Roaming Database, Structure and Updating Procedures

7.1

May, 2011

This is a binding permanent reference document of the GSM Association.

Security Classification – NON-CONFIDENTIAL GSMA Material

Table of Contents

1 Introduction

1.1 Scope of document

In order to have a common and simple overview of the most important data related to International Roaming, a database for storing this data has been created, according to the RAEX Business Requirements defined in chapter 7.1.

1.2 Glossary

Term	Meaning
APN	Access Point Name
ASN	Autonomous System Number
CAMEL	Customized Applications for Mobile networks using Enhanced Logic
CAP	CAMEL Application Part
CC	Country Code
CCITT	International Telegraph and Telephone Consultative Committee
DNS	Domain Name Service
ETS	European Telecommunications Standard
ETSI	European Telecommunications Standards Institute
GPRS	General Packet Radio Service
GSMA	GSM Association
GRX	GPRS Roaming Exchange
GSN	GPRS Support Node
GUI	Graphical User Interface
HQ	Headquarters
IMSI	International Mobile Station Identity
IP	Internet Protocol
MAP	Mobile Application Part
MCC	Mobile Country Code
MGT	Mobile Global Title
MNC	Mobile Network Code
MSC	Mobile Services Switching Centre
MSISDN	Mobile Subscriber ISDN Number
MNO	Mobile Network Operator
NC	Network Code
NDC	National Destination Code
PC	Point Code
PMN	Public Mobile Network
RAEX	Roaming Agreement EXchange

Term	Meaning
RILTE	Roaming in Long Term Evolution
SCCP	Signalling Connection Control Part
SMSC	Short Message Service Centre
SS7	Signalling System no. 7

Table 1: Glossary

2 STRUCTURE OF THE DATABASE

The following information is stored in the GSM Association RAEX IR.21 Roaming Database for each MNO, (Mobile Network Operator):

- Organization Information:
- The Organization Name
- The Operators home country in abbreviated format
- Information for each Network(s), Roaming Hubbing and Hosted Network belonging to the Organization including:
- The TADIG code used by the operator according TD.13
- Network Information
- Numbering Information
- International and Domestic SCCP GW information
- Type of SCCP protocol available at PMN
- Information about Subscriber Identity Authentication
- The test number available at PMN for service testing
- The information concerning introduction of MAP, a list of the Application Context with the current version and the time planned for changing to the next higher version
- Addresses of network elements with Time Zone information
- Information about USSD availability and the supported phase
- CAMEL Application Part (CAP) version
- Information associated with GPRS network identifiers, such as APN operator identifier, list of test APNs, Data Service supported with Class Capabilities etc
- Information associated with IP Roaming and IP interworking towards the GRX provider, such as DNS IP addresses/names (primary and secondary), IP address range(s), AS Number etc. of the PMN
- MMS Inter-working and WLAN Information
- Detailed numbering information where needed
- Information about contact persons listed by service and troubleshooting contacts
- Information about any type of Hosted Network, including non terrestrial and satellite. Available information are: TADIG code and numbering of the network nodes
- Information for LTE Roaming

3 REPORTS

Note: Production of the reports have yet to be agreed with the GSM Association.

Currently, the following information is available through the GSMA Infocentre RAEX IR.21 Application, in line with requirements defined in [7.5 Access to Roaming Database]:

- Routing Information
- Test Numbers
- Network Elements
- Packet Data

4 Procedures for updating the database

When data for a PMN changes, or when a new PMN is introduced, the procedures for updating the Roaming Database and for distributing the information to the other PMNs are as follows:

1. The PMN sends the updating information to the GSM Infocentre RAEX IR.21 Application, according to the RAEX IR.21 exchange process described in [7.2.1 RAEX Exchange Process].

   The timescales for a PMN to send information about a change of data to the GSM Infocentre RAEX IR.21 Application are described in [6.2 Update Intervals].
2. The GSM Infocentre RAEX IR.21 Application updates the database with the information provided.
3. The IR.21 information for each PMN is available on the GSM Association's Infocentre RAEX IR.21 Application. A nominated contact from each PMN operator can make changes to update the information on this database for their respective network only.
4. After a new change on the PMN information occurs all the other PMN operators will receive automatic notification that a change has been made to that operator's IR.21 information, as described in [7.3 Notification Functionalities].

5 Annex A

Updating of the GSM Association roaming database

GSMA Roaming Database

IR.21 Data

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Effective Date of Change:	DD-MM-YYYY

ORGANISATION INFORMATION

Section ID: 1 (Mandatory)

Organisation Name:[1]	<Organisation Name>
Country:	<XXX>

1 Maximum 128 chars. This field is only used for administrative purposes, however, it must always be filled in order to identify the operator.

History of Changes

Date of Change	Section ID	*TADIG Code*	Description
YYYY-MM-DD			
YYYY-MM-DD			
YYYY-MM-DD			
YYYY-MM-DD			

NETWORK

Section ID: 2 (Mandatory, Repeating)

TADIG Code:	XXXYY *(Fill with TADIG Code Associated to the Network. See TD.13)*

Network Type:	*Choose between "*Terrestrial" or "Non-Terrestrial"

NETWORK INFORMATION

Section ID: 3 (Mandatory)
The following information refer to the network identified by TADIG Code: XXXYY
RAEX Version: YYYY

ROUTING INFORMATION

TADIG Code: XXXYY
Section ID: 4 (Mandatory)

CCITT E.164 Number series	**Country Code (CC)**	**National Destination Code (NDC)**	***SN Range Start***	***SN Range Stop***	***Primary International DPC[2]***	***Secondary International DPC[3]***
MSISDN Number Range(s):						

Network Nodes Global Title Number Range(s):						

MSRN Number Range(s):						

E. 212 Number series:	**Mobile Country Code (MCC)**	**Mobile Network Code (MNC)**

[2] Primary Destination Point Code parameters mandatory for signalling routing configuration. This field must be filled if SCCP routing differentiation is applied to group of E.164 number series, by using one of the DPC values defined in section "International SCCP GW"

[3] Secondary Destination Point Code parameters mandatory for signalling routing configuration. This field must be filled if SCCP routing differentiation is applied to group of E.164 number series, by using one of the DPC values defined in section "International SCCP GW"

E. 214 Mobile Global Title (MGT)	Country Code of MGT (CC)[4]	Network Code of MGT (NC)

Does Number Portability apply?	

List of E.164 Number Ranges due to Number Portability	CC	NDC	*SN Range Start*	*SN Range Stop*

Additional Information:	

Short number translation information	Short number	Long number[5]	Service name[6]

INTERNATIONAL SCCP GATEWAY

TADIG Code: XXXYY
Section ID: 5 (Mandatory)

International SCCP Carrier List	
SCCP Carrier Info	
SCCP carrier Name:	
DPC List	
DPC Info	
Signature:	
Type:	
International DPC:	
Comments:[7]	

4 identical to the E.164 Country Code. Additional information due to Number Portability is included in the "Number Information" field of the "Miscellaneous Information" table

5 translated short number in international format without international call prefix (+, 00, 011,…)

6 service name. For instance: customer care, voice mail.

7 To provide more information about the specific DPC used (i.e. primary, secondary)

DOMESTIC SCCP GATEWAY

TADIG Code: XXXYY
Section ID: 6 (Conditional)

Section Not Applicable

Or

Domestic SCCP Carrier List	
SCCP Carrier Info	
SCCP carrier Name:	
DPC List	
DPC Info	
Signature:[8]	
Type:[9]	
Domestic DPC:	
Comments:[10]	

SCCP PROTOCOL AVAILABLE AT PMN FOR CONNECTION FOR INTERNATIONAL SS7 ROAMING

TADIG Code: XXXYY
Section ID: 7 (Optional)

Section Not Applicable

Or

SCCP Protocol available at PMN	**Availability (Yes/No)**
ETSI (ITU):	
ANSI:	

SUBSCRIBER IDENTITY AUTHENTICATION

TADIG Code: XXXYY
Section ID: 8 (Mandatory)

Authentications	**Performed (Yes/No)**
Authentication performed for Roaming subscribers at the commencement of GSM service[11]	

8 Maximum 20 letters. This field is only needed for information and may be omitted.

9 ISC, MSC, Stand-alone SCCP etc. Maximum 20 letters. This field is only needed for information and may be omitted

10 To provide more information about the specific DPC used (i.e. primary, secondary)

11 Write YES if authentication is performed as described within the current version of SG.15 under section Subscriber Identity Authentication/ Roamed Subscriber. Otherwise write NO

SG.15 v 3.0.0 says in section 2.2 Roamed Subscribers:

For roamed subscribers (at the commencement of GSM service) authentication is to be performed at every occasion of:-

Authentication performed for roaming subscribers in case of GPRS[12]	

A5 Cipher Algorithm version in use	

Test Numbers Information

TADIG Code: XXXYY
Section ID: 9 (Optional)

Section Not Applicable

Or

Number Type	Test Number	*Location*	*Comments*

a) Network access using IMSI

b) Location updating involving VLR change

c) Network access for at least 1 in x mobile originated and terminated call set-ups (incl. SMS). The value of x will be defined in the roaming agreements and should be less than 10

d) Supplementary service operation outside call

e) Cipher key sequence number mismatch

If GPRS is supported, authentication is also to be performed at every occasion of:-

a) GPRS attach

b) routing area updating involving SGSN change

c) PDP context activation

d) P-TIMSI signature mismatch, if P-TMSI signature is used

e) P-TMSI signature not inserted in a Attach Request or Routing Area Update Request

12 Write YES if authentication is performed as described within the current version of SG.15 under section Subscriber Identity Authentication/ Roamed Subscriber if GPRS is supported. Otherwise write NO. If GPRS is not supported fill in N/A

MOBILE APPLICATION PART (MAP)

TADIG Code: XXXYY
Section ID: 10 (Mandatory)

Interworking Specifically for Roaming				
Application Context Name	**Current Version in**			***Comment***
	Inbound Roaming		**Outbound Roaming** [13]	
	MSC/VLR	**SGSN**		
networkLocUp		N/A		
roamingNumberEnquiry		N/A		
InfoRetrieval				
subscriberDataMng				
networkFunctionalSs		N/A		
mwdMngt				
shortMsgMT-Relay (shortMsgRelay in v1)				
shortMsgMO-Relay (shortMsgRelay in v1)				
ss-InvocationNotification		N/A		
subscriberInfoEnquiry				
gprsLocationUpdate	N/A			
locationCancellation				
msPurging				
reset				
networkUnstructuredSs		N/A		
Reporting		N/A		
callCompletion		N/A		
istAlerting		N/A		
serviceTermination		N/A		
locationSvcGateway	N/A	N/A		
mm-EventReporting		N/A		
authenticationFailureReport				
imsiRetrieval		N/A		
gprsNotifyContext	N/A			
gprsLocationInfoRetrieval	N/A			
failureReport	N/A			
secureTransportHandling				

13 The term "Outbound Roaming" denotes any one of the following nodes that is located in the home PLMN only: HLR, gsmSCF, SMS-IWMSC, SMS-GMSC.

MAP OPTIMAL ROUTING SECTION

TADIG Code: XXXYY
Section ID: 11 (Optional)

Section Not Applicable

Or

MAP Optimal Routing of mobile-to-mobile calls				
Application Context Name	**Current Version in**			***Comment***
	(V)MSC[14]	**GMSC**	**HLR**	
CallControlTransfer			N/A	
LocationInfoRetrieval[15]	N/A			

MAP INTER OPERATOR SMS ENHANCEMENT

TADIG Code: XXXYY
Section ID: 12 (Optional)

Section Not Applicable

Or

Inter-Operator SMS Enhancement				
Application Context Name	**Current Version in**			***Comment***
	SMS-IWMSC	**SMS-GMSC**	**HLR**	
shortMsgGateway	N/A			
shortMsgAlert		N/A		

14 The MSC is acting as a VMSC for a roaming subscriber for ORLCF; see sub-clause 4.2 of 3GPP TS 23.079 for more information.

15 The "locationInfoRetrieval" application context is only valid for inter-PMN signalling in Optimal Routeing of mobile-to-mobile calls; otherwise it is only intra-PMN. Note that the dialogue initiator is a GMSC which is integrated with the calling subscriber's MSC/VLR (and obviously the dialogue responder is the called subscriber's HLR, which is in the called subscriber's HPMN).

