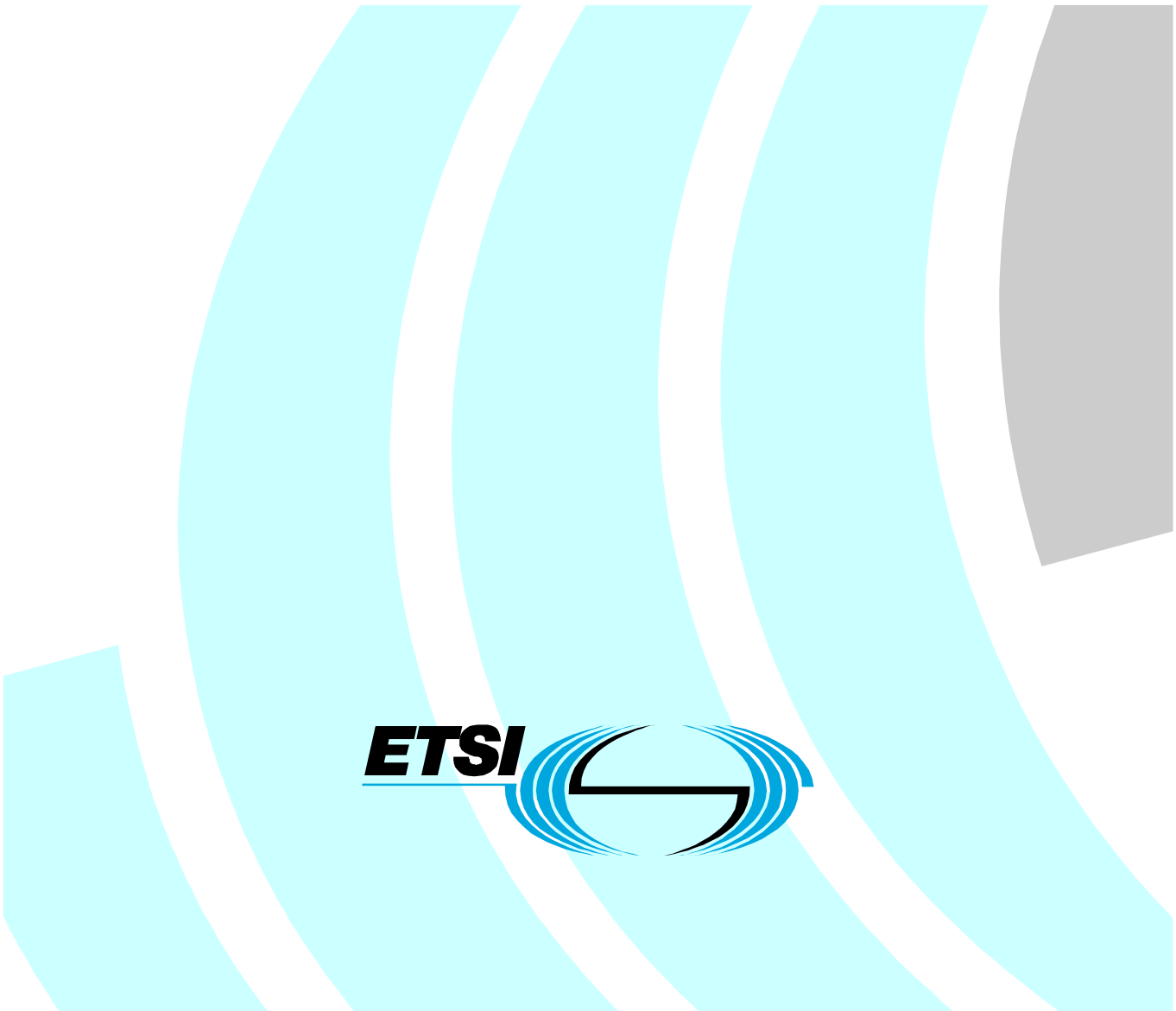
ETSI TS 101 909-19-1 V1.1.1 (2002-03)

Technical Specification

Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 19: IPCablecom Audio Server Protocol Specification; Sub-part 1: H.248 option



Reference
DTS/SPAN-120090

Keywords
access, broadband, cable, gateway, H.248, IP,
MEGACO, multimedia, PSTN

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

The present document is part 19, sub-part 1 of a multi-part deliverable covering Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services. Full details of the entire series can be found in part 1 (TS 101 909-1 [10]).

Introduction

The present document describes the architecture and specifies a set of signalling interfaces that may be used for playing announcements in voice-over-IP (VoIP) IPCablecom networks. It defines one of these interfaces: the MPC-MP interface.

The ideal objective for this interface would be to have a standard based on a single technical solution. However, commercial implementations of the Audio Server application based on a potential candidate for such a solution, ITU-T Recommendation H.248 [3], cannot yet be validated against the Audio Server requirements.

The present document defines a solution based on H.248. The solution based on ITU-T Recommendation J.162 (see Bibliography) is defined in TS 101 909-19-2 [4].

1 Scope

The present document describes the architecture and protocols that are required for playing announcements in Voice-over IP (VoIP) IPCablecom networks, where the IVR (Interactive Voice Response) system is embedded in the IPCablecom network. Announcements are typically needed for calls that do not complete. Additionally, they may be used to provide enhanced information services to the caller. Different carrier service feature sets require different announcement sets and announcement formats.

Announcements can be as basic as fixed-content announcements (e.g. all circuits busy) or as complex as those provided by intelligent IVR (Interactive Voice Response) systems. The IPCablecom service model requires that all announcements be provisioned and signalled in a standard manner for all supported call features and use case scenarios.

The present document identifies a set of signalling interfaces that are used to provide announcement services within a cable network, and specifies one of these interfaces: the MP-MPC interface, based on the protocol defined in ITU-T Recommendation H.248 [3].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] ETSI TS 101 909-2: "Access and Terminals (AT); Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 2: Architectural framework for the delivery of time critical services over cable Television networks using cable modems".

[2] ETSI TS 101 909-13: "Access and Terminals (AT); Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 13: Trunking Gateway Control Protocol".

