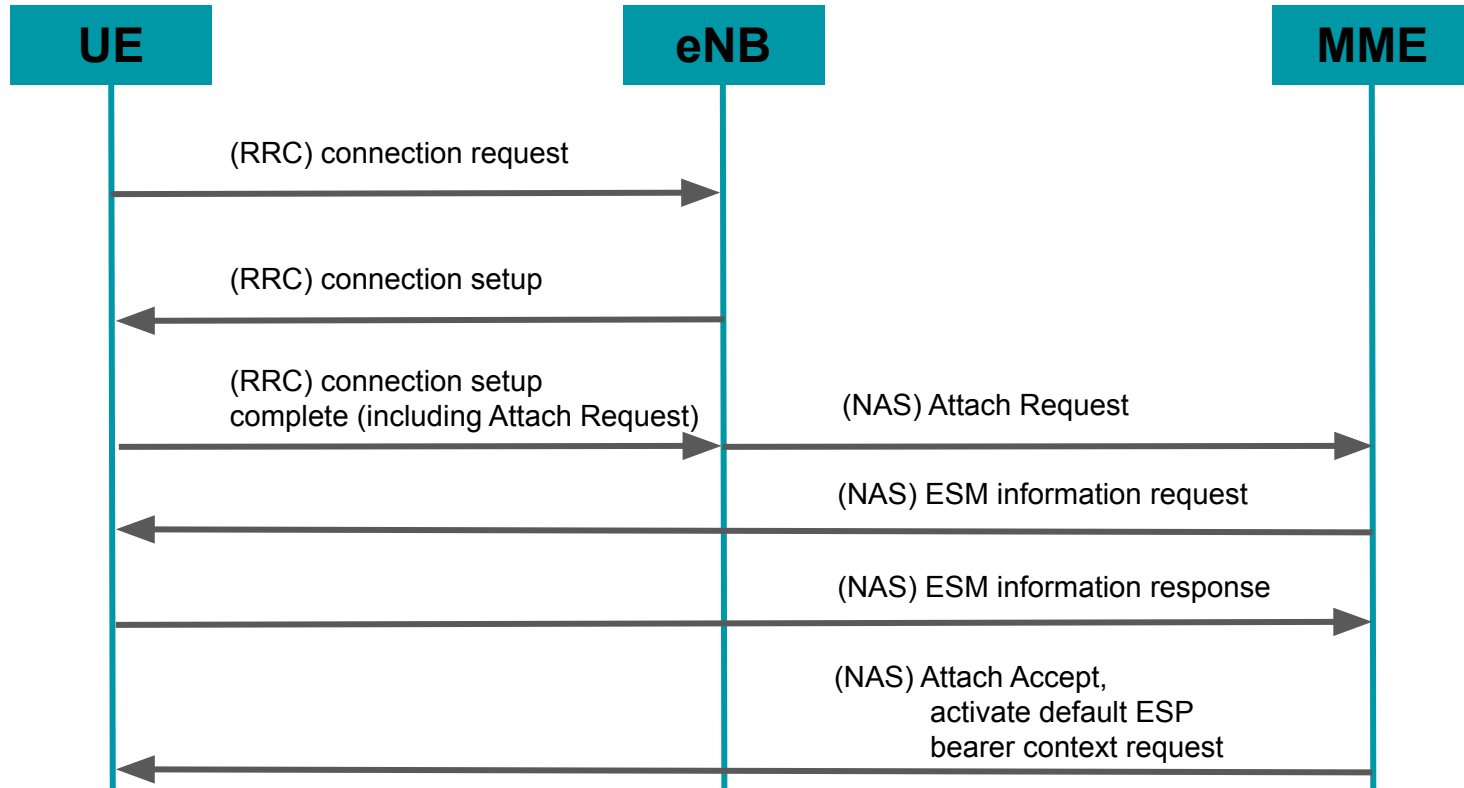


Project 3

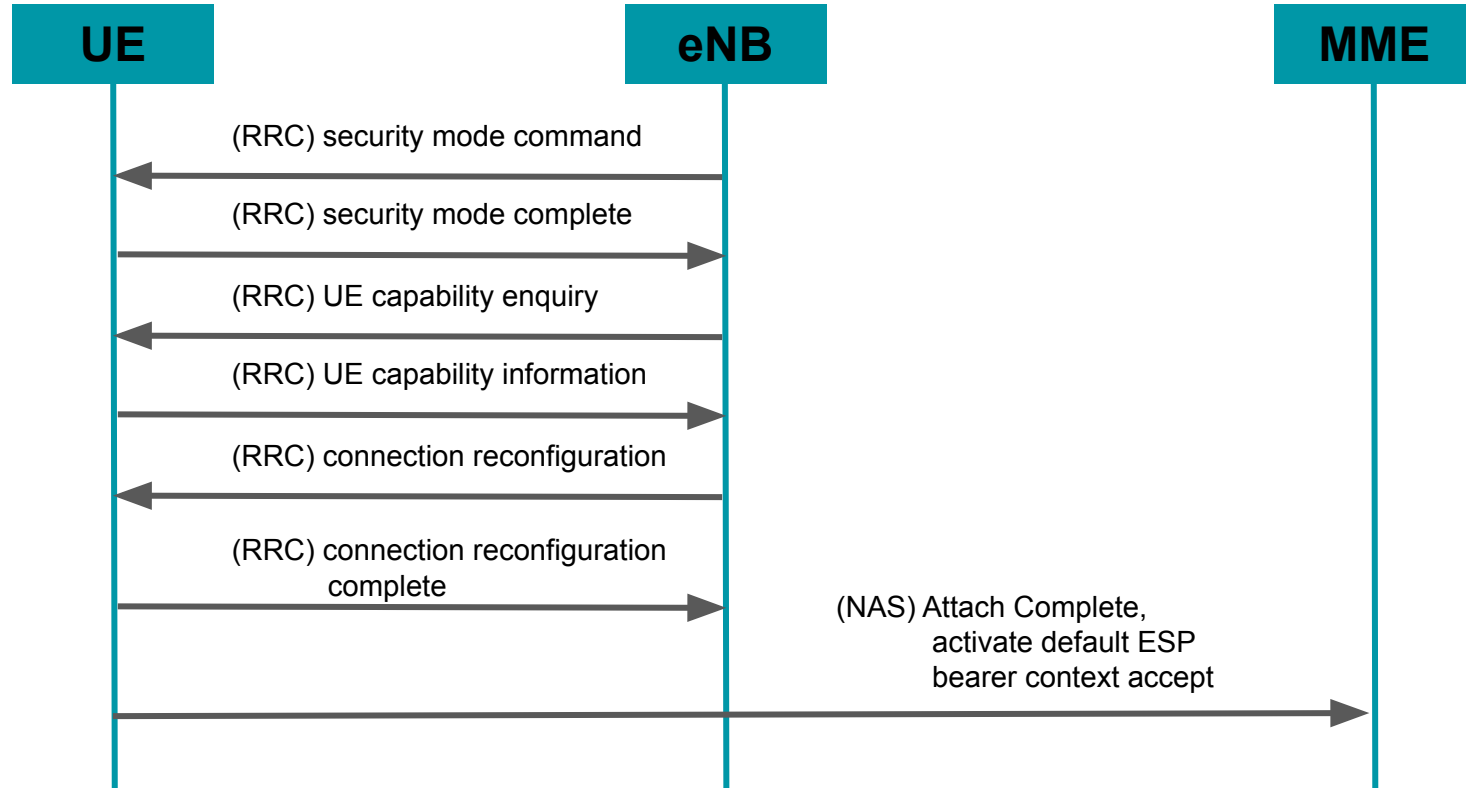
310552030 陳則明
310552038 蔡瀚興

Task I: 4G network attach and detach

Task I: message exchanges in attach procedure



Task I: message exchanges in attach procedure



WireShark detail description - Attach request

GSMTAP/NAS-EPS

215 Attach request, PDN connectivity request

Parameters in message

PLMN

Mobile Country Code (MCC): Unassigned (466)
Mobile Network Code (MNC): Unknown (92)

TAC

Tracking area code(TAC): 13700

GUTI

Mobile Country Code (MCC): Unassigned (466)
Mobile Network Code (MNC): Unknown (92)
MME Group ID: 32768
MME Code: 1
M-TMSI: 4171311851 (0xf8a12aeb)

P-TMSI

No

MSISDN

No

IMEISV

No

WireShark detail description - Attach accept

GSMTAP/NAS-EPS

215 Attach request, PDN connectivity request

Parameters in message

PLMN

Mobile Country Code (MCC): Unassigned (466)
Mobile Network Code (MNC): Unknown (92)

TAC

Tracking area code(TAC): 13700

GUTI

Mobile Country Code (MCC): Unassigned (466)
Mobile Network Code (MNC): Unknown (92)
MME Group ID: 32768
MME Code: 1
M-TMSI: 4171377369 (0xf8a22ad9)

P-TMSI

TMSI/P-TMSI/M-TMSI/5G-TMSI: 806641512 (0x30145f68)

MSISDN

No

IMEISV

No

How Control messages enable 4G network

RRC Connection

- *RRC CONNECTION REQUEST* message is used to request the E-UTRAN for the establishment of an RRC connection
- UE send *RRC Connection Request* message to eNB
- eNB send *RRC Connection Setup* message to UE
- UE used SRB1 send *RRC Connection Setup Complete* to eNB, with *Attach Request* included in “*dedicatedInfoNASList*”.

```
dedicatedInfoNAS: 171fc03fa2040741020bf664f629800001f8a12aeb07f070c04011009000370202d031d1...
  Non-Access-Stratum (NAS)PDU
    0001 .... = Security header type: Integrity protected (1)
    .... 0111 = Protocol discriminator: EPS mobility management messages (0x7)
    Message authentication code: 0x1fc03fa2
    Sequence number: 4
    0000 .... = Security header type: Plain NAS message, not security protected (0)
    .... 0111 = Protocol discriminator: EPS mobility management messages (0x7)
    NAS EPS Mobility Management Message Type: Attach request (0x41)
    0... .... = Type of security context flag (TSC): Native security context (for KSIasme or KSIamf)
    .000 .... = NAS key set identifier: (0)
    .... 0... = Spare bit(s): 0x00
    .... .010 = EPS attach type: Combined EPS/IMSI attach (2)
```

- eNB get message “*dedicatedInfoNASList*” directly forward to MME

Attach request

- ***EPS Attach Type*** indicates the purpose of the attach procedure. The value *combined EPS/IMSI attach* means to attach for both EPS and non-EPS services.

