International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Series G

Supplement 77

(06/2022)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

Influencing factors on quality of experience (QoE) for video customized alerting tone (CAT) and video customized ringing signal (CRS) services

ITU-T G-series Recommendations – Supplement 77

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TRANSMISSION MEDIA AND OPTICAL SYSTEMS CHARACTERISTICS	G.600–G.699
DIGITAL TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
MULTIMEDIA QUALITY OF SERVICE AND PERFORMANCE – GENERIC AND USER-RELATED ASPECTS	G.1000–G.1999
TRANSMISSION MEDIA CHARACTERISTICS	G.6000–G.6999
DATA OVER TRANSPORT – GENERIC ASPECTS	G.7000–G.7999
PACKET OVER TRANSPORT ASPECTS	G.8000–G.8999
ACCESS NETWORKS	G.9000–G.9999

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

Supplement 77 to ITU-T G-series Recommendations

Influencing factors on quality of experience (QoE) for video customized alerting tone (CAT) and video customized ringing signal (CRS) services

Summary

Supplement 77 to ITU-T G-series Recommendations describes video customized alerting tone (CAT) and video customized ringing signal (CRS) services and helps to identify the quality of experience (QoE) key factors of video CAT and CRS.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T G Suppl. 77	2022-06-17	12	11.1002/1000/14997

Keywords

HD video customized alerting tone (CAT), HD video customized ringing signal (CRS), QoE.

* 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.

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

This is an informative ITU-T publication. Mandatory provisions, such as those found in ITU-T Recommendations, are outside the scope of this publication. This publication should only be referenced bibliographically in ITU-T Recommendations.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this publication 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 publication 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

Supplement 77 to ITU-T G-series Recommendations

Influencing factors on quality of experience (QoE) for video customized alerting tone (CAT) and video customized ringing signal (CRS) services

1 Scope

As specified in [ETSI TS 124 182], the customized alerting tone (CAT) service is an operator specific service by which an operator enables the subscriber to customize the media which is played to the calling party during alerting of the called party. As specified in [ETSI TS 124 183], the customized ringing signal (CRS) service is an operator specific service by which an operator enables the subscriber to customize the media which is played to the called party during alerting of the called party.

For both services the media can consist of user's favourite songs, multi-media clips or other customized alerting tones. When the media consists of video clips, it is called video CAT and video CRS service, respectively. High definition (HD) video CAT and CRS service can provide high-definition, full-screen video.

In order to assess the quality of experience (QoE) of a specific video CAT or video CRS service, analysis of influencing factors is critical. Compared with traditional video and audio, the short-time experience in video CAT and CRS imposes a new set of requirements to QoE assessment. The challenge is to characterize video CAT's real-life short video, terminal display strategy, and interactivity.

This Supplement categorizes and summarizes the major factors that affect user-perceived experience of a HD video CAT and CRS service, with the intention to help identify the methodologies for assessing the video CAT or CRS quality.

2 References

[ITU-T H.262] Recommendation ITU-T H.262 (2012), *Information technology – Generic coding of moving pictures and associated audio information: Video*.

[ITU-T P.10] Recommendation ITU-T P.10/G.100 (2017), *Vocabulary for performance, quality of service and quality of experience*.

[ETSI TS 124 182] ETSI TS 124 182 (2022), *Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) Customized Alerting Tones (CAT); Protocol specification*.

[ETSI TS 124 183] ETSI TS 124 183 (2022), *Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) Customized Ringing Signal (CRS); Protocol specification*.

3 Definitions

3.1 Terms defined elsewhere

This Supplement uses the following terms defined elsewhere:

3.1.1 quality of experience (QoE) [ITU-T P.10]: The degree of delight or annoyance of the user of an application or service.

3.1.2 QoE influencing factors [ITU-T P.10]: Include the type and characteristics of the application or service, context of use, the user's expectations with respect to the application or

service and their fulfilment, the user's cultural background, socio-economic issues, psychological profiles, emotional state of the user, and other factors whose number will likely expand with further research.

3.1.3 frame rate [ITU-T H.262]: The rate at which frames are output from the decoding process.

4 Abbreviations and acronyms

This Supplement uses the following abbreviations and acronyms:

CAT Customized Alerting Tone

CRS Customized Ringing Signal

HD High Definition

IMS IP Multimedia Subsystem

UE User Equipment

VoIMS Voice over IMS

5 Conventions

This Supplement uses the following conventions:

– The person who is called by another person is referred to as called party or called user.

