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

Television transport network and system deployment in developing countries

Television content distribution platforms – Requirements for open access and signal quality

Recommendation ITU-T J.1401

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Television content distribution platforms: Requirements for open access and signal quality

Summary

In a country where analogue TV to digital TV (DTT) migration is taking place, the use of fibre optic backbone and local loop is considered affordable and reliable for content delivery. When such digital television content distribution platforms are provided by a single signal distribution provider and national fibre optic infrastructure provider, it is imperative that they are open for access by any entity providing DTT and other television content on an equal basis.

Recommendation ITU-T J.1401 defines technical requirements for digital television content distribution platforms that consist of national fibre optic lines and local loops that provide open access to entities who wish to deliver content to end users, as well as expected signal quality.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T J.1401	2022-01-13	9	11.1002/1000/14844

Keywords

ADSL loops, digital migration, DTT platforms, fibre optic.

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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Television content distribution platforms: Requirements for open access and signal quality

1 Scope

This Recommendation intends to build the capacities of regulators with the technical know-how in dealing with open access principles on digital television content distribution platforms provided by a single signal distribution provider and National Fibre Optic Infrastructure provider. This will ensure adequate capacity utilization leading to the provision of reliable and affordable content to all in the country intending to deploy digital TV on the national fibre backbone infrastructure.

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 G.707] Recommendation ITU-T G.707/Y.1322 Amd. 2 (2009), *Network node interface for the synchronous digital hierarchy (SDH)*.

[ITU-T G.7041] Recommendation ITU-T G. 7041/Y.1303 Amd.1 (2019), *Generic framing procedure*.

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

DTC Digital Television Content

DTT Digital Terrestrial Television

GFP General Framing Procedure

HE Headend

MPLS Multiprotocol Label Switching

SDH Synchronous Digital Hierarchy

SDI Serial Digital Interface

SLA Service Level Agreement

5 Conventions

In this Recommendation:

The keywords "**is required to**" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

The keywords "**is recommended**" indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement need not be present to claim conformance.

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In the body of this document and its annexes, the words *shall*, *shall not*, *should*, and *may* sometimes appear, in which case they are to be interpreted, respectively, as *is required to*, *is prohibited from*, *is recommended* and *can optionally*. The appearance of such phrases or keywords in an appendix or in material explicitly marked as *informative* are to be interpreted as having no normative intent.

6 Background

In most developing countries, as a result of low economic activity coupled with the low purchasing power of the citizens, it makes business sense for the government to allow a single signal distributor. This arrangement is premised on the belief that access by content service providers to the headend will be based on open access principles and will be non-discriminatory. However, the fact that there is only one provider naturally leads to a monopoly situation. As a monopoly, unless there are proper checks and balances, the issue of quality and affordable price maybe be compromised. In some extreme instances, the signal distributors are given the right to operate as a monopoly and at the same time have the mandate to compete with other content providers in the same market, posing a serious threat to competition and quality service delivery. Such operators have no incentive to reduce costs and a serious challenge is posed to regulators who are mandated to ensure high quality service delivery which should be affordable, accessible and available across the length and breadth of their country. As a result of the issues raised above and of other challenges associated with digital migration, regulators should be equipped with the necessary technical tools to ensure a smooth transition through the development of appropriate technologies which shall leverage on the existing national fibre backbone at a reasonable cost without compromising on the quality of the signals.

7 Architecture of digital television content distribution platform

Figure 1 shows a basic architecture of a digital television content distribution platform. It takes content streams from content provider A, content provider B, and content provider N, and delivers them, for example, to cable headend A, cable headend B and digital terrestrial television (DTT) transmitter N, respectively. The platform includes a core network such as a national fibre backbone which may be owned either by the platform provider or by a separate entity.

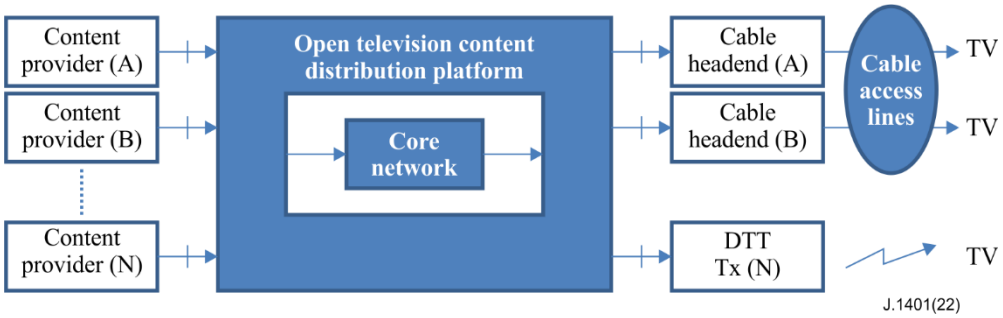

Figure 1 – Basic architecture of digital television content distribution platform

8 Requirements for the digital television content distribution platform

The digital television content (DTC) distribution platform is used to deliver content streams to multiple content providers on a fair, non-discriminatory basis, based on service agreements between those concerned. For this purpose, the platform is required to meet the following technical requirements.

