

**3GPP TSG\_CN  
Plenary Meeting #9, Oahu, Hawaii  
20<sup>th</sup> – 22<sup>nd</sup> September 2000.**

**Tdoc NP-000470**

**Source:** TSG\_N WG 3  
**Title:** CRs to R99 Work Item T.E.I (CS Data Services) part 3 of 4  
**Agenda item:** 8.6.3  
**Document for:** APPROVAL

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**Introduction:**

This document contains 6 CRs on **R99 Work Item CS Data Services**, that has been agreed by **TSG\_N WG3**, and is forwarded to TSG\_N Plenary meeting #9 for approval.

Doc-2nd-	Spec	CR	Rev	Phase	Subject	Cat	Version-Current
N3-000381	23.146	002		R00	Modification from V.25bis to V.250	F	4.0.0
N3-000430	27.001	037		R99	Modification from V.25bis to V.250	F	3.5.0
N3-000431	27.001	038		R00	Modification from V.25bis to V.250	A	4.0.0
N3-000491	27.001	041		R00	Modification from V.25bis to V.250	A	3.5.0
N3-000432	27.002	006		R99	Modification from V.25bis to V.250	F	3.4.0
N3-000433	27.003	006		R99	Modification from V.25bis to V.250	F	3.4.0

**3GPP N3/SMG3 WPD Meeting #11**  
**Oslo, Norway, 10<sup>th</sup> – 14<sup>th</sup> of July, 2000**

**Document N3-000381**

e.g. for 3GPP use the format TP-99xxx  
or for SMG, use the format P-99-xxx

## CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

**23.146 CR 002**

Current Version: **4.0.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **CN#9**  
list expected approval meeting # here  
↑

for approval   
for information

strategic   
non-strategic  (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

**Proposed change affects:** (U)SIM  ME  UTRAN / Radio  Core Network   
(at least one should be marked with an X)

**Source:** TSG\_N3 **Date:** 2000-7-10

**Subject:** Modification from V.25bis to V.250

**Work item:** RT facsimile

**Category:** F Correction  **Release:** Phase 2   
A Corresponds to a correction in an earlier release  Release 96   
B Addition of feature  Release 97   
C Functional modification of feature  Release 98   
D Editorial modification  Release 99   
Release 00

(only one category shall be marked with an X)

**Reason for change:** V.25bis is outdated. References to V.25bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.

**Clauses affected:** clause 2, subclause 6.4, clause 9, Annex C

**Other specs affected:** Other 3G core specifications  → List of CRs: 3G TS 27.001 to be presented to CN3#12  
Other GSM core specifications  → List of CRs:  
MS test specifications  → List of CRs:  
BSS test specifications  → List of CRs:  
O&M specifications  → List of CRs:

**Other comments:**



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## 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.

- [1] 3G TS 22.003: "Circuit Teleservices supported by a Public Land Mobile Network (PLMN)".
- [2] 3G TR 23.910: "Circuit Switch Data Bearer Services".
- [3] 3G TS 24.008: "Mobile radio interface layer 3 specification".
- [4] 3G TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".
- [5] 3G TS 27.002: "Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities".
- [6] 3G TS 27.007: "AT command set for 3GPP User Equipment(UE)".
- [67] 3G TS 29.007: "3GPP; TSG CN; General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".
- [78] ITU-T Recommendation T.4: "Standardization of group 3 facsimile apparatus for document transmission".
- [89] ITU-T Recommendation T.30: "Procedures for document facsimile transmission in the general switched telephone network".
- [910] ITU-T Recommendation V.21: "300 bits per second duplex modem standardized for use in the general switched telephone network".
- [1011] ITU-T Recommendation V.24: "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".
- [112] ITU-T Recommendation V.27 ter: "4 800/2 400 bits per second modem standardized for use in the general switched telephone network".
- [1213] ITU-T Recommendation V.29: "9 600 bits per second modem standardized for use on point-to-point 4-wire leased telephone-type circuits".
- [1314] ITU-T Recommendation V.17: "A 2-wire modem for facsimile applications with rates up to 14 400 bit/s".
- [15] ITU-T Recommendation V.250: "Serial asynchronous automatic dialling and control".
- [1416] ITU-T Recommendation X.300: "General principles and arrangements for interworking between public data networks, and between public data networks and other networks".
- [1517] ITU-T Recommendation T.38: "Procedures for real-time Group 3 facsimile communication over IP networks".
- [1618] ITU-T Recommendation X.680: "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".
- [1719] ITU-T Recommendation X.691: "Information technology – ASN.1 encoding rules – Specification of Packed Encoding Rules (PER)".

[1820]	IETF RFC 1662: "PPP in HDLC-like Framing".
[1921]	IETF RFC 1661: "The Point-to-Point Protocol (PPP)".
[2022]	IETF RFC 1570: "PPP LCP Extensions".
[2123]	IETF RFC 1332: "The PPP Internet Protocol Control Protocol (IPCP)".
[2224]	IETF RFC 791: "Internet Protocol".
[2325]	IETF RFC 768: "User Datagram Protocol".

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## 6 Connection types

In UMTS, the following connection elements attributes are applicable to these Teleservices.

Connection element: Non-transparent

Duplex Mode: Full Duplex

Synchronous/Asynchronous: Asynchronous

Fixed Network User Rate: 14400 or 9600[bit/s]

Wanted Air User Rate: 28800 or 14400[bit/s]

Layer 1 and Layer 2 at R reference point are specified in 3G TS 27.002, but not here.

To support the ITU-T Recommendation T.30, requiring different transmission rates, the following strategy shall be implemented:

- the channel on the radio interface in UMTS shall be a channel that is satisfied with a user rate of 28800bit/s or 14400bit/s;
- the transmission rate between the FA and the associated facsimile terminal at both ends shall be the same, i.e. there shall be only one common end-to-end transmission rate at any given time;
- the message speed shall be negotiated between T-FAX and R-FAX; this also allows for message speeds of 2400, 4800, 7200, 9600, or 12000, 14400bit/s to be used;
- the connection between the fax terminals is divided into three logical sections (T-FAX -(1)- T-FA-(2)- -R-FA-(3)-R-FAX);
- flag stuffing is applied by the FA towards the associated facsimile terminal within the constraints of ITU-T Recommendation T.30, to keep the data link active whenever a procedure delay occurs;
- the BCS protocol elements and the facsimile coded data are buffered at both FAs , if necessary, to guarantee data integrity;
- a specific FA protocol (FA protocol) is provided between both FAs to cater for appropriate link control.

### 6.1 Protocol model

Figure 4 depicts the protocol stack for this Teleservice.

Depending on the particular implementation, the R reference point may not explicitly exist. In this case, the Layer2 protocol between the FA and the TAF and consequently the Layer2 protocol between the FA and the TAF entities operating across this interface may be omitted. The protocol stack at the radio interface, however, is not affected by this consideration, i.e. RLP and L2RCOP always apply.

All protocol modules specific for this Teleservice shall be confined in the FA functions at both the UE and MSC/IWF ends. The TAF shall comply with the specifications 3G TS 27.001 and 3G TS 27.002.

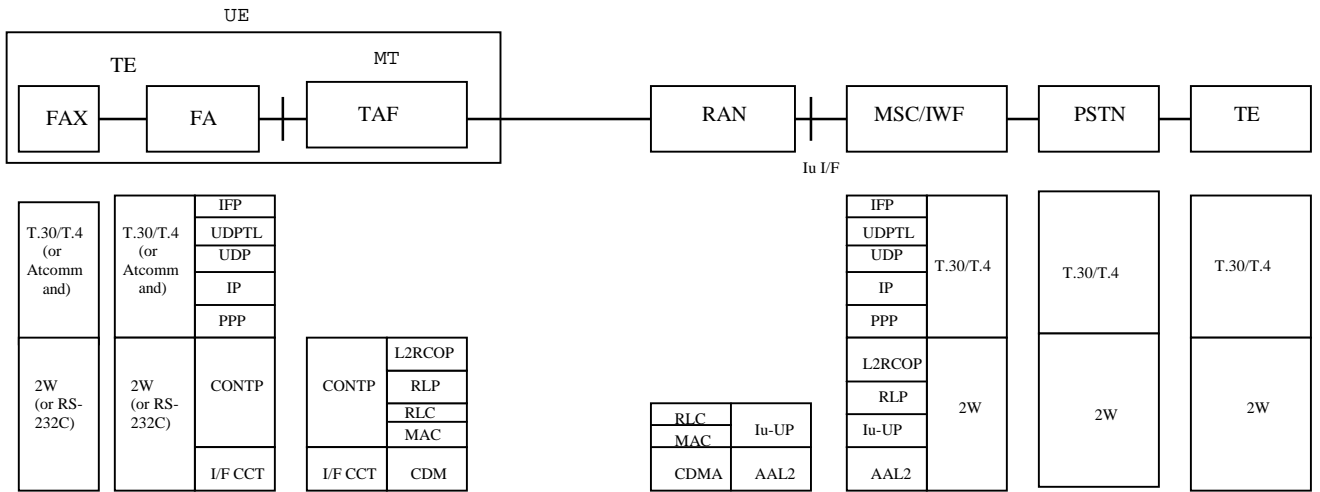


Figure 4: Protocol stack for non-transparent support in UMTS

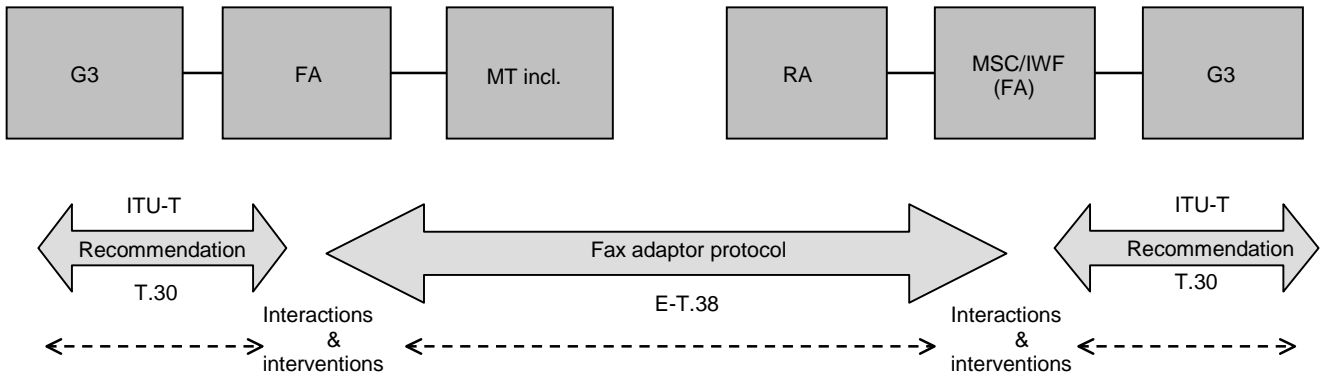


Figure 5: Communication model

## 6.2 Mobile to mobile calls

Tandem operation shall be applied to mobile to mobile calls.

## 6.3 Procedure interrupts

Procedure interrupts shall be supported only in Teleservices 61. In the case of Teleservice 62 any attempt to invoke procedure interrupts by MMI on the MT (see 6.4 below) shall have no effect.

## 6.4 Radio channel modification

This section applies to Teleservice 61 only, if a change of the radio channel during the call swapping from speech to facsimile or vice versa is required. For this purpose the in-call modification procedure (ICM) as detailed in 3G TS 24.008 is carried out.

The change from speech to facsimile shall be initiated by MMI at the facsimile terminal starting the ICM procedure via MODIFY signalling. As a basic requirement for this transition, circuit 108.2 (according to ITU-T Recommendation V.24) towards the MT shall be in the ON condition.

Additionally, the data call direction (DCD) shall be known to both FAs because of a correct tone handling. The DCD identifies the call direction from the calling to the called station according to ITU-T Recommendation T.30 phase A tonal signals. The DCD is derived from an evaluation of the behaviour of the mobile fax machine. No later than 3 sec after connecting the fax apparatus to the line the FA/UE is able to determine the DCD. If a CNG tone or nothing is detected by the FA/UE the mobile fax station is the calling station, if a CED tone or a BCS signal is detected by the FA/UE the mobile fax station is the called station. The FA indicates this towards the TAF by means of CT105: CT105 in the OFF condition indicates "mobile terminated", whereas CT105 ON indicates "mobile originated". The detection of the CT105 condition and subsequent triggering of the MODIFY message has to be done 3 sec after the reception of the ON condition of CT108.2.

A reverse DCD compared with the initial call setup direction is indicated to the TAF/IWF by means of the "Reverse Call Setup Direction (RCSD)" IE within the MODIFY message. If the MODIFY message has contained this IE, the same IE shall be included in the MODIFY COMPLETE (ACK) message. On the basis of RCSD and additional information about the initial call setup direction (e.g. transaction identifier flag – see 3G TS 24.007), the TAF/IWF shall resolve the actual DCD.

At DCD condition "mobile originated" the FA/TAF has to transmit a CNG tone if neither CED nor a BCS signal has been already received, otherwise nothing. At DCD condition "mobile terminated" the FA/TAF has to transmit a CED. At the moment when CT107 goes to the ON condition the FA/TAF has to generate CED if CT105 was in the ON condition, otherwise nothing (see 9.2.1.1 and 9.2.2.1).

If during the facsimile call the return to speech is necessary (T.30 procedure interrupt request), this shall be initiated by the mobile fax machine as well as by the fixed network fax machine. Upon receipt of the alert operator tone the request shall be accepted by manual intervention via MT (phone off-hook) and is reflected to the TAF/IWF by CT106 and CT109 going to the OFF condition. Upon monitoring the transit of the necessary sequence of BCS signals specific for PRI the CT108.2 goes to the OFF condition causing ICM from the fax data phase to the speech phase.

During the speech phase of a procedure interrupt, the phone off-hook condition of the MT is reported via the FA/TAF R-I/F (CT106/109 in OFF condition) to the fax apparatus, which shall remain functionally connected to the FA to maintain the connection.

A subsequent reverse change to facsimile phase is also carried out by manual intervention at the MT causing ICM. This shall be immediately reflected by circuit 107 going to the OFF condition. The successful completion of ICM is indicated towards the FA/TAF by circuit 107 going to the ON condition (provided circuit 108/2 is still in the ON condition).

During the speech phase of a procedure interrupt, the condition of the facsimile terminal of the UE is not reported across the ITU-T Recommendation V.24 interface. It may remain functionally connected to the FA, but in a suspended state.

The precise operation of the FA for the support of a procedure interrupt is implementation dependent.

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## 9 Signalling aspects

3G TS 27.002 identifies the bearer capability requirements to be supported by the terminal adaptation function in the MT (see 3G TS 27.001 for BC and HLC coding). The specific signalling requirements are those for "speech" and "facsimile group 3" or "facsimile group 3" only, respectively. The MT indicates in the call set up request the requirements, e.g. first speech, second facsimile by sending the bearer capability information element(s) in the appropriate order. For an "auto calling" facsimile request, the facsimile group 3 bearer capability is sent as the first or the only bearer capability for Teleservice 61 or 62, respectively.

For interworking between Teleservice 61 and Teleservice 62, refer to 3G TS 22.003 and 3G TS 27.001.

### 9.1 Handling of tonal signals

Because the ITU-T defined service uses modems, there are some signals received from the analogue link at the MSC/IWF and (where used) the FA which do not have a direct binary representation. ~~These signals may not therefore be passed across the radio interface in the same way as ITU-T Recommendation T.30 and ITU-T Recommendation T.4 information.~~

These signals are the modem called (CED) and calling (CNG) tones sent at the start of each fax data phase of the call. These tonal signals shall be used for the selection of ATD or ATA. No later than 3 sec after connecting the fax apparatus to the line the FA/UE is able to determine the AT command. If a CNG tone or nothing is detected by the FA/UE the mobile fax station is the calling station, if a CED tone or a BCS signal frame is detected by the FA/UE the mobile fax station is the called station. If the associate fax is the calling station, the FA shall transmit ATD toward the TAF. If the associate fax is the called station, the FA shall transmit ATA toward the TAF.

After the link of the FA protocol is established, these tonal signals shall be sent to the opposite FA as the IFP packet(CNG,CED). The FA receiving the FA packet(CNG,CED) shall generate the tonal signal and transmit the signal toward the associated facsimile terminal.(see figure D.3)

~~They are generated locally by the FA, exploiting an end-to-end time alignment mechanism, triggered by appropriate messages on the UMTS signalling channel.~~

### 9.2 Call establishment

#### 9.2.1 Mobile terminated call

The call may be set-up manually or automatically by the PSTN facsimile group 3.

##### 9.2.1.1 Speech then facsimile

Refer to the diagrams in figures C.1a and C.1b. In both of the figures, the initial call setup is mobile terminated. In figure C.1a, the DCD is also mobile terminated (MT), while the DCD in figure C.1b is mobile originated (MO).

