CR-Form-v6.1

CHANGE REQUEST

| ⌘ | **23.972** CR **CR Num** | ⌘ **rev** | **-** | ⌘ | Current version: | **3.0.0** | ⌘ |

Spec Title: Circuit Switched Multimedia Telephony ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Clean-up of TR 23.972 to align with REL-5 drafting rules
Source:	⌘	ERICSSON L.M.
Work item code: ⌘		SCUDIF **Date:** ⌘ 2002-02-21

Category: ⌘ **D**   **Release:** ⌘ REL-5

Use one of the following categories:
 F *(correction)*
 A *(corresponds to a correction in an earlier release)*
 B *(addition of feature),*
 C *(functional modification of feature)*
 D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
 2   *(GSM Phase 2)*
 R96   *(Release 1996)*
 R97   *(Release 1997)*
 R98   *(Release 1998)*
 R99   *(Release 1999)*
 REL-4 *(Release 4)*
 REL-5 *(Release 5)*

Reason for change:	⌘	The TR is not following REL-5 drafting rules
Summary of change: ⌘		Editorial updates to update the text and correct some grammar faults.
Consequences if not approved:	⌘	The TR will not follow the drafting rules for REL-5 documents

Clauses affected:	⌘	
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<div style="border:2px solid black; text-align:center">

*** First modified section ***

</div>

2   References

[1]   ITU-T Recommendation H.324: "Terminal for low bit-rate multimedia communication"

[2]   ITU-T Recommendation H.223: "Multiplexing protocol for low bit rate multimedia communication"

[3]   ITU-T Recommendation H.245: "Control protocol for multimedia communication"

[4]   ITU-T Recommendation V.8: "Procedures for starting sessions of data transmission over the public switched telephone network".

[5]   ITU-T Recommendation V.8bis: "Procedures for the identification and selection of common modes of operation between data circuit-terminating equipment (DCEs) and between data terminal equipment (DTEs) over the general public switched telephone network and on leased point-to-point telephone-type circuits".

[6]   ITU-T Recommendation V.140: "Procedures for establishing communication between two multiprotocol audio-visual terminals using digital channels at a multiple of 64 or 56 kbit/s".

[7]   ITU-T Recommendation Q.764: "Signalling System No. 7 – ISDN User Part Signalling Procedures".

[8]   ITU-T Recommendation Q.931: "Digital subscriber signalling system no. 1 (DSS1) – ISDN user-network interface layer 3 specification for basic call control".

[9]   3GPP TS 24.008: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".

[10]   3GPP TS 22.002: "Digital cellular telecommunications system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)"

[11]   3GPP TR 22.972: "Real Time Multimedia" (Stage 1 description) – obsolete

[12]   3GPP TR 23.960: "Framework of Network Functions to support multimedia services in UMTS " ('guide-lines for the production of standards')

[13]   3GPP TS 26.111: "Codec for Circuit Switched Multimedia Telephony Service; Modifications to H.324"

[14]   3GPP TS 26.112: "Codec for Circuit Switched Multimedia Telephony Service; Call Setup Requirements" – created in S4 Codec adhoc, to be incorporated in various N1 and N3 specifications (and terminated).

[15]   3GPP TR 26.911: "Codec for Circuit Switched Multimedia Telephony Service"

[16]   N1-99748: "Call Setup Procedure for interworking with H.320"

[17]   N1-99749: "Indication for multimedia telephony in UMTS"

[18]   N1-99750: "Rate Negotiation Procedure for Multimedia Telephony"

[19]   N1-99971: "Low rate 3G-H324M"

[20]   N1-99973: "Proposal for additional point codes in UMTS Bearer Capability Information Element"

[21]   N1-99A30: "CODEC Negotiation Procedure"

[22]   N1-99A98: "LS – Joint N1/N3 to S1, S2, S4, N2: Liaison Statement on 3G-H.324M "

[23]   N1-99B72: "LS – S2 to N1: Multimedia Call Control for UMTS R 99"

[24]   N3-99314: "Multimedia call Inter-working with H.320 and H.324/I"

[29]   3GPP TS 22.004 "General on supplementary services"

*** Next modified section ***

3   Multimedia call setup

3.1   Requirements

The following basic working assumptions are agreed or adopted in N1 and/or N3 to be supported in R99 or R400 (The target release is indicated for each issue):

-   Circuit Switched (CS) multimedia will be based on H.324 terminal, more specifically a mobile specific subset H.324/M and even more specifically a 3G-variant called 3G-324M [13]. (R99)

-   Packet Switched (PS) multimedia will be based on H.323 [22]0. (R99)

-   All call scenarios shall be supported, i.e. Mobile Originating and Mobile Terminating call against Mobile (including 2G), ISDN and PSTN call party. (R99)

-   CS Multimedia telephony is a Bearer Service, which utilizses Synchronous Transparent Data service (BS30) [10]. However, it bears some Teleservice-like characteristics, as the application (H.324 information) must be signalled to the network (for invoking appropriate Interworking equipment) and to the peer end terminal (R99)

-   Single and multiple numbering. (R99)

-   Speech fallback, i.e. if setup of the multimedia call fails the call will be set up as a speech call. The specific fallback case -is -fallback from '3.1kHz Ext. PLMN' to speech (R99). Fallback from 'UDI'/'RDI' to speech is not supported by all implementations of ISDN and thus excluded from R99 scope for the time being (see section 6.20).

-   In-call modification:

    -   Modification of call type from speech call to multimedia call (and vice versa) during call – outband approach (for end-to-end digital connection) (see section 6.1.1.10). (R400)

    -   Modification of call type from speech call to multimedia call (and vice versa) during call – inband approach (for the case with PSTN access) (see section 6.1.1.2). (R400)

    -   Service degradation and upgrading (see section 6.1.2) (R400)

-   End-to-end user rate negotiation. (R400)

-   H.324 - H.323 interworking. (R400 or later)

-   H.324 - H.320 interworking [16]. (R400)

3.2   Indication and Coding of 3G-324M during Setup

3.2.1   Call Type

Call type indication during a 3G-324M call setup is a necessity. Both the network and the remote-end need to know it in order to better co-ordinate the process, to invoke the interworking unit required in the connecting nodes and also to invoke the application at the remote-end. H.223 & H.245 are low layer requirements for 3G-324M and this is considered to reflect 3G-324M uniquely and thus -agreed to be used asfor call type indication for a 3G-324M call.