```
.... .010 = EPS attach type: Combined EPS/IMSI attach (2)
```

- ***EPS Mobile Identity*** can be *GUTI*, *IMSI* or *IMEI*.

```
EPS mobile identity
Length: 11
.... 0... = Odd/even indication: Even number of identity digits
.... .110 = Type of identity: GUTI (6)
Mobile Country Code (MCC): Unassigned (466)
Mobile Network Code (MNC): Unknown (92)
MME Group ID: 32768
MME Code: 1
M-TMSI: 4171311851 (0xf8a12aeb)
```

- ***ESM message container*** is to enable piggybacked transfer of an ESM message within an EMM message.
- ***Last Visited Registered TAI*** shall be included if the UE holds a valid last visited registered *Tracking Area Identity (TAI)*.

```
Tracking area identity - Last visited registered TAI
Element ID: 0x52
Mobile Country Code (MCC): Unassigned (466)
Mobile Network Code (MNC): Unknown (92)
Tracking area code(TAC): 13700
```


ESM Information

- MME use ESM information request procedure to retrieve ESM information.
- MME send a *ESM INFORMATION REQUEST* message to the UE.
- MME set the EPS bearer identity to the value "*no EPS bearer identity assigned*" and include the PTI.

```
0000 .... = EPS bearer identity: No EPS bearer identity assigned (0)
.... 0010 = Protocol discriminator: EPS session management messages (0x2)
Procedure transaction identity: 2
NAS EPS session management messages: ESM information request (0xd9)
```

- UE send an *ESM INFORMATION RESPONSE* message to MME.
- UE include all the protocol configuration options and APN if required, to MME in the *ESM INFORMATION RESPONSE* message.

```
Access Point Name
Element ID: 0x28
Length: 9
APN: internet
```

- UE set the EPS bearer identity to the value "*no EPS bearer identity assigned*" and include the PTI.

```
0000 .... = EPS bearer identity: No EPS bearer identity assigned (0)
.... 0010 = Protocol discriminator: EPS session management messages (0x2)
Procedure transaction identity: 2
NAS EPS session management messages: ESM information response (0xda)
```

Attach accept

- The *ATTACH ACCEPT* message is sent by MME to the UE to indicate that the corresponding *ATTACH REQUEST* has been accepted.
- The IE ***EPS Attach Result*** can be either “*EPS only*” or “*combined EPS/IMSI attach*”. “*combined EPS/IMSI attach*” indicates that the attach request for EPS and non-EPS services, or for EPS services and “SMS only” have been successful.

.... .010 = Attach result: Combined EPS/IMSI attach (2)

- When the default bearer is activated as part of the attach procedure, the MME shall send the *ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST* message together with *ATTACH ACCEPT* message.

