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

Digital transmission of television signals

Requirements and framework for gathering electronic content over IP-based network

ITU-T Recommendation J.284

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Requirements and framework for gathering electronic content over IP-based network

Summary

ITU-T Recommendation J.284 is for use of fast IP transmission for the delivery of news clips or other content materials from remote locations to broadcasters' station. It defines a framework and requirements to provide a common platform for development of various specifications per specific demands.

Source

ITU-T Recommendation J.284 was approved on 14 December 2007 by ITU-T Study Group 9 (2005-2008) under the ITU-T Recommendation A.8 procedure.

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.

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

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1 Scope

Recent deployment of high speed IP networks provides broadcasters and video distribution companies of a new means to gather content materials such as news clips, materials for production and video programs.

Considering the growing demand for the content material transmission over the IP networks, this Recommendation presents a common framework to cover various usages and aims to stimulate development of a specific system according to each purpose.

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-R BT.1205] ITU-R Recommendation BT.1205 (1995), *User requirements for the quality of baseband SDTV and HDTV signals when transmitted by digital Satellite News Gathering (SNG).*

3 Definitions

This Recommendation defines the following terms:

3.1 transaction initiator: One end that initiates a video transmission transaction operated by a human.

3.2 transaction recipient: One end that accepts a video transmission transaction automatically.

3.3 session client: One end that sets up a connection.

3.4 session server: One end that accepts a connection request.

3.5 remote terminal: Video terminal at a remote site.

3.6 video server: Video server at a broadcaster's station.

4 Abbreviations and acronyms

None.

5 Conventions

None.

6 Use case

6.1 Basic configuration

A video terminal on site connects to a video server at broadcaster station through IP networks.

6.2 Live coverage

1) *Unidirectional*

This is a one-way report with no audiovisual interaction from the remote site to the station. A typical usage of this model is highway traffic monitoring or weather-monitoring camera. It may have remote control functionality in order to control the camera movement such as pan, tilt, zoom, etc., according to the intention of a director in the station.

For this usage, video and audio transmission shall be in real time with low latency.

2) *Bidirectional*

This is a dialogue between the remote site and the station. A typical usage is dialogue between a reporter and an anchorman. In some cases, video transmission may be one way from the remote site to the station, but in many cases the reporter needs to receive video from the station in order to see the current on-the-air video.

For this usage, video and audio transmission shall also be in real time with low latency, whereas requirements for the quality may be different per direction.

6.3 Material transmission

1) *Push operation*

The server at the station is operated automatically, and the terminal is operated by the reporter. The reporter collects new materials and transmits them to the station after some editing, if possible. The server stores the received materials to be utilized for program production in the later stage.

A typical usage of this model is video reporting from the area where the telecommunication environment is not rich. In this case, a director in the station sometimes needs to prioritize the transmission sessions according to the new value.

Another usage is transmission of video program from video aggregation station to own broadcasting station.

For this usage, video transmission may take the form of file transmission, and it requires error-free transmission and high-picture quality that is affordable for post-production.

2) *Pull operation*

The terminal is operated automatically, and the server is operated by the director.

The director initiates the transmission transaction to gather content materials at a remote terminal or remote subsidiary stations. This system may be enhanced for on-line editing using the content streaming from the remote site.

For this usage, active control of remote devices has great significance as well as picture quality.

3) *Exchange*

An affiliation of the reporter and the director may be different. In such a case, the video server is not only the storing device but also a place for content exchange. Independent video journalists submit their video materials on the server, and directors search for materials for their program production.

7 Assumed system model

The system is constructed based on a client/server model. Transaction relates the service aspects, such as use case described in clause 6, while session client/server acts as an enabler of the service set-up and control part. Audiovisual transport service is provided by transport module that includes media handling block such as codecs.

It is desirable that the system is flexible enough to cover the variety of use cases. Therefore, a generic system model for transaction initiator and recipient is represented as in Figure 1. In this figure, transaction initiator is the site with a human operator, and he/she starts a session as a session client. In some cases, reverse session set-up procedure is required in order to tunnel a firewall. It should be noted that the transaction initiator can be a remote terminal or a video server at a station. It depends on which side the human starts the operation.