It has been agreed in N1 to indicate 'H.223 & H.245' as Other Rate Adaptation (ORA) in the PLMN3GPP BC-IE [9]0. This shall be mapped into -'H.223 & H.245'- as user information layer 1 protocol in the ISDN BC [8]. This is following the existing principles in 3GPP TS 24.008 [9].

3.2.2 Data Rates

3G-324M call is to be supported by different bitrates in different networks and, more specifically, different bitrates could be available within the considered networks. On the other hand, the application itself has the flexibility to operate within a range of bitrates by sacrificing performance up to a certain extent. This gives the scope of indicating supporting rates by the originating terminal at setup This might help in providing sophisticated in-call upgrade or downgrade feature, depending on the resource availability and end users' intention. Thus, a situation like Hhandover could be better taken care of, and end-users might find it feasible useful to have it at different charging rates.

However, current standards do not allow indication of H.324 call and rate adaptation at the same time.
It does not make sense to indicate a user rate for -'H.223 & H.245'- in ISUP, since H.223 rate adaptation is always up to 28,-8/33,-6 kbitp/s for modem call and 56/64 kbitp/s for RDI/UDI calls. Since this is a mobile specific requirement, it should be handled within the mobile network as for other bearer services (in the IWF), not impacting the fixed network signalling.
The current working assumptions in 3GPP does not contain any solution to this problem.

The following list contains the required bitrate options for inter-network 3G-324M call within the range of application requirement:

- 64, 56, 33,-6, 32 and 28,-8 kbitp/s for Mobile to Mobile call

- 64 and 56 kbitp/s for Mobile to/from N-ISDN call

- 33,-6 and 28,-8 kbitp/s for Mobile to/from PSTN call

- 32 kbitp/s for Mobile to/from PHS call [17]0.

The Ppossibility of multiple 64/56 kbitp/s channels for a single call to enhance performance is FFS.

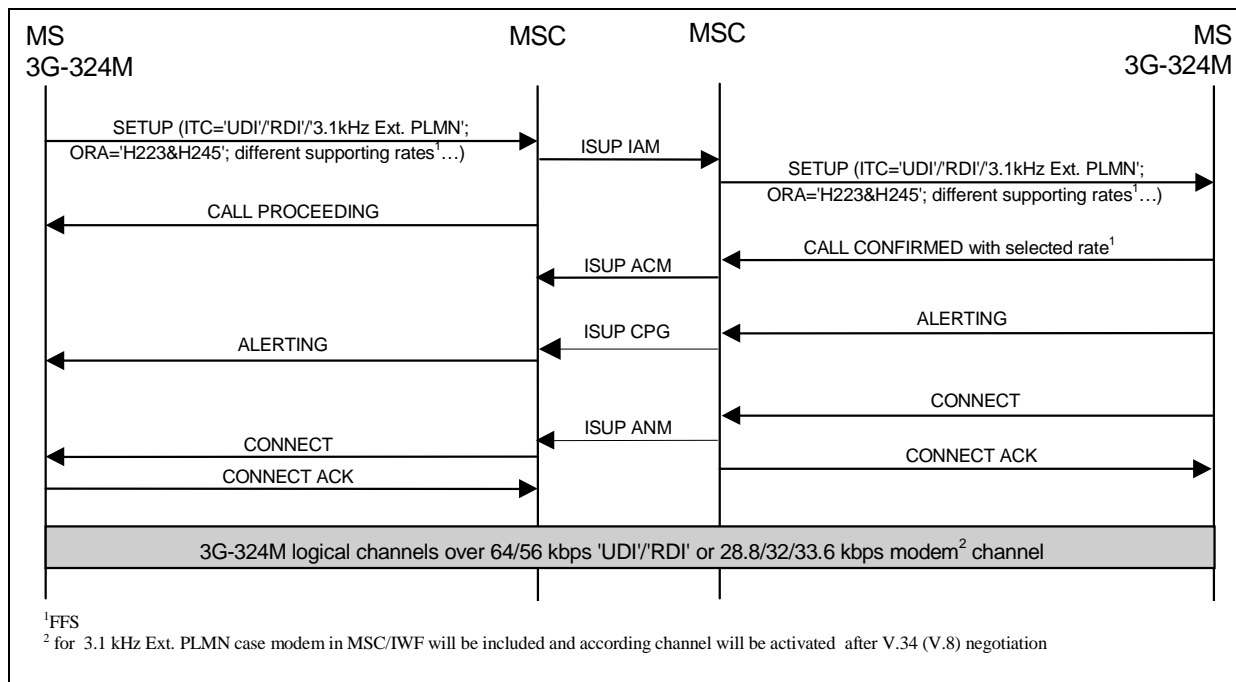## 3.2.3 User rate renegotiation.

There does not exist a feasible end-to-end signalling solution for user rate negotiation. However, it can be handled in a similar way as the user rate indication by providing H.223 rate adaptation in the IWF. Change of user rate can be requested by the subscriber by invoking a 3GPP TS 24.008 [9] MODIFY procedure (with a new user rate). See section0 6.4.

3.2.4 Versions

In the future, the need to indicate supported 3G-324M versions might arise. The feature and -actual coding it is FFS.

3.3 Mobile to Mobile Call

Mobile to mobile 3G-324M call is a basic feature required in R99. Figure 1 shows a general view of the call setup in this regard.

The logical channels diagram contains:

- MS 3G-324M — MSC — MSC — MS 3G-324M

SETUP (ITC='UDI'/'RDI'/'3.1kHz Ext. PLMN'; ORA='H223&H245'; different supporting rates[1]...)

ISUP IAM

SETUP (ITC='UDI'/'RDI'/'3.1kHz Ext. PLMN'; ORA='H223&H245'; different supporting rates[1]...)

