

20 апреля 2024

Протоколы и интерфейсы БС LTE. Лекция 8.

Интерфейс E1AP. TS 38.463

ВЛАД РЫЖОВ

Fast Track в Телеком, 2024



Что сегодня будет происходить? Адженда

**Список
процедур E1AP**

5 минут

**Разбор типов
процедур**

25 минут

**Примеры
сообщений**

5 минут

Пример

10 минут

**Какие компоненты сети соединяет
интерфейс E1AP? Каковы его
функции?**

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Список процедур. Класс-1.

Table 1: Class 1 procedures

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
Reset	RESET	RESET ACKNOWLEDGE	
gNB-CU-UP E1 Setup	GNB-CU-UP E1 SETUP REQUEST	GNB-CU-UP E1 SETUP RESPONSE	GNB-CU-UP E1 SETUP FAILURE
gNB-CU-CP E1 Setup	GNB-CU-CP E1 SETUP REQUEST	GNB-CU-CP E1 SETUP RESPONSE	GNB-CU-CP E1 SETUP FAILURE
gNB-CU-UP Configuration Update	GNB-CU-UP CONFIGURATION UPDATE	GNB-CU-UP CONFIGURATION UPDATE ACKNOWLEDGE	GNB-CU-UP CONFIGURATION UPDATE FAILURE
gNB-CU-CP Configuration Update	GNB-CU-CP CONFIGURATION UPDATE	GNB-CU-CP CONFIGURATION UPDATE ACKNOWLEDGE	GNB-CU-CP CONFIGURATION UPDATE FAILURE
E1 Release	E1 RELEASE REQUEST	E1 RELEASE RESPONSE	
Bearer Context Setup	BEARER CONTEXT SETUP REQUEST	BEARER CONTEXT SETUP RESPONSE	BEARER CONTEXT SETUP FAILURE
Bearer Context Modification (gNB-CU-CP initiated)	BEARER CONTEXT MODIFICATION REQUEST	BEARER CONTEXT MODIFICATION RESPONSE	BEARER CONTEXT MODIFICATION FAILURE
Bearer Context Modification Required (gNB-CU-UP initiated)	BEARER CONTEXT MODIFICATION REQUIRED	BEARER CONTEXT MODIFICATION CONFIRM	
Bearer Context Release (gNB-CU-CP initiated)	BEARER CONTEXT RELEASE COMMAND	BEARER CONTEXT RELEASE COMPLETE	



Список процедур. Класс-2.

Table 2: Class 2 procedures

Elementary Procedure	Message
Error Indication	ERROR INDICATION
Bearer Context Release Request (gNB-CU-UP initiated)	BEARER CONTEXT RELEASE REQUEST
Bearer Context Inactivity Notification	BEARER CONTEXT INACTIVITY NOTIFICATION
DL Data Notification	DL DATA NOTIFICATION
UL Data Notification	UL DATA NOTIFICATION
Data Usage Report	DATA USAGE REPORT
gNB-CU-UP Counter Check	GNB-CU-UP COUNTER CHECK
gNB-CU-UP Status Indication	GNB-CU-UP STATUS INDICATION
MR-DC Data Usage Report	MR-DC DATA USAGE REPORT