~~In order to make the transition from the speech phase to the facsimile phase, the MODIFY command shall be initiated by the MMI at the facsimile terminal, which shall result in the establishment of RLP across the radio interface and connection to line of the FA/IWF.~~

~~If a FA at UE is used, it The connection of the FA to the TAF causes the initialization between the FA and the TAF. At this time, the setting of speech/facsimile call should be done in the FA. The operation of the FA for the speech/facsimile call setting is implementation dependent.~~

~~At first, the FA at the UE shall turn on circuit 108/2 and circuit 105. shall turn on circuit 108/2 when the mobile fax apparatus is connected to the line by manual intervention. After that, the TAF at the UE shall turn on circuit 106 and circuit 107 toward the FA. The FA which detected ON condition of circuit 106 and circuit 107 requires facsimile call of the TAF by appropriate AT command (e.g. AT+CMOD=1, AT+FCLASS=1, 2). If the AT command is recognized, the TAF shall transmit "OK" to the FA as a result code.~~

In order to make the transition from the speech phase to the facsimile phase, the MODIFY message shall be initiated by the MMI at the facsimile terminal, which shall result in the establishment of RLP across the radio interface and connection to the line of the FA/IWF.

When the facsimile machine is connected to the line by manual intervention, the facsimile machine should transmit tonal signal (CNG or CED) toward the FA. The FA shall select ATD or ATA according to the rules in subclause 9.1 and transmit ATD or ATA toward the TAF.

After determination of the DCD and ICM (see subclause 6.4) and RLP establishment, the CT107 shall be turned on by the UE. In the case where a FA is used on receipt of CT107 from UE, the FA shall complete the tonal handshaking according to the rules in subclause 6.4.

The analogue link at the FA/IWF side shall be established in accordance with the T.30 Recommendation; provided the synchronization process or the RLP establishment is completed (CT108.2 ON condition), the appropriate tone according to the rules in subclause 6.4 shall be transmitted. In case of DCD mobile terminated, the CED tone shall be transmitted after a silence of 1.8 to 2.5s (see T.30, 4.3.3.2) from the call being answered; during transmission of CED tone (2.6 sec minimum duration, followed by a delay period of 75 +/- 20 ms), the FA/IWF shall process data received from the remote FA as usual.

On detecting ATD or ATA, the TAF shall transmit the MODIFY message that has G3FAX ability as a bearer capability. The circuit 109 (according ITU-T Recommendation V.24) at the R interface of the UE shall be turned on by the FA at the IWF (according 3G TS 27.002) before any further procedure may be carried out between the FAs and consequently end-to-end. After that, RLP and L2RCOP shall be established across the radio interface. Once the connection is established, circuit 109 shall be clamped to the ON condition by the FATAF at the IWF. Then, the FA protocol shall be started between the FAs, so fixing a full duplex mode throughout the whole facsimile phase of the call.

### 9.2.1.2 Auto answer

Refer to the diagram in figure C.2. The connection of the FA to the TAF causes the initialization between the FA and the TAF. At first, the FA at the UE shall turn on circuit 108/2 and circuit 105. After that, the TAF at the UE shall turn on circuit 106 and circuit 107 toward the FA. The FA which detected ON condition of circuit 106 and circuit 107 shall require facsimile call of the TAF by appropriate AT command (e.g. AT+FCLASS=1, 2). If the AT command is recognized, the TAF shall transmit "OK" to the FA as a result code.

A call received from the PSTN shall cause the UE to turn on circuit 125 (according to ITU-T Recommendation V.24) at the R interface.

If a UMTS facsimile machine is used, the ITU-T Recommendation V.25bis auto answering process shall be handled directly by turning on circuit 108/2.

When the MT receives a call in the condition finished the above initialization, the TAF shall transmit the result code "RING" toward the FA. If a FA is used, "circuit 125" "RING" shall cause a ring current to be sent to the mobile facsimile terminal. The FA shall turn on circuit 108/2, when the mobile facsimile terminal answers the call. The FA shall transmit ATA toward the TAF when the FAX terminal connects to the line and begins behaviour of receiving. On receiving ATA, the FA shall transmit a signal that notifies the calling side that called facsimile terminal connected to the line.

Once the connection is established, circuit 109 shall be clamped to the ON condition by the TAF at the IWF. Then, the FA protocol shall be started between the FAs.

On receipt of circuit 108/2, the UE shall answer the call and initiate the synchronization process and the establishment of the RLP across the radio interface. On completion of the synchronization process or RLP establishment, the modem at IWF shall automatically be selected and send CED to the PSTN facsimile terminal. Also circuit 107 shall be turned on by the UE.

If a FA is used, on receipt of circuit 107 from UE, the FA may initiate the tonal hand-shake by sending CNG. The CNG signal is optional.

The analogue links at both the PSTN side and the mobile side (where a FA is used) shall be established in accordance with the appropriate ITU-T Recommendation V. series.

The circuit 109 (according ITU-T Recommendation V.24) at the R interface of the UE shall be turned on by the FA at the IWF (according 3G TS 27.002 clause 4) before any further procedure may be carried out between the FAs and



consequently end-to-end. Once the connection is established, circuit 109 shall be clamped to the ON condition by the FA at the IWF, so fixing a full duplex mode throughout the whole facsimile phase of the call.

## 9.2.2 Mobile originated calls

The PSTN facsimile group 3 terminal may manually or automatically answer the call originated by the mobile station.

### 9.2.2.1 Speech then facsimile

Refer to the diagrams in figure C.3a and figure C.3b. In both of the figures, the initial call setup is mobile originated. In figure C.3a the DCD is also MO, while in figure C.3b the DCD is MT.

The connection of the FA to the TAF causes the initialization between the FA and the TAF. At this time, the setting of speech/facsimile call should be done in the FA. The operation of the FA for the speech/facsimile call setting is implementation dependent.

At first, the FA at the UE shall turn on circuit 108/2 and circuit 105. After that, the TAF at the UE shall turn on circuit 106 and circuit 107 toward the FA. The FA which detected ON condition of circuit 106 and circuit 107 requires facsimile call of the TAF by appropriate AT command (e.g. AT+CMOD=1, AT+FCLASS=1, 2). If the AT command is recognized, the TAF shall transmit "OK" to the FA as a result code.

In order to make the transition from the speech phase to the facsimile phase, the MODIFY message shall be initiated by the MMI at the facsimile terminal, which shall result in the establishment of RLP across the radio interface and connection to line of the FA/IWF.

When the facsimile machine is connected to the line by manual intervention, the facsimile machine should transmit tonal signal (CNG or CED) toward the FA. The FA shall select ATD or ATA according to the rules in subclause 9.1 and transmit ATD or ATA toward the TAF. On detecting ATD or ATA, the TAF shall transmit the MODIFY message that has G3FAX ability as a bearer capability. After that, RLP and L2RCOP shall be established across the radio interface. Once the connection is established, circuit 109 shall be clamped to the ON condition by the TAF at the IWF. Then, the FA protocol shall be started between the FAs.

In order to make the transition from the speech phase to the facsimile phase, the MODIFY command shall be initiated by MMI at the UE, which shall result in an establishment of the RLP across the radio interface and connection to a line of the FA/IWF.

If a FA is used, the mobile facsimile terminal shall be connected to line by manual intervention at this stage, and shall cause the FA to turn on circuit 108/2 (according to ITU-T Recommendation V.24) towards the UE.

In the case where a UMTS facsimile machine is used, circuit 108/2 shall be turned on when the UMTS facsimile machine is connected to line by manual intervention.

After determination of the DCD and ICM (see subclause 6.4) and establishment of RLP, the modem at the IWF shall be automatically selected and send the appropriate modem tone according to the rules in subclause 6.4 to the PSTN facsimile terminal. Also circuit 107 shall be turned on by the UE, whereupon the UE shall complete the tonal handshaking according to the rules in subclause 6.4.

If a FA is used, the receipt of circuit 107 shall cause the FA to connect to the line.

The analogue links at both the PSTN side and the mobile side (where a FA is used) shall be established in accordance with the appropriate ITU-T V. series recommendation.

The circuit 109 (according ITU-T Recommendation V.24) at the R interface of the UE shall be turned on by the FA at the IWF (according 3G TS 27.002 clause 4) before any further procedure may be carried out between the FAs and consequently end-to-end. Once the connection is established, circuit 109 shall be clamped to the ON condition by the FA at the IWF, so fixing a full duplex mode throughout the whole facsimile phase of the call.

### 9.2.2.2 Auto calling

Refer to the diagram in figure C.4. The auto-calling procedure of ITU-T Recommendation V.25bis is initiated at the ITU-T Recommendation V.24 interface.

The FA at the UE shall turn on circuit 108/2 and circuit 105 when the fax apparatus is connected to the line by manual intervention. After that, the TAF at the UE shall turn on circuit 106 and circuit 107 toward the FA. The FA which detected ON condition of circuit 106 and circuit 107 shall require facsimile call of the TAF by appropriate AT command (e.g. AT+FCLASS=1, 2). If the AT command is recognized, the TAF shall transmit "OK" to the FA as a result code. This is done either directly from the UMTS facsimile machine or, if a FA is used, by DTMF dialling information between the mobile facsimile terminal and the FA.

The FA shall make ATD [Dial signal] from DTMF dialling information and transmit ATD[Dial signal] toward the TAF. On detecting ATD [Dial signal], the TAF shall transmit the call set-up signal that has G3FAX ability as a bearer capability. When the call is answered, the synchronization process shall be started and the RLP shall be established across the radio interface.

After that, RLP and L2RCOP are established across the radio interface. Once the connection is established, circuit 109 shall be clamped to the ON condition by the TAF at the IWF. Then, the FA protocol is started between the FAs.

On completion of the synchronization process across the radio interface or RLP establishment, the modem at the IWF shall be automatically selected and send CNG (option) to the PSTN facsimile terminal. Also circuit 107 shall be turned on by the UE.

If a FA is used, the receipt of circuit 107 shall cause the FA to connect to the line.

The analogue links at both the PSTN side and the mobile side (where a FA is used) shall be established in accordance with the appropriate ITU-T Recommendation V. series.

The circuit 109 (according ITU-T Recommendation V.24) at the R interface of the UE shall be turned on by the FA at the IWF (according 3G TS 27.002 clause 4 ) before any further procedure may be carried out between the FAs and consequently end-to-end. Once the connection is established, circuit 109 shall be clamped to the ON condition by the FA at the IWF, so fixing a full duplex mode throughout the whole facsimile phase of the call.

### 9.2.2.3 Manual calling

Refer to the diagram in figure C.5. The connection of the FA to the TAF causes the initialization between the FA and the TAF. At first, the FA shall turn on circuit 108/2 and circuit 105. After that, the TAF at the UE shall turn on circuit 106 and circuit 107 toward the FA. The FA which detected ON condition of circuit 106 and circuit 107 shall require facsimile call of the TAF by appropriate AT command (e.g. AT+FCLASS=1, 2). If the AT command is recognized, the TAF shall transmit "OK" to the FA as a result code.

After the initialization of the FA and the TAF, the dialling operation shall be done at the MT. Then, the MT shall transmit the call set-up signal that has G3FAX ability as a bearer capability.

After that, RLP and L2RCOP shall be established across the radio interface. Once the connection is established, circuit 109 shall be clamped to the ON condition by the TAF at the IWF. Then, the FA protocol shall be started between the FAs. And the fax apparatus is connected to the line by manual intervention.

When the call is answered, the RLP shall be established across the radio interface providing circuit 108/2 in the ON condition.

If a FA is used, the mobile facsimile terminal shall be connected to the line by manual intervention at this stage, and this shall cause the FA to turn on circuit 108/2 (according to ITU-T Recommendation V.24) towards the TAF/UE.

If a UMTS facsimile machine is used, circuit 108/2 shall be turned on when the UMTS facsimile machine is connected to the line by manual intervention.

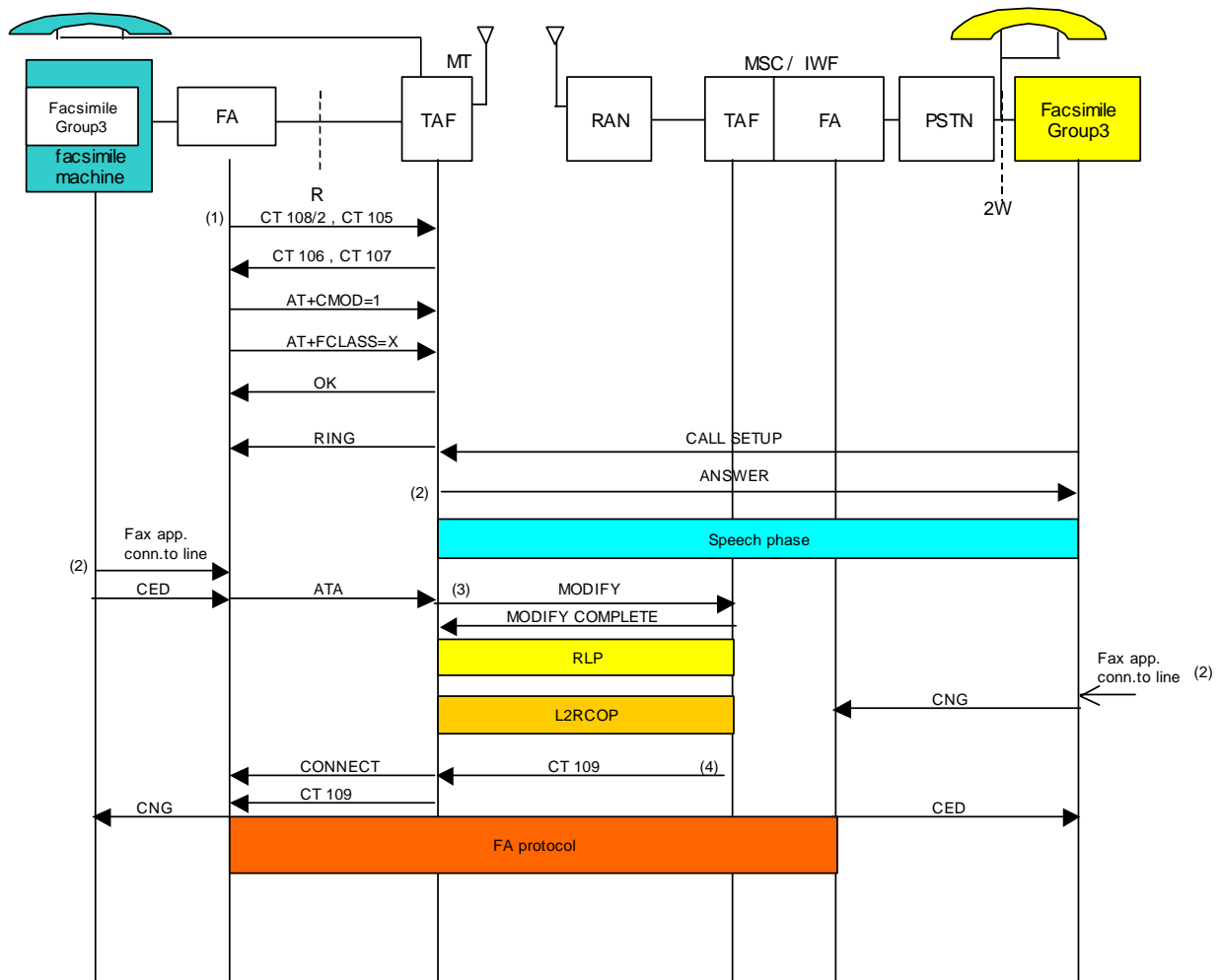
On completion of RLP establishment, the modem at the IWF shall be automatically selected and may send a CNG message to the PSTN facsimile terminal. Also circuit 107 shall be turned on by the TAF/UE.