GSMTAP/NAS-EPS

281 Attach accept, Activate default EPS bearer context request

- The MME shall include in the *ATTACH ACCEPT* message the new assigned GUTI together with the assigned TAI list

Security Mode Command

- *SECURITY MODE COMMAND* message is used to command UE for the activation of AS security.
- eNB sends integrity protected *SECURITY MODE COMMAND* message to UE.
- If the *SECURITY MODE COMMAND* passes the integrity protection check, then UE derive the encryption keys associated with the ciphering algorithm indicated in the *SECURITY MODE COMMAND*.

```
securityAlgorithmConfig  
  cipheringAlgorithm: eea1 (1)  
  integrityProtAlgorithm: eia2 (2)
```

Security Mode Complete

- The *SECURITY MODE COMPLETE* message is used to confirm the successful completion of a *SECURITY MODE COMMAND*.
- UE send *SECURITY MODE COMPLETE* message integrity protected but un-ciphered.

UE Capability Enquiry

- *UE CAPABILITY ENQUIRY* message is used to request the transfer of UE radio access capabilities for *E-UTRA*.
- *eNB* acquire UE's AS capability from UE using *UE CAPABILITY ENQUIRY*.

```
ue-CapabilityRequest: 3 items
  ✓ Item 0
    RAT-Type: eutra (0)
  ✓ Item 1
    RAT-Type: utra (1)
  ✓ Item 2
    RAT-Type: geran-cs (2)
```

UE Capability Information

- *UE CAPABILITY INFORMATION* message is used to transfer of UE radio access capabilities requested by *UE CAPABILITY ENQUIRY*.
- *ueCapabilityRAT-Container* is the container for the UE capabilities of the indicated RAT.

```
ue-CapabilityRAT-ContainerList: 3 items
  Item 0
    UE-CapabilityRAT-Container
      rat-Type: eutra (0)
      ueCapabilityRAT-Container: ddb805061c302006d2a80db1b8ffff1b8ffff1b8ffff1b8ffff1b8ffff1b8ffef...
  Item 1
    UE-CapabilityRAT-Container
      rat-Type: geran-cs (2)
      ueCapabilityRAT-Container: 330357588660140422918100121e100000
  Item 2
    UE-CapabilityRAT-Container
      rat-Type: utra (1)
      ueCapabilityRAT-Container: 40000b40caab541a955aa22920c112000600056284251cfb9a6bb65ca128e7dc35db2f5...
```

RRC Connection Reconfiguration

- *RRC CONNECTION RECONFIGURATION* message is the command to modify an RRC connection.
 - To establish/modify/release Radio Bearers
 - To perform Handover
 - To setup/modify/release Measurements
 - To add/modify/release *SCells*
 - Dedicated NAS Information might also be transferred from eNB to UE

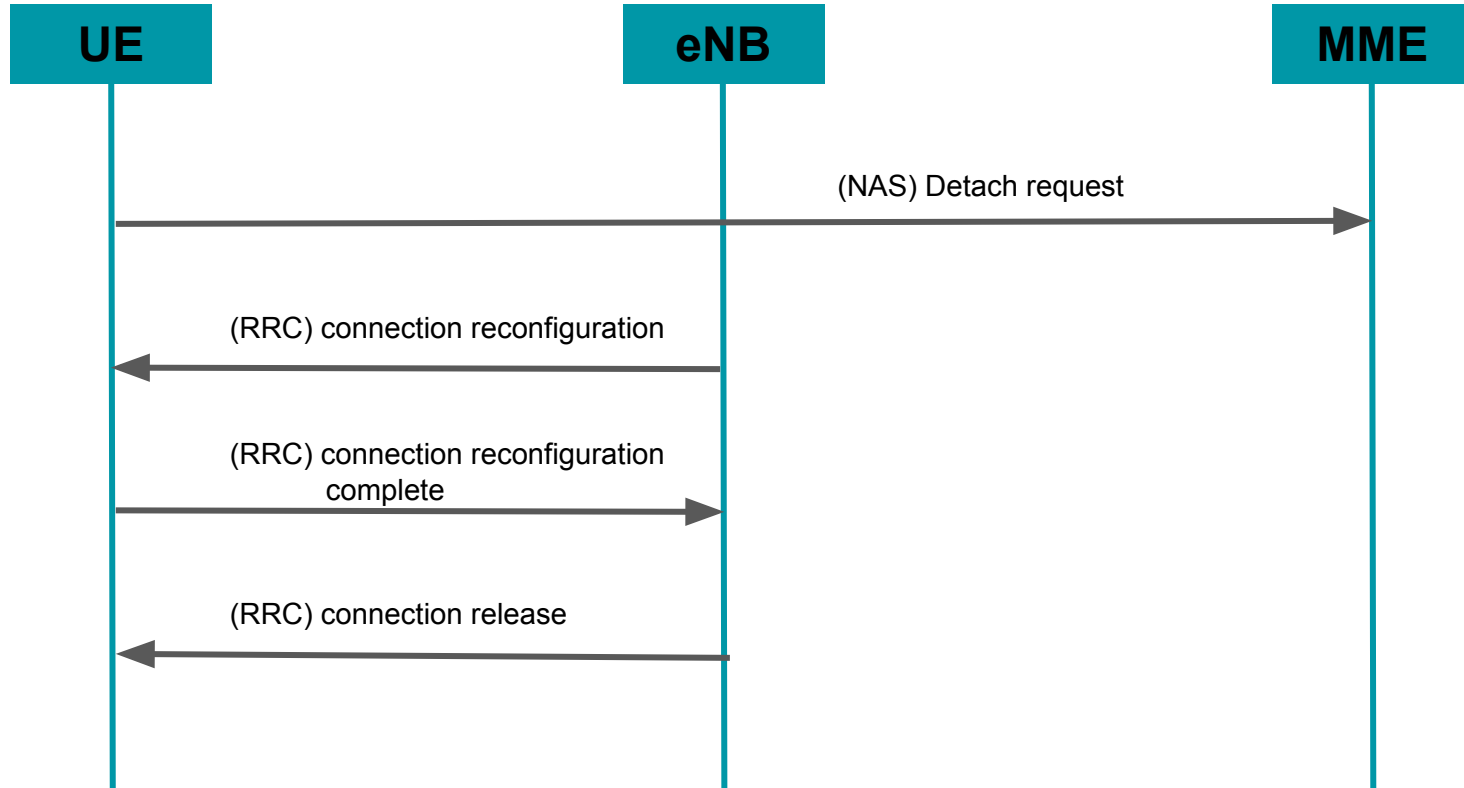
RRC Connection Reconfiguration Complete

- The *RRC CONNECTION RECONFIGURATION COMPLETE* message is used to confirm the successful completion of an *RRC CONNECTION RECONFIGURATION*.

