.	M
			For modulation type changes, the CM MUST be able to transmit consecutive bursts as long as the CMTS allocates at least 96 symbols in between the last symbol center of one burst and the first symbol center of the following burst.	M
			If Channel Frequency is to be changed, then the CM MUST be able to implement the change between bursts as long as the CMTS allocates at least 96 symbols plus 100 msec between the last symbol center of one burst and the first symbol of the following burst.	M
			The Channel Frequency of the CM MUST be settled within the phase noise and accuracy requirements of Section 4.2.9.5 and Section 4.2.9.6 within 100 msec from the beginning of the change.	M

TABLE 4 : PHYSICAL MEDIA DEPENDENT SUBLAYER SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
			If Output Power is to be changed by 1 dB or less, the CM MUST be able to implement the change between bursts as long as the CMTS allocates at least 96 symbols plus 5 µsec between the last symbol center of one burst and the first symbol center for the following burst.	M
			If Output Power is to be changed by more than 1 dB, the CM MUST be able to implement the change between bursts as long as the CMTS allocates at least 96 symbols plus 10 µsec between the last symbol center of one burst and the first symbol center of the following burst.	M
			The Output Power of the CM MUST be settled to within ±0.1 dB of its final output power level a) within 5 µsec from the beginning of a change of 1dB or less, and b) within 10 µsec from the beginning of a change of greater than 1 dB.	M
			The output transmit power MUST be maintained constant within a TDMA burst to within less than 0.1 dB.	M
Burst timing convention	B.4.2.7	4.2.7		GID
Transmit Power Requirements	B.4.2.8	4.2.8	The upstream PMD sublayer MUST support varying the amount of transmit power.	M
Output Power Agility and Range	B.4.2.8.1	4.2.8.1	The output transmit power in the design bandwidth MUST be variable over the range of +8 dBmV to 55 dBmV (16 QAM) or 58 dBmV (QPSK), in 1dB steps.	M
			The absolute accuracy of the transmitted power MUST be ±2dB, and the step size accuracy ±0.4dB.	M
			The step resolution MUST be 1dB or less. When a CM is commanded with finer resolution than it can implement, it MUST round to the nearest supported step size.	M
Fidelity Requirements	B.4.2.9	4.2.9	Heading	–
Spurious Emissions	B.4.2.9.1	4.2.9.1	The noise and spurious power MUST NOT exceed the levels given in Table B.4-6/J.112.	M
Adjacent channel spurious emissions	B.4.2.9.1.1	4.2.9.1.1	Table B.4-7/J.112	M
Spurious emissions in 5 to 42 MHz	B.4.2.9.1.2	4.2.9.1.2	TableB.4-8/J.112	M

TABLE 4 : PHYSICAL MEDIA DEPENDENT SUBLAYER SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Spurious Emissions During Burst On/Off Transients	B.4.2.9.2	4.2.9.2	On/off spurious emissions, such as the change in voltage at the upstream transmitter output due to enabling or disabling transmission, MUST be no more than 100 mV, and such a step MUST be dissipated no faster than 2 µs of constant slewing. This requirement applies when the CM is transmitting at +55 dBmV or more; at backed-off transmit levels, the maximum change in voltage MUST decrease by a factor of 2 for each 6 dB decrease of power level from +55 dBmV, down to a maximum change of 7 mV at 31 dBmV and below. This requirement does not apply to CM power-on and power-off transients.	M
Symbol Error Rate (SER)	B.4.2.9.3	4.2.9.3	Modulator performance MUST be within 0.5 dB of theoretical SER vs C/N (i.e., Es/No), for SER as low as 10^{-6} uncoded, for QPSK and 16 QAM.	M
			The measured SNR MUST be better than 30 dB.	M
Filter Distortion	B.4.2.9.4	4.2.9.4		GID
Amplitude	B.4.2.9.4.1	4.2.9.4.1	The spectral mask MUST be the ideal square root raised cosine spectrum with alpha = 0.25, within the ranges given below: $f_c - R_s/4$ Hz to $f_c + R_s/4$ Hz: –0.3 dB to +0.3dB $f_c - 3R_s/8$ Hz to $f_c - R_s/4$ Hz, and $f_c + R_s/4$ Hz to $f_c + 3R_s/8$ Hz: –0.5 dB to 0.3 dB $f_c - R_s/2$ Hz and $f_c + R_s/2$ Hz: –3.5 dB to –2.5 dB $f_c - 5R_s/8$ Hz and $f_c + 5R_s/8$ Hz: no greater than –30 dB where fc is the center frequency, Rs is the symbol rate, and the spectral density is measured with a resolution bandwidth of 10 kHz.	M
Phase	B.4.2.9.4.2	4.2.9.4.2	$f_c - 5R_s/8$ Hz to $f_c + 5R_s/8$ Hz: Group Delay Variation MUST NOT be greater than 100 nsec	M
Carrier Phase Noise	B.4.2.9.5	4.2.9.5	The upstream transmitter total integrated phase noise MUST be less than or equal to –43 dBc summed over the spectral regions spanning 1 kHz to 1.6 MHz above and below the carrier	M