[3] ITU-T Recommendation H.248 (2000): "Audiovisual and multimedia systems - Gateway control protocol".

[4] ETSI TS 101 909-19-2: "Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 19: IPCablecom Audio Server Protocol Specification; Sub-part 2: MGCP option".

[5] Void.

[6] ETSI TS 101 909-3: "Access and Terminals (AT); Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 3: Audio Codec Requirements for the Provision of Bi-Directional Audio Service over Cable Television Networks using Cable Modems".

[7] ETSI TS 101 909-11: "Access and Terminals (AT); Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 11: Security".

[8] ETSI TS 101 909-10: "Access and Terminals (AT); Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 10: Event Message Requirements for the Provision of Real Time Services over Cable Television Networks using Cable Modems".

[9] ETSI ETR 187: "Human Factors (HF); Recommendation of characteristics of telephone services tones when locally generated in telephony terminals".

[10] ETSI TS 101 909-1: "Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 1: General".

[11] ITU-T Recommendation J.112: "Transmission systems for interactive cable television services".

[12] IETF RFC 2045: "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies".

[13] ITU-T Recommendation E.182: "Application of tones and recorded announcements in telephone services".

[14] ITU-T Recommendation G.728: "Coding of speech at 16 kbit/s using low-delay code excited linear prediction".

[15] IETF RFC 2327: "SDP: Session Description Protocol".

[16] IETF RFC 1889: "RTP: A Transport Protocol for Real-Time Applications".

[17] IETF RFC 1890: "RTP Profile for Audio and Video Conferences with Minimal Control".

[18] IETF RFC 2543: "SIP: Session Initiation Protocol".

[19] IETF RFC 2234: "Augmented BNF for Syntax Specifications: ABNF".

[20] IETF RFC 2401: "Security Architecture for the Internet Protocol".

[21] IETF RFC 2409: "The Internet Key Exchange (IKE)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

announcement: announcement to be played and which consists of one or more audio segments

cable modem: cable modem is a layer two termination device that terminates the customer end of the J.112 connection (ITU-T Recommendation J.112)

digit map: one or more digit patterns to be collected

EuroPacketCable: ETSI working group project that includes an architecture and a series of Specifications that enable the delivery of real time services (such as telephony) over the cable television networks using cable modems

IPCablecom: ETSI working group project that includes an architecture and a series of Specifications that enable the delivery of real time services (such as telephony) over the cable television networks using cable modems

off-net(work): voice call or data transmission session in which either the originating or terminating device is connected to an IPCablecom network which is interconnected to another network which is supporting the second terminal

on-net(work): voice call or data transmission session in which the originating and terminating devices are connected to a single IPCablecom network which may consist of one or more zones or domains

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ABNF	Augmented Backus-Naurr Form
AS	Audio Server
CMS	Call Management Server
DNS	Domain Name Server
DTMF	Dual Tone Multi-Frequency

IKE	Internet Key Exchange
IPSEC	Internet Protocol Security
IVR	Interactive Voice Response system
MG	Media Gateway
MGC	Media Gateway Controller
MP	Media Player
MPC	Media Player Controller
MTA	Media Terminal Adapter
NCS	Network-based Call Signalling
PSTN	Public Switched Telephone Network
RTP	Real Time Protocol
RTCP	RTP Control Protocol
SDP	Session Description Protocol
SPI	Security Parameter Index
TGCP	Trunking Gateway Control protocol
VoIP	Voice over IP

4 Technical overview

The IPCablecom Audio Server Specification identifies a suite of signalling protocols for providing announcement and media services in an IPCablecom network. This clause:

- defines the architectural requirements for providing IPCablecom announcement and media services,
- defines and categorizes announcement and media types,
- defines the components and their roles in the IPCablecom Audio Server Architecture, and
- describes the signalling and media interfaces in the IPCablecom Audio Server Specification.

4.1 Architectural requirements

The architectural requirements and assumptions for providing Audio and Media Services for an IPCablecom Network are listed below. These requirements are based upon the specifications and technical reports that define the IPCablecom architecture.

The reference architecture for the IPCablecom Network (TS 101 909-2 [1]) is shown in Figure 1 below.