Attach complete

- The *ATTACH COMPLETE* message is sent by the UE to MME in response to an *ATTACH ACCEPT* message
- UE forward the *ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST* message to the ESM sublayer. Once the ESM sublayer indicates that the default EPS bearer context has been activated, the UE shall send an *ATTACH COMPLETE* message together with an *ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT* message contained in the ***ESM message container*** IE to the network

Task I: message exchanges in detach procedure



How Control messages disable 4G network

Detach request

GSMTAP/NAS-EPS

85 Detach request (Combined EPS/IMSI detach / switch-off)

- UE initiates the detach procedure by sending a *DETACH REQUEST* message.
- **Detach type** IE included in this message indicates the type of detach. 3-bits (LSBs) indicate whether the detach is for '*EPS detach*' or '*IMSI detach*' or '*Combined EPS/IMSI detach*'.

.... .011 = Detach Type: Combined EPS/IMSI detach (3)

- If the UE has a valid GUTI, the UE set the **EPS mobile identity** IE as GUTI.
- When *Detach type* IE set to '*switch off*', MME shall not send a *DETACH ACCEPT* message to the UE.

Switch off: Switch off (1)

EPS mobile identity

Length: 11

.... 0... = Odd/even indication: Even number of identity digits

.... .110 = Type of identity: GUTI (6)

Mobile Country Code (MCC): Unassigned (466)

Mobile Network Code (MNC): Unknown (92)

MME Group ID: 32768

MME Code: 1

M-TMSI: 4171377369 (0xf8a22ad9)

RRC connection release

- *RRC CONNECTION RELEASE* message is used to command the release of an RRC connection.
- The *eNB* may provide a cell reselection priority for each frequency, by means of separate lists for each RAT (including E-UTRA) in the *RRC CONNECTION RELEASE* message.
- There is no *RRC CONNECTION RELEASE COMPLETE* message defined in LTE. So, UE leaves RRC_CONNECTED state without transmitting *RRC CONNECTION RELEASE COMPLETE* message.

Parameter determines whether the voice service is enabled

- message: Attach request

GSMTAP/NAS-EPS

215 Attach request, PDN connectivity request

- parameter for voice service
 - *UE's usage setting*
 - *Voice domain preference for E-UTRAN*

Voice Domain Preference and UE's Usage Setting

Element ID: 0x5d

Length: 1

0000 0... = Spare bit(s): 0

.... .0.. = UE's usage setting: Voice centric

.... ..11 = Voice domain preference for E-UTRAN: IMS PS voice preferred, CS Voice as secondary (3)

- VoLTE not enable
 - set *UE's usage setting* to **Voice centric**
 - set *Voice domain preference for E-UTRAN* to **CS Voice only**

