

ETSI TR 122 903 V16.0.0 (2020-08)



**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
Study on Videotelephony teleservice
(3GPP TR 22.903 version 16.0.0 Release 16)**



Reference

RTR/TSGS-0122903vg00

Keywords

GSM,LTE,UMTS

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

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1 Scope

The present document intends to analyse the introduction of additional functionalities for the videotelephony service in addition to what is provided in the 3GPP specifications up to Release 6. The functionalities will include but are not limited to codec negotiation, charging principles, supplementary services support. The approach followed is to evaluate how functionalities which are applicable to existing teleservices can be replicated for videotelephony.

The document will analyse how the new functionalities will impact the backwards compatibility with the existing CS multimedia service and will whether it is beneficial to create a videotelephony teleservice.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP specifications".
- [2] 3GPP TS 22.004: "General on Supplementary Services".
- [3] 3GPP TS 22 101: "Service Principles".
- [4] 3GPP TS 26.110: "Codec for circuit switched multimedia telephony service".
- [5] 3GPP TS 26.111: "Modification to H.324".
- [6] 3GPP TS 21.133: "3G security; Security threats and requirements".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Teleservice: Is a type of telecommunication service that provides the complete capability, including terminal equipment functions, for communication between users according to standardised protocols and transmission capabilities established by agreement between operators.

Videotelephony: a instance of bidirectional multimedia communications between two parties where a speech component and a video component are transmitted and received.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

VT	Video Telephony
UE	User Equipment

Further abbreviations are given in 3GPP TR 21.905 [1].

4 Overview of CS videotelephony support in 3GPP specifications up to Release 6

The CS Multimedia telephony is a Bearer Service, which is using the basic bearer service BS30 in the Core Network. On the air interface the BS30 is mapped to the Radio Access Bearer (RAB) using the traffic class “Conversational” with 64kbps CS in UL and DL direction.

4.1 Codec

ITU-T has specified that Recommendation H.324 should be used for video telephony in circuit switched connection. The 3GPP-variant of H.324 is named 3G-324M and the corresponding 3GPP specification is the [4] TS 26.110 "Codec for circuit switched multimedia telephony service" and [5] TS 26.111 "Modification to H.324". 3G-324M terminals provide real-time video, audio, or data, in any combination over 3GPP circuit-switched radio networks.

4.2 Charging

The RAB and the corresponding BS30 is not only for video telephony, data transfer is also possible. The user is able to select via terminal, depending on terminal capabilities, which service they prefer, but the CN may not be able to distinguish between video telephony and data transfer unless the UE provides such indication. This also applies to changes during call set-up and in-call modification of the requested service. That means the current charging architecture may not be able to support e.g. two different pricing models for video telephony and data transfer.

4.3 Supplementary services

The BS30 is a general synchronous bearer service with support of supplementary services. [2] TS 22.004 includes an overview of the supplementary services which are supported and which are not supported by the BS30 bearer as shown in the table below:

Supplementary Service		Support by BS30
eMLPP	enhanced Multi-Level Precedence and Pre-emption	Yes
CD	Call Deflection	Yes
CLIP	Calling Line Identification Presentation	Yes
CLIR	Calling Line Identification Restriction	Yes
COLP	Connected Line Identification Presentation	Yes
COLR	Connected Line Identification Restriction	Yes
CFU	Call Forwarding Unconditional	Yes
CFB	Call Forwarding on Mobile Subscriber Busy	Yes
CFNRy	Call Forwarding on No Reply	Yes
CFNRc	Call Forwarding on Mobile Subscriber Not Reachable	Yes
CW	Call Waiting	Yes
HOLD	Call Hold	No
MPTY	Multi Party Service	No
CUG	Closed User Group	Yes
AoCI	Advice of Charge (Information)	Yes
AoCC	Advice of Charge (Charging)	Yes
UUS	User-to-user signalling	Yes
BAOC	Barring of All Outgoing Calls	Yes
BOIC	Barring of Outgoing International Calls	Yes
BOIC-exHC	Barring of Outgoing International Calls except those directed to the Home PLMN Country	Yes
BIC	Barring of All Incoming Calls	Yes
BIC-Roam	Barring of Incoming Calls when Roaming Outside the Home PLMN Country	Yes
ECT	Explicit Call Transfer	No
CCBS	Completion of calls to busy subscribers	Yes
SPNP	Support of Private Numbering Plan	Yes
CNAP	Calling Name Presentation	No
MSP	Multiple Subscriber Profiles	Yes
MC	Multicall	Yes

5 Requirements for videotelephony service

5.1 Charging

It should be possible for the network to identify when a videotelephony is established so that accurate charging can be realised. All the events related to the videotelephony call such as modifications of the service type (e.g. speech call to videotelephony call modification, fall back to speech), modification of the codecs and so on should be recorded.

