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SERIES J: CABLE NETWORKS AND TRANSMISSION OF TELEVISION, SOUND PROGRAMME AND OTHER MULTIMEDIA SIGNALS

Secondary distribution of IPTV services

Functional requirements of the service provider interface for television primary and secondary distribution and associated interactive services

Recommendation ITU-T J.704

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Functional requirements of the service provider interface for television primary and secondary distribution and associated interactive services

Summary

To encourage the successive growth of television broadcasting services, it is important to enable third-party operators to provide services by making the best use of television distribution facilities and functionalities. Recommendation ITU-T J.704 defines functional requirements of the service provider's interface for television primary and secondary distribution and associated interactive services for integrated broadband cable and primary distribution television networks. This Recommendation provides interfaces and functionalities to enable third-party service providers to offer television and associated interactive services including RF-based linear TV, video on demand (VoD), cable telephony, and enhanced broadcast services.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T J.704	2009-12-14	9

FOREWORD

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Functional requirements of the service provider interface for television primary and secondary distribution and associated interactive services

1 Scope

This Recommendation defines functional requirements of the service provider's interface for television primary and secondary distribution and associated interactive services for integrated broadband cable and primary distribution television networks. This Recommendation provides interfaces and functionalities to enable third-party service providers to offer television and associated interactive services. The functionalities described in this Recommendation are defined according to the requirements of cable television operators. Television and associated interactive services supported in this Recommendation include RF-based linear TV, video on demand (VoD), cable telephony, and enhanced broadcast services.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T J.83] Recommendation ITU-T J.83 (2007), *Digital multi-programme systems for television, sound and data services for cable distribution*.

[ITU-T J.98] Recommendation ITU-T J.98 (2003), *Metadata requirements for video-on-demand in cable networks*.

[ITU-T J.160] Recommendation ITU-T J.160 (2005), *Architectural framework for the delivery of time-critical services over cable television networks using cable modems*.

[ITU-T J.185] Recommendation ITU-T J.185 (2002), *Transmission equipment for transferring multi-channel television signals over optical access networks by FM conversion*.

[ITU-T J.186] Recommendation ITU-T J.186 (2008), *Transmission equipment for multi-channel television signals over optical access networks by sub-carrier multiplexing (SCM)*.

[ITU-T J.360] Recommendation ITU-T J.360 (2006), *IPCablecom2 architecture framework*.

[ITU-T J.700] Recommendation ITU-T J.700 (2009), *IPTV service requirements and framework for secondary distribution*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 enhanced broadcasting [ITU-T J.700]: A system that is capable of delivering broadcast programs over existing secondary distribution networks composed of HFC or FTTx with enhancements by applications and/or services transferred over IP-enabled networks.

3.1.2 Linear TV [b-ITU-T Y.1901]: A television service in which a continuous stream flows in real time from the service provider to the terminal device and where the user cannot control the temporal order in which contents are viewed.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

API Application Programming Interface
CM Cable Modem
CMTS Cable Modem Termination System
DOCSIS Data Over Cable Service Interface Specification
DVR Digital Video Recorder
EMTA Embedded Multimedia Terminal Adaptor
EPG Electronic Program Guide
FEC Forward Error Correction
IMS IP Multimedia Subsystem
MPEG Moving Picture Experts Group
OSS Operations Support System
PPV Pay Per View
QoS Quality of Service
RST Residential SIP Telephony
SCP Service and Content Protection
SDP Service Delivery Platform
SDV Switched Digital Video
VoD Video On Demand
VoIP Voice over IP
VPN Virtual Private Network

5 Interface definitions for delivery of television and associated interactive services

5.1 Overview of the interfaces for television and associated interactive service delivery

The service provider's interface for television and associated interactive services is an interface that enables outside entities to offer television and associated interactive services.

As shown in Figure 1, this interface enables a number of functions such as video delivery management, user information management, and service accounting. Service providers can use these functions through APIs provided by this interface.