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5 минут

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25 минут

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сообщений**

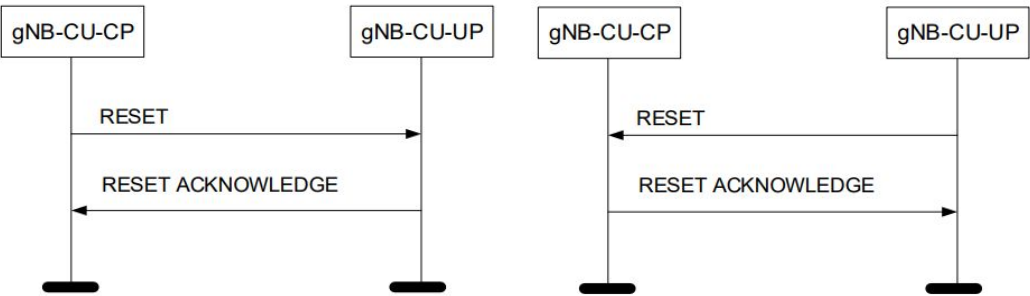
5 минут

Пример

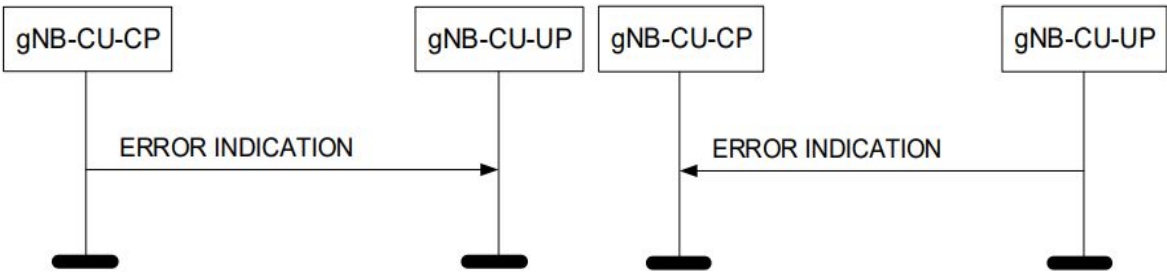
10 минут

Interface Management procedures

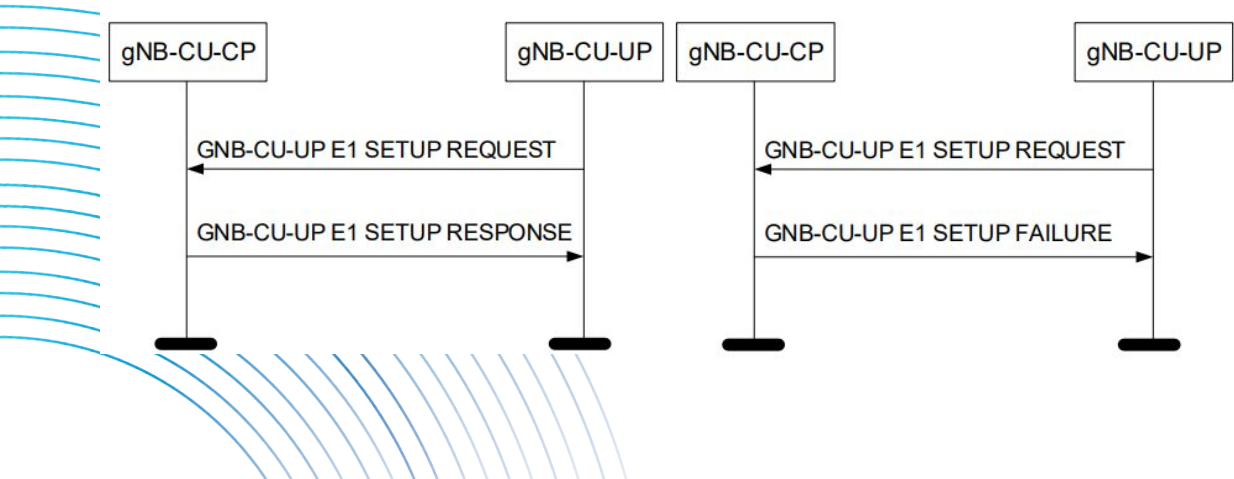
Reset



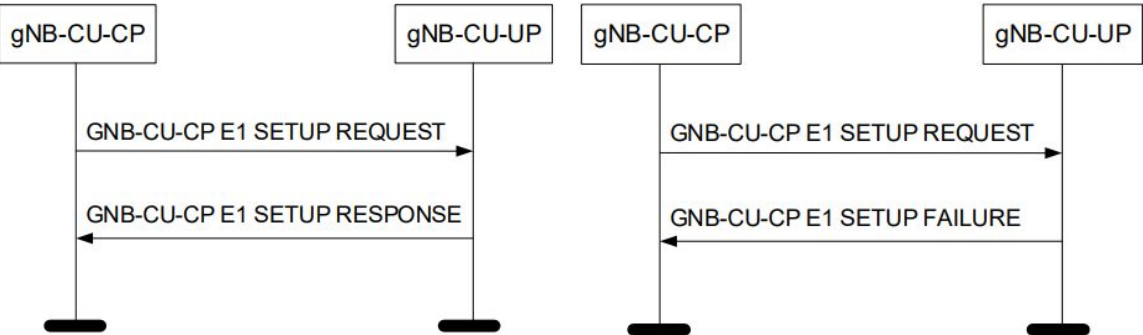
Error Indication



gNB-CU-UP E1 Setup

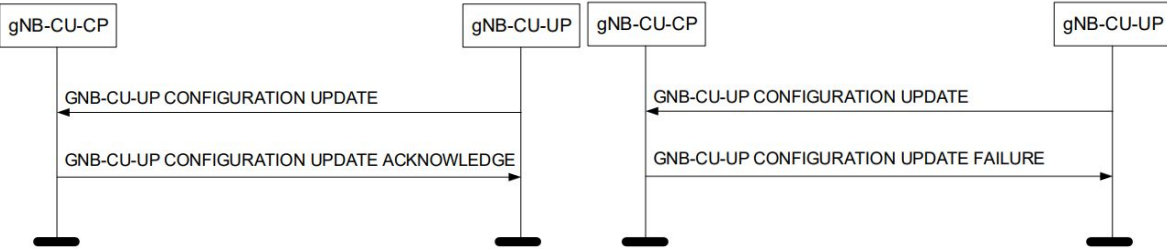


gNB-CU-CP E1 Setup

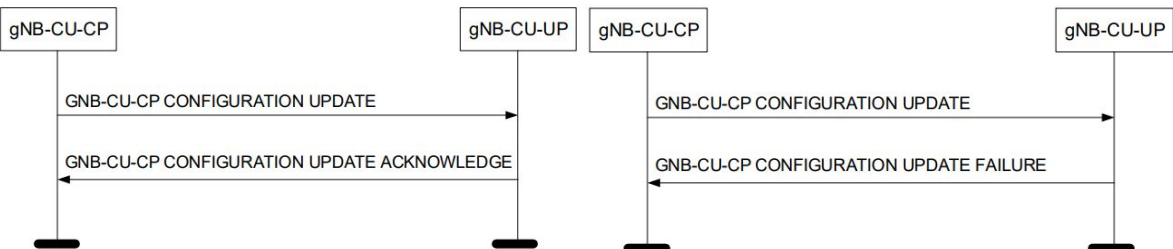


Interface Management procedures

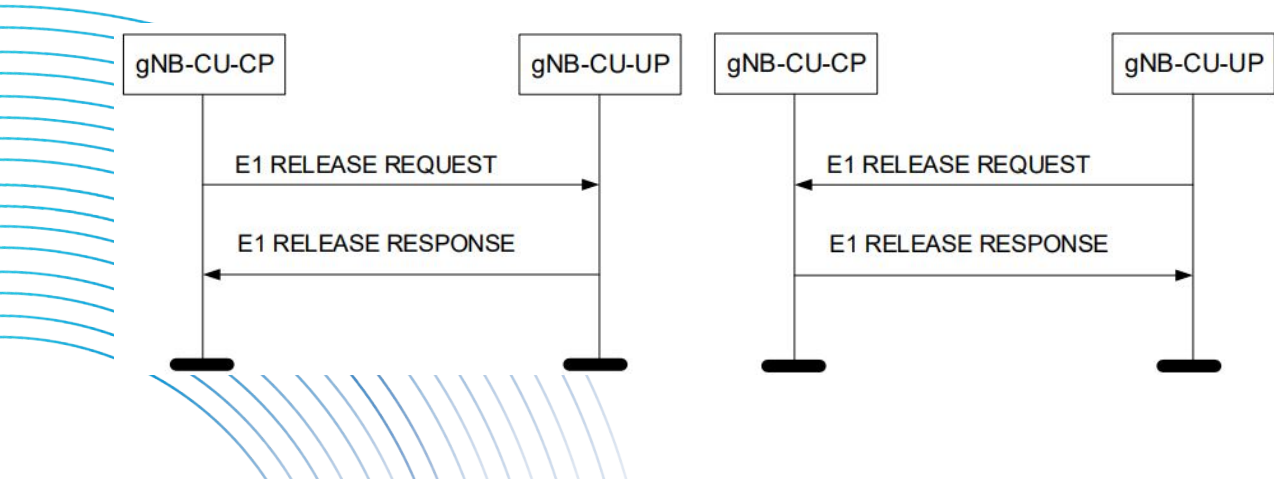
gNB-CU-UP Configuration Update



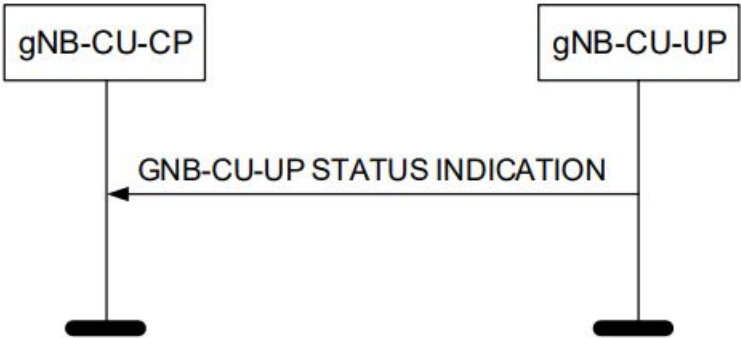
gNB-CU-CP Configuration Update



E1 Release

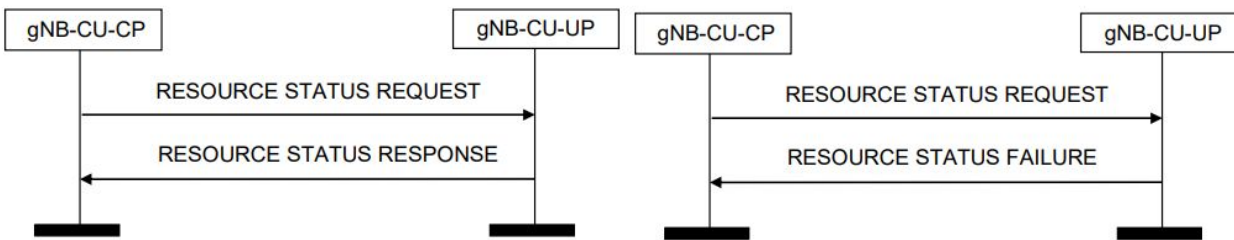


gNB-CU-UP Status Indication

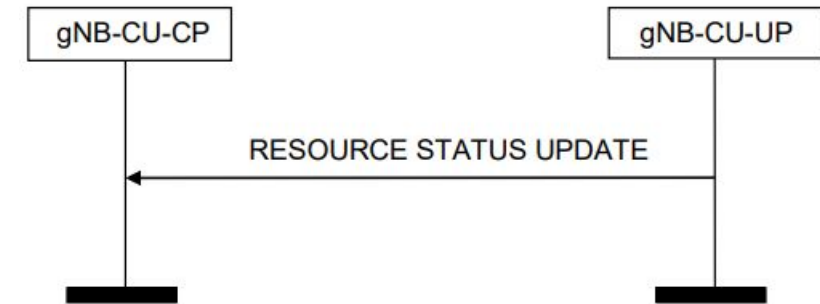


