Digital Video Broadcasting (DVB);

DVB-IPTV

SRM delivery over IPTV networks

DVB Document A149
March 2010


DVB
Digital Video
Broadcasting

TM4351

DVB-IPTV

SRM delivery over IPTV networks

Version: 0.5
Document name: tm-ipi-srm-v5-clean.doc
Date: 15.12.2009

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Introduction

System Renewability Messages (SRMs) are messages issued by the administrator of a Content Protection (CP) System that, when sent to devices using that CP System, can revoke permission of certain devices or groups of devices to obtain content protected by that CP System. Different CP Systems will each have their own SRM to maintain the integrity of their systems; e.g., in the event that device keys are stolen and cloned. Although the term “system renewability” also can refer to the capability of a far more comprehensive renewal of the security components of a content protection system, content protection technology developers refer to their revocation list as a “System Renewability Message”.

SRMs are for example used in case of HDCP to provide a list of revoked devices (e.g. compromised display devices) to DVD/Blu-ray players. The delivery of content to such revoked devices via the HDCP protected digital interface (e.g. HDMI) will be restricted.

SRM content, its processing and protection is specific to the CP System and outside the scope of this document. SRM delivery shall be transparent to it.

SRMs are for example included on DVD and Blu-Ray discs. SRM delivery in a MPEG-2 TS is defined by ATSC in A/98 [4] and DVB in ETSI TS 102 770 [3]. These solutions are targeted to broadcast distribution and require that the terminal device (e.g. STB) is tuned to the specific transport stream (e.g. TV channel) with the SRM messages included. In case of IPTV SRMs can be delivered directly over the IP network and the terminal device can access the SRMs independently of its access to a specific TV channel or content item.

DVB CM-IPTV has defined commercial requirements for SRM delivery over IP networks [1].This document defines a technical solution for the SRM delivery over IP networks by defining the announcement and download of SRMs over IPTV networks and introduces the changes to DVB IPTV Handbook V1.4 [2].

References

[1] cm-iptv0473r3; Commercial Requirements for SRM delivery over IPTV networks

[2] DVB Bluebook A086r8; DVB-IPTV 1.4: Transport of MPEG 2 TS Based DVB Services over IP Based Networks (dTS 102 034 V1.4.1)

[3] ETSI TS 102 770 V1.1.1; DVB - System Renewability Messages (SRM) in DVB Systems

[4] ATSC A/98; System Renewability Message Transport

[5] ETSI TS 102 824; Remote Management and Firmware Update System for DVB IPTV Services

[6] ETSI TS 101 162 V1.2.1; DVB - Allocation of Service Information (SI) and Data Broadcasting Codes for Digital Video Broadcasting (DVB) systems

[7] IETF RFC 2974: "SAP - Session Announcement Protocol".

[8] IETF RFC 4566: "SDP - Session Description Protocol".

[9] DCP LLC; “HDCP - Interface Independent Adaptation"; Version 2.0

[10] IETF RFC 2616: "Hypertext Transfer Protocol - HTTP/1.1".

[11] IETF RFC 3926: "FLUTE - File Delivery over Unidirectional Transport".

[12] ETSI TS 102 472; DVB - IP Datacast over DVB-H: Content Delivery Protocols

[13] IETF RFC 3695: “Compact Forward Error Correction (FEC) Schemes”

Requirements

DVB CM-IPTV has defined a brief set of commercial requirements in [1]. They ask for signaling the type and version of the SRMs available for download to the HNED, a reliable download of the SRMs over the IP network to the HNED independent of the delivery of content items and the reuse of existing DVB-IPTV signaling, metadata and download mechanisms.

Security requirements are explicitly not included in the commercial requirements. Security (e.g. authentication, encryption) of the SRM itself is defined by the CP System using the SRM and is outside the scope of SRM delivery.

Technical solution

SRM delivery is a new service for DVB-IPTV. It has some similarities with the Firmware update Service (FUS) defined in the DVB-IPTV RMS/FUS specification [5] and the Content Download Service (CDS) defined in the IPTV Handbook [2]. SRM delivery consists of announcement and download services. SRM announcement services provide information about the availability of SRMs for download (= SRM Download service) for specific CP Systems. SRM download services define the location and protocol to be used for downloading SRMs.

SRM announcement

The basic entry point for service announcements in DVB-IPTV is SD&S as defined in clause 5 of the DVB IPTV handbook [2]. Specific SD&S records for SRM announcements are defined. It is possible to directly provide SRM download service information in such records or alternatively point to dedicated SRM announcement services. Both approaches are supported.

SRM Identifiers

SRM specific identifiers are defined to differentiate between different SRMs in the delivery process and to indicate the CP System for which the SRM is issued.

CP System ID

The DVB SRM over MPEG2-TS specification TS 102 770 [3] uses the CP System ID defined in TS101162 [6] to identify the CP System for which a SRM is delivered. CP System IDs are introduced by DVB CPCM to identify CP Systems to which DVB-CPCM content will be exported. They are allocated by DVB Services SARL (http://www.dvbservices.com/identifiers/cp_system_id). CP System IDs for CPCM (0x000 – 0x0002), DTCP (0x0100) and HDCP (0x0101) are already allocated. The CP System ID will also be used for the identification of CP Systems in SRM delivery over IP networks.

CP System SRM ID

In addition an optional CP System SRM identifier is introduced to support Content Protection Systems which may have more than one type of SRMs under the same CP System ID. One example is CPCM which supports up to eight Compliance and Robustness (C&R) schemes under one root authority. Each C&R scheme or a combination of C&R schemes can have its own SRM. The root authority will be uniquely identified by a CP System ID (currently only one CP System ID is allocated for CPCM SRMs representing one root authority). SRMs for the individual C&R schemes will be indicated by the CP System SRM ID.

The usage of the CP System SRM ID has to be defined by the CP system. However for the SRM delivery system it is required that SRMs with the same CP System ID but which have to be treated individually (individual announcement and download) must have unique CP System SRM IDs so that the SRM delivery system can differentiate between them by a simple equal/not equal comparison. A binary string (hexadecimal coded) with a maximum of 256 bytes is therefore proposed as CP System SRM ID.

SD&S SRM announcement

A new SD&S Payload ID (0x09) for SD&S SRM offerings is defined.

A new SD&S SRM offering record is defined, which provides SRM announcement service offerings and SRM download service offerings.

The SD&S SRM offering record is XML encoded by extending the existing SD&S XML schema.

SRM announcement service offering

A SRM announcement service offering provides a list of dedicated SRM announcement services. For each SRM announcement services it provides the list of CP System IDs and optional CP System SRM IDs that are covered by the announcement service and how to access the announcement service. The list of CP System IDs and CP System SRM IDs can have a single entry, multiple entries or no entry. In the latter case the HNED has to access the service in order to get information on which CP System IDs and CP System SRM IDs are supported by the service. In case a CP System uses CP System SRM IDs and only the CP System ID is provided in the announcement the HNED has to access the service in order to get information about which CP System SRM IDs are supported by the service.

Multiple SRM announcement services for the same CP System ID or combination of CP System ID and CP System SRM ID are possible. The behavior of the HNED in selecting a particular SRM announcement service in this case is implementation specific.

SRM download service offering

An SRM download service offering provides a list of SRM download services. For each SRM download service it provides the list of CP System IDs and optional CP System SRM IDs that are covered by the download service and how to access the download service. The list of CP System IDs and CP System SRM IDs can have a single entry, multiple entries or no entry. In the latter case the HNED has to access the service in order to get information on which CP System IDs and CP System SRM IDs are supported by the service (i.e. FLUTE FDT). In case a CP System uses CP System SRM IDs and only the CP System ID is provided in the announcement the HNED has to access the service (i.e. FLUTE FDT) in order to get information about which CP System SRM IDs are supported by the service.

Multiple SRM download services for the same CP System ID or combination of CP System ID and CP System SRM ID are possible. The behavior of the HNED in selecting a particular SRM download service in this case is implementation specific.

Dedicated SRM announcement service

The dedicated SRM announcement service provides a list of SRM download services for one or more CP System IDs. For each SRM download service it provides the list of CP System IDs and optional CP System SRM IDs that are covered by the download service and how to access the download service. The list of CP System IDs and CP System SRM IDs can have a single entry, multiple entries or no entry. In the latter case the HNED has to access the service in order to get information on which CP System IDs are supported by the service (i.e. FLUTE FDT). In case a CP System uses CP System SRM IDs and only the CP System ID is provided in the announcement the HNED has to access the service (i.e. FLUTE FDT) in order to get information on which CP System SRM IDs are supported by the service.

Note that for a HTTP unicast download service one and only one CP System ID or combination of CP System ID and CP System SRM ID has to be provided to clearly identify the SRM delivered by this service.

Dedicated SRM announcement services are delivered via unicast using HTTP [10] or via multicast using SAP [7].

HTTP unicast announcement service

In this case the SRM announcements are distributed via unicast using HTTP [10]

The SD&S SRM announcement service offering provides the URL of the SRM announcement information on the HTTP server.

The dedicated HTTP unicast announcement service provides XML coded SRM download offerings record reusing the SD&S SRM download service offering scheme defined for SD&S.

