Device Specifications
for Intercarrier Roaming in Emergency

[Version 1.8]

Intercarrier Roaming study working group
Device study sub working group

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Device specifications for Intercarrier Roaming in Emergency

Device specifications

Functions that terminal equipment must possess to support intercarrier roaming in emergency

	Function Name	Function Overview	Method	Excluded devices
#1	Emergency Attach	A feature that allows emergency call origination via the rescue network in situations where location registration has not been made.	Emergency Call Only Roaming	Not equipped with voice (VoLTE) feature
#2	IMSI sending function	Send IMSI instead of MSISDN	Emergency Call Only Roaming	Not equipped with voice (VoLTE) feature
#3	Detach after EMR Attach emergency call ends and Attach to the Home network	Function to return to the home network after ending an emergency call	Emergency Call Only Roaming	Not equipped with voice (VoLTE) feature
#4	Non-detectable/detectable emergency call	Function to enable emergency calls via local breakout even when prefixes like 184 are attached	Full Rm	Not equipped with voice (VoLTE) feature
#5	CellReserved	Function to prevent connection to the relief network during normal conditions	common	
#6	ACB per PLMN	Function to control location registration to avoid overloading the relief network	Full Rm	
#7	SSAC per PLMN	Function to control connections for each service to avoid overloading the relief network	Full Rm	Not equipped with voice (VoLTE) feature
#8	The display of operators during VPLMN selection for roaming	Function to display and allow selection of being registered in the relief network	common	No display on the devices
#9	Avoiding excessive re-transmissions when receiving rejection from the network.	Function to avoid overloading the relief network	Full Rm	

Device specifications (Supplemental Information)

Function that is desirable to be equipped in terminal devices to allow users to use intercarrier roaming in emergency without special restrictions

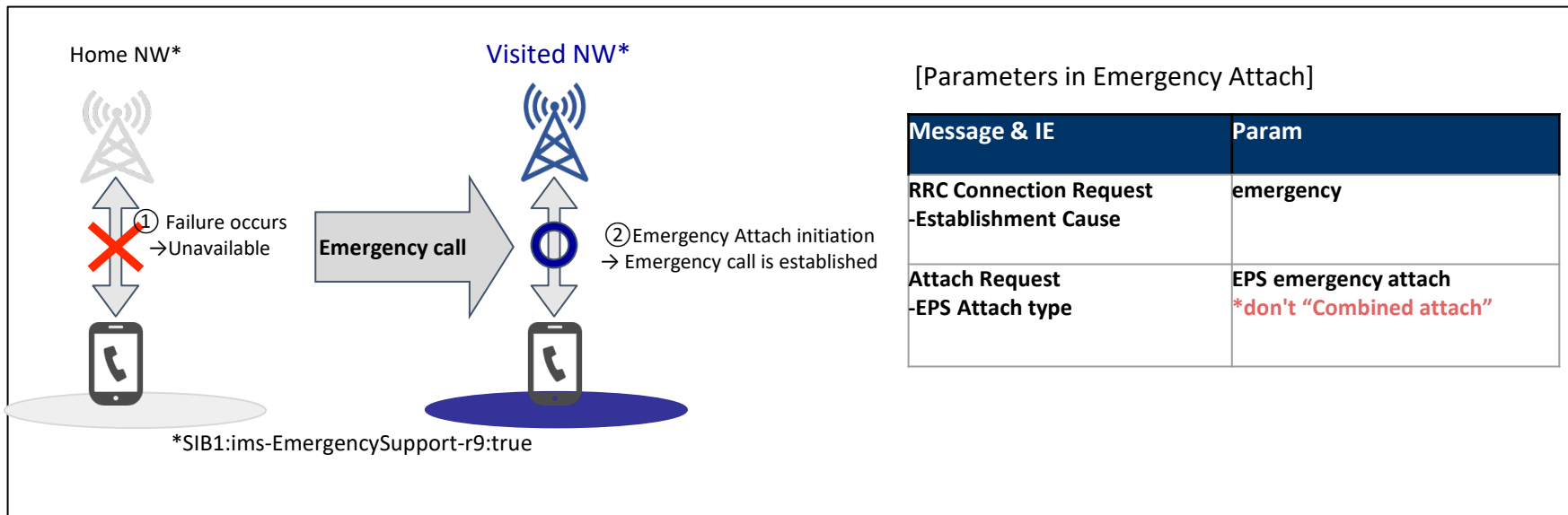|	Function Name	Function Overview	Method	Excluded devices
Supplemental Information #1	Emergency Attach	A feature that allows emergency call origination via the rescue network in situations where location registration has not been made.	Emergency Call Only Roaming	Not equipped with voice (VoLTE) feature
Supplemental Information #2	Disabling the Emergency-reg timer function	Devices that support Emergency call Only Roaming must disable the Emergency-reg timer function	Emergency Call Only Roaming	Not equipped with voice (VoLTE) feature