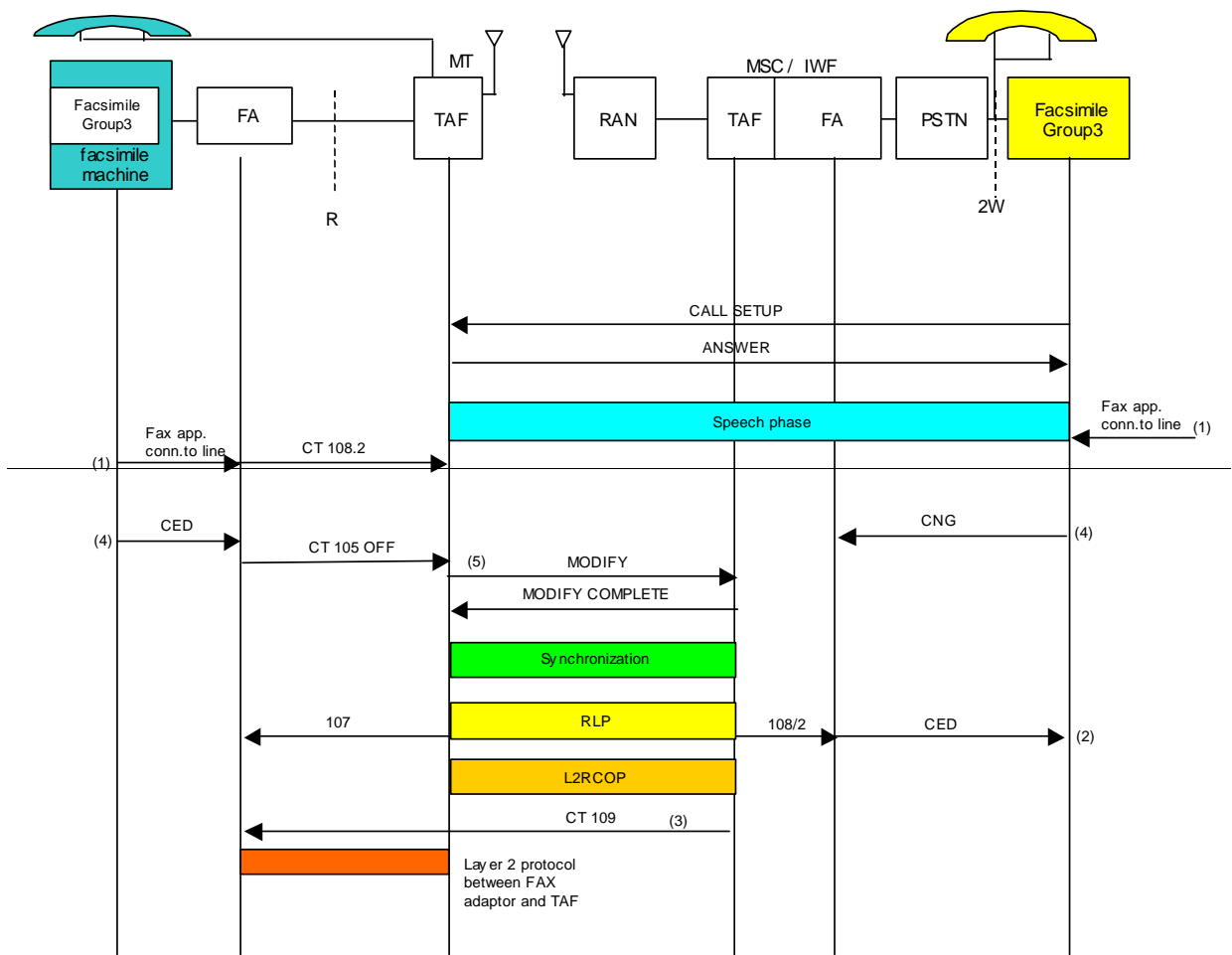
If a FA is used, the receipt of circuit 107 shall cause the FA to connect to the line.

The analogue links at both the PSTN side and the mobile side (where a FA is used) shall be established in accordance with the appropriate ITU-T V. series recommendation.

The circuit 109 (according ITU-T Recommendation V.24) at the R interface of the UE shall be turned on by the FA at the IWF (according 3G TS 27.002 clause 4 ) before any further procedure may be carried out between the FAs and consequently end-to-end. Once the connection is established, circuit 109 shall be clamped to the ON condition by the FA at the IWF, so fixing a full duplex mode throughout the whole facsimile phase of the call.

# Annex C (informative): Procedure examples





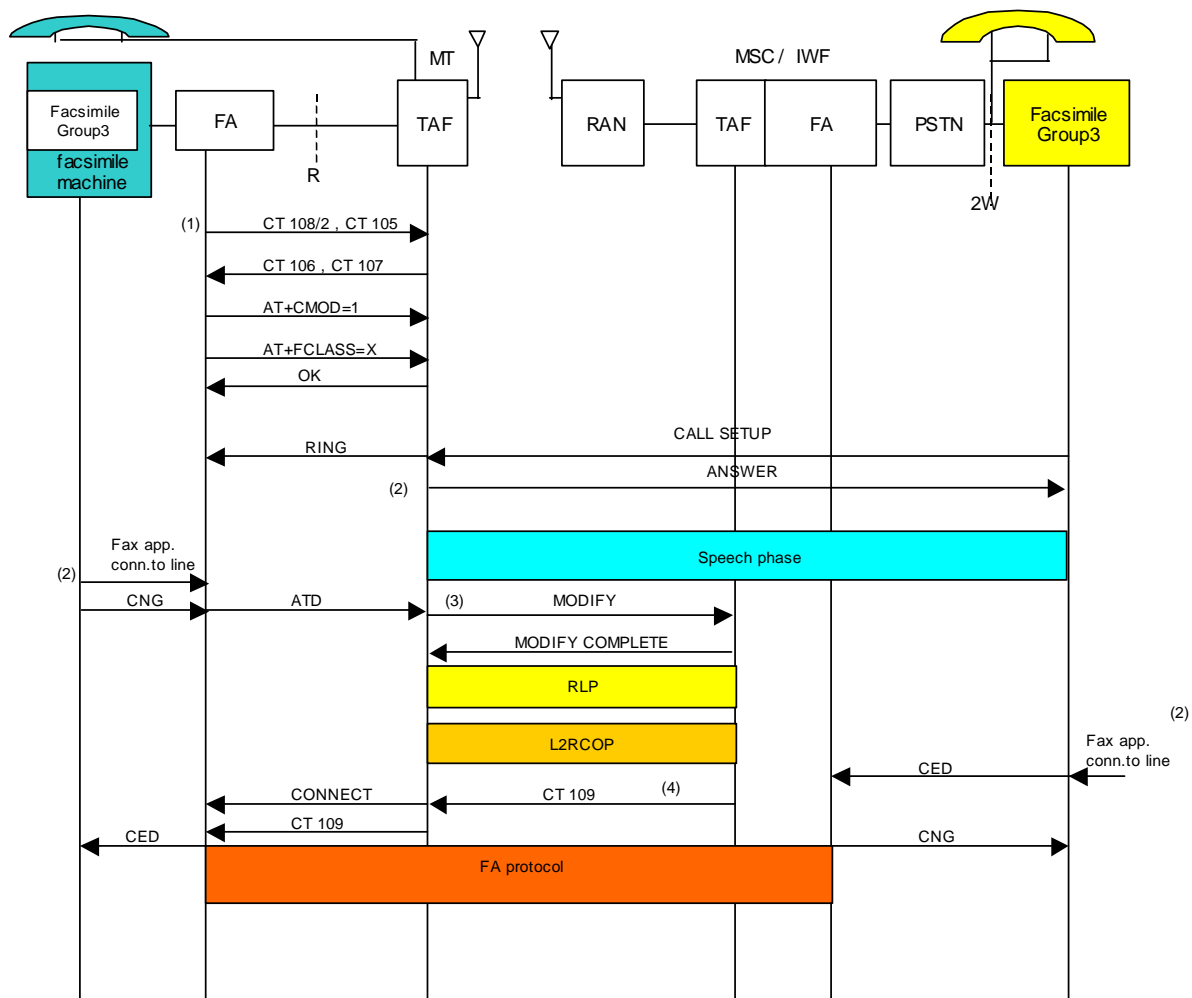
105, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24

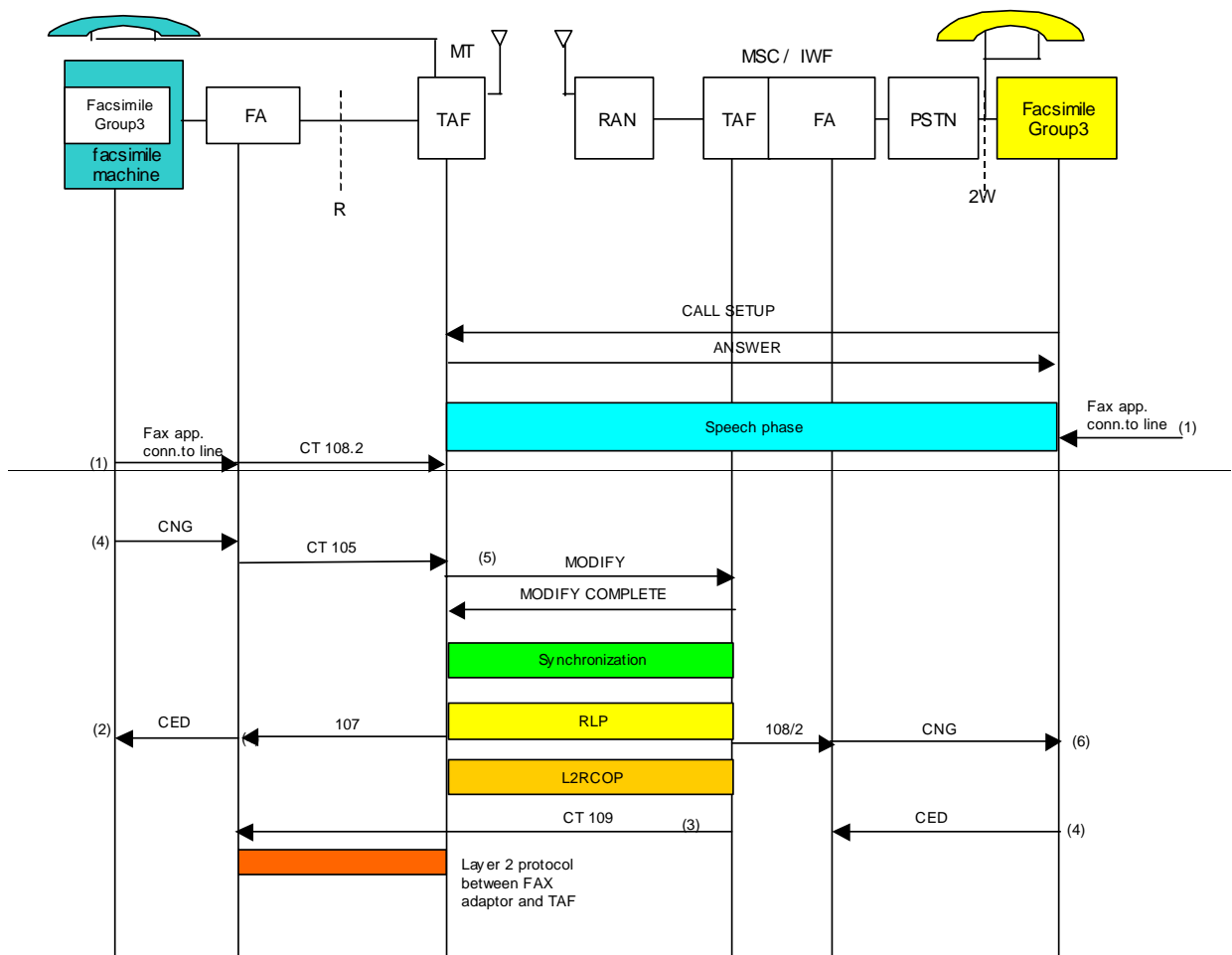
- (1) manual intervention
- (2) mandatory
- (3) locally generated by the FA at IWF
- (4) optionally
- (5) triggered by delayed CT108.2 (3-sec)

105, 106, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24

- (1) speech/fax call setting
- (2) manual intervention
- (3) triggered by ATA
- (4) locally generated by the IWF

**Figure C.1a: Mobile terminated call - speech then facsimile DCD mobile terminated**





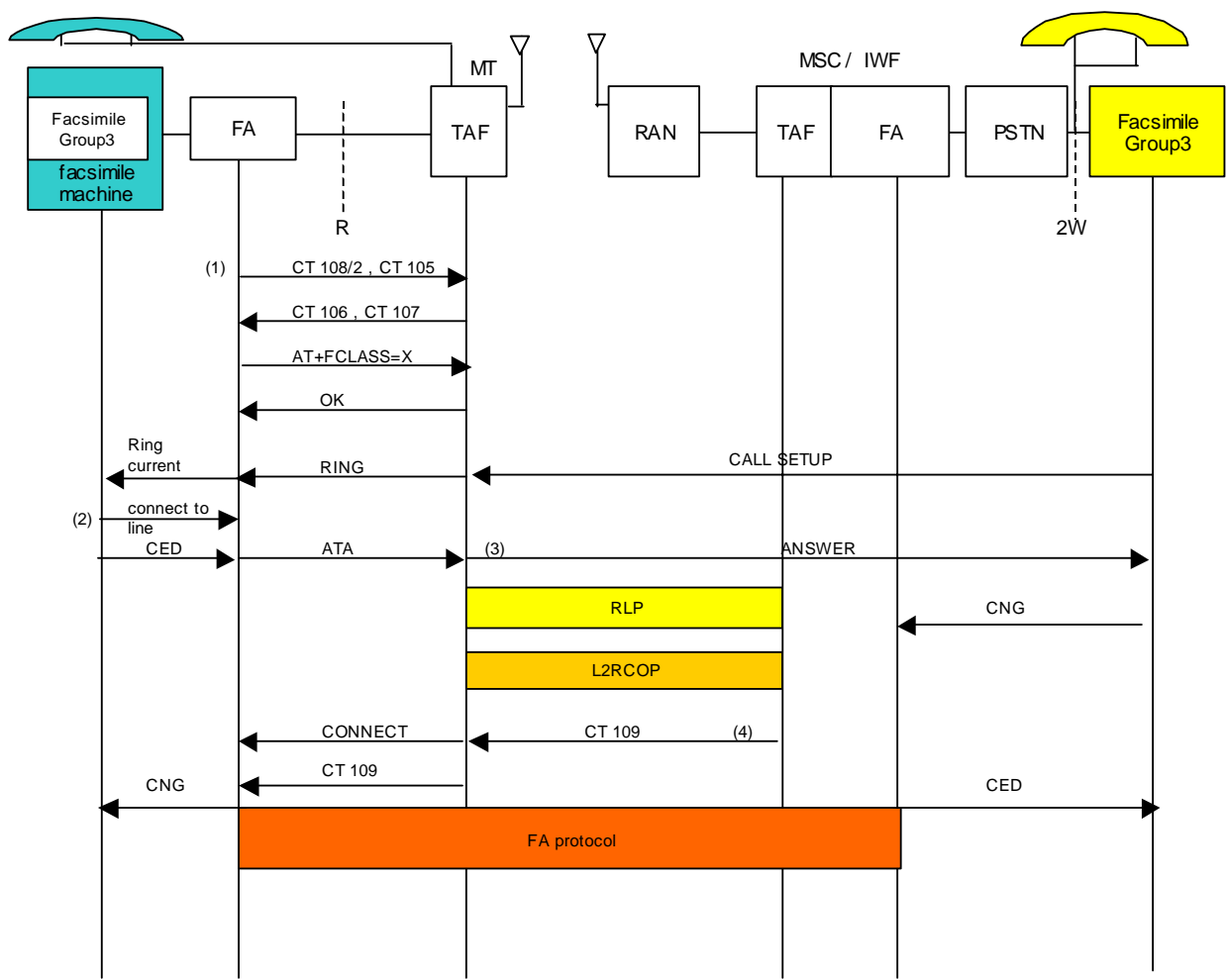
105, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24