TABLE 4 : PHYSICAL MEDIA DEPENDENT SUBLAYER SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Channel Frequency Accuracy	B.4.2.9.6	4.2.9.6	The CM MUST implement the assigned channel frequency within ± 50 parts per million over a temperature range of 0 to 40 degrees C up to five years from date of manufacture.	M
Symbol Rate Accuracy	B.4.2.9.7	4.2.9.7	The upstream modulator MUST provide an absolute accuracy of symbol rates ± 50 parts per million over a temperature range of 0 to 40 degrees C up to five years from date of manufacture.	M
Symbol Timing Jitter	B.4.2.9.8	4.2.9.8	Peak-to-peak symbol jitter, referenced to the previous symbol zero-crossing, of the transmitted waveform, MUST be less than 0.02 of the nominal symbol duration over a 2-sec period.	M
			The peak-to-peak cumulative phase error, referenced to the first symbol time and with any fixed symbol frequency offset factored out, MUST be less than 0.04 of the nominal symbol duration over a 0.1 sec period.	M
Frame Structure	B.4.2.10	4.2.10		GID
Signal Processing Requirements	B.4.2.11	4.2.11		GID
Upstream Demodulator Input Power Characteristics	B.4.2.12	4.2.12		GID
Upstream Electrical Output from the CM	B.4.2.13	4.2.13	The CM MUST output an RF modulated signal with the characteristics delineated in Table 4-10	M
Downstream	**B.4.3**	**4.3**	Heading	–
Downstream Protocol	B.4.3.1	4.3.1		GID
Scalable Interleaving to Support Low Latency	B.4.3.2	4.3.2		GID
Downstream Frequency Plan	B.4.3.3	4.3.3	The downstream frequency plan should comply with Harmonic Related Carrier (HRC), Incremental Related Carrier (IRC) or standard (STD) North American frequency plans per [IS-6]. However, operation below a center frequency of 91 MHz is not required.	GID
CMTS Output Electrical	B.4.3.4	4.3.4		GID
Downstream Electrical Input to CM	B.4.3.5	4.3.5		GID

TABLE 4 : PHYSICAL MEDIA DEPENDENT SUBLAYER SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
CM BER Performance	B.4.3.6	4.3.6		GID
64 QAM	B.4.3.6.1	4.3.6.1	Heading	–
64 QAM CM BER Performance	B.4.3.6.1.1	4.3.6.1.1		GID
64 QAM Image Rejection Performance	B.4.3.6.1.2	4.3.6.1.2		GID
64 QAM Adjacent Channel Performance	B.4.3.6.1.3	4.3.6.1.3		GID
256 QAM	B.4.3.6.2	4.3.6.2	Heading	–
256 QAM CM BER Performance	B.4.3.6.2.1	4.3.6.2.1		GID
256 QAM Image Rejection Performance	B.4.3.6.2.2	4.3.6.2.2		GID
256 QAM Adjacent Channel Performance	B.4.3.6.2.3	4.3.6.2.3		GID
CMTS Timestamp Jitter	B.4.3.7	4.3.7		GID

