

## ***EMM – Procedure***

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- **Acronyms**
- **EMM Specific Procedure**
  - Attach
  - Detach
  - Tracking Area Updating
- **EMM connection management Procedure**
  - Service request
  - Paging
- **EMM STATUS message**
- **Q&A**

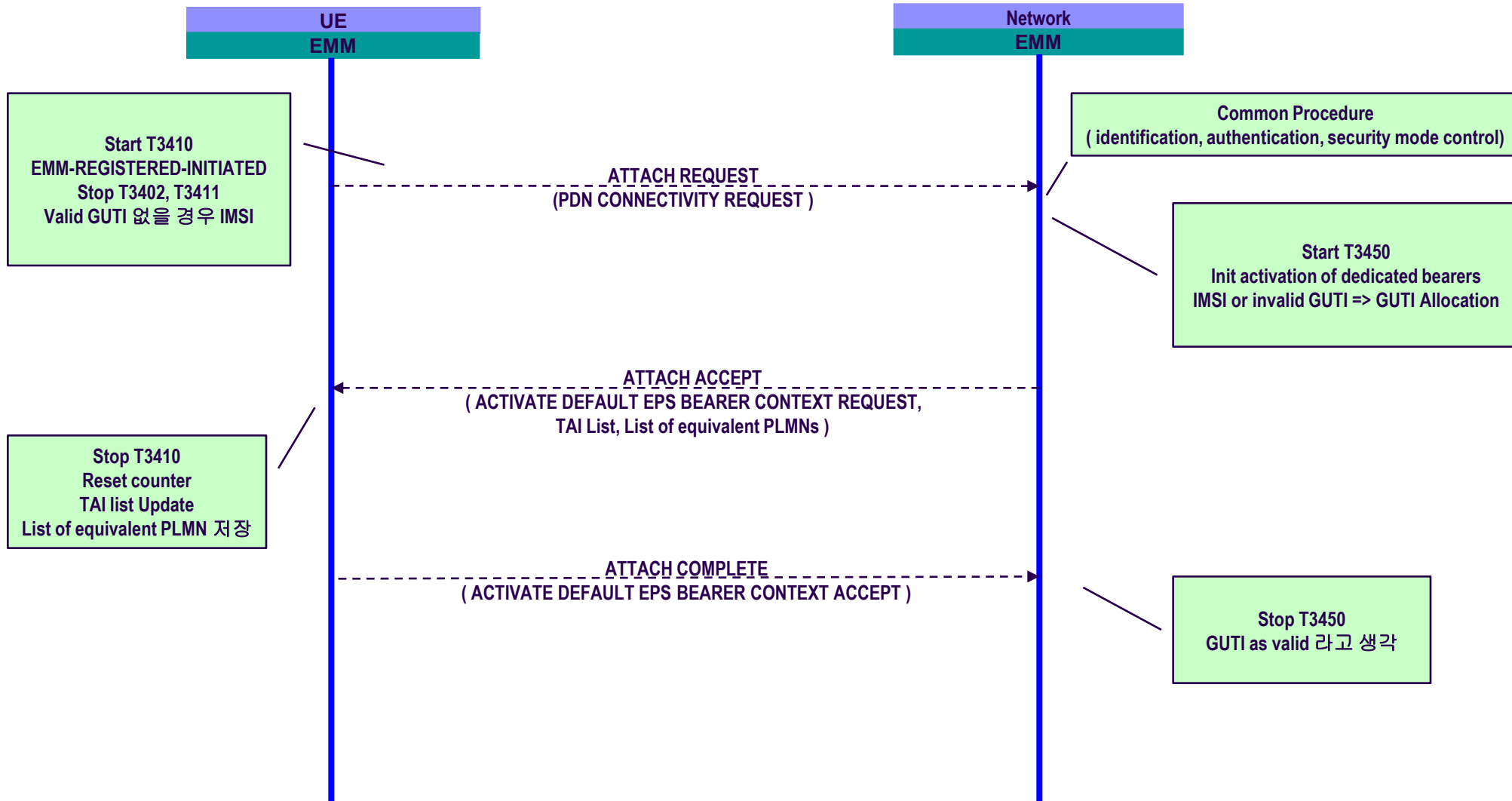
- EPC : Evolved Packet Core Network
- EPS : Evolved Packet System
- EMM : EPS Mobility Management
- GUTI : Globally Unique Temporary Identity
- IMSI : International Mobile Subscriber Identity
- KSI : Key Set Identifier
- MME : Mobility Management Entity
- NAS : Non Access Stratum
- PDN GW : Packet Data Network Gateway
- S-TMSI : S-Temporary Mobile Subscriber Identity
- TAC : Tracking Area Code
- TAI : Tracking Area Identity
- TIN : Temporary Identity used in Next Update
- TMSI : Temporary Mobile Subscriber Identity

