Recommendation

ITU-T J.1036 (07/2023)

SERIES J: Cable networks and transmission of television, sound programme and other multimedia signals

Conditional access and protection – Factual subscriber-base reporting and protected content delivery in conditional access systems

Factual subscriber-base reporting and protected content delivery in conditional access system – Requirements

ITU-T J-SERIES RECOMMENDATIONS

Cable networks and transmission of television, sound programme and other multimedia signals

GENERAL RECOMMENDATIONS	J.1-J.9
GENERAL SPECIFICATIONS FOR ANALOGUE SOUND-PROGRAMME TRANSMISSION	J.10-J.19
PERFORMANCE CHARACTERISTICS OF ANALOGUE SOUND-PROGRAMME CIRCUITS	J.20-J.29
EQUIPMENT AND LINES USED FOR ANALOGUE SOUND-PROGRAMME CIRCUITS	J.30-J.39
DIGITAL ENCODERS FOR ANALOGUE SOUND-PROGRAMME SIGNALS - PART 1	J.40-J.49
DIGITAL TRANSMISSION OF SOUND-PROGRAMME SIGNALS	J.50-J.59
CIRCUITS FOR ANALOGUE TELEVISION TRANSMISSION	J.60-J.69
ANALOGUE TELEVISION TRANSMISSION OVER METALLIC LINES AND INTERCONNECTION WITH RADIO-RELAY LINKS	J.70-J.79
DIGITAL TRANSMISSION OF TELEVISION SIGNALS	J.80-J.89
ANCILLARY DIGITAL SERVICES FOR TELEVISION TRANSMISSION	J.90-J.99
OPERATIONAL REQUIREMENTS AND METHODS FOR TELEVISION TRANSMISSION	J.100-J.109
INTERACTIVE SYSTEMS FOR DIGITAL TELEVISION DISTRIBUTION (DOCSIS FIRST AND SECOND GENERATIONS)	J.110-J.129
TRANSPORT OF MPEG-2 SIGNALS ON PACKETIZED NETWORKS	J.130-J.139
MEASUREMENT OF THE QUALITY OF SERVICE - PART 1	J.140-J.149
DIGITAL TELEVISION DISTRIBUTION THROUGH LOCAL SUBSCRIBER NETWORKS	J.150-J.159
IPCABLECOM (MGCP-BASED) - PART 1	J.160-J.179
DIGITAL TRANSMISSION OF TELEVISION SIGNALS - PART 1	J.180-J.189
CABLE MODEMS AND HOME NETWORKING	J.190-J.199
APPLICATION FOR INTERACTIVE DIGITAL TELEVISION - PART 1	J.200-J.209
INTERACTIVE SYSTEMS FOR DIGITAL TELEVISION DISTRIBUTION (DOCSIS THIRD TO FIFTH GENERATIONS)	J.210-J.229
MULTI-DEVICE SYSTEMS FOR CABLE TELEVISION	J.230-J.239
MEASUREMENT OF THE QUALITY OF SERVICE - PART 2	J.240-J.249
DIGITAL TELEVISION DISTRIBUTION THROUGH LOCAL SUBSCRIBER NETWORKS	J.250-J.259
IPCABLECOM (MGCP-BASED) - PART 2	J.260-J.279
DIGITAL TRANSMISSION OF TELEVISION SIGNALS - PART 2	J.280-J.289
CABLE SET-TOP BOX	J.290-J.299
APPLICATION FOR INTERACTIVE DIGITAL TELEVISION - PART 2	J.300-J.309
MEASUREMENT OF THE QUALITY OF SERVICE - PART 3	J.340-J.349
IPCABLECOM2 (SIP-BASED) - PART 1	J.360-J.379
DIGITAL TRANSMISSION OF TELEVISION SIGNALS - PART 3	J.380-J.389
MEASUREMENT OF THE QUALITY OF SERVICE - PART 4	J.440-J.449
IPCABLECOM2 (SIP-BASED) - PART 2	J.460-J.479
DIGITAL TRANSMISSION OF TELEVISION SIGNALS - PART 4	J.480-J.489
TRANSPORT OF LARGE SCREEN DIGITAL IMAGERY	J.600-J.699
SECONDARY DISTRIBUTION OF IPTV SERVICES	J.700-J.799
MULTIMEDIA OVER IP IN CABLE	J.800-J.899
TRANSMISSION OF 3-D TV SERVICES	J.900-J.999
CONDITIONAL ACCESS AND PROTECTION	J.1000-J.1099
Renewable conditional access system	J.1000-J.1004
Digital rights management for cable television multiscreen service	J.1005-J.1009
Exchangeable embedded conditional access and digital rights management solutions	J.1010-J.1019
Downloadable system for multi-CA/DRM service of mobile broadcasting	J.1020-J.1025
Downloadable conditional access system for unidirectional networks	J.1026-J.1029
Downloadable conditional access system for bidirectional networks	J.1031-J.1035
Factual subscriber-base reporting and protected content delivery in conditional access systems	**J.1036-J.1039**
SWITCHED DIGITAL VIDEO OVER CABLE NETWORKS	J.1100-J.1119
SMART TV OPERATING SYSTEM	J.1200-J.1209
IP VIDEO BROADCAST	J.1210-J.1219
CLOUD-BASED CONVERGED MEDIA SERVICES FOR IP AND BROADCAST CABLE TELEVISION	J.1300-J.1309
TELEVISION TRANSPORT NETWORK AND SYSTEM DEPLOYMENT IN DEVELOPING COUNTRIES	J.1400-J.1409
ARTIFICIAL INTELLIGENCE (AI) ASSISTED CABLE NETWORKS	J.1600-J.1649