Messages include security algorithms configuration

- message: Security Mode Command

LTE RRC DL_DCCH

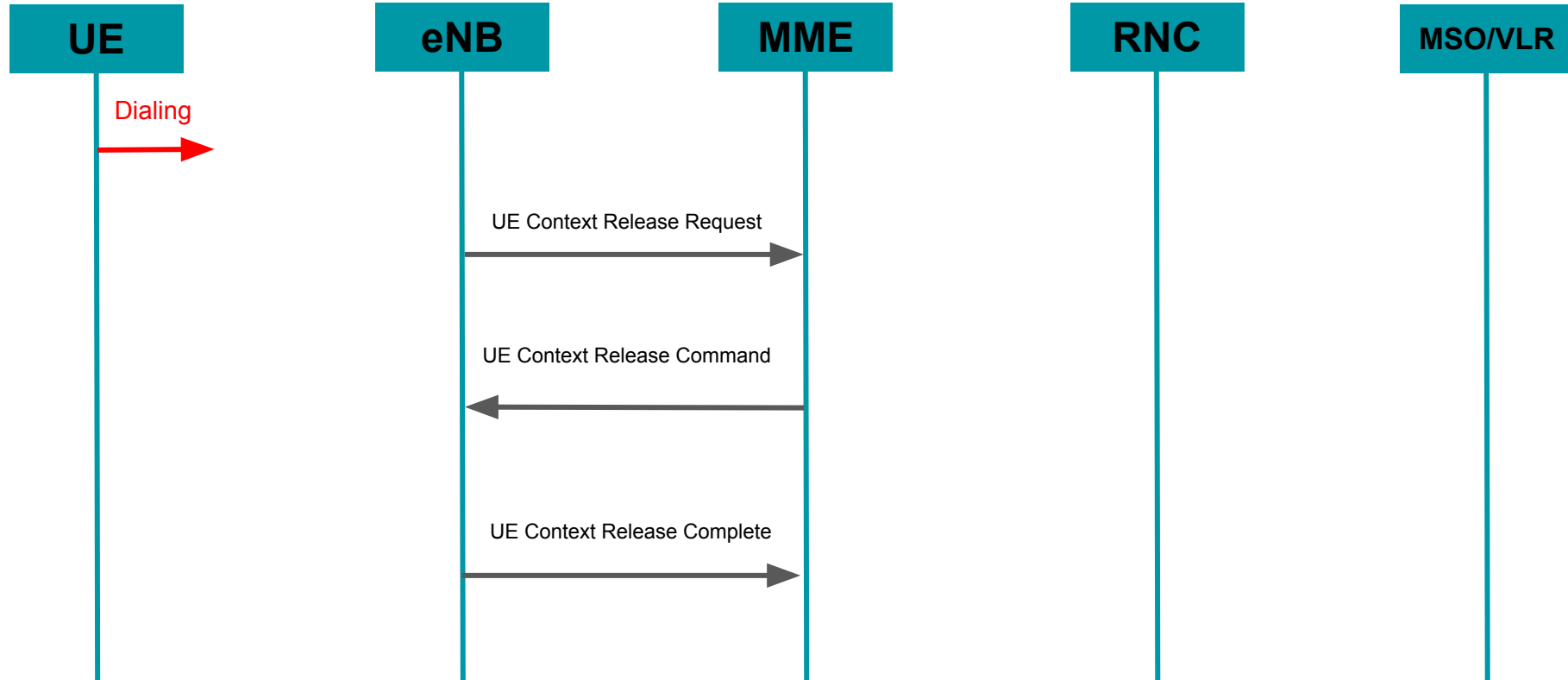
73 SecurityModeCommand

- cipher algorithm: eea1
- integrity algorithm: eia2

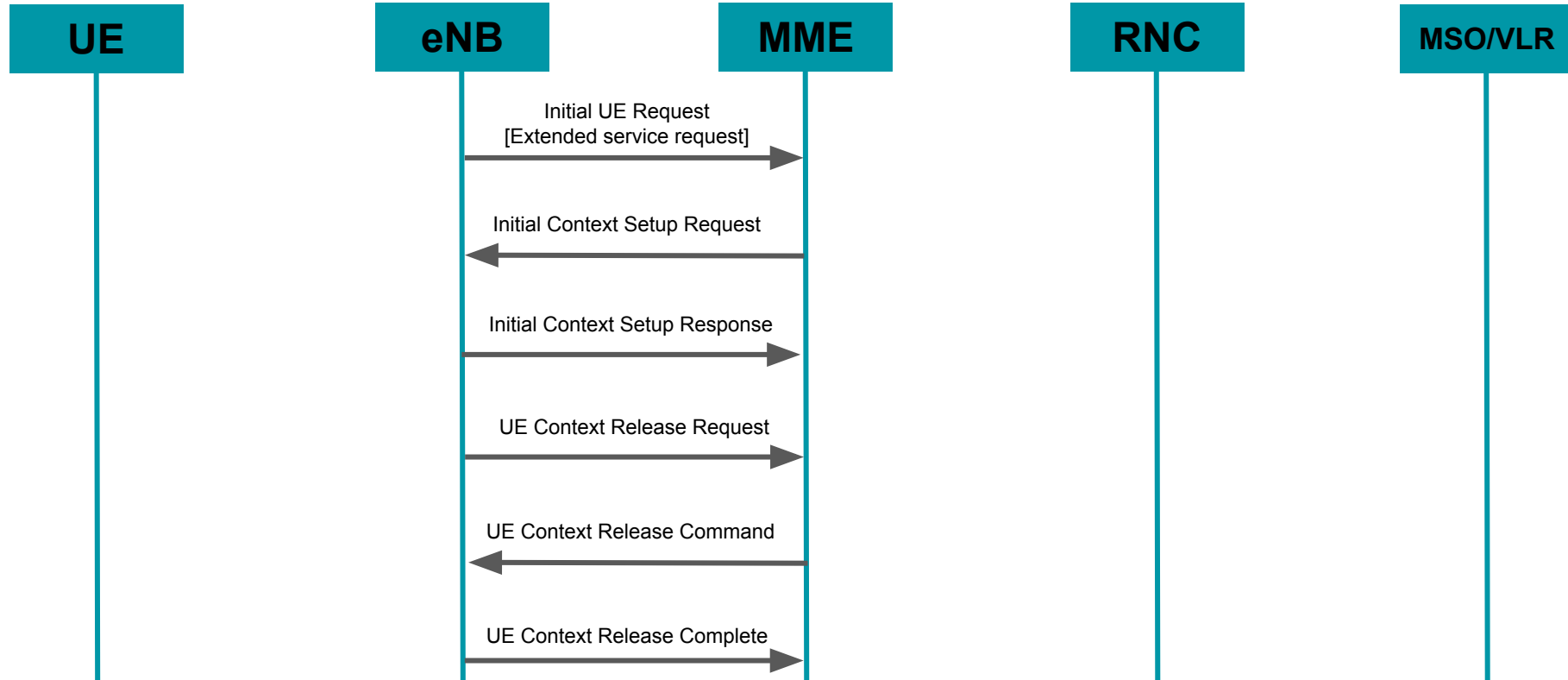
```
securityAlgorithmConfig  
  cipheringAlgorithm: eea1 (1)  
  integrityProtAlgorithm: eia2 (2)
```

Task II : Circuit Switched Fallback (CSFB)

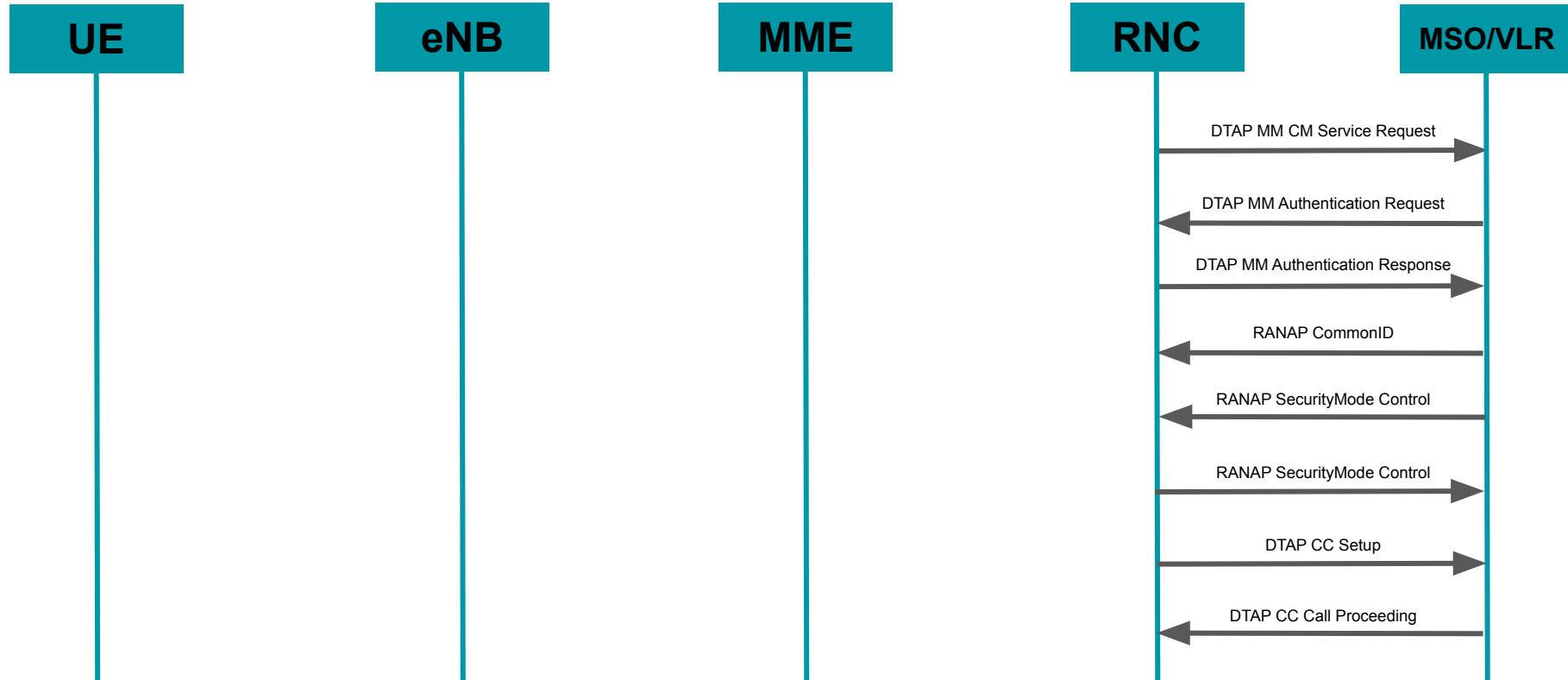
Task II: message exchanges in cell setup procedure