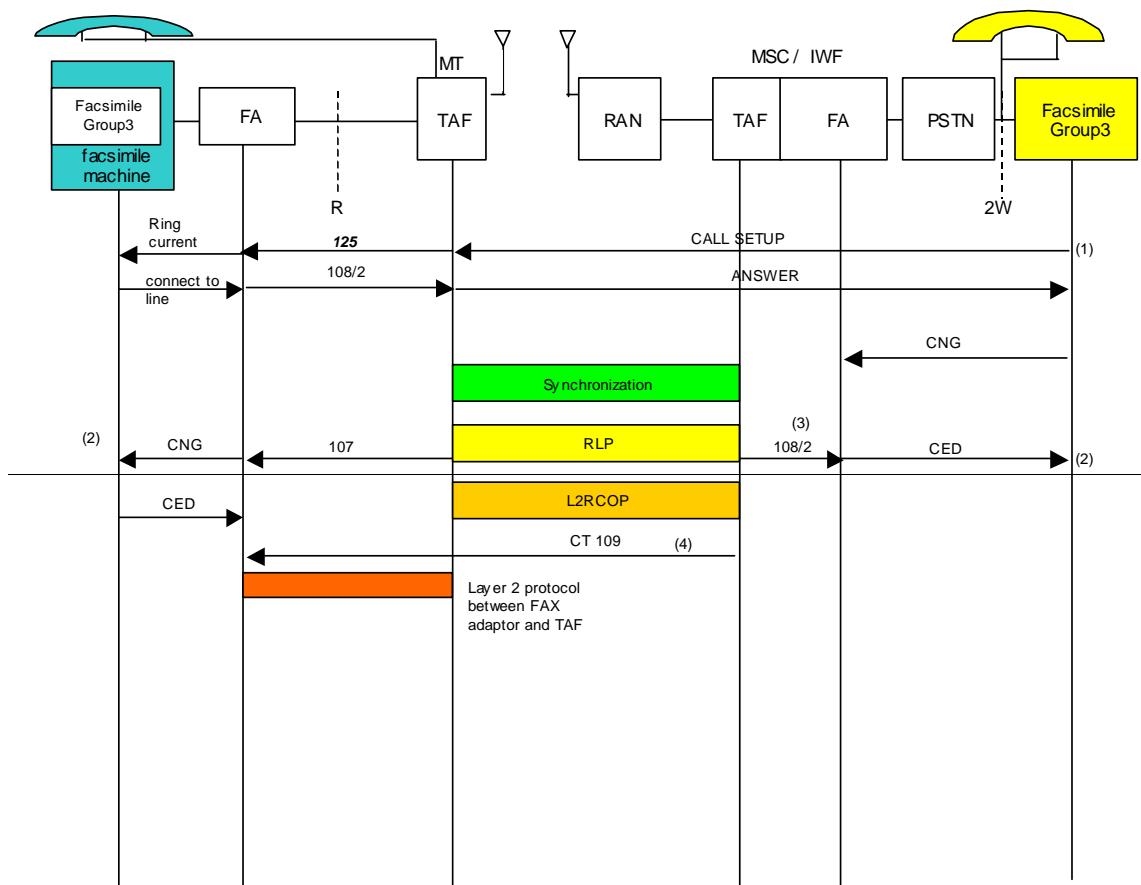
- (1) manual intervention
- (2) mandatory
- (3) locally generated by FA at IWF
- (4) optionally
- (5) triggered by delayed CT108.2 (3 sec)
- (6) transmitted only if neither CED nor BCS is already received

105, 106, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24

- (1) speech/fax call setting
- (2) manual intervention
- (3) triggered by ATD
- (4) locally generated by the IWF

**Figure C.1b: Mobile terminated call - speech then facsimile DCD mobile originated**



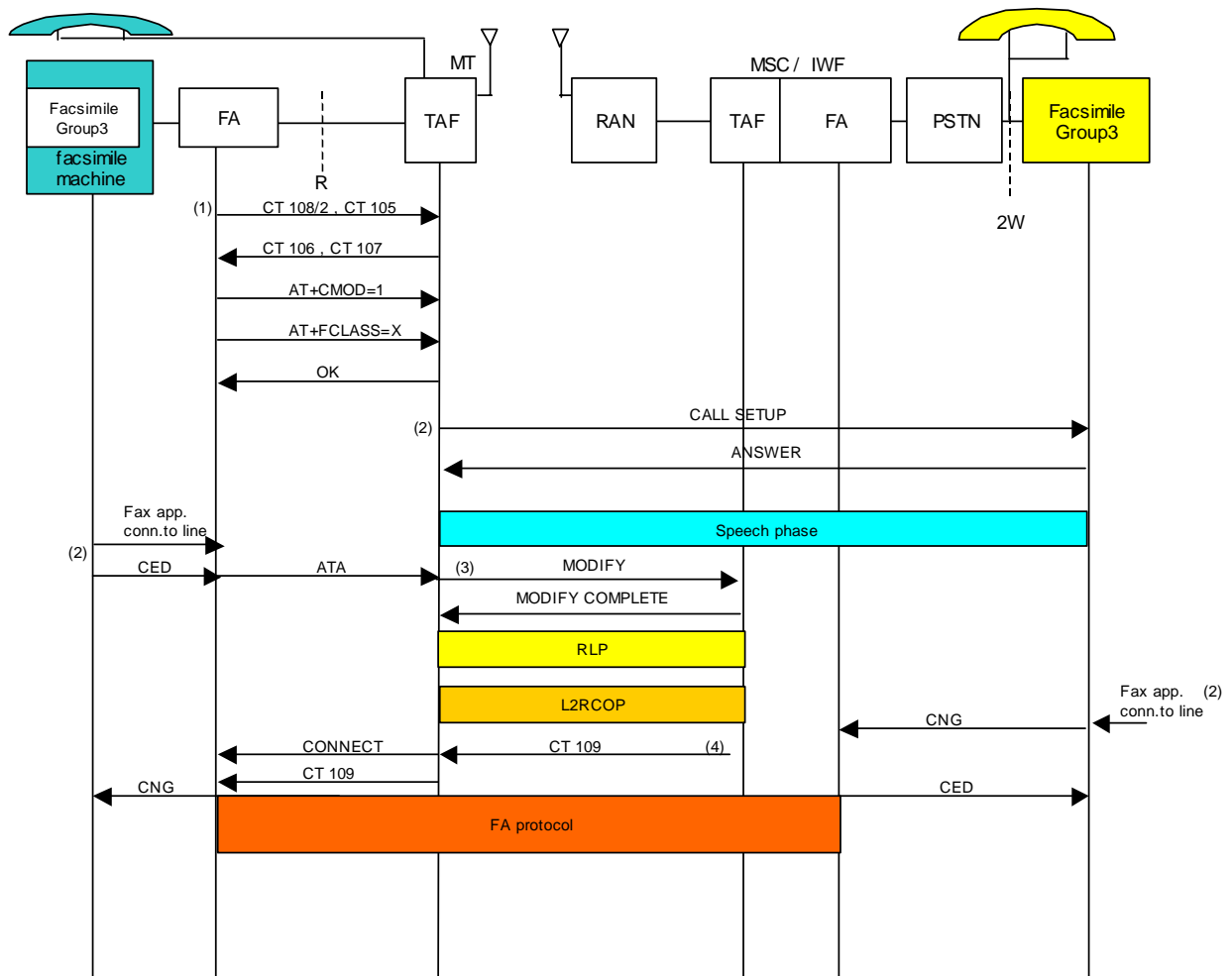


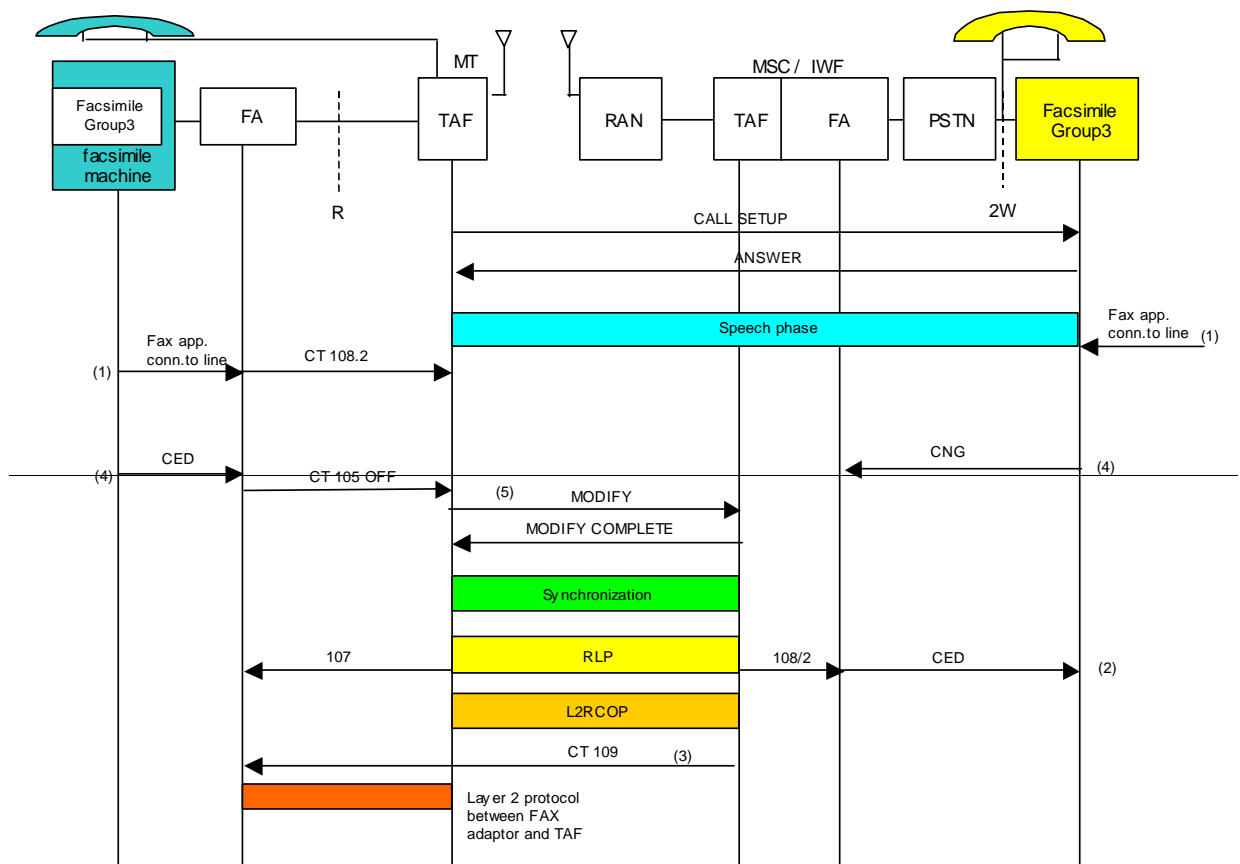
- 107, 108/2, 109: circuits according to ITU-T Recommendation V.24
- (1) manual or automatic operation
  - (2) mandatory
  - (3) either after synchronization or RLP establishment
  - (4) locally generated by FA at IWF

- 105, 106, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24
- (1) fax call setting
  - (2) manual or automatic operation
  - (3) triggered by ATA
  - (4) locally generated by the IWF

**Figure C.2: Mobile terminated call - auto answer**







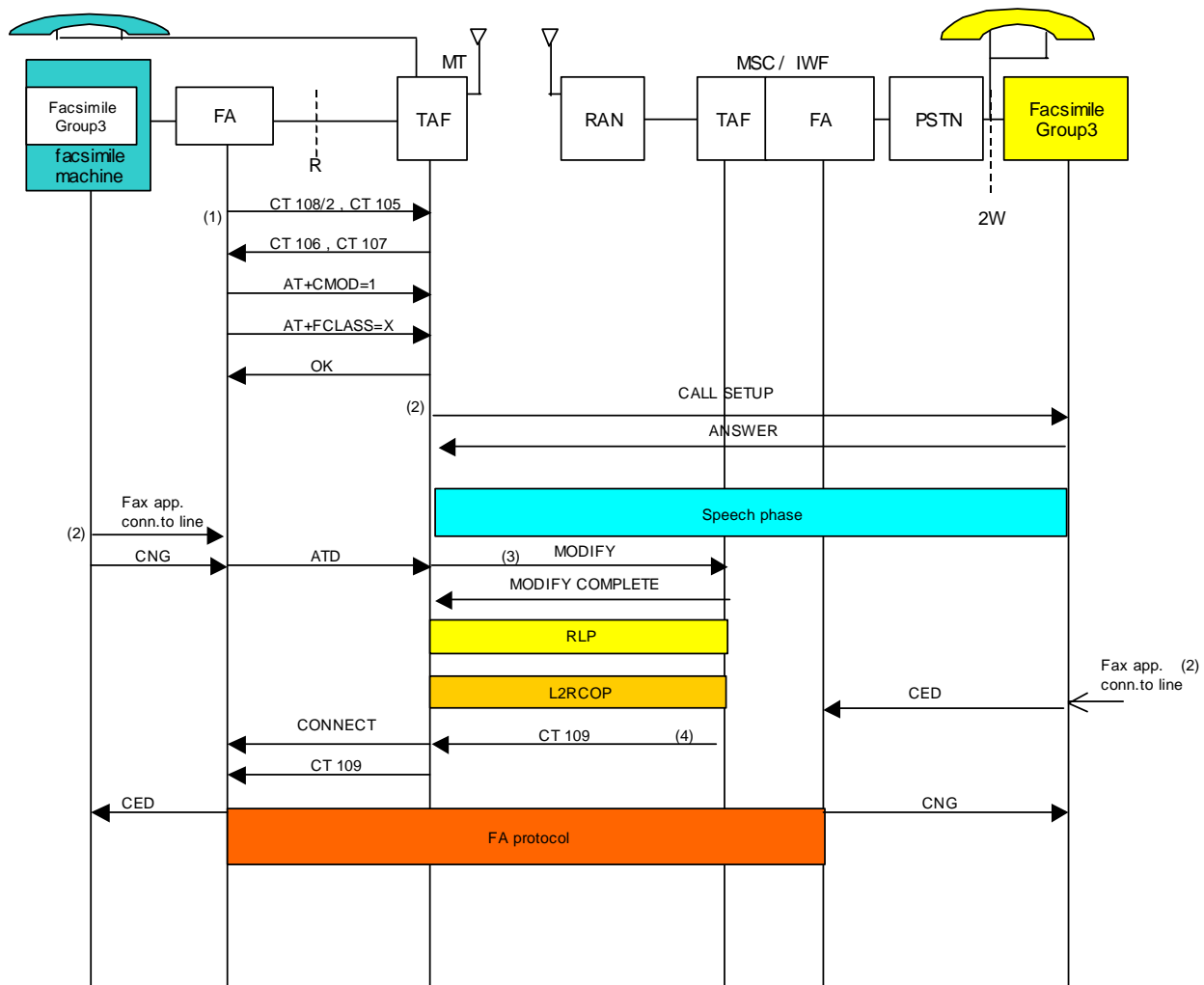
105, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24

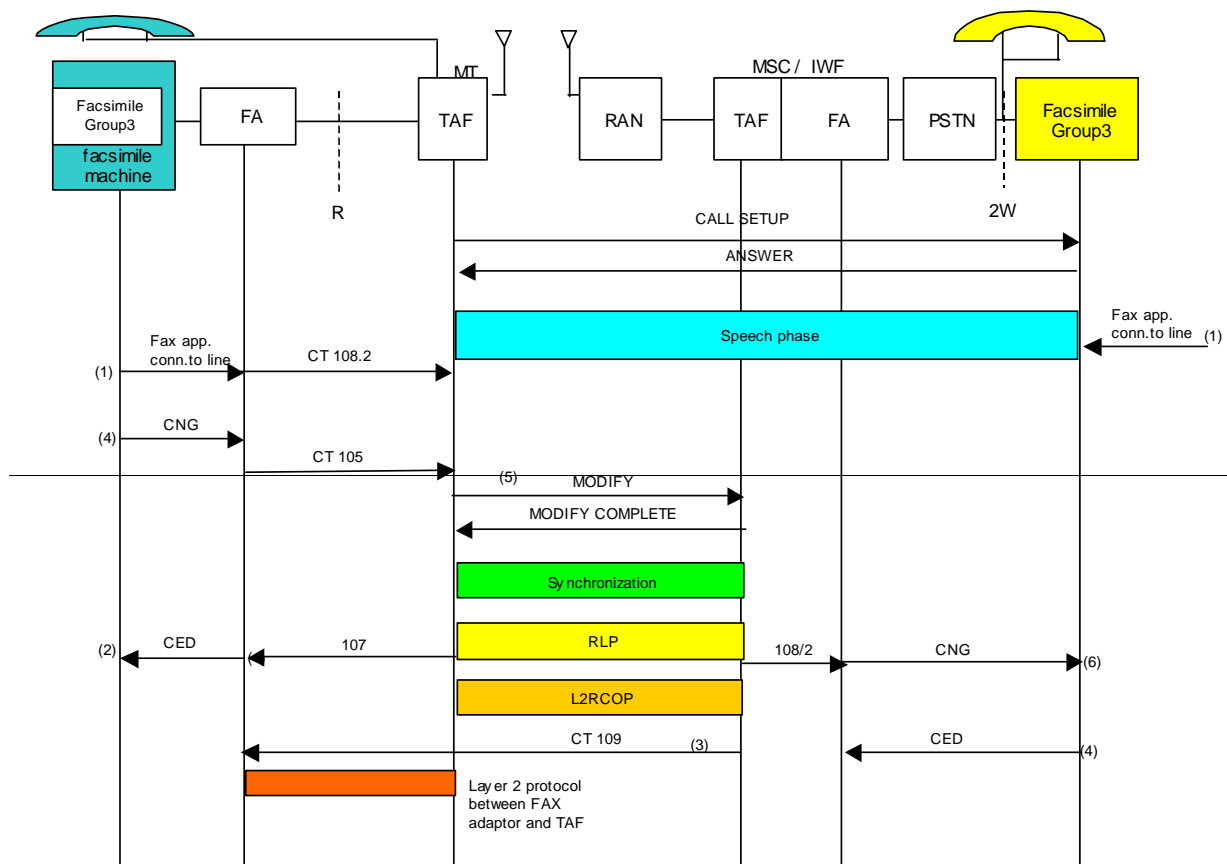
- (1) manual intervention
- (2) mandatory
- (3) locally generated by FA at IWF
- (4) optionally
- (5) triggered by delayed CT108.2 (3 sec)