CALL PROCEEDING

CALL CONFIRMED with selected rate[1]

ISUP ACM

ALERTING

ISUP CPG

ALERTING

CONNECT

ISUP ANM

CONNECT

CONNECT ACK

CONNECT ACK

3G-324M logical channels over 64/56 kbps 'UDI'/'RDI' or 28.8/32/33.6 kbps modem[2] channel

[1]FFS
[2] for 3.1 kHz Ext. PLMN case modem in MSC/IWF will be included and according channel will be activated after V.34 (V.8) negotiation

Figure 1: General Mobile to Mobile 3G-324M call setup procedure

The ITC field in the SETUP message is either 'UDI'/'RDI' or '3.1 kHz Ext. PLMN' depending on the ~~supporting~~ ability of both the ends and the involved networks. ~~I~~The inclusion of the '3.1 kHz' mode gives~~provides~~ the flexibility of providing multimedia call support even if an~~y~~ intermediate network part or the remote-end do~~es~~ not support the desired UDI/RDI mode. The originating end is required to~~must~~ determine the call mode in advance. The originating user determines (possibly by pre-configuration of the terminal) whether a digital connection ('UDI'/'RDI') is required or if the call will be an analog~~ue~~ modem call ('3.1 kHz Ext. PLMN'). For analog~~ue~~ modem call, additionally, the required modem type is indicated ~~–~~with Other Modem Type (OMT) = 'V.34'. The SETUP message shall also include call type indication for 3G-324M call (ORA = 'H223&H245'). The CALL CONFIRMED message at the end-leg will indicate the selected rate, but the proper field and the coding of the different supporting rates are still FFS~~.~~.

Fallback from 'UDI'/'RDI' call ~~due to~~ 3G-324M call handshaking failure is ~~not~~ supported by all ISDN implementations, and thus~~,~~ it is kept out of the R99 scope. The issue is described in sections 6.2 ~~0~~and 6.3.

On the other hand, fallback from '3.1 kHz Ext. PLMN' to speech is within R99 scope and is described in sections 3.4.1, 3.4.2.1 and 3.4.2.2 for different cases.

3.4   Mobile to/from PSTN call

Mobile ~~to/from PSTN~~ 3G-324M (H.324) call to/from PSTN is also considered as basic requirement for R99. The ~~M~~modem in MSC/IWF needs to support~~conform corresponding~~ V.8 [4]~~,~~ and optionally V.8*bis* [5]~~0~~, signalling for this case involving PSTN. The scenario can be separated into Mobile Originated (MO) and Mobile Terminated (MT) cases, and in both cases, fallback to speech~~, in any case of call origination,~~ due to 3G-324M call modem handshaking failure is considered to be integral part of the service ~~to be~~ provided to the end-user.

3.4.1   MO case

The general signalling situation for this case is shown in Figure 2. This case indicates the necessity of including IWF in MSC, as soon as it receives a SETUP message from an MS with 'H223&H245' as ORA, -'3.1 kHz Ext. PLMN' as ITC and 'V.34' as OMT. The IWF V.34 modem initiates the ITU-T V.8 inband handshaking and indicates the support of H.324 in the call function category of the V.8 handshaking. If the called party's modem does not indicate a H.324 support in its V.8 inband signalling response, the IWF may clear the call. If the called party respon~~d~~s with a modem answering tone but there is no V.8 response at all, the IWF clears the call.

A fallback to speech ~~can be made~~is only possible if the mobile station requests the fallback support with a speech BC-IE in the SETUP~~setup~~ message. If the IWF modem does not recogni~~z~~se the answering tone of the called modem within the expiration of a timer started at the reception of the answer message, the MSC IWF initiates an In Call Modification

procedure [9]0 in order to fall back to a speech mode. As a result of the procedure, the IWF resource is released and a speech channel is set up between the calling MS and the fixed network. If the In Call Modification procedure fails, the IWF clears the call. A recommended minimum value for the (modem detection) timer is 3 seconds [4].
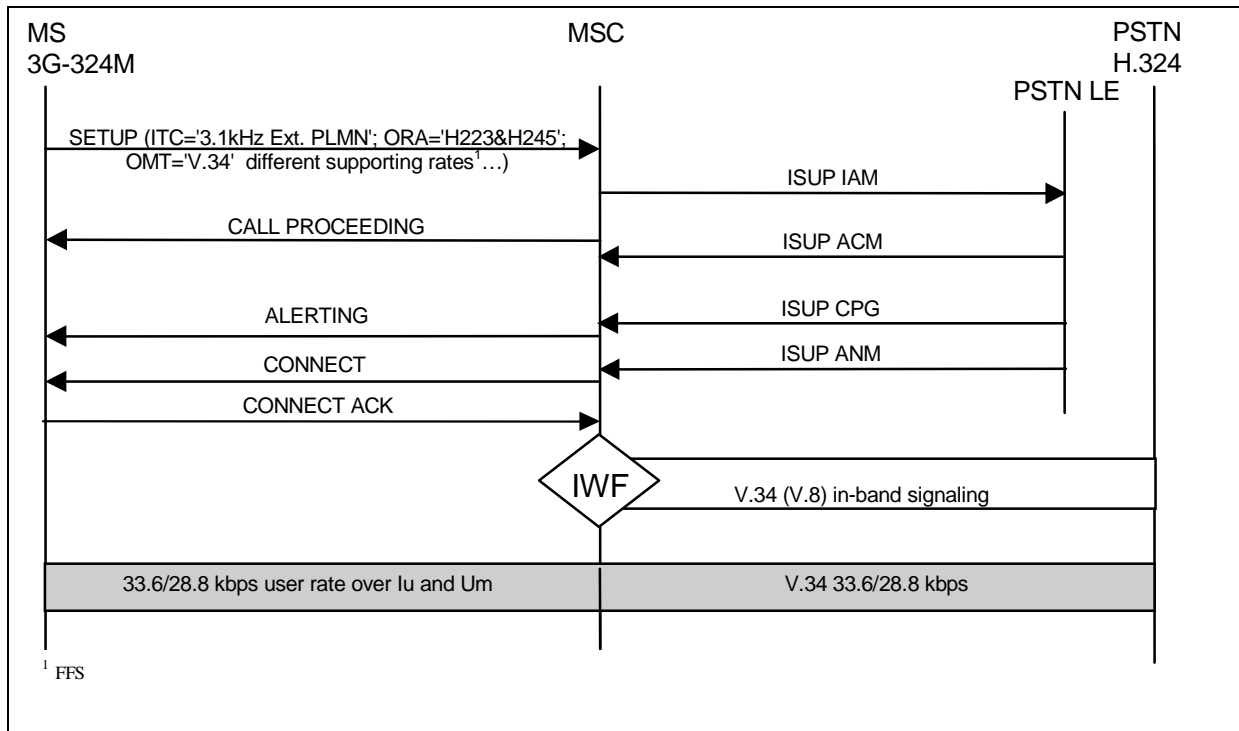