Interface Management procedures

Resource Status Reporting Initiation

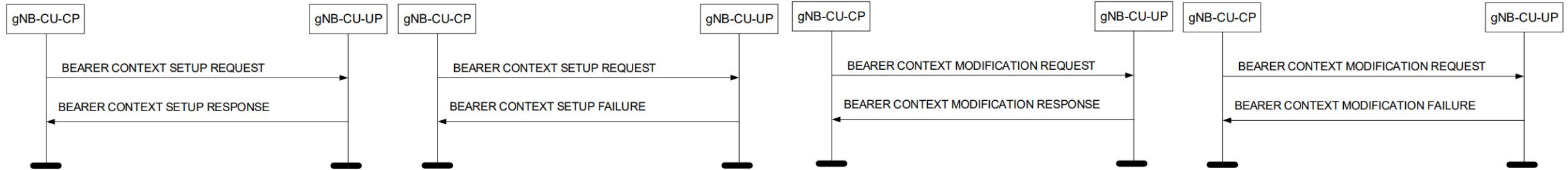


Resource Status Reporting



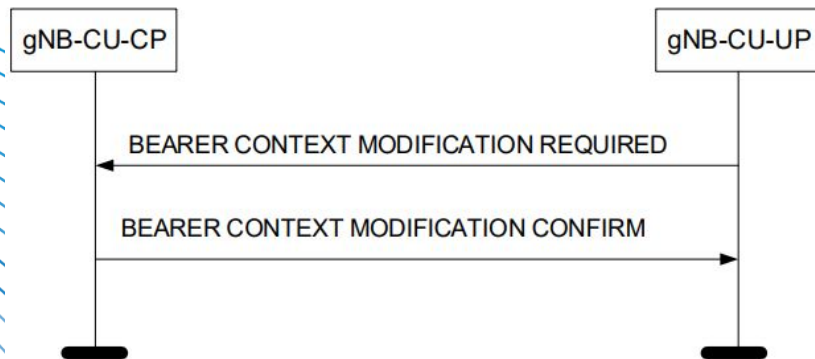
Bearer Context Management procedures

Bearer Context Setup



Bearer Context Modification Required

Bearer Context Modification Required



Bearer Context Release

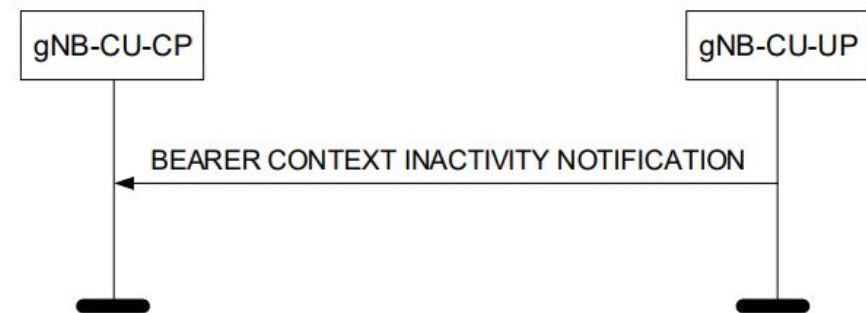


Bearer Context Management procedures

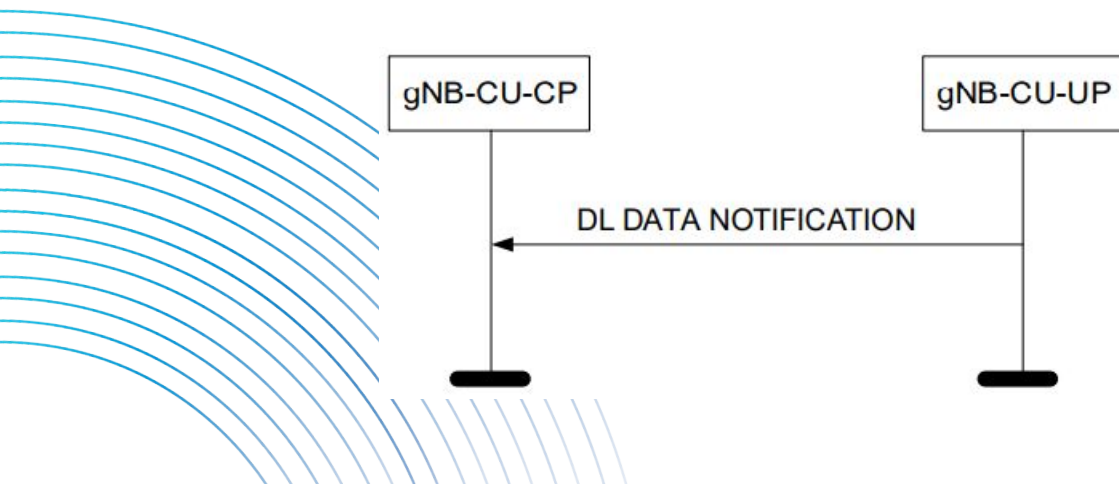
Bearer Context Release Request



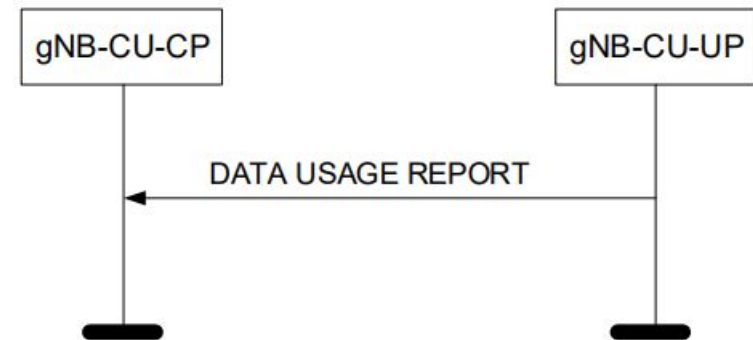
Bearer Context Inactivity Notification



DL Data Notification



Data Usage Report

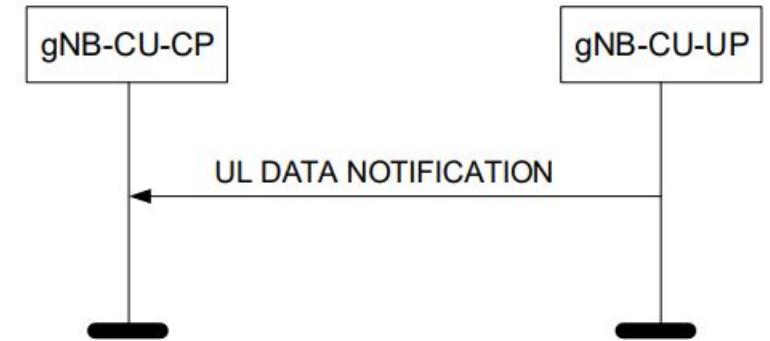


Bearer Context Management procedures

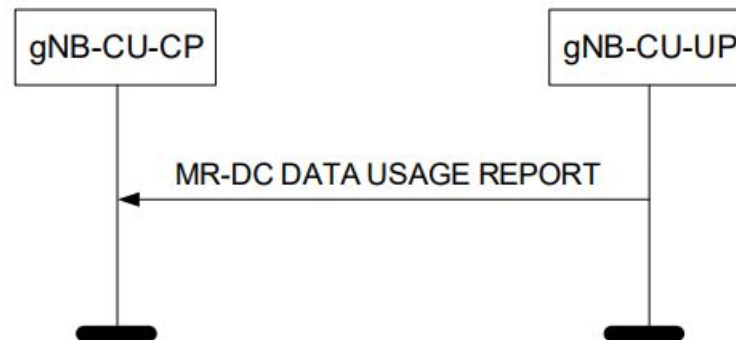
gNB-CU-UP Counter Check



UL Data Notification



MR-DC Data Usage Report



**Может ли gNB-CU-UP/CP отправить
команду Bearer Context Release?
Почему?**