# ***EMM Specific Procedure - Attach***

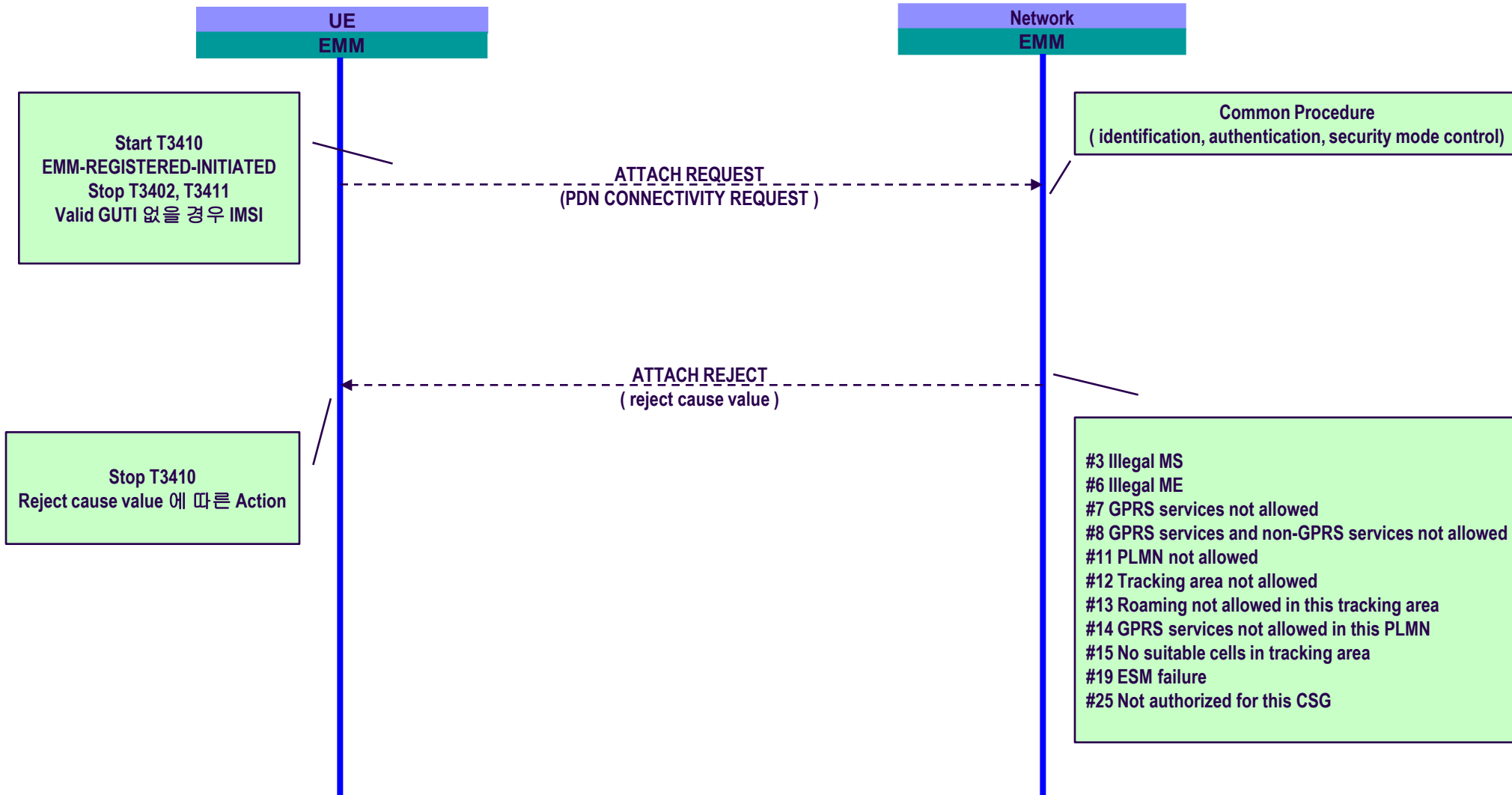
## ▪ Attach

- 목적 : packet service 위해 EPC 에 Attach
- 결과
  - Context in MME
  - Default bearer
  - Always on IP connectivity
  - IPv4, IPv6 Address
- UE에서 먼저 시작함