105, 106, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24

- (1) speech/fax call setting
- (2) manual intervention
- (3) triggered by ATA
- (4) locally generated by the IWF

**Figure C.3a: Mobile originated call - speech then facsimile DCD mobile terminated**





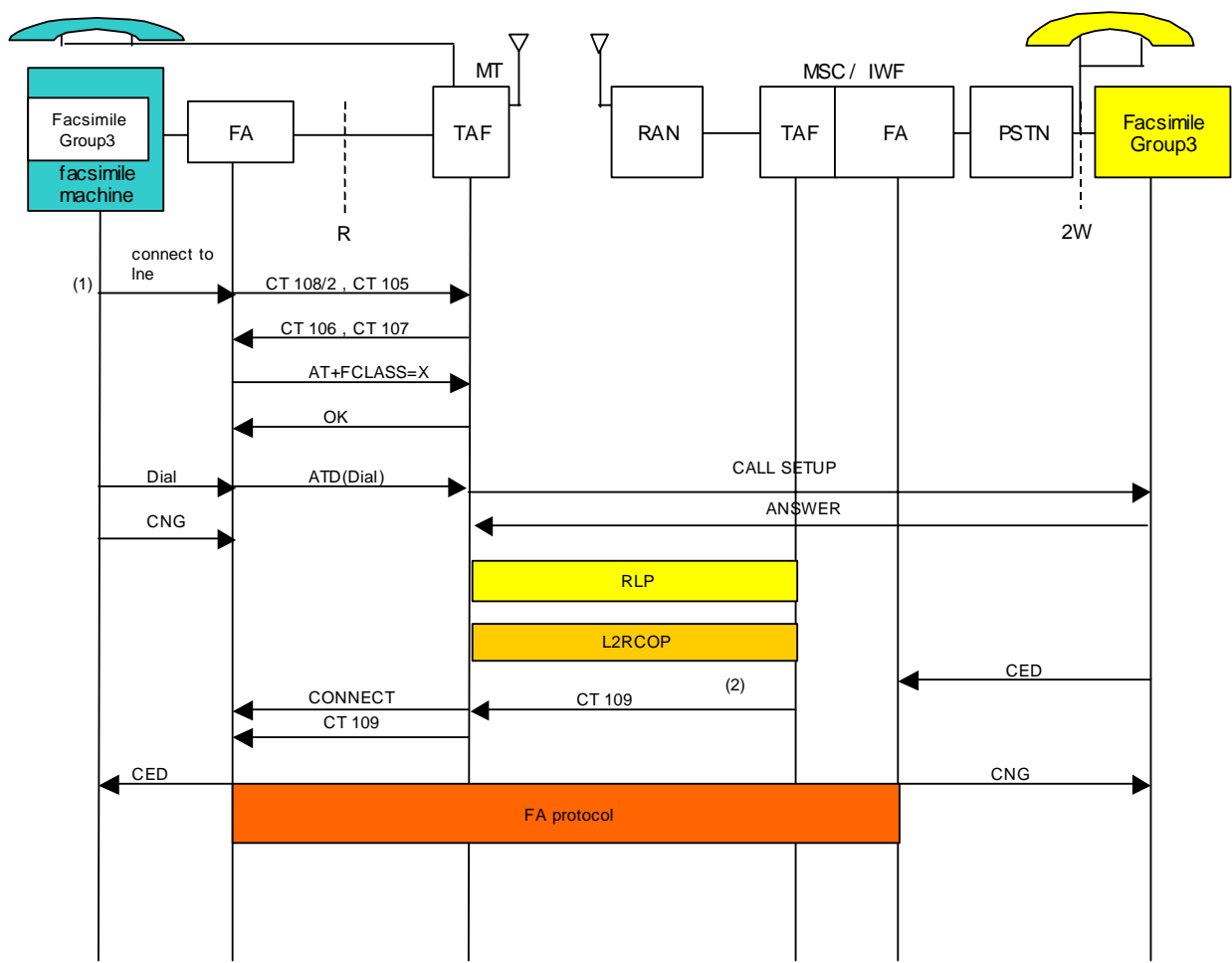
105, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24

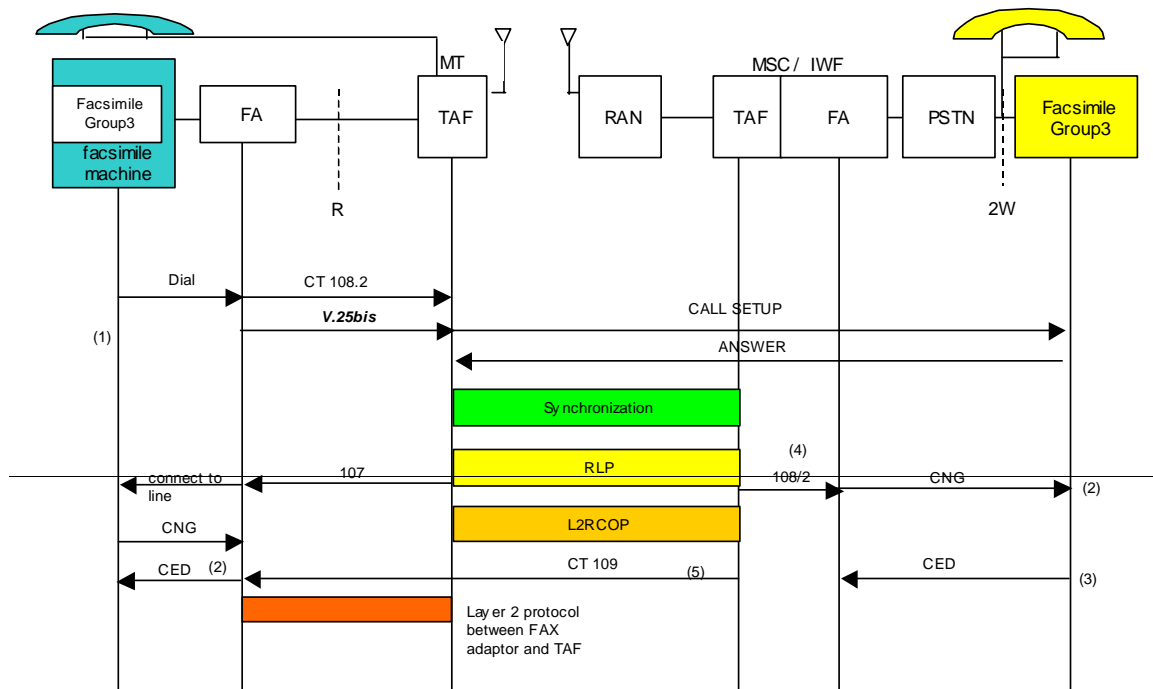
- (1) manual intervention
- (2) mandatory
- (3) locally generated by FA at IWF
- (4) optionally
- (5) triggered by delayed CT108.2 (3 sec)
- (6) transmitted only if neither CED nor BCS is already received

105, 106, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24

- (1) speech/fax call setting
- (2) manual intervention
- (3) triggered by ATD
- (4) locally generated by the IWF

**Figure C.3b: Mobile originated call - speech then facsimile DCD mobile originated**





107, 108/2, 109: circuits according to ITU-T Recommendation V.24

(1) manual intervention

(2) mandatory

(3) PSTN fax terminal may be manually or automatically answered

(4) either after synchronization or RLP establishment

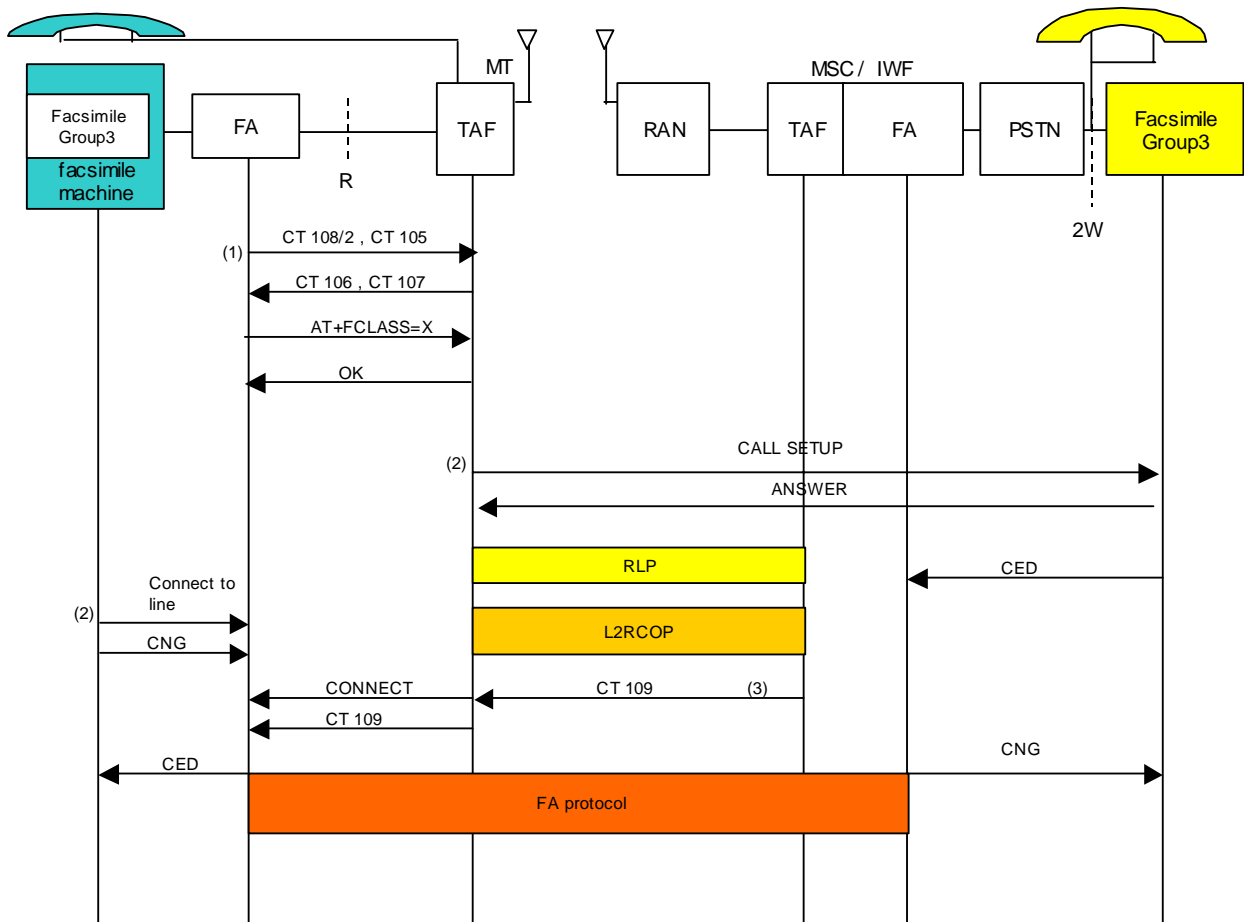
(5) locally generated by FA at IWF

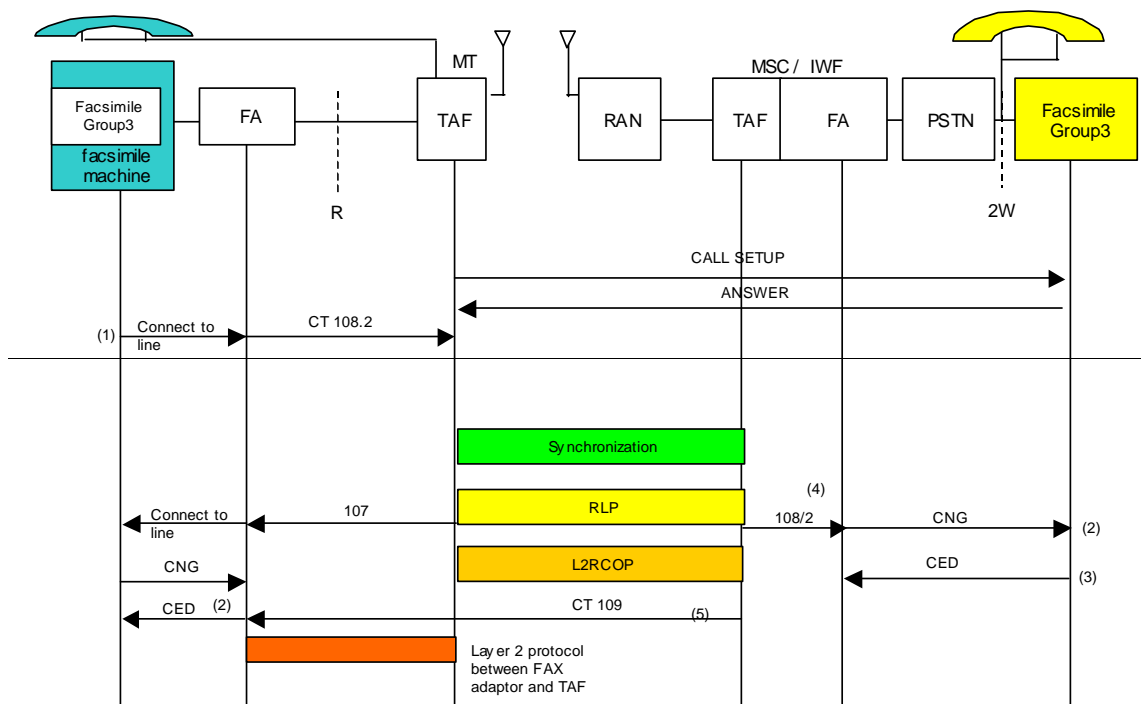
105, 106, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24

(1) manual intervention

(2) locally generated by the IWF

Figure C.4: Mobile originated call - auto calling





- 107, 108/2, 109: circuits according to ITU-T Recommendation V.24
- (1) manual intervention
  - (2) mandatory
  - (3) PSTN fax terminal may be manually or automatically answered
  - (4) either after synchronization or RLP establishment
  - (5) locally generated by FA at IWF
- 105, 106, 107, 108/2, 109: circuits according to ITU-T Recommendation V.24
- (1) fax call setting
  - (2) manual intervention
  - (3) locally generated by the IWF

**Figure C.5: Mobile originated call - manual calling**



## CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

**27.001 CR 037**

Current Version: **3.5.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **CN#9**  
list expected approval meeting # here ↑

for approval   
for information

strategic   
non-strategic  (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

**Proposed change affects:** (U)SIM  ME  UTRAN / Radio  Core Network   
(at least one should be marked with an X)

**Source:** TSG\_N3 **Date:** 2000-08-17

**Subject:** Modification from V.25bis to V.250

**Work item:** TEI

**Category:** F Correction  **Release:** Phase 2   
(only one category shall be marked with an X) A Corresponds to a correction in an earlier release  Release 96   
B Addition of feature  Release 97   
C Functional modification of feature  Release 98   
D Editorial modification  Release 99   
Release 00

**Reason for change:** V.25bis is outdated. References to V.25bis procedures are replaced by corresponding procedures based on V.250 and 3G TS 27.007.

**Clauses affected:**

**Other specs affected:** Other 3G core specifications  → List of CRs: 27.002 CR 006, 27.003 CR 006  
Other GSM core specifications  → List of CRs:  
MS test specifications  → List of CRs:  
BSS test specifications  → List of CRs:  
O&M specifications  → List of CRs:

**Other comments:**

<----- double-click here for help and instructions on how to create a CR.

---

## 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.

- [1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".
- [2] 3G TS 22.002: "Digital cellular telecommunication system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".
- [3] GSM 02.03: "Digital cellular telecommunication system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".
- [4] 3G TS 23.002: "Network architecture".
- [5] GSM 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".
- [6] GSM 04.02: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".
- [7] 3G TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols -Stage 3".
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- [10] GSM 05.05: "Digital cellular telecommunication system (Phase 2+); Radio transmission and reception".
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- [12] 3G TS 27.003: "Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".
- [13] 3G TS 27.005: "Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".
- [14] 3G TS 27.007: "AT command set for 3GPP User Equipment (UE)".
- [15] Void.
- [16] 3G TS 29.002: "Mobile Application Part (MAP) specification".
- [17] Void.
- [18] Void.
- [19] Void.