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T J.1036

Factual subscriber-base reporting and protected content delivery in conditional access system – Requirements

Summary

The objective of Recommendation ITU-T J.1036 is to address two major concerns related to conditional access system (CAS), namely underreporting of subscriber numbers and content piracy leading to revenue loss to broadcasters, content providers and the governments.

Most countries have implemented digital addressable systems (DAS) for distribution platforms such as cable TV, direct to home (DTH), Internet protocol television (IPTV), and headend in the sky (HITS), DAS enables subscribers to have a choice and option to select their channels and packages. Conditional access system (CAS) and subscriber management system (SMS) are integral parts of a DAS environment. While CAS is responsible for encrypting the content and its delivery in a secure and encrypted manner only to authorised subscribers, SMS handles the subscriber management functions. The quality of service depends on the CAS and SMS systems deployed by the distribution platform owner (DPO).

Since content providers and broadcasters have no control over the CAS and SMS, as these are deployed at the DPO end, they often complain about the loss of revenue due to various malpractices such as under-reporting of subscriber-base, distribution of channels to unauthorised users, and content piracy.

Therefore, it is necessary to frame benchmarks for the CAS systems prescribing technical specifications focusing on functional requirements to ensure factual reporting of the subscriber-base and protected delivery of content to authorised subscribers. Creating a framework that prevents the deployment of sub-standard CAS will bring preventive control from potential threats and revenue losses arising due to the vulnerability of such systems, bring economic efficiency, improve quality of service, and improve the end-consumer experience.

This Recommendation thus elaborates the various functional requirements of the CAS such as log requirements, reports requirements, database requirements, security requirements, service requirements and more. Compliance with these requirements in CAS performance will address the concerns mentioned above.

---

* To access the Recommendation, type the URL https://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents/software copyrights, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the appropriate ITU-T databases available via the ITU-T website at http://www.itu.int/ITU-T/ipr/.

Table of Contents

Recommendation ITU-T J.1036

Factual subscriber-base reporting and protected content delivery in conditional access system – Requirements

1 Scope

This Recommendation specifies the functional requirements of conditional access systems (CAS) deployed in digital addressable systems (DAS) for television broadcasting to enable factual subscriber-base reporting and to ensure protected delivery of content to authorised subscribers.

The objective of this Recommendation is to address two major concerns related to CAS namely, underreporting of subscriber numbers and content piracy, leading to revenue loss to broadcasters, content providers and the governments.

