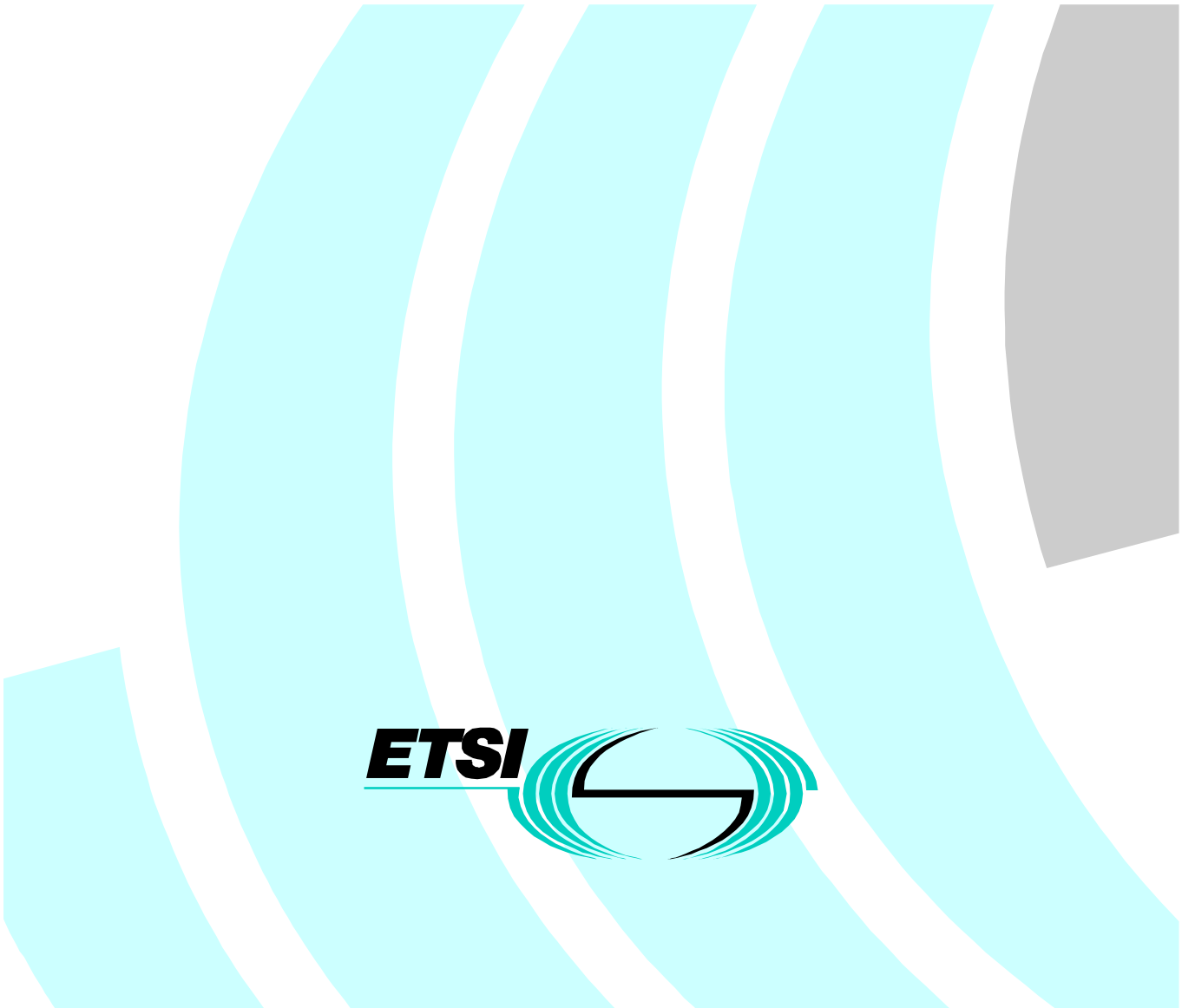
ETSI TS 101 376-4-7 V1.1.1 (2001-03)

Technical Specification

GEO-Mobile Radio Interface Specifications;
Part 4: Radio interface protocol specifications;
Sub-part 7: Mobile Radio Interface Signalling Layer 3
General Aspects;
GMR-1 04.007



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IPRs:

Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
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

IPR Owner: Ericsson Mobile Communications (UK) Limited
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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 shall then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 1.m.n

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- the third digit (n) is incremented when editorial only changes have been incorporated in the specification;
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The present document is part 4, sub-part 7 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";

Part 4: "Radio interface protocol specifications";

Sub-part 1: "Mobile Earth Station-Gateway Station System (MES-GSS) Interface; GMR-1 04.001";

Sub-part 2: "GMR-1 Satellite Network Access Reference Configuration; GMR-1 04.002";

Sub-part 3: "Channel Structures and Access Capabilities; GMR-1 04.003";

Sub-part 4: "Layer 1 General Requirements; GMR-1 04.004";

Sub-part 5: "Data Link Layer General Aspects; GMR-1 04.005";

Sub-part 6: "Mobile earth Station-Gateway Station Interface Data Link Layer Specifications; GMR-1 04.006";

Sub-part 7: "Mobile Radio Interface Signalling Layer 3 General Aspects; GMR-1 04.007";

Sub-part 8: "Mobile Radio Interface Layer 3 Specifications; GMR-1 04.008";

Sub-part 9: "Performance Requirements on the Mobile Radio Interface; GMR-1 04.013";

Sub-part 10: "Rate Adaptation on the Access Terminal-Gateway Station Subsystem (MES-GSS) Interface; GMR-1 04.021";

Sub-part 11: "Radio Link Protocol (RLP) for Data Services; GMR-1 04.022";

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 defines the architecture of Layer 3 and its sublayers on the GeoMobile (GMR-1) Air Interface. Most of the procedures defined for Layer 3 are similar to those defined in Global System for Mobile GSM 04.07 [8]. Only significant differences are described here.