8.1 Basic requirements

– The platform is required to deliver the content stream intact to its destination, without loss during transport over the distribution platform.

– To achieve the first requirement, the platform is required to set allocated bandwidth to each incoming content stream, and when this is exceeded, the excess data is rejected and not transported for delivery. This bandwidth allocation should be based on a commercial or other agreement between the platform operator and content provider. The connection between the content provider and the platform may be provided by a third party in line with agreed terms and conditions stipulated in an SLA.

– The platform is required to support permanent and long-term as well as short-term or occasional content delivery.

– The platform is required to deliver not only video content stream but also other associated signals including audio, captions, subtitles, metadata, orderwire (intercom) signals and television content in file format.

8.2 Other requirements

– The platform should support multidestination delivery of the same content stream.

– The platform should be IP based, although other conventional technology may also be utilized.

– Error correction should be used to null or alleviate the effect of transmission errors in the core network.

– The platform should implement redundancy or protection switching.

– The platform should be equipped with monitor, control and management functions to alert operators and help them act on any problem that may occur in the platform or core network.

9 Interface definitions

9.1 Video interface

This clause defines the format of incoming and outgoing signal formats into / out of the DTC platform.

This interface receives digital television content from the content provider and feeds it to the distribution platform. At the other end of the platform, it outputs the content stream received through for delivery to the cable television headend and DTT transmitters.

The signal format is recommended to be IP, but the use of non-IP format is not precluded.

Detailed interface specifications should be defined to meet the requirements of the content provider, cable headend and DTT transmitters, based on the either of the following policies:

1) One standard interface definition

   In this policy, each and every content provider transmits a content stream in a standard format defined by the platform operator.

2) Multiple interface definitions

   In this policy, the content provider can transmit a content stream in any format, provided that the platform is equipped with functions that convert the format of the incoming content stream into the one for delivery to the destination.

9.2 Examples of video interface

1) IP-based signal format (recommended)
   - Ethernet (1G, 10G)
2) Non-IP-based signal format
   - Synchronous digital hierarchy (SDH)
   - Serial digital interface (SDI) (12G, 3G, HD, SD)

9.3 Trunk interface

Trunk interface connects the DTC platform with a core network.

The signal format is recommended to be IP, but the use of non-IP format is not precluded.

9.4 Examples of trunk interface

- Ethernet/IP network (recommended)
- Multiprotocol label switching (MPLS) network
- SDH

9.5 General framing procedure

To carry variable-length IP/Ethernet traffic over an SDH network, it is necessary to encapsulate the signals of the former so that they fit into the synchronous frames that the latter use. For this purpose, general framing procedure (GFP) is used. This function can be used at both the video interface and trunk interface.

For details of GFP and SDH, see [ITU-T G.7041] and [ITU-T G.707], respectively.

10 Content delivery

The content stream received at one end of the DTC platform is delivered to the other end of the platform using the core network inside the platform. As defined in clause 8.1, it is required that the platform adequately manage the aggregate traffic volume into the core network so that it does not exceed the capacity of the core network.

When the core network is not dedicated for this content distribution platform, but shared with other services, it is required that the aggregate traffic volume into the core network not exceed the capacity assigned for this service by the core network.

11 Required agreement between entities

This clause defines the technical requirements which should be included in agreement documents to be concluded between platform operator and content provider. Sometimes, separate agreements between content provider and ISP may be required to ensure IP connectivity between the content provider and the platform or between the platform and cable headend (HE)/DTT transmitters.

11.1 Maximum available bit rate

For the purpose of a DTC distribution network, it is important to agree on the maximum bit rate of the input signal that a service provider can feed into the platform.

– Maximum bit rate of service provider's input signal into the platform

11.2 Service level agreement

A service level agreement (SLA) for a DTC distribution platform would define the following quality indicators:

– Availability

– Reliability

Availability is defined as the percentage of time that the system is operational under stated conditions, while reliability is the probability that the system will operate without failure. For the purpose of this system, the stated conditions would mean that television content sent by a content provider at one end arrives at the destination without error.

See [b-ITU-T E.800], *Definitions of terms related to quality of service*, for the definitions of availability and reliability. They are reproduced in Appendix I for reference.

Appendix I

Definitions of terms related to quality of service

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

From [b-ITU-T E.800], Definitions of terms related to quality of service.

availability: Availability of an item to be in a state to perform a required function at a given instant of time or at any instant of time within a given time interval, assuming that the external resources, if required, are provided.

reliability: The probability that an item can perform a required function under stated conditions for a given time interval.

Bibliography

[b-ITU-T E.800] Recommendation ITU-T E.800 (2008), *Definitions of terms related to quality of service*.

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