



Reference Specification

for

Multimedia Terminal Adaptor (MTA)

IDA RS MTA
Issue 1, 16 June 2003

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NOTICE

This Reference Specification is subject to review and revision.

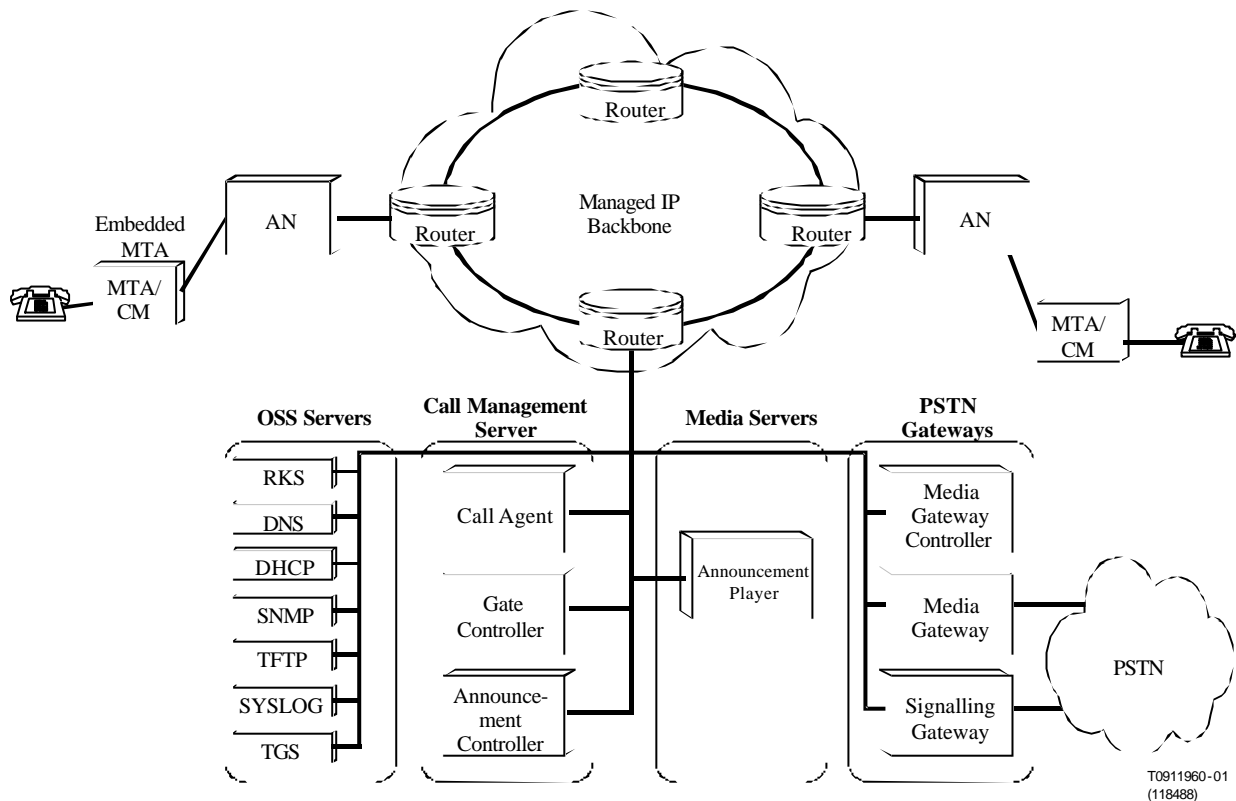
Reference Specifications and Guides are informative documents, and are not used for type approval of customer equipment. They are either one of the following types of documents:

- i. Informative and interim documents on customer equipment standards which are yet to be adopted by the network operators and where standardisation is still in progress.**
- ii. Informative documents describing the network standards adopted by the Public Telecommunication Networks in Singapore.**

PART A INTRODUCTION

1. Scope

- 1.1 This Specification describes the integrated protocol interfaces for the embedded Multimedia Terminal Adaptor (MTA) for the delivery of time-critical interactive services over cable television networks, using Internet protocol as shown in Figure 1.



