



**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
Information element mapping between
Mobile Station - Base Station System (MS - BSS)
and Base Station System - Mobile-services
Switching Centre (BSS - MSC);
Signalling Procedures and the Mobile Application Part (MAP)
(3GPP TS 29.010 version 15.1.0 Release 15)**



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Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

The present document specifies Information element mapping between Mobile Station - Base Station System (MS - BSS) and Base Station System - Mobile-services Switching Centre (BSS - MSC) Signalling procedures and the Mobile Application Part (MAP) within the digital cellular telecommunications system.

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1 Scope

The scope of the present document is:

- i) to provide a detailed specification for the interworking between information elements contained in layer 3 messages sent on the MS-MSC interface (Call Control and Mobility Management parts of 3GPP TS 24.008 [4]) and parameters contained in MAP services sent over the MSC-VLR interface (3GPP TS 29.002 [9]) where the MSC acts as a transparent relay of information;
- ii) to provide a detailed specification for the interworking between information elements contained in BSSMAP messages sent on the BSC-MSC interface (3GPP TS 48.008 [12]) and parameters contained in MAP services sent over the MSC-VLR interface (3GPP TS 29.002 [9]) where the MSC acts as a transparent relay of information;
- iii) to provide a detailed specification for the interworking between information elements contained in BSSMAP messages (3GPP TS 48.008 [12]) and RANAP ((3GPP TS 25.413 [7]);
- iv) to provide a detailed specification for the interworking as in i) and ii) above when the MSC also processes the information;
- v) to provide a detailed specification for the interworking between information elements contained in layer 3 messages sent on the MS-SGSN interface (GPRS mobility part of 3GPP TS 24.008 [4]) and parameters contained in MAP services sent over the SGSN-HLR interface (3GPP TS 29.002 [9]);
- vi) to provide a detailed specification for the interworking between information elements contained in RANAP messages sent on the SGSN-RNC interface (3GPP TS 25.413 [7]) and parameters contained in S1AP messages sent on the MME-eNodeB interface (3GPP TS 36.413 [21]);
- vii) to provide a detailed specification for the interworking between information elements contained in BSSMAP messages (3GPP TS 48.008 [12]) or RANAP messages (3GPP TS 25.413 [7]) during SRVCC handovers.

Interworking for supplementary services is given in 3GPP TS 29.011 [11]. Interworking for the short message service is given in 3GPP TS 23.040 [3] and 3GPP TS 24.011. Interworking between the call control signalling of 3GPP TS 24.008 [4] and the PSTN/ISDN is given in GSM 09.03 [13], 3GPP TS 29.007 [10] and 3GPP TS 49.008 [14] [14]. Interworking between the 'A' and 'E' interfaces for inter-MSC handover signalling is given in 3GPP TS 29.007 [10] and 3GPP TS 49.008 [14] [14].

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 21.905: "3G Vocabulary".
- [2] 3GPP TS 23.009: "Handover procedures".
- [3] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS) Point to Point (PP)".
- [4] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".
- [5] 3GPP TS 24.010: "Mobile radio interface layer 3 Supplementary services specification - General aspects".

- [6] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".
- [7] 3GPP TS 25.413: "Iu interface RANAP signalling".
- [8] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".
- [9] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".
- [10] 3GPP 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)".
- [11] 3GPP TS 29.011: "Digital cellular telecommunications system (Phase 2+); Signalling interworking for supplementary services".
- [12] 3GPP TS 48.008: "Mobile Switching Centre - Base Station System (MSC - BSS) interface Layer 3 specification".
- [13] GSM 09.03: "Digital cellular telecommunications system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".
- [14] 3GPP TS 49.008 [14]: "Digital cellular telecommunications system (Phase 2+); Application of the Base Station System Application Part (BSSAP) on the E-interface".
- [15] 3GPP TS 29.108: "Application of the Radio Access Network Application Part (RANAP) on the E-interface".
- [16] 3GPP TS 23.271: "Functional stage 2 description of LCS".
- [17] 3GPP TS 43.051: "Technical Specification Group GSM/EDGE; Radio Access Network; Overall description - Stage 2".
- [18] 3GPP TS 23.012: "Location management procedures".
- [19] Void.
- [20] 3GPP TS 24.301: "Non-Access Stratum (NAS) protocol for Evolved Packet System (EPS)".
- [21] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network E-UTRAN); S1 Application Protocol (S1AP)".
- [22] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".
- [23] 3GPP TS 29.060: "GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".
- [24] 3GPP TS 48.018: "Base Station System (BSS) -Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP)".
- [25] 3GPP TS 29.280: "3GPP EPS Sv interface (MME to MSC) for SRVCC".
- [26] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".

