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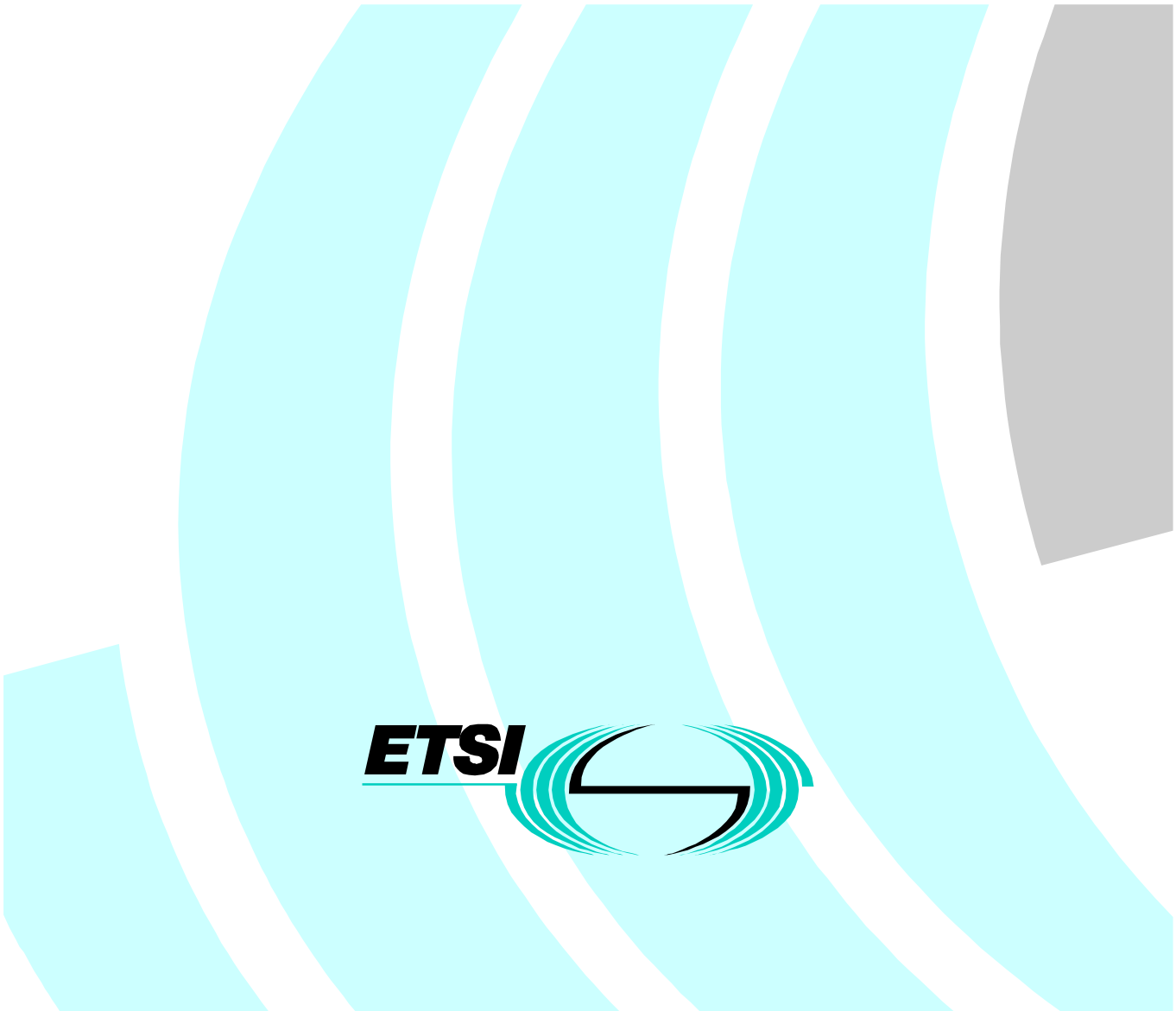
Technical Specification

GEO-Mobile Radio Interface Specifications;
Part 3: Network specifications;
Sub-part 13: Technical realization of group 3 facsimile using transparent mode of transmission;
GMR-1 03.045



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IPRs:

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TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,226,084	US
TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,715,365	US
TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,826,222	US
TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,754,974	US
TS 101 376 V1.1.1	Digital Voice Systems Inc		US	US 5,701,390	US

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 376 V1.1.1	Ericsson Mobile Communication	Improvements in, or in relation to, equalisers	GB	GB 2 215 567	GB
TS 101 376 V1.1.1	Ericsson Mobile Communication	Power Booster	GB	GB 2 251 768	GB
TS 101 376 V1.1.1	Ericsson Mobile Communication	Receiver Gain	GB	GB 2 233 846	GB
TS 101 376 V1.1.1	Ericsson Mobile Communication	Transmitter Power Control for Radio Telephone System	GB	GB 2 233 517	GB

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 376 V1.1.1	Hughes Network Systems		US	Pending	US