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 03.297 (ETSI TS 101 376-3-19): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 19: Optimal Routing technical realization; GMR-1 03.297".

[4] GMR-1 03.298 (ETSI TS 101 376-03-20): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 20: Technical realization of High-Penetration Alerting; GMR-1 03.298".

[5] GMR-1 04.001 (ETSI TS 101 376-4-1): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 1: Mobile Earth Station-Gateway Station System (MES-GSS) Interface; GMR-1 04.001".

[6] GMR-1 04.006 (ETSI TS 101 376-4-6): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 6: Mobile earth Station-Gateway Station Interface Data Link Layer Specifications; GMR-1 04.006".

[7] 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".

[8] GSM 04.07 (ETSI ETS 300 556): "European digital cellular telecommunications system (Phase 2); Mobile radio interface signalling layer 3; General aspects (GSM 04.07 (V4.3.1))".

[9] GSM 04.07 (ETSI TS 100 939): "Digital cellular telecommunications system (Phase 2+); Mobile radio interface signalling layer 3; General aspects (GSM 04.07 (V6.5.1))".

[10] GSM 04.10 (ETSI ETS 300 558): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3; Supplementary services specification; General aspects (GSM 04.10 (V4.10.1))".

[11] GSM 04.11 (ETSI ETS 300 559): "Digital cellular telecommunications system (Phase 2); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface (GSM 04.11 (V4.10.0))".

[12] ITU-T Recommendation X.200: "Information technology - Open Systems Interconnection Basic reference model: The basic model".

[13] GSM 04.08 (ETSI ETS 300 557): "Digital cellular telecommunications system (Phase 2); Mobile radio interface; Layer 3 specification (GSM 04.08 (V4.23.1))".

3 Definitions and abbreviations

The definitions and abbreviations used in the present document are identical to those listed in GMR-1 01.004 [1].
A number of concepts and terms have been borrowed from GSM 04.07 [8]. Table 3.1 shows the terms mapped from the GSM to the GMR-1 documents and are useful for proper association.

Table 3.1: Mapping of GSM terms to GMR-1

Usage in GSM	Usage in GMR-1
MS (Mobile Station)	MES (Mobile Earth Station)
BS (Base Station)	GS (Gateway Station)

4 Introduction

4.1 General

Signalling Layer 3 provides the functions required to establish, maintain and terminate circuit-switched connections across a GMR-1 Public Land Mobile Network (PLMN) and other networks to which the GMR-1 PLMN is connected. Layer 3 provides the necessary supporting operations related to supplementary services and short messages service control. It also includes the actions required for mobility and radio resource management.

Layer 3 contains three sublayers having the following functions:

- Radio Resource (RR) management;
- Mobility Management (MM);
- Connection Management (CM).

The RR sublayer contains:

- the RR management protocol;
- the Dual Tone Multiple Frequency (DTMF) transmission and Dual Tone Reception Service (DTRS) management.

The CM sublayer contains:

- Call Control (CC);
- SMS support;
- Supplementary Services (SS).

4.2 Objectives

The objectives of Layer 3 are to provide the means for:

- the establishment, operation and release of a dedicated radio channel connection, exchange of position information and support for optimal routing and single-hop MES-MES calls (RR);
- the transmission and reception of DTMF digits dialled by the mobile user over the air to the peer entity (MES or GS) (DTRS);
- the location updating, authentication, Temporary Mobile Subscriber Identity (TMSI) reallocation and support for optimal routing (MM);
- the establishment, maintenance and termination of Circuit-Switched Calls (CC);
- SS support;
- SMS support.

4.3 General characteristics

4.3.1 Technique of description

Layer 3 signalling is described in terms of:

- the services provided by signalling Layer 3;
- the services assumed from signalling Layer 2;
- the functions of signalling Layer 3.

The signalling Layer 3 functions are performed by means of the signalling Layer 3 protocols between two systems representing the MES and network sides of the radio interface (as viewed by the MES). The present document does not consider the distribution of signalling functions among the different network equipment. The functions of Layer 3 and its supporting lower layers provide the Mobile Network Signalling (MNS) service to the upper layers.

The service interfaces to the upper layers and to the data link Layer 2 are described by the primitives and parameters as recommended in ITU-T Recommendation X.200 [12].

The same technique of description is used for the three sublayers.

4.3.2 Primitives

The services provided by the various sublayers are described in the present document. The primitives describe the elementary interactions among adjacent sublayers. Primitives consist of requests, responses, indications and confirmations. The basic syntax of a primitive is specified in GMR-1 04.001 [5].