1.2 Abbreviations

Abbreviations used in the present document are listed in 3GPP TS 21.905 [1].

1.3 Definitions

The following terms are used in this Technical Specification:

A/Gb mode: mode of operation of the MS when connected to the Core Network via GERAN and the A and/or Gb interfaces. Throughout this specification the term GSM refers to GERAN A/Gb mode.

Iu mode: mode of operation of the MS when connected to the Core Network via GERAN or UTRAN and the Iu interface. Throughout this specification the term UMTS refers to UTRAN or GERAN Iu mode.

2 Classification of interworking cases

2.1 Transparent procedures

The following MSC procedures require transparent mapping of access protocol information elements into MAP parameters and vice versa (see 3GPP TS 29.002 [9] for definitions and the use of the procedures):

- location update;
- forward new TMSI;
- provide IMSI;
- obtain IMEI;
- check IMEI;
- authenticate;
- trace subscriber activity.

2.2 Non-transparent procedures

Procedures in this class require processing in the MSC and information element mapping. These procedures include those related to:

- outgoing call set-up;
- incoming call set-up;
- handover;
- cipher mode setting;
- location services.

3 Interworking in the MSC, Transparent case

3.1 General

When the MSC receives a forward message from the BSS (possibly forwarded transparently from the MS), it will invoke the desired MAP service and establish a cross reference between the BSSAP procedure and the MAP procedure in order to return the result of the operation to the BSS (which may forward it transparently to the MS). The cross reference is deleted when the MSC terminates the MAP procedure.

Positive or negative results of the MAP procedure are returned in the appropriate BSSAP message.

The parameters of the forward BSSAP message are mapped by a one-to-one mapping into the parameters of the MAP service. However, in some cases parameters received on the radio path may be suppressed at the MSC because they are related to another protocol entity, e.g. information related to RR-management may be included in MM-management messages. Similarly, parameters received in the (positive) MAP service response are mapped one-to-one into parameters of the corresponding backward BSSAP message.

A negative outcome, as carried in various MAP services (MAP specific service response, MAP_U_ABORT, MAP_P_ABORT, MAP_NOTICE and premature MAP_CLOSE, see 3GPP TS 29.002 [9] for definitions) is mapped into a cause value in the required backward BSSAP message. In this case several negative results of MAP may be mapped into the same BSSAP cause value, i.e. without discrimination between these negative results.

NOTE: For O & M purposes, the MAP procedure entity in the MSC may require a more detailed overview of negative results than the MS.

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These principles are illustrated in figure 1.