This Recommendation elaborates the various functional requirements of the CAS such as log requirements, reports requirements, database requirements, security requirements, service requirements, and more. Compliance with these requirements in CAS performance will address the concerns mentioned above.

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.

None.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 conditional access system (CA) [b-ITU-T J.95]: The complete system for ensuring that cable services are accessible only to those who are entitled to receive them, and that the ordering of such services is not subject to modification or repudiation.

3.1.2 content [b-ITU-R BT.1852-1]: This is any form of digital data that can be acquired and presented by a device.

3.1.3 piracy [b-ITU-T J.93]: The act of acquiring unauthorized access to programmes, usually for the purpose of reselling such access.

3.1.4 service [b-ITU-R BT.1852-1]: This is one or more data flows intended to be presented together.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 factual subscriber-base reporting: Factual subscriber-base reporting in the context of a conditional access system refers to the accurate and truthful representation of the number of

subscribers of each service in a distribution platform without any manipulation or distortion of the underlying data.

3.2.2 **protected delivery of content**: Protected delivery of content in the context of a conditional access system used in broadcasting and distribution platforms refers to the secure encrypted transmission of digital content, such as TV programmes, movies, or music to authorized users while preventing unauthorized access or piracy.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

API   Application Programming Interface

CAS   Conditional Access System

DB   Database

DAS   Digital Addressable Systems

DPO   Distribution Platform Operator

DTH   Direct To Home

EPG   Electronic Programme Guide

FTA   Free-To-Air

HITS   Headend In The Sky

IPTV   Internet Protocol Television

LCN   Logical Channel Number

OTA   Over-The-Air

OTT   Over-The-Top

SMS   Subscriber Management System

STB   Set-Top-Box

UA   Unique Access

VC   Viewing Card

5 Conventions

None.

6 Overview

Most countries have implemented digital addressable systems (DAS) for distribution platforms such as cable TV, direct to home (DTH), Internet protocol television (IPTV), and headend in the sky (HITS). DAS enables subscribers to have a choice and option to select their channels and packages. Conditional access system (CAS) and subscriber management system (SMS) are integral parts of a DAS environment. While CAS is responsible for encrypting the content and its delivery in a secure and encrypted manner only to authorised subscribers, SMS handles the subscriber management functions. The quality of service depends on the integrated CAS and SMS systems deployed by the distribution platform owner (DPO).

Since the content providers and broadcasters have little control over the CAS and SMS, as these are deployed at the DPO end, they are concerned about the difference between the actual and the reported subscriber-base, and the distribution of channels to unauthorised users.

Multiple CAS solutions are available, some using advanced embedded security while others using sub-standard security solutions. Systems having sub-standard solutions can be prone to manipulations and vulnerable to hacking, leading to loss of revenue to the concerned broadcasters and the government.

Therefore, it is necessary to frame benchmarks for the CAS systems, prescribing technical specifications focusing on functional requirements to ensure factual reporting of subscriber-base and protected delivery of content to authorised subscribers. Creating a framework that prevents the deployment of sub-standard CAS will bring preventive control from potential threats, and revenue losses arising due to the vulnerability of such systems bring economic efficiency, improve quality of service, and improve the end-consumer experience.

7 Requirements for factual subscriber-base reporting and protected delivery of content in the conditional access system

7.1 Log requirements

[CAS Logs]

(LOG-REQ 01): CAS logs such as the user command, configuration, channel / bouquet creation, modification, etc., shall be kept in a secured and un-editable way.

(LOG-REQ 02): The system shall not allow altering or modification of any logs. There shall be no facility for the distributor / users to purge logs.

[Time Stamping]

(LOG-REQ 03): All logs shall be stamped with date and time.

[SMS and CAS Integration]

(LOG-REQ 04): Each instance of the activity carried out at SMS pertaining to CAS shall be recorded in the logs / reports of CAS, along with the date and time stamp.

(LOG-REQ 05): If any activity has been carried out directly from CAS for troubleshooting; such an exception shall be identified through the synchronization mismatch report.