Figure 2: General Mobile to PSTN 3G-324M (H.324) call setup procedure

3.4.2 MT Case

The case can be separated as Mmulti-numbering and Ssingle-numbering scheme, as described below.:

3.4.2.1 Multi-numbering Scheme

In this scheme, a separate MSISDN (E.164) is assigned for different applications within one terminal, and the service required for different applications and the corresponding MSISDN areis stored in VLR. So, when a call is coming from the PSTN end, the terminating MSC knows about it from VLR and sends a SETUP message to the terminating MS indicating '3.1 kHz Ext. PLMN' as ITC, 'H223&H245' as ORA , 'V.34' as OMT and other required corresponding parameters. It also invokes IWF in terminating MSC, and the IWF V.34 modem expects to receive the ITU-T V.8 handshaking and to recognizse the support of H.324 in the call function category of the incoming V.8 handshaking. If the calling party's modem does not indicate a H.324 support in its V.8 inband signalling, the IWF may clear the call. If the calling modem tries to handshake another protocol than V.34 modem scheme, the IWF clears the call. The general signalling sequence for call setup in this case is shown in Figure 3.
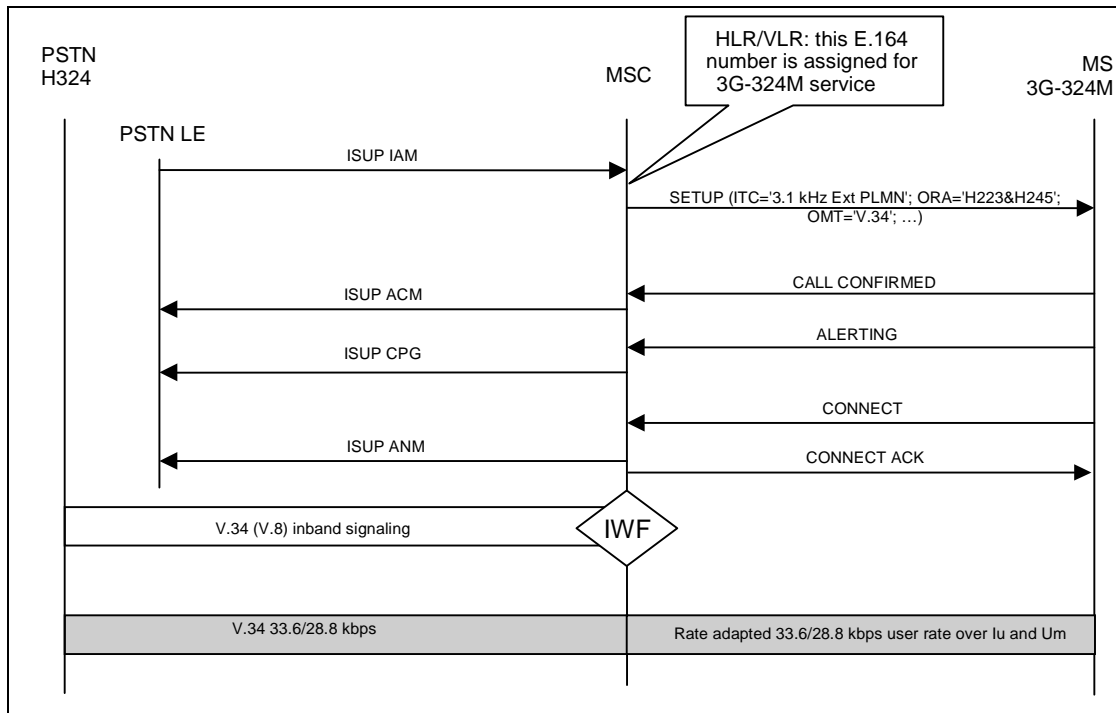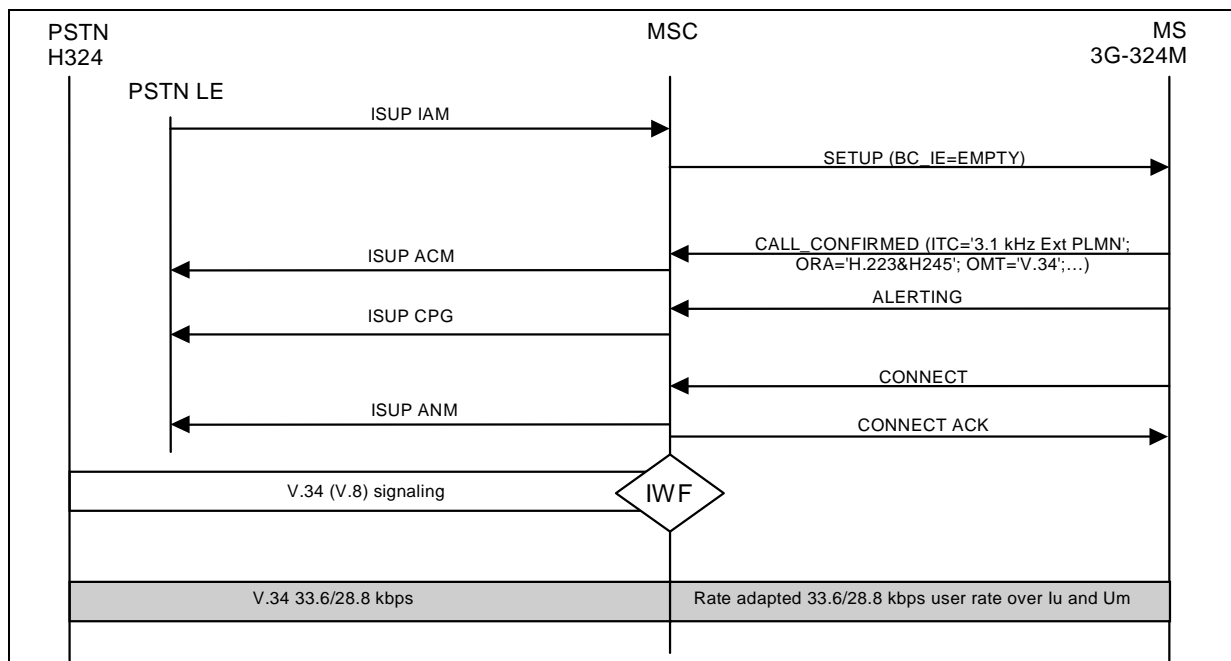
Figure 3: General PSTN to Mobile 3G-324M (H.324) call setup procedure for Mmulti-numbering scheme