4.3.3 Peer-to-Peer communication

Exchange of information between two peers of signalling Layer 3 is performed by means of the three sublayer protocols CM, MM, RR. A protocol is a set of rules and formats over which the control information and user data are exchanged between the two peers.

4.3.4 Contents of signalling layer 3 related technical specifications

GMR-1 04.008 [7] specifies the protocols for CC, MM, DTRS, and RR management.

GSM 04.10 [10] specifies the protocols for SS support.

GSM 04.11 [11] specifies the protocols for SMS support.

5 Structure of signalling layer 3 functions

5.1 Basic groups of functions

Signalling Layer 3 contains the following groups of signalling functions:

- CC;
- SMS;
- SS Support;
- MM;
- RR Management;
- DTRS.

These functional groups are realized by separate protocol control entities.

Other functions contained in Layer 3 are related to the transport of messages such as multiplexing and splitting. These functions are defined in the RR management sublayer and the MM sublayer. They route the messages according to the PD and Transaction Identifier (TI), which are included as part of the message header.

The MM sublayer routing function shall route the messages of the CM entities and of the MM entity of its own sublayer in the uplink direction toward the service access point of RR. This sublayer shall also multiplex these messages for parallel transactions. The routing function of the RR management sublayer shall distribute the messages to be sent according to their PD and the actual channel configuration.

The DTRS entity uses the same routing function to send messages to the RR entity to transmit DTMF tone related information. The RR entity internally checks whether a Data Link (DL) connection on SAPI = 2 on the FACCH Terminal-To-Terminal (TtT) signalling link exists for messages with PD of DTRS. If so, it transmits the information using this DL connection or it uses the SAPI = 0 connection (the main signalling link). The RR suppresses transmission of a message internally if there is no RR connection present or if it is at the network side of a single hop TtT call.

The messages provided at the different service access points of Layer 2 in the downlink direction are split by the RR sublayer routing function according to the PD. Messages with a PD equal to RR are passed to the RR entity of their own sublayer. All other messages are provided to the DTRS/MM sublayer at the service access point RR-SAP. The DTRS entity extracts messages using its own PD and passes the remaining messages on to the MM sublayer.

The routing function of MM passes the messages according to the protocol discriminator (PD) and the transaction identifier (TI) towards the MM entity or towards the CM entities via the various MM-SAP's. The message header or parts of it are not removed by the RR routing function before passing it to the MM sublayer because further routing shall be done by MM using the same criteria. This is not in line with the rules of the ISO reference model but it reduces the number of message octets.

5.2 Protocol architecture

A hierarchy of three sublayers is defined as follows:

- The RR sublayer provides services to the MM sublayer and utilizes the services of signalling Layer 2. The RR and DTRS protocol entities are included.
- The MM sublayer provides common services to the entities of the CM sublayer.
- The CM sublayer includes the CC, SS and SMS entities, which are independent entities.

See figure 5.1 for Layer 3 MES side protocol architecture.

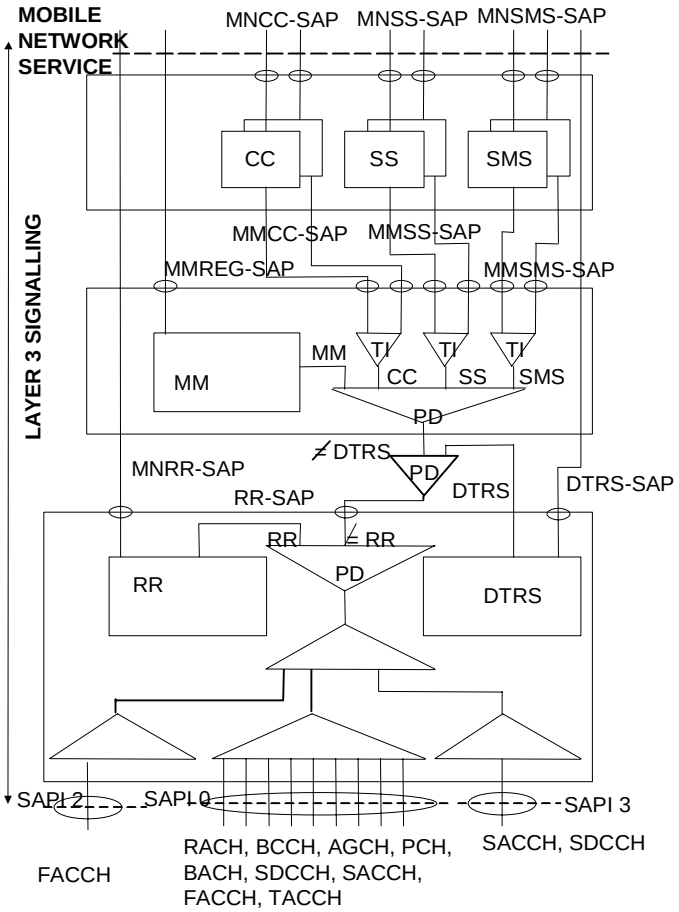

Figure 5.1: Protocol architecture of signalling layer 3 – mobile earth station side

6 Services provided by signalling layer 3 at the Mobile Earth Station side

The different classes of services provided by signalling Layer 3 at the MES side are accessible at the following service access points:

- Alert indications and position information at the MNRR-SAP;
- Registration services at the MMREG-SAP;
- DTRS at the DTRS-SAP;
- CC services for normal and emergency calls including call-related supplementary services support at the MNCC-SAP;
- Short message services support at the MNSMS-SAP;
- Call-independent supplementary services support at the MNSS-SAP.