# EMM Specific Procedure - Attach



# EMM Specific Procedure - Attach



# EMM Specific Procedure - Attach

## ▪ Abnormal cases in the UE

- Access barred
- Lower layer failure
- T3410 timeout
- ATTACH REJECT
  - Cause code 에 따른 Action
- Change of cell
- Mobile originated detach
- Detach procedure collision
- PDU Transmission failure



## ▪ Attach attempt counter

- Counter < 5
  - T3411 Start, EMM-DEREGISTERED.ATTEMPTING-TO-ATTACH, expired Attach restart
- Counter == 5
  - Delete GUTI, TAI list, TAI, PLMN list
  - T3402 Start

# ***EMM Specific Procedure - Attach***

- **Abnormal cases on the network side**
  - Lower layer failure
  - Protocol error
  - T3450 timeout
  - ATTACH REQUEST duplicated
  - ATTACH REQUEST in EMM-REGISTERED
  - TAU received before ATTACH COMPLETE



# ***EMM Specific Procedure - Detach***

## ▪ Detach

### – 목적

- EPS Service detach
- Disconnect PDN connected
- Network 가 UE에게 더 이상 필요 없는 EPS 라고 알리기 위해

### – 발생시기

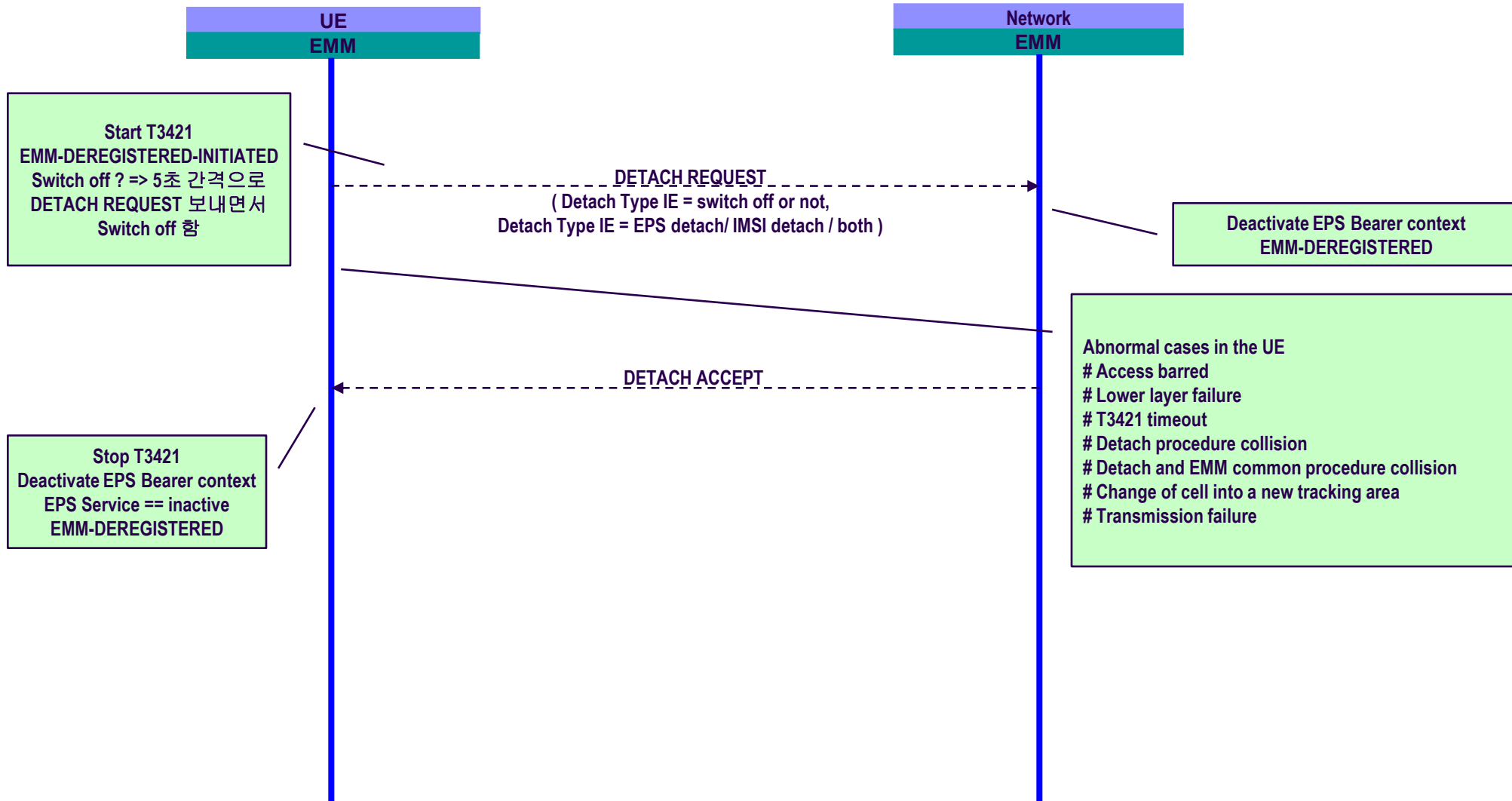
- UE Switch off
- USIM removed
- EPS capability Disable