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 376 V1.1.1	Lockheed Martin Global Telecommunic. Inc	2.4-to-3 KBPS Rate Adaptation Apparatus for Use in Narrowband Data and Facsimile Communication Systems	US	US 6,108,348	US
TS 101 376 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Cellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic ThroughputCellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic Throughput	US	US 5,717,686	US
TS 101 376 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Enhanced Access Burst for Random Access Channels in TDMA Mobile Satellite System	US	US 5,875,182	
TS 101 376 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,314	US
TS 101 376 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,315	US
TS 101 376 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System with Mutual Offset High-argin Forward Control Signals	US	US 6,072,985	US
TS 101 376 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System with Spot Beam Pairing for Reduced Updates	US	US 6,118,998	US

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The contents of the present document are subject to continuing work within TC-SES and may change following formal TC-SES approval. Should TC-SES modify the contents of the present document it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 1.m.n

where:

- the third digit (n) is incremented when editorial only changes have been incorporated in the specification;
- the second digit (m) is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

The present document is part 3, sub-part 13 of a multi-part deliverable covering the GEO-Mobile Radio Interface Specifications, as identified below:

Part 1: "General specifications";

Part 2: "Service specifications";

Part 3: "Network specifications";

Sub-part 1: "Network Functions; GMR-1.001";

Sub-part 2: "Network Architecture; GMR-1 03.002";

Sub-part 3: "Numbering, Addressing and identification; GMR-1 03.003";

Sub-part 4: "Organization of Subscriber Data; GMR-1 03.008";

Sub-part 5: "Technical realization of Supplementary Services; GMR-1 03.011";

Sub-part 6: "Location Registration and Position Identification Procedures; GMR-1 03.012";

Sub-part 7: "Discontinuous Reception (DRX); GMR-1 03.013";

Sub-part 8: "Support of Dual-Tone Multifrequency Signalling (DTMF); GMR-1 03.014";

Sub-part 9: "Security related Network Functions; GMR-1 03.020";

Sub-part 10: "Functions related to Mobile Earth station (MES) in idle mode; GMR-1 03.022";

Sub-part 11: "Technical realization of the Short Message Service (SMS) Point-to-Point (PP); GMR-1 03.040";

Sub-part 12: "Technical realization of the Short Message Service Cell Broadcast (SMSCB); GMR-1 03.041";

Sub-part 13: "Technical realization of group 3 facsimile using transparent mode of transmission; GMR-1 03.045";

Sub-part 14: Transmission Planning Aspects of the Speech Service in the GMR-1 system; GMR-1 03.050";

Sub-part 15: "Line Identification supplementary service - Stage 2; GMR-1 03.081";

Sub-part 16: "Call Barring (CB) supplementary services - Stage 2; GMR-1 03.088";

Sub-part 17: "Unstructured Supplementary Service Data (USSD) - Stage 2; GMR-1 03.290";

Sub-part 18: "Terminal-to-Terminal Call (TtT); GMR-1 03.296";

Sub-part 19: "Optimal Routing technical realization; GMR-1 03.297";

Sub-part 20: "Technical realization of High-Penetration Alerting; GMR-1 03.298";

Sub-part 21: "Position Reporting services; Stage 2 Service description; GMR-1 03.299";

Part 4: "Radio interface protocol specifications";

Part 5: "Radio interface physical layer specifications";

Part 6: "Speech coding specifications";

Part 7: "Terminal adaptor specifications".

Introduction

GMR stands for GEO (Geostationary Earth Orbit) Mobile Radio interface, which is used for mobile satellite services (MSS) utilizing geostationary satellite(s). GMR is derived from the terrestrial digital cellular standard GSM and supports access to GSM core networks.

Due to the differences between terrestrial and satellite channels, some modifications to the GSM standard are necessary. Some GSM specifications are directly applicable, whereas others are applicable with modifications. Similarly, some GSM specifications do not apply, while some GMR specifications have no corresponding GSM specification.

Since GMR is derived from GSM, the organization of the GMR specifications closely follows that of GSM. The GMR numbers have been designed to correspond to the GSM numbering system. All GMR specifications are allocated a unique GMR number as follows:

GMR-n xx.zyy

where:

- xx.0yy (z = 0) is used for GMR specifications that have a corresponding GSM specification. In this case, the numbers xx and yy correspond to the GSM numbering scheme.
- xx.2yy (z = 2) is used for GMR specifications that do not correspond to a GSM specification. In this case, only the number xx corresponds to the GSM numbering scheme and the number yy is allocated by GMR.
- N denotes the first (n = 1) or second (n = 2) family of GMR specifications.

A GMR system is defined by the combination of a family of GMR specifications and GSM specifications as follows:

- If a GMR specification exists it takes precedence over the corresponding GSM specification (if any). This precedence rule applies to any references in the corresponding GSM specifications.

NOTE: Any references to GSM specifications within the GMR specifications are not subject to this precedence rule. For example, a GMR specification may contain specific references to the corresponding GSM specification.

- If a GMR specification does not exist, the corresponding GSM specification may or may not apply. The applicability of the GSM specifications is defined in GMR-1 01.201 [2].