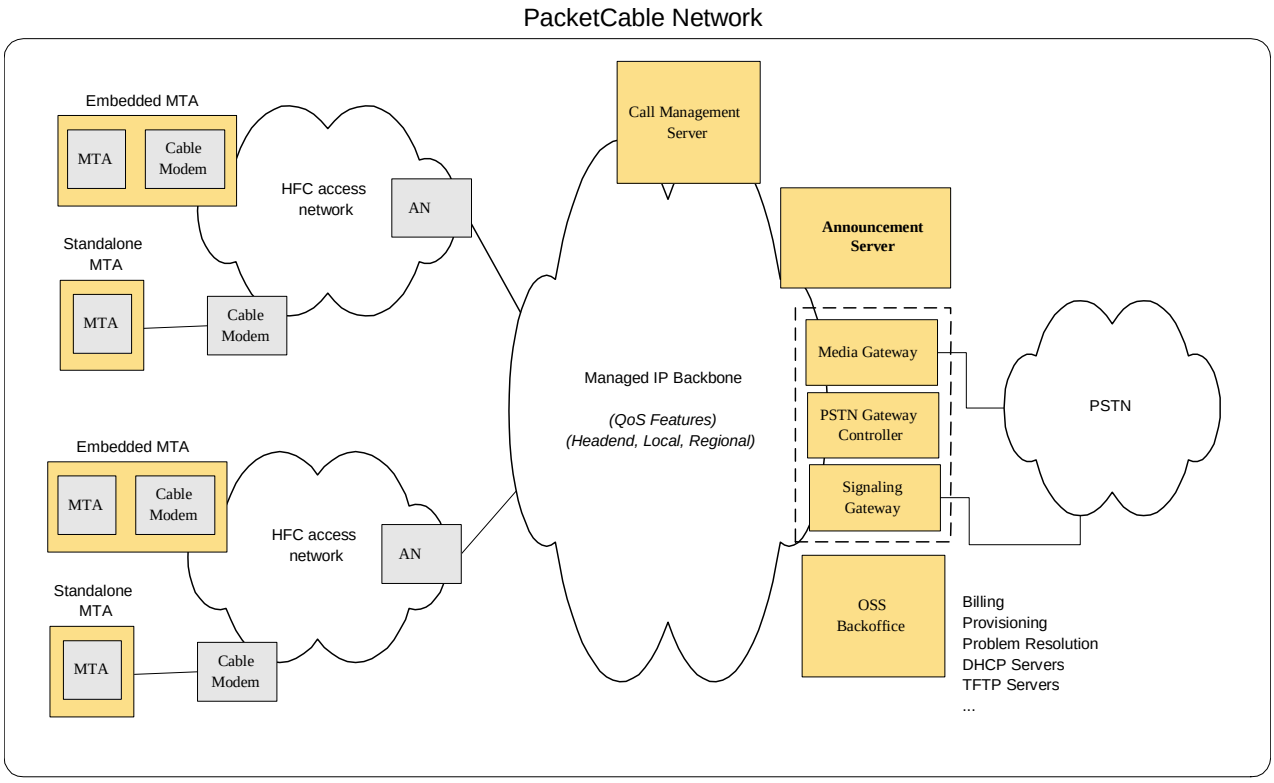


Figure 1: IPCablecom Network Component Reference Model

4.1.1 Call destination

The Audio Server Specification shall define how announcements are provided for IPCablecom on-net to off-net and on-net to on-net calls.

NOTE: Announcements for Off-net to on-net calls will usually be handled by the PSTN as a result of SS7 clearing messages. However when appropriate, they also may be played from the IPCablecom Media Gateway (MG).

4.1.2 Media formats

The required media formats for announcements are specified by the IPCablecom Codecs specification (TS 101 909-3 [6]).

4.1.3 Security

Audio shall be signalled and played in a secure manner. Security protocols defined in the IPCablecom Security specification TS 101 909-11 [7] shall be supported in the IPCablecom Audio Server Specification.

4.1.4 Operational Support Systems

Audio Servers may be required to support the IPCablecom billing and event message protocols as defined in [8].

4.2 Announcement definitions

Announcements can be divided into four distinct categories: tones, fixed-content, variable content, and interactive announcements.

4.2.1 Tones

Includes tones such as reorder, busy, and ringback. See [9] for further examples.

4.2.2 Fixed-content Announcements

Fixed-content Announcements consist of audio messages with fixed-content that require no user interaction. For example, "Your call did not go through. Please hang up and try your call again.".

4.2.3 Variable Content Announcements

Variable Content Announcements are messages that contain a customizing parameter(s) yet require no user interaction. For example, "The number you have dialled, 32 19 876, has been changed. The new number is 32 16 789.".

4.2.4 Interactive Announcements

Interactive Announcements are announcements that require user interaction, DTMF (Dual Tone Multi-Frequency) or IVR. For example, "The number you have dialled, 54 13 2198 76, has been changed. The new number is 54 13 2167 89. To be connected to the new number, at a cost of thirty-five cents, please press 1.".

4.3 Architectural components

IPCablecom components responsible for providing announcement services are defined below. These components work together to provide the complete set of announcement services available from the IPCablecom network provider. There may be more than one of these components in the network. Figure 2 defines a logical architecture for providing announcement services and only where an interface is exposed is it expected to meet IPCablecom specification requirements.

4.3.1 Audio Server (AS)

An AS is a logical entity composed of a Media Player Controller (MPC) and a Media Player (MP).

4.3.1.1 Media Player Controller (MPC)

The MPC initiates and manages all announcement services provided by the Media Player. The MPC accepts requests from the CMS and arranges for the MP to provide the announcement in the appropriate stream so that the user hears the announcement. The MPC also serves as the termination for certain calls routed to it for IVR services. These might include, for example, calls in which the user dials an <free phone> number to reach a credit-card calling service operated by the IPCablecom network operator. When the MP collects information from the end-user, the MPC is responsible for interpreting this information and manage the IVR session accordingly. Hence, the MPC will manage call state.

The MPC can be standalone, or it can be embedded within the CMS. See Figure 2 and Figure 3 for illustrations of standalone and embedded MPC configurations.

4.3.1.2 Media Player (MP)

The Media Player is a media resource server. It is responsible for receiving and interpreting commands from the MPC and for delivering the appropriate announcement(s) to the MTA. The MP provides the media streams with the announcement contents. The MP also is responsible for accepting and reporting user inputs (e.g. DTMF tones). The MP functions under the control of the MPC.

An MP can be standalone, or it can be embedded with the MPC in a Media Server. See Figure 2 and Figure 4 for respective illustrations of the stand-alone and embedded MP configurations.

4.3.2 Multimedia Terminal Adapter (MTA)

The MTA has the ability to provide tones and a limited set of fixed-content announcements to the user. The MTA accepts NCS signalling requests from the CMS and plays the appropriate tones and announcements accordingly.

4.3.3 Media Gateway (MG)

The Media Gateway to the PSTN also has the ability to provide fixed-content announcements to PSTN end-users involved in off-net to on-net calls. The MG accepts TGCP request to play announcement from the Media Gateway Controller (MGC) and provides the announcements accordingly.

4.3.4 Media Gateway Controller (MGC)

The Media Gateway Controller (MGC) receives and mediates call-signalling information between the EuroPacketCable network and the PSTN. It also has the ability to request the MG to play announcements.

4.3.5 Call Management Server (CMS)

The CMS determines when announcements should be played at the MTA, when to use the resources of a network MPC/MP complex, and when to play announcements to a PSTN end-user from the MG. This is based on the status of a call in progress. The CMS then signals the appropriate entity: MTA, MPC, or MGC to play tones or announcements to the end-user, accordingly.

4.4 IPCablecom Audio Server Interface descriptions

The signalling interfaces to support Media Services are shown in Figure 2 and are summarized in Table 1.

Table 1: Announcement Interfaces

Interface	Signalling Components	Protocol
Ann-1	MTA/CMS, MGC/MG	NCS/TGCP with announcement packages
Ann-2	MPC/MP	The present document.
Ann-3	CMS/MPC, CMS/MGC	Undefined. See clause 4.4.3.
Ann-4	MP/MTA	RTP

The remainder of this clause provides an overview of the announcements interfaces introduced above.