TABLE 5 : DOWNSTREAM TRANSMISSION CONVERGENCE SUBLAYER				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Downstream Transmission Convergence Sublayer	**B.5**	**5**	Heading	–
Introduction	**B.5.1**	**5.1**		GID
MPEG Packet Format	**B.5.2**	**5.2**	The format of an MPEG Packet carrying MCNS data is shown in Figure B5-2/J.112.	M
MPEG Header for MCNS Data-Over-Cable	**B.5.3**	**5.3**	The format of the header for use on an MCNS Data-Over-Cable PID is restricted to that shown in Table B.5-1/J.112.	M
MPEG Payload for MCNS Data-Over-Cable	**B.5.4**	**5.4**	The first byte of the MPEG payload will be a 'pointer_field' if the PUSI of the MPEG header is set.	M
			This standard defines a stuff_byte pattern having a value (0xFF) that is used within the MCNS payload to fill any gaps between the MCNS MAC frames.	M
			The pointer_field contains the number of bytes in this packet that immediately follow the pointer_field that the CM decoder must skip past before looking for the beginning of an MCNS MAC Frame.	M

TABLE 5 : DOWNSTREAM TRANSMISSION CONVERGENCE SUBLAYER (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
			A pointer field MUST be present if it is possible to begin a Data-Over-Cable MAC Frame in the packet, and MUST point to either: – the Beginning of the first MAC frame to start in the packet or – to any stuff_byte preceding the MAC frame	M
Interaction with the MAC Sublayer	**B.5.5**	**5.5**	MAC frames may begin anywhere within an MPEG packet, MAC frames may span MPEG packets, and several MAC frames may exist within an MPEG packet.	M
Interaction with the Physical Layer	**B.5.6**	**5.6**	The MPEG-2 packet stream MUST be encoded according to [ITU-T J.83-B], including MPEG-2 transport framing using a parity checksum as described in [ITU-T J.83-B]	M
MPEG Header Synchronization and Recovery	**B.5.7**	**5.7**	The MPEG-2 packet stream SHOULD be declared “in frame” when five consecutive correct parity checksums, each 188 bytes from the previous one, have been received.	O
			The MPEG-2 packet stream SHOULD be declared “out of frame”, and a search for correct packet alignment started, when nine consecutive incorrect parity checksums are received.	O

TABLE 6 : MEDIA ACCESS CONTROL SPECIFICATION				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Media Access Control Specification	**B.6**	**6**	Heading	–
Introduction	**B.6.1**	**6.1**	Heading	–
Overview	B.6.1.1	6.1.1		GID
Definitions	B.6.1.2	6.1.2	Heading	–
MAC-Sublayer Domain	B.6.1.2.1	6.1.2.1		GID
MAC Service Access Point	B.6.1.2.2	6.1.2.2		GID
Service ID	B.6.1.2.3	6.1.2.3	Within a MAC-sublayer domain, all Service IDs MUST be unique	M
			In a basic CM implementation, a single SID can be used.	M
			For more complex CMs to support multiple service classes, multiple SIDs can be used.	O
Upstream Intervals, Mini-Slots and 6.25-Microsecond Increments	B.6.1.2.4	6.1.2.4		GID
Frame	B.6.1.2.5	6.1.2.5		GID
Future Use	B.6.1.3	6.1.3	A number of fields are defined as being “for future use” in the various MAC frames described in this document. These fields MUST NOT be interpreted or used in any manner by this version (1.0) of the MAC protocol.	M
MAC Frame Formats	**B.6.2**	**6.2**	Heading	–
Generic MAC Frame Format	B.6.2.1	6.2.1		GID
PMD Overhead	B.6.2.1.1	6.2.1.1		GID
MAC Frame Transport	B.6.2.1.2	6.2.1.2		GID
Ordering of Bits and Octets	B.6.2.1.3	6.2.1.3		M
		6.2.1.3.1	Representing Negative Numbers	GID
		6.2.1.3.2	Type-Length-Value Fields	GID
MAC Header Format	B.6.2.1.4	6.2.1.4	The MAC Header format MUST be as shown in Figure 6-3	M
			The HCS field coverage MUST include the entire MAC Header including any EHDR.	M
			All MAC Headers MUST have the general format as shown in Table B.6-1/J.112.	M
			The format of the FC field MUST be as shown in Table B.6-2/J.112.	M
			The five bits following the FC_TYPE sub-field is the FC_PARM sub-field. The use of these bits are dependent on the type of MAC Header	M