NETWORK ELEMENTS INFORMATION

TADIG Code: XXXYY
Section ID: 13 (Mandatory)

Node Type	**Node ID**	**GT Address or GT Address Range**	***IP Address or IP Address Range***	***Vendor Info***	***Sw/Hw Version***	***Dual Access*** [16]	***Location***	**UTC Time Offset**	***DST*** [17] ***Start***	***DST End***

USSD INFORMATION

TADIG Code: XXXYY
Section ID: 14 (Optional)

Section Not Applicable

Or

USSD capability available? [18]	
Supported phase: [19]	

16 Dual Access information for testing purposes

17 Indication if Daylight Savings Time (DST) is observed. Insert Start and End date for DST (mm/dd/year).

18 Yes means USSD capability is supported including all of case a), section 5.1.2, 3GPP TS 22.090 / GSM 02.90.

19 The field is mandatory, where USSD capability is available.

Phase 1 only support mobile initiated operation (pull operation)

Phase 2 support for network initiated operation (pull and push operation).

CAMEL INFO

TADIG Code: XXXYY
Section ID: 15 (Conditional)

Section Not Applicable

Or

gsmSSF/MSC		
CAP Version supported[20] Inbound	***Planned Version***	***Planned Date:***
CAP Version supported[21] Outbound	***Planned Version***	***Planned Date:***

CAMEL Functionality Information			
Service name	**SK**	**CAP Version**	**SCP GT Address(es)**
CAMEL re-Routing Numbering Information			
List of numbers used for re-routing purposes[22]			

CAPv4 Partial Implementations[23]		
CAMEL Phase 4 CSIs:	**Supported (Yes/No)**	***Planned Date:***
O-CSI		
D-CSI		
VT-CSI		
MT-SMS-CSI		
Functionalities:	**Supported (Yes/No)**	***Planned Date:***
Initiate Call Attempt		
Split Leg		
Move Leg		
Disconnect Leg		
Entity Released		
DFC With Argument		
Play Tone		
DTMF Mid Call		
Charging Indicator		
Alerting DP		
Location At Alerting		
Change Of Position DP		

20 For information: some operators may restrict the use of CAMEL on specific PMNs.

21 For information: some operators may restrict the use of CAMEL on specific PMNs.

22 To provide information of Re Routing CAMEL number for troubleshooting

23 To be completed only if CAP version 4 is supported.

CAPv4 Partial Implementations[23]		
CAMEL Phase 4 CSIs:	**Supported (Yes/No)**	***Planned Date:***
OR Interactions		
Warning Tone Enhancements		
CF Enhancements		

gsmSSF/SGSN		
CAP Version supported[24]	***Planned Version:***	***Planned Date:***

CAPv4 Partial Implementations[25]		
CAMEL Phase 4 CSIs:	**Supported (Yes/No)**	***Planned Date:***
MT-SMS-CSI		
MG-CSI		
PSI Enhancements		

24 For information: some operators may restrict the use of CAMEL on specific PMNs

25 To be completed only if CAP version 4 is supported.

PACKET DATA SERVICES INFORMATION

TADIG Code: XXXYY
Section ID: 16 (Conditional)

Section Not Applicable

Or

List of APN Operator Identifiers	
APN Operator Identifier[26]	

List of APNs available for testing and troubleshooting

APN WEB List				
APN Credential			***ISP DNS IP address (primary)***	***ISP DNS IP address (secondary)***
APN	**Username**	**Password**		

APN WAP List					
APN Credential			***WAP Gateway IP Address***	***WAP Server URL***	***WAP Port***
APN	**Username**	**Password**			

APN MMS List				
APN Credential			***WAP Gateway IP address for MMS***	***Messaging Server URL***
APN	**Username**	**Password**		

GTP Version[27]	
SGSN:	
GGSN:	

List of Data Services supported	
Data Service	***Multislot Class Capability***[28]

26 APN Operator Identifier used for GGSN resolution. The last three labels of the APN Operator Identifier must be in the form: MNC.MCC.GPRS

27 The highest GTP version which operators support. (e.g.: R97 and R98: ver.0, R99 and after R99 : ver.1)
It is recommend that GTPver1 be supported from 00:00:00 1st January 2005, otherwise while GTPver0 only is supported by a network that network should apply the configuration defined in IR.34.

28 Maximum Multislot class capability available

List of Data Services supported	
Data Service	***Multislot Class Capability*[28]**
Multiple PDP Context Support[29]	
Supported or Not Supported	
Number of simultaneous Primary PDP context	

IPv6 Connectivity Information		***Supported (Yes/No)***
SGSN	**IPv6 PDP Type**	[Yes/No]
	IPv4v6 PDP Type	[Yes/No]
GGSN	**IPv6 PDP Type**	[Yes/No]
	IPv4v6 PDP Type	[Yes/No]

29 If Yes please indicate how many simultaneous Primary PDP context are supported by the network

IP - ROAMING AND IP - INTERWORKING INFORMATION

TADIG Code: XXXYY
Section ID: 17 (Conditional)

Section Not Applicable

Or

List of All IP address ranges used by PMN for connection to Inter-PMN IP backbone[30]	**IP Address Range**

Any *additional* MNC/MCC (that is different to the MNC/MCC in the E.212 field) that may be sent in the Routeing Area Identity (RAI) in GTP messaging from SGSNs[31]	**MCC (3 digit)**	**MNC (2 or 3 digit)**

List of Autonomous System Numbers	**ASN[32]**

List of PMN authoritative DNS server IP addresses and names[33]	**IP address**	**DNS Name**

List of PMN local caching DNS server IP	***IP address***	***DNS Name***

30 IP addresses or IP address range(s) of all operator's nodes that connect to the inter-PMN IP backbone network known as the "GRX" e.g. GGSNs, SGSNs, MMSCs, AAA Servers/Proxies, DNS Servers etc. This information is used for firewall and Border Gateway configuration (see PRD IR.34).

31 Provide the details of any MNC/MCC that is different to the E.212 field (located at the top of the IR.21 form) that can be sent from any SGSN in the VPMN to the GGSN in the HPMN, in the Create PDP Context Request and Update PDP Context Request GTP messages. If only the MNC/MCC as stated in the E.212 field is sent to the HPMN, this table should be left blank.

32 The Autonomous System Number (ASN) is a 16 bit integer that every PMN must assign to their IP network that is seen as one Autonomous System (AS). The ASN enables the exchange of exterior routing information between neighbouring Autonomous Systems. This can be either a private ASN (64512 through to 65535) or public ASN.

33 IP address(es) and name(s) of DNS server(s) that are authoritative DNS server(s) i.e. DNS servers that answer DNS requests/queries from local caching DNS servers. Note that DNS hostname(s) given in this field should match the actual name(s) configured in the operator DNS server(s) (this is to avoid conflict with the NS records in the Root DNS and operator DNS servers).

addresses and names[34]		

IP address that responds to ping/traceroute:[35]	

List of GRX Providers	**GRX Provider**

34 IP address(es) and name(s) of DNS server(s) that are local caching DNS server(s) i.e. DNS server(s) that send DNS requests/queries in order to resolve domain names on behalf of e.g. SGSN, MMSC etc. Note that DNS hostname(s) given in this field should match the actual name(s) configured in the operator DNS server(s) (this is to avoid conflict with the NS records in the Root DNS and operator DNS servers).

35 Pingable and traceroutable IP address of a node within the operator's AS. Maximum size for ping is 64 bytes. Minimum time interval for pinging is 1 hour.

MMS INTERWORKING INFORMATION

TADIG Code: XXXYY
Section ID: 18 (Optional)

Section Not Applicable

Or

MMS Element Data						
Domain name of MMSC	**IP Address Range for MMSC[36]**	**Max. size of MMS allowed**	**Delivery Report allowed? (Yes/No)**	**Read Report allowed? (Yes/No)**	**IP address(es) of Incoming MTA**	**IP address(es) of Outgoing MTA**
List of MMS IW Hub Provider		**MMS IW Hub Provider Name**			**MMS IW Hub Provider GT Address**	

MMS Element Data						
Domain name of MMSC	**IP Address Range for MMSC**	**Max. size of MMS allowed**	**Delivery Report allowed? (Yes/No)**	**Read Report allowed? (Yes/No)**	**IP address(es) of Incoming MTA**	**IP address(es) of Outgoing MTA**
List of MMS IW Hub Provider		**MMS IW Hub Provider Name**			***MMS IW Hub Provider GT Address***	

36 IP addresses or IP address range(s) of MMSC that give onto the inter-PMN backbone. This information is used for firewall and Border Gateway configuration

WLAN INFORMATION

TADIG Code: XXXYY
Section ID: 19 (Optional)

Section Not Applicable

Or

List of RADIUS server/ RADIUS proxy IP address(es)	**IP Address**

List of IP address range(s) used for WLAN roaming[37]	**IP Address Range**

List of WLAN Service Brand[38]	**Brand Name**	**Realm**

LTE ROAMING INFORMATION

TADIG Code: XXXYY
Section ID: 20 (Conditional)

Roaming Interconnection	
Diameter:	
IP addresses of the Diameter Edge Agent[39]	[List/Range/Subnetmask of IP addresses]
S6a:[40]	
Is S6a supported without IWF?	[Yes/No]
Hostnames for HSS, MME in the form which they are used in the Diameter-Origin and Diameter-Destination,	

37 "Subnet IP address range(s) in the form of x.x.x.x/n to which the RADIUS server/proxy IP address also belongs".

38 Brand name of the Home WO WLAN service seen by the end user in the web based login page. The brand name can be used to mask the realm from the end user in web based login pages e.g. by utilizing a dropdown box into realm known by the network. This enables an operator to change its roaming realm with reduced impact to the user experience. If the operator has multiple roaming realms they have to be mapped one-to-one to brand names.

39 **GSMA PRD IR.88 specifies 6 deployment examples for Diameter Edge Agent. This entry shows Edge Agent IP addresses if deployment example 1-4 is used, and shows Diameter Agent outsourced to IPX for deployment example 5 and 6.**

40 Support of S6a (with or without IWF) is a requirement for full LTE roaming

Host and Realm AVPs	
Is IWF available to allow support of inter-PMN MAP interface for connection towards HSS?	[Yes/No]
Is IWF available to allow support of inter-PMN MAP interface for connection towards MME?	[Yes/No]
S6d:	
Is S6d used for legacy SGSN?	[Yes/No]
S9:	
Is S9 used?	[Yes/No]
S8:	
Is GTP Interface available?	[Yes/No]
Is PMIP Interface available?	[Yes/No]

SMS ITW	
SMS Delivery mechanism	
SMS over IP	[Yes/No]
SMS over SGs	[Yes/No]

Voice ITW	
IMS/CSFB/other	

Roaming Retry[41]	
Is Roaming Retry supported?	[Yes/No]

Home PMN Information For LTE Roaming Agreement Only	
Is LTE-only roaming supported?	[Yes/No]

Visited PMN Information For LTE Roaming Agreement Only	
Is LTE-only roaming supported?	[Yes/No]

Home PMN Information For 2G/3G Roaming Agreement Only (See footnote[42] for scenario 1, and footnote[43] for other scenarios)	
Scenario 2 supported?	[Yes/No]
Scenario 3 supported?	[Yes/No]

Visited PMN Information For 2G/3G Roaming Agreement Only (See footnotes for Home PMN entry for the details of scenarios)	
Scenario 2 supported?	[Yes/No]
Scenario 3 supported?	[Yes/No]

41 Roaming Retry is required for CSFB, as defined in 3GPP TS 23.272

42 **Scenario 1 is same as legacy GPRS roaming.**

43 **Scenario 2 and 3 are described in GSMA PRD IR.88 Section 4.2.2.1 "2G/3G Roaming Agreement Only"**

Home PMN Information For 2G/3G and LTE Roaming Agreement (See footnote[44] for scenarios)	
Scenario 1 supported?	[Yes/No]
Scenario 2 supported?	[Yes/No]
Scenario 3 supported?	[Yes/No]
Scenario 4 supported?	[Yes/No]

Visited PMN Information For 2G/3G and LTE Roaming Agreement (See footnote[45] for scenarios)	
Scenario 1 supported?	[Yes/No]
Scenario 2 supported?	[Yes/No]
Scenario 3 supported?	[Yes/No]
Scenario 4 supported?	[Yes/No]

List of QCI[46] values supported	
QCI value	

IPv6 Connectivity Information		*Supported (Yes/No)*
MME	**IPv6 PDN Type**	[Yes/No]
	IPv4v6 PDN Type	[Yes/No]
SGW	**IPv6 PDN Type**	[Yes/No]
	IPv4v6 PDN Type	[Yes/No]
PGW	**IPv6 PDN Type**	[Yes/No]
	IPv4v6 PDN Type	[Yes/No]

44 **All Scenarios are described in GSMA PRD IR.88 Section 4.2.2.2"4.2.2.2 2G/3G and LTE Roaming Agreement"**

45 **All Scenarios are described in GSMA PRD IR.88 Section 4.2.2.2"4.2.2.2 2G/3G and LTE Roaming Agreement"**