Term definition

term	meaning
Visited NW relief network	Relief side network that accepts roaming
Home NW affected network	Affected side network that requests roaming
Full Intercarrier Roaming (Full Rm)	Roaming that provides all general calls, emergency calls, SMS, and data
Emergency Call Only Roaming	Roaming that provides emergency call only
Affected network HPLMN	PLMN assigned to the insured entity (Home PLMN)
VPLMN for roaming	PLMN that allows affected users for roaming, additionally provided by relief carriers

Device specifications

#1 Emergency Attach function

If an emergency call is made when the home network is unavailable due to an outage or other circumstances, and if there is another operator with a valid SIB1 :ims-EmergencySupport-r9, an Emergency Attach shall be performed to establish the emergency call.

Home NW*

Visited NW*

① Failure occurs
→Unavailable

Emergency call

②Emergency Attach initiation
→ Emergency call is established

*SIB1:ims-EmergencySupport-r9:true

[Parameters in Emergency Attach]

Message & IE	Param
RRC Connection Request -Establishment Cause	emergency
Attach Request -EPS Attach type	EPS emergency attach *don't "Combined attach"

Reference: TS36.331-6.2.2 Message definitions
　　　　　　TS24.301-5.5.1.2 Attach Procedure for EPS service
　　　　　　 -Annex D

#2   IMSI sending function

In "Emergency Call Only" Roaming , when initiating an emergency call using "Emergency Attach",
the IMSI number shall be sent in the SIP Contact header .
The format shall be as follows:

Please insert IMSI in the user part of the SIP URI in the Contact header.
 (Insert IMSI in the "user" of m)

```
Session Initiation Protocol
  Request-Line: INVITE urn:service:sos SIP/2.0
  Message Header
    f: "Anonymous" sip:Anonymous@Anonymous.invalid;tag=257509327
    t: <urn:service:sos>
    CSeq: 257509321 INVITE
    i: 257509321_3850616408@2001:0:0:1
    [Generated Call-ID: 257509321_3850616408@2001:0:0:1::1]
    Max-Forwards: 70
    m: sip:user@[2001:0:0:1::1]:5060;+sip.instance="<urn:gsma:imei:00440015-202000-0>";
              +g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.mmtel";audio;+g.3gpp.mid-call;+g.3gpp.srvcc-alerting;+g.3gpp.ps2cs-srvcc-orig-pre-alerting
    Route: sip:[2001:0:0:11::2]:5060;lr
    P-Access-Network-Info: 3GPP-E-UTRAN-FDD;utran-cell-id-3gpp=4401000010000000
    P-Preferred-Identity: sip:00440015-202000-0@[2001:0:0:1::1]
    Allow: INVITE,ACK,CANCEL,BYE,UPDATE,PRACK,MESSAGE,REFER,NOTIFY,INFO,OPTIONS
    c: application/sdp
    Accept: application/sdp,application/3gpp-ims+xml
    P-Preferred-Service: urn:urn-7:3gpp-service.ims.icsi.mmtel
    a: *;+g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.mmtel";audio
  …
```
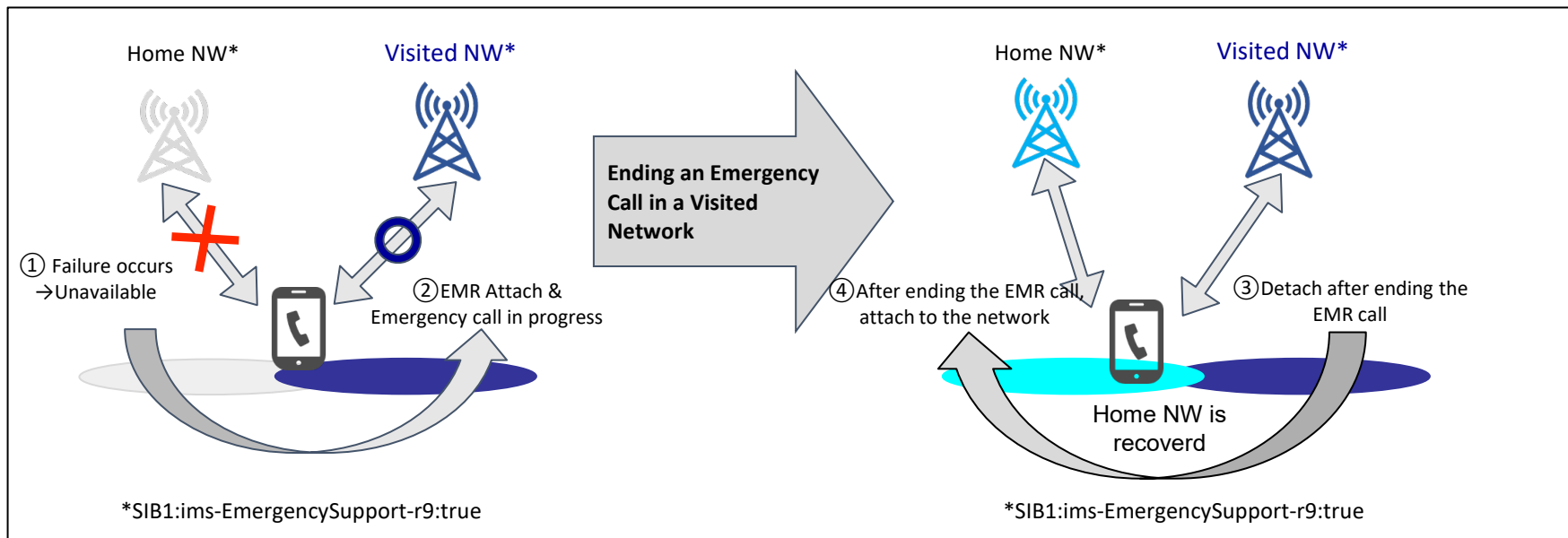
References: None (*IMSI settings are unique to Japan)

Detach after EMR Attach emergency call ends and Attach to the Home network

Detach after ending the emergency call at the Visited NW by EMR Attach.
Also, if the Home NW has been recovered, it is necessary to attach to the Home NW.

Home NW*   Visited NW*   Home NW*   Visited NW*

Ending an Emergency Call in a Visited Network

① Failure occurs
→Unavailable

②EMR Attach & Emergency call in progress

④After ending the EMR call, attach to the network

③Detach after ending the EMR call

Home NW is recoverd

*SIB1:ims-EmergencySupport-r9:true

*SIB1:ims-EmergencySupport-r9:true

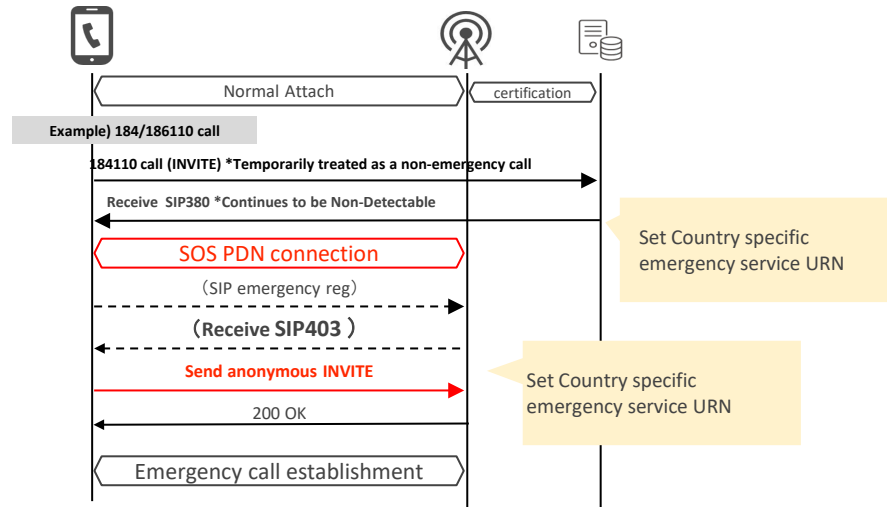Reference: TS24.301-5.5.1/5.5.2 Detach procedure