– The person calling the other person is referred to as calling party or calling user.

6 HD video CAT overview

After the users apply for the video customized alerting tone (CAT) function, they can set their own personalized video alerting tone. The video CAT service provides a flexible video medium for the calling user to replace the ordinary network ring back tone service. In the ringing stage when they are called, the system plays the personalized media for the calling users. The user equipment (UE) should support voice over IMS (VoIMS) function when using the CAT service.

The service user can subscribe to the video CAT service, activate (or deactivate) the service, and update the settings, e.g., to make changes by configuring the active CAT media. The media can consist of videos, multimedia clips or other video customized alerting tones. The video CAT subscriber is able to refine the CAT media selection behaviour with configured rules, e.g., time, calling party's location, called party's location, the identity of the calling and called party. The video CAT service enables the user to select the appropriate CAT media according to the service rules.

When the precondition procedure is used in the initial call media negotiation stage, the calling party should support the video CAT media negotiation with the video CAT platform in the video calling stage.

After the calling party completes the video CAT media negotiation, the calling party should receive resource reservation confirmation. After the calling party receives the video CAT media, the requirements for playing the video CAT are met. The calling party can then start playing the video CAT media.

When the called party answers, the calling party call interface should enter the call connection state. At the same time, the calling party should stop displaying the video media image and other relevant CAT prompt words, and stop playing the audio media of the video CAT.

When the called party hangs up, the calling party should stop displaying the video media image screen and related CAT prompts words and stop playing the audio media of the video CAT, according to the result of media negotiation. Instead, it should play the network refusal notification

sound and display the related prompts. Then, when the calling party hangs up or hangs up for timeout, the calling party should end the call, close the call details interface, stop displaying the relevant prompts, and stop playing the network refusal notification sound.

When the called party hangs up without response and timeout or the calling party hangs up without a called side answer, the calling party should end the call, close the call details interface, stop displaying the video media image and related CAT prompt words, and stop playing the audio media of the video CAT.

Video customized ringing signal (CRS) service is similar to video CAT service. After the users apply for the video CRS function, they can set their own personalized video ringing signals. Through video CRS service, the customized media is played to the called party as an incoming communication indication during establishment of a communication. The presentation of the selected CRS media to the called party starts at a certain time after the initiation of a session, but before the answer of the session. The procedure of CRS playing is similar to the procedure of CAT playing.

Connections with high bandwidth and low delay enable the video CAT or CRS to achieve high quality video alerting tone.

7 Key influencing factors of HD video CAT and CRS QoE

As [b-Le Callet] recommended, the factor of HD video CAT and CRS QoE can be categorized according to the following groups: human influence factors, system influence factors and context influence factors. Compared with a typical video service, some major system influence factors which are special in video CAT an CRS are listed in clauses 7.1 to 7.5.

7.1 Key factors of video quality

7.1.1 Video content related

The HD video CAT and CRS media has high-definition resolution and a high frame rate, so it will provide clearer and smoother video quality.

The HD video CAT content should be easily understandable to the calling user in a short time. The duration of a video CAT should be less than the timeout of the calling user, and usually should be less than 1 minute.

The HD CRS content should be easily understandable to the called user in a short time. The duration of CRS content should be less than the timeout of the called user, and usually should be less than 1 minute.

The HD video CAT and CRS content has strong social functions, so video content should be easily configured by users.

7.1.2 Video codec related

Video codec is used to compress original scene data from raw format, so video CAT and CRS media is streamed from a platform to the user terminal via an IP multimedia subsystem (IMS) network. Traditional video codecs (e.g., H.264, H.265), may be used for video CAT and CRS content.

The decompressed video should have clear texture, and blur should be imperceptible.

7.1.3 Video initial buffer time

The video initial buffer time is the duration between a user's calling time and the time when the first video CAT and CRS frame is displayed on the screen. A shorter initial buffer time can provide the user with a better experience.

7.1.4 Video stall

The number of stalling events, the length of stalling events, and the interval between stalling events of video CAT and CRS will affect the quality of user experience.

7.1.5 Video mosaic

The number of mosaic events, the length of mosaic events, mosaic area ratio and the interval between mosaic events of video CAT and CRS will affect the quality of user experience.