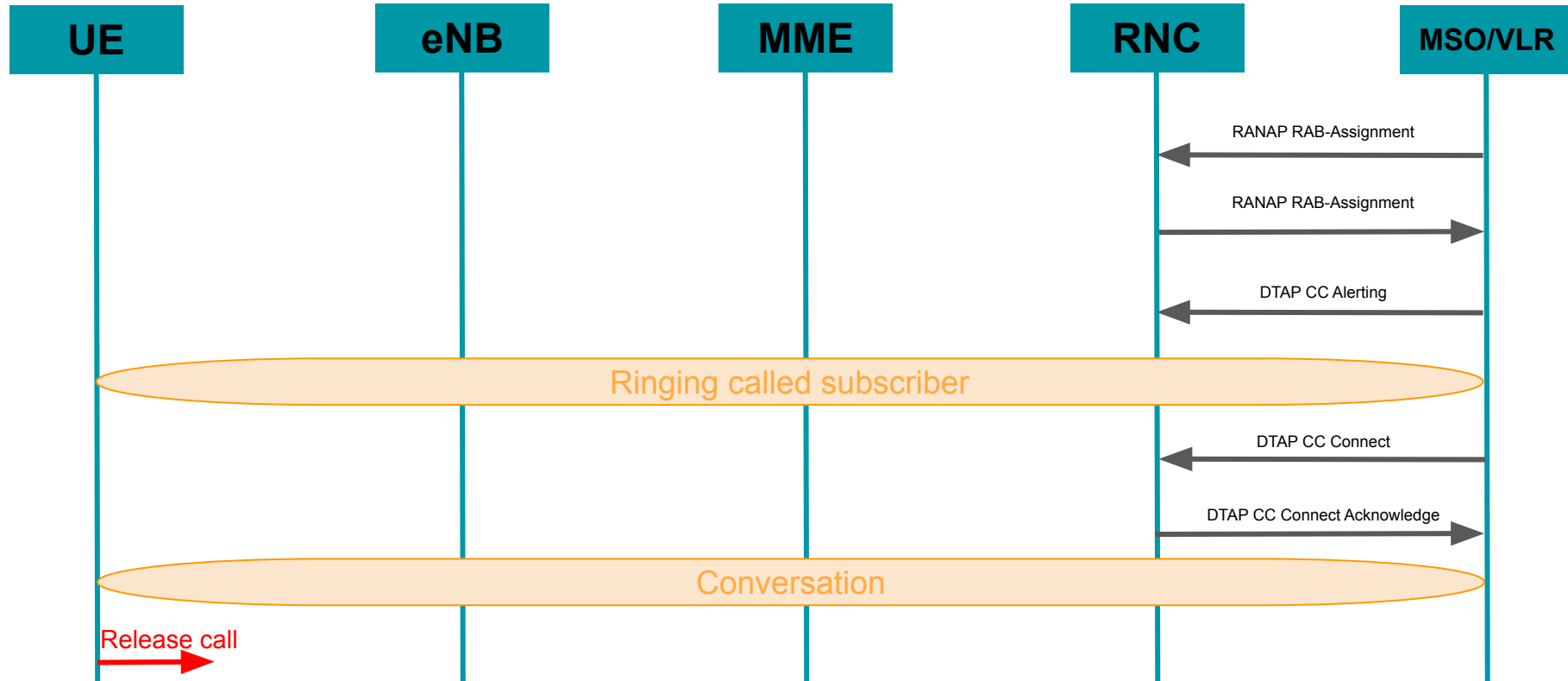
Task II: message exchanges in cell setup procedure



Task II: message exchanges in cell setup procedure



Task II: message exchanges in cell setup procedure



How UE handovers from 4G to 3G network?

Extended service request

```
LTE RRC UL_DCCH/NAS-EPS      94 RRCConnectionSetupComplete, Extended service request
```

- UE use this request to notify 4G core network to initiate a "CS fallback or 1xCS fallback call"

```
NAS EPS Mobility Management Message Type: Extended service request (0x4c)
```

```
> Mobile identity - M-TMSI - TMSI/P-TMSI (0xddb02a68)
```

UE Context Release Request/Command/Complete

- UE release the existing session when it needs to initiate an extended service request

Initial UE Request [Extended service request]

- Signal to the 4G network that the UE wishes to fall back for a circuit switched call

Initial Context Setup Request/Response

- The MME signals to the UE that CS fall back is required.
- The message also notifies the UE about the 3G location area that needs to be used in 3G access for the voice call.

UE Context Release Request/Command/Complete

- Release the 4G LTE session as the UE is going to transition to a 3G UMTS network.

DTAP MM CM Service Request

GSMTAP

84 (DTAP) (MM) CM Service Request

- The first message to be received for the call from the RNC. Setup the SCCP connection between RNC and Core Network.

TMSI/P-TMSI/M-TMSI/5G-TMSI: 857077184 (0x3315f5c0)

▼ CM Service Type

.... 0001 = Service Type: Mobile originating call establishment or packet mode connection establishment (1)

RRC

92 InitialDirectTransfer(cs-domain)(DTAP) (MM) CM Service Request

cn-DomainIdentity: cs-domain (0)

TMSI/P-TMSI/M-TMSI/5G-TMSI: 857077184 (0x3315f5c0)

DTAP GMM Routing Area Update Request

GSMTAP

163 (DTAP) (GMM) Routing Area Update Request

TMSI/P-TMSI/M-TMSI/5G-TMSI: 3708037736 (0xdd042a68)

RRC

172 InitialDirectTransfer(ps-domain)(DTAP) (GMM) Routing Area Update Request

cn-DomainIdentity: ps-domain (1)

TMSI/P-TMSI/M-TMSI/5G-TMSI: 3708037736 (0xdd042a68)

RANAP SecurityMode Control

RRC 96 SecurityModeCommand(cs-domain)

- The message includes the UE security capability, the UIA and FRESH to be used and if ciphering shall be started also the UEA to be used. It contains the MAC-I integrity protection “checksum”.

cn-DomainIdentity: cs-domain (0)

RRC 88 SecurityModeComplete

Uplink Direct Transfer [DTAP CC Setup]

RRC 110 UplinkDirectTransfer(cs-domain)(DTAP) (CC) Setup

- Call Setup is received as a NAS payload.
- Call Setup request is received from the RNC.

cn-DomainIdentity: cs-domain (0)

Called Party BCD Number - (0900000000)

Element ID: 0x5e

Length: 6

1... = Extension: No Extension

.000 = Type of number: unknown (0x0)

.... 0001 = Numbering plan identification: ISDN/Telephony Numbering

Called Party BCD Number: 0900000000

DTAP MM Authentication Request/Response

- The Authentication Request is carried as NAS payload in a Downlink Direct Transfer RRC message.
- The Authentication Response is carried as NAS payload in a Uplink Direct Transfer RRC message.