TABLE 6 : MEDIA ACCESS CONTROL SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
			The MAC_PARM field of the MAC Header serves several purposes depending on the FC field. If the EHDR_ON indicator is set, then the MAC_PARM field MUST be used as the Extended Header length (ELEN). The EHDR field MAY vary from 0 to 240 bytes. If this is a concatenation MAC Header, then the MAC_PARM field represents the number of MAC frames (CNT) in the concatenation. If this is a Request MAC Header (REQ), then the MAC_PARM field represents the amount of bandwidth being requested.	M
			The third field has two possible uses. In most cases, it indicates the length (LEN) of this MAC frame. In one special case, the Request MAC Header, it is used to indicate the cable modem's Service ID since no PDU follows the MAC Header	M
			The Extended Header (EHDR) field provides extensions to the MAC frame format. This will allow future software upgrades to take advantage of this capability.	M
Data PDU	B.6.2.1.5	6.2.1.5	The MAC Header MAY be followed by a Data PDU.	O
			All CMs MUST use the length in the MAC Header to skip over any reserved data.	M
Packet-Based MAC Frames	B.6.2.2	6.2.2	Heading	–
Variable-Length Packets	B.6.2.2.1	6.2.2.1	The MAC sublayer MUST support a variable-length Ethernet-type Packet Data PDU. The Packet PDU MUST be passed across the network in its entirety, including its original CRC. The frame format without an Extended header MUST be as shown in Figure B.6-4/J.112 and Table B.6-3/J.112.	M
ATM Cell MAC Frames	B.6.2.3	6.2.3	The frame format MUST be as shown in Figure B.6-5/J.112 and Table B.6-4/J.112.	M
Reserved PDU MAC Frames	B.6.2.4	6.2.4	This PDU MUST be silently discarded by MAC implementations of this version.	M
MAC-Specific Headers	B.6.2.5	6.2.5		GID

TABLE 6 : MEDIA ACCESS CONTROL SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Timing Header	B.6.2.5.1	6.2.5.1	In the downstream, this MAC Header MUST be used to transport the Global Timing Reference to which all cable modems synchronize. In the upstream, this MAC Header MUST be used as part of the Ranging message needed for a cable modem's timing and power adjustments. The Timing MAC Header is followed by a Packet Data PDU. The format MUST be as shown in Figure B.6-7/J.112 and Table B.6-6/J.112.	M
MAC Management Header	B.6.2.5.2	6.2.5.2	A specific MAC Header is identified to help support the MAC management messages required. This MAC Header MUST be used to transport all MAC management messages. The format MUST be as shown Figure B.6-8/J.112 and Table B.6-7/J.112.	M
Request MAC Header	B.6.2.5.3	6.2.5.3	There MUST be no Data PDUs following the Request MAC Header. The general format of the Request MUST be as shown in Figure B.6-9/J.112 and Table B.6-8/J.112.	M
Concatenation	B.6.2.5.4	6.2.5.4	Concatenation of multiple MAC frames MUST be as shown in Figure B.6-10/J.112.	M
			A compliant CM MAY support concatenation	O
			The format of the Concatenation MAC Header MUST be as shown in Figure B.6-11/J.112 and Table B.6-9/J.112.	M
			The MAC_PARM field in the Concatenation MAC header provides a count of MAC frames. If the field is non-zero, then it MUST indicate the total count of MAC Frames in this concatenation burst.	M
Extended MAC Headers	B.6.2.6	6.2.6	The presence of an EHDR field MUST be indicated by the EHDR_ON flag in the FC field being set. Whenever this bit is set, then the MAC_PARM field MUST be used as the EHDR length (ELEN).	M
			A compliant CM MUST support extended headers	M
			The format of a generic MAC Header with an Extended Header included MUST be as shown in Figure B.6-12/J.112 and Table B.6-10/J.112.	M