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5 минут

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25 минут

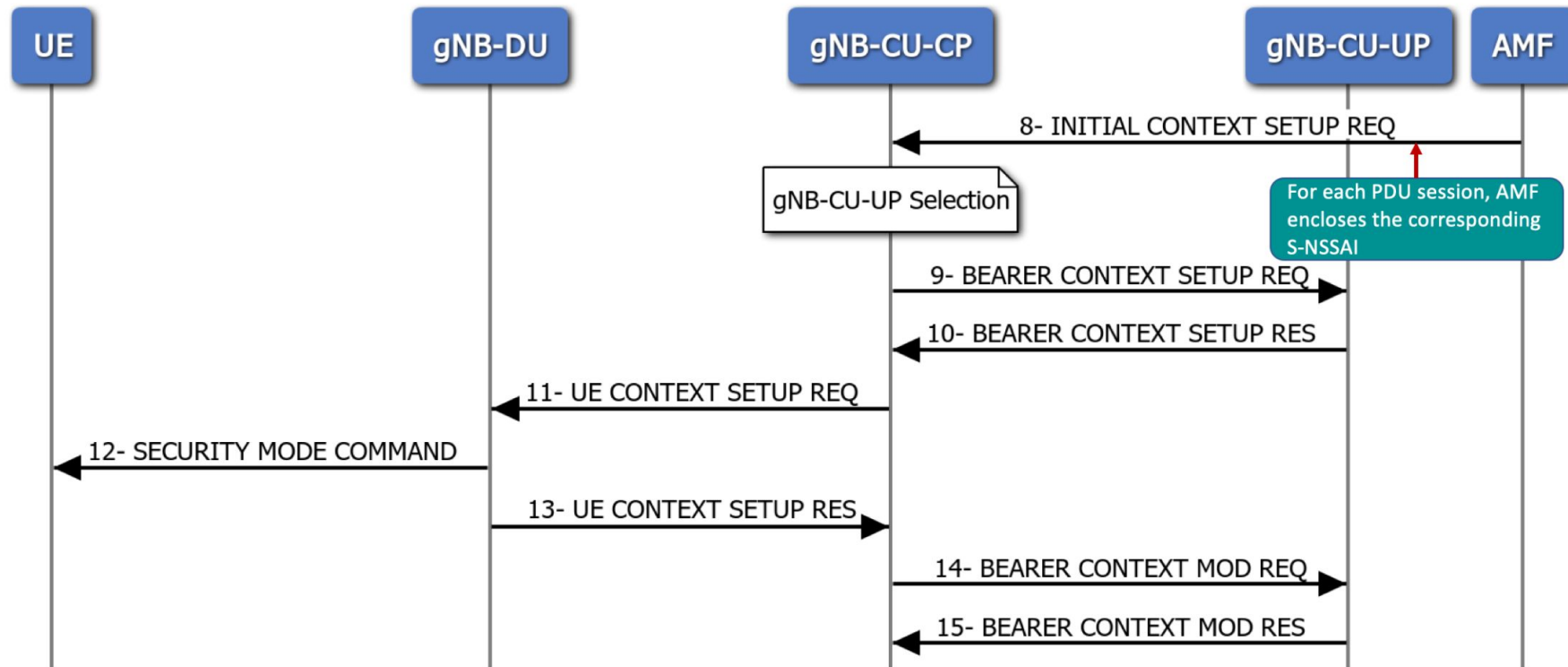
**Примеры
сообщений**

5 минут

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10 минут

Bearer Context Setup procedures call flow



Bearer Context Setup messages via ASN1

1

```
BearerContextSetupRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    ( { BearerContextSetupRequestIEs} ),
    ...
}

BearerContextSetupRequestIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID          CRITICALITY reject TYPE GNB-CU-CP-UE-E1AP-ID          PRESENCE mandatory }|
    { ID id-SecurityInformation            CRITICALITY reject TYPE SecurityInformation          PRESENCE mandatory }|
    { ID id-UEDLAggregateMaximumBitRate    CRITICALITY reject TYPE BitRate                  PRESENCE mandatory }|