1 Scope

The present document deals with the procedures allowing the technical realization of the Group 3 facsimile service within the GMR-1 Mobile Satellite System using transparent network support, according to the definition of Teleservice 61 and 62 specified in GSM 02.03 [4].

The present document is based on GSM 03.45 [5].

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] GMR-1 01.004 (ETSI TS 101 376-1-1): "GEO-Mobile Radio Interface Specifications; Part 1: General specifications; Sub-part 1: Abbreviations and acronyms; GMR-1 01.004".

[2] GMR-1 01.201 (ETSI TS 101 376-1-2): "GEO-Mobile Radio Interface Specifications; Part 1: General specifications; Sub-part 2: Introduction to the GMR-1 Family; GMR-1 01.201".

[3] GMR-1 07.003 (ETSI TS 101 376-7-3): "GEO-Mobile Radio Interface Specifications; Part 7: Terminal adaptor specifications; Sub-part 3: Terminal Adaptation Functions (TAF) for Services Using Synchronous Bearer Capacities; GMR-1 07.003".

[4] GSM 02.03 (ETSI ETS 300 502): "European digital cellular telecommunications system (Phase 2); Teleservices supported by a GSM Public Land Mobile Network (PLMN) (GSM 02.03 V4.3.1)".

[5] GSM 03.45 (ETSI ETS 300 538): "European digital cellular telecommunications system (Phase 2); Technical realization of facsimile group 3 transparent (GSM 03.45 V4.5.0)".

[6] GSM 03.46 (ETSI ETS 300 539): "European digital cellular telecommunications system (Phase 2); Technical realization of facsimile group 3 non-transparent (GSM 03.46 V4.1.2)".

[7] ITU-T Recommendation T.4 (Fascicle VII.3): "Standardization of Group 3 facsimile terminals for document transmission".

[8] ITU-T Recommendation T.30 (Fascicle VII.3): "Procedures for document facsimile transmission in the general switched telephone network".

[9] ITU-T Recommendation V.24 (Fascicle VIII.1): "List of Definitions for Interchange Circuits Between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE)".

[10] ITU-T Recommendation V.25 bis: "Synchronous and asynchronous automatic dialling procedures on switched networks".

[11] ITU-T Recommendation V.25 ter: "Serial asynchronous automatic dialling and control".

[12] ITU-T Recommendation V.110: "Support by an ISDN of data terminal equipments with V-series type interfaces".

[13] ITU-T Recommendation G.763: "Digital circuit multiplication equipment using G.726 ADPCM and digital speech interpolation".

[14] ITU-T Recommendation G.766: "Facsimile demodulation/remodulation for digital circuit multiplication equipment".

3 Abbreviations

For the purposes of the present document, the abbreviations given in GMR-1 01.004 [1] and the following apply.

MES	Mobile Earth Station
BCS	Binary Coded Signalling phase of facsimile transmission per ITU-T Recommendation T.30 [8]
CT105	Interchange circuit 105 per ITU-T Recommendation V.24 [9]
CT106	Interchange circuit 106 per ITU-T Recommendation V.24 [9]
CT107	Interchange circuit 107 per ITU-T Recommendation V.24 [9]
CT108.2	Interchange circuit 108/2 per ITU-T Recommendation V.24 [9]
CT109	Interchange circuit 109 per ITU-T Recommendation V.24 [9]
CT114	Interchange circuit 114 per ITU-T Recommendation V.24 [9]
CT115	Interchange circuit 115 per ITU-T Recommendation V.24 [9]
FA/MES	The Fax Adaptor specifically located on the MES side
FA/IWF	The Fax Adaptor specifically located on the IWF side
MSG	Message phase of facsimile transmission as per ITU-T Recommendation T.30 [8]

All protocol entities from ITU-T facsimile Recommendations (T.4 [7] and T.30 [8]) apply; in the present document they are referenced in the same way as in the above ITU-T recommendations. See also annex I of GSM 03.45 [5].

4 Service definition

Same as clause 1 of GSM 03.45 [5].

5 Network architecture

The network architecture applicable to this teleservice is shown in figure 5.1.

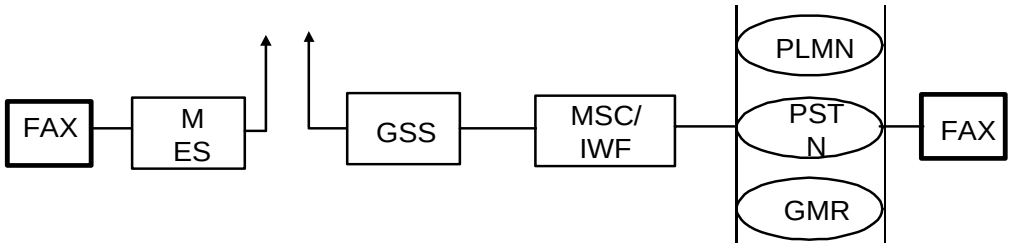

Figure 5.1: Network architecture

For mobile-to-mobile calls there would effectively be a loopback within the GMR-1 System, using two IWFs.

6 Reference configuration at the mobile station

The following mobile reference configurations are possible in the GMR-1 system.