TABLE 6 : MEDIA ACCESS CONTROL SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Error-Handling	B.6.2.7	6.2.7	For every MAC transmission, The HCS MUST be verified. When a bad HCS is detected, the MAC Header and any payload MUST be dropped.	M
			For Packet PDU transmissions, a bad CRC MAY be detected. Packet PDU MUST be dropped, but any pertinent information in the MAC Header MAY be used.	O
Error Codes and Messages	–	6.2.7.1		GID
MAC Management Messages	**B.6.3**	**6.3**	Heading	–
MAC Management Message Header	B.6.3.1	6.3.1	MAC management messages MUST be encapsulated in an LLC unnumbered information frame which in turn is encapsulated within the cable network MAC framing, as shown in Figure B.6-13/J.112. The MAC Management Message Types are defined in Table B.6-13/J.112.	M
MAC Management Messages	B.6.3.2	6.3.2	A compliant CM MUST support the following management messages types.	M
Time Synchronization (SYNC)	B.6.3.2.1	6.3.2.1	Transmitted by CMTS	M
Upstream Channel Descriptor (UCD)	B.6.3.2.2	6.3.2.2	Transmitted by CMTS	M
Upstream Bandwidth Allocation Map (MAP)	B.6.3.2.3	6.3.2.3	Generated by CMTS	M
Ranging Request (RNG-REQ)	B.6.3.2.4	6.3.2.4	A Ranging Request MUST be transmitted by a CM at initialization and periodically on request from CMTS to determine network delay.	M
Ranging Response (RNG-RSP)	B.6.3.2.5	6.3.2.5	Transmitted by CMTS	M
Encoding	B.6.3.2.5.1	6.3.2.5.1	The type values used MUST be those defined in Table B.6-17/J.112 and Figure B.6-22/J.112.	M
Example of TLV Data	B.6.3.2.5.2	6.3.2.5.2		GID
Overriding Channels	B.6.3.2.5.3	6.3.2.5.3		M
Registration Request (REG-REQ)	B.6.3.2.6	6.3.2.6	A Registration Request MUST be transmitted by a CM at initialization after receipt of a CM parameter file.	M
Encodings	B.6.3.2.6.1	6.3.2.6.1	The CM MUST forward the vendor specific configuration settings to the CMTS in the same order in which they were received.	M
Example	B.6.3.2.6.2	6.3.2.6.2		GID

TABLE 6 : MEDIA ACCESS CONTROL SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Registration Response (REG-RSP)	B.6.3.2.7	6.3.2.7	Transmitted by CMTS	GID
			A CM which does not recognise a parameter type MUST skip over this parameter and MUST NOT treat the event as an error condition.	M
Encodings	B.6.3.2.7.1	6.3.2.7.1		GID
Modem Capabilities	B.6.3.2.7.1.1	6.3.2.7.1.1		GID
Service Class Data	B.6.3.2.7.1.2	6.3.2.7.1.2		GID
Registration Response Encoding Example	B.6.3.2.7.2	6.3.2.7.2		GID
Sample Service Class Data Encoding	B.6.3.2.7.3	6.3.2.7.3		GID
Upstream Channel Change Request (UCC-REQ)	B.6.3.2.8	6.3.2.8	May be transmitted by CMTS	GID
Upstream Channel Change Response (UCC-RSP)	B.6.3.2.9	6.3.2.9	An Upstream Channel Change Response MUST be transmitted by a CM in response to a received Upstream Channel Change Request message to indicate that it has received and is complying with the UCC-REQ. The format of an UCC-RSP message is shown in Figure B.6-30/J.112.	M
Upstream Bandwidth Allocation	**B.6.4**	**6.4**	The CM MUST time its transmission so that the CMTS receives it in the time reference specified.	M
			CMs MAY issue requests to the CMTS for upstream bandwidth.	O
The Allocation Map MAC Management Message	B.6.4.1	6.4.1		GID
Information Elements	B.6.4.1.1	6.4.1.1		M
The Request IE	B.6.4.1.1.1	6.4.1.1.1		M
The Request/Data IE	B.6.4.1.1.2	6.4.1.1.2		M
The Initial Maintenance IE	B.6.4.1.1.3	6.4.1.1.3		M
The Station Maintenance IE	B.6.4.1.1.4	6.4.1.1.4		M
Short and Long Data Grant IEs	B.6.4.1.1.5	6.4.1.1.5		M
Data Acknowledge IE	B.6.4.1.1.6	6.4.1.1.6		M
Expansion IE	B.6.4.1.1.7	6.4.1.1.7		M
Null IE	B.6.4.1.1.8	6.4.1.1.8		M
Requests	B.6.4.1.2	6.4.1.2	The number of mini-slots requested MUST be the total number that are desired by the CM at the time of the request (including any physical layer overhead), subject to administrative limits.	M