SAP multicast announcement service

In this case the SRM announcements are distributed via multicast using SAP [7]

The SD&S SRM announcement service offering provides the multicast address, port and optional source address (in case of source specific multicast) of the SAP multicast channel.

The dedicated SAP multicast announcement service provides SDP coded SRM Download Offering records. The information provided by SDP is the same as provided by the XML SRM download record of the HTTP unicast announcement service defined above. Due to the limitations of SAP to 1 Kbyte packet size a SDP message shall contain only the announcement for a single SRM download service. Several SRM download services shall be announced with separate SDP messages distributed via the same SAP multicast channel.

SRM download service

SRMs are usually in the range of several Kbyte to Mbyte. HDCP SRMs are for example limited to 5 Kbyte [9]. Therefore no sophisticate download methods have to be supported. For unicast HTTP download will be used and for multicast FLUTE.

HTTP unicast SRM download service

The unicast SRM download service uses HTTP [10] to download a SRM. The location of the SRM file (URI) is provided by the SRM download service offering together with the CP System ID and optional CP System SRM ID for which the SRM file is valid and the version number of the SRM file.

FLUTE multicast SRM download service

The FLUTE protocol [11] is used for the multicast SRM download service. One or more SRM files can be delivered by a FLTUE session. An SRM FLUTE session runs as a dynamic carousel as defined in the DVB IPDC CDP specification [12]. This allows a HNED to join the session at any time to acquire the SRM files. SRM files can be updated and SRM files for new CP System IDs can be added during the session. The FLUTE FDT is extended to provide the CP System ID, optional CP System SRM ID and SRM file version number for each SRM file.

Due to the limited size of the SRM only single channel FLUTE sessions are supported. Only the Compact No-Code FEC scheme [13] is supported. If an error occurs during the transmission the file can be recovered at a later time when it is repeated in the carousel.

The TSI, multicast address, port and optional source address of the FLUTE session are provided by the SRM download service offering together with an optional FLUTE session version number and the optional list of CP System IDs, CP System SRM IDs and SRM file version numbers of the SRMs delivered by the FLUTE session.

Changes to the DVB IPTV Handbook

This chapter defines the changes to the DVB IPTV Handbook [2] in order to support SRM delivery over IPTV networks.

Clause 1 Scope

- In general change from phase 1.4 to phase 1.5
- Remove the existing bullet items
- Add new bullet item:
  - Support for delivery of System Renewability Messages (SRM) over IP networks

Clause 1.1.1 What is within the scope

- Add new bullet item after the bullet item starting with “Clause 10”:
  - Clause 12 specifies SRM delivery over IP networks. SRMs are a messages issued by the administrator of a Content Protection (CP) System that, when sent to devices that use that CP System, can revoke permission of certain devices or groups of devices to obtain content protected by that CP System. Clause 12 defines the announcement and download mechanisms for the delivery of SRMs to HNEDs over IP networks.

Clause 2.1 Normative references

- Change the following reference:

[27] IETF RFC ~~2~~4234: "Augmented BNF for Syntax Specifications: ABNF".

- Add the following references:

[112] ETSI TS 102 770: "Digital Video Broadcasting (DVB); System Renewability Messages (SRM) in DVB Systems ".

[113] IETF RFC 3695: “Compact Forward Error Correction (FEC) Schemes”.

Clause 3.2 Abbreviations

- Add the following abbreviation:

CP Content Protection
SRM System Renewability Message

Clause 4.1.3 Diagram of the DVB-IPTV Protocol Stack

– Make the following changes to the paragraph above figure 3:

~~In this updated version of the present document t~~The initial boot procedure uses a stub file (FUSStub) downloaded over HTTP ~~for~~ (unicast) or acquired from a multicast DVBSTP service~~, this stub file mechanism replaces the identification agent method used in previous versions of this present document~~.

For Content Download Services (CDSs) the HTTP protocol is used for unicast delivery and the FLUTE protocol for multicast delivery. Content download sessions are described in XML or SDP syntax and delivery is via HTTP (unicast) or SAP (multicast for SDP data) or DVBSTP (multicast for XML data). The mechanisms and protocols are specified in clause 10.

For System Renewability Message (SRM) delivery over IP the HTTP protocol is used for unicast download and the FLUTE protocol for multicast download. HTTP (unicast) and SAP (multicast) are used for SRM announcements. The mechanisms are specified in clause 12.

– Update figure 3 to have SRM download over FLUTE and HTTP and SRM announcements over SAP and HTTP.

Clause 5.2.2.1 SD&S Information data types

– Add the following bullet item:

- SRM Announcement Information to download SRMs to HNEDs.

– Add the following payload ID value to Table 1:

0x09	SRM announcement Information
0x0~~A9~~ to 0xA0	Reserved

Clause 5.2.6 DVB-IPTV service discovery information

- add the following new sub-clauses:

5.2.6.9 SRM Offering Record

The SRM Offering Record provides information for the delivery of System Renewability Messages (SRMs) over IP networks to HNEDs.

The SRM Offering Record shall use the Payload ID value 0x09 as defined in Table 1 and inherit the base Offering Record defined in clause 5.2.6.1. The domain name is the domain name of the provider of the SRM delivery services.

For more information on SRM delivery over IP network see clause 12.

The SRM Offering Record provides a list of SRM announcement (see clause 12.4) and download services (see clause 12.5) for specific CP Systems. For each SRM announcement and download service the list of supported CP System IDs, optional CP System SRM IDs (see clause 12.3) and information on how to access the service is provided. The list of CP System IDs and CP System SRM IDs can have a single entry, multiple entries or no entry. In the latter case the HNED has to access the specific service in order to know which CP System IDs and CP System SRM IDs are supported by the service. In case a CP System uses CP System SRM IDs and only the CP System ID is provided in the announcement the HNED has to access the service in order to get information about which CP System SRM IDs are supported by the service.

Note that in case of a HTTP unicast SRM download service announcements one and only one CP System ID or combination of CP System ID and CP System SRM ID has to be provided to clearly identify the SRM provided by the service.

A SRM file version number shall be provided together with the CP System ID and optional CP System SRM ID for HTTP unicast SRM download services and may be provided for FLUTE unicast SRM download services. This SRM file version number shall be incremented each time an updated SRM file is available via the HTTP download. An announcement service version number may be provided for SRM announcement services. This announcement service version number shall be incremented each

time new or updated announcements are available via the SRM announcement service. A FLUTE session version number may be provided for FLUTE multicast SRM download services. This FLUTE session version number shall be incremented each time new or updated SRM files are available via the FLUTE download session. For more information on the different version numbers and their usage see clause 12.6.

Note that multiple announcement and download services can be offered for a specific CP System ID and CP System SRM ID. The behavior of the HNED in selecting a particular service in this case is implementation specific.

Table 12: SRM Offering Record

Element/Attribute Name	Element/Attribute Description	Mandated/ Optional
SRMOffering:	SRM Offering Record (extending the OfferingBase from Table 3)	
SRMAnnouncementService (one entry per service)	SRM Announcement Service information	O
SRMID List	List of SRM IDs of SRMs supported by the SRM Announcement Service	M (see note 1)
SRMID	SRM ID	O
CPSystemID	CP System ID	M (see note 1)
CPSystem SRMID	CP System SRM ID	O
AnnouncementServiceVersion	Version of the SRM Announcement Service (see clause 12.6.4)	O
SRMAnnouncementMode	Information on how to access the SRM Announcement Service.	M (see note 1)
SAP Delivery	SAP session information	O
Address	Address of the SAP Multicast Channel	M (see note 1)
Port	Port of the SAP Multicast Channel	M (see note 1)
Source	Source address in case of source specific multicast	O
HTTP Delivery	File URI for unicast HTTP delivery	O
SRMDownloadService (one entry per service)	SRM Download Service information	O
FLUTE	FLUTE download service information	O
SRMIDVerList	List of SRM IDs and SRM file version umbers of SRMs supported by the FLUTE Download Service	M (see note 1)
SRMIDVer	SRM ID	O
CPSystemID	CP System ID	M (see note 1)
CPSystem SRMID	CP System SRM ID	O
SRMFileVersion	SRM File version number	O
FLUTESessionVersion	FLUTE session version (see clause 12.6.2)	O
Address	Address of the Flute Multicast Channel	M (see note 1)
Port	Port of the Flute Multicast Channel	M (see note 1)
Source	Source address in case of source specific multicast	O
TSI	Transport Session Indicator of the FLUTE session	M (see note 1)
HTTP	HTTP download service information	O

Element/Attribute Name	Element/Attribute Description	Mandated/ Optional
SRMIDVer	SRM ID and SRM file version of SRM supported by the HTTP Download service	M (see note 1)
CPSystemID	CP System ID	M (see note 1)
CPSystem SRMID	CP System SRM ID	O
SRMFileVersion	SRM File version number	M (see note 1)
Location	File URI for unicast HTTP download	M (see note 1)
NOTE 1: The Mandatory here means that if the Optional parent element is transmitted, then this field shall be present.		