4.4.1 Ann-1 Interface - CMS/MTA and MGC/MG Announcement package

The IPCablecom Network Call Signalling (NCS) protocol and the IPCablecom Trunking Gateway Protocol (TGCP) include an announcement package that can be used for the CMS-MTA and MGC-MG interfaces.

4.4.1.1 CMS/MTA Interface

The CMS to MTA interface provides a mechanism for the CMS to signal the MTA to play locally stored announcements. Simple tones and some frequently used fixed-content announcements (e.g. network busy) may be stored in the MTA so they can be played to the IPCablecom subscriber without tying up network bandwidth or media resources. Furthermore, storing these announcements in the MTA allows for providing informative progress tones to the end user independently of the Network State (e.g. congestion).

4.4.1.2 MGC/MG Interface

The MGC to MG interface provides a mechanism for the MG to play fixed-content announcements to PSTN end-users involved in off-net to on-net calls. For example, MG announcements may be used to provide PSTN users call progress information for calls that cannot be completed to the IPCablecom network (all-lines-busy). Simple, fixed-content announcements (e.g. all-lines-busy) may be stored at the Media Gateway to provide announcements to PSTN users.

4.4.2 Ann-2 interface - MPC/MP Announcement package

The MPC to MP protocol is based upon ITU-T Recommendation H.248 [3] and the packages defined in Annex M.1 of ITU-T Recommendation H.248 (see Bibliography). Less frequently used tones and fixed-content announcements, as well as all variable content and interactive announcements are provided by MPC and MP complex. With regards to the H.248 protocol architecture, the MPC plays the role of an MGC, while the MP plays the role of an MG.

When the CMS identifies a need for an AS-based announcement, it sends a request to the MPC over interface Ann-3. Upon receiving a request from the CMS, the MPC opens a session with the Media Player . The MP then interacts with the specified endpoint over interface Ann-4.

4.4.3 Ann-3 interface - CMS/MPC and CMS/MGC

The Ann-3 interface allows the CMS to request the MPC to establish announcement sessions between the MP and another endpoint. It also allows the CMS to request the MGC to have the MG play fixed-content announcements to a PSTN endpoint. This interface is currently undefined. It is expected that this signalling interface will be based upon the IPCablecom CMS/CMS signalling protocol being specified in TS 101 909-16 (see Bibliography). The protocol for the Ann-3 is for further study.

4.4.4 Ann-4 interface - MP/MTA

The interface Ann-4 defines the media stream format (RTP) for delivery of the announcement from the ANP to the MTA. The specifics of interface Ann-4 are not within the scope of the present document.

4.4.5 Audio Server Physical vs. Logical configuration

It should be noted that the MPC and MP are logical components that may reside in the same physical entities. When logical components reside in the same physical entity, interfaces between these components are not exposed and become unspecified.

It should also be noted that standalone components using the Ann-2 and Ann-3 interfaces specified in the present document may be shared by many network entities.

Figure 2 depicts an example of a network where the CMS, MPC, and MP are implemented as separate physical entities communicating over the Ann-2 and Ann-3 interfaces.

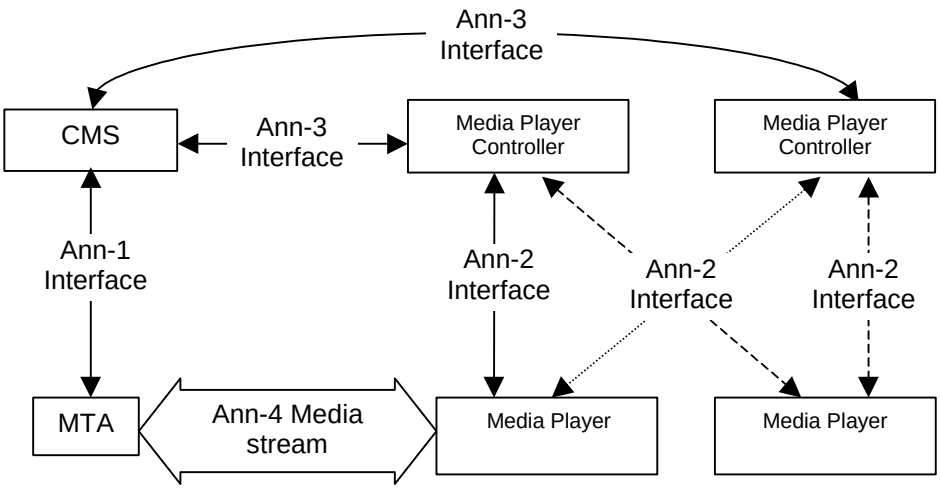


Figure 2: Standalone Components configuration

The MPC may be embedded with the CMS, as shown in Figure 3. In this case, interface Ann-3 is not exposed and becomes unspecified.

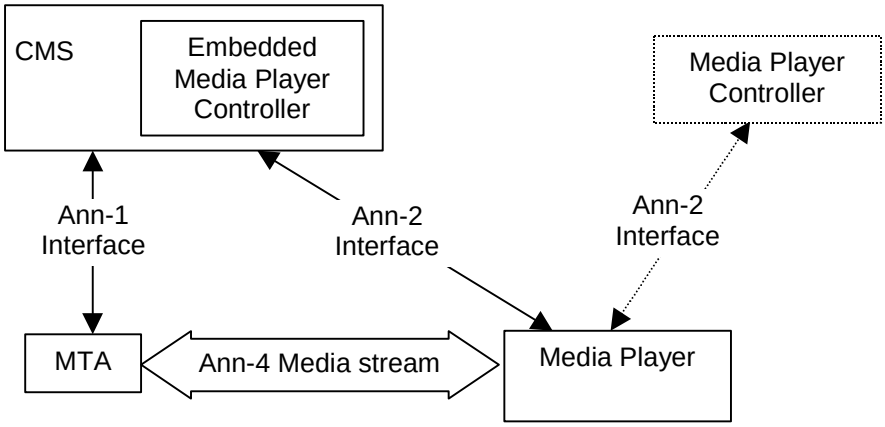


Figure 3: Embedded MPC configuration

Similarly, the MP may be embedded with the MPC, as shown in Figure 4, in which case the interface Ann-2 is not exposed and becomes unspecified.