5.2 Codec negotiation

It should be possible for terminals to perform codec negotiation during videotelephony call set up. This should result in reduced call set up time for videotelephony calls and may allow new and more efficient video codecs to be introduced

easily within mobile networks. This should be realised in the same fashion as speech call where the calling terminal presents to the recipient a list of supported codecs alongside the preferred one.

5.3 Security

The user shall be able to use and access the VT service in a secure manner. It shall be possible to deny access to the VT service to unauthorized users. An authorization may be based on the identity of the originating and/or destination user/device.

The "Security Threats and Requirements" specified in [6] shall not be compromised.

5.4 Privacy

It shall be possible to prevent exchange of user's identity during call setup (e.g., by using CLIR/COLR). In addition, to protect user privacy it shall be possible to:

- enable/disable video camera during the call.
- accept a video call in audio mode only.
- enable/disable audio during the call (mute/unmute).

A recipient shall be informed of the identity of the sender in case the sender has not restricted his identity to be transmitted.

Optional support for ciphering user audio/video/data sessions should be considered.

- Note: this may be in conflict with lawful intercept if the encrypting in this case is user to user and the network is not able to recover the keys.

5.5 Supplementary service support

At least the following supplementary services should be supported for videotelephony, which are already available for BS30:

- eMLPP (enhanced Multi-Level Precedence and Pre-emption)
- CD (Call Deflection)
- CLIP (Calling Line Identification Presentation)
- CLIR (Calling Line Identification Restriction)
- COLP (Connected Line Identification Presentation)
- COLR (Connected Line Identification Restriction)
- all the call forwarding types (CFU, CFB, CFNRy, CFNRc)
- - CW (Call Waiting)
- CUG (Closed User Group)
- AoCI (Advice of Charge Information) and AoCC (Advice of Charge Charging)
- UUS (User-to-user signalling)
- all types of barring (BAOC, BOIC, BOIC -exHC, BIC, BIC-Roam)
- CCBS (Call Completion to Busy Subscriber)
- SPNP (Support of Private Numbering Plan)
- MSP (Multiple Subscriber Profiles)

- MC (Multicall)

Furthermore following supplementary services should be supported:

- HOLD:
- CNAP (calling name presentation)

The support of multiparty is for further study.

5.6 Fall back to speech and in-call modification

When the radio access network of the calling party or of the called party cannot support any longer the video media, or the interconnection between networks does not or no longer support videotelephony, the videotelephony call should be downgraded to a speech call. The transition from videotelephony to speech should be realised with minimum (ideally without) interruptions.

When the videotelephony call can be supported again the downgraded call, i.e.the speech call, may be upgraded to a videotelephony call. The transition from speech to videotelephony should be realised with minimum (ideally without) interruptions.

The fall back from videotelephony to speech and the upgrade from speech to videotelephony should be supported when requested by either party.

The user should be able to deny a service change from speech to videotelephony.

It should be possible to accept a videotelephony call with downgrading to speech, which means the user should be able to request a downgrade of an incoming videotelephony call before the call is answered resulting in establishing a speech call only.

5.7 Subscription

It should be possible for the mobile operator to control the access to the videotelephony service by means of a subscription to the service.

5.8 Handover

Inter-system handover between UMTS and GSM is not supported for 64 kbps UDI calls. In the case of a user moving out of 3G coverage, the video call will be released. The user has to establish a voice call either manually or the handset provides a voice call set up automatically. In the early days of UMTS this is an especially likely scenario. Therefore, the handover from 3G to 2G linked with a downgrade from video to voice is a desirable functionality.

Handover of VT between UMTS and I-WLAN should be available if the network is available and if the terminal has this functionality.

5.9 Emergency calls support

The capability of establishing a videotelephony call towards an emergency number should not be mandatory. If a user attempts to establish a videotelephony call to an emergency service, which is not equipped to handle video telephony calls, the UE or the network should be able to transform it to an emergency speech call (TS12) set up request.

5.10 Notifications to the User

A network should provide notifications to the user(s) if needed, e.g., if the call set-up is unsuccessful or modified (e.g., by applying supplementary services).

Notifications can consist of audible (e.g. announcement) and / or of visible (e.g. picture or video) and / or textual information.