New Clause 12

- add the following new clause 12:

12 SRM delivery over IP networks

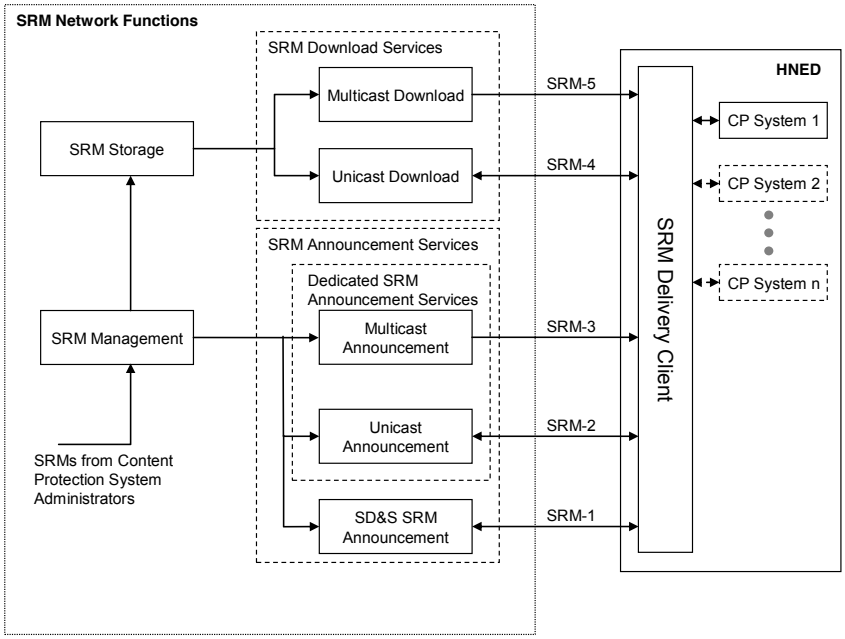
12.1 Overview

An important function of Content Protection (CP) Systems is the field renewability of important parts of the system implementation in order to replace or revoke such parts which have been compromised and fail in further preventing undesired us of content. That renewability information is conveyed to consumer equipment in the form of System Renewability Messages (SRMs). SRMs are for example delivered as part of the content on packaged media like DVDs. For delivery over broadcast networks DVB has defined SRM transport in a MPEG-2 transport stream in TS 102 770 [112]. While MPEG-2 transport streams with SRMs can also be delivered over IP networks, the following clauses define the delivery of SRMs to HNEDs directly over IP out-of-band of the media delivery.

NOTE: The SRM delivery service defines no support for securing the announcement and download of SRMs. It can therefore not guarantee that the HNEDs always have the latest and correct SRMs. It is up to the CP Systems to take care of that.

12.2 Functional Architecture

Figure 22 below shows the SRM delivery functional architecture. The architecture includes logical interfaces between the SRM network functional components and the SRM Delivery Client on the HNED (SRM-x, see Table 32). These interfaces are part of the IPI-1 interface and defined in the following clauses. Interfaces between network functional components (e.g. between SRM Management and SRM Storage) and between the SRM Delivery CP System on the HNED are out of scope of this specification.



NOTE: All functions identified in the figure are logical rather than physical. No physical device is implied. The arrow direction indicates the main message flow.

Figure 22: SRM Delivery Functional Architecture

The SRM Storage holds the SRMs which are delivered to the HNED via the multicast or unicast download services. The SRM Management receives the SRMs from the CP System administrators, puts them on the SRM storage and generates the SRM announcement information accordingly. The SRM Download and Announcement Services and the SRM Delivery Client functionality are defined in the following clauses. SRM Storage and SRM Management are out of scope of this specification.

Table 32: SRM-x interfaces

Interface	Functionality
SRM-1	SD&S SRM announcement (see clause 12.4.1)
SRM-2	Dedicated SRM unicast announcement (see clause 12.4.2.1)
SRM-3	Dedicated SRM multicast announcement (see clause 12.4.2.2)
SRM-4	Unicast SRM download (see clause 12.5.1)
SRM-5	Multicast SRM download (see clause 12.5.2)

12.3 SRM specific identifiers

SRM specific identifiers are defined to differentiate between different SRMs in the delivery process and to indicate the CP System for which the SRM is issued.

12.3.1 CP System ID

SRMs are issued for a specific Content Protection System. The SRM delivery system uses the CP System ID defined in TS 101 162 [2] to identify the Content Protection System for which a SRM is issued. The CP System ID is also used in TS 102 770 [112] to identify the CP Systems for which SRMs are delivered over MPEG-2 transport streams.

12.3.2 CP System SRM ID

Some Content Protection Systems support different SRMs (e.g. different protocol versions, different compliance regimes) which have to be distributed in parallel. In order to support the individual announcement and download of such SRMs a CP System SRM ID can be optionally be used in combination with the CP System ID. This CP System SRM ID shall be a binary string (hexadecimal

coded) with a maximum length of 256 bytes. The usage of the CP System SRM ID is CP System specific and has to be defined by the CP System. However for the SRM delivery system it is required that SRMs with the same CP System ID which have to be delivered individually (dedicated announcement and download) must have unique CP System SRM IDs so that the SRM delivery system can differentiate between them by a simple equal/not equal comparison.

12.4 SRM Announcement Services

SRM announcement services provide announcements for SRM download services or provide pointers to other SRM announcement services.

The announcements provide the list of CP System IDs and optional CP System SRM IDs (see clause 12.3 above) that are supported by the SRM download or announcement service and information on how to access the service. The list of CP System IDs and CP System SRM IDs can have a single entry, multiple entries or no entry. In the latter case the HNED has to access the service in order to know which CP System IDs and CP System SRM IDs are supported by the service. In case a CP System uses CP System SRM IDs and only the CP System ID is provided in the announcement the HNED has to access the service in order to get information about which CP System SRM IDs are supported by the service.

In case CP System SRM IDs are provided for a certain CP System ID by the SRM announcement and download services the SRM delivery client on the HNED shall provide the list of all announced CP System SRM IDs to the CP System specific functional block on the HNED. Based on this information the CP System specific functional block shall decide which SRM announcement and download services the HNED has to access in order to receive the relevant SRMs. The CP System specific functional block shall instruct the SRM delivery client to access these relevant services by providing the list of CP System SRM IDs in which it is interested in.

SRM announcements may include different types of version numbers (record version, announcement service version, FLUTE session version, SRM file version). For details on the version numbers and their usage see clause 12.6.

Note that multiple download or announcement services (e.g. multicast and unicast delivery) can be provided for a specific CP System ID and CP System SRM ID. The behavior of the HNED in selecting a particular service in this case is implementation specific.

12.4.1 SD&S SRM Announcements (SRM-1 interface)

The entry point for all SRM services (announcement and download) is SD&S. SD&S SRM announcements are provided with the SRM Offering Record defined in clause 5.2.6.9. The SRM Offering Record can either directly announce SRM download services or can point to dedicated SRM announcement services.

12.4.2 Dedicated SRM Announcement services

A dedicated SRM announcement service provides a list of SRM download services for one or more CP System IDs and optional CP System SRM IDs.

Further indirection from the dedicated SRM announcement service, to other dedicated SRM announcement services is not supported.

Dedicated SRM announcement services are delivered via unicast using HTTP or via multicast using SAP.

Note that more than one Download Service might be announced for the same CP System ID or combination of CP System ID and CP System SRM ID. The behavior of the HNED in selecting a particular download service in this case is implementation specific.

12.4.2.1 HTTP unicast SRM announcement service (SRM-2 interface)

Dedicated SRM unicast announcements are distributed using HTTP [39]. The service provides XML coded SRM download offering records reusing the SD&S SRM download service offering scheme as defined in clause 5.2.6.9. Table 33 lists the element of the SRM Download Record.

Dedicated unicast SRM announcement services are announced in SD&S (SRM announcement service offering) by providing the HTTP URL of the announcement, the list of CP System IDs and optional CP System SRM IDs that are handled by this announcement service and the announcement service version number (see clause 12.6 on the use of version numbers).

Table 33: SRM Download Record

Element/Attribute Name	Element/Attribute Description	Mandated/ Optional
SRMDownload:	SRM Download Record (extending the OfferingBase from Table 3).	
SRMDownloadService (one entry per service)	SRM Download Service information (as defined in Table 12)	M

12.4.2.2 SAP multicast announcement service (SRM-3 interface)

Dedicated SRM multicast announcements are distributed using SAP [77]. The service provides SDP coded SRM download offerings records with the information as defined in Table 33. The SDP syntax for SRM announcements is defined in Annex H.

Due to the limitations of SAP to 1 Kbyte for a single SDP message a SDP message shall announce only a single SRM download service. Several SRM download services shall be announced by separate SDP messages which can be delivered via the same SAP multicast session. The record version number (see clause 12.6 on version numbers) provided by the “o=” line of the SDP message (see Annex H.2.1) is used to indicate a new version of a SDP message for a specific SRM download service.

Dedicated multicast SRM announcement services are announced in SD&S (SRM announcement service offering) by providing the SAP multicast address, port, optional source address (in case of source specific multicast), the list of CP System IDs, optional CP System SRM IDs that are handled by this multicast announcement service and the optional announcement service version number (see clause 12.6 for version numbers).

The HNED has to join the SAP multicast session in order to access the SRM announcement information distributed via this session.

12.5 SRM download services

SRM download services deliver the SRMs for specific CP System IDs to the HNED. The download service is transparent to the content of the SRMs.