Support the following two operations for emergency calls during full roaming.
- **Start detectable call processing after receiving 380 from NW**
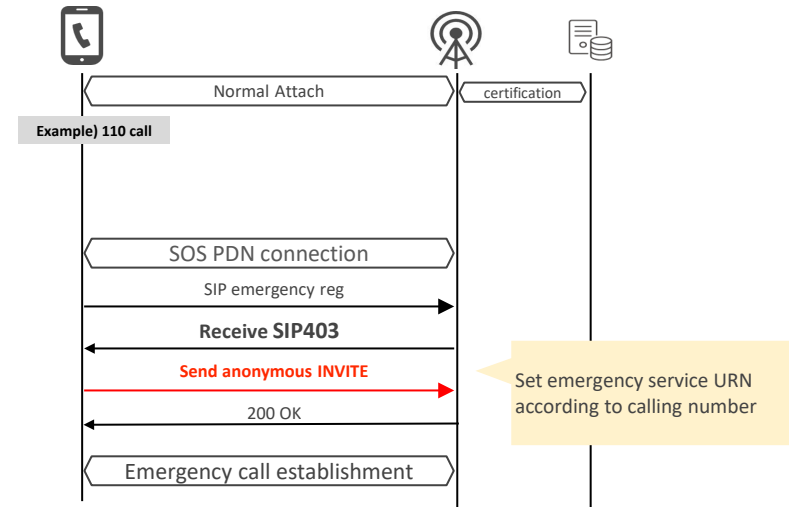- **If device receives 403 for REGISTER , make an emergency call (anonymous) from no-Registration state**