6 Backwards compatibility requirements

Taking into account that there is already a large population of UEs and networks that support videotelephony services using the BS30 multimedia call bearer service, a new videotelephony teleservice (if specified) shall provide interworking and interoperability with the BS30 multimedia call bearer service. Moreover, the specification of a videotelephony teleservice shall have no negative impact on the interworking and interoperability of videotelephony services provided based on the BS30 multimedia call bearer service specified in 3GPP releases prior to Rel-7.

It shall be possible for a videotelephony teleservice capable UE to initiate and terminate a call towards a UE supporting BS30 multimedia calls. In other words, it is required that a videotelephony capable UE behaves towards a BS30 multimedia call capable network and/or UE as a BS30 multimedia call capable UE.

The following table provides an overview of the backwards compatibility requirements for a new videotelephony teleservice:

			UE feature support	
			New Videotelephony Teleservice	BS 30 Multimedia Call Bearer
Network feature support	New Videotelephony Teleservice	HPLMN	Out of scope of this study	Backwards Compatibility Required
		VPLMN	Out of scope of this study	Backwards Compatibility Required
	BS 30 Multimedia Call Bearer	HPLMN	Backwards Compatibility Required	Out of scope of this study
		VPLMN	Backwards Compatibility Required	Out of scope of this study

Figure 6.1: Overview of backwards compatibility requirements for a new videotelephony teleservice

Backwards compatibility between a new videotelephony teleservice (if specified) and videotelephony services using the BS30 multimedia call bearer service shall be provided for all roaming and intra and inter-PLMN call connection scenarios from the perspectives of the UE, HPLMN, VPLMN and interconnection network capabilities. As a minimum, if a new videotelephony teleservice is specified by 3GPP backwards compatibility shall be provided for the following scenarios:

- General
 - Support of videotelephony services for a UE supporting videotelephony services using the BS30 multimedia call bearer service within PLMNs that support the new videotelephony teleservice
 - Support of videotelephony services for a UE supporting the new videotelephony teleservice within PLMNs that support only the BS30 multimedia call bearer service
- Roaming
 - Support of videotelephony services for a UE supporting the new videotelephony teleservice roaming in a VPLMN that does not support the new videotelephony teleservice but supports the BS30 multimedia call bearer service

- Support of videotelephony services for a UE supporting videotelephony services using the BS30 multimedia call bearer service roaming in a VPLMN that supports the new videotelephony teleservice
- Intra-PLMN connection
 - Intra-HPLMN connection between a UE supporting the new videotelephony teleservice and a UE supporting videotelephony services using the BS30 multimedia call bearer service

Note 1: In the following scenarios the HPLMN and VPLMN is the same network.

- Intra-PLMN connection between a UE supporting the new videotelephony teleservice roaming within a VPLMN that supports the new videotelephony service and a UE supporting videotelephony services using the BS30 multimedia call bearer service within its HPLMN
- Intra-PLMN connection between a UE supporting the new videotelephony teleservice roaming within a VPLMN that does not support the new videotelephony service and a UE supporting videotelephony services using the BS30 multimedia call bearer service within its HPLMN
- Inter-PLMN connection

Note 2: In the following scenarios the HPLMNs are different networks and may be in different countries.

- Inter-HPLMN connection between a UE supporting the new videotelephony teleservice within its HPLMN and a UE supporting videotelephony services using the BS30 multimedia call bearer within its HPLMN that does not support the new videotelephony teleservice
- Inter-HPLMN connection between a UE supporting the new videotelephony teleservice within its HPLMN and a UE supporting videotelephony services using the BS30 multimedia call bearer within its HPLMN that supports the new videotelephony teleservice

Note 3: In the following scenarios the HPLMN and VPLMN are different networks and may be in different countries.

- Inter-PLMN connection between a UE supporting the new videotelephony teleservice within its HPLMN and a UE supporting videotelephony services using the BS30 multimedia call bearer roaming in a VPLMN that does not support the new videotelephony teleservice
- Inter-PLMN connection between a UE supporting the new videotelephony teleservice within its HPLMN and a UE supporting videotelephony services using the BS30 multimedia call bearer roaming in a VPLMN that supports the new videotelephony teleservice

Note 3: In the following scenarios the VPLMNs are different networks and may be in different countries.