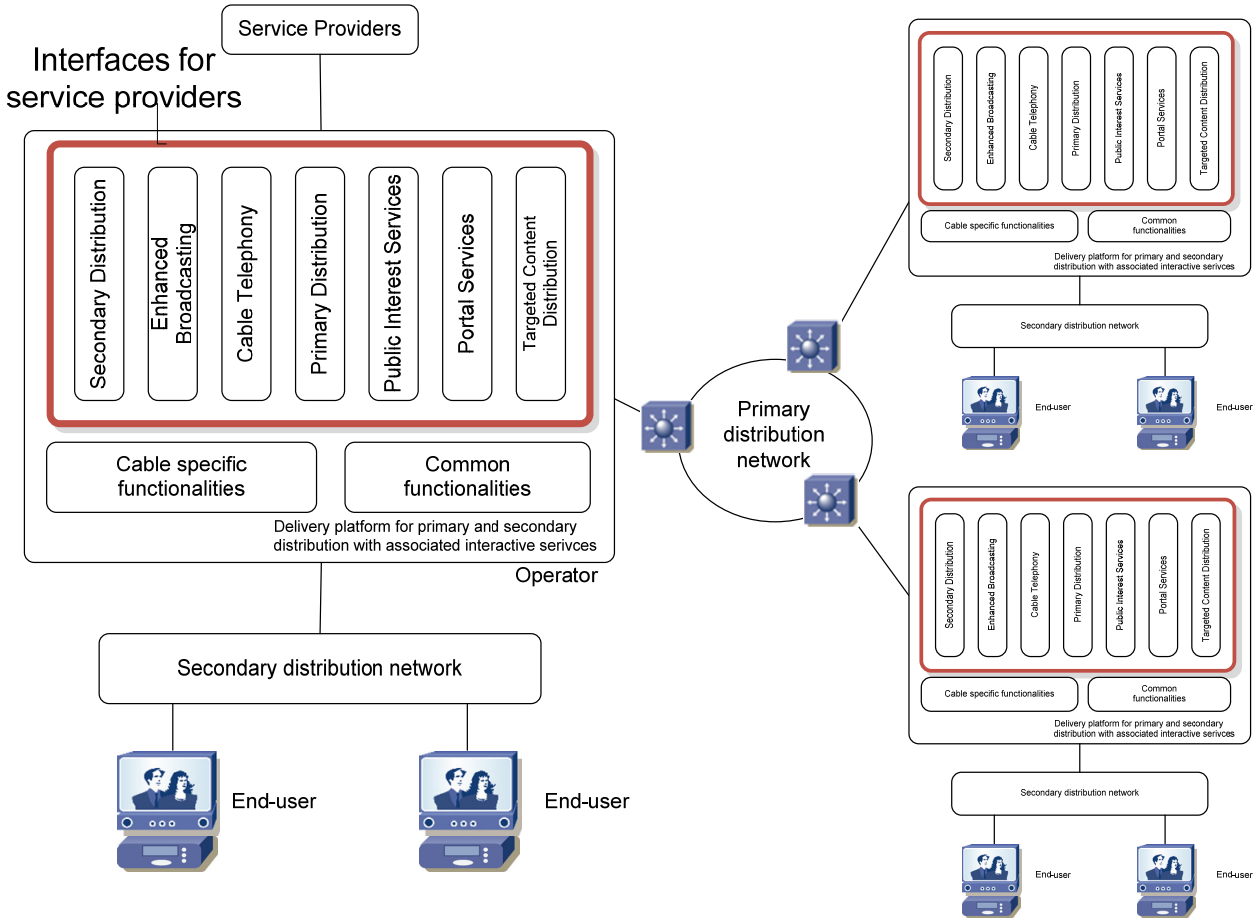

Figure 1 – Conceptual diagram of the service provider's interface for television and associated interactive services

5.2 Interface definitions

This clause defines interfaces to provide the supposed services to be enabled.

5.2.1 Content secondary distribution

This interface is defined to distribute content to consumers. This is the primary and core service of this interface, and linear TV and VoD are assumed in this Recommendation. Linear TV is the RF-based digital broadcasting defined in [ITU-T J.83], [ITU-T J.185], and [ITU-T J.186], and VoD is the on-demand video distribution described in [ITU-T J.98].