46 All QCI values supported by the VPLMN must be listed here. At least there must be one QCI value supported. QCI 1 & 5 must be supported for VoLTE

CONTACT INFORMATION

TADIG Code: XXXYY
Section ID: 21 (Mandatory)

List of Roaming Troubleshooting Contact Information				
Troubleshooting Office Information Item				
Location				
Office Time Zone in UTC[47]				
Office Hours	**Week Day(s)**	**Start Time**	**End Time**	
	Mon, Tue, Wed			
	Thu, Fri			
Main Contact for Troubleshooting (Office Hours)	**Team Name**	**Tel.**	**Fax**	**Email**
Escalation Contact for Troubleshooting	**Person Name**	**Tel.**	**Fax**	**Email**
24 x 7 Troubleshooting Contact (Out of Office Hours)	**Team Name**	**Tel.**	**Fax**	**Email**
Troubleshooting Office Information Item				
Location				
Office Time Zone in UTC				
Office Hours[48]	**Week Day(s)**	**Start Time**	**End Time**	
Main Contact for Troubleshooting (Office Hours)	**Team Name**	**Tel.**	**Fax**	**Email**[49]
Escalation Contact for Troubleshooting	**Person Name**[50]	**Tel.**	**Fax**	**Email**
24 x 7 Troubleshooting Contact (Out of Office Hours)	**Team Name**[51]	**Tel.**	**Fax**	**Email**

Additional Contacts				
SCCP Inquiries and ordering of	**Person Name**	**Tel.**	**Fax**	**Email**

47 Office Time zone relative to GMT/UTC (± hrs).

48 Normal office hours e.g. Mon-Sat 08:00 to 17:00.

49 Generic e-mail addresses are recommended, e.g. roamingsupport@operator.com

50 Contact for escalating roaming faults as per PRD IR.78.

51 Contact for roaming troubleshooting out of office hours. Can be the same as Main Contact for Troubleshooting.

SS7 Routes					

Roaming Coordinator	**Person Name**	**Tel.**	**Fax**	**Email**	

IREG Tests	**Person Name**	**Tel.**	**Fax**	**Email**	

TADIG Tests	**Person Name**	**Tel.**	**Fax**	**Email**	

CAMEL Tests	**Person Name**	**Tel.**	**Fax**	**Email**	

GPRS Contact	**Person Name**	**Tel.**	**Fax**	**Email**	

Contact Person(s) (in PMN) for GRX connectivity	**Person Name**	**Tel.**	**Fax**	**Email**	

Contact person (in PMN) to verify authority of a GRX provider to add/modify data in Root DNS	**Person Name**	**Tel.**	**Fax**	**Email**	

Contact person(s) for IW MMS	**Person Name**	**Tel.**	**Fax**	**Email**	

Person Name		**Tel.**	**Fax**	**Email**	
Contact person(s) for IW SMS					

Person Name	**Tel.**	**Fax**	**Email**	
Contact person(s) for WLAN				

Other Contacts

Person Name	**Tel.**	**Fax**	**Email**	
Job Title				

IR21 Distribution Email Address	**Email**

HOSTED NETWORKS

TADIG Code: XXXYY
Section ID: 22 (Optional, Repeating)

Section Not Applicable

Or

List of Hosted Network Data						
Hosted Network Data						
Network Name:						
Country:						
TADIG Code						
Network Type	*Choose between "*Terrestrial" or "Non-Terrestrial"					
List of Hosted Network Nodes						
Node Type	**GT (E.164) Address(es)**	***IP Address(es)***	**MSRN Range(s)**			
			CC	**NDC**	***SN Range Start***	***SN Range End***

Hosted Network Data						
Network Name:						
Country:						
TADIG Code						
Network Type	*Choose between "*Terrestrial" or "Non-Terrestrial"					
List of Hosted Network Nodes						
Node Type	**GT (E.164) Address(es)**	***IP Address(es)***	**MSRN Range(s)**			
			CC	**NDC**	***SN Range Start***	***SN Range End***

6 Annex B

6.1 Update schedule for the GSM Association Roaming Database

General updating procedures for information in the Roaming Database are described in section 4 of this document. The following schedule shall detail these procedures with regard to the single parts of information.

The various fields contained in the database are of different importance to the operation of the GSM networks. Therefore, the time schedule of sending the information about a change of data to the GSMA Infocentre RAEX IR.21 Application and the delay until this information is distributed to the other GSM Association members may depend upon the single case.

Details of any changes will be sent via email according notification functionalities.

6.2 Update Intervals

The intervals for updating of information shall be as follows:

1. Name of Operator/Operator's Home Country (abbreviated):

Impact:

Changes to a name of the operator are only critical to the administrative parts of GSM relationships. New operators joining the GSM Association should be introduced as soon as possible.

Update to GSMA Infocentre RAEX IR.21 Application:

As soon as possible with date when the change will be valid or the new member will start service

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

With next full update (if before date of change), otherwise at least two weeks before change.

2. E.164 CC+NDC of the MSISDN:

Impact:

Critical information for the operation of International Roaming connections. New or changed data have to be implemented in the switches.

Update to GSMA Infocentre RAEX IR.21 Application:

3 months before change takes place.

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

Within one week.

3. E.212 MCC+MNC of the IMSI:

Impact/Update to GSMA Infocentre RAEX IR.21 Application/Distribution to GSM Association members:

Similar to item 2.

4. E.214 CC+NC of the Mobile Global Title (MGT):

Impact/Update to GSMA Infocentre RAEX IR.21 Application/Distribution to GSM Association members:

Similar to item 2.

5. International SPC of the International Gateway SCCP Node(s) connected:

Impact:

Critical if one or both GSM networks have gateways with ISPC and direct access to the international SS7 network. Otherwise in the responsibility of the international fixed network operators.

Update to GSMA Infocentre RAEX IR.21 Application:

three months before change takes place.

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

Within one week.

6. Signature of the International Gateway SCCP Node(s) connected:

Impact:

Only for administrative reasons.

Update to GSMA Infocentre RAEX IR.21 Application:

As soon as possible with date when the change will be valid.

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

With next full update (if before date of change), otherwise at least two weeks before change.

7. Exchange Type of the International Gateway SCCP Node(s) connected:

Impact/Update to GSMA Infocentre RAEX IR.21 Application/Distribution to GSM Association members:

Similar to item 6.

8. Initial/Subsequent Access Solution(s) to the International SS7 Network:

Impact:

For information only. Details exchanged under items 5,6,7.

Update to GSMA Infocentre RAEX IR.21 Application:

As soon as possible with date when the change will take place.

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

With next full update (if before date of change), otherwise at least two weeks before change.

9. (GPRS information) IP based services information:

Impact:

Critical information for the operation of International Roaming connections. New or changed data to be implemented on the PMN operator's GPRS network or the GPRS root DNS server where relevant.

Update to GSMA Infocentre RAEX IR.21 Application:

It is recommended to inform the affected operators two months before change, but at least one month before.

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

Within one week.

10. Date of Introduction of White Book SCCP:

Impact:

Critical to operation with regard to compatibility aspects.

Update to GSMA Infocentre RAEX IR.21 Application:

three months before date of introduction in order to allow for agreements between the affected GSM networks.

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

Within one week.

11. Date of Introduction of First MAP Version 2 Operation (to be filled at the discretion of PMN Operators):

Impact:

Less critical to operation, however necessity for coordination.

Update to GSMA Infocentre RAEX IR.21 Application:

As soon as possible, three month before first date of operation recommended.

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

With next full update (if before date of first introduction), otherwise at least 6 weeks prior to first introduction.

12. Additional Data (Contact Names, Comments, and so on.):

Impact:

Contact names critical to negotiations between the operators. Other miscellaneous information dependent on single case.

Update to GSMA Infocentre RAEX IR.21 Application:

For contact names and addresses as soon as possible with date when the change will be valid. For other information left up to the operator.

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

Within one week for contact names and addresses, for other information according to the request of the operator.

13. SMS GT addresses:

Impact:

Information critical to operation of International SMS Interworking connections. New or changed data have to be implemented in the switches.

Update to GSMA Infocentre RAEX IR.21 Application:

At least four weeks in advance, with date when the change will be valid.

Distribution from GSMA Infocentre RAEX IR.21 Application to GSM Association members:

As soon as possible after the update has been made.

6.3 Update Intervals Scheme

The intervals for updating of information are described in the following schema:

Section Id	Section Name	Element (if needed)	Impact	Update
1	Organization information		Administrative only	
2	Network		Critical	3 months before
3	Network Information		Critical	3 months before

4	Routing Information		Critical	3 months before
5	International SCCP GW		Critical	3 months before
6	Domestic SCCP GW		Critical	3 months before
7	SCCP Protocol available at PMN ….		Normal	1 week
8	SUBSCRIBER IDENTITY AUTHENTICATION		Normal	1 week
9	Test Numbers Information		Medium. Maintenance usage	1 month before
10	MAP Interworking Specifically for Roaming		Normal. Critical for new version introduction	3 months before
11	MAP Optimal Routing of mobile-to-mobile calls		Normal	1 week
12	Inter-Operator SMS Enhancement		Normal	1 week
13	Network Elements Information		Medium	4 weeks before
14	USSD Information		Normal	1 week
15	CAMEL Information		Critical	3 months before
16	Packet Data Services Information		Critical	2 months before
17	IP-Roaming and IP-Interworking Information		Critical	2 months before
18	MMS Interworking Information		Critical	3 months before
19	WLAN Information		Critical	3 months before
20	Numbering Information		Normal	1 week
21	Contact Information		Critical for troubleshooting Normal for other contacts	3 months before 1 week
22	Roaming HUB Info		Critical	3 months before
23	Hosted Networks		Critical	45 days before

7 Annex C

7.1 RAEX IR.21 Business Requirements

In addition to the Word, Excel or PDF IR.21, Operators may also choose to exchange IR.21 data electronically by using RAEX IR.21 until a defined date.
Iif the “electronic” way is considered the initialy option, after the defined deadline, electronic format may become the only admitted and certified way to exchange PMN information.
RAEX IR.21 provides the means of exchanging the IR.21 using a pre-defined data format and according to a standardized business process represented here. The standard IR.21 will remain the legally binding document.

RAEX IR.21, when used, should conform to the latest version of IR.21 in order to avoid any lose of changes on Roaming Partners data.

RAEX IR.21 requirements are **Binding** within the GSMA Community.

For RAEX purposes, Service Providers (SP) in this document will be considered: Operators and Roaming Hubbing Providers.

7.2 RAEX IR.21 Exchange process and Notification functionalities

This section highlights and describes the exchange process to be used by the parties using RAEX IR.21 format.

7.3 RAEX IR.21 exchange process

Is supposed to have the exchange process performed by GSMA Infocentre.
The implementation of the data input could be executed in two different ways:
A - Manual by Mobile Network Operator
B - Using Infocenter GUI

(A) Manual by Mobile Network Operator
According to the diagram below, an Operator could populate its own RAEX IR.21 XML file and submit it to the GSMA Infocentre using the procedure described.
The Operator that submits the file to the Infocentre is in charge of conformity check and data validation.
Conformity checks and validation of the data and the file are operations in charge of the sending Operator. The Infocentre allows the Operator to bring an image file containing the network interconnection diagram.
The Infocentre allows the Operator to bring an image file containing the network interconnection diagram.

(B) Using Infocenter GUI
The Infocentre GUI is an evolution of the user interface actually used for populating the Roaming Database. The GUI application is in charge to validate the integrity of the data and produce XML and PDF files. These will be then available for download.

If option A or B is used, once the data upload or data entry is completed, notification/distribution process starts towards the operator lists accordingly.