MTA Provisioning Server
 Telephony Syslog server
 MTA to DHCP server
 MTA to Provisioning Application
 MTA to CMS
 MTA to Security Server (TGS)
 MTA and configuration data file access
 DHCP extensions for MTA Provisioning

FIGURE 1 (Figure 3/ITU-T REC. J.160)
IPCablecom Component Reference Model

- 1.2 The Specification defines the requirements for the network client device, which is the embedded MTA (E-MTA) necessary to support primary line communications service. An E-MTA is a Cable Modem (CM) integrated with a Multimedia Terminal Adapter (MTA). The designation of communications service as "primary" refers to one which is sufficiently reliable to meet consumers' expectation of constant availability, including availability during power failure at the customers' premises, and (assuming the service is used to connect to the PSTN), access to emergency services.

1.3 References

ITU-T Rec. J.160	Architectural framework for the delivery of time critical services over cable television networks using cable modems
ITU-T Rec. J.161	Audio codec requirements for the provision of bidirectional audio service over cable television networks using cable modems
ITU-T Rec. J.162	Network call signalling protocol for the delivery of time critical services over cable television networks using cable modems Addendum 1
ITU-T Rec. J.163	Dynamic quality of service for the provision of real time services over cable television networks using cable modems
ITU-T Rec. J.167	Media terminal adapter (MTA) device provisioning requirements for the delivery of real-time services over cable television networks using cable modems
ITU-T Rec. J.173	IPCablecom embedded MTA primary line support
IEC 60950	International Electrotechnical Commission - Safety of Information Technology Equipment
IDA TS CM 2 Issue 1	Type Approval Specification for Cable Modems connected to the Radio-Frequency Interface of the High-speed Data-Over-Cable Systems (DOCSIS 1.1)
IDA TS PSTN 1	Type Approval Specification for Terminal equipment for connection to Public Switched Telephone Network

1.4 Abbreviations

AN	Access Node
ANC	Announcement Controller
ANP	Announcement Player
ANS	Announcement Server
CM	Cable Modem
CM/MTA	Term used in this Specification generically to represent the combination of CM and MTA. This could be an embedded MTA or a standalone MTA.
CMS	Call Management Server
CPE	Customer Premise Equipment
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DTMF	Dual Tone Multi-Frequency
FQDN	Fully Qualified Domain Name
GC	Gate Controller
HFC	Hybrid Fiber/Coax
IP	Internet Protocol
MAC	Media Access Control
MG	Media Gateway
MGC	Media Gateway Controller
MIB	Management Information Base

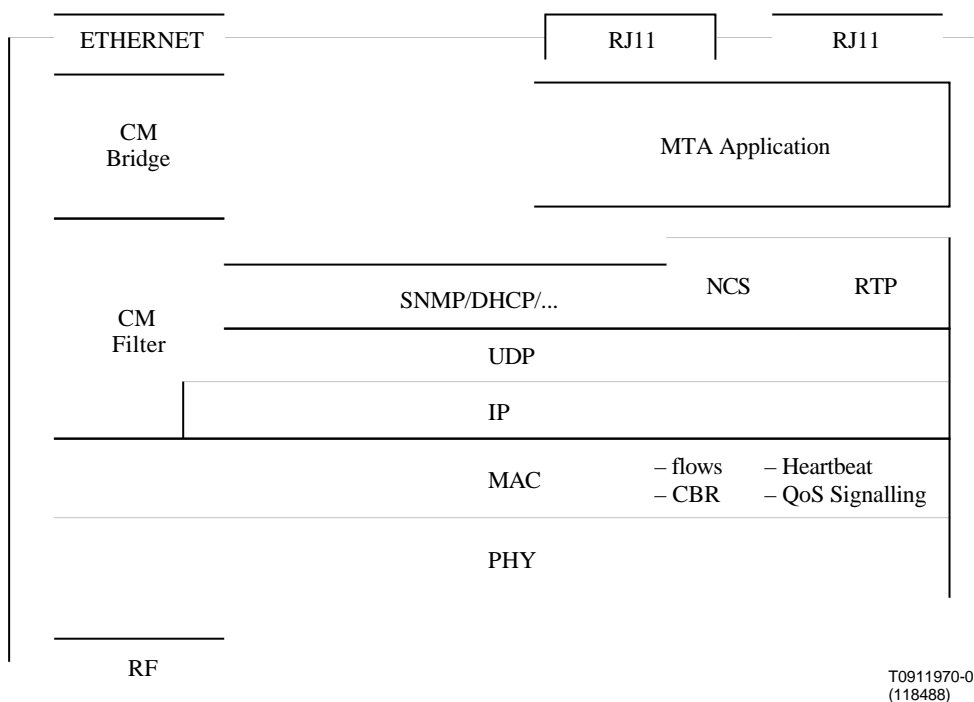
MTA	Multimedia Terminal Adapter
NCS	Network Based Call Signalling
OSS	Operational Support System
PSTN	Public Switched Telephone Network
RKS	Record Keeping Server
RTP	Real-Time Transfer Protocol
QoS	Quality of Service
SG	Signalling Gateway
SID	System IDentification number
SNMP	Simple Network Management Protocol
TCAP	Transaction Capabilities Application Part
TFTP	Trivial File Transfer Protocol
TGCP	Trunking Gateway Control Protocol
TGS	Ticket Granting Server
UDP	User Datagram Protocol