6.1 Registration services

Same as clause 6.1 of GSM 04.07 [8].

6.1.1 Service state diagram

Same as clause 6.1.1 of GSM 04.07 [8].

6.1.2 Service primitives

Same as clause 6.1.2 of GSM 04.07 [8].

6.2 Call control services

Same as GSM 04.07 [8] with the exception of clauses 6.2.2.23 through 6.2.2.26, which are not required. The following primitives are not supported:

- MNCC_START_DTMF_REQ;
- MNCC_START_DTMF_CNF;
- MNCC_STOP_DTMF_REQ;
- MNCC_STOP_DTMF_CNF.

6.3 Call-independent supplementary services support

Same as clause 6.3 of GSM 04.07 [8].

6.4 Short Message Services support

Same as clause 6.4 of GSM 04.07 [8].

6.5 MN-RR State services support

The RR sublayer provides services related to the state of the RR session at the MNRR-SAP.

6.5.1 Service State Diagram

The primitives provided by the Radio Resource Management sublayer at the MNRR_SAP and the transitions between permitted states are shown in figure 6.1.

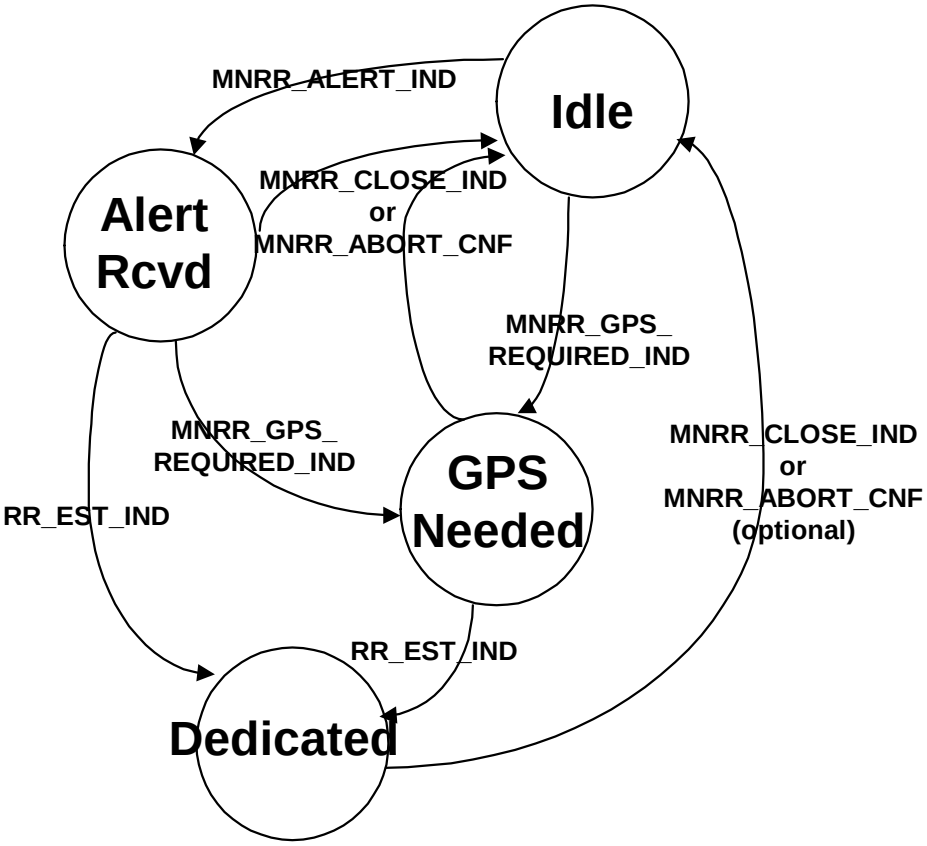

Figure 6.1: Service graph of RR service primitives for network services layer

6.5.2 Service primitives

Table 6.1 lists the state-related primitives and parameters supported at the MNRR-SAP of the MES.

Table 6.1: RR State Primitives and parameters at MNRR-SAP – MES only

Primitives	Parameters (Information elements of message)	Reference
MNRR_ALERT_IND	Alert timer value	6.5.1.1
MNRR_GPS_REQUIRED_IND	None	6.5.1.2
MNRR_CLOSE_IND	Close error code	6.5.1.3
MNRR_ABORT_REQ	None	6.5.1.4
MNRR_ABORT_CNF	None	6.5.1.5

6.5.2.1 RR_ALERT_IND

The RR sublayer issues the MNRR_ALERT_IND to the network services layer when an alert indication has been received. The alert timer contains the network-configured maximum amount of time that an MES shall wait before accessing the network (see GMR-1 04.008 [7]).

6.5.2.2 MNRR_GPS_REQUIRED_IND

The RR sublayer issues the MNRR_GPS_REQUIRED_IND primitive to the network services layer when a new GPS is required for a MT RR session establishment. User cooperation may be required for the GPS receiver to successfully compute a position fix.