5.2.2 Enhanced broadcasting

The service provider's interface defined in this Recommendation provides enhanced broadcasting, which is defined in [ITU-T J.700]. [ITU-T J.700] defines enhanced broadcasting as follows: delivering enhanced video and other multimedia capabilities to the TV using IP. This scenario is generally considered an enhancement to the existing digital television delivery service. The existing video service delivery mechanisms remain intact, but are enhanced to allow for additional service overlays. All of these also may provide an integrated experience with the existing broadcast-based television services.

a) IP video features – For example, mosaics of video content (e.g., for interactive program guide or Picture in Picture) require multiple-tuner capabilities using traditional delivery mechanisms. IP gives the ability to deliver multiple video streams for various display purposes efficiently.

b) Web-based services – Video delivery through standard web-based mechanisms can be used in conjunction with existing digital TV offerings to provide interactivity. For example, enhanced information services related to programming can be displayed through access to web servers over the IP network.

c) IP-based enhancements – Combining existing broadcast video applications with new interactive IP-based multimedia services. For example, IPCablecom [ITU-T J.160] defines a standard architecture for voice over IP (VoIP) and IPCablecom2 [ITU T J.360] defines multimedia services for cable networks. Other IMS-based multimedia services are being defined as well. These new services will be integrated with the existing digital television offerings.

5.2.3 Cable telephony

Many cable operators provide cable telephony services with VoIP technology. The interface for cable telephony is defined to provide an end-to-end telephony service such as [b-ITU-T J.460.0] over the IPCablecom architecture [ITU-T J.160] and [ITU-T J.360] with EMTA. In addition, some telephony-related services would be provided through the TV screen. For example:

– Caller ID

  Caller ID is a function to display (or block) a caller's phone number. Clause II.6.2 of [b-ITU-T J.460.0] describes in more detail Caller ID over cable networks.

– Presence

  Presence is a functionality to enable the exchange of dynamic information (e.g., state and availability) of logical entities such as the users and devices. For TV services, users may acquire their friend's presence through the TV screen. [b-ITU-T J.367] describes in more detail presence services over cable networks.

– Multimedia teleconferencing

  Multimedia teleconferencing is an advanced function to enable the exchange of information (e.g., visual information) among multiple callers.

5.2.4 Primary distribution

This interface is defined to provide delivery of program or content from the originating service provider to those operators that are responsible for the secondary distribution. Primary distribution can be considered as a business-to-business service. Program or content may also contain metadata as well as audio and/or video media. This interface also provides addressable distribution mechanism that can specify or choose the destination operator(s). In this Recommendation, primary distribution is classified in several levels, i.e., national level, regional level, prefecture level and municipal level.

5.2.5 Public interest services

This interface is defined to provide delivery of public interest services directly to the end-users connected to the operator (secondary distribution, or business-to-consumer) and to other operators (primary distribution, or business-to-business) to distribute the services within the specified domain. The public interest services would include, but not limited to, traffic information, flight information, weather information, disaster information such as earthquake, storm, tsunami, and other major accidents.

5.2.6 Portal services

This interface is defined to provide portal services that can be accessed from the end-users located in the specified domain. The portal service would include, but not limited to, program guide, content guide, pay per view transaction, subscription handling, electronic-commerce, etc.

5.2.7 Targeted content distribution

This interface is defined to provide targeted content distribution services, which will be addressed to specific targets according to a set of delivery plans and/or placement directions. This would be applicable to, but not limited to, targeted advertisement, content recommendation, automatic video recording, etc.

This interface also provides several feedbacks such as messages from end-users, application fulfilment summary, service measurement summary, etc.

6 Functional requirements

This interface is required to implement functional components for supported services and shall provide interfaces to enable the service provider to use them.

Figure 2 shows the functional diagram of this interface. Each box in the diagram shows functional components. Shaded boxes indicate functional components specific to this Recommendation and white boxes indicate general functional components for providing services.