### – 연결 되었던 Context

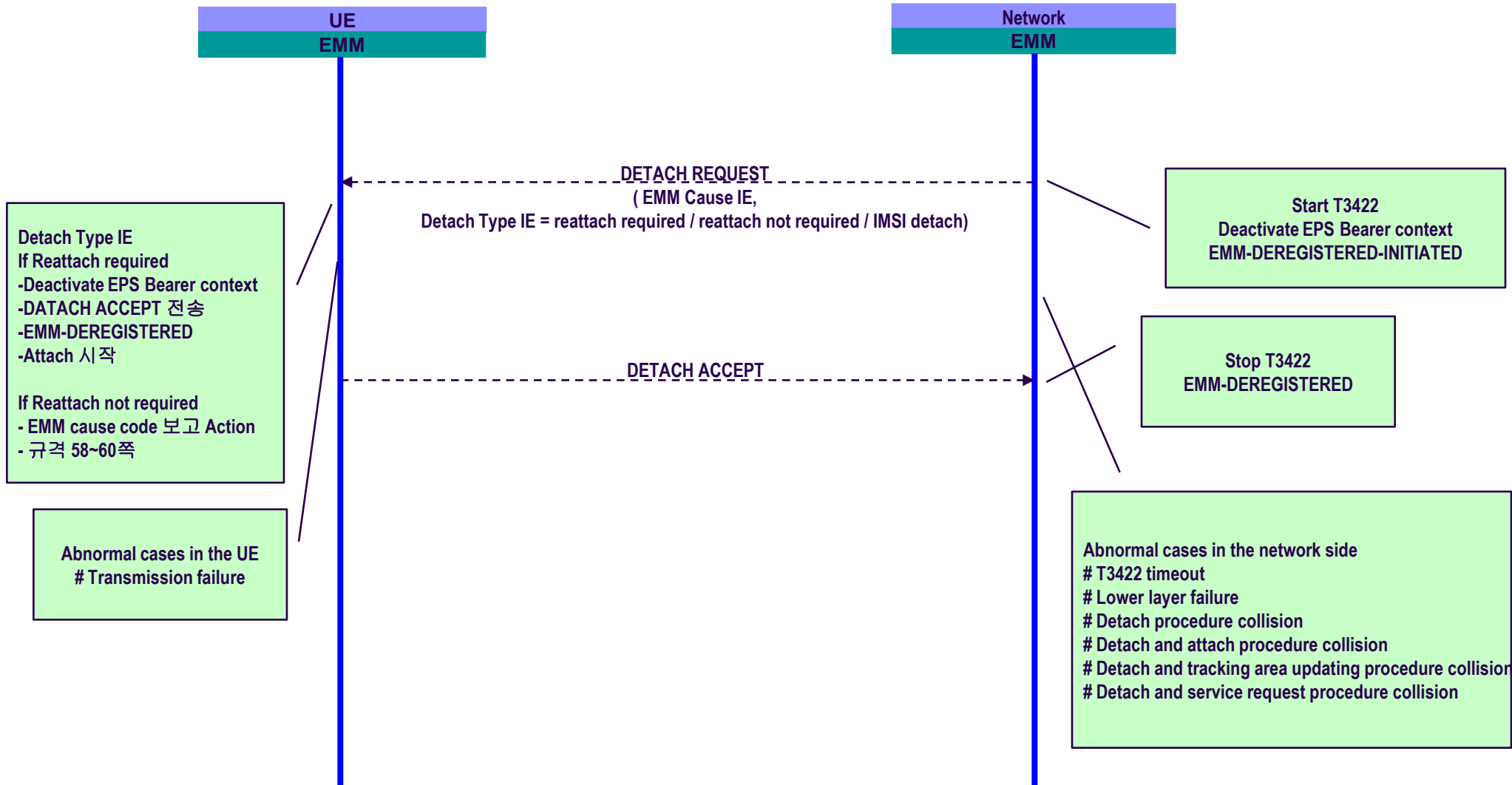
- Deactivated without Peer to Peer PDU

### – 양쪽 모두 시작할 수 있음

# EMM Specific Procedure - Detach



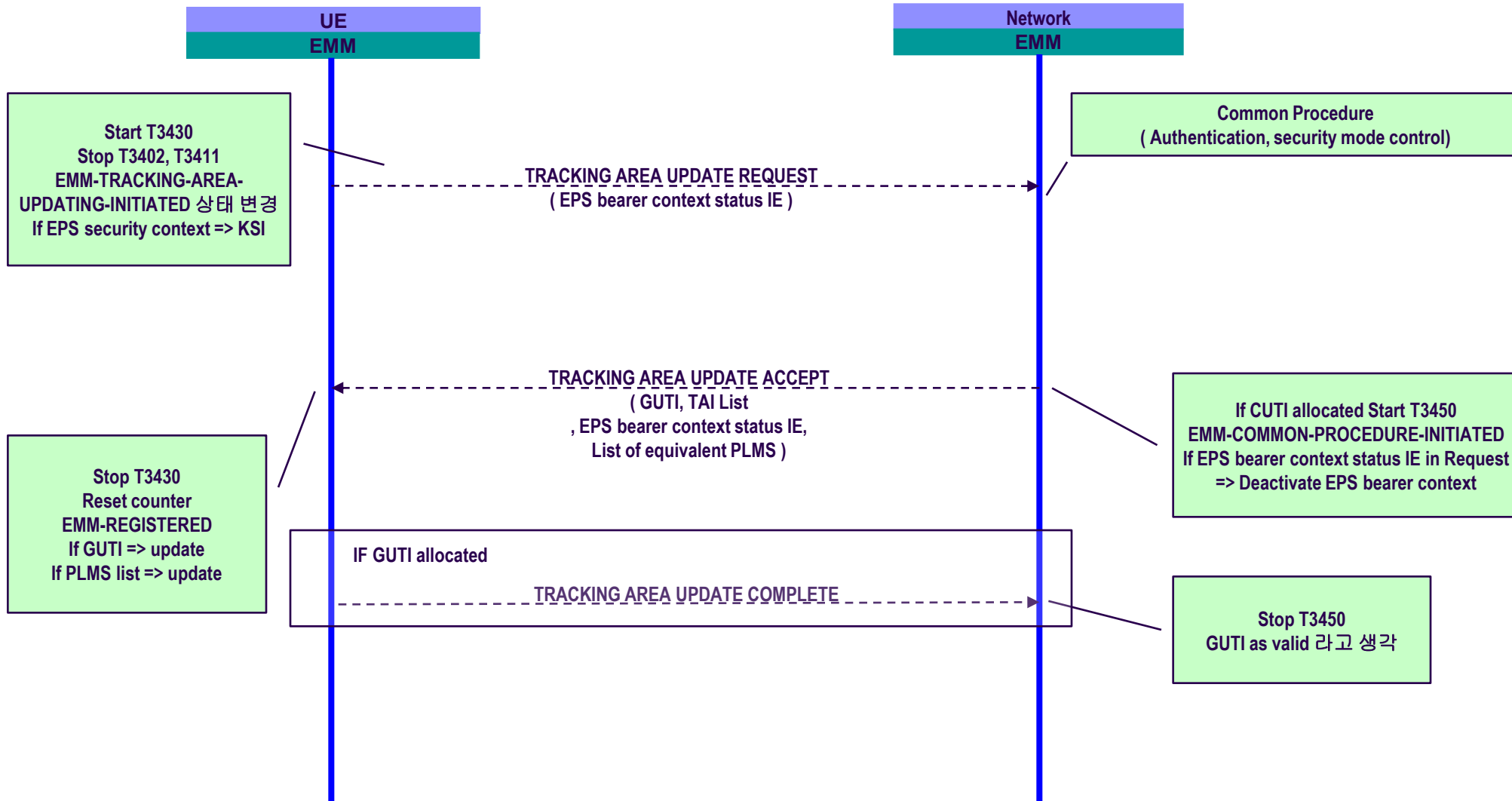