HTTP unicast and FLUTE multicast download services are defined.

12.5.1 HTTP unicast SRM download service (SRM-4 interface)

Unicast SRM download services use HTTP [39] to download the SRM file for a specific CP System ID.

The SD&S or dedicated SRM announcement service offering provides the location of the SRM file together (URI) with the CP System ID and optional CP System SRM ID for which the SRM file is valid and the SRM file version (see clause 12.6.1).

Content encoding of the SRM files is not supported.

The HTTP server may use redirection to a different server location or ask for a delayed request (retry-after) to prevent overload conditions.

12.5.2 FLUTE multicast SRM download service (SRM-5 interface)

The FLUTE protocol defined in RFC 3926 [71] and further detailed in clause 6 of TS102 472 [66] and clause 10.6.2.2 of this document is used for multicast SRM download services.

The SD&S or dedicated SRM announcement service offering provides the FLUTE session information (multicast address, port, TSI, optional source address), the list of CP System IDs, optional CP System SRM ID and SRM File version number supported by the service and the FLUTE session version number (see clause 12.6 on version numbers).

One or more SRM files can be delivered by a FLUTE session. A SRM FLUTE session runs as dynamic carousel as defined in clause 6.2.1.5 of TS 102 472 [66]. This allows a HNED to join the session at any time to acquire the SRM file. SRM files can be updated and SRM files for new CP System IDs can be added during the session.

The FLUTE FDT is extended to provide the CP System ID, CP System SRM ID and SRM file version number for each SRM file as shown in Table 33 below. HNEDs can join the FLUTE session and check the FDT for CP System IDs for which they want to download SRM files. The SRM file version number shall be incremented each time the SRM file for a specific CP System ID is modified (see clause 12.5.1). A change of the SRM file version number will also result in a change of the FDT instance

number. Modified versions of SRM files shall be sent with a different Transport Object Identifier (TOI) as defined in clause 6.1.12 of TS102 472 [66].

Table 34: Extended SRM FLUTE File Delivery Table (FDT) structure

Element/Attribute Name	Element/Attribute Description	Mandated/ Optional
FDT-Instance-Attributes	**Common Attributes for all the files described by the FDT instance**	
Expires	expiry time of the FDT Instance.	M
Complete	when present and TRUE, signals that no new data will be provided in future FDT Instances within this session.	O
Content-Type	content type.	O
Content-Encoding	Content encoding.	O
FDT-Instance-Delivery-Attributes	Attributes related to the delivery of all files described by the FDT instance	
FEC-OTI-FEC-Encoding-ID	Identification of FEC algorithm.	O
FEC-OTI-FEC-Instance-ID	FEC instance depending on the FEC algorithm identification.	O
FEC-OTI-Maximum-Source-Block-Length	The maximum number of source symbols per source block.	O
FEC-OTI-Encoding-Symbol-Length	Length of encoding symbols in bytes.	O
File Attributes (one per file)		
Content-Type	MIME media type of content.	O
Content-Encoding	Compression.	O
Content-Location	Location of file.	M
Content-Length	Size of the content.	M
Content-MD5	Hash of the content (MD5).	O
CP-System-ID	CP System ID of the SRM file.	M
CP-System-SRM-ID	CP System SRM ID of the SRM file (of the CP Systems supports several types of SRM files)	O
SRM-File-Version	Version of the SRM file for download.	M
Content-Delivery-Attributes	**Attributes related to the delivery of the file**	
TOI	Transport Object Identifier.	M
Transfer-Length	Size of the transport object carrying the content.	O
Bandwidth-Requirement	Aggregate rate of sending packets to all channels.	O
FEC-OTI-FEC-Encoding-ID	Identification of FEC algorithm.	O
FEC-OTI-FEC-Instance-ID	FEC instance depending on the FEC algorithm identification.	O
FEC-OTI-Maximum-Source-Block-Length	The maximum number of source symbols per source block.	O
FEC-OTI-Encoding-Symbol-Length	Length of encoding symbols in bytes.	O

The use of a single multicast channel for SRM FLUTE sessions shall be supported. Multiple multicast channels for a SRM FLUTE session are not supported.

The “Compact No-Code FEC scheme” [113] (FEC Encoding ID 0) shall be supported for SRM FLUTE sessions. The Algorithm for Computing Source Block Structure defined in RFC 3926 [71] shall be used. Other symbol encoding schemes are not be supported for SRM FLUTE sessions. If an error occurs during the download of a SRM file it can be recovered at a later time when it is repeated in the carousel.

Content encoding of the SRM files is not supported.

12.6 Version Numbers

Different types of version numbers are used by the SRM Announcement and Download Services. The different types of version numbers and their usage is defined in this clause. Figure 23 below provides an overview on the use of the different version numbers.

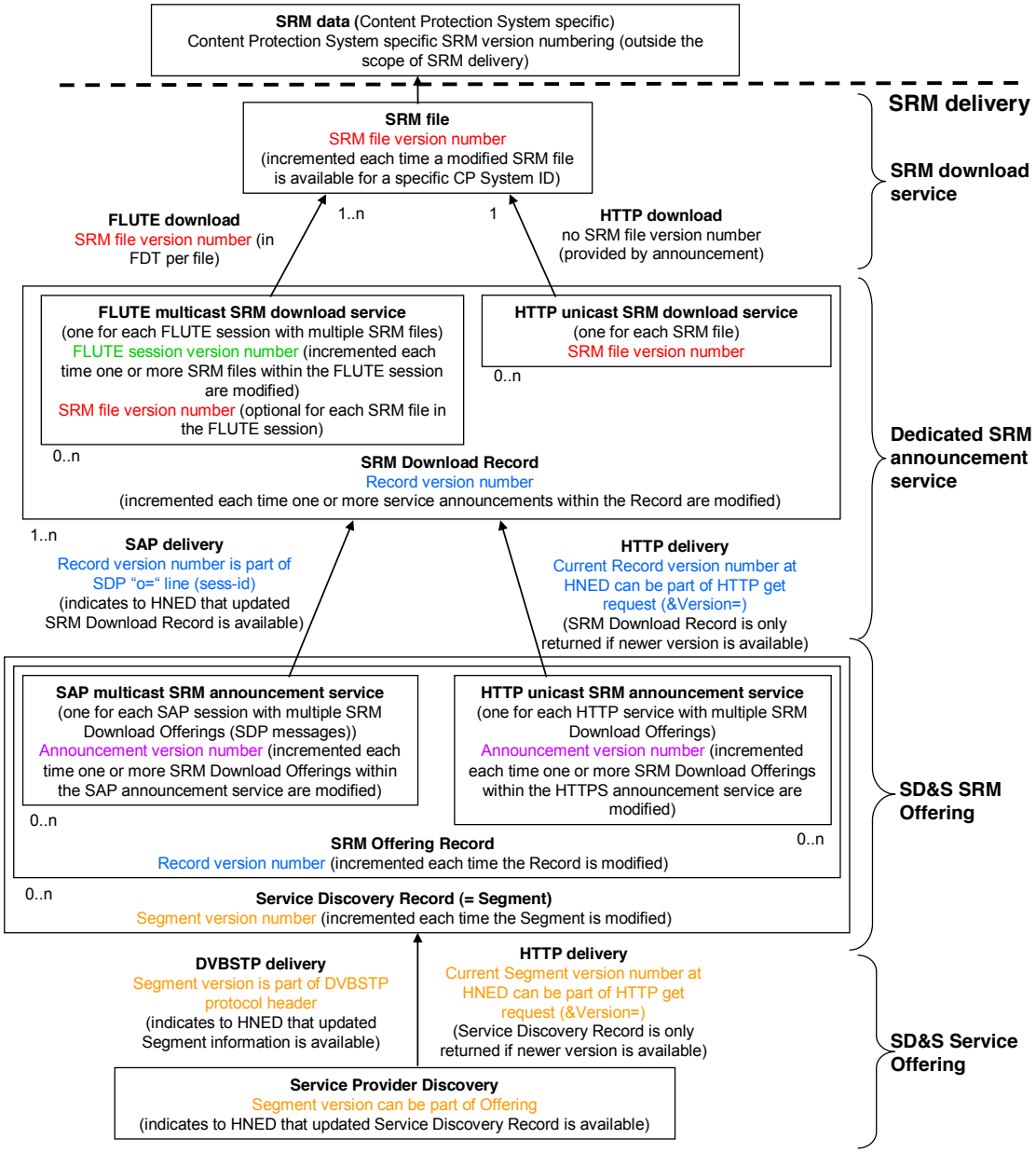


Figure 23: SRM version numbers

12.6.1 SRM File Version Number

A SRM file version number shall be provided in download service offerings for HTTP unicast SRM download services (SD&S SRM Offering Record or SRM Download Record) and in the FLUTE FDT for each SRM file delivered by the FLUTE multicast SRM download service. It may also be used in the download service offerings for FLUTE unicast download services.

The SRM file version number is specific to the SRM file for a dedicated CP System ID or combination of CP System ID and CP System SRM ID and shall be incremented (modulo 256) each time an update of that SRM file is available.

In case a SRM file for a specific CP System ID is delivered via FLUTE and HTTP the SRM file version number in the FLUTE FDT and in the download service offering for the HTTP unicast SRM download services shall be the same for the same version of the SRM file. This provides a consistent check of the version of the SRM file over the different download services.