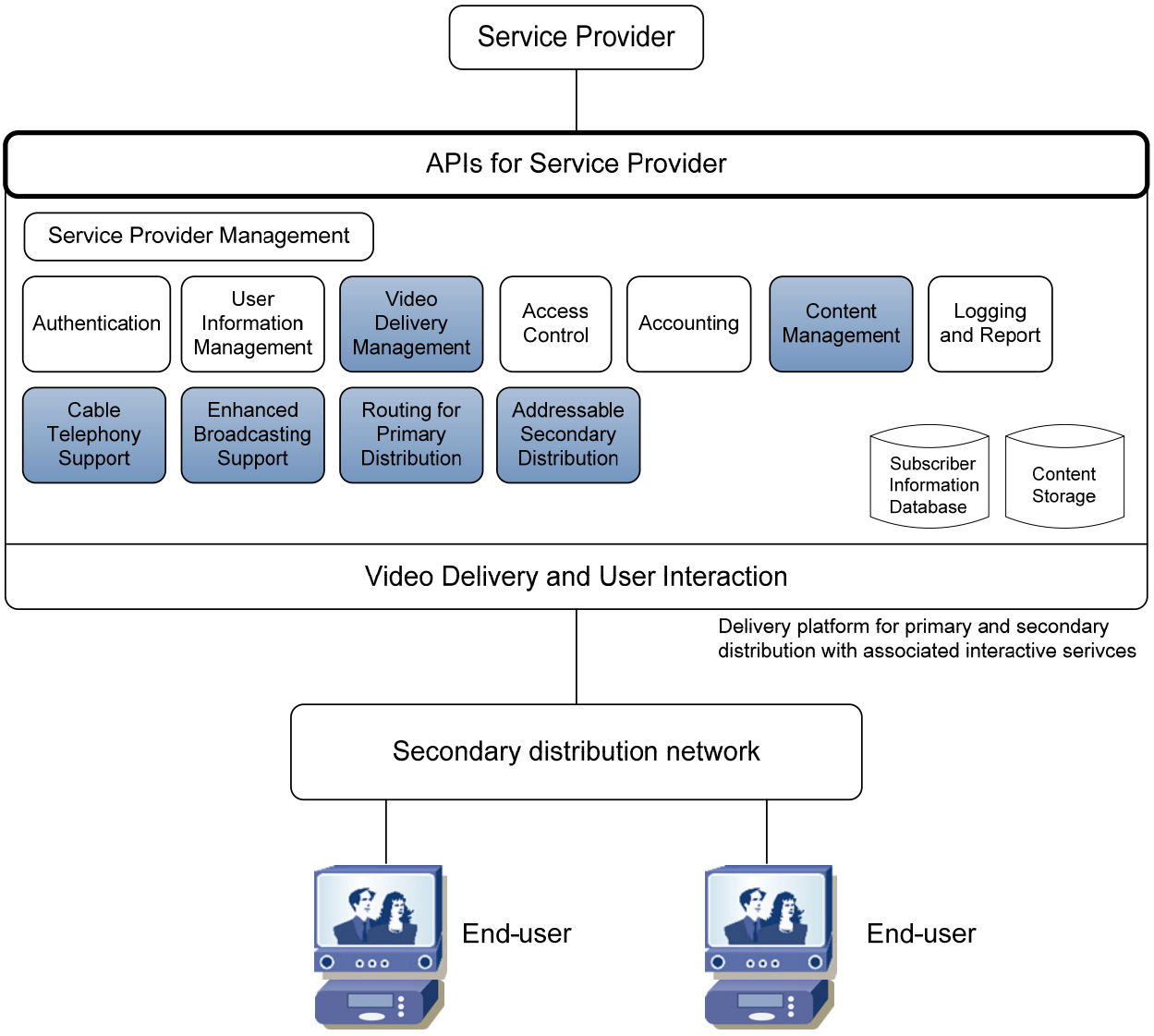

Figure 2 – Functional diagram of the service provider's interface

6.1 Authentication

Three types of authentication are necessary to be supported by the interface defined in this Recommendation.

– Authentication between service provider and cable television operator.

– Authentication between cable television operator and end-user.

– Authentication between service provider and end-user.

6.2 Service provider management function

This interface is required to implement the service provider management function such as issuing and managing login accounts for service providers. Login account is used to authenticate a service provider to ensure that only authorized service providers can access this interface.