In this multi-numbering case, a fallback to speech can be made only if the MSC indicates the availability of the fallback support with (a multimedia BCIE and) a speech BC-IE in the SETUP message, and the mobile station accepts both BC-IEs (with or without modifications) with the CALL CONFIRMED message. If the IWF modem does not recognizse a call tone nor a V.8 Call Indication nor a V.8 Call Menu within the expiration of a timer started at the sending of the ANSam answer tone (i.e. the calling party is not a V.34 modem), the IWF initiates an In Call Modification procedure [9]0 in order to fall back to a speech mode. As a result of the procedure, the IWF resource is released and a speech channel is set up between the called MS and the fixed network. If the In Call Modification procedure fails, the IWF clears the call. A recommended minimum timer value is 3 seconds [4]0.

3.4.2.2   Single-numbering Scheme

If the terminating MSC does not get any BC information from the ISUP IAM, it sends the SETUP message to the terminating MS without aempty BC-IE. This will allow the terminating MS to acknowledge by sending CALL CONFIRMED message back with a BC-IE, thatwhich indicates the supported/desired type of call. The probability of a successful call setup is enhanced if the terminating MS includes several BC-IEs elements in the CALL CONFIRMED message, thus enabling a call type negotiation. If analogue multimedia call is desired, '3.1 kHz Ext. PLMN' is set as ITC in the BCIE. After this, IWF is invoked by MSC. The IWF V.34 modem expects to receive the ITU-T V.8 handshaking and to recognizse the support of H.324 in the call function category of the incoming V.8 handshaking. If the calling party's modem does not indicate a H.324 support in its V.8 inband signalling, the IWF may clear the call. If the calling modem tries to handshake another than V.34 modem scheme, the IWF clears the call. The signalling scenario for the case is shown in Figure 4.

A problem with this scenario is, that an incoming speech call coming without BC-IE, which is responded with multimedia BC-IE (i.e. ITC='3.1 kHz Ext. PLMN' -and Other Rate Adaption='H.223/H.245') ,will have to wait for modem negotiation, before the fallback to speech, even if the call does not need modem connection, requiring some extra time. A plain speech call, i.e. the called MS responds only with onlya speech BC-IE in CALL CONFIRMED, will however not be affected, as the modem is not invoked in this case.

Figure 4: General PSTN to Mobile 3G-324M (H.324) call setup procedure for single-numbering scheme

In this single--numbering case, a fallback to speech can be made only if the mobile station requests the fallback support with (a multimedia BC-IE and) a speech BC-IE in the CALL CONFIRMED message. If the IWF modem does not recognizse a call tone nor a V.8 Call Indication nor a V.8 Call Menu within the expiration of a timer started at the sending of the ANSam answer tone (i.e. the calling party is not a V.34 modem), the IWF initiates an In Call Modification procedure [9]0 in order to fall back to a speech mode. As a result of the procedure, the IWF resource is released and a speech channel is set up between the called MS and the fixed network. If the In Call Modification procedure fails, the IWF clears the call. A recommended minimum timer value is 3 seconds [4]0.

3.5   Mobile to/from ISDN call

3G-324M call from/to N-ISDN to/from Mobile end is another basic requirement for R99. The application in the N-ISDN side should conform to H.324 Annex D – H.324/I [1]0. The other assumption in this regard is that within digital PLMN-ISDN domain, the 3GPP TS 24.008 [98] call control signalling should be interworking with the corresponding Q.931 [87] call control signalling. It is expected that H.324/I terminals will always use whole B channel – 64/56 kbitp/s, for the purpose.

According to H.324 Annex D – H.324/I, V.140 shall be supported. However, the implementation of V.140 is considered to be non-trivial, and under certain preconditions, a UDI-H.324 session can, with certain preconditions, be set up without V.140 [24]0. Consequently, the support of V.140 is not required in R99.