Note that the SRM file version number is not related to any version number within the SRM data itself. The SRM file version number is used to indicate the availability of updated SRM files within the SRM

delivery and is generated by the SRM delivery service independently of any version number within the SRM data itself.

12.6.2 FLUTE Session Version Number

A FLUTE session version number can be provided in download service offerings for FLUTE multicast SRM download services. The FLUTE session version number shall be incremented (modulo 256) each time new or updated SRM files are available via the specific FLUTE download session.

A change of the FLUTE session number in the download service offering indicates to the HNED that new or updated SRM files are available from a SRM FLUTE download service. The HNED shall join the FLUTE session and check if new SRM files are available for the CP System IDs and CP System SRM IDs it is interested in. If the FLUTE session version number is not provided the HNED has to check the FLUTE session regularly for updates.

12.6.3 Record Version Number

Each SD&S SRM Offering Record and SRM Download Record has a record version number which indicates the version of this record. The record version number shall be incremented (modulo 256) each time the record is modified (i.e. new, updated or deleted SRM announcement or download service offerings).

The record version is provided by the version attribute in the SD&S OfferingBase type (Table 3) used by the SD&S SRM Offering Record (Table 12) and the SRM Download Record (Table 33) and by the session version attribute of the SDP “o=” line (see Annex H.2.1).

The record version number tells the HNED if the record has changed from a previous received version.

12.6.4 Announcement Service Version Number

Each SRM announcement service offering within an SD&S SRM Offering may have an announcement service version included. A dedicated SRM announcement service provides 1 or more SRM Download Records. The announcement service version number shall be incremented (modulo 256) each time SRM Download Records are updated, added to or removed from the dedicated SRM announcement service.

The use of the announcement service version number is optional for SRM multicast announcement service offerings and mandatory for SRM unicast announcement service offerings. If a HNED detects a change of an announcement service version number for a SRM announcement service it is interested in the HNED shall join this announcement service and check for updated information. If the announcement service version number is not provided the HNED has to check the announcement service regularly for updates.

12.6.5 Segment Version Number

Segment version numbers are specific for the SD&S delivery and are defined in clause 5.

A SD&S Segment provides one or more Service Offering records. The segment version number is incremented each time any of these Service Offering records is update, removed or a new record is added.

Annex C.1.2 Simple Type

- add sub clauses with the following new simple types:

C.1.2.x CPSystemIDType

```
<xsd:simpleType name="CPSystemIDType">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">CP System ID of Content Protection System as defined
in TS 101 162</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:pattern value="[0-9a-fA-F]{4}"/>
    </xsd:restriction></xsd:simpleType>
```

Identifier (CP System ID) of the Content Protection System as defined in TS 101 162 [2].

C.1.2.x CPSystemSRMID

```
<xsd:simpleType name="CPSystemSRMIDType">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">CP System SRM ID of Content Protection System as
defined in TS 101 162</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:pattern value="([0-9a-fA-F][0-9a-fA-F]){1,256}"
    </xsd:restriction>
</xsd:simpleType>
```

CP System SRM IDentifier.

Annex C.1.3 Complex types and attribute groups

- add sub clauses with the following new complex types:

C.1.3.x SRMAnnouncementModeType

```
<xsd:complexType name="SRMAnnouncementModeType">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">SAP or HTTP delivery of SRM Announcement
Services</xsd:documentation>
    </xsd:annotation>
    <xsd:choice>
        <xsd:element name="SAP">
            <xsd:complexType>
                <xsd:attributeGroup ref="dvb:BasicMulticastAddressAttributesType"/>
            </xsd:complexType>
        </xsd:element>
        <xsd:element name="HTTP" type="xsd:anyURI"/>

    </xsd:choice>
</xsd:complexType>
```

SAP or HTTP delivery of SRM Announcement Services.

C.1.3.x SRMAnnouncementServiceType

```
<xsd:complexType name="SRMAnnouncementServiceType">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">SRM Announcement Service
information</xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
        <xsd:element name="SRMID" type="dvb:SRMIDType" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="SRMAnnouncementMode" type="dvb:SRMAnnouncementModeType"/>
    </xsd:sequence>
    <xsd:attribute name="AnnouncementServiceVersion" type="dvb:Version" use="optional"/>
</xsd:complexType>
```

SRM Announcement Service information.

C.1.3.x SRMDownloadServiceType

```
<xsd:complexType name="SRMDownloadServiceType">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">FLUTE or HTTP download of SRM
files</xsd:documentation>
    </xsd:annotation>
    <xsd:choice>
        <xsd:element name="FLUTE">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="SRMIDVer" type="dvb:SRMIDVerMType" minOccurs="0"
maxOccurs="unbounded"/>
                </xsd:sequence>
                <xsd:attribute name="FLUTESessionVersion" type="dvb:Version"/>
                <xsd:attributeGroup ref="dvb:BasicMulticastAddressAttributesType"/>
                <xsd:attribute name="TSI" type="dvb:TSId" use="required"/>
            </xsd:complexType>      </xsd:element>
        <xsd:element name="HTTP">
            <xsd:complexType>
                <xsd:sequence>
                    <xsd:element name="SRMIDVer" type="dvb:SRMIDVerUType"/>
```

```
                </xsd:sequence>
                <xsd:attribute name="Location" type="xsd:anyURI" use="required"/>
            </xsd:complexType>      </xsd:element>
    </xsd:choice>
</xsd:complexType>
```

SRM Download Service information.

C.1.3.x SRMIDType

```
<xsd:complexType name="SRMIDType">
    <xsd:annotation>
        <xsd:documentation>SRM specific ID (CP System ID, CP System SRM
ID)</xsd:documentation>
    </xsd:annotation>
        <xsd:attribute name="CPSystemID" type="dvb:CPSystemIDType" use="required"/>
        <xsd:attribute name="CPSystemSRMID" type="dvb:CPSystemSRMIDType" use="optional"/>
</xsd:complexType>
```

Provides the CP System and optional CP System SRM ID for a SRM.

C.1.3.x SRMIDVerMType

```
<xsd:complexType name="SRMIDVerMType">
    <xsd:annotation>
        <xsd:documentation>SRM ID and optional SRM file version</xsd:documentation>
    </xsd:annotation>
    <xsd:complexContent>
        <xsd:extension base="dvb:SRMIDType">
            <xsd:attribute name="SRMFileVersion" type="dvb:Version" use="optional"/>
        </xsd:extension>
    </xsd:complexContent>
</xsd:complexType>
```

Provides the CP System, optional CP System SRM ID and SRM file version number for a SRM.

C.1.3.x SRMIDVerUType

```
<xsd:complexType name="SRMIDVerUType">
    <xsd:annotation>
        <xsd:documentation>SRM ID and SRM file version</xsd:documentation>
    </xsd:annotation>
    <xsd:complexContent>
        <xsd:extension base="dvb:SRMIDType">
            <xsd:attribute name="SRMFileVersion" type="dvb:Version" use="required"/>
        </xsd:extension>
    </xsd:complexContent>
</xsd:complexType>
```

Provides the CP System, SRM File version number and optional CP System SRM ID for a SRM.

Annex C.1.4 Element Types

- add a sub clause with the following new element:

C.1.4.x SRMOffering

```
<xsd:complexType name="SRMOffering">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">Provides a list of SRM Announcement and Download
Services</xsd:documentation>
    </xsd:annotation>
    <xsd:complexContent>
        <xsd:extension base="dvb:OfferingBase">
            <xsd:sequence>
                <xsd:element name="SRMAnnouncementService"
type="dvb:SRMAnnouncementServiceType" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element name="SRMDownloadService" type="dvb:SRMDownloadServiceType"
minOccurs="0" maxOccurs="unbounded"/>
            </xsd:sequence>
        </xsd:extension>
    </xsd:complexContent>
```

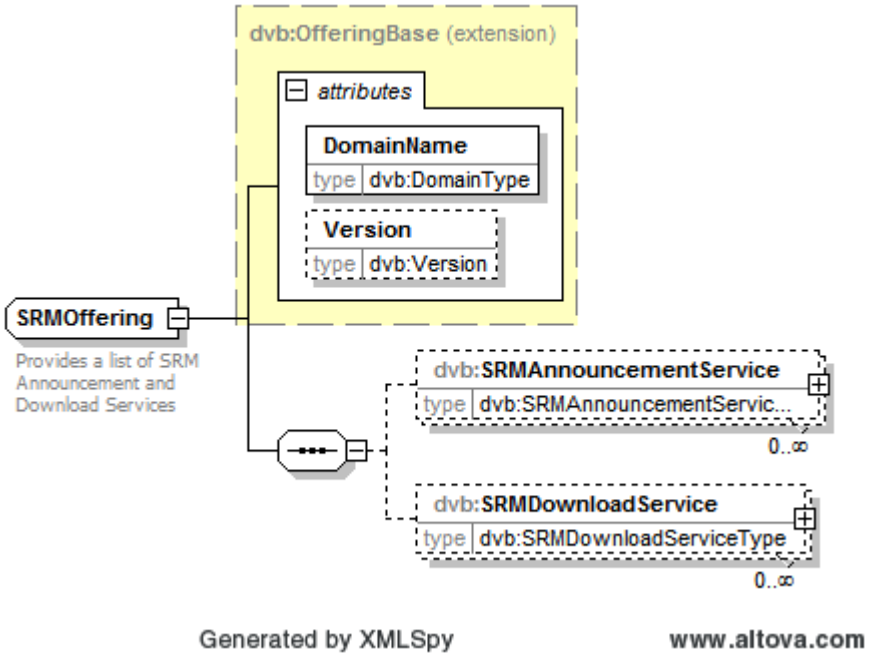


Figure C.32: SRMOffering

This element is used where the SP is offering SRM delivery over IP networks. It provides a list of SRM Announcement and Download Services for specific CP System IDs.