- [20] GSM 09.06: "Digital cellular telecommunication system (Phase 2+); Interworking between a Public Land Mobile Network (PLMN) and a Packet Switched Public Data Network/Integrated Services Digital Network (PSPDN/ISDN) for the support of packet switched data transmission services".
- [21] 3G TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".
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- [27] ITU-T Series V.42bis: "Data Compression for Data Circuit Terminating Equipment (DCE) using Error Correction Procedures".
- [28] ITU-T Series X Recommendations: "Data Communication networks".
- [29] ITU-T Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit - terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".
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- [31] ~~Void. ITU-T Recommendation V.25bis: "Automatic Calling and/or Answering Equipment on the General Switched Telephone Network (GSTN) using the 100-Series Interchange Circuits".~~
- [32] ITU-T Recommendation V.250: "Serial asynchronous automatic dialling and control".
- [33] ITU-T Recommendation V.54: "Loop Test Devices for Modems".
- [34] ITU-T Recommendation V.110: "Support of data terminal equipments (DTEs) with V-Series interfaces by an integrated services digital network".
- [35] ITU-T Recommendation I.460-I.464: "ISDN Overall Network Aspects and Functions, User Network Interfaces".
- [36] ITU-T Recommendation Q.931 (05/98): "DSS 1 - ISDN user network interface layer 3 specification for basic call control".
- [37] ETR 018: "Integrated Services Digital Network (ISDN), Application of the BC-, HLC-, LLC- Information elements by terminals supporting ISDN services".
- [38] ISO/IEC 6429: "Information technology - Control functions for coded character sets".
- [39] Personal Computer Memory Card Association: "PCMCIA 2.1 or PC-Card 3.0 electrical specification or later revisions".
- [40] IrDA "IrPHY Physical signalling standard".
- [41] TIA-617: "Data Transmission Systems and Equipment - In-Band DCE Control".
- [42] ITU-T Recommendation V.120: "Support by an ISDN of data terminal equipment with V-Series type interfaces with provision for statistical multiplexing".

- [43] GSM 03.34: "Digital cellular telecommunication system (Phase 2+); High Speed Circuit Switched Data (HSCSD); Stage 2 Service description".
- [44] ISO/IEC 3309: "Telecommunications and information exchange between systems - High-level data link control (HDLC) procedures - Frame structure".
- [45] IETF RFC 1662: "PPP in HDLC-like framing".
- [46] 3G TS 21.905: "3G Vocabulary".
- [47] 3G TS 25.990: "Vocabulary for UTRAN".
- [48] 3G TS 25.322: "Radio Link Control (RLC) Protocol Specification".
- [49] 3G TS 25.415: "UTRAN Iu interface user plane protocols".
- [50] Mobile Internet Access Forum: "PIAFS Specification Ver. 1.1, 2.1".

---

## 5 Functions to support data services

The main functions of the MT to support data services are:

- functions to ensure conformity of terminal service requests to network capability;
- physical connection of the reference points R and S;
- flow control of signalling and mapping of user signalling to/from GSM PLMN access signalling;
- rate adaptation of user data (see GSM 04.21) and data formatting for the transmission SAP (3G TS 25.322);
- flow control of non-transparent user data and mapping of flow control for asynchronous data services;
- support of data integrity between the MS and the interworking function in the GSM PLMN;
- end-to-end synchronization between terminals;
- filtering of status information;
- functions to support non-transparent bearer services e.g. termination of the Radio Link Protocol (RLP) and the Layer 2 Relay function (L2R) including optional data compression function (where applicable);
- terminal compatibility checking;
- optional support of local test loops.

In addition, functions to support autocalling and autoanswering are optionally specified in accordance with ~~ITU-T Rec. V.25 bis or with~~ ITU-T Recommendation. V.250 (although the use of other autocalling/auto-answering procedures are not prohibited provided that mapping in a functionally equivalent way to TS 24.008 call control is also provided).

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.~~

Other functional entities can be envisaged apart from the TAF. One of the physical interfaces to all these functions is the DTE/DCE interface to the MT. Normally, this DTE/DCE interface is associated with the TAF, if available. Therefore the access to any of these other functional entities, if implemented, via the DCE/DTE interface must be triggered by appropriate command sequences which are described in the applicable specifications (although the use of other procedures is not prohibited provided that mapping in a functionally equivalent way is also provided). These command sequences can be issued by the DTE only when the MT is in the appropriate command status and there is no data connection pending. They are interpreted by an MT internal control function and result in an association of the DTE/DCE interface with the addressed function, if available.

## 8.5 ~~8.5~~ Alternate speech/facsimile group 3

### 8.5.1 ~~In case of GSM~~

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.~~

~~This alternate service may be initiated by a manual procedure where CT106, CT107, CT108.2 and CT109 are set in the OFF condition.~~

~~These alternate services may be initiated by either V.25 bis or manual procedures. In the former case, standard call establishment procedures will apply. In the latter case, CT106, CT107, CT108.2 and CT109 are in the OFF condition.~~

Selection of the data phase (from the speech phase) will be by manual intervention via the MS causing ICM by means of CT108.2 going to ON condition, refer to GSM 03.45 or ~~3G TS 23.146~~. The ensuing data phase shall follow all the operational procedures as described in 3G 27-series.

Selection of the speech phase (from the data phase) will be by manual intervention via the MS causing ICM (phone off-hook condition at the MT and data call end condition at the TE).

During the ensuing speech phases, CT107, CT106 and CT109 will be maintained in the OFF condition.

Subsequent re-selection of the data phase will be by manual intervention via the MS causing CT108.2 going to ON condition initiating ICM. At this point, re-synchronization will take place as described in subclause 8.1 above.

### 8.5.2 ~~In case of UMTS~~

~~Refer to section 9.2.1.1 and 9.2.2.1 in 3G TS 23.146.~~

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**27.001 CR 038**

Current Version: **3.5.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **CN#9**  
list expected approval meeting # here ↑

for approval   
for information

strategic   
non-strategic  (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

**Proposed change affects:** (U)SIM  ME  UTRAN / Radio  Core Network   
(at least one should be marked with an X)

**Source:** TSG\_N3 **Date:** 2000-08-17

**Subject:** Modification from V.25bis to V.250

**Work item:** TEI

<b>Category:</b> (only one category shall be marked with an X)	F Correction	<input type="checkbox"/>	<b>Release:</b>	Phase 2	<input type="checkbox"/>
	A Corresponds to a correction in an earlier release	<input checked="" type="checkbox"/>		Release 96	<input type="checkbox"/>
	B Addition of feature	<input type="checkbox"/>		Release 97	<input type="checkbox"/>
	C Functional modification of feature	<input type="checkbox"/>		Release 98	<input type="checkbox"/>
D Editorial modification	<input type="checkbox"/>	Release 99		<input type="checkbox"/>	
			Release 00	<input checked="" type="checkbox"/>	

**Reason for change:** V.25bis is outdated. References to V.25bis procedures are replaced by corresponding procedures based on V.250 and 3G TS 27.007.

**Clauses affected:**

<b>Other specs affected:</b>	Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	27.002 CR006, 27.003 CR006
	Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

**Other comments:**

<----- double-click here for help and instructions on how to create a CR.

---

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- [15] Void.
- [16] 3G TS 29.002: "Mobile Application Part (MAP) specification".
- [17] Void.
- [18] Void.
- [19] Void.



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- [43] GSM 03.34: "Digital cellular telecommunication system (Phase 2+); High Speed Circuit Switched Data (HSCSD); Stage 2 Service description".
- [44] ISO/IEC 3309: "Telecommunications and information exchange between systems - High-level data link control (HDLC) procedures - Frame structure".
- [45] IETF RFC 1662: "PPP in HDLC-like framing".
- [46] 3G TS 21.905: "3G Vocabulary".
- [47] 3G TS 25.990: "Vocabulary for UTRAN".
- [48] 3G TS 25.322: "Radio Link Control (RLC) Protocol Specification".
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- flow control of non-transparent user data and mapping of flow control for asynchronous data services;
- support of data integrity between the MS and the interworking function in the GSM PLMN;
- end-to-end synchronization between terminals;
- filtering of status information;
- functions to support non-transparent bearer services e.g. termination of the Radio Link Protocol (RLP) and the Layer 2 Relay function (L2R) including optional data compression function (where applicable);
- terminal compatibility checking;
- optional support of local test loops.

In addition, functions to support autocalling and autoanswering are optionally specified in accordance with ~~ITU-T Rec. V.25 bis or with~~ ITU-T Recommendation. V.250 (although the use of other autocalling/auto-answering procedures are not prohibited provided that mapping in a functionally equivalent way to TS 24.008 call control is also provided).

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.~~

Other functional entities can be envisaged apart from the TAF. One of the physical interfaces to all these functions is the DTE/DCE interface to the MT. Normally, this DTE/DCE interface is associated with the TAF, if available. Therefore the access to any of these other functional entities, if implemented, via the DCE/DTE interface must be triggered by appropriate command sequences which are described in the applicable specifications (although the use of other procedures is not prohibited provided that mapping in a functionally equivalent way is also provided). These command sequences can be issued by the DTE only when the MT is in the appropriate command status and there is no data connection pending. They are interpreted by an MT internal control function and result in an association of the DTE/DCE interface with the addressed function, if available.

## 8.5 ~~8.5~~ Alternate speech/facsimile group 3

### 8.5.1 ~~In case of GSM~~

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.~~

~~This alternate service may be initiated by a manual procedure where CT106, CT107, CT108.2 and CT109 are set in the OFF condition.~~

~~These alternate services may be initiated by either V.25 bis or manual procedures. In the former case, standard call establishment procedures will apply. In the latter case, CT106, CT107, CT108.2 and CT109 are in the OFF condition.~~

Selection of the data phase (from the speech phase) will be by manual intervention via the MS causing ICM by means of CT108.2 going to ON condition, refer to GSM 03.45 or 3G TS 23.146. The ensuing data phase shall follow all the operational procedures as described in 3G 27-series.

Selection of the speech phase (from the data phase) will be by manual intervention via the MS causing ICM (phone off-hook condition at the MT and data call end condition at the TE).

During the ensuing speech phases, CT107, CT106 and CT109 will be maintained in the OFF condition.

Subsequent re-selection of the data phase will be by manual intervention via the MS causing CT108.2 going to ON condition initiating ICM. At this point, re-synchronization will take place as described in subclause 8.1 above.

### 8.5.2 ~~In case of UMTS~~

~~Refer to section 9.2.1.1 and 9.2.2.1 in 3G TS 23.146.~~

## CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

**27.002 CR 006**

Current Version: **3.4.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **CN#9**

list expected approval meeting # here ↑

for approval   
for information

strategic   
non-strategic  (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <http://ftp.3gpp.org/Information/CR-Form-v2.doc>

**Proposed change affects:**

(at least one should be marked with an X)

(U)SIM  ME  UTRAN / Radio  Core Network

**Source:**

**TSG\_N3**

**Date:**

**2000-08-17**

**Subject:**

**Modification from V.25bis to V.250**

**Work item:**

**TEI**

**Category:**

(only one category shall be marked with an X)

F Correction   
A Corresponds to a correction in an earlier release   
B Addition of feature   
C Functional modification of feature   
D Editorial modification

**Release:**

Phase 2   
Release 96   
Release 97   
Release 98   
Release 99   
Release 00

**Reason for change:**

V.25bis is outdated. References to V.25bis procedures are replaced by corresponding procedures based on V.250 and 3G TS 27.007.  
Some S-interface remnants are also removed.

**Clauses affected:**

**Other specs affected:**

Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	<b>27.001 CR 037, 27.003 CR 006</b>
Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
MS test specifications	<input type="checkbox"/>	→ List of CRs:	
BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
O&M specifications	<input type="checkbox"/>	→ List of CRs:	

**Other comments:**



help.doc

<----- double-click here for help and instructions on how to create a CR.

# 1 Scope

The present document defines the interfaces and Terminal Adaptation Functions (TAF) integral to a Mobile Termination (MT) which enables the use of asynchronous bearer services in the PLMN and the attachment of asynchronous terminals to a MT (see GSM 04.02 [3] and 3G TS 23.101 [6]).

The general aspects of Terminal Adaptation Functions are contained in 3G TS 27.001 [10].

The present document covers support of these services for the following interfaces and procedures:

- (i) ITU-T V.14 [16] procedures.
- (ii) ITU-T V.21 [17] DTE/DCE interface.
- (iii) ITU-T V.22bis [18] DTE/DCE interface.
- (iv) ITU-T V.32 [24] DTE/DCE procedures.
- (v) ITU-T I.420 [14] S interface.
- ~~(vi) ITU-T V.25 bis [21] signalling procedures.~~
- (vi) ITU-T V.250 [22] signalling procedures.

The asynchronous data rates between the MT and the TE2-IWF are defined in 3G TS 22.002 [5].

NOTE: From GSM R99 onwards the following services are no longer required a GSM PLMN:

- the dual Bearer Services "alternate speech/data" and "speech followed by data";
- the dedicated services for PAD and Packet access;
- the BS 21 ... 26 and BS 31 ... 34.

The support of these services is still optional. The specification of these services is not within the scope of the present document. For that, the reader is referred to GSM Release 98.

## 1.1 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.
- [1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".
  - [2] GSM 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".
  - [3] GSM 04.02: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".
  - [4] GSM 04.21: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".
  - [5] 3G TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".
  - [6] 3G TS 23.101: "General UMTS Architecture".
  - [7] 3G TR 23.910: "Circuit Switched Data Bearer Services".

- [8] 3G TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".
- [9] 3G TS 24.022: "Radio Link Protocol (RLP) for Circuit Switched Bearer and Teleservices".
- [10] 3G TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".
- [11] 3G TS 27.007: "AT command set for 3G User Equipment (UE)".
- [12] 3G TR 21.905: "3G Vocabulary".
- [13] 3G TS 29.007: "General requirements on Interworking between the PLMN and the ISDN or PSTN".
- [14] ITU-T Recommendation I.420 (1998): "Basic user-network interface".
- [15] ITU-T Recommendation V.4 (1988): "General structure of signals of international alphabet No.5 code for character oriented data transmission over public telephone networks".
- [16] ITU-T Recommendation V.14 (1993): "Transmission of start-stop characters over synchronous bearer channels".
- [17] ITU-T Recommendation V.21 (1988): "300 bits per second duplex modem standardized for use in the general switched telephone network".
- [18] ITU-T Recommendation V.22bis (1988): "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".
- [19] ITU-T Recommendation V.24 (1996): "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".
- [20] ITU-T Recommendation V.25 (1996): "Automatic answering equipment and general procedures for automatic calling equipment on the general switched telephone network including procedures for disabling of echo control devices for both manually and automatically established calls".
- [21] ~~Void. ITU-T Recommendation V.25 bis (1996): "Synchronous and asynchronous automatic dialling procedures on switched networks".~~
- [22] ITU-T Recommendation V.250: "Serial asynchronous automatic dialling and control".
- [23] ITU-T Recommendation V.28 (1993): "Electrical characteristics for unbalanced double-current interchange circuits".
- [24] ITU-T Recommendation V.32 (1993): "A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use in the general switched telephone network and on leased telephone-type circuits".
- [25] ITU-T Recommendation V.42 (1996): "Error-correcting procedures for DCEs using asynchronous-to-synchronous conversion".
- [26] ITU-T Recommendation V.42 bis (1990): "Data compression procedures for data circuit-terminating equipment (DCE) using error correction procedures".
- [27] ITU-T Recommendation V.110 (1996): "Support of data terminal equipments with V-Series interfaces by an integrated services digital network".
- [28] ITU-T Recommendation X.28 (1997): "DTE/DCE interface for a start-stop mode Data Terminal Equipment accessing the Packet Assembly/Disassembly facility (PAD) in a public data network situated in the same country".
- [29] Personal Computer Memory Card Association: "PCMCIA 2.1 or PC-Card 3.0 electrical specification or later revisions".

- [30] Infrared Data Association IrDA "IrPHY Physical layer signalling standard".
- [31] ISO 2110: "Data communication - 25-pole DTE/DCE interface connector and contact number assignments".
- [32] ITU-T Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic call control".



## 2.2 Terminal Adaptation Function (TAF)

*Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G-TS 27.007.*

The TAF provides facilities to allow manual or automatic call control functions associated with circuit switched services. The following functions are also included:

- Conversion of electrical, mechanical, functional and procedural characteristics of the ITU-T V series and ISDN type interfaces to those required by the PLMN.
- Bit rate adaptation of the ITU-T V series data signalling rates and the ISDN 64 kbit/s to that provided in the PLMN.
- The mapping functions necessary to convert automatic calling and/or automatic answering procedures of ~~the ITU-T recommendations V.25 bis [21]~~ or V.250 [22] and parameters for asynchronous operation.
- The mapping functions necessary to convert S interface signalling to the PLMN Dm channel signalling.
- Flow control (in some cases resulting in non-transparency of data as described in 4.3).
- Layer 2 Relaying (see annex A).
- In-call modification function.
- Synchronization procedure, which means the task of synchronizing the entry to and the exit from the data transfer phase between two user terminals. This is described in 3G TS 27.001 [10].
- Filtering of channel control information as described in 3G TS 27.001 [10].
- Terminal compatibility checking.
- Splitting and combining of the data flow in case of multiple substream data configurations.