3.5.1   MO case

Figure 5 shows the Mobile to N-ISDN 3G-324M (H324/I) call setup signalling procedure. In this case, the originating MS needs to know about the ITC ('UDI'/'RDI') capability of the called end beforehand. No fallback from 'UDI'/'RDI' to either speech or 3.1 kHz is supported in R99, due to the reasons mentioned in sections 6.20 and 6.3 respectively. The application specific codepoint 'H223&H245' as ORA in 3GPPPLMN BC-IE shall be mapped into 'H.223&H.245' as User Information Layer 1 Protocol (UIL1P) in the ISDN BC-IE.
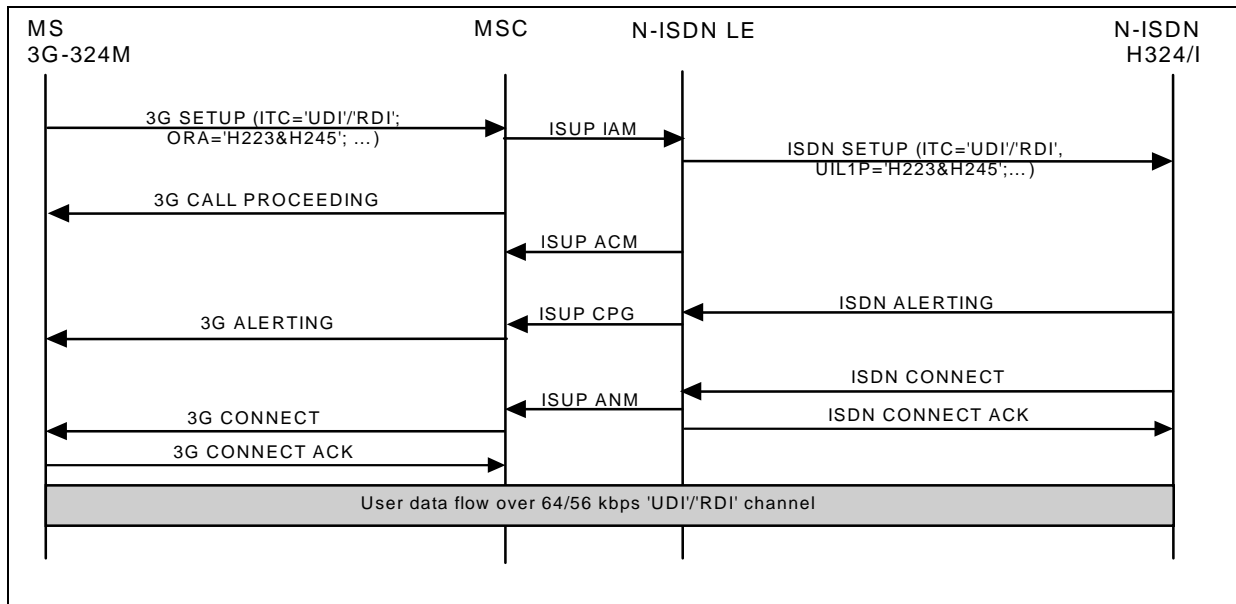
Figure 5: Mobile to N-ISDN general 3G-324M (H.324/I) call setup procedure

3.5.2   MT case

N-ISDN to Mobile 3G-324M (H.324/I) call setup signalling procedure is shown in Figure 6. No fallback from 'UDI'/'RDI' to either speech or 3.1 kHz is supported in R99, due to the reasons mentioned in sections 6.2 and 6.3 respectively. The application specific codepoint 'H223&H245' as UIL1P in ISDN BC-IE shall be mapped into 'H.223&H.245' as ORA in the PLMN BC-IE.
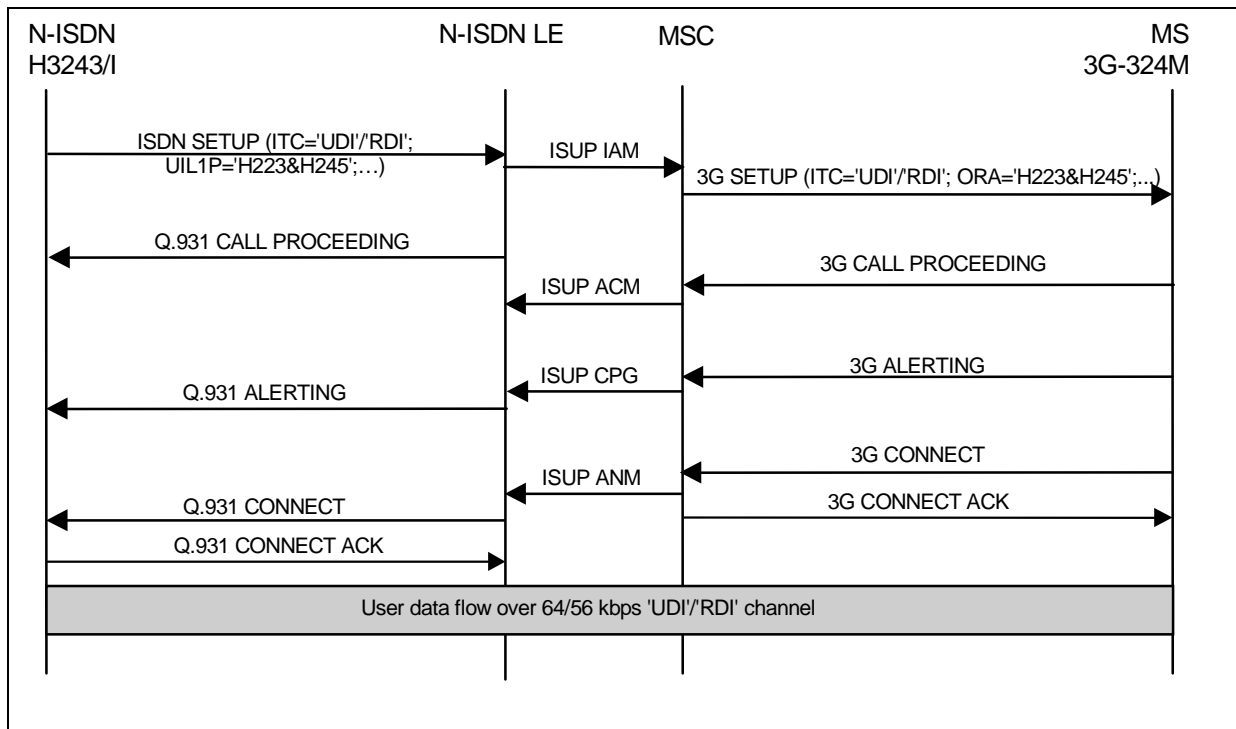

Figure 6: N-ISDN to Mobile general H.324/I-3G-324M call setup procedure

3.6   Fallback from 3.1 kHz to speech

Fallback from '3.1 kHz Ext. PLMN' to speech is within R99 scope and the corresponding procedure is detailed in section 3.4.1, 3.4.2.1 and 3.4.2.2 for MO case, MT multi-numbering scheme and single-numbering scheme

respectively. In this case, to enable the speech mode, the terminal or the MSC shall include a speech BC-IE in the SETUP or CALL CONFIRMED message depending on the situation.