6.3 User information management function

This interface is recommended to implement the storage and management of user information such as user profile, price plan, parental lock level, service charge information, etc. This information is stored for each service provider and a service provider cannot access the user information owned by other service providers.

6.4 Video delivery management function

This interface is required to implement the video delivery management function. It includes:

– EPG delivery for linear TV

– Linear TV delivery as per schedule

– Portal pages delivery for content navigation

– VoD delivery for the user client corresponding to the request from service providers

– FEC capability to increase error resilience for video and audio distribution

– TV program insertion (e.g., commercial insertion, emergency alert)

With this interface, it is also possible to implement the SDV as a part of the video delivery function. Details of SDV are described in Appendix I.

6.5 Access control function

This interface is recommended to implement the SCP function for video content. SCP controls licensed access to services and protects the integrity of the content. Service providers can specify whether SCP is required for each video content delivery. If multiple SCP methods are provided by the interface, service providers can choose one from among them.

6.6 Accounting function

This interface is recommended to implement the accounting function that enables service providers to charge service fees to user clients. Service fees include VoD fee, VoIP fee, and so on. When the service provider charges a new service fee for the user, this interface is required to obtain the user's permission first.

6.7 Content management function

This interface is recommended to implement the content management function. The functionalities listed below are enabled by the content management function:

– Content transmission between service providers and this interface

– Content storage management

– Video and audio transcoding with format conversion

When a service provider specifies format change for their content, this interface enables format conversion and storage of the modified content. Format changes include but are not limited to:

– Video resolution, frame rate, progressive or interlaced
– The number of audio channels, sampling frequency, the number of bits for quantization
– Video/audio codec type and bit rate

These format change functions enable service providers to provide their services to multiple types of user clients that have different capabilities.

6.8 Report function

This interface is required to implement the report functionality, which provides the fulfilment data related to services. For this purpose, this interface enables aggregation of the activity information from clients and provides the data to service providers.

The report information includes:

– Statistics regarding audiences, e.g., audience measurement information
– Service fulfilment measurement
– Interactive application fulfilment
– Other information regarding end-user behaviour

Note that, regarding audience measurement, some existing specifications such as [b-ITU-T J.204] provide formats of the audience measurement information.

6.9 Cable telephony support function

This interface is recommended to implement cable telephony. It includes:

– Signalling capability
– Media priority control
– Capability exchange

6.10 Enhanced service support function

This interface is recommended to implement enhanced services. For example:

– Multi-view video distribution
– Network-based digital video recording
– Content recommendation

6.11 Routing function for primary distribution

This interface is required to enable routing function for primary distribution. As described in clause 5.2.4, primary distribution needs to control its destination domain according to a distribution plan, e.g., national level, regional level, prefecture level and municipal level.

6.12 Addressable secondary distribution function for targeted content distribution

The interface is recommended to enable addressable secondary distribution function for targeted content distribution. As described in clause 5.2.7, targeted content distribution needs to control their destination address according to a distribution plan or strategy.

If the interface supports this service, the interface is required to implement the following functions:

– Function to receive delivery policies from service providers. Typically, the delivery policy includes, but is not limited to, delivery schedule, geographical information of user, demographical information of user, delivery frequency, etc.

– Function to decide content and/or advertisement to be distributed.

– Report function defined in clause 6.8.

7 Relationship to local application service delivery platform (LASDP)

Local application service delivery platform (LASDP) is a conceptual platform, which resides within the home network to provide programming interfaces and functionalities to enable cable television operator and third-party service provider to deliver advanced and innovative applications and services to cable subscribers on the home network. The LASDP can communicate and interwork with the interface defined by this Recommendation to create more value for customers and the service provider.

According to the definition of the LASDP, services that will be provided through the interface defined by this Recommendation can be classified into the following three categories:

– Service class A: Services provided from/to service providers through the service provider's interface, e.g., primary distribution, service measurement.

– Service class B: Services provided to end-users through the service provider's interface, e.g., secondary distribution.

– Service class C: Services provided to end-users through the service provider's interface with an interaction with the local application service delivery platform, e.g., remote management.