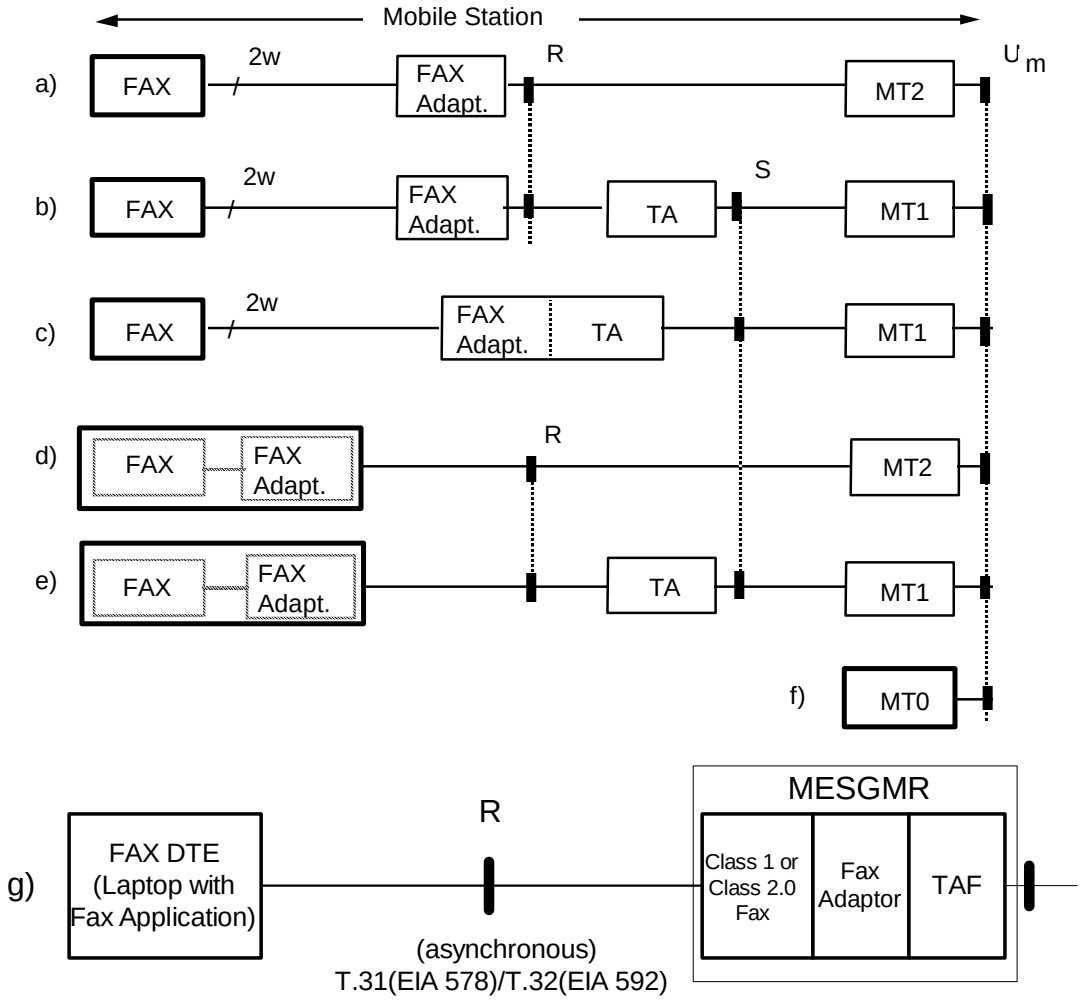

Figure 6.1: Reference configurations

The Teleservice definition in GSM 02.03 [4] regards the group 3 facsimile terminal as two-wire analog-terminated equipment. In order to connect this to the MT2, a separate "fax adaptor" device is necessary. This configuration, shown in part a) of figure 6.1 must be considered the standard analog configuration, so that all the existing Group 3 facsimile apparatus can be connected to the GMR-1 system. The fax adapter in part a) of figure 6.1 could also be part of a docking adapter kit that can be used for fixed and vehicular types of mobile earth stations.

One alternative realization would be to combine a standard group 3 facsimile machine and the fax adaptor into a specially developed "Digital facsimile machine", directly providing a digital output. Although such a device appears to the MT2 as identical to the fax adaptor (i.e., it has an identical interface and protocol), it would allow for a significantly smaller and simpler facsimile machine. This configuration is shown in part d) of figure 6.1.

Another alternative is to integrate the fax adaptor into the handset, thereby essentially having the synchronous R (ITU-T Recommendation V.24 [9]) interface shown in part a) of figure 6.1 inside the handset, to provide readily available asynchronous serial interfaces as an external interface to communicate with laptop computers and/or desktop PCs running fax applications. Such an integration into the handset is possible because of significant advances in integrated circuit technology and the increased proliferation of Class 1 and Class 2.0 fax implementations. This is illustrated in part g) of figure 6.1, where the mobile terminal with an integrated fax adaptor is denoted by MESGMR-1.

In addition, it is always possible to realize an MT0, as in part f) of figure 6.1, where both the facsimile and mobile termination functions are considered to be part of one integrated unit.