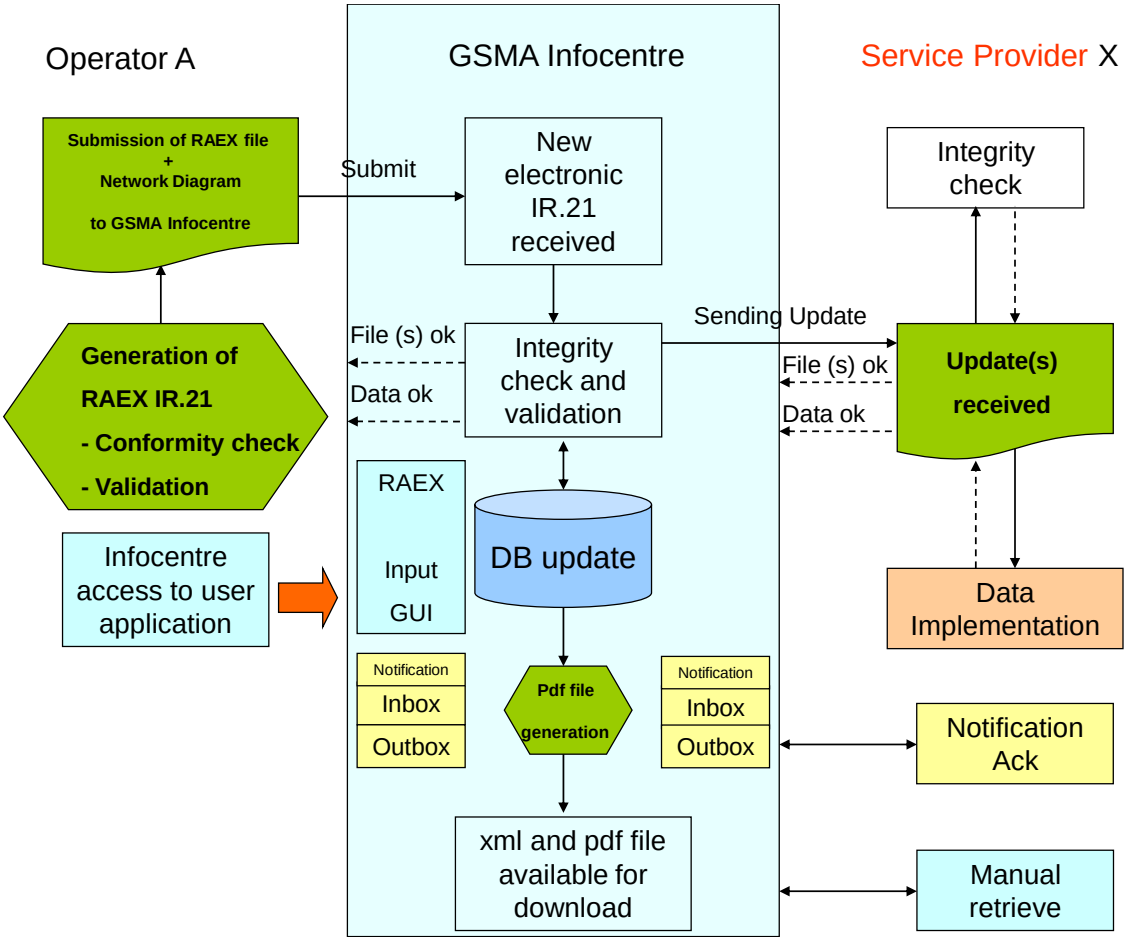

Figure 1: RAEX IR.21 Exchange Process

7.4 Details of Exchange process in manual or GUI scenarios

The first four steps are applicable in the manual upload of the XML file and network image by a PMN

1. Operator A generates the RAEX IR.21 File containing all IR.21 data. Operator A should ensure that the File it produces is correctly formatted and populated. For this purpose an XML file template is used. Within the file the date of the change is indicated.
2. Operator A Is also allowed to upload an image containing its network interconnection diagram
3. Submit the RAEX IR.21 File and an image to the GSMA Infocentre. The Infocentre will use this data to update the Internal Roaming Database. There will be a special section folder to allow a RAEX format upload.
4. An acknowledgement from the Infocentre, communicating the file has been correctly accepted and uploaded. Note: The Infocentre should also verify the integrity of the file and the structure according to the RAEX principles. It is out of scope to verify the correctness of data inserted by operators.
5. Operator A may use the Infocentre GUI as an interface for submitting its network data. The Internal Roaming Database is updated as per point 3.
6. The Infocentre sends a notification to the receiving party (to receiving parties listed accordingly) a new RAEX IR.21 is available within the website. This is done according to the notification preferences set by the receiving party within the Infocentre. The notification sent to the receiving parties may contain a number of RAEX IR.21 available.
7. SPX, on the receiving party side, will receive the updated notification and/or the updated XML file(s) and network diagrams, as it optionally has chosen within the notification/distribution section on the Infocentre.
8. SPX checks RAEX file(s) received for opening and readability of data. Any error on the file or corruption should be troubleshooted directly with the other party
9. Once the file has been verified by the receiving party, it will be loaded into systems according to internal procedures defined (for example manually, electronically)
10. According to the notification functionality, the party will communicate the right implementation and definition of the data sending back notification acknowledgement via the GSMA Infocentre RAEX IR.21 Application(see 3.3)

SPX is also able to manually retrieve XML/PDF IR.21 updated files and network diagrams.
The Infocentre for backward compatibility always generates PDF versions.

7.5 Notification functionalities

The notification of IR.21 updates is implemented per week (that is on Fridays) and contains a list of updates generates by operators and the reply acknowledges, if any/still.
The format of the notification is by email and the content provided is represented as listed below:

- Organization and contact name providing the update
- Alert number and URL to get access to the content
- Accessing the Infocentre page, an operator may acknowledge the receipt and provide implementation feedback (that is implemented or planned [date]). This is represented by an operator “outbox” section. This information is either transmitted back to the operator who sent the update and stored into an “inbox” section for that operator on the Infocentre.
- Reply method on email received could be used. The reply must contain information on acknowledge and implementation as above. The automation on the Infocentre replies the mechanism above for storing and providing back acknowledges.
- The weekly notification contains also the status of acknowledges with Infocentre URL to point for verification and consequently the table with operator list – Alert number of acks replied.

7.6 Company Logo

Every operator is allowed to upload its company logo on the Infocentre at the same time the XML file is provided. The logo format can be a JPG file and will be automatically integrated into the PDF file while converted with the XML schema. The name of the file shall be “logo.jpg”.
If the update is done directly on the Infocentre via GUI, the company logo can also be loaded in the input page.
The company logo position will be in the first page of IR.21

7.7 Access to roaming Database

Infocentre designated IR.21 administrators can access to Roaming Database for information retrieval. The method consists of accessing the relative page on the Infocentre containing the front end mask selection.
The mask contains a wizard to allow a cascade selection of the elements that are allowed to be queried. Possible elements are those defined in IR.21 Data Definition. The format of the output is provided in clear/text content.
At the same URL containing the query wizard, there is also the reference for downloading the entire IR.21 in XML or PDF versions.

7.8 File naming convention

A Naming convention is applied to RAEX IR.21 file according to GSMA IT specifications. It contains the following information:

- Organisation name/title
- TADIG Code
- Infocentre Id reference number

7.9 Version Control and Change Log

The main reference for IR.21 data is Annex A. Every potential change/addition to data structure and definition, with principles of Change Request process, will mirror changes in RAEX structure.
A revision control mechanism in use is still valid and also applied for RAEX sections.

A general ChangeLog is automatically populated with the information already present per section on the Infocentre.
It is defined by two fields:

- DATE
- DESCRIPTION

Operators must every time use the latest version definition and IR.21 RAEX documents, in order to avoid any lack of data or fields into their networks.
A version control mechanism is maintained by the Infocentre.

7.10 Structure of data

This paragraph shows the structure of the sections included within IR.21 Annex A with the purpose of:
A - Characterize sections with a tag (mandatory, optional, conditional)
B - Define dependencies between sections, if any
C - Identifying correctly the section name

In consideration of new services still in a design stage and scenarios already live (that is network extensions) it is proposed to structure the IR.21information considering these new services and to base the identification of a PMN with the IMSI associated, as described in the image attached.

Major level of the structure contains operator general information, the “organization name” that manages a single or a group of PMN(s), major identified with the element “network” (level 1). Unique reference in this network level, according to IMSI and MGT information, is the TADIG code, managed and released by GSMA to every PMN.

Every PMN has a major definition with the fields IMSI and MGT and with the possibility of having multiple IMSI series translated in a single MGT. At the same level, a differentiation by NDC is represented with the right parameters associated. This need is to accomplish those PMN who are indicating different SCCP GW destinations for their E.164 ranges.

Every operator will have as many different network data blocks as the pair of IMSI / MGT series they have.

Representation of extended and non terrestrial network will be given by a new section named “Hosted Networks”.

Roaming Hubbing will have its own section with relevant information on HUB provider.

The aim of the structure is logical, in order to let the data being reflected and verified within stable conditions.

In the below diagram, IR.21 sections are quoted with ID reference and colour marked according to this legend:

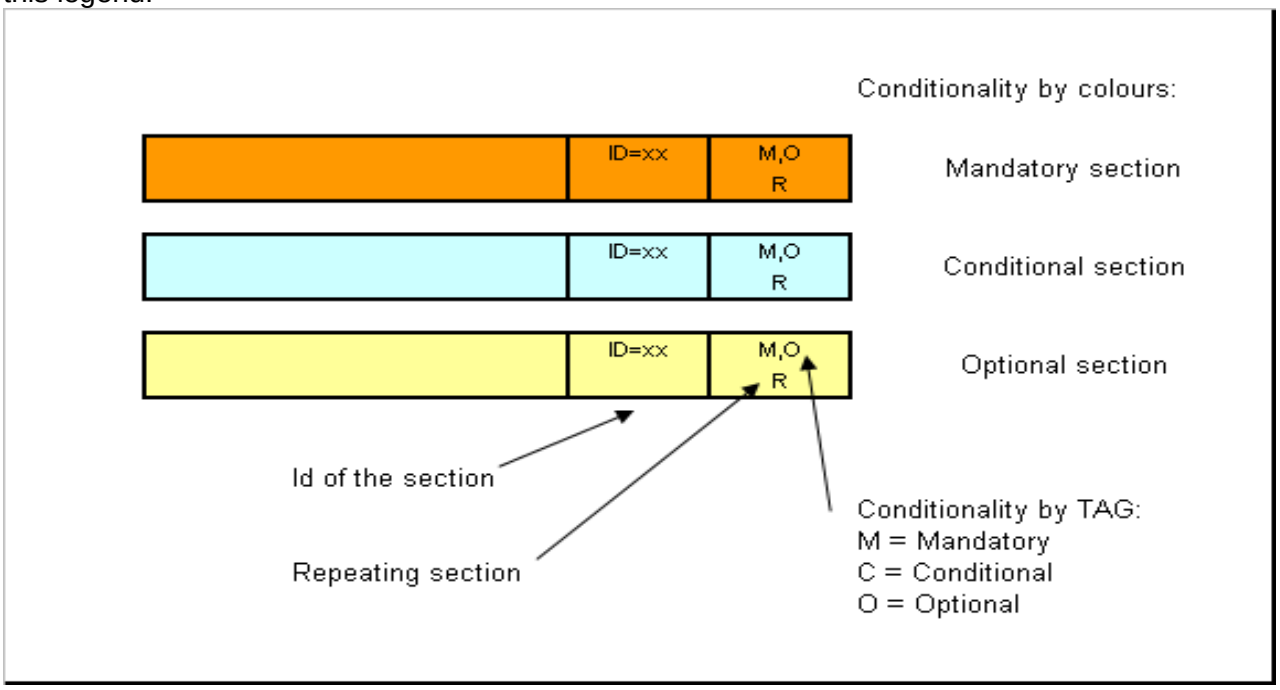

Figure 2: RAEX IR.21 Conditionality legend

Represented below is the Data Structure of IR.21 sections:

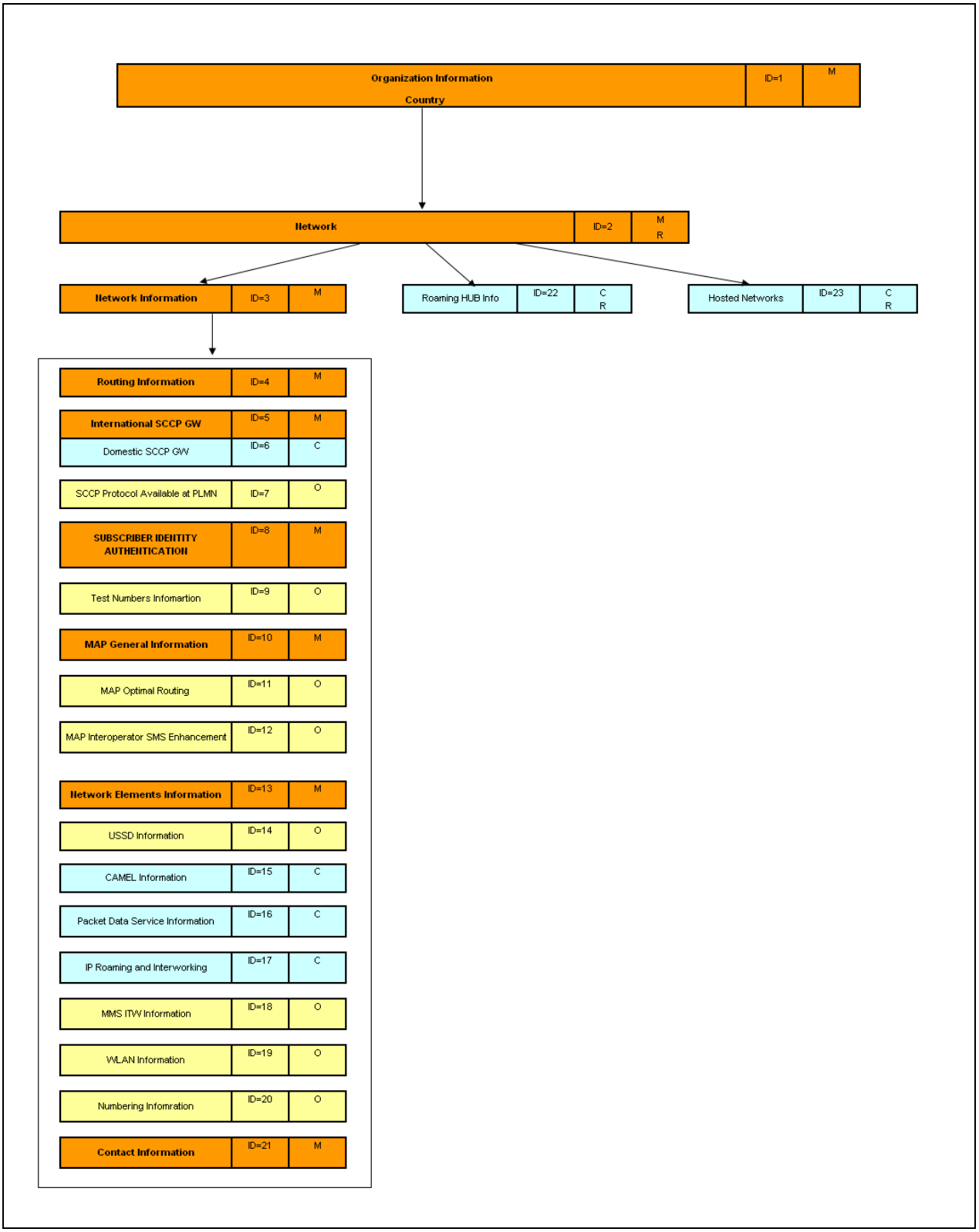

Figure 3: RAEX IR.21 Sections Data structure

7.11 IR.21 DATA DICTIONARY

This chapter contains detailed information for every field populated within IR.21, indicating whether they are Mandatory, Optional, type of content in the description of the field. This data should be used to further define technical requirements for RAEX XML file.
Starting from 6.3, top fields “Section name” and “ID” are used to uniquely identify the section, to be further addressed or referenced.
A legend is also created to define the structure of the content data.

7.11.1 Description

The table below describes each of the column headings used within the data dictionary. Every sub-chapter identifies IR.21 section name in

Column	Description	Example
Section Name	The name of the section	
ID	Section Id for reference	
Parent	Major referring element	
Element name	The name of the element described	
Format	Type format of the element	
Conditionality	Each element is defined as “Mandatory”, “Optional” or “Conditional”. - Conditional elements have a condition described in the particular “Description” field of the element. - Mandatory elements are a must. - Optional elements may not be present.	M= Mandatory C= Conditional O= Optional
Value Indicator	If available the value indicator contains a list of fix values allowed for the particular element or sub-element content	“Repeating” means the element can be used more times. “Y,N” means either value “Y” – yes or “N” – no, is allowed to be set.
Description	Textual description of the “IR.21 Element’s content”	Explicit description in case of “conditional” elements

Note: All free text fields must contain English text.

7.11.2 Terms legend

This legend is created with the intention to define the structure of common data repeated within the document. Elements defined in this legend are reported to the “format” field in next sections

Name	Format	Value(s) allowed	Example
Date	yyyymmdd		20070116
E.164GT Address	ITU E.164 number composed by CC+NDC+SN, max length xx digits		393359609600
E.164GT Address range	ITU E.164 number range, length is max xx digits		393351111111-393359999999
IMSI	ITU E.212 number composed by MCC+MNC+MSIN, length is max 15 digits		222011234567890
MGT	ITU E.214 number translated from E.212 and composed by CC+NC+MSIN, length is max xx digits		393391234567890
ITU DPC	Point code expressed in decimal format: a-b-c, length is max xx digits	a,c=1digit 0-9 b=3 digits 0 to 999	2-046-0
ANSI DPC	Point code expressed in decimal format: a-b-c, length is max xx digits	a=1digit 0-9 b=3 digits 0 to 999 c=2 digits 0 to 99	2-046-00
APN Op Id	mncxxx.mccxxx.gprs	X=0-9	mnc001.mcc222.gprs
IP Address	a.b.c.d (IPv4 format)	a=1-255 b=0-255 c=0-255 d=1-255	222.234.222.234
IP Address range	a.b.c.d/x	a=1-255 b=0-255 c=0-255 d=0-255 x= CIDR denotation of subnet mask. Values allowed are 1-32	222.234.222.0/16

ASN	xxxxx	Numeric Max 5 digit = 1- 65535	16232
Alpha	Alphanumeric		
Tel Number	(+) Number	(+) Number	+390612345678
WAP GW IP address	IP Address + (port number)		222.234.222.234:8080
Domain Name	Dot Alpha		Example: www.colorado.edu
URL (Uniform Resource Locator)	URL		http://wap.google.it; port may be included. Example: http://wap.google.it:3447

7.11.3 History of Changes

Section name: History of changes			**Conditionality: M,R**		
Parent	**Element Name**	**Format**	**Conditionality**	**Value Indicator**	**Description**
	Section ID	Numeric	M		ID of the section that has been modified.
	Date of change	Date	M		Represents the date when the change has been made to the section
	Description	Alphanumeric, max 512 chars	M		Brief description of changes made to the section

7.11.4 Effective date of change

Section name: Effective date of changes			ID: 0	Conditionality: M,R	
Parent	**Element Name**	**Format**	**Conditionality**	**Value Indicator**	**Description**
	Effective date of change	Date	M		Represents the date when the updated information contained into IR.21 will become effective

7.11.5 Organization information

	Section name: Organization Information		ID: 1	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Organization Information	Organization Name	Alphanumeric Max 128 chars	M		Identifies the name of the operator
Organization Information	Country	Text Max 3 chars	M		Country Code abbreviated according to ISO 3166
Organization Information	Network	N/A	M,R		Element containing all the information related to a particular network

7.11.6 Network

Section name: Network			ID: 2	Conditionality: M,R	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Network	TADIG Code	Alpha, max 5 chars	M		TADIG code associated to MCC/MNC of the network, according TD.13
Network	Type		M	Terrestrial, NonTerrestrial	
Network	Network Information	N/A	M,R	N/A	
Network	Roaming HUB Info	N/A	O,R	N/A	
Network	Hosted Networks	N/A	O,R	N/A	

7.11.7 Network Information

Section name: Network Information			ID: 3	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Value Indicator**	**Description**
Network Information	Routing Information	N/A	M		
Network Information	International SCCP GW	N/A	M		

Section name: Network Information			ID: 3	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Value Indicator**	**Description**
Network Information	Domestic SCCP GW	N/A	C		
Network Information	SSCP Protocol available at PMN for International Roaming	N/A	O		
Network Information	Subscriber Identity Authentication	N/A	M		
Network Information	Auto Roam Testing	N/A	O		
Network Information	MAP General Information	N/A	M		
Network Information	MAP Optimal Routing	N/A	O		
Network Information	MAP Interoperator SMS Enhancement	N/A	O		

Section name: Network Information			ID: 3		Conditionality: M
Parent	**Element Name**	**Format**	**Conditionality**	**Value Indicator**	**Description**
Network Information	MSC/VLR	N/A	M		
Network Information	SMSC Address	N/A	M		
Network Information	USSD Information	N/A	M		
Network Information	CAMEL Information	N/A	C		Section is mandatory, where CAMEL service is supported by the PMN
Network Information	Vendor Information	N/A	O		
Network Information	Packet Data Services	N/A	C		
Network Information	IP Data Roaming Information	N/A	C		

Section name: Network Information			ID: 3		Conditionality: M
Parent	**Element Name**	**Format**	**Conditionality**	**Value Indicator**	**Description**
Network Information	MMS ITW Information	N/A	O		
Network Information	WLAN Information	N/A	O		
Network Information	Contact Information	N/A	M		
Network Information	Numbering Information	N/A	O		

7.11.8 Routing Information

Section name: Routing Information			ID: 4	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Routing Information	CCITT E.164 Number Series	N/A	M		Contains definitions for the node ranges in use in the PMN.
Routing Information	E.212 Number Series	N/A	M		According ITU E.212, IMSI is composed by: 3 digits for MCC Max 3 digits for MNC
Routing Information	E.214 Mobile Global Title (MGT)	N/A	M		
Routing Information	Number Portability	Boolean	M	Yes No	
Routing Information	Numbering Information	N/A	M		
Numbering Information	E.164 Number Ranges due to Number Portability	E.164 GT Address	M,R		E.164 Number Ranges due to Number Portability may be included in this section.

Section name: Routing Information			ID: 4	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Numbering Information	Additional Information	Alpha	M,R		Additional Information about Numbering and addressing may be included in this section.
Routing Information	Short number translation information	N/A	O		
CCITT E.164 Number Series	MSISDN(s) number ranges	N/A	M,R		Number ranges in use in the PMN.
CCITT E.164 Number Series	Network nodes Global Title number range(s)	N/A	M,R		
CCITT E.164 Number Series	MSRN Number Range(s)	N/A	C,R		Field is mandatory for non terrestrial networks, otherwise it is optional. Definitions for Roaming Number ranges provided for MT calls in the PMN.
MSISDN(s) number ranges	Country Code (CC)		M		
MSISDN(s) number ranges	National Destination Code (NDC)		M		

Section name: Routing Information			ID: 4	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
MSISDN(s) number ranges	International DPC Primary		C		Primary Destination Point Code parameters mandatory for Signalling routing configuration. This field must be filled if SCCP routing differentiation is applied to group of E.164 number series, by using one of the DPC values defined in section “International SCCP GW”
MSISDN(s) number ranges	International DPC Secondary		C		Secondary Destination Point Code parameters mandatory for Signalling routing configuration. This field must be filled if SCCP routing differentiation is applied to group of E.164 number series, by using one of the DPC values defined in section “International SCCP GW”
Network nodes Global Title number range(s)	Country Code (CC)		M		
Network nodes Global Title number range(s)	National Destination Code (NDC)		M		
Network nodes Global Title number range(s)	International DPC Primary		C		Primary Destination Point Code parameters mandatory for Signalling routing configuration. This field must be filled if SCCP routing differentiation is applied to group of E.164 number series, by using one of the DPC values defined in section “International SCCP GW”
Network nodes Global Title number range(s)	International DPC Secondary		C		Secondary Destination Point Code parameters mandatory for Signalling routing configuration. This field must be filled if SCCP routing differentiation is applied to group of E.164 number series, by using one of the DPC values defined in

Section name: Routing Information			ID: 4	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
					section “International SCCP GW”
MSRN Number Range(s)	Country Code (CC)		M		
MSRN Number Range(s)	National Destination Code (NDC)		M		
E.212 Number Series	Mobile Country Code (MCC)		M		
E.212 Number Series	Mobile Network Code (MNC)		M		
E.214 Mobile Global Title (MGT)	Country Code of MGT (CC)		M		
E.214 Mobile Global Title (MGT)	Network Code of MGT (NC)		M		

Section name: Routing Information			ID: 4	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Short number translation information	Translation information		C, R		
Translation information	Short number	numeric	M		Short number to be translated by the VMSC
Translation information	Long number	ITU E.164 number	M		Long number result of the short number translation without international call prefix (+, 00, 011…)
Translation information	Service name	Alpha	M		Name of the service accessed when dialling the short number (voice mail, customer care…)

7.11.9 International SCCP GW

Section name: International SCCP GW			ID: 5	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
International SCCP GW	SCCP Carrier	N/A	M,R		
SCCP Carrier	SCCP Carrier Name	Alpha max 64 chars	M		The name of the SCCP Carrier
SCCP Carrier	DPC Info	N/A	M,R		
DPC Info	Signature	Alpha max 64 letters	M		Name associated to the switching center
DPC Info	Type	Text max 64 chars	O		Type of switching center: ISC, MSC, Stand-alone SCCP
DPC Info	International DPC	Alpha	M		Destination Point Code parameters mandatory for Signalling routing configuration. This value can be used for defining Primary and Secondary DPC information in Routing Information Section. Both ANSI and ITU format shall be supported
DPC Info	Comments	Text max 64 chars	O		To provide more information about the specific DPC used (that is primary, secondary)