Annex C.1.5 Schema

- modify this clause as follows:

C.1.5 Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema targetNamespace="urn:dvb:metadata:iptv:sdns:2008-1"
xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:dvb="urn:dvb:metadata:iptv:sdns:2008-1"
xmlns:tva="urn:tva:metadata:2005" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xsd:import namespace="urn:tva:metadata:2005" schemaLocation="./tva_metadata_3-
1_v131.xsd"/>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:dvb="urn:dvb:metadata:iptv:sdns:2009-1" xmlns:tva="urn:tva:metadata:2008"
targetNamespace="urn:dvb:metadata:iptv:sdns:2009-1" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xsd:annotation>
        <xsd:documentation>
XML schema for DVB-IP SDS service provider and service offerings, RTSP CoD announce/describe
and SRM download records. This is the schema for the 1.5.1 version of the DVB-IP handbook
(ETSI TS 102 034).
        </xsd:documentation>
    </xsd:annotation>
    <xsd:import namespace="urn:tva:metadata:2008" schemaLocation="tva/tva_metadata_3-
1_v151.xsd"/>
    <xsd:element name="ServiceDiscovery">
        <xsd:complexType>
            <xsd:choice>
                <xsd:element name="BroadcastDiscovery" type="dvb:BroadcastOffering"
maxOccurs="unbounded"/>
                <xsd:element name="CoDDiscovery" type="dvb:CoDOffering"
maxOccurs="unbounded"/>
                <xsd:element name="ServicesFromOtherSP" type="dvb:ReferencedServices"
maxOccurs="unbounded"/>
                <xsd:element name="PackageDiscovery" type="dvb:PackagedServices"
maxOccurs="unbounded"/>
```

```
                <xsd:element name="ServiceProviderDiscovery"
type="dvb:ServiceProviderListType" maxOccurs="unbounded"/>
                <xsd:element name="BCGDiscovery" type="dvb:BCGOffering"
maxOccurs="unbounded"/>
                <xsd:element name="RegionalisationDiscovery"
type="dvb:RegionalisationOffering" maxOccurs="unbounded"/>
                <xsd:element name="RMSFUSDiscovery" type="dvb:RMSFUSDiscoveryType"
maxOccurs="unbounded"/>
                <xsd:element name="SRMDiscovery" type="dvb:SRMOffering"
maxOccurs="unbounded"/>
            </xsd:choice>
            <xsd:attribute name="Version" type="dvb:Version" use="optional"/>
        </xsd:complexType>
    </xsd:element>

    <xsd:element name="CoDAnnounceDescribe">
        <xsd:complexType>
            <xsd:sequence>
                <xsd:element name="ContentDescription"
type="tva:BasicContentDescriptionType"/>
                <xsd:element name="FECInfo" type="dvb:FECInfoType" minOccurs="0"/>
                <xsd:element name="RETInfo" type="dvb:RETInfoType" minOccurs="0"/>
            </xsd:sequence>
            <xsd:attribute name="RTSPControlURL" use="optional"/>
            <xsd:attribute name="Streaming" type="dvb:StreamingType" use="optional"/>
        </xsd:complexType>
    </xsd:element>

    <xsd:element name="SRMDownloadRecord">
        <xsd:annotation>
            <xsd:documentation xml:lang="en">Provides a list of SRM Download
Services</xsd:documentation>
        </xsd:annotation>
        <xsd:complexType>
            <xsd:complexContent>
                <xsd:extension base="dvb:OfferingBase">
                    <xsd:sequence>
                        <xsd:element name="SRMDownloadService"
type="dvb:SRMDownloadServiceType" maxOccurs="unbounded"/>
                    </xsd:sequence>
                </xsd:extension>
            </xsd:complexContent>
        </xsd:complexType>
    </xsd:element>