6.5.2.3 MNRR_CLOSE_IND

The RR sublayer issues the MN_RR_CLOSE_IND primitive to the network services layer at these times.

1) Anytime the RR sublayer has previously issued either an MNRR_ALERT_IND or an MNRR_GPS_IND, and there is not a successful establishment of an RR session, for any reason. The MNRR_CLOSE_IND contains an error code with the reason for failure to establish the session in this case.

2) Upon close of an established RR session and provided that the RR sublayer has previously issued either an MNRR_ALERT_IND or an MNRR_GPS_IND prior to the establishment of the RR session. The primitive contains the "normal" error code response in this case.

6.5.2.4 MNRR_ABORT_REQ

The network services layer can issue this primitive to the RR sublayer. This primitive causes the RR to abort an attempt to establish an RR session. Optionally for RR, RR may also abort an established RR session. The primitive has this effect only if the RR session has previously issued either MNRR_ALERT_IND or an MNRR_GPS_IND.

6.5.2.5 MNRR_ABORT_CNF

The RR sublayer issues the MNRR_ABORT_CNF only in response to the MNRR_ABORT_REQ. The network services sublayer shall only assume the actions regarding an MNRR_ABORT REQ have been completed when it receives either the MNRR_ABORT_CNF or MNRR_CLOSE_IND.

6.6 Position information support

6.6.1 Service primitives

The position primitives and parameters supported at the MNRR-SAP of the MES are listed in table 6.2.

Table 6.2: Position Primitives and parameters at MNRR-SAP – MES only

Primitives	Parameters (Info elements of message)	Reference
MNRR_REGION_IND	Country code, region name	6.6.1.1
MNRR_POSITION_IND	GPS_Timer, GPS_Required	6.6.1.2

6.6.1.1 MNRR_REGION_IND

This primitive conveys the country and/or the region string to the network services layer.

6.6.1.2 MNRR_POSITION_IND

This primitive conveys GPS position information to the network services layer. Each parameter is optional to allow RR to send a partial string of parameters. RR shall, at minimum, issue this primitive immediately upon camp-on after power-on and after all GPS position computations.

- GPS_Required parameter: indication whether the network requires or does not require GPS reporting.

- GPS_Timer parameter: period of time for which a GPS position can be considered to be "current", if required by the network. This period begins at time of issue of the primitive.

6.7 DTMF digits transmission and reception service

The DTRS permits the user at the MES to send information about user-dialled DTMF digits of variable duration to the remote end. This service also enables an MES or a GS to receive the DTMF digit information dialled by the peer MES user. The DTMF digits transmission and reception service is provided at the DTRS-SAP. This is directly accessed at the RR sublayer (DTRS protocol service).

6.7.1 Service primitives

The primitives and parameters supported at the DTRS-SAP at the MES side are listed in table 6.3.

Table 6.3: Primitives and parameters at DTRS-SAP – MES side

Primitives	Parameters (Info elements of message)	Reference
DTMF_DIGIT_START_REQ	Digit value	6.7.1.1
DTMF DIGIT_ STOP_REQ		6.7.1.2
DTMF_DIGIT_START_IND	Digit value	6.7.1.3
DTMF_DIGIT_STOP_IND		6.7.1.4

6.7.1.1 DTMF_DIGIT_START_REQ

The network services layer uses this primitive to initiate the transfer of the DTMF digit still pressed. This primitive is used by the network services layer immediately upon detection of the user pressing a key. The network services layer passes the digit value along with this primitive.

6.7.1.2 DTMF_DIGIT_STOP_REQ

The network service layer initiates this primitive when it detects the release of the key for which a digit start request has already been sent.

This primitive is used by the network service layer to stop generation of the indicated tone to the peer.

6.7.1.3 DTMF_DIGIT_START_IND

The DTRS protocol entity uses this primitive upon receipt of tone information from the peer. This informs the local network services layer that the user on the other end has started to generate a DTMF digit (the keypress event). The DTRS entity passes the DTMF digit value to the network services layer. The network services layer then responds by initiating the generation of the corresponding DTMF tone. This tone continues until a DTMF_DIGIT_STOP_IND has been received. The network services layer should then implement a timeout after which it can be assumed that the pressed digit has been released. This may be required to prevent the possible loss of the digit stop information from the peer entity.

6.7.1.4 DTMF_DIGIT_STOP_IND

The DTRS uses this primitive to inform the network services layer that the DTMF digit transmitted earlier is now released. The network services layer should treat the DTMF digit as completed. The duration field indicates that the DTMF digit was pressed for the time identified by the duration. The network services layer now generates a tone for at least the same length of time as the duration. The tone actually generated may be of greater duration due to the finite time used by the protocol message exchange to indicate the starting and stopping of the DTMF digit.

7 Services provided by signalling layer 3 on the network side

7.1 Call Control services

Same as GSM 04.07 [8] with the exception of clauses 7.1.2.23 to 7.1.2.26, which are not required. The following primitives are not supported:

- MNCC_START_DTMF_REQ;
- MNCC_START_DTMF_CNF;
- MNCC_STOP_DTMF_REQ;
- MNCC_STOP_DTMF_CNF.

7.2 Call-independent supplementary services support

Same as GSM 04.07 [8].