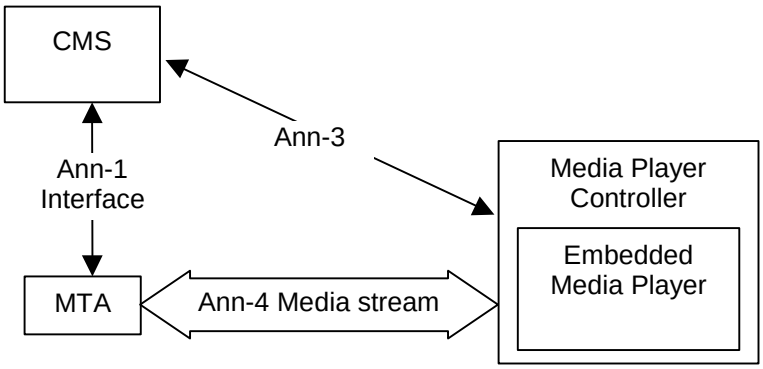


Figure 4: Embedded MP configuration

Finally, the CMS and AS, (MPC and MP) may be embedded in the same physical entity, in which case the Ann-2 and Ann-3 interfaces are not exposed and become unspecified.

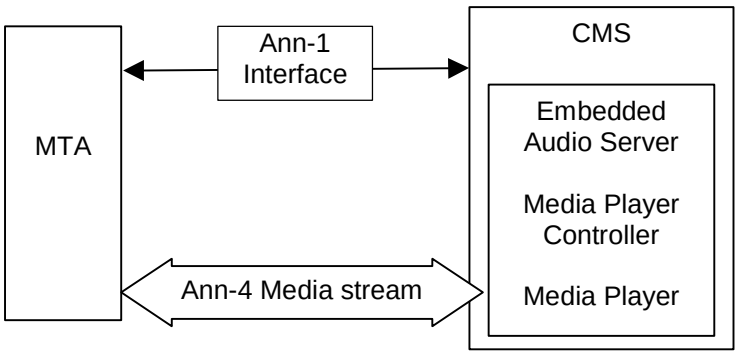


Figure 5: Embedded AS configuration

4.5 Interface Specifications

The IPCablecom Audio Server Specification identifies a set of interfaces between the components responsible for providing audio services. The following figure illustrates the interfaces between these components. Only where an interface is exposed is it expected to meet IPCablecom specification requirements.

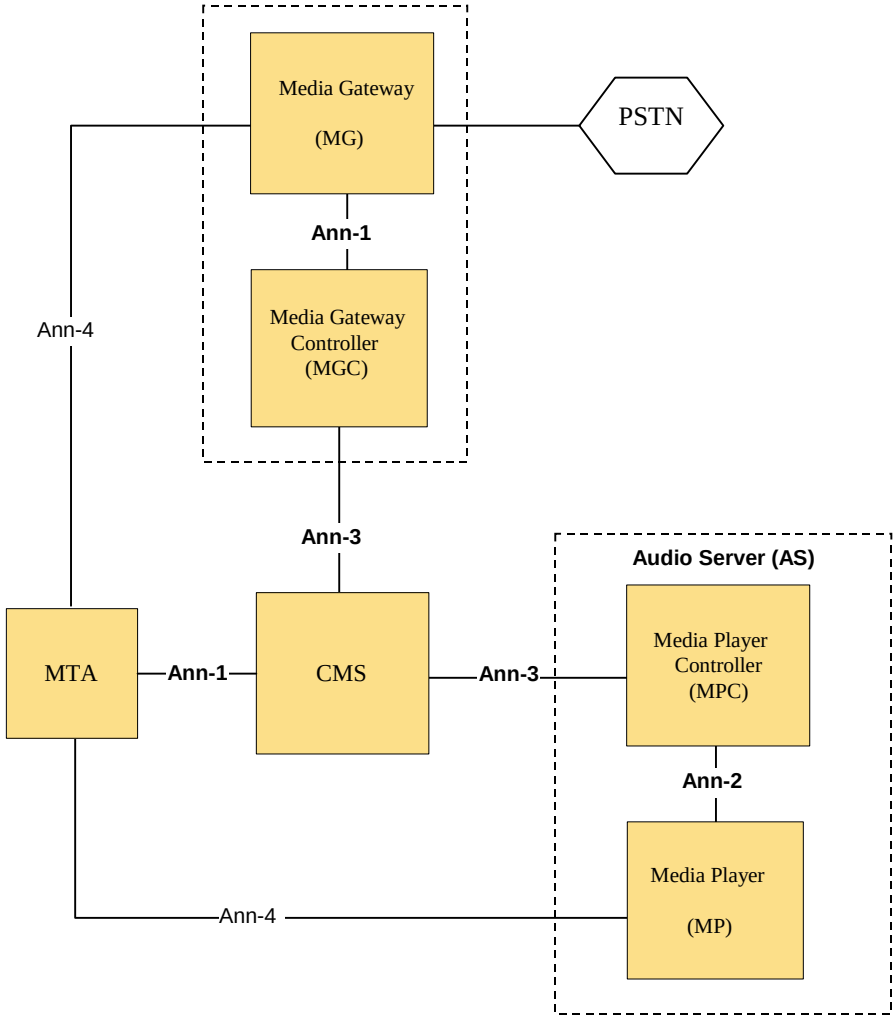


Figure 6: IPCablecom Audio Server Components and Interfaces

5 Ann-1 interface: CMS-MTA and MGC-MG

The CMS-MTA and MGC-MG announcement interfaces are implemented by the Legacy Audio Package of the NCS/TGCP protocol, which provides the playback of tones and fixed-content announcements to the end-users.

5.1 CMS-MTA Interface

Each MTA in the network may store a predefined set of simple announcements locally. When an announcement is needed, the CMS will decide if it should instruct the MTA to play a local announcement or set up a connection between the MTA and a Network ANS and have the announcement played over the network. Playing simple announcements from the MTA saves network resources.