The mobile station has the following options for the inclusion of BC-IE in the SETUP or CALL CONFIRMED message:

- if the mobile station/user wants a multimedia call, and supports speech fallback, both a multimedia and a speech BC-IE shall be included

- if the mobile station/user wants a multimedia call, but does not support speech fallback, only a multimedia BC-IE shall be included

- if the mobile station/user wishes a speech (only) call, a speech BC-IE*bearer capability information element* is included

3.7 Call retry

Call retry is a way to recover from a multimedia call setup failure, i.e. the originating terminal (automatically, pre-defined, or manually by the user) makes a new call attempt with modified characteristics, i.e. 'downgraded' call mode. This method complements specified fallbacks, and does not require specification in the standards.

The decision to perform call retry and the retry call characteristics can be based on the cause (cause code and location) of the call failure. Details and possible need for new cause codes are FFS.

*** Next modified section ***

4 Supplementary services

As CS multimedia telephony utilizses a general bearer service (BS30), by default supplementary servicesSSs apply according to 3GPP TS 224.004 [29], Aannex A. The following points regarding the applicability of SSs for BS30, may be noted:

- Call Hold does not apply to data calls. H.324 does not cope with a held/suspended transmission path.

- Multiparty does not apply to data calls. A Ccorresponding functionality can be provided by external conference devices (MCU, Multipoint Communication Unit). Alternatively, multimedia/video conference calls could be implemented in the terminal through multicall.

- Explicit Call Transfer does not apply to data calls. Now asthat data calls are used for human communication, there may be a need to be able to transfer the call to a third party. ButHowever, as H.324 does not tolerate a broken data connection, this issues isf FFS.

- Calling NaAme Presentation does not apply to data calls. The need is equal to that of speech call and is →FFS.

- There may be a need for multimedia call specific Call Barring. This is FFS.

*** Next modified section ***

5 Multimedia work plan, Specification changes

This section summarizes the required specification changes required for support of multimedia call in R99 (and later releases) in detail.

Item	Tdoc/CR	Specification	Change	Status
Coding of 3G-324M-indication in BCIE	N1-99E88	24.008	- Add code point 'H.223 & H.245' to Other Rate Adaptation	Agreed (?)
Rev. CR TO 29.007 v3.2.0-INTERWORKING WITH H.324/I.	N3-99508	29.007		Agreed
REV CR to 27.001 for INTRODUCTION OF MULTIMEDIA	N3-99502	27.001		Agreed
Multimedia CR	N1-000525	24.008	Changes to support a circuit switched multimedia call	N1- 000525 approved in N1#11.
Multimedia CR	N3-000112	29.007	Changes to support a fallback to speech in a circuit switched multimedia call setup	Approved in N3#8
Multimedia CR	N3-000083	27.001	Changes to support a fallback to speech in a circuit switched multimedia call.	Approved in N3#8

*** Next modified section ***

6 Open issues

The following list contains features, which are proposed, but not yet agreed in N1/N3. The items should be evaluated in order to determine the target release for the feature – whether it is important enough, and possible to realize in R99, or if it will be postponed to R400 or later:

- Subscription issues – need to be clarified (for R99). Current assumption is that multimedia requires basic bearer service (BS30) subscription - it is an open question whether this provides the provisioning and charging facilities, which will be required by the operators. The Current understanding is, that there are no other applications that utilize BS30., cConsequently, the BS30 subscription is equal to the CS multimedia subscription.

- Multiple 56/64 kbitp/s channels for one call.

- In the future, it may be possible to have an end-to-end signalling solution for user rate negotiations., based on BICC.

- Fallback from 'UDI'/'RDI' call setup attempt to 3.1 kHz call setup, in case of PSTN access, will increase user friendliness of multimedia call. (see section 6.30). [14]

- Indication of 3G-324M version information.

- Call type negotiation of terminating call -by allowing several BC-IEelements in the CALL CONFIRMED message. The BC-IEelements could be -in priority order[1]. See section 3.4.2.20.

NOTE: The multiple BC-IEs indicate the desired type of call, set by the user in order of preference, e.g. primarily multimedia call, secondarily speech, etc.

- Support of V.140, according to H.324 Annex D – H.324/I [1].

---

[1] The multiple BCIEs indicate the desired type of call, set by the user in order of preference, e.g. primarily multimedia call, secondarily speech etc.

- Fallback from 'UDI'/'RDI' to speech. See section 6.2~~0~~.

The following sections contain descriptions of various open issues.

6.1 In-call modification

6.1.1 Modification of call type - Speech first, swap to H.324

The ~~O~~option of starting 3G-324M call with speech mode first and then switching to H.324 mode depending on end-users' intention is a requirement in R99 or R4~~00~~ (which one is to be decided). The feature could be achieved both through outband and inband approach and are discussed under separate sections below.

6.1.1.1 Outband Approach

The call would start as a normal speech call with speech indicated in BC-IE, with no pre-indication about H.324 call. When user wants to switch to H.324 call, an In-Call-Modification message from originating terminal, indicating BS requirement for 3G-324M call in BC-IE, would change the mode of the call from speech to 3G-324M call. This approach would support the opposite case as well – H.324 first, swap to speech and thus toggling between the two modes of the call. Existing ~~R~~recommendations do not support the~~of~~ switching to a non-prenotified mode ~~not pre-notified~~ and thus thi~~se~~ approach needs further change in the existing ~~R~~recommendations. End-to-end UDI/RDI connection (most mobile and N-ISDN cases) should be working fine with the approach, provided mentioned changes are ratified and implemented. But connection involving modem (PSTN and some mobile/N-ISDN cases) seems to need additional attention from users' side - both the users must invoke the modem within a certain time window (2 seconds) in relation to each other, otherwise the modem handshake would fail, resulting in ~~failure of the~~ call failure.

Furthermore, signalling of the modification procedure over ISDN/PSTN networks, required for an end-to-end solution, is a problem to be solved. BICC may provide the solution. Being ISUP dependent, BICC might be found limited for PSTN case or for systems not using ISUP.

Consequently, a full solution can not be expected before R4~~00~~.