It is also taken into account that this basic system model can be cascaded to realize a "relay" operation.

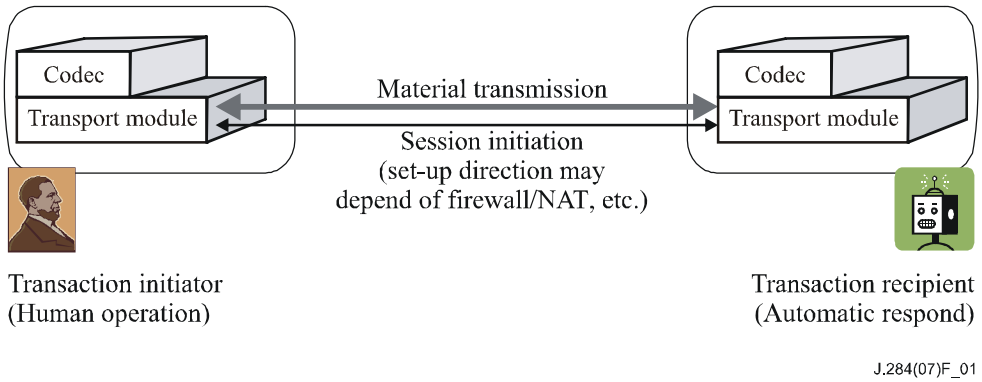

Figure 1 – System model for electronic content material gathering

8 Requirements

The following are requirement items to be covered in the electronic news gathering (ENG) system as described in clause 6.

8.1 Session control

1) *Name resolution*

A hostname should be able to be used for an identifier of the server in addition to IP address.

The server address may be resolved from a content ID such as unique material identifier (UMID).

2) *Authentication*

An operator and his/her affiliation should be authorized at the server side.

The server should be able to refuse the connection attempt except pre-registered terminals.

3) *Capability exchange*

The server and terminal should be able to show its capability at the connecting procedure.

Capability information should include transmission protocol, usage bandwidth, available disk space, the size of content material, encoding rate and employed codec.

4) *Mobility support*

The terminal should be able to access to the server from any location if the network is reachable.

5) *Firewall traversal*

The terminal should be able to access to the server inside of NAT/Firewall.

8.2 Transport

1) *Error control*

Error control mechanism should be supported in order to reduce or cancel the influence of transmission error.

Error free transmission should be provided for non-real time transmission.

Error control mechanism for real-time transmission should not damage the real-time feature.

2) *Stability for severe channel condition*

The non-real time transmission means should fully utilize the available bandwidth that is limited physically or assigned from the network operator even if the transmission link is high delay.

The transmission means should have a vital check functionality of a remote system.

3) *Resume*

The transmission pause or resume should be supported.

The session prioritization may be supported in order to control the transmission rate of each session.

4) *Integrity check*

Data identity check function should be supported between transmitter side and receiver side for non-real time transmission.

Received data malicious alteration may be detected for real-time transmission.

5) *Eavesdropping*

Transmission data should be protected against third party.

6) *Transport control*

Mutually relating multiple streams should be received simultaneously and synchronized at field and/or frame precision.

The receiver should be able to control bandwidth usage.

7) *Delay*

Transmission delay should be low enough for bidirectional live coverage.

8.3 Application layer

The system based on this Recommendation shall have a common operation mode for codec, encoding rate, and picture format, etc.

NOTE – Actual operating parameters shall be defined in the specific system Recommendation based on the requirements defined in this Recommendation.

Contribution quality shall be fulfilled as defined in [ITU-R BT.1205]. (Quality degradation: < 12% DSCQS, recovery time: < 1 s after a break of 50 ms, Maximum relative sound/vision delay: ±2 ms per coded element).

Received and stored data should be accessible randomly per field/frame precision.

Stored file format should be a generic and an international/industry standard.

Remote files should be accessible per field/frame precision for streaming.

Meta data may be attached to the content files in order to utilize the content by applications, such as encoding format, etc.

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