The MTA may store announcements in either static or dynamic memory. If announcements are stored in dynamic memory then the announcements will not be available until the MTA has accessed them from the network.

For example, these simple announcements will require only a small amount of storage on the MTA. The table below illustrates the storage requirements for such announcements. The example uses an average announcement time of 10 seconds.

Table 2: ANS Storage

Number of Announcements	Announcement Length (seconds)	Encoding bytes/second	Bytes required
11	10	2 000 (ITU-T Recommendation G.728 [14])	220 kbytes
11	10	8 000 (PCMU/PCMA)	880 kbytes

MTAs require the ability to be updated dynamically with announcements so that the same MTA can move from service provider to service provider without requiring complete firmware upgrades. This capability is for further study.

5.1.1 Announcement list

The table below lists the text version of the announcements that should be stored locally on the MTA. Each MTA is required to store and play announcements similar to those defined in the following table. Announcements that address at least the following network conditions may be played using the announcement package of the NCS protocol. Cached versions of all announcement should be refreshed every time the MTA connects to the network. Other methods of propagating new announcements to MTAs, for instance while the MTA remains in service, is an issue for study by the provisioning team and is beyond the scope of the present document.

Table 3: Sample announcements

Sample Announcement	Name
Your call cannot be completed as dialled. Please check the number dialled and try again.	Vacant Code (cf. ITU-T Recommendation E.182 [13])
Please replace the receiver and try again. If you need help, replace the receiver and dial the operator.	Re-order time-out (cf. ITU-T Recommendation E.182 [13])
Your call cannot be completed as dialled. Please read the instruction card or call your operator for assistance.	Assisted Dialling (cf. ITU-T Recommendation E.182 [13])
Your call cannot be completed at this time. Please try your call again.	Reorder (cf. ITU-T Recommendation E.182 [13])
The network is busy at the moment. Please try your call later.	No Circuit (cf. ITU-T Recommendation E.182 [13])
The called number is not obtainable because of a network fault. Please try your call later.	Domestic Facility (cf. ITU-T Recommendation E.182 [13])
The party you are calling has declined to receive this call. Please try your call again with "Calling Line Identity" enabled.	Unidentified Call Reject
Thank you for using [carrier's name]	Branding (N/A in EU).

5.2 MGC-MG Interface

The MG announcement interface (Ann-1) allows for the MGC to request the MG play fixed-content announcements to PSTN end-users. The MGC/MG announcement interface package does not specify any standard announcements to be stored locally in the MG. All announcements are provisioned dynamically and are referenced accordingly.

This MG announcement provisioning capability is for further study.

6 Ann-2 interface: MPC-MP

An MP (Media Player) is a shared resource in the IPCablecom Network that can be instructed to provide media services to an end-user or terminal. These services include streaming fixed-content, variable content and interactive announcements to IPCablecom subscribers. For example, the MP is responsible for playing prompts and collecting digits when charging a call to a calling card.

The MP is controlled by an external element, the MPC (Media Player Controller). The MP is responsible for managing its own resources. When accepting a request, the MP SHALL make sure that the required resources are available before accepting request. When a single session involves multiple requests to the Media Player, the MP may experience a shortage of resources preventing it from accepting one given request belonging to that session. In this case, the MP user (i.e. the MPC) is responsible for re-sending the request or terminating the end-user session elegantly.

The ANN-2 interface shall be implemented as an H.248 profile described in the following clauses.

This profile shall be entitled "IPCablecom Audio Server". The version number shall be 1.0. This name shall be returned by conforming media players when sending a ServiceChange command as part of the initial registration of the MP.

6.1 Support of packages

6.1.1 Mandatory packages

The following packages SHALL be supported:

Package Name	Id	Version	Defined in
Generic	g	1	ITU Recommendation H.248 [3] Annex E
Base Root	root	1	ITU Recommendation H.248 [3] Annex E
Network	nt	1	ITU Recommendation H.248 [3] Annex E
Advanced Audio Server	aas	1	ITU Recommendation H.248 Annex M.1 (see Bibliography)
AAS Digit Collection	aasdc	1	ITU Recommendation H.248 Annex M.1 (see Bibliography)

6.1.2 Optional packages

The following packages MAY be supported:

Package Name		Version	Defined in
AAS Recording Package	aasrec	1	ITU Recommendation H.248 Annex M.1 (see Bibliography)
AAS segment management	aassm	1	ITU Recommendation H.248 Annex M.1 (see Bibliography)
Security	sec	1	TS 101 909-13 [2]

NOTE: The packages defined in ITU-T Recommendation H.248 Annex M.1 (see Bibliography) have been organized in a modular way, which makes possible to implement all the packages or only those which are required to support the most common features (i.e. playing announcements and collecting digits).

6.2 Compatibility rules

This profile is based on ITU-T Recommendation H.248 [3]. The compatibility rules for packages, signals, events, properties and statistics and the H.248 protocol are defined in ITU-T Recommendation H.248 [3].

6.3 Naming conventions

MP and MPC names shall be in the form of a domain name. An example MPC name is:

mpc1.whatever.net

Reliability is provided by the following precautions:

- MPs and MPCs are identified by their domain name, not their network addresses. Several addresses can be associated with a domain name. If a command cannot be forwarded to one of the network addresses, implementations SHALL retry the transmission using another address.
- MPs and MPCs may move to another platform. The association between a logical name (domain name) and the actual platform are kept in the Domain Name Service (DNS). MP and MPC SHALL keep track of the record's time-to-live read from the DNS. They SHALL query the DNS to refresh the information if the time-to-live has expired.

6.4 Topology descriptor

A Media Player conforming to this specification need not to implement Topology. MPCs that expect control gateway conforming to this specification shall not assume that Topology is supported.

6.5 Transaction timers

All transaction timers as specified in ITU-T Recommendation H.248 [3] shall be supported here.

6.6 Transport

Media Players SHALL implement UDP/ALF.

Media Player Controllers SHALL implement UDP/ALF.