7.11.10 Domestic SCCP GW

Section name: Domestic SCCP GW			ID: 6	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Domestic SCCP GW	SCCP Carrier	N/A	M,R		
SCCP Carrier	SCCP Carrier Name	Alpha max 64 chars	M		The name of the SCCP Carrier
SCCP Carrier	DPC Info	N/A	M,R		
DPC Info	Signature	Alpha max 64 letters	M		Name associated to the switching center
DPC Info	Type	Text max 64 chars	O		Type of switching center: ISC, MSC, Stand-alone SCCP
DPC Info	Domestic DPC	Alpha	M		Destination Point Code parameters mandatory for Signalling routing configuration Both ANSI and ITU format shall be supported
DPC Info	Comments	Text max 64 chars	O		To provide more information about the specific DPC used (that is primary, secondary)

7.11.11 SCCP Protocol available at PMN for connection for International SS7 Roaming Signalling

Section name: SCCP Protocol available at PMN			ID: 7	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
SCCP Protocol available at PMN	ETSI (ITU-T)	Boolean	M	Yes No	
SCCP Protocol available at PMN	ANSI	Boolean	M	Yes No	

7.11.12 SUBSCRIBER IDENTITY AUTHENTICATION

Section name: Subscriber Identity Authentication			ID: 8	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Subscriber Identity Authentication	Authentication performed for roaming subscribers at the commencement of GSM Service	Boolean	M	Yes No	Write YES if authentication is performed as described within the current version of SG.15
Subscriber Identity Authentication	Authentication performed for roaming subscribers in case of GPRS	Boolean	C	Yes No	Mandatory where GPRS is supported: write YES if authentication is performed as described within the current version of SG.15 under section Subscriber Identity Authentication/ Roamed Subscribe
Subscriber Identity Authentication	A5 Cipher Algorithm version in use	Alpha	M		Version of A5 algorithm in use

7.11.13 Test Numbers Information

Section name: Test Numbers Information			ID: 9	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Test Numbers Information	Test Number	N/A	M,R		
Test Number	Number Type	Listed values	M	AAC DAAC FAAC VTAAC RTAAC NNAAC NNDAAC NNFAAC NNVTAAC NNRTAAC CLIAAC CLIDAAC CLIFAAC CLIVTAAC CLIRTAAC SMSIW MMSIW	Possible Number Types for test numbers are: AAC – Voice Automatic Answering Circuit DAAC – Data Automatic Answering Circuit FAAC – Fax Automatic Answering Circuit VTAAC – Video Telephony Automatic Answering Circuit RNAAC – MSRN range Automatic Answering Circuit NN* – For any AAC type if an AAC is accessible from Network-Network Interconnection Interface only Number Type is prefixed with NN (for example NNAAC for voice AAC) CLI* – For any AAC type if an AAC in any way presents received CLI information Number Type is prefixed with CLI (for example CLIAAC for voice AAC) SMSIW – test number for SMS Interworking testing MMSIW – test number for MMS Interworking testing
Test Number	Number	E.164	M		

Test Number	Location	Text max 32 char	O		
Test Number	Comments	Text max 128 char	O		

7.11.14 MAP Interworking Specifically for Roaming

In this section, all the elements described contain maximum three sub elements. MSC/VLR and SGSN are relevant in case of Inbound Roaming context. Outbound Roaming doesn't require any differentiation. The values applicable to these sub elements are: MAPv1, MAPv2, MAPv3 or Not Applicable. All the elements defined in the following table are Mandatory.

Section name: MAP Interworking Specifically for Roaming		**ID: 10**	**Conditionality: M**
Parent	**Element Name**	**Applicable Sub Elements**	**Description**
MAP Interworking Specifically for Roaming	networkLocUp	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	roamingNumberEnquiry	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	InfoRetrieval	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	subscriberDataMngt	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	networkFunctionalSs	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	MwdMngt	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	

MAP Interworking Specifically for Roaming	shortMsgMT-Relay (called shortMsgRelay in v1)	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	shortMsgMO-Relay (called shortMsgRelay in v1)	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	ss-InvocationNotification	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	subscriberInfoEnquiry	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	gprsLocationUpdate	Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	locationCancellation	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	MsPurging	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	reset	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	

MAP Interworking Specifically for Roaming	networkUnstructuredSs	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	Reporting	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	CallCompletion	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	IstAlerting	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	serviceTermination	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	locationSvcGateway	Outbound Roaming	
MAP Interworking Specifically for Roaming	mm-EventReporting	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	AuthenticationFailureReport	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	

MAP Interworking Specifically for Roaming	ImsiRetrieval	Inbound Roaming: MSC/VLR Outbound Roaming	
MAP Interworking Specifically for Roaming	GprsNotifyContext	Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	gprsLocationInfoRetrieval	Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	FailureReport	Inbound Roaming: SGSN Outbound Roaming	
MAP Interworking Specifically for Roaming	secureTransportHandling	Inbound Roaming: MSC/VLR Inbound Roaming: SGSN Outbound Roaming	

7.11.15 MAP Optimal Routing of mobile-to-mobile calls

All the elements described in the following section contain maximum three sub elements. (V)MSC and GMSC are relevant in case of Inbound Roaming context. HLR is the element for Outbound Roaming. The values applicable to these sub elements are: MAPv1, MAPv2, MAPv3 or Not Applicable. All the elements defined in the following table are Optional.

Section name: MAP Optimal Routing of mobile-to-mobile calls		**ID: 11**	**Conditionality: O**
Parent	**Element Name**	**Applicable Sub Elements**	**Description**
MAP Optimal Routing of mobile-to-mobile calls	CallControlTransfer	Inbound Roaming: (V)MSC Inbound Roaming: GMSC	
MAP Optimal Routing of mobile-to-mobile calls	LocationInfoRetrieval	Inbound Roaming: GMSC Outbound Roaming: HLR	

7.11.16 Inter-Operator SMS Enhancement

All the elements described in the following section contain maximum three sub elements. SMS-GMSC and SMS-IWMSC are relevant in case of Inbound Roaming context. HLR is the element for Outbound Roaming. The values applicable to these sub elements are: MAPv1, MAPv2, MAPv3 or Not Applicable. All the elements defined in the following table are Optional.

Section name: MAP Inter-Operator SMS Enhancement		**ID: 12**	**Conditionality: O**
Parent	**Element Name**	**Applicable Sub Elements**	**Description**
Inter-Operator SMS Enhancement	shortMsgGateway	Inbound Roaming: SMS-GMSC Outbound Roaming: HLR	
Inter-Operator SMS Enhancement	shortMsgAlert	Inbound Roaming: SMS-IWMSC Outbound Roaming: HLR	

7.11.17 Network Elements Information

Section name: Network Elements Information			ID: 13	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Network Elements Information	Network Node	N/A	M,R		
Network Node	Node Type	Listed values	M		Type of the node (the complete list to be defined)
Network Node	Node Id	Alpha max 16 chars	O	BSS UTRAN CGSN EIR GGSN HLR MMSC MSC MSC-2G MSC-3G	The name associated to the node. Example:“SGSNRM4”

				MSC-2G+3G MSC/VLR MSC/VLR-2G MSC/VLR-3G MSC/VLR-2G+3G SCP SGSN SGSN-2G SGSN-3G SGSN-2G+3G SMSC IP-SMGW SSP HSS VLR MME SGW PGW PCRF	
					[new node types available on LTE]
Network Node	GT (E.164) Address(es)	E.164 GT Address or E.164 GT Address range	M		GT address or range of GT addresses
Network Node	IP Address(es)	IP Address or IP Address range(s)	C		IP address or range of IP addresses are present in case of SGSN or GGSN node types
Network Node	Vendor Info	Alpha max 64 chars	O		

Network Node	SW/HW Version	Alpha max 64 chars	O		
Network Node	Dual Access	Boolean	O		
Network Node	Location	Alpha max 64 chars	O		
Network Node	UTC Time Offset	UTC	M		Time Zone of the area most served by MSC/VLR, in UTC + offset
Network Node	DST	N/A	O		Applicability of Daylight Savings Time (DST), if any.
DST	DST Start Date	Date	M		DST starting Date
DST	DST End Date	Date	M		DST ending Date

7.11.18 USSD Information

Section name: USSD Information			ID: 14	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
USSD Information	USSD capability available	Boolean	Mandatory	Yes No	Yes means USSD capability is supported including all of case a), section 5.1.2, 3GPP TS 22.090 / GSM 02.90.
USSD Information	Supported USSD Phase	Listed values	Conditional	Phase 1 Phase 2	The field is mandatory, where USSD capability is available. Phase 1 only support mobile initiated operation (pull operation) Phase 2 support for network initiated operation (pull and push operation).

7.11.19 CAMEL Information

Section name: CAMEL Information			ID: 15	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
CAMEL Info	gsmSSF/MSC	N/A	M		
gsmSSF/MSC	CAP Version Supported Inbound	Listed values	M	CAPv1 CAPv2 CAPv3 CAPv4	
gsmSSF/MSC	CAP Version Supported Outbound	Listed values	M	CAPv1 CAPv2 CAPv3 CAPv4	
gsmSSF/MSC	CAP Version Planned	N/A	O		
CAP Version Planned	Planned Version	Listed values	M	CAPv2 CAPv3 CAPv4	
CAP Version Planned	Planned Date	Date	O		
CAMEL Info	CAMEL re-Routing Numbering Information	N/A	O		

Section name: CAMEL Information			ID: 15	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
CAMEL re-Routing Numbering Information	List of numbers used for re-routing purposes	E.164GT Address	M,R		To provide information of Re Routing CAMEL number for troubleshooting
gsmSSF/MSC	CAPv4 Partial Implementations	N/A	C		Must be present if CAP version supported is CAPv4.
CAPv4 Partial Implementations	CAMEL Phase 4 CSIs	N/A	M		
CAPv4 Partial Implementations	Functionalities	N/A	M		
CAMEL Phase 4 CSIs	O-CSI	Boolean	M		
CAMEL Phase 4 CSIs	D-CSI	Boolean	M		
CAMEL Phase 4 CSIs	VT-CSI	Boolean	M		

Section name: CAMEL Information			ID: 15	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
CAMEL Phase 4 CSIs	MT-SMS-CSI	Boolean	M		
Functionalities	Initiate Call Attempt	Boolean	M		
Functionalities	Split Leg	Boolean	M		
Functionalities	Move Leg	Boolean	M		
Functionalities	Disconnect Leg	Boolean	M		
Functionalities	Entity Released	Boolean	M		
Functionalities	DFC With Argument	Boolean	M		

Section name: CAMEL Information			ID: 15	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Functionalities	Play Tone	Boolean	M		
Functionalities	DTMF Mid Call	Boolean	M		
Functionalities	Charging Indicator	Boolean	M		
Functionalities	Alerting DP	Boolean	M		
Functionalities	Location At Alerting	Boolean	M		
Functionalities	Change Of Position DP	Boolean	M		
Functionalities	OR Interactions	Boolean	M		

Section name: CAMEL Information			ID: 15	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Functionalities	Warning Tone Enhancements	Boolean	M		
Functionalities	CF Enhancements	Boolean	M		
CAMEL Info	gprsSSF/SGSN	N/A	O		
gprsSSF/SGSN	CAP Version Supported	Listed values	M	CAPv3 CAPv4	
gprsSSF/SGSN	CAP Version Planned	N/A	O		
gprsSSF/SGSN	Partial implementations supported in CAP version 4	N/A	C		
Partial implementations supported in CAP version 4	CAMEL Phase 4 CSIs	N/A	M		

Section name: CAMEL Information			ID: 15	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
CAMEL Phase 4 CSIs	MT-SMS-CSI	Boolean	M		
CAMEL Phase 4 CSIs	MG-CSI	Boolean	M		
CAMEL Phase 4 CSIs	PSI Enhancements	Boolean	M		
CAMEL Info	CAMEL Functionality Information	N/A	O,R		
CAMEL Functionality Information	Services name	Alpha max 64 chars	M		
CAMEL Functionality Information	SK	Numeric	M		
CAMEL Functionality Information	CAMEL Version	Listed values	M	CAPv1 CAPv2 CAPv3 CAPv4	

Section name: CAMEL Information			ID: 15	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
CAMEL Functionality Information	SCP GT Addresses	E.164 GT Address	M,R		One or more SCP GT Addresses referring to the service name

7.11.20 Packet Data Services Information

Section name: Packet Data Services Information			ID: 16	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Packet Data Services Information	APN Operator Identifier	APN OpID	M,R		
Packet Data Services Information	List of APN's available for testing and troubleshooting	N/A	O		
List of APN's available for testing and troubleshooting	WEB	N/A	O,R		