6.1.1.2 Inband Approach

On the other hand, V.8*bis* support should be accomplished in IWF to provide inband speech-call-first feature. The inband approach is required for mobile multimedia call~~s~~ with PSTN access. Again, this is something which is not present in existing implementation, and the H.324 [1] ~~R~~recommendation also mentions the support to be optional. There are many ways to have inter-modem V.8*bis* [5] transactions and the ~~R~~recommendation mentions about 13 different ways. Some of those do not support a speech-call-first feature, while some provide some additional features. Transaction number 2 could/should be a good candidate for providing the feature with less complexity. ~~But~~However, ~~still~~ further study is required in order to~~for~~ select~~ing~~ the best possible V.8*bis* transaction.

The target release of the inband approach is R4~~00~~.

6.1.2 Network~~W~~ initiated call modification

6.1.2.1 Service degradation

If~~When~~ during a multimedia call, the available bandwidth decreases (e.g. due to ~~H~~handover to a congested area), there may be a need for modification of call type.

H.324 can cope with a change ~~of~~in the transmission speed, but if the available data rate is below 28,8 kbit~~p~~/s, the network should initiate a modification downgrading the call to speech. (It should be noted that the fallback to speech ~~only~~ could be done only within the multimedia call. That would be a much simpler approach in which only the bandwidth needs to be adapted ~~(see option 10) in section 6.3~~. It would then also be easier to add a video stream once enough bandwidth is available again.~~)~~ - FFS

6.1.2.2   Upgrading service

If at call setup the requested resources can not be granted (e.g. a requested H.324 call is set up (through fallback) as a speech call), -and later during the call the requested resources become available (H.324 call would become possible in the example), it must be determined if this upgrading should be done. -This networkNW functionality shallmust be optional. The issue is FFS.

6.2   UDI/RDI fallback to speech

In ISDN fallback mode, if 'UDI preferred' is indicated in the setup, a possible intermediate part of the ISDN network not supporting the 'UDI preferred' & fallback functionality turns the setup to the fallback value, i.e. speech or 3.1kHz, from the original 'UDI preferred' setup. The called party gets thea speech or 3.1kHz setup. Again, ISDN does not support fallback if only 'UDI'/'RDI' is mentioned in the setup [7]0. Due to this problem, fallback from 'UDI'/'RDI' to speech is FFS and not within R99 scope.

## 6.3   UDI/RDI fallback to 3.1 kHz

One more important fallback aspect, which is not mentioned before in any of the intra- and inter-network 3G-324M (H.324, H.324/I) call cases, is fallback from UDI/RDI to 3.1 kHz. The subjected application is expected to work in different inter-network cases and, more importantly, there are considerable variations in providing services within different networks depending on implementation. This fallback issue will help to provide bridges -with PSTN circuits.

The main advantage of this type of fallback is that the originating end does not necessarily need to know the ITC capabilities of the terminating terminals. In this case, failure in UDI/RDI handshaking will include IWF and initiates modem handshaking, resulting in a 3.1 kHz modem connection, provided the terminating end also supports the 3.1 kHz mode of the application.

To enable the UDI- to 3.1kHz fallback, the transmission medium requirement (TMR) in the setup message (IAM) sent by the MSC/IWF is set to 'UDI preferred'. In backward progress/access information, the terminating (or transit) exchange indicates whether the call (including end terminal) is end-to-end ISDN or not. Specifically, in the case where 'UDI preferred' was requested, and the terminating terminal issupports analogue multimedia, the terminating exchange will accept the call, but backwards set the Access Indicator (AI) to 'Terminating access non-ISDN'. A substantial problem with this procedure is, that although it is according to the specifications [7], few operators appear to use this fallback procedure in practisce. -Mainly due to this problem, the functionality is FFS.

6.4   H.223 Rate Adaptation

An alternative to support low data rate multimedia has been presented in N1-99971. It proposes to terminateing H.223M in the MSC/IWF and then using HDLC flags for rate adaptation. The described alternative described is rather straightforward. Furthermore, it provides a solution to all the requirements on supporting user rates for 3G.324M (low user rates and also change of user rate during the call). It is baseds on the technique that the IWF removes all stuffing flags on the receiving side and inserts stuffing flags on the sending side (thereby allowing -different rates on either
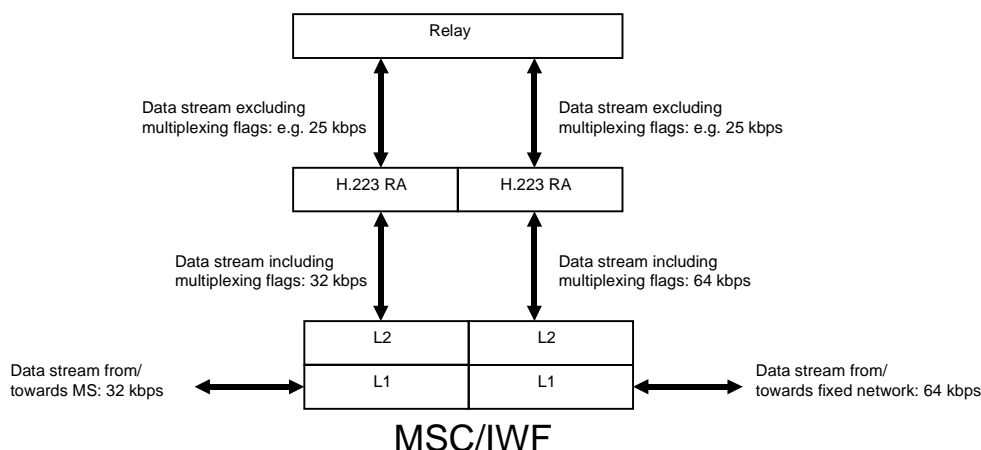
side).÷

A drawback with this solution may be that the approach needs some kind of gateway sort of thing in the MSC/IWF to handle H.223M flags, making the scenario very complex and requiring a lot of workmuch to do. On the other hand, rate negotiation is not that way then taken care of in thise approach;– it is rather more rate adaptation.

*** End of modified section ***