</xsd:schema>
```

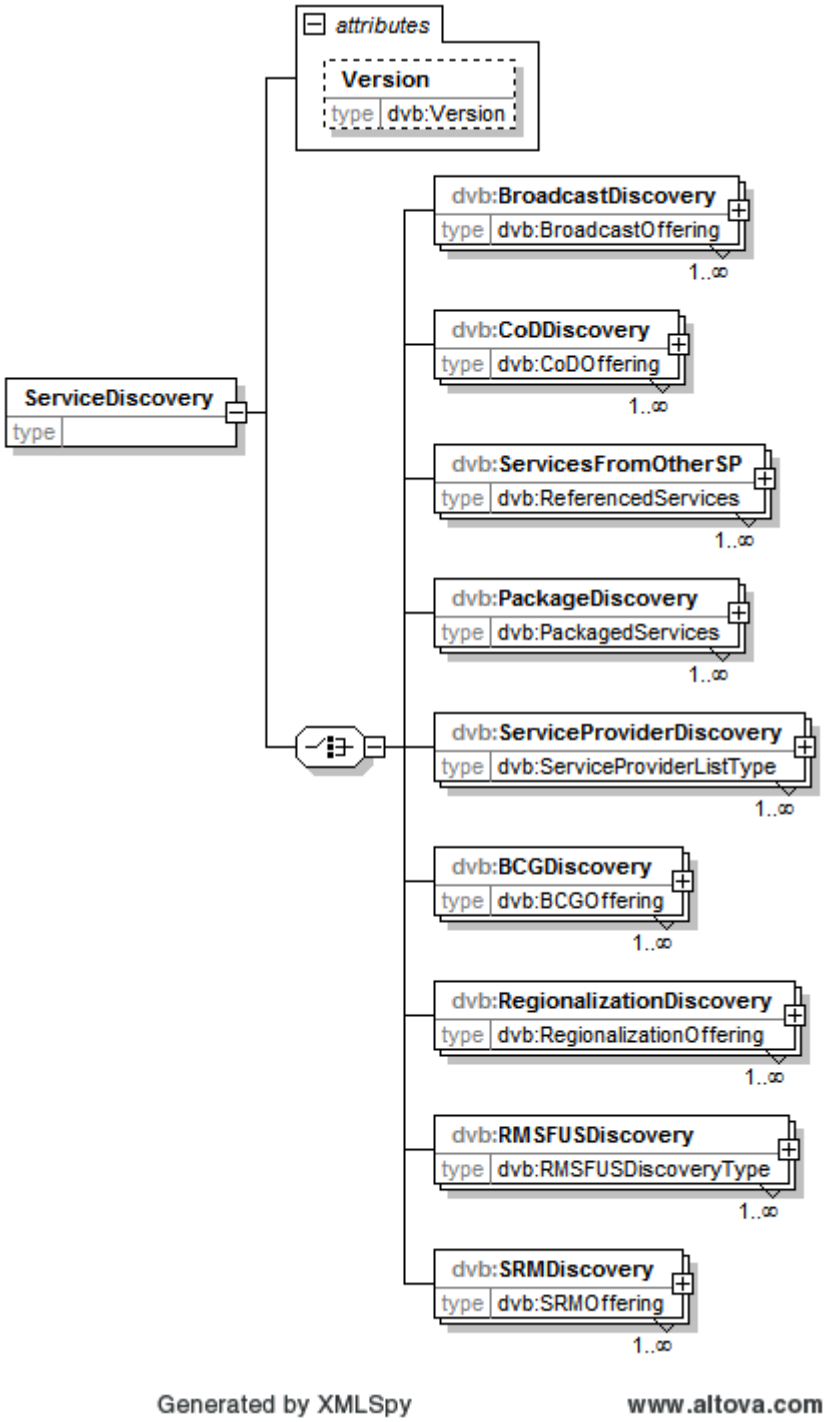


Figure C.3~~2~~: Service discovery

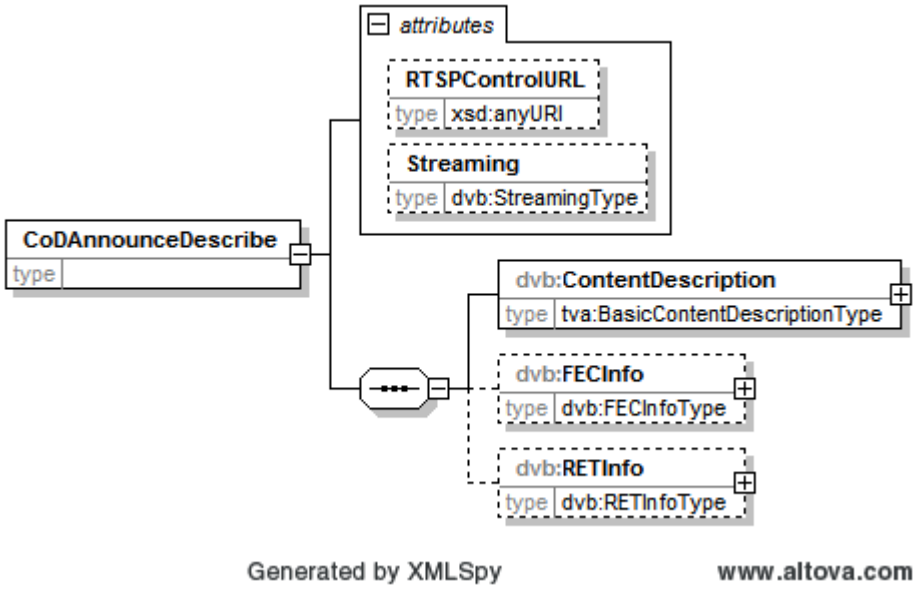


Figure C.3~~3~~ CoDAnnounceDescribe (RTSP only)

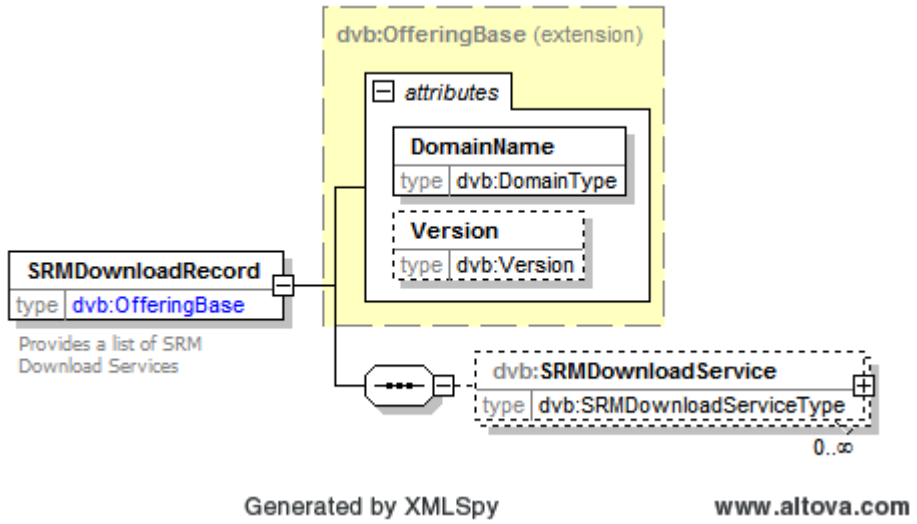


Figure C.35 SRMDownloadRecord (for SRM HTTP Unicast SRM Announcement Service)

~~Figure C.33: CoDAnnounceDescribe (RTSP only).~~Figure C.3~~3~~ shows the structure of ~~a~~the ~~s~~ServiceDiscovery root element~~offering~~. Each service offering shall contain only one of the "Element Types" as described in clause 5.2.6, but may have multiple instances of this type.

The version attribute of the offering is used as described in clauses 5.2.5 and 5.2.6. It is used to carry the version number of the XML document within the XML. Note that for records described in clause 5.2.6 the version number is provided through the OfferingBase type as defined in clause C.1.3.24.

The Version attribute of the root element (ServiceDiscovery) shall be present when XML is delivered via the pull mode (HTTP). It is recommended that the version attribute is not present when the XML is delivered via push mode (multicast) and in this case the value of the missing Version attribute is equal to the Version field of the DVBSTP Segment header.

Figure C.3~~4~~ shows the root element CoDAnnounceDescribe that shall only be present in documents used as part of the RTSP ANNOUNCE and DESCRIBE methods as outlined in clause 6.

Figure C.35 shows the root element SRMDownloadRecord. This element is used by the SRM HTTP unicast announcement service as defined in clause 12.4.2.1.

New Annex C.3 FLUTE FDT XML Schema fro SRM

- add new Annex C.3 with FLUTE FDT XML Schema for SRM

C.3 FLUTE FDT XML Schema for SRM

This clause defines FLUTE FDT XML schema for the FLUTE multicast SRM download service defined in clause 12.5.2. It supports the attributes defined in Table 34.

The base FLUTE FDT XML schema defined in RFC3926 [71] is not a valid schema. Therefore the XML schema defined in draft-ietf-rmt-flute-revised-07 is used as the base schema for the SRM extensions. This base schema is extended with the CP System ID, CP System SRM ID and SRM file version attributes as defined in Table 34.

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="urn:dvb:metadata:iptv:srm:fdt:2009-1"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:dvb="urn:dvb:metadata:iptv:sdns:2009-1"
targetNamespace="urn:dvb:metadata:iptv:srm:fdt:2009-1" elementFormDefault="qualified">
    <xs:import namespace="urn:dvb:metadata:iptv:sdns:2009-1" schemaLocation="./sdns_v1.5-srm-
v1.xsd"/>
    <xs:element name="FDT-Instance" type="FDT-InstanceType"/>
    <xs:complexType name="FDT-InstanceType">
        <xs:sequence>
            <xs:element name="File" type="FileType" maxOccurs="unbounded"/>
            <xs:any namespace="##other" processContents="skip" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
        <xs:attribute name="Expires" type="xs:string" use="required"/>
        <xs:attribute name="Complete" type="xs:boolean" use="optional"/>
        <xs:attribute name="Content-Type" type="xs:string" use="optional"/>
        <xs:attribute name="Content-Encoding" type="xs:string" use="optional"/>
        <xs:attribute name="FEC-OTI-FEC-Encoding-ID" type="xs:unsignedByte" use="optional"/>
        <xs:attribute name="FEC-OTI-FEC-Instance-ID" type="xs:unsignedLong" use="optional"/>
        <xs:attribute name="FEC-OTI-Maximum-Source-Block-Length" type="xs:unsignedLong"
use="optional"/>
        <xs:attribute name="FEC-OTI-Encoding-Symbol-Length" type="xs:unsignedLong"
use="optional"/>
        <xs:attribute name="FEC-OTI-Max-Number-of-Encoding-Symbols" type="xs:unsignedLong"
use="optional"/>
        <xs:attribute name="FEC-OTI-Scheme-Specific-Info" type="xs:base64Binary"
use="optional"/>
        <xs:anyAttribute processContents="skip"/>
    </xs:complexType>

    <xs:complexType name="FileType">
        <xs:sequence>
            <xs:any namespace="##other" processContents="skip" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
        <xs:attribute name="Content-Location" type="xs:anyURI" use="required"/>
        <xs:attribute name="TOI" type="xs:positiveInteger" use="required"/>
        <xs:attribute name="Content-Length" type="xs:unsignedLong" use="optional"/>
        <xs:attribute name="Transfer-Length" type="xs:unsignedLong" use="optional"/>
        <xs:attribute name="Content-Type" type="xs:string" use="optional"/>
        <xs:attribute name="Content-Encoding" type="xs:string" use="optional"/>
        <xs:attribute name="Content-MD5" type="xs:base64Binary" use="optional"/>
        <xs:attribute name="FEC-OTI-FEC-Encoding-ID" type="xs:unsignedByte" use="optional"/>
        <xs:attribute name="FEC-OTI-FEC-Instance-ID" type="xs:unsignedLong" use="optional"/>
        <xs:attribute name="FEC-OTI-Maximum-Source-Block-Length" type="xs:unsignedLong"
use="optional"/>
        <xs:attribute name="FEC-OTI-Encoding-Symbol-Length" type="xs:unsignedLong"
use="optional"/>
        <xs:attribute name="FEC-OTI-Max-Number-of-Encoding-Symbols" type="xs:unsignedLong"
use="optional"/>
        <xs:attribute name="FEC-OTI-Scheme-Specific-Info" type="xs:base64Binary"
use="optional"/>
        <xs:attribute name="CP-System-ID" type="dvb:CPSystemIDType"/>
        <xs:attribute name="CP-System-SRM-ID" type="dvb:CPSystemSRMIDType" use="optional"/>
        <xs:attribute name="SRM-File-Version" type="dvb:Version"/>
        <xs:anyAttribute processContents="skip"/>
    </xs:complexType>
</xs:schema>
```

Annex D Bibliography

- add the following new references to the bibliography:

- draft-ietf-rmt-flute-revised-07.txt (August 2009): " FLUTE - File Delivery over Unidirectional Transport".

New Annex H SD&S

- add new Annex H with SDP syntax for SRM

Annex H (normative): SDP syntax for SRM announcement services

This annex defines the SDP syntax for the SAP multicast SRM announcement service defined in clause 12.4.2.2. The information provided by SDP is similar to the one provided by the SRM Download Record defined in Table 33.

The SDP syntax is defined based on RFC 4566 [76]. SRM specific usage of the standard SDP parameters defined in RFC 4566 [76] and new SRM specific parameters are defined.

FLUTE specific SDP parameters for multicast download sessions are based on the definitions in TS 102 472 [66], clause 6.1.3.

The Augmented BNF Syntax as defined in RFC4234 [27] is used to define new parameters.

H.1 SDP message structure

A single SDP message contains the description for a single SRM Download Service. The SDP message provides all the necessary information to access the SRM Download Service, the CP System IDs supported by the Download Service and the service version.