RRC 81 DownlinkDirectTransfer(cs-domain)(DTAP) (MM) Identity Request

cn-DomainIdentity: cs-domain (0)

RRC 90 UplinkDirectTransfer(cs-domain)(DTAP) (MM) Identity Response

Mobile Identity - IMEISV (3521326543113217)

cn-DomainIdentity: cs-domain (0)

RRC 81 DownlinkDirectTransfer(ps-domain)(DTAP) (GMM) Identity Request

cn-DomainIdentity: ps-domain (1)

RRC 90 UplinkDirectTransfer(ps-domain)(DTAP) (GMM) Identity Response

Mobile Identity - IMEISV (3521326543113217)

cn-DomainIdentity: ps-domain (1)

DownlinkDirectTransfer [DTAP CC Call Proceeding]

RRC 80 DownlinkDirectTransfer(cs-domain)(DTAP) (CC) Call Proceeding

- Core Network signal that the call setup is proceeding.

```
cn-DomainIdentity: cs-domain (0)
```

Radio Bearer Setup

RRC 210 RadioBearerSetup(cs-domain)

Radio Bearer Setup Complete

RRC 80 RadioBearerSetupComplete

DownlinkDirectTransfer [DTAP CC Alerting]

RRC 84 DownlinkDirectTransfer(cs-domain)(DTAP) (CC) Alerting

- Ask RNC to Notify the terminal that the subscriber is being rung
- alert is sent to UE

DownlinkDirectTransfer [DTAP CC Disconnect]

RRC 83 UplinkDirectTransfer(cs-domain)(DTAP) (CC) Disconnect

- RNC sends call disconnect to the Core Network

DownlinkDirectTransfer [DTAP CC Release]

RRC 80 DownlinkDirectTransfer(cs-domain)(DTAP) (CC) Release

- Core Network releases the session.

DownlinkDirectTransfer [DTAP CC Release Complete]

RRC 80 UplinkDirectTransfer(cs-domain)(DTAP) (CC) Release Complete

- RNC signals release complete to Core Network

How UE switch switches between 3G NodeB and 4G eNB

RRConnectionRelease

```
LTE RRC DL_DCCH          75 RRConnectionRelease [cause=other]
```

- UE release the RRC connection with eNB, then ready to switch to RNC

ReleaseCause: The IE *releaseCause* is used to indicates the reason for releasing the *RRC Connection*

```
▼ rrcConnectionRelease-r8  
  releaseCause: other (1)
```

(Ex:- *loadBalancingTAUrequired*, *cs-FallbackHighPriority*, or *other*)

RedirectedCarrierInfo: The *redirectedCarrierInfo* indicates a carrier frequency which is used to redirect the UE to an E-UTRA or an inter-RAT carrier frequency

```
▼ redirectedCarrierInfo: utra-FDD (2)  
  utra-FDD: 10787
```


UE receive information about RNC

RRC	101 SystemInformation-BCH (MasterInformationBlock) (SysInfoType 7)
RRC	101 SystemInformation-BCH (SysInfoType 3)
RRC	88 MasterInformationBlock

- SystemInformationBlockType7 (SIB7): contains inter-RAT cell re-selection information only for GERAN. It includes cell re-selection parameters for each frequency.
- SystemInformationBlockType3 (SIB3): contains cell re-selection information common for intra-frequency, inter-frequency and/or inter-RAT cell re-selection
- MASTER INFORMATION BLOCK (MIB): includes a limited number of most essential and most frequently transmitted parameters that are needed to acquire other information from the cell.

```
▼ plmn-Type: gsm-MAP (0)
  ▼ gsm-MAP
    > plmn-Identity
      Mobile Country Code (MCC): Unassigned (466)
      Mobile Network Code (MNC): Unknown2 (92)
```

UE receive information about RNC

RRC

89 SysInfoType 1(cs-domain)(ps-domain)

- *SystemInformationBlockType1 (SIB1)*: contains information relevant when evaluating if a UE is allowed to access a cell. Also, it supplies the UE with the scheduling of other system information.

```
▼ CN-DomainSysInfo
  cn-DomainIdentity: cs-domain (0)
  ▼ cn-Type: gsm-MAP (0)
    gsm-MAP: 0a01
    ▼ CS domain specific system information
      T3212: 10
      0000 000. = Spare bit(s): 0
      .... ...1 = ATT: MSs shall apply IMSI attach and detach procedure
      cn-DRX-CycleLengthCoeff: 6
```

⇐ Information about CS domain

```
▼ CN-DomainSysInfo
  cn-DomainIdentity: ps-domain (1)
  ▼ cn-Type: gsm-MAP (0)
    gsm-MAP: 0101
    ▼ PS domain specific system information
      Routing Area Code (RAC): 0x01 (1)
      0000 00.. = Spare bit(s): 0
      .... ..0. = NMO I: Network Mode of Operation indicated in Bit 1 (NMO) is used for MS configured for NMO_I_Behaviour
      .... ...1 = NMO: Network Mode of Operation II
      cn-DRX-CycleLengthCoeff: 6
```

⇐ Information about PS domain

UE connecting to RNC

RRC 88 RRCConnectionRequest

- UE wishes to establish a voice call so it requests a Radio Resource Control connection

tmsi: 3315f5c0 [bit length 32, 0011 0011 0001 0101 1111 0101 1100 0000 decimal value 857077184]

Mobile Country Code (MCC): Unassigned (466)

Mobile Network Code (MNC): Unknown2 (92)

RRC 191 RRCConnectionSetup

- The RNC accepts the RRC Connection Request and assigns a traffic channel. The message also creates a SRB.

tmsi: 3315f5c0 [bit length 32, 0011 0011 0001 0101 1111 0101 1100 0000 decimal value 857077184]

Mobile Country Code (MCC): Unassigned (466)

Mobile Network Code (MNC): Unknown2 (92)

UE connecting to RNC

RRC 182 RRCConnectionSetupComplete(cs-domain)(ps-domain)