Appendix I

Examples of the SDV for the service provider's interface for television service

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

Figure I.1 shows a conceptual diagram of the SDV which is the mechanism to increase the transmission efficiency of the video broadcasting. SDV is one of the video delivery mechanisms and is realized by the media delivery function shown in Figure 2.

The SDV client, SDV manager, and MPEG switch function are necessary for the SDV services. The SDV client sends the ID of the subscriber and the program to the SDV master; the SDV master connects the downstream port after recognizing the ID, and the incoming broadcast signals to the MPEG switch are routed to the appropriate output ports.

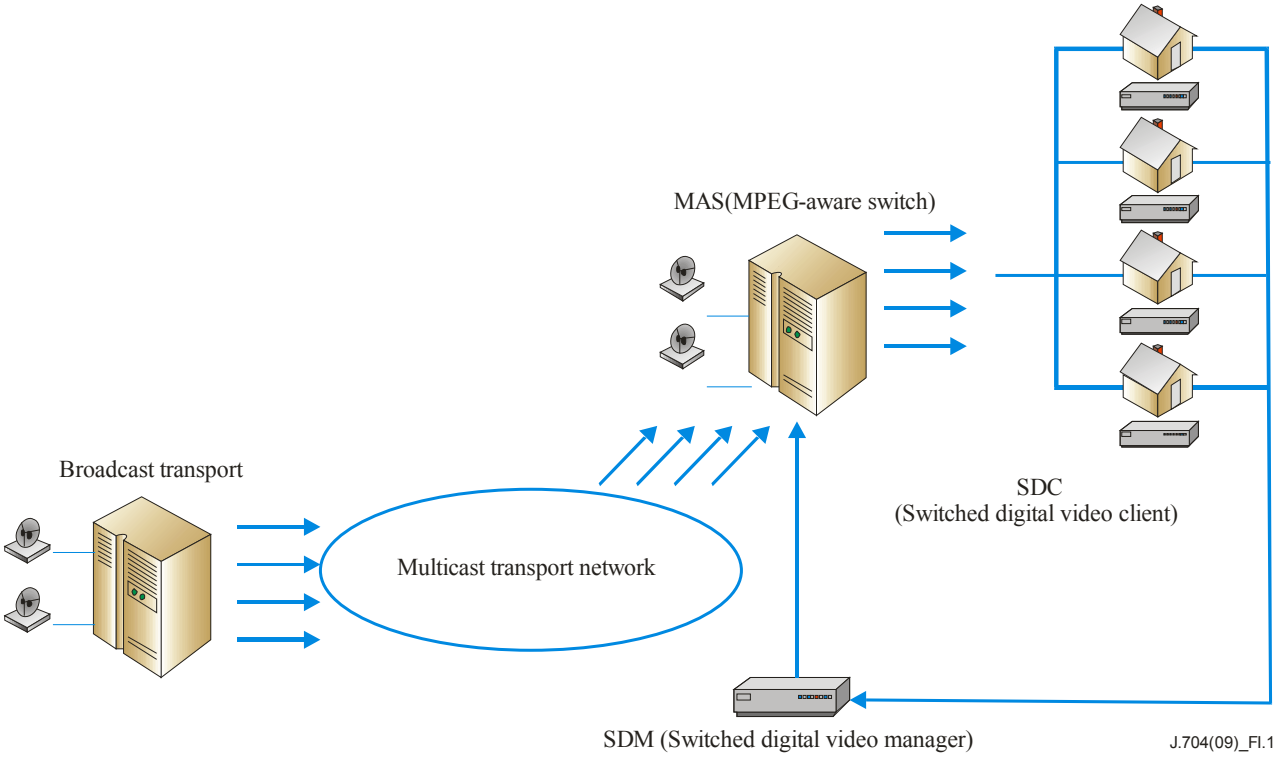

Figure I.1 – Conceptual diagram of the SDV

Figure I.2 shows the efficiency and performance of SDV using cable networks. As shown in the following HFC network physical topology, the subscriber group in the same cell (i.e., service group) receives the same program. The service provider sends multichannel content to the cable television service operator. The video server receives the multichannel content and transports the multichannel content to the multicast network and switch. The SDV manager also sends the control and management information to the headend transmitter. For example, four subscribers who use the same cell of the service operator's cable network request a different program. One is not subscribed now, another two subscribers request ch.2 program, the other requests ch.1 program. The four subscribers who use the same cell of the service operator receive the same program, i.e., ch.1 and ch.2 program.