TABLE 6 : MEDIA ACCESS CONTROL SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Map Transmission and Timing	B.6.4.2	6.4.2	The set of all maps taken together, MUST describe every mini-slot in the upstream channel. If a CM fails to receive a map describing a particular interval, it MUST NOT transmit during that interval.	M
Protocol Example	B.6.4.3	6.4.3	When the CM determines that a collision has occurred, it MUST perform a back-off algorithm and retry.	M
			CM MUST interpret zero-length grant as a signal that the request is still pending.	M
			So long as the CM is still receiving a zero-length grant, it MUST NOT issue new requests for that service queue.	M
Contention Resolution	B.6.4.4.	6.4.4.	The mandatory method of contention resolution, which MUST be supported, is based on a truncated binary exponential back-off, with the initial back-off window and the maximum back-off window controlled by the CMTS.	M
CM Behaviour	B.6.4.5	6.4.5		M
Support for Multiple Channels	B.6.4.6	6.4.6	Vendors MAY choose to offer various combinations of upstream and downstream channels within one MAC service access point	O
Classes of Service	B.6.4.7	6.4.7	This Service ID MAY be assigned to all traffic for a CM, or it MAY only be used for this particular service within the CM	O
Resource-Sharing	B.6.4.7.1	6.4.7.1		GID
Timing and Synchronisation	**B.6.5**	**6.5**		GID
Global Timing Reference	B.6.5.1	6.5.1	Cable modems MUST then compare the actual time the message was received with the timestamp and adjust their local clock references accordingly.	M
			The timing delays through the remainder of the PHY layer MUST be relatively constant.	M
CM Channel Acquisition	B.6.5.2	6.5.2	Any cable modem MUST NOT use the upstream channel until it has successfully synchronized to the downstream.	M
			First, the cable modem MUST establish PMD sublayer synchronization.	M

TABLE 6 : MEDIA ACCESS CONTROL SPECIFICATION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
			The MAC sublayer MUST now search for the Timing Synchronization (SYNC) MAC management messages	M
			If the Lost SYNC Interval has elapsed without a valid SYNC message, a cable modem MUST NOT use the upstream and MUST try to re-establish synchronization again.	M
Ranging	B.6.5.3	6.5.3	The cable modem MUST put together a Ranging Request message to be sent in an Initial Maintenance region. The SID field MUST be set to the non-initialised CM value (zero).	M
Timing Units and Relationships	B.6.5.4	6.5.4		GID
Data Link Encryption Support	**B.6.6**	**6.6**		GID
MAC Messages	B.6.6.1	6.6.1	MAC Management Messages MUST NOT be encrypted	M
Framing	B.6.6.2	6.6.2		M
Example of Security System Encryption	B.6.6.2.1	6.6.2.1		GID
CMCI to RF	B.6.6.2.1.1	6.6.2.1.1		GID
RF to CMST-NSI	B.6.6.2.1.2	6.6.2.1.2		GID