The remaining configurations concern the use of an S interface and are considered optional configurations. Their use is a subject for further study.

The particular terminal adaptation functions used are those detailed in GMR-1 07.003 [3] with an option for support of ITU-T Recommendation V.25 bis [10] or ITU-T Recommendation V.25 ter [11] procedures for autocalling and autoanswering.

6.1 Fax adaptor functionality

Same as clause 3.1 of GSM 03.45 [5].

6.2 "Digital" facsimile machine functionality

The special "digital" facsimile machine shown in the configuration of part d) of figure 6.1 has a similar functionality to the digital part of the fax adaptor, but without any of the analog portions. Such a fax-machine/fax-adaptor combination configuration typically represents a laptop computer or a desktop PC with fax application software and the fax adaptor implemented either as an internal plug-in card or as an external PCMCIA attachment. Alternatively, the digital fax machine could simply be fax application software in conjunction with fax adaptor software, implemented natively on a laptop or desktop PC with no added hardware.

It appears over the ITU-T Recommendation V.24 [9] interface as identical to the fax adaptor, i.e., the MT2 does not require knowledge of the particular configuration used. When necessary, this reference configuration will be explicitly referenced in the following; otherwise all technical aspects relevant to the configuration implicitly apply.

7 Connection types

Same as clause 4 of GSM 03.45 [5].

7.1 Information transfer protocol model

Same as clause 4.1 of GSM 03.45 [5].

7.2 Interactions with ITU-T Recommendation T.30

The philosophy of the present document is to allow the ITU-T Recommendation T.30 [8] protocol to pass transparently wherever possible through the fax adaptors at both ends of the GMR-1 channel. Manipulations are only made to the protocol where necessary to overcome problems resulting from the differences between the PSTN and the GMR-1 system. Basically, these problems fall into five categories:

- Supporting facsimile on a digital connection type.
- Bit errors during transfer of BCS frames.
- The need to change speed to reduce the impact of bit errors during transfer of fax-encoded messages.
- Inability to support some features of ITU-T Recommendation T.30 [8].

The need to avoid signal collision on the two-wire link due to long propagation delay.

7.2.1 Link control strategy

Same as clause 4.2.1 of GSM 03.45 [5].

7.2.1.1 Message detection

Same as clause 4.2.1.1 of GSM 03.45 [5].

7.2.2 Speed conversion for BCS phases

Given the signalling load caused by the channel mode modify procedure, a speed conversion mechanism is exploited at both the system ends, rather than changing the radio channel speed to 300 bps to carry the BCS frames. This allows maintenance of the channel rate of the message phase (9 600 bps or 4 800 bps or 2 400 bps) during BCS phases.

A speed conversion factor can be defined as:

$$\frac{\text{Fax Message speed (9 600 bps or 4 800 bps or 2 400 bps)}}{\text{Standard BCS speed (300 bps)}}$$

which will assume the value 8 or 16 or 32, depending on the actual message speed negotiated between the terminals.

On the basis of the above speed conversion factor, speed will be performed according to the repetition algorithm specified in the originating FA upconversion to message.

In the terminating FA, downconversion to the BCS speed will require a decimation algorithm; this algorithm is assumed to be implementation dependent, so its actual definition is beyond the scope of the present document.

As the actual access rate over the TCH may change throughout the call, the speed conversion factor needs to be updated in both Fas.

The FA/IWF will update this value upon successful completion of a CMM procedure.

The FA/MES which does not have direct access to the signalling channel (except for MT0 and MESGMR-1 configurations), will estimate the actual access rate established over the TCH from the effective access rate of the MES data interface (or by any other means in case of MT0); this check will be performed whenever a BCS frame is sent toward the radio path, after which a change for TCH access rate may be expected (e.g., DIS and DCS frames for normal fax mode, PPR and CTC frames for error correction mode).

7.2.3 Compatibility checking

Same as clause 4.2.3 of GSM 03.45 [5].

7.2.3.1 Group 1 and Group 2 support

Same as clause 4.2.3.1 of GSM 03.45 [5].

7.2.3.2 2 400 bps handshaking

Same as clause 4.2.3.2 of GSM 03.45 [5].

7.2.3.3 Nonstandard facilities

Same as clause 4.2.3.3 of GSM 03.45 [5].

7.2.3.4 7 200 bps facsimile document transfer

Same as clause 4.2.3.4 of GSM 03.45 [5].

7.2.3.5 Procedure interrupts

Same as clause 4.2.3.5 of GSM 03.45 [5].

7.2.4 Speed checking

Same as clause 4.2.4 of GSM 03.45 [5].

7.3 Radio channel modification procedures

Same as clause 4.3 of GSM 03.45 [5].

7.3.1 In-Call modification (ICM)

Same as clause 4.3 1 of GSM 03.45 [5].

7.3.2 Channel Mode Modify (CMM)

The channel mode modification procedure is initiated only by the FA/IWF. Its purpose is to adjust the radio channel bit rate to match the message speed negotiated end-to-end between the facsimile machines. On the receipt of a CMM procedure, all subsystems, including the GSS and MES, will appropriately change the channel coding to provide more robust performance. Such an increase in robustness is achieved when the two end facsimile machines fall back in user rates and the satellite resources available at call establishment are not released.