### 3.4.1 V-series interface Autocalling/answering

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures defined in V.250 and 3G TS 27.007.~~

- ~~- These procedures are provided according to ITU-T Recommendation V.250 [22] and 3G TS 27.007 [11].~~
- ~~- For autocalling, during the call establishment phase, i.e. after signalling, calling tone according to ITU-T Recommendation V.25 [20] shall be generated in the IWF (3G TS 29.007 [13]).~~

~~The mapping of the ITU-T Recommendation V.25 bis [21] procedures to the messages of the PLMN signalling in 3G TS 24.008 [8] is defined in clause 5.~~

~~a) Auto Calling:~~

- ~~— This procedure is provided according to ITU-T Recommendation V.25 bis [21] using only 108/2.~~
- ~~— A subset of ITU-T Recommendation V.25 bis [21] is shown in table 3. This subset gives minimum level of control and indication.~~
- ~~— During the call establishment phase, i.e. after signalling, calling tone according to ITU-T Recommendation V.25 [20] shall be generated in the IWF (3G TS 29.007 [13]).~~
- ~~— An alternative to ITU-T Recommendation V.25 bis [21] is to use the ITU-T Recommendation V.250 [22] dial command as specified in 3G TS 27.007 [11].~~

~~b) Auto Answer:~~

- ~~— This procedure is provided according to ITU-T Recommendation V.25 bis [21] or to ITU-T Recommendation V.250 [22].~~

~~During the call establishment phase:~~

- ~~- the states of the ITU-T Recommendation V.24 [19] interchange circuits shall be according to 3G TS 27.001 [10];~~
- ~~- the data and status bits from the IWF shall not be mapped;~~
- ~~- the data and status bits towards the IWF shall be according to 3G TS 27.001 [10].~~

### 3.4.4 V-series interface Call Clearing

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures defined in V.250 and 3G TS 27.007.~~

~~This procedure is provided according to ITU-T Recommendation V.250 [22] and 3G TS 27.007 [11].~~

~~This procedure is provided according to ITU-T V.25 bis [21] using CT-108/2. An alternative to ITU-T Recommendation V.25 bis [21] is to use the ITU-T Recommendation V.250 [22] hook control command or the hangup commands specified in 3G TS 27.007 [11]. The mapping of the ITU-T Recommendation V.25 bis [21] procedures to the messages of the PLMN signalling in 3G TS 24.008 [8] is defined in clause 5.~~

During the call clearing phase:

- the states of the ITU-T Recommendation V.24 [19] interchange circuits shall be according to ITU-T Recommendation V.24 [19];
- the data and status bits from the IWF shall not be mapped or used by the MT in any way;
- the data and status bits towards the IWF have no significance and may be set to 1 and OFF respectively.

## 4.5 Bit Transparency

~~Void. The ITU-T V.25 bis [21] indications generated by the TAF shall be even parity, even if the parity condition for the user's application is different.~~

## 4.7 Data Compression

L2R optionally includes a data compression function according to ITU-T V.42bis [26] that spans from the MS to the IWF in the MSC. The error correction function is provided by RLP instead of ITU-T Recommendation V.42 [25]. RLP XID is used to negotiate compression parameters. L2R includes the ITU-T V.42bis [26] control function especially for reinitializing in case of break recognition or RLP reset and error indication by the data compression function respectively.

**Table 3: Minimum set of Interchange Circuits**

Circuit Number	Circuit Name	Ground	Data		Control	
			To TE2	From TE2	To TE2	From TE2
CT102	Common return	x				
CT103	Transmitted data			x		
CT104	Received data return		x			
CT105	Request to send (note 2)					x
CT106	Ready for sending				x	
CT107	Data set ready				x	
CT108/2	Data terminal ready					x
CT109	Data channel received line signal detector				x	
CT125	Calling indicator (note 1)				x	
CT133	Ready for Receiving (note 2)					x

NOTE 1: CT125 is used with the automatic answering function of the TAF.

NOTE 2: CT105 and CT133 are assigned to the same connector pin on both the standard 25 pin connector (ISO 2110) and the commonly used 9 pin connector (annex B). When this pin is used for CT133 then on the DCE (MT) side of the interface CT 105 is treated as being always in the ON condition. Similarly, when this pin is being used for CT105 then on the DCE (MT) side of the interface CT 133 is treated as being always in the ON condition. As circuit 133 is used only in duplex operation and circuit 105 is used only in half duplex operation (which is not supported by GSM or UMTS) there should be no conflict.

**Table 4: Minimum Set of Call Set-up Commands and Indications**

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures defined in V.250 and 3G TS 27.007.

	Description	IA5 Characters
Commands from TE2	<u>C</u> all <u>R</u> equest with <u>N</u> umber provided 0,1..9,*,#,A,B,C,D	CRN
	<u>C</u> onnect <u>I</u> ncoming <u>C</u> all	CIG
	<u>D</u> isregard <u>I</u> ncoming <u>C</u> all	DIC
Indications to TE2	<u>C</u> all <u>F</u> ailure <u>I</u> ndication XX = CB,AB,NT,FC (Note)	CFI-XX
	<u>I</u> ncoming <u>C</u> all	INC
	<u>V</u> ALid	VAL
	<u>I</u> NValid	INV

NOTE: ~~CB = Local MT busy.~~  
~~AB = Abort call.~~  
~~NT = No answer.~~  
~~FC = Forbidden call.\*~~

\* ~~Forbidden call indication results from contravention of rules for repeat call attempts as defined by the appropriate national approvals administration. It is recommended that this is the responsibility of the MT, not the TE2.~~

## 5 Terminal interfacing to 3G TS 24.008 [8] Mapping

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.

Only those elements/messages that are of particular relevance are considered.

Interface procedures not directly mappable to 3G TS 24.008 [8] (i.e. ~~ITU-T Recommendation V.25 bis [21] VAL/INV~~) are not considered. Mobile management procedures of 3G TS 24.008 [8] are not considered applicable.

Mapping of other call establishment or clearing messages to the S interface e.g. "Call proceeding" etc. has not been included. It is assumed these can be mapped directly and as such are of no relevance to the ~~ITU-T Recommendation V.25 bis [21] or~~ manual interfaces.

For the Alternate speech/group 3 facsimile service the TAF shall be able to generate a "Modify" message according to the defined procedure in 3G TS 24.008 [8].

### 5.1 Mobile Originated Calls

Call establishment is initiated by the keypad or DTE action:

a) Setup

Element	Derived from		
	MMI	ITU-T V.25 bis message [21]	S interface message
Called Address	Keypad	-CRN/CRI/CRS	-Setup
Called Sub Address	Keypad	CRI	-Setup
HLC	Derived from internal settings or MMI information.		Setup
LLC	Same as HLC		Setup
BC	Same as HLC 3G TS 27.001 [10] gives Allowed values		-Setup (with additional information from MMI originated settings)

b) Release Complete

Element	Derived from		
	MMI	ITU-T V.25 bis [21] message	S interface message
Cause	Display (optional)	-CFI	-Release-Complete

## 5.2 Mobile Terminated Calls

Call establishment is initiated by receipt of Setup at the MS:

a) Setup

Element	Mapped on to		
	MMI	ITU-T V.25 bis [21] message	S interface message
Called Address	Display (optional)	-INC	-Setup
Called Sub Address	Display (optional)	-Not applicable	-Setup
HLC	Display (optional)	-Not applicable	-Setup
LLC	Display (optional)	-Not applicable	-Setup
BC	Display (optional)	-Not applicable	-Setup (with PLMN specific elements removed)

b) Call Confirm

Information for the BC element in the call confirm shall be derived from e.g. MMI or by internal settings.

c) Connect

Connect is sent in response to connect from the S interface, from MMI, or when the timeout period referred to in ITU-T Recommendation V.25 bis [21] has expired. This period shall be between 5 and 10 seconds. During this time the automatic answering of the incoming call may be prevented by issuing a DIC command. The CIC can be used to cancel the effect of a preceding DIC command (see ITU-T Recommendation V.25 bis [21]).

Connect is sent in response to connect from MMI.

## 5.3 Call Clearing

### 5.3.1 Mobile initiated

Call clearing is initiated by the keypad or DTE action:

Disconnect

Element	Derived from		
	MMI	ITU-T V.250 [22] bis [21]	S interface message
Cause	Keypad	DTE shall turn CT 108/2 OFF See section 3.4.4	Disconnect or inband ITU-T V.110 [27] disconnect request

### 5.3.2 Network initiated

Call clearing is initiated by receipt of Disconnect at the MS:

Disconnect

Element	Mapped on to		
	MMI	ITU-T V.250 [22] bis [21]	S interface message
Cause	Display (optional)	MS shall turn CT 107 OFF Unsolicited result codes	Disconnect





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# 1 Scope

The present document defines Terminal Adaptation Functions (TAF) which are integrated in a Mobile Termination (MT) and which enable the use of synchronous bearer services in the PLMN and the attachment of ~~Synchronous~~ synchronous Terminals-terminals to an MT (see GSM 04.02 [3]). For the case where asynchronous terminals are attached to the TAF when using synchronous bearer services in the PLMN, the reader is referred to 3G TS 27.002 [36] for the asynchronous MT-TAF interface specifics and to the present document for synchronous bearer service specifics on the TAF-IWF interface. The general aspects of Terminal Adaptation Functions are contained in specification 3G TS 27.001 [9]. The present document covers support of synchronous data services (see 3G TS 22.002 [6]) for the following interfaces and procedures:

- V.22 [15]            DTE/DCE Interface;
- V.22 bis [16]        DTE/DCE Interface;
- V.26 ter [19]        DTE/DCE Interface;
- X.21 bis [24]        DTE/DCE Interface;
- X.32 [30]            Procedure;
- V.25 bis [18]        Procedure;

LAPB is the only synchronous non-transparent protocol which is considered in the present document.

NOTE: From GSM R99 onwards the following services are no longer required by a GSM PLMN:

- the dual Bearer Services "alternate speech/data" and "speech followed by data";
- the dedicated services for PAD and Packet access;
- BS 21 ... 26 and BS 31 ... 34.

The support of these services is still optional. The specification of these services is not within the scope of the present document. For that, the reader is referred to GSM Release 98.

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# 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.

- [1]            GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".
- [2]            GSM 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".
- [3]            GSM 04.02: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".
- [4]            GSM 04.21: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

- [5] GSM 08.20: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [6] 3G TS 22.002: "Circuit Bearer Services (BS) supported by Public Land Mobile Network (PLMN)".
- [7] 3G TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".
- [8] 3G TS 24.022: "Radio Link Protocol (RLP) for Circuit Switched Bearer and Teleservices".
- [9] 3G TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".
- [10] 3G TR 21.905: "3G Vocabulary".
- [11] ITU-T Recommendation I.420 (1998): "Basic user-network interface".
- [12] ITU-T Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic call control".
- [13] ITU-T Recommendation V.10: "Electrical characteristics for unbalanced double-current interchange circuits operating at data signalling rates nominally up to 100 kbit/s".
- [14] ITU-T Recommendation V.11: "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates nominally up to 10 Mbit/s".
- [15] ITU-T Recommendation V.22 (1988): "1200 bits per second duplex modem standardized for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".
- [16] ITU-T Recommendation V.22 bis (1988): "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".
- [17] ITU-T Recommendation V.24 (1996): "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".
- [18] ITU-T Recommendation V.25 bis (1996): "Synchronous and asynchronous automatic dialling procedures on switched networks".
- [19] ITU-T Recommendation V.26 ter (1988): "2400 bits per second duplex modem using the echo cancellation technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".
- [20] ITU-T Recommendation V.28 (1993): "Electrical characteristics for unbalanced double-current interchange circuits".
- [21] ITU-T Recommendation V.32 (1993): "A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use in the general switched telephone network and on leased telephone-type circuits".
- [22] ITU-T Recommendation V.110 (1996): "Support of data terminal equipments with V-Series interfaces by an integrated services digital network".
- [23] Void.
- [24] Void.
- [25] ITU-T Recommendation X.24 (1988): "List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) on public data networks".
- [26] ITU-T Recommendation X.26 (1993): "Electrical characteristics for unbalanced double-current interchange circuits operating at data signalling rates nominally up to 100 kbit/s".

- [27] ITU-T Recommendation X.27 (1996): "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".
- [28] Void.
- [29] Void.
- [30] ITU-T Recommendation X.32 (1996): "Interface between Data terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in packet mode and accessing a Packet-Switched Public Data Network through a public switched telephone network or an Integrated Services Digital Network or a Circuit-Switched Public Data Network".
- [31] ISO/IEC Recommendation 8885: "Information technology - Telecommunication and information exchange between systems - High-level data link control (HDLC) procedures - General purpose XID frame information field content and format".
- [32] ISO/IEC Recommendation 8886: "Information technology - Telecommunication and information exchange between systems - Data link service definitions for Open Systems interconnection".
- [33] Personal Computer Memory Card Association: "PCMCIA 2.1 or PC-Card 3.0 electrical specification or later revisions".
- [34] Infrared Data Association IrDA: "IrPHY Physical layer signalling standard".
- [35] 3G TR 23.910: "Circuit Switched Data Bearer Services".
- [36] 3G TS 27.002: "Terminal adaptation functions (TAF) for services using asynchronous bearer capabilities".

## 3.2 Terminal Adaptation Function

The TAF is functionally part of an MT0, MT1 or MT2 (see GSM 04.02 [3]). The terminal adaptation provides facilities to allow manual or automatic call control functions associated with circuit switched data services, in case of ITU-T V series interfaces. The following functions are included:

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.~~

- conversion of electrical, mechanical, functional and procedural characteristics of the ITU-T V-series, type interfaces to those required by a PLMN;
- bit rate adaptation of ITU-T V-series and ITU-T X-series data signalling rates and the ISDN 64 kbit/s to that provided in the GSM PLMN;
- the mapping of ITU-T V.25 bis [18] AUTO CALL/AUTO ANSWER procedures to the PLMN Layer 3 signalling;
- the mapping functions necessary to convert ITU-T S-interface signalling to PLMN Layer 3 signalling;
- synchronization procedure, which means the task of synchronizing the entry to and the exit from the data transfer phase between two subscriber terminals. This is described in the specification 3G TS 27.001 [9];
- filtering of channel control information. This is described in the specification 3G TS 27.001 [9];
- compatibility checking (see 3G TS 27.001 [9]);
- layer 2 relaying (see annex 1);
- flow control;
- in Call Modification function (see clause 4);
- splitting and combining of the data flow in case of multi substream data configurations.

### 4.3.1.3 ITU-T V.25 bis [18] auto call/auto answer

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.~~

The mapping of the ITU-T V.25 bis [18] procedures to the messages of the PLMN Layer 3 signalling (3G TS 24.008 [7]) is defined in clause 4.

#### Auto Call:

This procedure is provided according to ITU-T V.25 bis [18] using only circuit 108/2. A subset of ITU-T V.25 bis [18] is shown in table 4. This subset gives minimum level of control and indication.

During the call establishment phase, i.e. after signalling, call tone according to ITU-T V.25 bis [18] shall be generated in the IWF, where appropriate.

#### Auto Answer:

This procedure is provided according to ITU-T V.25 bis [18].

**Table 4: Minimum set of ITU-T V.25 bis [18] Call Set-up Commands and Indications**

	Description	IA5Characters
Commands from TE2	Call Request with Number provided 0,1..9,*,#,A,B,C,D	CRN
	Disregard Incoming Call	DIC
	Connect Incoming Call	CIC
Indications to TE2	Call Failure Indication XX = CB,AB,NT,FC (Note)	CFI XX
	INcoming Call	INC
	VALid	VAL
	INValid	INV

NOTE to table 4:   CB = Local MT busy  
                       AB = Abort call  
                       NT = No answer  
                       FC = Forbidden call (\*)

(\*) Forbidden call indication results from contravention of rules for repeat call attempts as defined by the appropriate national approvals administration. It is recommended that this is the responsibility of the MT, not the TE2.

## 6 V-series interface procedures to 3G TS 24.008 [7] mapping

*Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.*

Interface procedures not directly mappable to 3G TS 24.008 [7] (ie. ITU-T V.25 bis [18] VAL/INV) are not considered. Mobile management procedures of 3G TS 24.008 [7] are not considered applicable.

Mapping of other call establishment or clearing messages to the S interface e.g. "Call proceeding", etc. have not been included. It is assumed that these may be mapped directly and thus are of no relevance to the ITU-T V.25 bis [18] or manual interface.