Non-detectable emergency call	**detectable emergency call**

Visited network   Home network   Visited network   Home network

Normal Attach   certification   Normal Attach   certification

Example) 184/186110 call   **Example) 110 call**

184110 call (INVITE) *Temporarily treated as a non-emergency call

Receive SIP380 *Continues to be Non-Detectable

Set Country specific emergency service URN

SOS PDN connection

（SIP emergency reg）

SOS PDN connection

SIP emergency reg

（**Receive SIP403** ）

Receive SIP403

Send anonymous INVITE

Set Country specific emergency service URN

Send anonymous INVITE

Set emergency service URN according to calling number

200 OK

200 OK

Emergency call establishment
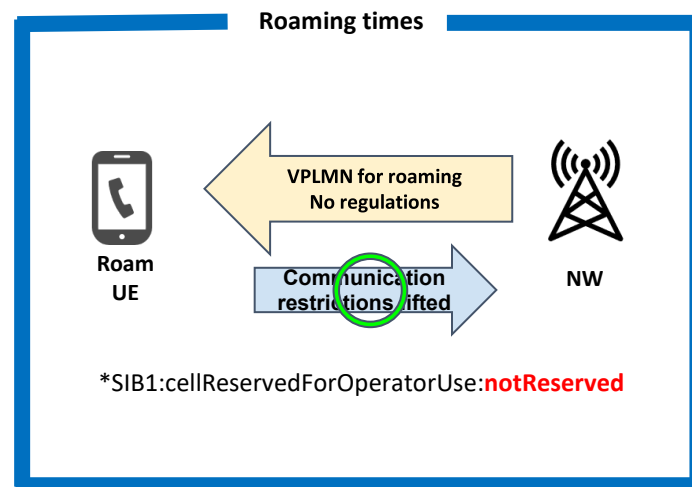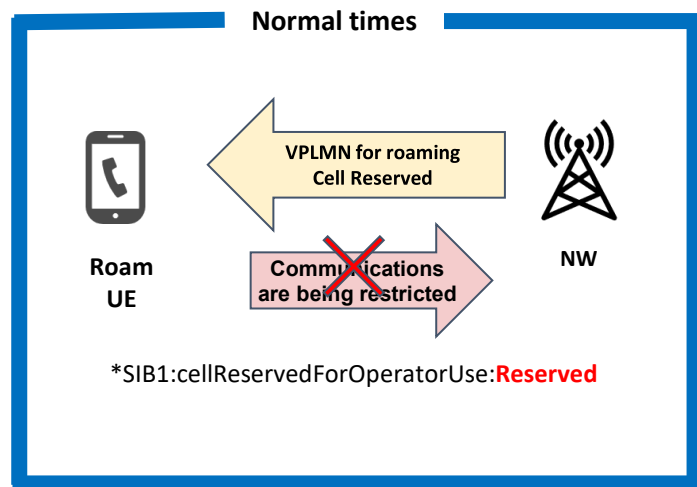
Emergency call establishment

References: TS24.229 5.1.2A Generic procedures applicable to all methods excluding the REGISTER method, 5.1.6 Emergency service
       TS24.229 7.11.1 Country specific emergency service URN

7

#5 Cell Reserved [Compliance with barring functions]

UE shall comply with barring functions related to cellReservedForOperatorUse.
After the start of Intercarrier roaming services, during normal times, the roaming PLMN for emergency relief will be under barring control.
In emergency situations, this control will be lifted, allowing for roaming services to be provided to devices of affected operators.

Normal times

VPLMN for roaming
Cell Reserved

Roam
UE

NW

Communications
are being restricted

*SIB1:cellReservedForOperatorUse:**Reserved**

Roaming times

VPLMN for roaming
No regulations

Roam
UE

NW

Communication
restrictions lifted

*SIB1:cellReservedForOperatorUse:**notReserved**

Reference: 3GPP TS36.331/TS36.304

8

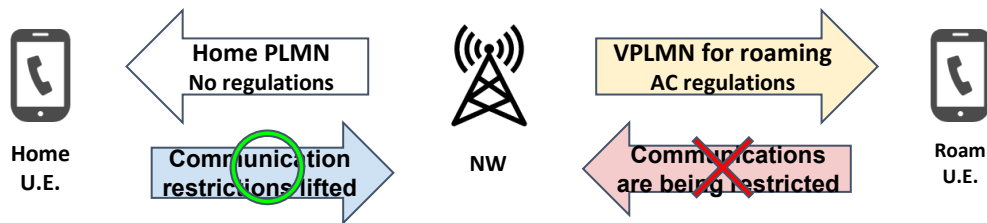**UE shall support access class barring control per PLMN.**
When full roaming is triggered, the UE shall comply with the Access Class Barring per PLMN function to apply barring to the roaming PLMN only if necessary, in order to protect the relief network.

Traffic control needs to be implemented for each PLMN. Home PLMN shall not be regulated, and access class control shall be applied only to the PLMN for roaming.

example
HPLMN: Not regulated
VPLMN for roaming: AC regulation

Home U.E.

Home PLMN
No regulations

Communication
restrictions lifted

NW

VPLMN for roaming
AC regulations

Communications
are being restricted

Roam U.E.