The FA/IWF enters the CMM routine when it detects the DCS frame sent from either the MES or the PSTN.

In the first case, when FA/IWF is the receiving side in the facsimile document transmission, the CMM procedure is executed as soon as the end of the frame is detected.

Specifically, FA/IWF monitors the DCS frame and, if the requested rate differs from the existing radio channel rate, performs the following actions:

- waits for the acknowledgement of CMM completed;
- returns to the usual information-passing process.

In the second case, when FA/IWF is the transmitting side in the facsimile document transmission, the CMM procedure is executed after a suitable delay assumed to be for transferring the DCS frame across the radio channel.

Specifically, FA/IWF monitors the DCS frame and, if the requested rate differs from the existing radio channel rate, performs the following actions:

- waits for a fixed time of 600 msec;
- issues a CMM request to the new rate toward the signalling;
- waits for the acknowledgement of CMM to be completed;
- returns to the usual information-passing process.

As will be seen below, in both cases the execution of the CMM procedure is seen as an exception to the usual information-passing process, even overlapping it to maintain the overall end-to-end fixed delay.

8 Use of terminal adaptation functions

Same as clause 5 of GSM 03.45 [5].

8.1 Standard TAFs for synchronous services

Same as clause 5.1 of GSM 03.45 [5].

8.2 Specific TAFs for facsimile service

Same as clause 5.2 of GSM 03.45 [5].

8.2.1 Working principle

Same as clause 5.2.1 of GSM 03.45 [5].

8.2.2 Basic protocol structure

Same as clause 5.2.2 of GSM 03.45 [5].

8.2.2.1 Frame formats

Same as clause 5.2.2.1 of GSM 03.45 [5].

8.2.3 Protocol description

Same as clause 5.2.3 of GSM-03.45 [5].

8.2.3.1 IDLE state

Same as clause 5.2.3.1 of GSM 03.45 [5].

8.2.3.2 BCS-REC state

Same as clause 5.2.3.2 of GSM-03.45 [5].

8.2.3.3 BCS-TRA state

Same as clause 5.2.3.3 of GSM 03.45 [5].

8.2.3.4 MSG-REC state

Same as clause 5.2.3.4 of GSM 03.45 [5].

8.2.3.5 MSG-TRA state

The basic function of FA in this state is to transfer MSG information from TCH to its local MSG modem.

Transition to this state is triggered by reception of MSG-REC code from TCH; continuous transmission of STATUS frames interleaved with SYNC frames is performed toward the radio path.

The MSG modem is trained and a 1 200 msec timer corresponding to the round-trip time over the TCH is started. After timeout, loss of synchronization in the information received from TCH will be assumed as the first fax-coded DATA frame. From the time the message is received, continuous transmission of SYNC frames is performed.

All data received from the TCH will be stored in the FA buffer, to be passed on to the MSG modem (first-in first-out mechanism) as soon as the modem training terminates (CT106 ON).

From this time on, resynchronization will be attempted continuously; when an IDLE state is recognized again in the data stream received from the radio path, an end-of-MSG phase will be assumed. Next, a transition to the IDLE state will be executed, in which the FA will wait (ignoring data received from TCH) until the buffered information has been fully transmitted to the local MSG modem. The procedure will then proceed in the normal way.

In case of 7,2 kbps MSG speed, the above general rule applies as well.

However, multiframe synchronization will also be checked to remove the SYNC frame stuffed by the originating FA to match the 9,6 kbps access rate over the PLMN. If necessary, multiframe resynchronization will be performed.

In case of a loss of ITU-T Recommendation V.110 [12] synchronization on the satellite side, the FA will transmit zeros toward the analog interface, as long as no data is available.

8.2.4 DCS and TCF processing

Same as clause 5.2.4 of GSM 03.45 [5].

8.2.5 DCN (disconnect) frame

Same as clause 5.2.5 of GSM 03.45 [5].

8.2.6 Clocking

Same as clause 5.2.6 of GSM 03.45 [5].

8.2.7 Timeouts

Same as clause 5.2.7 of GSM 03.45 [5].

8.3 Specific TAFs for facsimile service (ITU-T Recommendation T.30 Amend.1)

Same as clause 5.3 of GSM 03.45 [5].

8.3.1 Frame detection

Same as clause 5.3.1 of GSM 03.45 [5].

8.3.2 Message phase

Same as clause 5.3.2 of GSM 03.45 [5].

8.3.3 Additional CMM request

Same as clause 5.3.3 of GSM 03.45 [5].

8.4 Additional FA/IWF functionality to handle long propagation delays

The TCH delay for facsimile calls can be as high as 600 msec (one-way), taking into account interleaving delays to accommodate possible fading in the satellite channel. This delay, in addition to fax adapter delays, can cause a total end-to-end delay of 750 msec within the system. This total delay can result in ITU-T Recommendation T.30 [8] timer expiry for calls involving long PSTN delays and mobile-to-mobile calls.