TABLE 7 : CABLE MODEM - CMTS INTERACTION				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Cable Modem – CMTS Interaction	**B.7**	**7**		GID
CMTS Initialization	B.7.1	7.1		GID
Cable Modem Initialization	**B.7.2**	**7.2**	The procedure for initialization of a cable modem MUST be as shown in Figure B.7-1/J.112.	M
RSM Detection	B.7.2.1	7.2.1		GID
Scanning and Synchronisation to Downstream	B.7.2.2	7.2.2		GID
Obtain Upstream Parameters	B.7.2.3	7.2.3		M
Message Flows During Scanning and Upstream Parameter Acquisition	B.7.2.4	7.2.4	Messages are addressed to all CMs.	GID
Ranging and Automatic Adjustments	B.7.2.5	7.2.5		M
Ranging Parameter Adjustment	B.7.2.5.1	7.2.5.1		GID
Periodic Ranging	B.7.2.5.2	7.2.5.2		GID
Establish IP Connectivity	B.7.2.6	7.2.6		M

TABLE 7 : CABLE MODEM - CMTS INTERACTION (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Establish Time of Day	B.7.2.7	7.2.7		M
Establish Security Association	B.7.2.8	7.2.8		M
Transfer Operational Parameters	B.7.2.9	7.2.9		M
Registration	B.7.2.10	7.2.10		M
Baseline Privacy Initialisation	B.7.2.11	7.2.11		GID
Service IDs During CM Initialization	B.7.2.12	7.2.12		M
Multiple-Channel Support	B.7.2.13	7.2.13		M
Remote RF Signal Level Adjustment	B.7.2.14	7.2.14		M
Changing Upstream Burst Parameters	B.7.2.15	7.2.15		M
Changing Upstream Channels	B.7.2.16	7.2.16		M
Fault Detection and Recovery	B.7.2.17	7.2.17		GID
Prevention of Unauthorised Transmissions	B.7.2.18	7.2.18		M

TABLE 8 : SUPPPORTING FUTURE NEW CABLE MODEM CAPABILITIES				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Supporting Future New Cable Modem Capabilities	**B.8**	**8**	Heading	–
Setting Up Communications on an Enhanced Basis	**B.8.1**	**8.1**		GID
Upstream Enhanced/Downstream Standard	B.8.1.1	8.1.1		M
Downstream Enhanced/Upstream Enhanced or Standard	B.8.1.2	8.1.2		M
Downloading Cable Modem Operating Software	**B.8.2**	**8.2**		M

TABLE 9 : PROVISION FOR OTHER FUTURE CAPABILITIES				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Provision for Other Future Capabilities	**B.9**	**9**		GID
Anticipated Physical-Layer Changes	**B.9.1**	**9.1**		GID
Adding Upstream Channel and Burst Configuration Settings	B.9.1.1	9.1.1		GID
Channel Burst Parameters for Advanced Modems	B.9.1.1.1	9.1.1.1		GID
Downstream Channel Improvements	B.9.1.2	9.1.2		GID
New Network Service Requirements	**B.9.2**	**9.2**		GID
Multicast Service IDs	B.9.2.1	9.2.1		GID
RSVP Support for Upstream Traffic	B.9.2.2	9.2.2		GID
PID Filtering Capability	**B.9.3**	**9.3**		GID