The SDP starts with a session level section followed by a single media description. The order of the lines shall be as defined in RFC 4566 [76].

H.2 General Parameters

Table 33 lists the parameters that have to be provided for SRM Download Services.

This clause defines how the parameters that are not specific for a SRM download mode are mapped to the standard SDP parameters in Table H.1. In addition new SRM specific SDP parameters are defined.

Table H.1: SRM usage of standard SDP parameters

SDP Line	RFC 4566 [76] attribute definition	DVB CDS usage
Protocol Version	v=0	Mandatory as in RFC 4566 [76]
Origin	o=<username> <sess-id> <sess-version> <nettype> <addrtype> <unicast-address>	Mandatory <username> registered domain name of the SRM download service provider <sess-id> as in RFC 4566 [76] <sess-version> record version number of the SRM Download Record <nettype> is set to "IN" <addrtype> is set to "IP4" (see note) <unicast-address> as in RFC 4566 [76]
Session Name	s=<session-name>	Mandatory as in RFC 4566 [76]

SDP Line	RFC 4566 [76] attribute definition	DVB CDS usage
Session Description	i=<session-description>	optional as in RFC 4566 [76]
URI	u=<URI>	not used
Email Address	e=<email-address>	not used
Phone Number	p=<phone-number>	not used
Connection Data	c=<nettype> <addrtype> <connection address>	mandatory <nettype> is set to "IN" <addrtype> is set to "IP4" (see note) <connection-address> see unicast and multicast SRM download service parameters for specific usage
Bandwidth	b=<bwtype>:<bandwidth>	not used
Timing	t=<start-time> <stop-time>	not used
Repeat Times	r= <repeat interval> <active duration> <offsets from start-time>	not used
Time Zone	z=<adjustment time> <offset> <adjustment time> <offset>	not used
Encryption Keys	k=<method>:<encryption key>	not used
Attributes	a=<attribute>:<value>	None of the standard attributes defined in RFC 4566 [76] are used. see unicast and multicast SRM download service parameters below for specific usage
Media description	M=<media> <port> <proto> <fmt>	mandatory see unicast and multicast SRM download service parameters below for specific usage
NOTE: The current version of the specification supports only IP version 4.		

NOTE: The session ID, session name and session description can be freely defined within the scope of their definitions in RFC 4566 [76].

H.2.1 Domain name and Record version number

The domain name of the SRM download service provider and record version number of the SRM Download Record (see clause 12.5.4) shall be provided by the “o=” line at the session level.

The <username> field of the "o=" line is used for the domain name.

The <sess-version> field of the "o=" line is used for the record version.

The usage of the “o=” line is:

```
o=<service-provider-domain> <sess-id> <record-version> IN IP4 <unicast-address>

<service-proivder-domain>:  FQDN; registered domain name of the SRM download service provider
<sess-id>:                  unique session ID as defined in RFC4566 [76]
<record-version>:           2 HEXDIG; SRM Download Record version number (see clause 12.5.4)
<unicast-address>:          IPv4 address or fully qualified domain name of the server that
                            generated the session as defined in RFC4566 [76]
FQDN as defined in RFC4466 [76]
```

H.2.2 SRM ID

The SRM ID identifies the CP System (CP System ID and optional CP System SRM ID) and SRM file version number of the SRM that is available for download:

```
SRM-ID = "a=x-dvb-srm-id:" cp-system-id “,” [cp-system-srm-id] “,” [srm-file-version]

    cp-system-id = 4HEXDIG; CP System ID
    cp-system-srm-id = 1*256(HEXDIG HEXDIG); CP System SRM ID
    srm-file-version = 2HEXDIG; SRM file version
    HEXDIG as defined in RFC4234 [27]
```

The SRM ID line is included in the media section of the announcements.

A single SRM ID line shall be included in each HTTP unicast SRM download announcement. The cp-system-id and srm-file-version parameter are required. The cp-system-srm-id parameter is optional.

A Flute multicast SRM download announcement may have one more SRM ID lines. In case it has SRM ID lines it must have a SRM ID line for each SRM file delivered by the FLUTE session. The cp-system-id parameter is required. The srm-file-version and cp-system-srm-id parameters are optional.

H.3 HTTP unicast SRM download service parameters

This clause defines the SDP parameters used for the description of a HTTP unicast SRM download service.

HTTP unicast SRM download specific parameters are included in a single media section.

H.3.1 HTTP URI

For the unicast SRM download the URI of the download file has to be provided. As the URI includes the server IP address or domain name, the connection address in the “c=” line shall not be used. As the “c=” is mandatory for SDP, the connection address shall be set to “0.0.0.0” and ignored by the receiver. The “c=” line shall be part of the media description and has the following fixed syntax

```
c=IN IP4 0.0.0.0
```

The port sub-field provided in the “m=” line shall not be used as the port is provided by the URI (if no port is provided by the URI the default port for the protocol is used). The port sub-field shall be set to “*” and ignored by the HNED. The <media> sub-field shall be set to “application”, the <proto> sub-field to “HTTP/TCP” and the <fmt> sub-field to “srm”. The “m=” line has the following syntax:

```
m=application * HTTP/TCP srm
```

The URI of the SRM file is specified by the following syntax:

```
SRM-File-URI = "a=x-dvb-srm-file-uri:" srm-file-uri

    srm-file-uri = Uniform Resource Identifier as defined in RFC 3986 [80]
```

A SRM file URI shall be provided for each HTTP unicast SRM download service.

H.3.2 Complete SDP syntax for HTTP unicast SRM Download Service

The complete SDP syntax for the announcement of a HTTP unicast SRM Download Service is as follows:

```
v=0
o=<service-provider-domain> <sess-id> <record-version> IN IP4 <unicast-address>
s=<session-name>
i=<session-description>
m=application * HTTP/TCP srm
a=x-dvb-srm-id:<cp-system-id>,<cp-system-srm-id>,<srm-file-version>
c=IN IP4 0.0.0.0
a=x-dvb-srm-file-uri:<srm-file-uri>
```

An example for a HTTP unicast SRM Download Service announcement:

```
v=0
o=provider.org 356 2 IN IP4 135.27.66.45
s=Example1
i=Example for HTTP unicast SRM Download Service announcement
m=application * HTTP/TCP srm
a=x-dvb-srm-id:0002,,06
c=IN IP4 0.0.0.0
```

```
a=x-dvb-srm-file-uri:http://srm.provider.org/cp-system-02.dat
```

H.4 FLUTE multicast SRM download service parameters

This clause defines the SDP parameters used for the description of a FLUTE multicast SRM download service.

FLUTE multicast SRM download parameters are included in a single media section.

H.4.1 FLUTE Session Version

The FLUTE session version number (see clause 12.5.2) is specified by the following syntax:

```
SRM-FLUTE-Session-Version="a=x-dvb-srm-FLUTE-session-version:" flute-session-version

    flute-session-version = 2HEXDIG; FLUTE session version (see clause 12.5.2)
    HEXDIG as defined in RFC4234 [27]
```

The FLUTE session version number is optional.

H.4.2 FLUTE Session parameters

For the multicast SRM download service FLUTE session parameters have to be provided. SDP FLUTE parameters as defined in TS 102 472 [66], clause 6.1.3 and also used for CDS multicast download sessions (see Annex G.2.5) are used. As a SRM FLUTE session supports only a single multicast channel and the “Compact No-Code FEC scheme” only the following FLUTE parameters are supported:

- Multicast channel source address (see Annex G.2.5.2); optional
- Transport Session Identifier (see Annex G.2.5.3); required
- Multicast Address (see Annex G.2.5.6); required
- Mulitcast Port Number (see Annex G.2.5.7); required

The <media> sub-field of the “m=” line shall be set to “application”, the <proto> sub-field to “FLUTE/UDP” and the <fmt> sub-field to “srm”.

H.4.3 Complete SDP syntax for FLUTE multicast SRM Download Service

The complete SDP syntax for the announcement of a FLUTE multicast SRM Download Service is as follows:

```
v=0
o=<username> <sess-id> <record-version> IN IP4 <unicast-address>
s=<session-name>
i=<session-description>
m=application <IP-Multicast-Port-Number> FLUTE/UDP srm
a=x-dvb-srm-id:<cp-system-id>,<cp-system-srm-id>,<srm-file-version>
a=x-dvb-srm-id:<cp-system-id>,<cp-system-srm-id>,<srm-file-version>
.
.
.
a=x-dvb-srm-FLUTE-session-version:<flute-session-version>
a=source-filter: incl IN IP4 * <IP-Source-Address>
a=flute-tsi:<Transport-Session-Identifier>
c=IN IP4 <IP-Multicast-Address>
```

An example for a FLUTE multicast SRM Download Service announcement with 3 different SRM files in the FLUTE session:

```
v=0
o=provider.org 134 1 IN IP4 135.27.66.45
s=Example2
i=Example for FLUTE multicast SRM Download Service announcement
m=application 1200 FLUTE/UDP srm
a=x-dvb-srm-id0002,,
a=x-dvb-srm-id0012,,
```

```
a=x-dvb-srm-id003A,,
a=x-dvb-srm-FLUTE-session-version:0F
a=source-filter: incl IN IP4 * 135.27.66.40
a=flute-tsi:12345
c=IN IP4 227.124.5.4
```