    { ID id-UEDLMaximumIntegrityProtectedDataRate CRITICALITY reject TYPE BitRate          PRESENCE optional }|
    { ID id-Serving-PLMN                   CRITICALITY ignore TYPE PLMN-Identity              PRESENCE mandatory }|
    { ID id-ActivityNotificationLevel       CRITICALITY reject TYPE ActivityNotificationLevel    PRESENCE mandatory }|
    { ID id-UE-Inactivity-Timer            CRITICALITY reject TYPE Inactivity-Timer          PRESENCE optional }|
    { ID id-BearerContextStatusChange       CRITICALITY reject TYPE BearerContextStatusChange    PRESENCE optional }|
    { ID id-System-BearerContextSetupRequest CRITICALITY reject TYPE System-BearerContextSetupRequest PRESENCE mandatory }|
    { ID id-RANUEID                        CRITICALITY ignore TYPE RANUEID                  PRESENCE optional }|
    { ID id-GNB-DU-ID                      CRITICALITY ignore TYPE GNB-DU-ID                PRESENCE optional },
    ...
}

bearerContextSetup E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      BearerContextSetupRequest
    SUCCESSFUL OUTCOME      BearerContextSetupResponse
    UNSUCCESSFUL OUTCOME    BearerContextSetupFailure
    PROCEDURE CODE          id-bearerContextSetup
    CRITICALITY              reject
}
```

2

```
BearerContextSetupResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    ( { BearerContextSetupResponseIEs} ),
    ...
}

BearerContextSetupResponseIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID          CRITICALITY reject TYPE GNB-CU-CP-UE-E1AP-ID          PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID          CRITICALITY reject TYPE GNB-CU-UP-UE-E1AP-ID          PRESENCE mandatory }|
    { ID id-System-BearerContextSetupResponse CRITICALITY ignore TYPE System-BearerContextSetupResponse PRESENCE mandatory },