Reference: 3GPP TS36.331
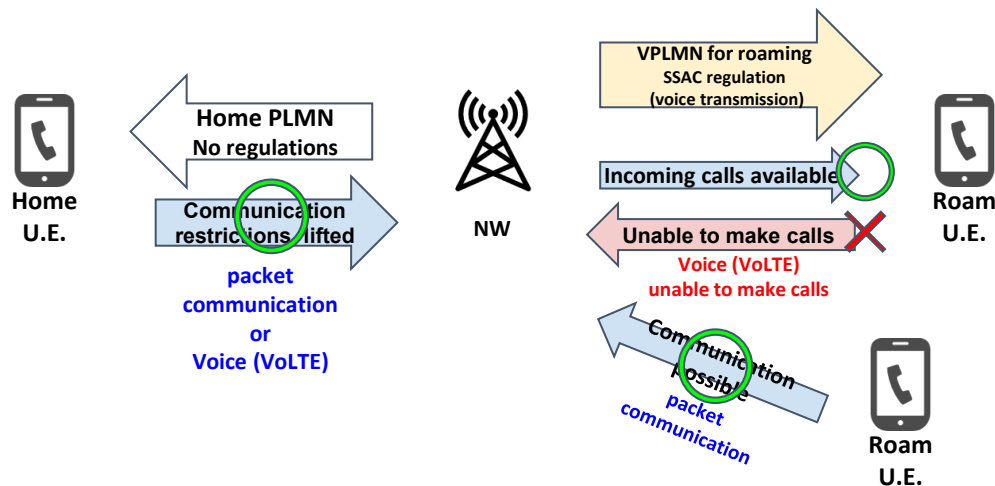
9

SSAC per PLMN [Compliance with barring functions]

UE shall perform access class control for services on a per-PLMN basis.
When full roaming is triggered, the UE shall comply with the Service Specific Access Control function to apply barring to specific services on the roaming PLMN only if necessary, in order to protect the relief network. (Assumption of using ssac-BarringForMMTEL-Voice)

Traffic control needs to be implemented for each PLMN. Regulating voice transmission only (excluding emergency calls) in the PLMN for roaming shall be considered, while applying no regulations in home PLMN.

example
HPLMN: Not regulated
VPLMN for roaming: voice transmission only regulation

Home PLMN
No regulations

Home U.E.

Communication restrictions lifted

packet communication or Voice (VoLTE)

NW

VPLMN for roaming SSAC regulation (voice transmission)

Incoming calls available

Unable to make calls
Voice (VoLTE) unable to make calls

Roam U.E.

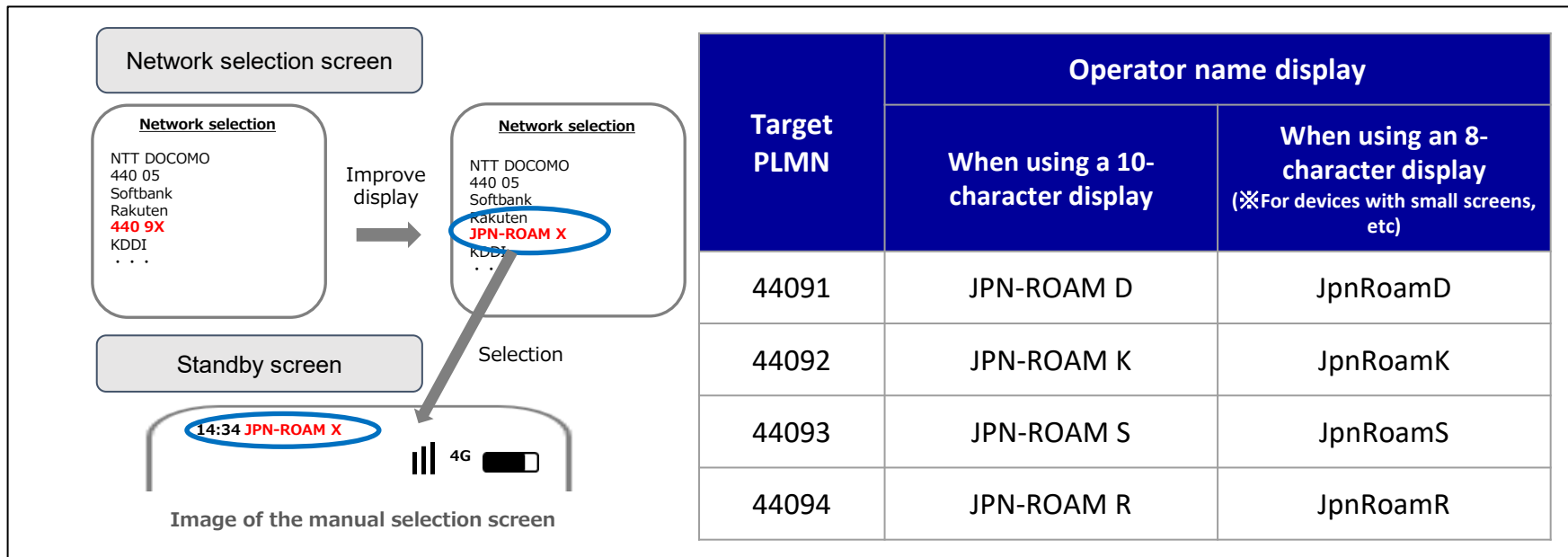Communication Possible
packet communication