6.7 Service change procedures

The Media Player shall allow one primary and one or more secondary Media Player Controller to be provisioned for registration.

6.8 Security

Media Players and Media Player Controllers SHALL implement IPsec (RFC 2401 [20]) and SHALL use IKE (RFC 2409 [21]) for key management.

6.9 Encoding

Conforming Media Players SHALL support text encoding.

6.10 Use of SDP

Strict conformance to RFC 2327 [15] is required. However, MPs and MPCs may make certain simplifying assumptions about the session description as specified in the following.

SDP usage depends on the type of session, as specified in the "media" parameter. This Technical Specification only support media of type "audio".

The SDP profile provided describes the use of the session description protocol on the MP-MPC interface. The general description and explanation of the individual parameters can be found in RFC 2327 [15], however below we detail what values MPs and MPCs need to provide for these fields (send) and what MPs and MPCs should do with values supplied or not supplied for these fields (receive).

Any parameter not specified below SHOULD NOT be provided by any MP or MPC, and if such a parameter is received, it SHOULD be ignored.

6.10.1 Protocol version (v=)

```
v= <version>
v= 0
```

Send: SHALL be provided in accordance with RFC 2327 (i.e. v=0)

Receive: SHALL be provided in accordance with RFC 2327.

6.10.2 Origin (o=)

The origin field consists (o=) of 6 sub-fields in RFC 2327 [15]:

```
o= <username> <session-ID> <version> <network-type> <address-type> <address>
o= - 2987933615 2987933615  IN   IP4    A3C47F2146789F0
```

Username:

Send: Hyphen SHALL be used as username when privacy is requested. Hyphen SHOULD be used otherwise.

Receive: This field SHOULD be ignored.

Session-ID:

Send: SHALL be in accordance with RFC 2327 for interoperability with non-EuroPacketCable clients.

Receive: This field SHOULD be ignored.

Version:

Send: In accordance with RFC 2327.

Receive: This field SHOULD be ignored.

Network Type:

Send: Type "IN" SHALL be used.

Receive: This field SHOULD be ignored.

Address Type:

Send: Type "IP4" SHALL be used.

Receive: This field SHOULD be ignored.

Address:

Send: SHALL be in accordance with RFC 2327 for interoperability with non-EuroPacketCable clients.

Receive: This field SHALL be ignored.

6.10.3 Session name (s=)

```
s= <session-name>
s= -
```

Send: Hyphen SHALL be used as Session name.

Receive: This field SHALL be ignored.

6.10.4 Session and media information (i=)

```
i= <session-description>
```

Send: This field SHALL NOT be used.

Receive: This field SHALL be ignored.

6.10.5 URI (u=)

```
u= <URI>
```

Send: This field SHALL NOT be used.

Receive: This field SHALL be ignored.

6.10.6 E-mail address and phone number (e=, p=)

```
e= <e-mail-address>
p= <phone-number>
```

Send: This field SHALL NOT be used.

Receive: This field SHALL be ignored.

6.10.7 Connection data (c=)

The connection data consists of 3 sub-fields:

```
c= <network-type> <address-type> <connection-address>
c= IN        IP4 10.10.111.11
```

Network Type:

Send: Type "IN" SHALL be used.

Receive: Type "IN" SHALL be present.

Address Type:

Send: Type "IP4" SHALL be used.

Receive: Type "IP4" SHALL be present.

Connection Address:

Send: This field SHALL be filled with a unicast IP address at which the application will receive the media stream. Thus a TTL value SHALL NOT be present and a "number of addresses" value SHALL NOT be present. The field SHALL NOT be filled with a fully-qualified domain name instead of an IP address. A non-zero address specifies both the send and receive address for the media stream(s) it covers.

Receive: A unicast IP address or a fully qualified domain name SHALL be present. A non-zero address specifies both the send and receive address for the media stream(s) it covers.

6.10.8 Bandwidth (b=)

```
b= <modifier> : <bandwidth-value>
b= AS : 64
```

Send: Bandwidth information is optional in SDP but it SHOULD always be included. When an rtpmap or a non codec not identified in TS 101 909-03 is used, the bandwidth information SHALL be used.

Receive: Bandwidth information SHOULD be included. If a bandwidth modifier is not included, the receiver SHALL assume reasonable default bandwidth values for well-known codecs.

Modifier:

Send: Type "AS" SHALL be used.

Receive: Type "AS" SHALL be present.

Bandwidth Value:

Send: The field SHALL be filled with the Maximum Bandwidth requirement of the Media stream in kilobits per second.

Receive: The maximum bandwidth requirement of the media stream in kilobits per second SHALL be present.

6.10.9 Time, repeat times and time zones (t=, r=, z=)

```
t= <start-time> <stop-time>
t= 36124033 0
r= <repeat-interval> <active-duration> <list-of-offsets-from-start-time>
z= <adjustment-time> <offset>
```

Send: Time SHALL be present; start time MAY be zero, but SHOULD be the current time, and stop time SHOULD be zero. Repeat Times, and Time Zones SHOULD NOT be used, if they are used it should be in accordance with RFC 2327.

Receive: If any of these fields are present, they SHOULD be ignored.

6.10.10 Encryption keys

```
k= <method>
k= <method> : <encryption-keys>
```

Security services for EuroPacketCable are to be defined by the EuroPacketCable Security specification. The security services specified for RTP and RTCP do not comply with those of RFC 1889 [16], RFC 1890 [17], and RFC 2327 [15]. In the interest of interoperability with non-EuroPacketCable devices, the "k" parameter will therefore not be used to convey security parameters.

Send: SHALL NOT be used.

Receive: This field SHOULD be ignored.

6.10.11 Attributes (a=)

```
a=  <attribute> : <value>
a=  rtpmap : <payload type> <encoding name>/<clock rate> [/<encoding parameters>]
a=  rtpmap : 0 PCMU / 8000
a=  X-pc-codecs: <alternative 1> <alternative 2> …
a=  X-pc-secret: <method>:<encryption key>
a =     X-pc-csuites-rtp: <alternative 1> <alternative 2> …
a =     X-pc-csuites-rtcp: <alternative 1> <alternative 2> …
a =     X-pc-spi-rtcp: <value>
a =     X-pc-bridge: <number-ports>
a=  <attribute>
a=  recvonly
a=  sendrecv
a=  sendonly
a=  ptime
```

Send: One or more of the "a" attribute lines specified below MAY be included. An attribute line not specified below SHOULD NOT be used.