- Inter-PLMN connection between a UE supporting the new videotelephony teleservice roaming in a VPLMN that supports the new videotelephony teleservice and a UE supporting videotelephony services using the BS30 multimedia call bearer roaming within a VPLMN that does not support the new videotelephony teleservice
- Inter-PLMN connection between a UE supporting the new videotelephony teleservice roaming in a VPLMN that does not support the new videotelephony teleservice and a UE supporting videotelephony services using the BS30 multimedia call bearer roaming within a VPLMN that also does not support the new videotelephony teleservice
- Inter-PLMN connection between a UE supporting the new videotelephony teleservice roaming in a VPLMN that supports the new videotelephony teleservice and a UE supporting videotelephony services using the BS30 multimedia call bearer service roaming within a VPLMN that also supports the new videotelephony teleservice
- Inter-PLMN connection between a UE supporting the new videotelephony teleservice roaming in a VPLMN that does not support the new videotelephony teleservice and a UE supporting videotelephony services using the BS30 multimedia call bearer service roaming within a VPLMN that supports the new videotelephony teleservice

6.1 General description of functionalities that are supported in a videotelephony call to a pre Rel-7 videotelephony

6.2 Interoperability with fixed videotelephony service

Similar to the BS30 multimedia call bearer service the new videotelephony teleservice (if specified) should support interconnection with CS videotelephony services provided by PSTN and ISDN fixed networks.

7 International calls and roaming

As Video Telephony depends on the 64kbps UDI bearer, for national as well as international and roaming calls, such a bearer must be provided by all carriers used for this specific connection. Presently many long distance carriers do not guarantee this functionality. If the 64kbit/s UDI bearer is not provided end to end, this may lead to SS7 signalling issues.

Note: This issue is FFS.

8 Conclusions

This study has identified the enhancements needed for videotelephony services including:

- Call setup time improvements
- Additional support of supplementary services
- Charging improvements
- Improved in call modification
- More efficient emergency videotelephony call support
- User notification

These enhancements can be provided by either:

1. standardising a new videotelephony teleservice.
2. improving the existing videotelephony service that is based on BS30

For both alternatives backwards compatibility with existing videotelephony services using the BS30 Multimedia Call Bearer Service is essential.

Some of the possible advantages for defining a videotelephony teleservice are:

- ability to negotiate the codecs used in the VT call using already standardised mechanisms available today for teleservices
- ability to differentiate the charging between videotelephony and data transfers using BS30
- simplification of handling of call modification for network operators compared to videotelephony services provided using the BS30 Multimedia Call Bearer Service
- simplification of downgrading the service to speech in case of changing from 3G to 2G and vice versa compared to videotelephony services provided using the BS30 Multimedia Call Bearer Service
- the same handling of supplementary services as other teleservices
- unique subscription for videotelephony services including unique definition within roaming agreements which may improve interoperator charging

- possible definition of a unique emergency videotelephony teleservice (if required)

These need to be balanced against possible disadvantages of defining two alternative solutions for providing videotelephony services.

Annex A: Existing requirements for videotelephony

Annex B: Change history

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	WI
2005-04			22.903					Initial draft	0.0.0	0.1.0	
2005-05			22.903					Output of SWG May2005	0.1.0	0.2.0	
2005-07			22.903					Output of SWG July 2005	0.2.0	1.0.0	
2005-10			22.903					Output of SWG October 2005	1.0.0	1.1.0	
2005-10			22.903					Output of SA1 October 2005	1.1.0	2.0.0	
SP-30	SP-050757	S1-051242	22.903			Rel-7		Approved for Rel-7 at SA #30	2.0.0	7.0.0	MITE
SP-42	-	-				Rel-8		Updated from Rel-7 to Rel-8	7.0.0	8.0.0	
SP-46	-	-	-	-	-	-	-	Updated to Rel-9 by MCC	8.0.0	9.0.0	
2011-03	-	-	-	-	-	-	-	Update to Rel-10 version (MCC)	9.0.0	10.0.0	
2012-09	-	-	-	-	-	-	-	Updated to Rel-11 by MCC	10.0.0	11.0.0	
2014-10								Updated to Rel-12 by MCC	11.0.0	12.0.0	
2015-12	-	-	-	-	-	-	-	Updated to Rel-13 by MCC	12.0.0	13.0.0	
2017-03	-	-	-	-	-	-	-	Updated to Rel-14 by MCC	13.0.0	14.0.0	
2018-06	-	-	-	-	-	-	-	Updated to Rel-15 by MCC	14.0.0	15.0.0	
SA#88e	-	-	-	-	-	-	-	Updated to Rel-16 by MCC	15.0.0	16.0.0	

History

Document history		
V16.0.0	August 2020	Publication