Section name: Packet Data Services Information			ID: 16	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
WEB	APN	Alpha	M		
WEB	Username	Alpha	O		
WEB	Password	Alpha	O		
WEB	ISP DNS IP address (primary)	IP Address	O		
WEB	ISP DNS IP address (secondary)	IP address	O		
WAP	APN	Alpha	M		
WAP	Username	Alpha	O		

Section name: Packet Data Services Information			ID: 16	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
WAP	Password	Alpha	O		
WAP	WAP Gateway IP address	WAP GW IP address	M		
WAP	WAP Server URL	URL	M		
WAP	WAP 1.0 Port(s)	Numeric	O,R		
WAP	WAP 2.0 Port(s)	Numeric	O,R		
MMS	APN	Alpha	M		
MMS	Username	Alpha	O		

Section name: Packet Data Services Information			ID: 16	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
MMS	Password	Alpha	O		
MMS	WAP Gateway IP address	WAP GW IP address	M		
MMS	WAP Server URL	URL	M		
Packet Data Services Information	GTP Version	N/A	M		
GTP Version	SGSN	Listed Values	M	GTPv0 GTPv1	
GTP Version	GGSN	Listed Values	M	GTPv0 GTPv1	
Packet Data Services Information	Data services supported	N/A	M,R		Repeating fields indicating one or more data services supported in a PMN

Section name: Packet Data Services Information			ID: 16	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Data services supported	Data Service	Listed Values	M	GPRS EDGE 3G PS HSDPA HSUPA	
Data services supported	Multislot Class Capability	Alpha	O		Maximum Multislot class capability available
Packet Data Services Information	Multiple PDP Context support	N/A	M		Query on Multiple PDP context support
Multiple PDP Context Support	Supported or Not Supported	Boolean	M	Yes/No	
Multiple PDP Context Support	Number of simultaneous Primary PDP Context	Numeric	M,C		
Packet Data Services Information	IPv6 Connectivity Information	N/A	M,R		Query on IPv6 connectivity support
IPv6 Connectivity Information	SGSN support	N/A	M		

Section name: Packet Data Services Information			ID: 16	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
SGSN support	IPv4v6 PDP Type	Boolean	M	Yes/No	
SGSN support	IPv6 PDP Type	Boolean	M	Yes/No	
IPv6 Connectivity Information	GGSN support	N/A	M		
GGSN support	IPv4v6 PDP Type	Boolean	M	Yes/No	
GGSN support	IPv6 PDP Type	Boolean	M	Yes/No	

7.11.21 IP-Roaming and IP-Interworking Information

Section name: IP-Roaming and IP-Interworking Information			ID: 17		Conditionality: C
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
IP-Roaming and IP-Interworking Information	All IP address ranges used by PMN for connection to Inter-PMN IP backbone	IP address ranges	M,R		IP addresses or IP address range(s) of all operator's nodes that connect to the inter-PMN IP backbone network known as the "GRX" for example GGSNs, SGSNs, MMSCs, AAA Servers/Proxies, DNS Servers etc. This information is used for firewall and Border Gateway configuration (see PRD IR.34).
IP-Roaming and IP-Interworking Information	Any additional MNC/MCC (that is different to the MNC/MCC in the E.212 field) that may be sent in the Routeing Area Identity (RAI) in GTP messaging from SGSNs	N/A			Provide the details of any MNC/MCC that is different to the E.212 field (located at the top of the IR.21 form) that can be sent from any SGSN in the VPMN to the GGSN in the HPMN, in the Create PDP Context Request and Update PDP Context Request GTP messages. If only the MNC/MCC as stated in the E.212 field is sent to the HPMN, this table should be left blank.
Any additional MNC/MCC (that is different to the MNC/MCC in the E.212 field) that may be sent in the Routeing Area Identity (RAI) in GTP messaging from SGSNs	MCC	MCC (3 digits)	O		Multiple values allowed

Section name: IP-Roaming and IP-Interworking Information			ID: 17	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Any additional MNC/MCC (that is different to the MNC/MCC in the E.212 field) that may be sent in the Routeing Area Identity (RAI) in GTP messaging from SGSNs	MNC	MNC (2/3 digits)	O		Multiple values allowed
IP-Roaming and IP-Interworking Information	Autonomous System Number(s) (ASN)	AS number	M,R		The Autonomous System Number (ASN) is a 16 bit integer that every PMN must assign to their IP network that is seen as one Autonomous System (AS). The ASN enables the exchange of exterior routing information between neighbouring Autonomous Systems. This can be either a private ASN (64512 through to 65535) or public ASN.
IP-Roaming and IP-Interworking Information	List of PMN authoritative DNS server IP addresses & names	IP Address	O,R		IP address(es) and name(s) of DNS server(s) that are authoritative DNS server(s) that is DNS servers that answer DNS requests/queries from local caching DNS servers. Note that DNS hostname(s) given in this field should match the actual name(s) configured in the operator DNS server(s) (this is to avoid conflict with the NS records in the Root DNS and operator DNS servers).
IP-Roaming and IP-Interworking Information	List of PMN local caching DNS server IP addresses &	IP Address	O,R		

Section name: IP-Roaming and IP-Interworking Information			ID: 17	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
	names				
IP-Roaming and IP-Interworking Information	IP address that responds to ping/traceroute	IP Address	O		Pingable and traceroutable IP address of a node within the operator's AS. Maximum size for ping is 64 bytes. Minimum time interval for pinging is 1 hour.
IP-Roaming and IP-Interworking Information	GRX provider(s)	Alpha max 64 chars	M,R		Name of the GRX Provider

7.11.22 MMS Interworking Information

Section name: MMS Interworking Information			ID: 18	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
MMS Interworking Information	MMSE		M,R		
MMSE	Domain name of MMSC	Domain name	M		
MMSE	IP address range for MMSC	IP Address range	M		
MMSE	IP address(es) of incoming MTA	IP Address	M,R		
MMSE	IP address(es) of outgoing MTA	IP Address	M,R		
MMSE	Max. size of MMS allowed	Pattern “Kb”, numeric	O		
MMSE	Delivery Report allowed	Boolean	M	Yes No	

Section name: MMS Interworking Information			ID: 18	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
MMSE	Read Report allowed	Boolean	M	Yes No	
MMSE	MMS IW Hub Provider(s) GT addresses	E.164GT Address range	O,R		
MMSE	MMS IW Hub Provider(s) Name(s)	Alpha, max 64 chars	O		

7.11.23 WLAN Information

Section name: WLAN Information			ID: 19	Conditionality: O	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
WLAN Information	RADIUS server/ RADIUS proxy IP address(es) – Incoming Traffic	IP address	M,R		
WLAN Information	RADIUS server/ RADIUS proxy IP address(es) – Outgoing Traffic	IP address	M,R		
WLAN Information	IP address range(s) used for WLAN roaming signaling	IP address range	M,R		
WLAN Information	Realm(s)	Domain name	M,R		
WLAN Information	Brand name of the WLAN service	Alpha	M,R		Brand name of the Home WO WLAN service seen by the end user in the web based login page. The brand name can be used to mask the realm from the end user in web based login pages for example by utilizing a dropdown box into realm known by the network. This enables an operator to change its roaming realm with reduced impact to the user experience. If the operator has multiple roaming realms they have to be mapped one-to-one to brand names

7.11.24 LTE ROAMING Information

Section name: LTE ROAMING Information			ID: 20	Conditionality: C	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Roaming Interconnection	Diameter	N/A			
Roaming Interconnection	S6a	N/A			
Roaming Interconnection	S6d	N/A			
Roaming Interconnection	S9	N/A			
Roaming Interconnection	S8	N/A			
Diameter	IP addresses of the Diameter Edge Agent	IP address range			

S6a	Hostnames for HSS, MME in the form which they are used in the Diameter-Origin and Diameter-Destination, Host and Realm AVPs				
S6a	Is MAP interface available for connection to HSS (PMN supports MAP-IWF to HSS)?	Boolean	M	Y/N	
S6a	Is MAP interface available for connection to MME (PMN supports MAP-IWF to MME)?	Boolean	M	Y/N	
S6d	Is S6d used for legacy SGSN?	Boolean	M	Y/N	
S9	Hostnames for PCRF in the form which they are used in the Diameter-Origin and Diameter-Destination, Host and Realm AVPs				
S9	Is S9 used for PCC?	Boolean	M	Y/N	

S8	Is GTP Interface available?	Boolean	M	Y/N	
S8	Is PMIP Interface available?	Boolean	M	Y/N	
SMS ITW	SMS Delivery Mechanism	N/A			
SMS Delivery Mechanism	SMS over IP	Boolean	O	Y/N	
SMS Delivery Mechanism	SMS over SGs	Boolean	O	Y/N	
Voice ITW	IMS	Boolean	O	Y/N	
Voice ITW	CS Fallback	Boolean	O	Y/N	
Voice ITW	Other	Boolean	O	Y/N	
Roaming Retry	Is Roaming Retry Supported?	Boolean	M	Y/N	
Home PMN Information For LTE Roaming Agreement Only	Is LTE only roaming supported?	Boolean	M	Y/N	
Visited PMN Information For LTE Roaming	Is LTE only roaming supported?	Boolean	M	Y/N	

Agreement Only					
Home PMN Information For 2G/3G Roaming Agreement Only	Is Scenario 2 supported?	Boolean	M	Y/N	
Home PMN Information For 2G/3G Roaming Agreement Only	Is Scenario 3 supported?	Boolean	M	Y/N	
Visited PMN Information For 2G/3G Roaming Agreement Only	Is Scenario 2 supported?	Boolean	M	Y/N	
Visited PMN Information For 2G/3G Roaming Agreement Only	Is Scenario 3 supported?	Boolean	M	Y/N	
Home PMN Information for 2G/3G and LTE Roaming Agreement	Is Scenario 1 supported?	Boolean	M	Y/N	
Home PMN Information for 2G/3G and LTE Roaming Agreement	Is Scenario 2 supported?	Boolean	M	Y/N	
Home PMN Information for 2G/3G and LTE Roaming Agreement	Is Scenario 3 supported?	Boolean	M	Y/N	
Home PMN Information for	Is Scenario 4 supported?	Boolean	M	Y/N	

2G/3G and LTE Roaming Agreement					
Visited PMN Information for 2G/3G and LTE Roaming Agreement	Is Scenario 1 supported?	Boolean	M	Y/N	
Visited PMN Information for 2G/3G and LTE Roaming Agreement	Is Scenario 2 supported?	Boolean	M	Y/N	
Visited PMN Information for 2G/3G and LTE Roaming Agreement	Is Scenario 3 supported?	Boolean	M	Y/N	
Visited PMN Information for 2G/3G and LTE Roaming Agreement	Is Scenario 4 supported?	Boolean	M	Y/N	
RILTE information	QCI values supported	Listed Values	M	1; 2; 3; 4; 5; 6; 7; 8; 9	Repeating fields indicating one or more QCI values supported in a PMN
RILTE information	IPv6 Connectivity Information	N/A	M		Query on IPv6 connectivity support
IPv6 Connectivity Information	MME support	N/A	M		
MME support	IPv4v6 PDP Type	Boolean	M	Yes/No	
MME support	IPv6 PDP Type	Boolean	M	Yes/No	
IPv6 Connectivity Information	SGW support	N/A	M		

SGW support	IPv4v6 PDP Type	Boolean	M	Yes/No	
SGW support	IPv6 PDP Type	Boolean	M	Yes/No	
IPv6 Connectivity Information	PGW support	N/A	M		
PGW support	IPv4v6 PDP Type	Boolean	M	Yes/No	
PGW support	IPv6 PDP Type	Boolean	M	Yes/No	

7.11.25 Contact Information

For this section a new Format type is defined named “Contact” as represented below. It occurs in in Contact Type elements. Conditionality is defined only if “Repeating” occurs.