(LOG-REQ 06): For any activity outside the normal channel / route of SMS-based commands, a secure log shall be maintained and made available on request to the audit or testing agency for scrutiny.

7.2 Report requirements

(RPT-REQ 01): CAS database (DB) shall have the reports of a white list of card / set-top-boxes (STBs) along with details such as active / inactive status, with the date and time stamp.

(RPT-REQ 02): CAS system shall be capable of generating reports pertaining to the channel / bouquet subscriptions and active / deactivated subscribers, or any combination thereof; of sharing the same with SMS as a scheduled activity, and also upon request, including but not limited to the following details:

- STB number;
- Viewing card (VC) number [or, in case of card-less CAS, chip identification (ID) or virtual card number of the STB];
- Product code pertaining to channels / bouquets available on the platform;
- Start date of entitlement;
- End date of entitlement;
- Status of card (active / inactive).

(RPT-REQ 03): It shall be possible to generate the following reports from the logs of CAS:

- STB-VC pairing / de-pairing;
- STB activation / deactivation;
- Channel assignment to STB;
- Report on the activation / deactivations of a particular channel for a given period.

7.3   CAS database requirements

[Explanation: Database here refers to the database where data and log of all activities related to STB activation, deactivation, subscription data, STB unique access (UA) / viewing card (VC) details, entitlement level information, etc., is being stored.]

(CDB-REQ 01): There shall not be any active unique subscriber outside the database tables.

(CDB-REQ 02): There shall not be an option to split the CAS database for the creation of more than one instance by a DPO or a vendor.

(CDB-REQ 03): CAS shall support the following options with reference to uploading unique access (UA) / viewing card (VC) details in the CAS database:

- A secure un-editable file of card details as purchased by the distributor, to be uploaded by the CAS vendor on the CAS Server directly, or;
- If it is uploaded in any other form, UA / VC in the CAS database shall be captured in logs;
- CAS shall support an automated, application programming interface (API)-based mechanism to populate such UA / VC details in the SMS without any manual intervention.

(CDB-REQ 04): CAS shall ensure that access to the database is available to authorized users only, and in "read only" mode only.

(CDB-REQ 05): The database audit trail shall be permanently enabled.

(CDB-REQ 06): CAS shall have a provision to export the database / report for reconciliation with the SMS database.

(CDB-REQ 07): There shall be a provision of reconciliation through secure APIs / secure scripts.

(CDB-REQ 08): CAS and SMS server separation: CAS and SMS applications, along with their respective databases, shall be stored in such a way that they can be separately identified.

(CDB-REQ 09): CAS backup server shall satisfy the following:

- In the event of provisioning of a backup server, logs of all activities carried out in the main server shall be concurrently copied into the backup server;
- Provided that a log of all such instances shall be maintained along with date and time stamp, where the backup server has been used as the main server;
- Provided further that the main and backup servers shall always be in sync with regard to the key data such as subscription data, STB UA / VC details, entitlement level information, etc.

7.4   Security requirements

[Activation and Deactivation]

(SEC-REQ 01): No access / login IDs / user interface / application shall be provided to the distributor of television channels to execute any commands, including but not limited to, activation / deactivation, bouquet creation/modification/deletion, etc., directly from CAS by bypassing SMS.

[Logical Channel Number (LCN)]

(SEC-REQ 02): CAS shall not support the carriage of channels with the same name or nomenclature in the distributor's network served by each headend under more than one LCN, and another channel descriptor.

(SEC-REQ 03): Each channel available in CAS shall be uniquely mapped with channels available in the SMS.

(SEC-REQ 04): CAS shall be accessible through a firewall only.

[CAS Server Hardware]

(SEC-REQ 05): CAS shall be deployed on a secure server.

(SEC-REQ 06): CAS shall be deployed on servers which protect against malicious software deployments and cyber security threats.

[Finger printing measures]

(SEC-REQ 07): CAS shall support both covert and visible types of finger printing functionality.

(SEC-REQ 08): The fingerprinting shall be on the topmost layer of the video.