Roam U.E.

Reference: 3GPP TS36.331

10

The display of operators during VPLMN selection for roaming

When the UE detects a roaming PLMN for Intercarrier roaming services, on the standby screen, display a name that can identify the telecommunications operator as follows. Also on the network selection screen, display a name that can identify the telecommunications carrier, allowing users to select it.

Image of the manual selection screen

Target PLMN	Operator name display	
	When using a 10-character display	When using an 8-character display (※For devices with small screens, etc)
44091	JPN-ROAM D	JpnRoamD
44092	JPN-ROAM K	JpnRoamK
44093	JPN-ROAM S	JpnRoamS
44094	JPN-ROAM R	JpnRoamR

Reference: GSMA TS.25
TS24.301-8.2.13 EMM information

11

**If a timer is set for Attach reject (T3346/T3402*), TAU reject (T3346), or Service reject (T3346), the retransmission interval must follow the timer setting:T3402 (Note: if not specified by the NW, make it 12 minutes or longer)**

ATTACH REJECT	TRACKING AREA UPDATE REJECT	SERVICE REJECT
U.E.	NW	U.E.	NW	U.E.	NW

ATTACH REJECT

U.E.   NW

Attach Request →

← Attach Reject
w/ T3402 (and/or T3346)

T3402 (and/or T3346) expire

Attach Request →

TRACKING AREA UPDATE REJECT

U.E.   NW

TAU Request →

← TAU Reject
w/ T3346

T3346 expired

TAU Request →

SERVICE REJECT

U.E.   NW

Service Request →

← Service Reject
w/ T3346

T3346 expired

Service Request →

References: TS24.301-5.5.1.2.6 Abnormal cases in the UE, 5.5.3.2.6 Abnormal cases in the UE, 5.6.1.6 Abnormal cases in the UE
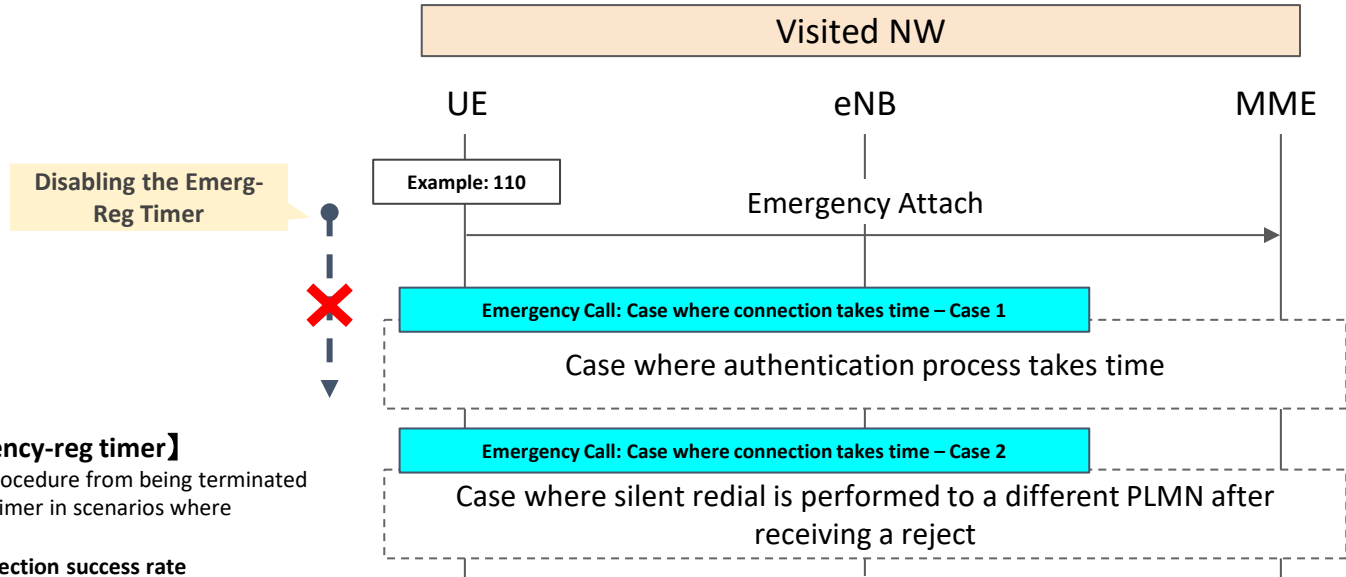   **TS24.008-11.2.2 Timers of GPRS mobility management**