    ...
}
```

Bearer Context Setup messages via ASN1

```
bearerContextSetup E1AP-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE      BearerContextSetupRequest  
    SUCCESSFUL OUTCOME      BearerContextSetupResponse  
    UNSUCCESSFUL OUTCOME    BearerContextSetupFailure  
    PROCEDURE CODE          id-bearerContextSetup  
    CRITICALITY              reject  
}
```

3

```
BearerContextSetupFailure ::= SEQUENCE {  
    protocolIEs          ProtocolIE-Container { { BearerContextSetupFailureIEs} },  
    ...  
}
```

```
BearerContextSetupFailureIEs E1AP-PROTOCOL-IES ::= {  
    { ID id-gNB-CU-CP-UE-E1AP-ID          CRITICALITY reject TYPE GNB-CU-CP-UE-E1AP-ID          PRESENCE mandatory } |  
    { ID id-gNB-CU-UP-UE-E1AP-ID          CRITICALITY ignore TYPE GNB-CU-UP-UE-E1AP-ID          PRESENCE optional } |  
    { ID id-Cause                          CRITICALITY ignore TYPE Cause                      PRESENCE mandatory } |  
    { ID id-CriticalityDiagnostics         CRITICALITY ignore TYPE CriticalityDiagnostics     PRESENCE optional } ,  
    ...  
}
```

4

```
-- *****  
--  
-- Elementary Procedures  
--  
-- *****  
  
id-reset                               ProcedureCode ::= 0  
id-errorIndication                     ProcedureCode ::= 1  
id-privateMessage                      ProcedureCode ::= 2  
id-gNB-CU-UP-E1Setup                   ProcedureCode ::= 3  
id-gNB-CU-CP-E1Setup                   ProcedureCode ::= 4  
id-gNB-CU-UP-ConfigurationUpdate       ProcedureCode ::= 5  
id-gNB-CU-CP-ConfigurationUpdate       ProcedureCode ::= 6  
id-e1Release                           ProcedureCode ::= 7  
id-bearerContextSetup                  ProcedureCode ::= 8
```

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Разбор примера

СПАСИБО