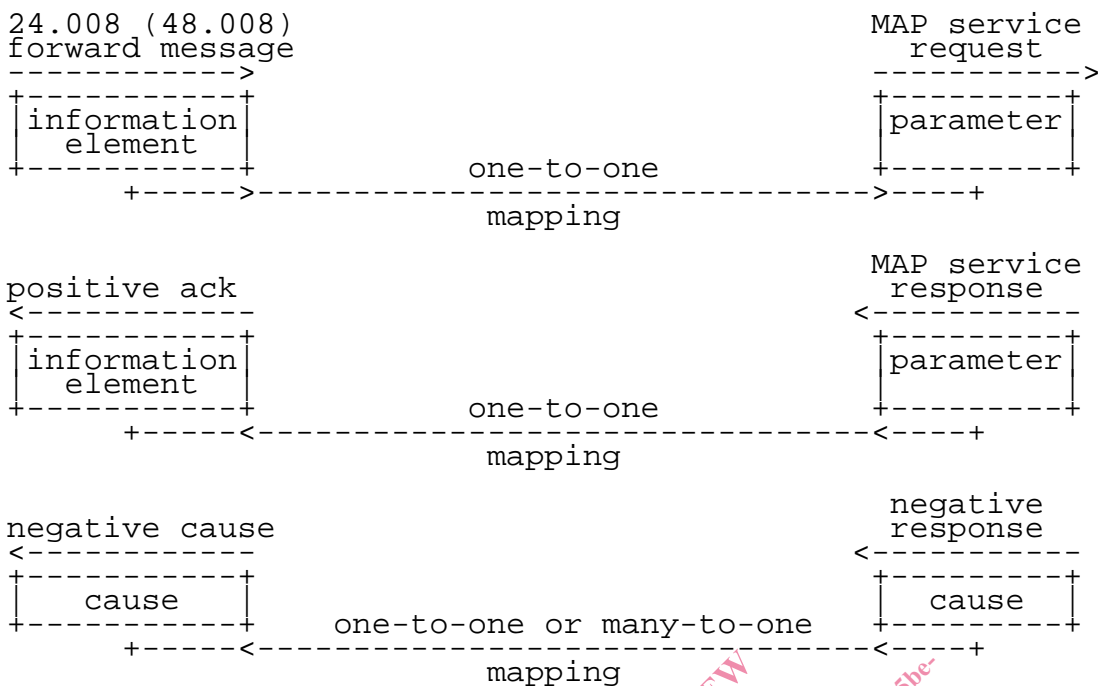


Figure 1: Illustration of mapping principles in the MSC

For each of the transparent operations listed in subclause 2.1, the following format is used to show the mapping.

	24.008 or 48.008		29.002	Notes
Forward message	MS/BSS to MSC message name information element 1 information element 2	<---> <--->	MSC to VLR MAP service request parameter 1 parameter 2	
Positive result	MSC to MS/BSS message name information element 1 information element 2	<---> <--->	VLR to MSC positive response parameter 1 parameter 2	
Negative result	MSC to MS/BSS message name cause 1 cause 2 cause 3 cause 3 cause 3	<---> <---> <---> <---> <--->	VLR to MSC negative response cause 1 cause 2 MAP_U/P_ABORT MAP_NOTICE MAP_CLOSE	

Equivalent mapping principles apply for operations invoked by the VLR towards the BSS/MS. However, negative results are generally not received from the BSS/MS but are generated in the MSC. Therefore, for such operations the interworking for negative results is not normally shown.

3.2 Routeing area updating

	24.008	29.002	Notes
Forward message	GMM (ROUTEING AREA UPDATE REQUEST) MS classmark 1 MS classmark 4 GPRS Ciphering key seq number Mobile station identity Old routeing area identification	MAP_UPDATE_GPRS LOCATION request - - - IMSI -	-
Positive results	GMM (ROUTEING AREA UPDATE ACCEPT) Routeing area identification Mobile station identity C Mobile station C Reject: IMSI unknown in HLR C Reject: MSC temporarily not reacheable	MAP_UPDATE_GPRS LOCATION response - - - - -	1 2 3 4
Negative results	GMM (ROUTEING AREA UPDATE REJECT) Network failure GPRS services not allowed in this PLMN GPRS services not allowed GPRS services and non GPRS services not allowed C GPRS services not allowed C GPRS services and non-GPRS services not allowed MS identity cannot be derived by the network GPRS services not allowed in this PLMN LA not allowed Roaming not allowed in this LA No Suitable cells in location area GPRS services not allowed in this PLMN GPRS services not allowed in this PLMN C GPRS services not allowed in this PLMN No Suitable cells in location area Illegal MS Illegal ME Network failure Network failure Network failure Network failure	MAP_UPDATE_GPRS LOCATION response Unknown HLR Unknown subscriber (no GPRS subscription) Unknown subscriber (IMSI unknown) Unknown subscriber (no GPRS subscription) Unknown subscriber (IMSI unknown) - Roaming not allowed: PLMN not allowed - - - Operator determined barring - - - Additional roaming not allowed: Supported RAT Types not allowed - - System Failure Unexpected data value MAP_U/P_ABORT MAP_NOTICE	5 6 7 8 9 10 14 11 12 12 13