- The UE responds back to signal the completion of the RRC Connection Setup. RRC Connection setup has been completed between the UE and the RNC. Signaling Radio Bearer(SRB) is also created at the time of RRC connection setup

```
▼ rrcConnectionSetupComplete
  rrc-TransactionIdentifier: 0
  ▼ startList: 2 items
    ▼ Item 0
      ▼ STARTSingle
        cn-DomainIdentity: cs-domain (0)
        start-Value: 000060 [bit length 20, 4 LSB pad bits, 0000 0000 0000 0000 0110 .... decimal value 6]
    ▼ Item 1
      ▼ STARTSingle
        cn-DomainIdentity: ps-domain (1)
        start-Value: 000000 [bit length 20, 4 LSB pad bits, 0000 0000 0000 0000 0000 .... decimal value 0]
```

⇐ UE setup RRC connection with RNC

```
> ue-RadioAccessCapability
> ue-RATSpecificCapability: 1 item
```

⇐ UE capability information

Five different message between 3G & 4G

1. RRC Connection Request

3G

```
message: rrcConnectionRequest (1)
  rrcConnectionRequest
    initialUE-Identity: tmsi-and-LAI (1)
      tmsi-and-LAI
        tmsi: 3315f5c0 [bit length 32, 0011 0011 0001 0101 1111 0101 1100 0000]
        lai
          plmn-Identity
            Mobile Country Code (MCC): Unassigned (466)
            Mobile Network Code (MNC): Unknown2 (92)
            lac: 2871 [bit length 16, 0010 1000 0111 0001 decimal value 10353]
          establishmentCause: originatingConversationalCall (0)
          protocolErrorIndicator: noError (0)
      measuredResultsOnRACH
        currentCell
          modeSpecificInfo: fdd (0)
          fdd
        v3d0NonCriticalExtensions
          rrcConnectionRequest-v3d0ext
        v4b0NonCriticalExtensions
          rrcConnectionRequest-v4b0ext
            accessStratumReleaseIndicator: rel-9 (5)
          v590NonCriticalExtensions
```

4G

```
rrcConnectionRequest
  criticalExtensions: rrcConnectionRequest-r8 (0)
    rrcConnectionRequest-r8
      ue-Identity: s-TMSI (0)
        s-TMSI
          mmec: 04 [bit length 8, 0000 0100 decimal value 4]
          m-TMSI: ddb02a68 [bit length 32, 1101 1101 1011 0000 0010 1010 0110 1000]
          establishmentCause: mo-Data (4)
          spare: 00 [bit length 1, 7 LSB pad bits, 0... .... decimal value 0]
```

2. RRC Connection Setup

3G

```
message: rrcConnectionSetup (3)
  v rrcConnectionSetup: later-than-r3 (1)
    v later-than-r3
      v initialUE-Identity: tmsi-and-LAI (1)
        v tmsi-and-LAI
          tmsi: 3315f5c0 [bit length 32, 0011 0011 0001 0101 1111 0101 1100 0000]
        v lai
          > plmn-Identity
            Mobile Country Code (MCC): Unassigned (466)
            Mobile Network Code (MNC): Unknown2 (92)
            lac: 2871 [bit length 16, 0010 1000 0111 0001 decimal value 10353]
          rrc-TransactionIdentifier: 0
        > criticalExtensions: criticalExtensions (1)
```

4G

```
c1: rrcConnectionSetup (3)
  v rrcConnectionSetup
    rrc-TransactionIdentifier: 0
    v criticalExtensions: c1 (0)
      v c1: rrcConnectionSetup-r8 (0)
        v rrcConnectionSetup-r8
          v radioResourceConfigDedicated
            > srb-ToAddModList: 1 item
            > mac-MainConfig: explicitValue (0)
            > physicalConfigDedicated
```

3. Security Mode Command

```
securityModeCommand: later-than-r3 (1)
  v later-than-r3
    rrc-TransactionIdentifier: 1
    v criticalExtensions: r7 (0)
      v r7
        v securityModeCommand-r7
          > securityCapability
          > cipheringModeInfo
          > integrityProtectionModeInfo
          cn-DomainIdentity: ps-domain (1)
          > ue-SystemSpecificSecurityCap: 1 item
```

```
c1: securityModeCommand (6)
  v securityModeCommand
    rrc-TransactionIdentifier: 0
    v criticalExtensions: c1 (0)
      v c1: securityModeCommand-r8 (0)
        v securityModeCommand-r8
          v securityConfigSMC
            v securityAlgorithmConfig
              cipheringAlgorithm: eea1 (1)
              integrityProtAlgorithm: eia2 (2)
```

4. RRC Connection Release

3G

```
rrcConnectionRelease: later-than-r3 (1)
  ✓ later-than-r3
    rrc-TransactionIdentifier: 0
    ✓ criticalExtensions: r4 (0)
      ✓ r4
        ✓ rrcConnectionRelease-r4
          n-308: 2
          releaseCause: directedsignallingconnectionre-establishment (5)
        ✓ v4d0NonCriticalExtensions
          > v690NonCriticalExtensions
```

4G

```
c1: rrcConnectionRelease (5)
  ✓ rrcConnectionRelease
    rrc-TransactionIdentifier: 0
    ✓ criticalExtensions: c1 (0)
      ✓ c1: rrcConnectionRelease-r8 (0)
        ✓ rrcConnectionRelease-r8
          releaseCause: other (1)
```


5. Routing/Tracking Area Update Request

3G

```
GSM A-I/F DTAP - Routing Area Update Request
> Protocol Discriminator: GPRS mobility management messages (8)
  DTAP GPRS Mobility Management Message Type: Routing Area Update Request (0x08)
> Update Type
> Ciphering Key Sequence Number
> Routing Area Identification - Old routing area identification - RAI: 466-92-32768-4
> MS Radio Access Capability
> P-TMSI Signature - Old P-TMSI Signature
> GPRS Timer - Requested Ready Timer
> Mobile Identity - P-TMSI - TMSI/P-TMSI (0xdd042a68)
> MS Network Capability
> PDP Context Status
> UE network capability
> Mobile Identity - Additional mobile identity - TMSI/P-TMSI (0xde7c7c06)
> Routing Area Identification 2 - Additional old routing area identification - RAI: 466-92-10353-1
> Voice Domain Preference and UE's Usage Setting
> P-TMSI Type
> MS network feature support
```

4G

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EPS mobile identity - Old GUTI
Ciphering Key Sequence Number - GPRS ciphering key sequence number
P-TMSI Signature - Old P-TMSI Signature
EPS mobile identity - Additional GUTI
Nonce - NonceUE
UE network capability
Tracking area identity - Last visited registered TAI
DRX Parameter
EPS bearer context status
MS Network Capability
Location area identification - Old location area identification
Mobile station classmark 2
Mobile station classmark 3
Supported Codec List - Supported Codecs
Voice Domain Preference and UE's Usage Setting
GUTI type - Old GUTI type
MS network feature support
Network Resource Identifier Container - TMSI based NRI container
UE additional security capability
```