In addition to expiry of ITU-T Recommendation T.30 [8] timers, one of the deleterious consequences of long delay environments for fax transmission is the collision of ITU-T Recommendation T.30 [8] command and responses on the two-wire analog link between the PSTN user and nearest central office (also true on the subscriber side if the system is required to support analog fax machines connected to handset via an external demodulation/remodulation unit). The problem is aggravated when there are long PSTN delays (such as international calls employing DCME equipment conforming to ITU-T Recommendations G.763 [13] and G.766 [14]) because there is little control over when exactly the command-sending entity begins to retransmit a command. Hence, intelligence is built into the FA/IWF that avoids collision on the two-wire link and prevents ITU-T Recommendation T.30 [8] timeouts. The intelligent scheme may include intervention mechanisms such as:

- the intelligence built into FA/IWF to accommodate long delays is implementation dependent; however, care must be taken that these designs do not require modifications to FA on the subscriber side that is built according to the present document;

- buffering a response based on supervision timer as described in clause 7.2.1.1 of GSM 03.46 [6] if a response was received that would potentially cause a signal collision with a retransmitted command;
- blocking a retransmitted command from reaching the other end in a manner similar to that described in clause 7.2.1.1 of GSM 03.46 [6]; however, as RLP is not used here, blocking of retransmitted commands is done selectively to accommodate possible signal loss/corruption;
- avoiding T2 timeouts between CFR and page-data using fill data similar to that described in clause 7.2.2.1 of GSM 03.46 [6];
- intelligently passing/corrupting TCF data based on BER measurement;
- handling mobile-to-mobile calls using clause 6.2.4 of GSM 03.46 [6].

9 Signalling aspects

Same as clause 6 of GSM 03.45 [5].

9.1 Handling of tonal signals

Same as clause 6.1 of GSM 03.45 [5].

9.2 Call establishment

Same as clause 6.2 of GSM 03.45 [5].

9.2.1 Mobile terminated call - speech then fax

Same as clause 6.2.1 of GSM 03.45 [5].

9.2.2 Mobile terminated call - auto answer

Same as clause 6.2.2 of GSM 03.45 [5].

9.2.3 Mobile originated call - speech then fax

Same as clause 6.2.3 of GSM-03.45 [5].

9.2.4 Mobile originated call - auto calling

Same as clause 6.2.4 of GSM 03.45 [5].

9.2.5 Mobile originated call - manual calling

Same as clause 6.2.5 of GSM 03.45 [5].

9.3 Call release

Same as clause 6.3 of GSM 03.45 [5].

9.4 Handling of satellite congestion for facsimile calls

There may be situations where the number of resources available is less than the number of resources required for the call. For example, a 9,6 kbps call which requires nine contiguous air-slots may not be available, but six air-slots may be available. In such an event, the GSS will modify the ASSIGNMENT REQUEST command from MSC before sending an ASSIGNMENT COMMAND to the MES. The MES will invoke the appropriate rate adaptation scheme and compute the appropriate speed conversion factor for the fax adaptor during binary coding signalling (BCS) phase of ITU-T Recommendation T.30 [8] protocol. The MES will then respond with an ASSIGNMENT COMPLETE, indicating to the network that it has accepted the new assignment. The ASSIGNMENT COMPLETE message is then transferred to MSC where the spare bits of the CHOSEN CHANNEL IE (see GSM 08.08) are used to indicate that the established TCH rate is different from requested rate. This is illustrated in figure 9.1.