7.3 Short Message Services support

Same as clause 7.3 of GSM 04.07 [8].

8 Services assumed from signalling layers 1 and 2

Same as clause 8 of GSM 04.07 [8].

9 Interlayer service interfaces on the Mobile Earth Station side

9.1 Services provided by the Radio Resource Management entity

Same as clause 9.1 of GSM 04.07 [8].

9.1.1 Service state diagram

Same as clause 9.1.1 of GSM 04.07 [8].

9.1.2 Service primitives

The service primitives, parameters, and corresponding references follow.

Table 9.1

PRIMITIVES	PARAMETERS	REFERENCES
RR_EST_REQ	Layer 3 message, called party number	9.1.2.1
RR_EST_IND	–	9.1.2.2
RR_EST_CNF	Location update indication	9.1.2.3
RR_REL_IND	Cause	9.1.2.4
RR_SYNC_IND	Cause (ciphering, reassess, mode modify)	9.1.2.5
RR_DATA_REQ	Layer 3 message	9.1.2.6
RR_DATA_IND	Layer 3 message	9.1.2.7
RR_UNIT_DATA_IND	Layer 3 message	9.1.2.8
RR_ABORT_REQ	Cause	9.1.2.9
RR_ABORT_IND	Cause	9.1.2.10
RR_ACT_REQ	Reselection mode	9.1.2.11
RR_LU_NEEDED_IND	–	9.1.2.12
RR_COVERAGE_IND	Coverage level	9.1.2.13
RR_POSITION_IND	Invalid position	9.1.2.14

9.1.2.1 RR_EST_REQ

The RR_EST_REQ primitive is used by the mobility management entity to request the establishment of a mobile-originated RR connection. This request shall be made only in the IDLE state when the mobile earth station listens to the Common Control Channel (CCCH) and the previously selected Broadcast Control Channel (BCCH). The called party's number is included as part of this message to support optimal routing of Mobile-Originated (MO) calls.

9.1.2.2 RR_EST_IND

Same as clause 9.1.2.2 of GSM 04.07 [8].

9.1.2.3 RR_EST_CNF

The RR_EST_CNF primitive is used by the RR to indicate the successful completion of a mobile-originated RR connection establishment. It indicates that the RR connection exists and that the RR is in dedicated mode. This primitive includes an indication to command the MM sublayer to perform a location update on the established link before sending any additional messages. The presence of this indication means that the original message sent by the MM in RR_EST_REQ has not been sent to the network and that it should be sent by the MM after the commanded location update.

9.1.2.4 RR_REL_IND

RR_REL_IND is used by the RR to indicate the release of an RR connection to the MM entity when the RR has received a CHANNEL RELEASE from the network and has triggered a normal release of the DLL. It is also used to indicate that a requested RR connection cannot be established. In this case, the RR_REL_IND is accompanied by appropriate reject reason. In both cases, RR returns to idle mode.

This primitive is also used by the DTRS entity to detect when an existing RR connection has been released. It shall flush out its internal transmit buffer upon the detection of this event.

9.1.2.5 RR_SYNC_IND

Same as clause 9.1.2.5 of GSM 04.07 [8].

9.1.2.6 RR_DATA_REQ

The RR_DATA_REQ primitive is identical to that discussed in GSM 04.07 [8]. Additionally, the DTRS entity shall use this primitive to transfer DTMF tone generation related information to its peer.

9.1.2.7 RR_DATA_IND

The RR_DATA_IND primitive is identical to that discussed in GSM 04.07 [8]. Additionally, the RR entity shall use this primitive to indicate to the DTRS entity that DTMF tone generation related information has been received from its peer.

9.1.2.8 RR_UNIT_DATA_IND

Same as clause 9.1.2.8 of GSM 04.07 [8].

9.1.2.9 RR_ABORT_REQ

Same as clause 9.1.2.9 of GSM 04.07 [8].

9.1.2.10 RR_ABORT_IND

Same as clause 9.1.2.10 of GSM 04.07 [8]. This primitive shall also be used by the DTRS entity to detect when an existing RR connection has been aborted. It shall flush its internal transmit buffer upon detection of this event.

9.1.2.11 RR_ACT_REQ

The RR_ACT_REQ primitive is used by the mobility management entity to initiate the RR spot beam selection procedure at the moment of power-on or of Subscriber Identity Module (SIM) insertion.

9.1.2.12 RR_LU_NEEDED_IND

The RR_LU_NEEDED_IND primitive is used by the RR to indicate to the mobility management entity to perform a location update due to change in position of the MES.

9.1.2.13 RR_COVERAGE_IND

The RR_COVERAGE_IND primitive is used by the RR to indicate the coverage state of the MES to the MM.
The coverage state may be:

- Camped-normal;
- Camped-high penetration;
- No spot beam available.

NOTE: The indication denotes the physical coverage of the MES and not the service available to it.

9.1.2.14 RR_POSITION_IND

This primitive is used by the RR to indicate to the MM entity that it is in an invalid position, i.e., due to physical layer issues or due to permission issues, the MES will be unable to get any service from any spot beam of any satellite in its current position.

9.2 Services provided by the Mobility Management entity

Same as clause 9.2 of GSM 04.07 [8].