(SEC-REQ 09): The fingerprinting shall appear on the screen in all scenarios, such as the menu, electronic programme guide (EPG), settings, blank screen, games, etc.

(SEC-REQ 10): The fingerprinting shall not get invalidated by the use of any device or software.

(SEC-REQ 11): CAS shall have the capability to run fingerprinting at regular intervals (e.g., minimum of 2 fingerprints per hour on a 24x7x365 basis) and provide broadcasters with the fingerprint schedule on request.

(SEC-REQ 12): The fingerprinting shall be available on a global as well as on an individual STB basis.

7.5   Service requirements

[Provision of à-la-carte channels or bouquet]

(SER-REQ 01): CAS shall be able to handle all the channels made available on a platform in à la carte mode.

(SER-REQ 02): CAS shall have the capability to handle such a number of broadcaster / DPO bouquets as required by the DPO.

[Set-Top-Box (STB) Operation]

(SER-REQ 03): Upon deactivation of any subscriber from the SMS, all programme / services, including all free-to-air (FTA) and pay channels and platform services, shall be denied to that subscriber.

(SER-REQ 04): Provided that there shall be a facility for the distribution platform operator (DPO) to continue to provide messages that enable a consumer to get the information in relation to the recharge / payment of the pending dues.

[Channel/Service Addition]

(SER-REQ 05): CAS shall be capable to add / modify channels / bouquets as may be required from time to time.

[Hybrid STB]

(SER-REQ 06): In case a distributor of television channels has deployed hybrid STBs, CAS shall ensure that the over-the-top (OTT) app does not get access to the linear television channels, and the CAS does not get access to channels delivered through the OTT platform. [Provided that all the mandatory requirements for CAS shall be complied with by the hybrid STBs.]

[CAS-STB addressability]

(SER-REQ 07): CAS shall be capable of providing STB / viewing card information with the current date, time, and name/logo of the distributor of television channels.

(SER-REQ 08): CAS shall be capable of individually addressing subscribers for the purpose of generating the reports, on channel by channel and STB by STB basis.

(SER-REQ 09): CAS shall be capable of tagging and blacklisting VC numbers and STB numbers that are involved in piracy, to ensure that such STB / VC cannot be redeployed.

(SER-REQ 10): CAS shall be capable of upgrading STBs over-the-air (OTA) so that the connected STBs can be upgraded.

[De-entitlement of STB]

(SER-REQ 11): The entitlement end date in CAS shall be equal to the entitlement end date in SMS, or,

(SER-REQ 12): The entitlement end date in CAS shall be open and the SMS shall manage entitlements based on the billing cycles and payments.

[Message Queue]

(SER-REQ 13): In the event of an unsuccessful transmission of messages due to network failure (for instance, due to power failure), the head-end shall have the option to queue up the messages.

(SER-REQ 14): There shall be a provision to retry them at specified intervals using additive back off retrial timings.

(SER-REQ 15): In the event of unsuccessful deliveries of messages, the life of the messages shall be specifiable.

[Geographical Blackout]

(SER-REQ 16): CAS shall have the feature of geographical blackout. [Explanation: Geographical blackout is the ability of CAS to blackout a particular region based on the postal index number codes (Geographic area code) if required by government agencies or for other reasons.]

Bibliography

[b-ITU-T J.93]   Recommendation ITU-T J.93 (1998), *Requirements for conditional access in the secondary distribution of digital television on cable television systems*.

[b-ITU-T J.95]   Recommendation ITU-T J.95 (1999), *Copy protection of intellectual property for content delivered on cable television systems*.

[b-ITU-R BT.1852-1]   Recommendation ITU-R BT.1852-1 (2016), *Conditional-access systems for digital broadcasting*.

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	Tariff and accounting principles and international telecommunication/ICT economic and policy issues
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	**Cable networks and transmission of television, sound programme and other multimedia signals**
Series K	Protection against interference
Series L	Environment and ICTs, climate change, e-waste, energy efficiency; construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling, and associated measurements and tests
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects, next-generation networks, Internet of Things and smart cities
Series Z	Languages and general software aspects for telecommunication systems