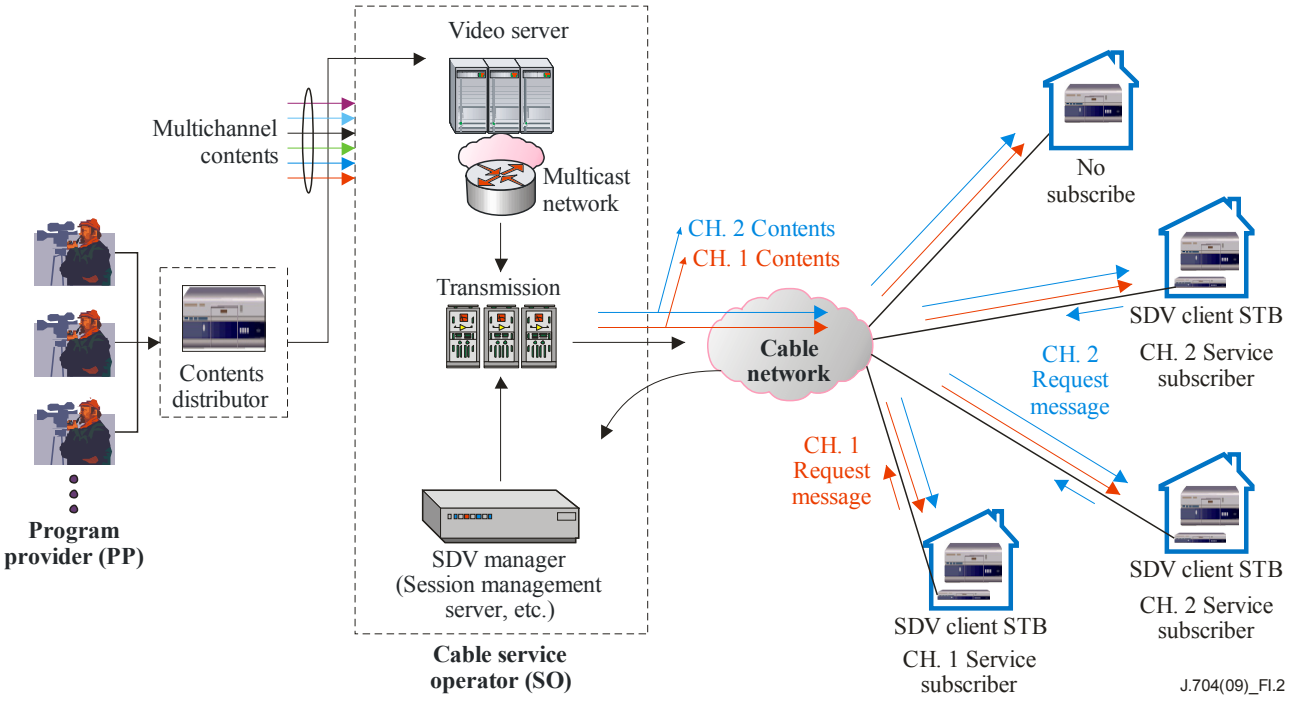

Figure I.2 – Efficiency and performance diagram of the SDV

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[b-ITU-T J.367] Recommendation ITU-T J.367 (2008), *IPCablecom2 presence specification*.

[b-ITU-T J.460.0] Recommendation ITU-T J.460.0 (2008), *IPCablecom2 residential SIP telephony: Feature definition*.

[b-ITU-T Y.Sup.5] ITU-T Y-series Recommendations – Supplement 5 (2008), ITU-T Y.1900-series – *Supplement on IPTV service use cases.*

[b-ITU-T Y.1901] Recommendation ITU-T Y.1901 (2009), *Requirements for the support of IPTV services*.

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