9.2.1 Service state diagram

Same as clause 9.2.1 of GSM 04.07 [8].

9.2.2 Service primitives

Same as clause 9.2.2 of GSM 04.07 [8] except for clause 9.2.2.1.

9.2.2.1 MMXX_EST_REQ

The MMXX_EST_REQ primitive is used by the CC, SS, and SMS respectively to request establishment of an MM connection. Several MM connections may be provided in parallel to the requesting entities. The primitive may contain parameters relevant to the CM SERVICE REQUEST message to distinguish a basic call from an emergency call. The called party's number is included as part of the MMCC_EST_REQ message to support optimal routing of MO calls.

10 Interlayer service interfaces on the network side

The interlayer service interfaces on the network side are identical to those discussed in GSM 04.07 [8] with the inclusion of the following additional paragraph:

The DTRS entity uses the following RR primitives to transmit DTMF tone generation related information to its peer entity and to maintain its internal transmit buffers:

- RR_DATA_REQ;
- RR_DATA_IND;
- RR_REL_IND;
- RR_ABORT_IND.

11 Standard layer 3 messages

In this clause the structure of standard L3 messages and their basic handling are defined. Standard L3 messages are used in layer 3 protocols of the Um interface when the relevant protocol specifications, e.g. GSM 04.08 [13], define so.

11.1 Components of a standard layer 3 message

Same as GSM 04.07 [8].

11.2 Imperative part of a standard layer 3 message

Same as GSM 04.07 [8].

11.2.1 Protocol discriminator

Same as GSM 04.07 [8] with the addition of a protocol discriminator for the DTRS. This protocol discriminator contains bits 1 to 4 set to the escape value of "1110" with the extended PD value (bits 8 to 5) set to "0001".

11.2.2 Skip Indicator

Bits 5 to 8 of octet 1 of a standard Layer 3 message may contain the skip indicator Identification Element (IE). The skip indicator IE is a type 1 IE and it always has format V in a standard Layer 3 message. The relevant protocol specification can state that a standard Layer 3 message received shall be ignored if the skip indicator has certain values. The encoding of the skip indicator is shown in figure 11.1.

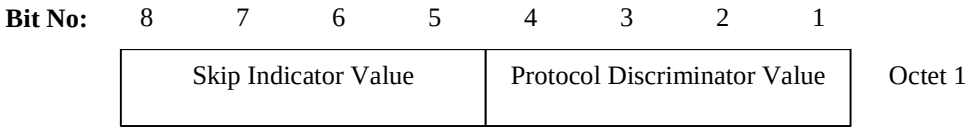

Figure 11.1: Skip indicator in a standard layer 3 message

The RR and the MM shall use default value 0 for the skip indicator field. Any message received from the peer entity shall be discarded if this message is received with a nonzero value in this field. DTRS messages do not have a skip indicator.

11.2.3 Transaction identifier

Same as GSM 04.07 [8].

11.2.4 Message type

Same as GSM 04.07 [8].

11.2.5 Further information elements of the imperative part

Same as GSM 04.07 [8].

11.3 Non-imperative part of a standard layer 3 message

Same as GSM 04.07 [8].

11.4 Presence requirements of information elements

Same as GSM 04.07 [8].

11.5 Handling of superfluous information

Same as GSM 04.07 [8].

11.5.1 Information elements that are unnecessary in a message

Same as GSM 04.07 [8].

Annex A (informative): MN-services arrow diagram

Figures A.1, A.2, A.3, A.4, A.6, and A.7 are identical to those presented in GSM 04.07 [8].

Figure A.5 is deleted (handover is not required).

Figures A.8 and A.9 are included below.