7.1.6 Frame skipping

The number of frame skipping events, the length of frame skipping events and the interval between frame skipping events of video CAT and CRS will affect the quality of user experience.

7.2 Key factors of audio quality

7.2.1 Audio content related

The frequency and channels of CAT and CRS audio media will affect audio quality.

The audio CAT and CRS content should be easily understandable to the calling user in a short time.

7.2.2 Audio codec related

Audio codecs are used to compress original scene data from raw format, so audio CAT and CRS media is streamed from a platform to the user terminal via an IMS network. Traditional audio codecs such as adaptive multi-rate wideband (AMR-WB) may be used for video content.

7.2.3 Audio stall

The number of stalling events, the length of stalling events and the interval between stalling events of audio CAT and CRS will affect user quality of experience.

7.3 Key factors of video display on terminal

7.3.1 Video interface layout

The displayed video should maintain the same aspect ratio as the original CAT and CRS media and expand the size to fill the terminal screen in one direction.

Called information and the function menu should not be concealed when video CAT media is displayed on the screen.

Calling information and the function menu should not be concealed when video CRS media is displayed on the screen.

7.3.2 Dial plate display strategy

When video CAT and CRS media is played, the dial plate should be easily identifiable and hidden after a fixed period of time.

The dial plate should be woken up and displayed on the screen immediately when the user touches the screen.

7.3.3 Video prompt words

When the calling party starts playing the video CAT media, it should prompt the user's calling status by displaying the prompt language, such as "the other party is ringing", "waiting for the other party to answer the call".

7.4 Key factors of audio playback on terminal

7.4.1 Audio output related

CAT or CRS media is played using the same audio output as ringtone playback. By default, CAT and CRS media are played from the microphone.

7.4.2 Audio volume related

When CAT and CRS audio is played, the volume of the audio being played should be similar to the audio volume of the raw media.

When CAT and CRS audio is played at maximum volume in speaker mode, there should be no harsh sound. When the user sets the phone to silent mode, the CAT and CRS audio should be played at no volume.

7.5 Key factors of CAT and CRS switch

Video CAT and CRS service should not negatively affect the conversation between calling and called parties. The switch speed of calling and called parties in video CAT and CRS service should be equivalent to that of normal calling switch.

7.5.1 Called party answered related

When video CAT media are played, the video image of the local camera should be paused in the calling interface.

After the called party answers, the calling party should stop playing video CAT media.

After the called party answers, the called party should stop playing video CRS media.

During the audio call, the terminal should not start the local camera, nor should it display the video image of the local camera on the screen. During the video call, the video images of both local cameras should be displayed normally.

7.5.2 Called party hangs up the call related

In CAT service, when the called party hangs up the call, the calling party should end the call, close the call details interface, stop displaying the video media image and related CAT prompt words and stop playing the audio media. Instead, the calling party should play the rejection notification sound and display the relevant prompt words.

In CRS service, when the called party hangs up the call, the called party should end the call, close the call details interface, stop displaying the video media image and related CRT prompt words, and stop playing the audio media. The calling party should play the rejection notification sound and display the relevant prompt words.

7.5.3 Called party timeout related

In CAT service, when there is a called party timeout without response, the calling party should end the call, close the call details interface, stop displaying the video media image and related CAT prompt words and stop playing the audio media of the video CAT. Instead, the calling party should play the timeout notification sound and display the relevant prompt words.

In CRS service, when there is a called party timeout without response, the called party should end the call, close the call details interface, stop displaying the video media image and related CRS prompt words, and stop playing the audio media of the video CRS. The calling party should play the timeout notification sound and display the relevant prompt words.

7.5.4 Calling party hangs up the call related

In CAT service, when the calling party hangs up the call without a called side answer, the calling party should end the call, close the call details interface, stop displaying the video media image and related CAT prompt words, and stop playing the audio media of the video CAT.

In CRS service, when the calling party hangs up the call without a called side answer, the called party should end the call, close the call details interface, stop displaying the video media image and related CRS prompt words, and stop playing the audio media of the video CRS.

Bibliography

[b-Le Callet] Le Callet, P., Möller, S., Perkis, A., et al. (2012), *Qualinet white paper on definitions of quality of experience*, Eur. Netw. Qual. Exp. Multimed. Syst. Serv. COST Action IC 1003.

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

Printed in Switzerland
Geneva, 2022