2. General Requirements

2.1 Multimedia Terminal Adapter (MTA)

2.1.1 An MTA is a network client device that contains a subscriber-side interface to the subscriber's CPE (e.g., telephone) and a network-side signalling interface to call control elements in the network. An MTA provides codecs and all signalling and encapsulation functions required for media transport and call signalling. MTAs reside at the customer site and are connected to other cable network elements via the HFC access network (refer to IDA TS CM 2). MTAs are required to support the Network Call Signalling (NCS) protocol.

2.1.2 An embedded MTA (E-MTA) is a single hardware device that incorporates a cable modem as well as a MTA component. Figure 2 shows a representative functional diagram of an E-MTA.



**FIGURE 2 (Figure 4/ITU-T REC. J.160)
E-MTA Conceptual Functional Architecture**

2.1.3 All MTAs are assumed to implement some multimedia signalling protocol, such as J.162. An MTA may be either a device with a standard two-wire telephone set in the MTA-1 configuration, or may add video input/output capabilities in the MTA-2 configuration. It may have minimal capabilities, or may implement this functionality on a multimedia personal computer, and have all of the capabilities of the PC at its disposal.

2.1.4 The MTA, a network client device can be one of the following devices. These devices reside at the customer site and are connected through the CM to the network.

a) Embedded/Integrated MTA

This is a client multimedia terminal, which incorporates a J.112 MAC-layer interface to the J.112 network.

b) Standalone MTA

This is a Client that implements the multimedia functionality without incorporating an ITU-T J.112 MAC-layer interface. The standalone MTA will typically use Ethernet, USB, or IEEE 1394 as the physical interconnect to a CM. The standalone MTA may

be connected to a customer network, and use transport facilities of the customer network (possibly including intermediate IP routers) to establish sessions over the J.112 network.

2.1.5 Cable Modem (CM)

This is a network element as defined by ITU-T J.112 (refer to IDA TS CM 2). The CM is responsible for classifying, policing and marking packets once the traffic flows are established by the signalling protocols.

2.2 MTA Functional Requirements

An MTA is responsible for the following functionality:

- a) NCS call signalling with the CMS.
- b) QoS signalling with the CMS and the AN.
- c) Authentication, confidentiality and integrity of some messages between the MTA and other IPCablecom network elements.
- d) Mapping media streams to the MAC services of the J.112 access network.
- e) Encoding/decoding of media streams.
- f) Providing multiple audio indicators to phones, such as ringing tones, call-waiting tones, stutter dial tone, dial tone, etc.
- g) Standard PSTN analogue line signalling for audio tones, voice transport, caller-id signalling, DTMF, and message waiting indicators.
- h) The G.711 audio codec.
- i) One or more analogue and/or ISDN BRI interface(s).
- j) Additional MTA functionality is defined in other IPCablecom specifications.

2.3 MTA Identifiers

- a) The following identifiers characterise the E-MTA:
- b) An embedded MTA has two MAC addresses, one for the CM and one for the MTA.
- c) An embedded MTA has two IP addresses, one for the CM and one for the MTA.
- d) An embedded MTA has two Fully Qualified Domain Names (FQDN), one for the CM and one for the MTA.
- e) At least one telephone number per configured physical port.
- f) Device capabilities.
- g) The MTA's associated CMS.

2.4 Device Provisioning

Device provisioning involves the MTA obtaining its IP configuration required for basic network connectivity, announcing itself to the network and downloading of its configuration data from its provisioning server.