Supplemental Information

Supplementary Information#1   **Data Roaming Settings**

A device that supports full roaming can perform data communication on the relief network in Intercarrier roaming regardless of the presence of a settings menu or the data roaming settings being turned OFF/ON.

| Device Settings Menu |
| Data Roaming Settings |
| OFF | ON |
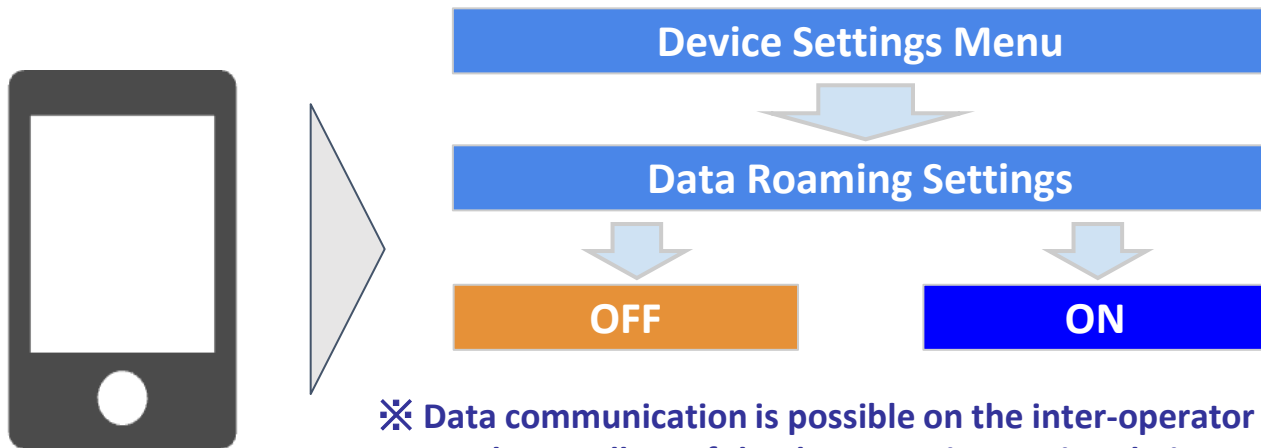
※ Data communication is possible on the inter-operator roaming (Rm) network regardless of the data roaming settings being turned OFF/ON.

References: None

14

Devices that support Emergency call only Roaming must disable the Emergency-reg timer function

Visited NW

UE   eNB   MME

Disabling the Emerg-Reg Timer

Example: 110

Emergency Attach

Emergency Call: Case where connection takes time – Case 1

Case where authentication process takes time

【Objective of disabling the Emergency-reg timer】
To prevent the emergency call connection procedure from being terminated due to the expiration of the Emergency-reg timer in scenarios where establishing the emergency call takes time.
⇒**Maximization of the emergency call connection success rate**

Emergency Call: Case where connection takes time – Case 2

Case where silent redial is performed to a different PLMN after receiving a reject

References：TS24.229 7.8 IM CN subsystem timers

Revision history

Ver.	Revision date	Details of changes
1.7⇒1.8	2025/8	・Added specification for Supplemental Information #2 ・Added revision history

EOF