Format Type: Contact					
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Contact	Person Name	Alpha, max 64 chars			
Contact	Tel	Tel number	R		
Contact	Fax	Tel number	R		
Contact	E-Mail	Email	R		

Section name: Contact Information				ID: 21	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**		**Description**
Contact Information	Contact Type	Listed Values		Roaming Troubleshooting Contact Information SCCP inquiries and ordering of SS7 routes Roaming Coordinator IREG Tests TADIG Tests CAMEL Tests GPRS Contact Contact person(s) (in PMN) for GRX connectivity Contact person (in PMN) to verify authority of a GRX provider to add/modify data in Root DNS Contact person(s) for IW MMS Contact person(s) for IW SMS Contact person(s) for WLAN Other contacts	
Contact Type	Roaming Troubleshooting Contact Information	N/A	M			
Roaming Troubleshooting Contact Information	Troubleshooting Office Information	N/A	M,R			
Troubleshooting Office Information	Location (City)	Alpha, max 64 chars	M			
Troubleshooting Office Information	Office Time Zone in UTC	UTC	M			

Section name: Contact Information				ID: 21	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**		**Description**
Troubleshooting Office Information	Office Hours	Time range	M			
Roaming Troubleshooting Contact Information	Main Contact for Troubleshooting (Office Hours)	N/A	M			
Main Contact for Troubleshooting (Office Hours)	Team Name	Alpha, max 64 chars	M			
Main Contact for Troubleshooting (Office Hours)	Tel	Tel number	M,R			
Main Contact for Troubleshooting (Office Hours)	Fax	Tel number	M,R			
Main Contact for Troubleshooting (Office Hours)	E-Mail	Email	M,R			
Roaming Troubleshooting Contact Information	Escalation Contact for Troubleshooting	N/A	M			

Section name: Contact Information				ID: 21	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**		**Description**
Escalation Contact for Troubleshooting	Person Name	Alpha, max 64 chars	M			
Escalation Contact for Troubleshooting	Tel	Tel number	M,R			
Escalation Contact for Troubleshooting	Fax	Tel number	M,R			
Escalation Contact for Troubleshooting	E-Mail	Email	M,R			
Roaming Troubleshooting Contact Information	24 x 7 Troubleshooting Contact (Out of Office Hours)	N/A	M			
24 x 7 Troubleshooting Contact (Out of Office Hours)	Team Name	Alpha, max 64 chars	M			
24 x 7 Troubleshooting Contact (Out of Office	Tel	Tel number	M,R			

Section name: Contact Information				ID: 21	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**		**Description**
Hours)						
24 x 7 Troubleshooting Contact (Out of Office Hours)	Fax	Tel number	M,R			
24 x 7 Troubleshooting Contact (Out of Office Hours)	E-Mail	Email	M,R			
Contact Type	SCCP inquiries and ordering of SS7 routes	Contact	M,R			
Contact Type	Roaming Coordinator	Contact	M,R			
Contact Type	IREG Tests	Contact	Contact Type			
Contact Type	TADIG Tests	Contact	M,R			

Section name: Contact Information				ID: 21	Conditionality: M	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**		**Description**
Contact Type	CAMEL Tests	Contact	M,R			
Contact Type	GPRS Contact	Contact	M,R			
Contact Type	Contact person(s) (in PMN) for GRX connectivity	Contact	M,R			
Contact Type	Contact person (in PMN) to verify authority of a GRX provider to add/modify data in Root DNS	Contact	M,R			
Contact Type	Contact person(s) for IW MMS	Contact	M,R			
Contact Type	Contact person(s) for WLAN	Contact	M,R			

Section name: Contact Information				ID: 21	Conditionality: M
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Other Contact	Job Title	Contact	O,R		
Job Title		Text	M		
Contact Information	Contact point (address) for distribution of updating of the roaming database	Alpha, max 256 chars	M,R		

7.11.26 Hosted Networks

Section name: Hosted Networks			ID: 22	Conditionality: C,R	
Parent	**Element Name**	**Format**	**Conditionality**	**Values**	**Description**
Hosted Networks	Network	N/A	M		

Network	Name		M		Name of the Hosted network
Network	Type		M	Terrestrial, NonTerrestrial	
Network	TADIG Code		M		
Network	Network Node	N/A	M,R		
Network Node	Node Type	Listed values	M	(U)MSC/VLR (U)SGSN	Type of the node
Network Node	GT (E.164) Address(es)	E.164 GT Address or E.164 GT Address range	M		GT address or range of GT addresses
Network Node	MSRN Range		M,R		
Network Node	IP Address(es)	IP Address or IP Address range(s)	C		IP address or range of IP addresses are present in case of SGSN or GGSN node types

8 Release management

8.1.1 RAEX IR.21 Change Management

Changes in the RAEX IR.21 process have implications in other PRDs such as TD.81. Release Management Procedures must be aligned for all GSMA data interchange formats, in order to provide implementation time and rules for testing and migration. TADIG is the Working Group within the GSMA responsible for the specification and maintenance of data interchange formats.

Therefore, the RAEX IR.21 Release Management Process will be aligned to the document already defined and in place within the TADIG group.
The Release Management principles for RAEX IR.21 are defined in the Permanent Reference Document (PRD) TD.34

The table below summarizes the timescales for the "RAEX IR.21 Scheduled Releases" according to Section 2.1 of TD.34:

Format	Submission of Major Req's	Approval of Major Changes	Submission of Minor Req's	Approval of Minor Changes	Latest Implem. Date
RAEX IR.21	15 March 2010	15 May 2010	15 September 2010	15 November 2010	1 May 2011

8.1.2 RAEX IR.21 Version Control

When a new IR.21 is released, a new version of RAEX Business Requirements and related TADIG documentation will also be created and SPs will need to support a new RAEX IR.21 version. It may also occur that development of TD documents may in turn create a change to RAEX IR.21. These changes are indicated using a latest version number.

Senders and receivers of IR.21 data in the new RAEX IR.21 version will need to make a change to their systems in order to create/accept any new information being exchanged in the newer RAEX IR.21 version.

Senders will need to indicate in their IR.21 ID.3 network information, which version of RAEX IR.21 they will 'send' to and can 'receive' from their roaming partners in order for them to understand what version of RAEX IR.21 is being supported by that Operator.

For Example:
RAEX IR.21 2010 All SPs must use the most recent version of RAEX IR.21.

9 DOCUMENT MANAGEMENT

Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
Draft	Dec. '92 - June '92	For EREG Discussions		
0.0.1	June 1992	For EREG Discussions		
1.0.1	June 1992	For EREG Discussions		
3.0.0	12th June 1992	Approved at MoU 20		
3.1.0		Approved at MoU 20 Note: No change to IR.21, only a new printout of the GSM Association Roaming database		
3.2.0	10th June 1993	Approved at MoU 24 - Includes CR no.2		
3.2.1		Approved at MoU 25 - Includes CR no.3		
3.2.2		Approved at MoU 26 - Includes CR no.4		
3.3.3	18th October 1995	Approved at MoU 32 - Includes CR no.5		
3.4.0	18th January 1996	Approved at MoU 33 - Includes CR no.6		
3.4.1	29th May 1996	Approved at MoU 34 - Includes CR no.7		
3.4.2	3rd October 1996	Conversion to PRD TD.15		
3.4.3	25th November 1996	Approved at IREG 31. Includes CR no.8, non-strategic: Removing the reference to PRD IR.22		
3.5.0	October 1999	CR# 9. PL Doc 181/99 Rev 1. Approved at Plenary 42		
3.6.0	27th April 2000	CR#10, PL Doc 030/00 approved at Plenary 43		
3.7.0	October 2000	Approved at Plenary 44 – CRs #		

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
		11 and 12		
3.8.0	May 2002	CR IREG 016/02 rev1 addition of new field containing network's SMSC GT addresses to allow operators with MSCs that require full SMSC addresses to enter them correctly CR IREG 019/02 rev1 introduction of GPRS and GSM vendor information		
3.8.1	August 2002	CR 013 IREG Doc 107/02 rev2 approved at IREG#43. Addition of "Pingable and traceroutable IP address" field in the "GPRS Information" section, in order to facilitate GPRS roaming testing and troubleshooting.		
3.8.2	February 2003	NCR 014 IREG Doc 019/03 rev1 approved at IREG#44. Addition of a GTP version field in the "GPRS Information" section, in order to clarify the GTP version supported by the operator.		
3.8.3	February 2003	NCR 015 IREG Doc 020/03 rev1 approved at IREG#44. Addition of MMS Information section.		
3.8.4	February 2003	NCR 016 IREG Doc 027/03 approved at IREG#44. Adding new fields to the CAP version information section, to show which CAMEL partial implementations are supported.		
3.9.0	February 2003	SCR 017 IREG Doc 029/03 Rev 1 approved at IREG#44. Adding a new section on WLAN information.		
3.9.1	February 2003	NCR 018 IREG Doc 035/03 Rev 1 approved at IREG#44 Introduction of minimum time to inform roaming partners when updating IP based services Information.		

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
3.9.2	August 2003	NCR 019 on the IR.21 ver.3.9.1 for addition of the Application Context in MAP		
3.9.3	August 2003	NCR 20 to IR.21 Re AAC numbers		
3.9.4	August 2003	NCR 21 on the IR.21 Ver.3.9.1 for Clarification of supporting GTP version1		
3.9.5	November 2003	NCR 024 on the IR.21 for correction of AC name in MAP		
3.9.6	November 2003	NCR 025 on the IR.21 for clarification of supporting latest version of Release		
3.9.7	May 2004	NCR 027 to IR.21 v.3.9.6		
3.9.8	October 2004	NCR 029 to IR.21 v.3.9.7 implemenation of compliance to SG.15		
3.9.9	March 2005	Three NCR to IR.21 v.3.9.8 NCR 030 : Addition of new section regarding Authentication to record compliance with SG.15 NCR 031 : Structure reorganization of Miscellaneous section NCR 032 : Provided a mechanism to detect SIM Box usage		
3.9.10	June 2005	MCR 032: Addition of MMS Hub provider information and MMS Hub provider data		
3.9.11	August 2005	NCR033: Introduction of an update interval for SMS-SC addresses MCR034: Record of A5 cipher algorithm in use by each operator		
4.0	November 2005	MCR035: Identification of operator network technology standard MCR036: New section called “IP-Roaming and IP-Interworking information” containing proper information for GRX Interworking		

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
		and for Master Root DNS Server MCR037: New section for SCCP Protocol availability at PMN		
4.1	March 2007	MCR 038: GPRS Information section change and addition of fields for data service support		
4.2	April 2007	MCR 039: New section containing MSC and VLR Time Zone information		
4.3	March 2008	MCR 046: collection of following CR MCR040: Enhancement of SMSC and CAMEL information sections MCR041: Removal of SS7 Access Solution section MCR042: Including Roaming Hubbing Information MCR043: Including USSD Information MCR044: Contact Point section review for Miscellaneous MCR045: Redesign of Auto Roam Section		
5.0	March 2008	MCR047: RAEX Business requirements and Infocentre improvements for notification procedures Editorial changes accordingly Revision of Annex A output		
5.2	July 2008	Editorial change on [Unrestricted]		
5.3	September 2008	MCR048: Revision of Annex A including new form template according xml schema Revision of IR.21 Data Dictionary Definition of Network Type Elements Removal of Technology and Frequency elements from IR21 Company logo in the output template Revision of Update Intervals Section		

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
		Clarification of WLAN Roaming Signalling IP List		
5.4	March 2009	MCR049: Revision of Data Dictionary and Output Template. Changes needed after "proof of concept" analysis, to allow correct definition of operator's data MCR050: - Revision of Annex A including "Comments" field on SCCP Carrier sections - Addition of CAMEL Re-Routing number information - Addition of Dual Access column in Network Elements information		
6.0	November 2009	MCR051: Removal of Roaming Hubbing section due to introduction of PRD IR.85	IREG eVote EMC#79	Fabrizio Fiorucci / Telecom Italia, Italy
6.0	December 2009	MCR052: - Addition of new section for RILTE information - Addition of RAI information - Editorial correction on section Id 3	IREG#57 EMC#79	Fabrizio Fiorucci / Telecom Italia, Italy
6.1	April 2010	mCR053: Support (or not support) of multiple PDP context	Signal#48	Fabrizio Fiorucci / Telecom Italia, Italy
6.2	October 2010	MCR054: -Definition of a Release Management proposal for RAEX IR.21 -Allow Roaming Hubs and other entities to receive IR.21 by replacing "Operator" with "Service Provider" in the text -State that RAEX IR.21 process is a "Binding" process.	IREG#58 EMC#80 DAG#73	Fabrizio Fiorucci / Telecom Italia, Italy
7.0	March 2011	**First version of 2012 release** MCR057: This CR is created in order to align the latest agreement made	Signal#53 Packet#49 IREG#59	Itsuma Tanaka / NTT DoCoMo,

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
		in Packet/RILTE on 2G/3G+LTE co-existence roaming scenarios. Also, current IR.21 on LTE roaming information (name of the information, Diameter sections) needs to be updated to align the latest IR.88.		Japan
7.1	May 2011	MCR059: IPv6 and IPV4IPv6 connectivity type MCR060: Support of QCI values MCR062: Introduction of RAEX process MCR061: list of short number translation Submitted to DAG & EMC for approval	Signal#54 Packet#50 IREG#60 EMC	Laurent Dubesset/Orange France Fabrizio Fiorucci/Telecom Italia

Other Information

Type	Description
Document Owner	IREG-SIGNAL
Editor / Company	Fabrizio Fiorucci / Telecom Italia, Italy