TABLE 10 : APPENDICES				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Well-known Addresses	**Appendix B.I**	**Appendix A**	Heading	–
MAC Addresses	B.I.1	A.1		M
MAC Service IDs	B.I.2	A.2		M
MPEG PID	B.I.3	A.3		M
Parameters and Constants	**Appendix B.II**	**Appendix B**	Parameters and constants defined for the CM MUST be implemented.	M
CM Configuration Interface Specification	**Appendix B.III**	**Appendix C**	Heading	–
DHCP Fields used by the CM	B.III.1	C.1		M
CM Binary Configuration File Format	B.III.2	C.2		M
Configuration File Settings	B.III.3	C.3	The following configuration settings MUST be supported by all CMs: – Downstream Frequency Configuration Setting – Upstream Channel ID Configuration Setting – Network Access Configuration Setting – End Configuration Setting – Maximum Number of CPEs	M
			The rest of the configuration settings are optional. Except for the “Telephone Settings Option” and “Vendor-Specific Configuration Settings”, a configuration setting must be supported if it is present in the configuration file.	O
Configuration File Creation	B.III.4	C.4		M
CM MIC Calculation	B.III.5	C.5		M
CMTS MIC Calculation	B.III.6	C.6		M
Digest Calculation	B.III.6.1	C.6.1		M
Registration Configuration Settings	B.III.7	C.7		GID
Encodings	B.III.8	C.8		M
End-of-Data Marker	B.III.8.1	C.8.1		M
Pad Configuration Setting	B.III.8.2	C.8.2		M
Downstream Frequency Configuration Setting	B.III.8.3	C.8.3		M
Upstream Channel ID Configuration Setting	B.III.8.4	C.8.4		M

TABLE 10 : APPENDICES (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Network Access Control Object	B.III.8.5	C.8.5		M
Class of Service Configuration Setting	B.III.8.6	C.8.6		M
Internal Class of Service Encodings	B.III.8.6.1	C.8.6.1	Heading	–
Class ID	B.III.8.6.1.1	C.8.6.1.1		M
Maximum Downstream Rate Configuration Setting	B.III.8.6.1.2	C.8.6.1.2		M
Maximum Upstream Rate Configuration Setting	B.III.8.6.1.3	C.8.6.1.3		M
Upstream Channel Priority Configuration Setting	B.III.8.6.1.4	C.8.6.1.4		M
Guaranteed Minimum Upstream Channel Data Rate Configuration Setting	B.III.8.6.1.5	C.8.6.1.5		M
Maximum Upstream Channel Transmit Burst Configuration Setting	B.III.8.6.1.6	C.8.6.1.6		M
Class-of-service Privacy Enable	B.III.8.6.1.7	C.8.6.1.7		M
Modem Capabilities Configuration Setting	B.III.8.7	C.8.7		M
Concatenation Support	B.III.8.7.1	C.8.7.1		M
CM Message Integrity Check (MIC) Configuration Setting	B.III.8.8	C.8.8		M
CMTS Message Integrity Check (MIC) Configuration Setting	B.III.8.9	C.8.9		M
Vendor ID Configuration Setting	B.III.8.10	C.8.10		M
Software Upgrade Filename	B.III.8.11	C.8.11		M
SNMP Write-Access Control	B.III.8.12	C.8.12		M
SNMP MIB Object	B.III.8.13	C.8.13		M
Vendor-Specific Information	B.III.8.14	C.8.14		O
Modem IP Address	B.III.8.15	C.8.15		M
Service(s) Not Available Response	B.III.8.16	C.8.16		M
CPE Ethernet MAC Address	B.III.8.17	C.8.17		M
Telephone Settings Option	B.III.8.18	C.8.18		–
SNMP IP Address	B.III.8.19	C.8.19		–
Baseline Privacy Configuration Settings Option	B.III.8.20	C.8.20		–
Maximum Number of CPEs	–	C.8.21		–
TFTP Server Timestamp	–	C.8.22		–
TFTP Provisioned Modem Address	–	C.8.23		–
Software Upgrade TFTP Server	–	C.8.24		–

TABLE 10 : APPENDICES (CONTINUED)				
TITLE	**ITU-T REC J.112 ANNEX B**	**DOCSIS RFI**	**COMMENTS**	**CR**
Summary	–	C.9		–
MAC Sublayer Service Definition	**Appendix B.IV**	**Appendix D**		GID
Example Burst Profiles	**Appendix B.V**	**Appendix E**		GID
Upstream Modulation Rates	**Appendix B.VI**	**Appendix F**		GID
Example: Multiple Upstream Channels	**Appendix B.VII**	**Appendix G**		GID
The Data-Over-Cable Spanning Tree Protocol	**Appendix B.VIII**	**Appendix H**		–
Error Codes and Messages	–	**Appendix I**		–
References	–	**Appendix J**		–
Glossary	–	**Appendix K**		–