Receive: One or more of the "a" attribute lines specified below MAY be included and SHALL be acted upon accordingly. "a" attribute lines not specified below may be present but SHALL be ignored.

rtpmap:

Send: When used, the field SHALL be used in accordance with RFC 2327. It MAY be used for well-known as well as well as non well-known codecs. The encoding names used are provided in a separate EuroPacketCable specification.

Receive: The field SHALL be used in accordance with RFC 2327.

X-pc-codecs:

Send: The field contains a list of alternative codecs that the endpoint is capable of using for this connection. The list is ordered by decreasing degree of preference, i.e. the most preferred alternative codec is the first one in the list. A codec is encoded similarly to "encoding name" in rtpmap.

Receive: Conveys a list of codecs that the remote endpoint is capable of using for this connection. The codecs SHALL NOT be used until signalled through a media (m=) line.

X-pc-secret:

Send: The field contains an end-to-end secret to be used for RTP and RTCP security. The secret is encoded similarly to the encryption key (k=) parameter of RFC 2327 with the following constraints:

- The encryption key SHALL NOT contain a ciphersuite, only a passphrase.
- The <method> specifying the encoding of the pass-phrase SHALL be either "clear" or "base64" as defined in RFC 2045, except for the maximum line length which is not specified here. The method "clear" SHALL NOT be used if the secret contains any characters that are prohibited in SDP.

Receive: Conveys the end-to-end secret to be used for RTP and RTCP security.

X-pc-csuites-rtp:
X-pc-csuites-rtcp:

Send: The field contains a list of ciphersuites that the endpoint is capable of using for this connection (respectively RTP and RTCP). The first ciphersuite listed is what the endpoint is currently expecting to use. Any remaining ciphersuites in the list represent alternatives ordered by decreasing degree of preference, i.e. the most preferred alternative ciphersuite is the second one in the list. A ciphersuite is encoded as specified below:

ciphersuite = [AuthenticationAlgorithm] "/" [EncryptionAlgorithm]

AuthenticationAlgorithm = 1*(ALPHA / DIGIT / "-" / "_")

EncryptionAlgorithm = 1*(ALPHA / DIGIT / "-" / "_")

where ALPHA, and DIGIT are defined in RFC 2234. Whitespaces are not allowed within a ciphersuite. The following example illustrates the use of ciphersuite:

62/51

The actual list of ciphersuites to be provided in the EuroPacketCable Security Specification.

Receive: Conveys a list of ciphersuites that the remote endpoint is capable of using for this connection. Any other ciphersuite than the first in the list cannot be used until signalled through a new ciphersuite line with the desired ciphersuite listed first.

X-pc-spi-rtcp:

Send: The field contains the IPSEC Security Parameter Index (SPI) to be used when sending RTCP packets to the endpoint for the media stream in question. The SPI is a 32-bit identifier encoded as a string of up to 8 hex characters. The field SHALL be supplied when RTCP security is used.

Receive: Conveys the IPSEC SPI to be used when sending RTCP packets over IPSEC. The field SHALL be present when RTCP security is used.

X-pc-bridge:

Send: MPCs and MPss SHALL NOT use this attribute.

Receive: MPCs and MPs SHALL ignore this attribute if received.

recvonly:

Send: The field SHALL be used in accordance with RFC 2543.

Receive: The field SHALL be used in accordance with RFC 2543.

sendrecv:

Send: The field SHALL be used in accordance with RFC 2543.

Receive: The field SHALL be used in accordance with RFC 2543.

sendonly:

Send: The field SHALL be used in accordance with RFC 2543, except that the IP address and port number SHALL NOT be zeroed.

Receive: The field SHALL be used in accordance with RFC 2543.

ptime:

Send: The ptime SHOULD always be provided and when used it SHALL be used in accordance with RFC 2327. When an rtpmap or non well-known codec is used, the ptime SHALL be provided.

Receive: The field SHALL be used in accordance with RFC 2327. When "ptime" is present, the MTA SHALL use the ptime in the calculation of QoS reservations. If "ptime" is not present, the MTA SHALL assume reasonable default values for well-known codecs.

6.10.12 Media Announcements (m=)

Media Announcements (m=) consists of 3 sub-fields:

```
M= <media> <port> <transport> <format>
M= audio 3456 RTP/AVP 0
```

Media:

Send: The "audio" media type SHALL be used.

Receive: The type received SHALL be "audio".

Port:

Send: SHALL be filled in accordance with RFC 2327. The port specified is the receive port, regardless of whether the stream is unidirectional or bi-directional. The sending port may be different.

Receive: SHALL be used in accordance with RFC 2327. The port specified is the receive port. The sending port may be different.

Transport:

Send: The transport protocol "RTP/AVP" SHALL be used.

Receive: The transport protocol SHALL be "RTP/AVP".

Media Formats:

Send: Appropriate media type as defined in RFC 2327 SHALL be used.

Receive: In accordance with RFC 2327.

6.11 Timestamps

Media Players are not required to include timestamps in every Notify command.

6.12 Digits Maps

Media Players are required to support Digit Maps, according to ITU-T Recommendation H.248 Annex M.1 (see Bibliography).

Annex A (informative): Bibliography

- ETSI TS 101 909-4: "Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 4: Network Call Signalling Protocol".
- ETSI TS 101 909-16: "Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 16:Signalling for Call Management Server".
- ITU-T Recommendation H.248, Annex M.1: "Audiovisual and multimedia systems - Infrastructure of audiovisual services - Communication procedures - Media Gateway Control Protocol - Audio Server packages".
- ITU-T Recommendation J.162: "Network call signalling protocol for the delivery of time critical services over cable television networks using cable modems".
- ITU-T Recommendation J.171: "IPCablecom Trunking Gateway Control Protocol (TGCP)".

History

Document history		
V1.1.1	March 2002	Publication