### 6.1 Mobile Originated calls

#### a) SET-UP.

Element	Derived from		
	MMI	ITU-T V.25 bis [18] message	ITU-T S interface message
Called Address Called Sub Address	Keypad Keypad	CRN/CRI/CRS CRI	Setup Setup
HLC LLC BC	Derived from internal settings or MMI information. Same as HLC Same as HSC 3G TS 27.001 [9] gives allowed values		Setup Setup Setup (with additional information from MMI oriented settings)

#### b) RELEASE COMPLETE.

Element	Derived from		
	MMI	ITU-T V.25 bis [18] message	ITU-T S interface message
Cause	Display (optional)	CFI	Release complete

### 6.2 Mobile Terminated calls

Call establishment is initiated by receipt of Setup at the MS:

#### a) SET-UP.

Element	Mapped on to		
	MMI	ITU-T V.25 bis [18] message	ITU-T S interface message
Called Address Called Sub Address	Display (optional) Display (optional)	INC Not applicable	Set-up Set-up
HLC LLC BC	Display (optional) Display (optional) Display (optional)	Not applicable Not applicable Not applicable	Set-up Set-up Set-up (with PLMN specific elements removed)

#### b) CALL CONFIRM.

Information for the BC element in the call confirm is derived from e.g. MMI or by internal settings.

c) CONNECT.

Connect is sent in response to ~~connect from the S-interface~~, CIC from ITU-T V.25 bis [18] or in response from MMI.



## CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

**27.002 CR 041**

Current Version: **3.4.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **CN#9**  
list expected approval meeting # here ↑

for approval   
for information

strategic   
non-strategic  (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <http://ftp.3gpp.org/Information/CR-Form-v2.doc>

**Proposed change affects:** (U)SIM  ME  UTRAN / Radio  Core Network   
(at least one should be marked with an X)

**Source:** TSG\_N3 **Date:** 2000-08-17

**Subject:** Modification from V.25bis to V.250

**Work item:** TEI

**Category:** F Correction   
A Corresponds to a correction in an earlier release   
B Addition of feature   
C Functional modification of feature   
D Editorial modification   
(only one category shall be marked with an X)

**Release:** Phase 2   
Release 96   
Release 97   
Release 98   
Release 99   
Release 00

**Reason for change:** V.25bis is outdated. References to V.25bis procedures are replaced by corresponding procedures based on V.250 and 3G TS 27.007. Some S-interface remnants are also removed.

**Clauses affected:**

**Other specs affected:** Other 3G core specifications  → List of CRs: 27.001 CR??, 27.003 CR??  
Other GSM core specifications  → List of CRs:  
MS test specifications  → List of CRs:  
BSS test specifications  → List of CRs:  
O&M specifications  → List of CRs:

**Other comments:**



help.doc

<----- double-click here for help and instructions on how to create a CR.

# 1 Scope

The present document defines the interfaces and Terminal Adaptation Functions (TAF) integral to a Mobile Termination (MT) which enables the use of asynchronous bearer services in the PLMN and the attachment of asynchronous terminals to a MT (see GSM 04.02 [3] and 3G TS 23.101 [6]).

The general aspects of Terminal Adaptation Functions are contained in 3G TS 27.001 [10].

The present document covers support of these services for the following interfaces and procedures:

- (i) ITU-T V.14 [16] procedures.
- (ii) ITU-T V.21 [17] DTE/DCE interface.
- (iii) ITU-T V.22bis [18] DTE/DCE interface.
- (iv) ITU-T V.32 [24] DTE/DCE procedures.
- (v) ITU-T I.420 [14] S interface.
- ~~(vi) ITU-T V.25 bis [21] signalling procedures.~~
- (vi) ITU-T V.250 [22] signalling procedures.

The asynchronous data rates between the MT and the ~~TE2-IWF~~ are defined in 3G TS 22.002 [5].

NOTE: From GSM R99 onwards the following services are no longer required a GSM PLMN:

- the dual Bearer Services "alternate speech/data" and "speech followed by data";
- the dedicated services for PAD and Packet access;
- the BS 21 ... 26 and BS 31 ... 34.

The support of these services is still optional. The specification of these services is not within the scope of the present document. For that, the reader is referred to GSM Release 98.

## 1.1 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.
- [1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".
  - [2] GSM 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".
  - [3] GSM 04.02: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".
  - [4] GSM 04.21: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".
  - [5] 3G TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".
  - [6] 3G TS 23.101: "General UMTS Architecture".
  - [7] 3G TR 23.910: "Circuit Switched Data Bearer Services".

- [8] 3G TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".
- [9] 3G TS 24.022: "Radio Link Protocol (RLP) for Circuit Switched Bearer and Teleservices".
- [10] 3G TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".
- [11] 3G TS 27.007: "AT command set for 3G User Equipment (UE)".
- [12] 3G TR 21.905: "3G Vocabulary".
- [13] 3G TS 29.007: "General requirements on Interworking between the PLMN and the ISDN or PSTN".
- [14] ITU-T Recommendation I.420 (1998): "Basic user-network interface".
- [15] ITU-T Recommendation V.4 (1988): "General structure of signals of international alphabet No.5 code for character oriented data transmission over public telephone networks".
- [16] ITU-T Recommendation V.14 (1993): "Transmission of start-stop characters over synchronous bearer channels".
- [17] ITU-T Recommendation V.21 (1988): "300 bits per second duplex modem standardized for use in the general switched telephone network".
- [18] ITU-T Recommendation V.22bis (1988): "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".
- [19] ITU-T Recommendation V.24 (1996): "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".
- [20] ITU-T Recommendation V.25 (1996): "Automatic answering equipment and general procedures for automatic calling equipment on the general switched telephone network including procedures for disabling of echo control devices for both manually and automatically established calls".
- [21] ~~Void. ITU-T Recommendation V.25 bis (1996): "Synchronous and asynchronous automatic dialling procedures on switched networks"~~.
- [22] ITU-T Recommendation V.250: "Serial asynchronous automatic dialling and control".
- [23] ITU-T Recommendation V.28 (1993): "Electrical characteristics for unbalanced double-current interchange circuits".
- [24] ITU-T Recommendation V.32 (1993): "A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use in the general switched telephone network and on leased telephone-type circuits".
- [25] ITU-T Recommendation V.42 (1996): "Error-correcting procedures for DCEs using asynchronous-to-synchronous conversion".
- [26] ITU-T Recommendation V.42 bis (1990): "Data compression procedures for data circuit-terminating equipment (DCE) using error correction procedures".
- [27] ITU-T Recommendation V.110 (1996): "Support of data terminal equipments with V-Series interfaces by an integrated services digital network".
- [28] ITU-T Recommendation X.28 (1997): "DTE/DCE interface for a start-stop mode Data Terminal Equipment accessing the Packet Assembly/Disassembly facility (PAD) in a public data network situated in the same country".
- [29] Personal Computer Memory Card Association: "PCMCIA 2.1 or PC-Card 3.0 electrical specification or later revisions".

- [30] Infrared Data Association IrDA "IrPHY Physical layer signalling standard".
- [31] ISO 2110: "Data communication - 25-pole DTE/DCE interface connector and contact number assignments".
- [32] ITU-T Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic call control".

## 2.2 Terminal Adaptation Function (TAF)

*Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G-TS 27.007.*

The TAF provides facilities to allow manual or automatic call control functions associated with circuit switched services. The following functions are also included:

- Conversion of electrical, mechanical, functional and procedural characteristics of the ITU-T V series and ISDN type interfaces to those required by the PLMN.
- Bit rate adaptation of the ITU-T V series data signalling rates and the ISDN 64 kbit/s to that provided in the PLMN.
- The mapping functions necessary to convert automatic calling and/or automatic answering procedures of ~~the ITU-T recommendations V.25 bis [21]~~ or V.250 [22] and parameters for asynchronous operation.
- The mapping functions necessary to convert S interface signalling to the PLMN Dm channel signalling.
- Flow control (in some cases resulting in non-transparency of data as described in 4.3).
- Layer 2 Relaying (see annex A).
- In-call modification function.
- Synchronization procedure, which means the task of synchronizing the entry to and the exit from the data transfer phase between two user terminals. This is described in 3G TS 27.001 [10].
- Filtering of channel control information as described in 3G TS 27.001 [10].
- Terminal compatibility checking.
- Splitting and combining of the data flow in case of multiple substream data configurations.

### 3.4.1 V-series interface Autocalling/answering

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures defined in V.250 and 3G TS 27.007.~~

- ~~- These procedures are provided according to ITU-T Recommendation V.250 [22] and 3G TS 27.007 [11].~~
- ~~- For autocalling, during the call establishment phase, i.e. after signalling, calling tone according to ITU-T Recommendation V.25 [20] shall be generated in the IWF (3G TS 29.007 [13]).~~

~~The mapping of the ITU-T Recommendation V.25 bis [21] procedures to the messages of the PLMN signalling in 3G TS 24.008 [8] is defined in clause 5.~~

~~a) Auto Calling:~~

- ~~— This procedure is provided according to ITU-T Recommendation V.25 bis [21] using only 108/2.~~
- ~~— A subset of ITU-T Recommendation V.25 bis [21] is shown in table 3. This subset gives minimum level of control and indication.~~
- ~~— During the call establishment phase, i.e. after signalling, calling tone according to ITU-T Recommendation V.25 [20] shall be generated in the IWF (3G TS 29.007 [13]).~~
- ~~— An alternative to ITU-T Recommendation V.25 bis [21] is to use the ITU-T Recommendation V.250 [22] dial command as specified in 3G TS 27.007 [11].~~

~~b) Auto Answer:~~

- ~~— This procedure is provided according to ITU-T Recommendation V.25 bis [21] or to ITU-T Recommendation V.250 [22].~~

~~During the call establishment phase:~~

- ~~- the states of the ITU-T Recommendation V.24 [19] interchange circuits shall be according to 3G TS 27.001 [10];~~
- ~~- the data and status bits from the IWF shall not be mapped;~~
- ~~- the data and status bits towards the IWF shall be according to 3G TS 27.001 [10].~~

### 3.4.4 V-series interface Call Clearing

~~Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures defined in V.250 and 3G TS 27.007.~~

~~This procedure is provided according to ITU-T Recommendation V.250 [22] and 3G TS 27.007 [11].~~

~~This procedure is provided according to ITU-T V.25 bis [21] using CT-108/2. An alternative to ITU-T Recommendation V.25 bis [21] is to use the ITU-T Recommendation V.250 [22] hook control command or the hangup commands specified in 3G TS 27.007 [11]. The mapping of the ITU-T Recommendation V.25 bis [21] procedures to the messages of the PLMN signalling in 3G TS 24.008 [8] is defined in clause 5.~~

During the call clearing phase:

- the states of the ITU-T Recommendation V.24 [19] interchange circuits shall be according to ITU-T Recommendation V.24 [19];
- the data and status bits from the IWF shall not be mapped or used by the MT in any way;
- the data and status bits towards the IWF have no significance and may be set to 1 and OFF respectively.

## 4.5 Bit Transparency

~~Void. The ITU-T V.25 bis [21] indications generated by the TAF shall be even parity, even if the parity condition for the user's application is different.~~



## 4.7 Data Compression

L2R optionally includes a data compression function according to ITU-T V.42bis [26] that spans from the MS to the IWF in the MSC. The error correction function is provided by RLP instead of ITU-T Recommendation V.42 [25]. RLP XID is used to negotiate compression parameters. L2R includes the ITU-T V.42bis [26] control function especially for reinitializing in case of break recognition or RLP reset and error indication by the data compression function respectively.

**Table 3: Minimum set of Interchange Circuits**

Circuit Number	Circuit Name	Ground	Data		Control	
			To TE2	From TE2	To TE2	From TE2
CT102	Common return	x				
CT103	Transmitted data			x		
CT104	Received data return		x			
CT105	Request to send (note 2)					x
CT106	Ready for sending				x	
CT107	Data set ready				x	
CT108/2	Data terminal ready					x
CT109	Data channel received line signal detector				x	
CT125	Calling indicator (note 1)				x	
CT133	Ready for Receiving (note 2)					x

NOTE 1: CT125 is used with the automatic answering function of the TAF.

NOTE 2: CT105 and CT133 are assigned to the same connector pin on both the standard 25 pin connector (ISO 2110) and the commonly used 9 pin connector (annex B). When this pin is used for CT133 then on the DCE (MT) side of the interface CT 105 is treated as being always in the ON condition. Similarly, when this pin is being used for CT105 then on the DCE (MT) side of the interface CT 133 is treated as being always in the ON condition. As circuit 133 is used only in duplex operation and circuit 105 is used only in half duplex operation (which is not supported by GSM or UMTS) there should be no conflict.

**Table 4: Minimum Set of Call Set-up Commands and Indications**

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures defined in V.250 and 3G TS 27.007.

	Description	IA5 Characters
Commands from TE2	<u>C</u> all <u>R</u> equest with <u>N</u> umber provided 0,1..9,*,#,A,B,C,D	CRN
	<u>C</u> onnect <u>I</u> ncoming <u>C</u> all	CIG
	<u>D</u> isregard <u>I</u> ncoming <u>C</u> all	DIC
Indications to TE2	<u>C</u> all <u>F</u> ailure <u>I</u> ndication XX = CB,AB,NT,FC (Note)	CFI-XX
	<u>I</u> ncoming <u>C</u> all	INC
	<u>V</u> ALid	VAL
	<u>I</u> NValid	INV

NOTE: ~~CB = Local MT busy.~~  
~~AB = Abort call.~~  
~~NT = No answer.~~  
~~FC = Forbidden call.\*~~

\* ~~Forbidden call indication results from contravention of rules for repeat call attempts as defined by the appropriate national approvals administration. It is recommended that this is the responsibility of the MT, not the TE2.~~

## 5 Terminal interfacing to 3G TS 24.008 [8] Mapping

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.

Only those elements/messages that are of particular relevance are considered.

Interface procedures not directly mappable to 3G TS 24.008 [8] (i.e. ~~ITU-T Recommendation V.25 bis [21] VAL/INV~~) are not considered. Mobile management procedures of 3G TS 24.008 [8] are not considered applicable.

Mapping of other call establishment or clearing messages to the S interface e.g. "Call proceeding" etc. has not been included. It is assumed these can be mapped directly and as such are of no relevance to the ~~ITU-T Recommendation V.25 bis [21] or~~ manual interfaces.

For the Alternate speech/group 3 facsimile service the TAF shall be able to generate a "Modify" message according to the defined procedure in 3G TS 24.008 [8].

### 5.1 Mobile Originated Calls

Call establishment is initiated by the keypad or DTE action:

a) Setup

Element	Derived from		
	MMI	ITU-T V.25 bis message [21]	S interface message
Called Address	Keypad	-CRN/CRI/CRS	-Setup
Called Sub Address	Keypad	CRI	-Setup
HLC	Derived from internal settings or MMI information.		Setup
LLC	Same as HLC		Setup
BC	Same as HLC 3G TS 27.001 [10] gives Allowed values		-Setup (with additional information from MMI originated settings)

b) Release Complete

Element	Derived from		
	MMI	ITU-T V.25 bis [21] message	S interface message
Cause	Display (optional)	-CFI	-Release-Complete

## 5.2 Mobile Terminated Calls

Call establishment is initiated by receipt of Setup at the MS:

a) Setup

Element	Mapped on to		
	MMI	ITU-T V.25 bis [21] message	S interface message
Called Address	Display (optional)	-INC	-Setup
Called Sub Address	Display (optional)	-Not applicable	-Setup
HLC	Display (optional)	-Not applicable	-Setup
LLC	Display (optional)	-Not applicable	-Setup
BC	Display (optional)	-Not applicable	-Setup (with PLMN specific elements removed)

b) Call Confirm

Information for the BC element in the call confirm shall be derived from e.g. MMI or by internal settings.

c) Connect

Connect is sent in response to connect from the S interface, from MMI, or when the timeout period referred to in ITU-T Recommendation V.25 bis [21] has expired. This period shall be between 5 and 10 seconds. During this time the automatic answering of the incoming call may be prevented by issuing a DIC command. The CIC can be used to cancel the effect of a preceding DIC command (see ITU-T Recommendation V.25 bis [21]).

Connect is sent in response to connect from MMI.

## 5.3 Call Clearing

### 5.3.1 Mobile initiated

Call clearing is initiated by the keypad or DTE action:

Disconnect

Element	Derived from		
	MMI	ITU-T V.250 [22] bis [21]	S interface message
Cause	Keypad	DTE shall turn CT 108/2 OFF See section 3.4.4	Disconnect or inband ITU-T V.110 [27] disconnect request

### 5.3.2 Network initiated

Call clearing is initiated by receipt of Disconnect at the MS:

Disconnect

Element	Mapped on to		
	MMI	ITU-T V.250 [22] bis [21]	S interface message
Cause	Display (optional)	MS shall turn CT 107 OFF Unsolicited result codes	Disconnect