3 Safety Requirements

- 3.1 The device shall be designed to comply with the principles of Singapore Standards SS 337, International Electrotechnical Commission IEC 60950 or other safety standards (e.g. EN 60950 and BS EN41003). The requirements that are applicable to the device, for example, class of equipment, type of TNV circuit and types of components covered in the relevant sections of IEC 60950 shall be identified and complied with.

3.2 Protection of telecommunications network service personnel and users of other equipment connected to the network from hazards in the equipment

Circuitry connected directly to a telecommunications network shall comply with the requirements for a TNV-1 circuit (6.1.1 of IEC 60950). There shall be insulation between this circuitry and any parts or circuitry within the device that is earthed (6.1.2 of IEC 60950).

3.3 Protection of equipment users from over voltages on telecommunications networks

The device shall provide adequate electrical separation between TNV-1 circuit and certain parts of the system (6.2.1 of IEC 60950). Compliance is verified by the electrical procedure of 6.2.2 of IEC 60950.

3.4 Protection of the telecommunications wiring system from overheating

The device intended to provide power over the telecommunications wiring system to remote equipment shall limit the output current to a value that does not cause damage to the telecommunications wiring system (6.3 Of IEC 60950).

Note:

The following notations are used in the Specification:

CR	Conformance requirement defines features and functions which must be supported at minimum.
M	Mandatory requirements
O	Optional requirements
NA	Not Applicable
GID	General Information and Definitions

PART B EMBEDDED MTA PRIMARY LINE SUPPORT

(Based on ITU-T Rec. J.173)

TITLE	ITU-T Rec. J.173	COMMENTS	CR
Scope	1		GID
References	2		GID
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Abbreviations, acronym and conventions	4		GID
Introduction	5		GID
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CM/MTA Alarms	6.1		GID
CM Failures	6.1.1		M
MTA Failures	6.1.2		M
CM/MTA Telemetry	6.2		GID
Telemetry Signals (External Interface)	6.2.1		M
Telemetry Signal 1 – AC Failure	6.2.2		M
Telemetry Signal 2 – Replace Battery	6.2.3		M
Telemetry Signal 3 – Battery Missing	6.2.4		M
Telemetry Signal 4 – Battery Low	6.2.5		M
OSS Event Reporting	6.2.6		M
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Typical CM/MTA Traffic Model	7.2		GID
Power Passing Tap Limitations	7.3		GID
Average Power Calculation	7.4		GID
Power Factor Consideration	7.5		GID
CM/MTA Average Power requirements	7.6		GID
Service Requirements under AC Fail Conditions	7.7		GID
Power Source Compatibility	7.8		M
Network Powering	7.9		M
Centre Conductor Delivery	7.9.1	Note 1	O
Composite Pair Delivery	7.9.2	Note 1	O
Local Powering with Battery Backup	7.10	Note 1	O
CM/MTA to UPS Interface	7.10.1	Note 1	O
Physical Connection	7.10.1.1	Note 1	O
Power Signals (External UPS)	7.10.1.2	Note 1	O
MTA Analogue Port Requirements	8		GID
Loop Start Signalling	8.1		M
General Supervision	8.2		M
General Ringing	8.3		M
Voice Grade Analogue Transmission	8.4		M
Primary Line Events	Annex A		GID
Bibliography	Appendix I		GID
Typical CM/MTA Traffic Model	Appendix II		GID
Analogue Interface Values for North America	Appendix III		GID
Note 1: If function is implemented/supported, the CR is "M".			

Part C AUDIO CODEC REQUIREMENTS

(Based on ITU-T Rec. J.161)

Part C specifies the audio codec requirements for the provision of bidirectional audio service over cable television networks using cable modems.

TITLE	ITU-T Rec. J.173	COMMENTS	CR
Scope	1		GID
References	2		GID
Terms and definitions	3		GID
Abbreviations	4		GID
Audio CODEC requirements	5		GID
DTMF support	5.1		M
Fax and modem support	5.2		M
Echo cancellation support	5.3		M
Asymmetrical services support	5.4		M
Hearing impaired services support	5.5		M
Mandatory CODECs (G.711)	6		M
μ -law and A-law support	6.1		M
Packet loss concealment	6.2		M
Additional CODECs	7		O
G.728	7.1		O
G.729 Annex E	7.2		O
Optional features	8	Heading	–
Wideband CODECs	8.1		O
Optional CODECs	8.2		O
Voice activity detection (VAD)	8.3		O
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Session description of CODECs	Annex A		GID
Bibliography	Appendix I		GID