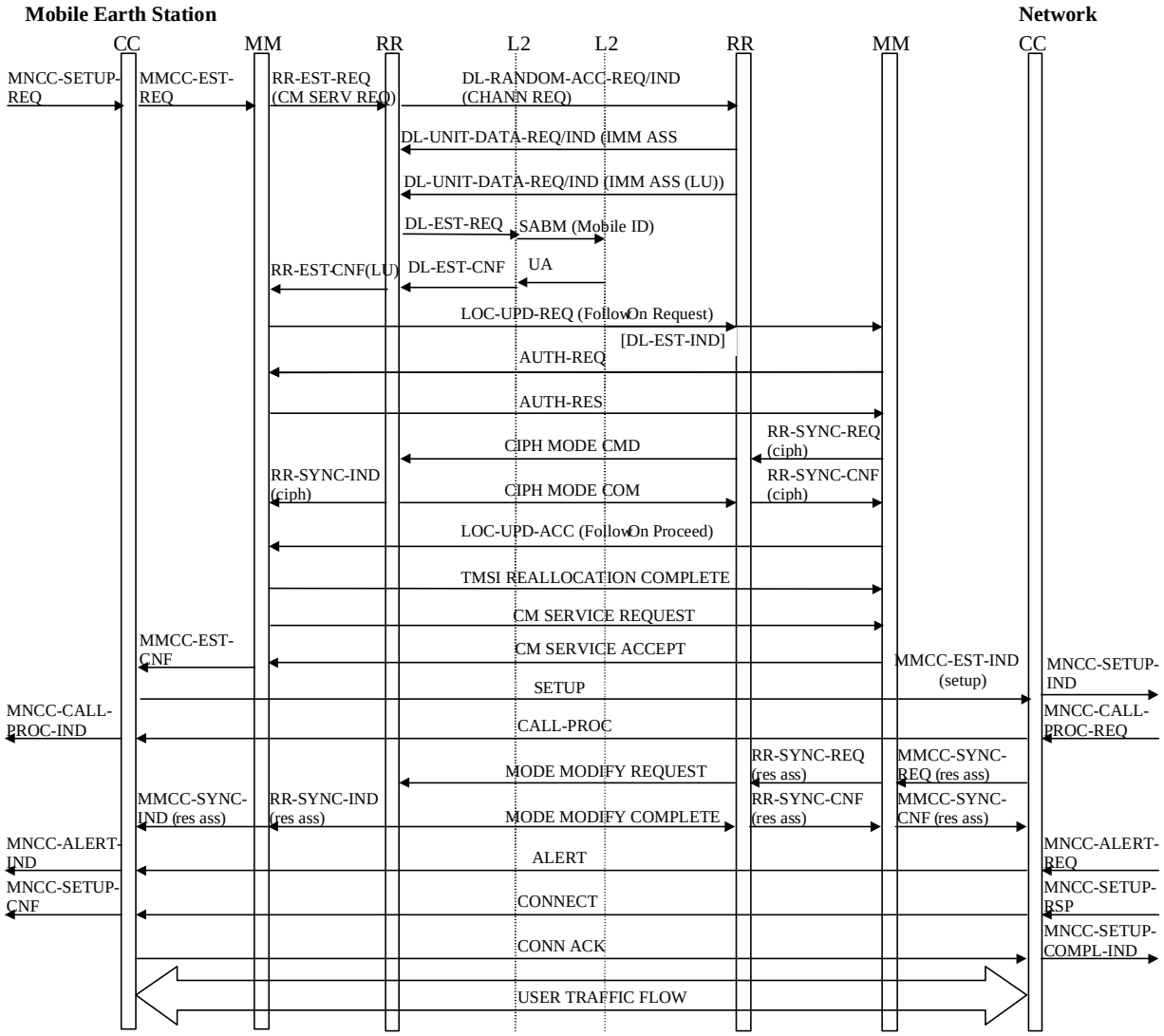

Figure A.8: Mobile-originated call setup with optimal routing. Successful case (see GMR-1 03.297[3])

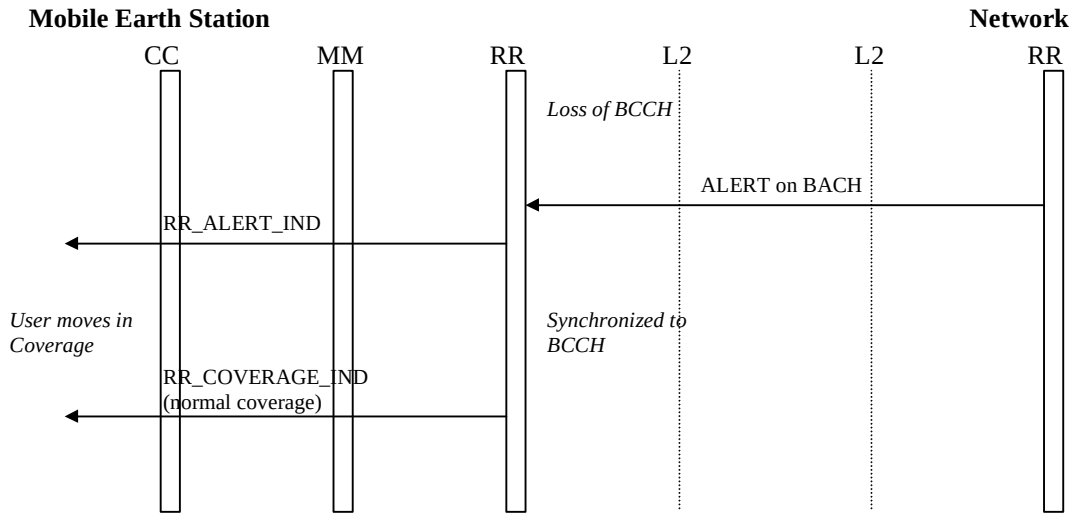

Figure A.9: Alerting. Successful case (see GMR-1 03.298 [4])

Annex B (informative): Description of CSN.1

Same as GSM 04.07 [9] with the additional comment that all the Layer 3 messages that use the notation given in the clause need to be mapped to the string of octets. The convention for formatting the binary string into an octet string is given in GMR-1 04.006 [6].

Annex C (informative): Bibliography

GMR-1 03.022 (ETSI TS 101 376-3-10): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 10: Functions related to Mobile Earth station (MES) in idle mode; GMR-1 03.022".

GMR-1 03.296 (ETSI TS 101 376-3-18): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 18: Terminal-to-Terminal Call (TtT); GMR-1 03.296".

GMR-1 03.299 (ETSI TS 101 376-3-21): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 21: Position Reporting services; Stage 2 Service description; GMR-1 03.299".

GMR-1 04.005 (ETSI TS 101 376-4-5): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 5: Data Link Layer General Aspects; GMR-1 04.005".

History

Document history		
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