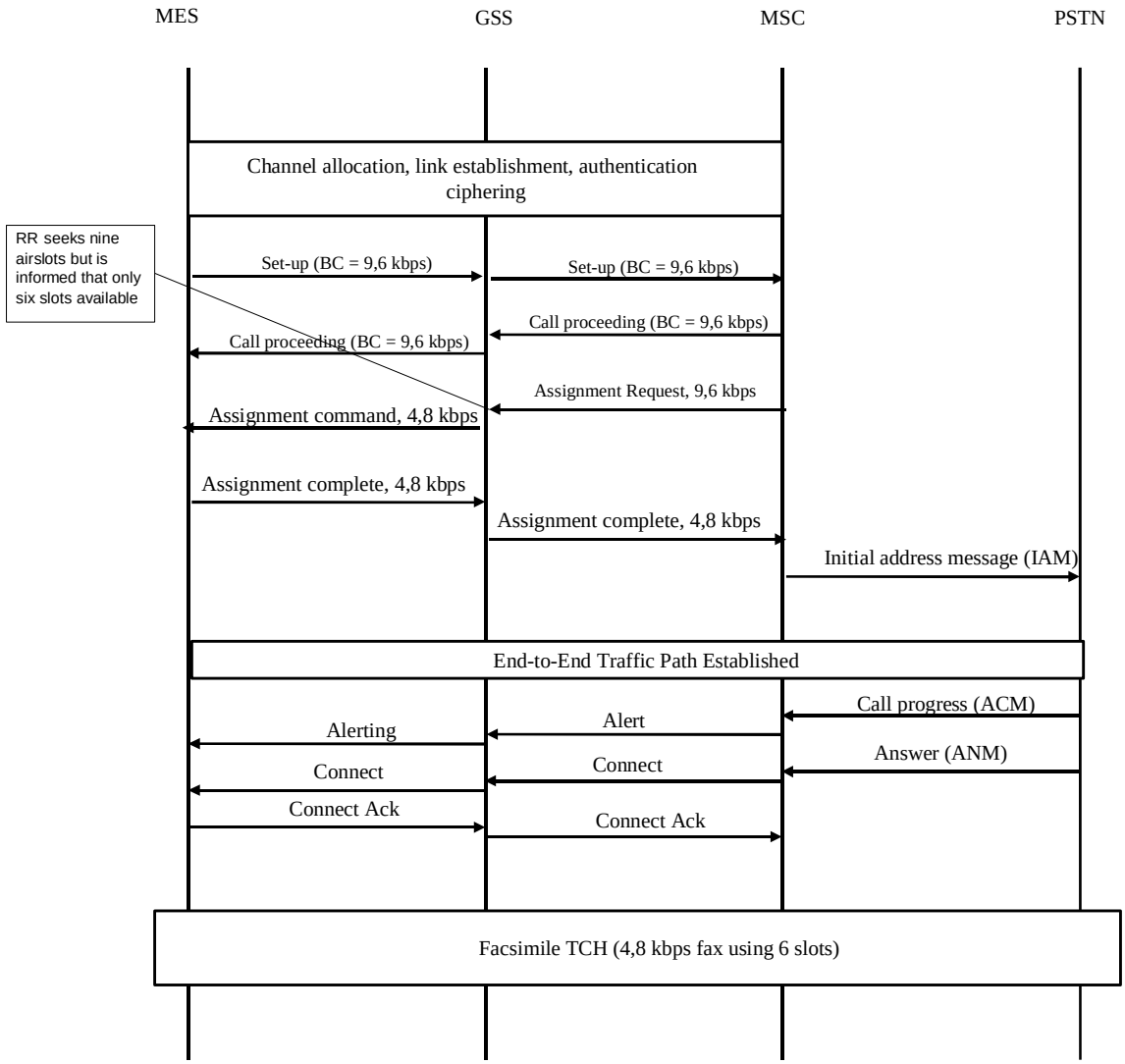

Figure 9.1: Illustration of "Forced Fallback" due to lack of necessary resources

10 Interworking to fixed networks

Same as clause 7 of GSM 03.45 [5].

10.1 Interworking to PSTN

Same as clause 7.1 of GSM 03.45 [5].

10.2 Interworking to ISDN

Same as clause 7.2 of GSM 03.45 [5].

Annex A (informative): Protocol entities from ITU-T Recommendations T.30 and T.4

Same as annex I of GSM 03.45 [5].

Annex B (informative): Procedure examples

Same as annex II of GSM 03.45 [5].

Annex C (informative): Bibliography

ITU-T Recommendation F.160 Fascicle II.5: "General operational provisions for the international public facsimile services".

ITU-T Recommendation T.35: "Procedure for the allocation of ITU-T defined codes for non-standard facilities".

ITU-T Recommendation V.21 Fascicle VIII.1: "300 bits per second duplex modem standardized for use in the general switched telephone network".

ITU-T Recommendation V.27 ter Fascicle VIII.1: "4800/2400 bits per second modem with automatic equalizer standardized for use on leased telephone-type circuits".

ITU-T Recommendation V.29 Fascicle VIII.1: "9600 bits per second modem standardized for use on point-to-point 4-wire leased telephone-type circuits".

ITU-T Recommendation V.33 Fascicle VIII.1: "14 400 bits per second modem standardized for use on point-to-point 4-wire leased telephone-type circuits".

ITU-T Recommendation X.300 Fascicle VIII.6: "General principles for interworking between public networks and between public networks and other networks for the provision of data transmission services".

GMR-1 04.002 (ETSI TS 101 376-4-2): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 2: GMR-1 Satellite Network Access Reference Configuration; GMR-1 04.002".

GMR-1 04.008 (ETSI TS 101 376-4-8): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 8: Mobile Radio Interface Layer 3 Specifications; GMR-1 04.008".

GMR-1 04.021 (ETSI TS 101 376-4-10): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 10: Rate Adaptation on the Access Terminal-Gateway Station Subsystem (MES-GSS) Interface; GMR-1 04.021".

GMR-1 07.001 (ETSI TS 101 376-7-1): "GEO-Mobile Radio Interface Specifications; Part 7: Terminal adaptor specifications; Sub-part 1: General on Terminal Adaptation Functions (TAF) for Mobile Earth Stations (MES); GMR-1 07.001".

GSM 03.10 (ETSI ETS 300 528): "European digital cellular telecommunications system (Phase 2); GSM Public Land Mobile Network (PLMN) connection types (GSM 03.10 V4.3.1)".

GSM-1 09.07 (ETSI ETS 300 604): "Digital cellular telecommunications system (Phase 2); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) (GSM 09.07 V4.12.1)".

History

Document history		
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