# EMM Specific Procedure - Detach



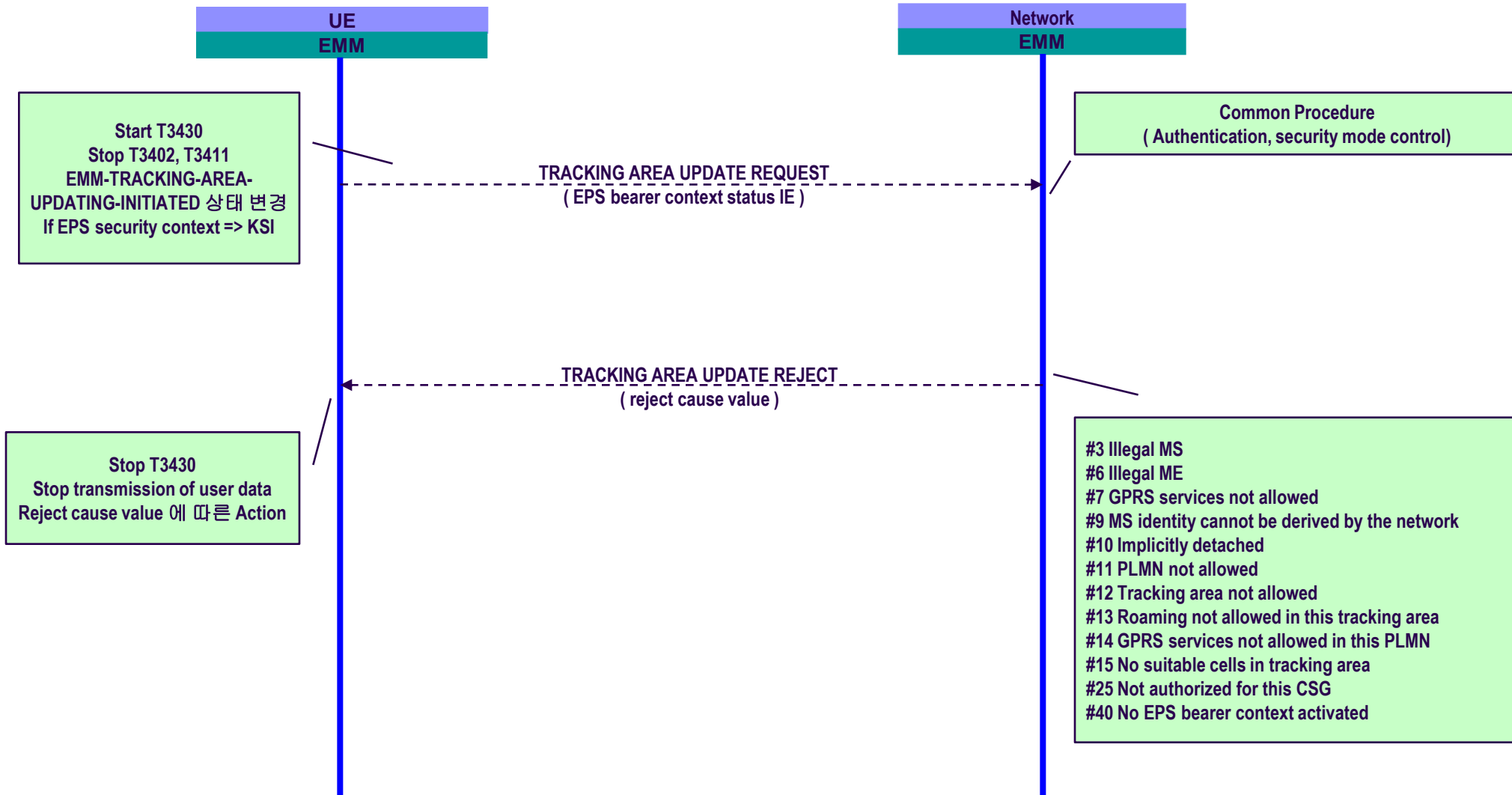
## ■ Tracking Area Updating

- S1 mode only
- 발생 목적
  - Normal : 실제 Tracking Area 를 등록하기 위해서
  - Periodic : UE 의 Availability 를 Network 에 알리기 위해서
  - Intersystem change : lu mode / A Gb mode / S101 mode -> S1 mode
  - MME load balancing
- UE에서 먼저 시작함
- UE 가 EMM-IDLE 모드인 경우 radio and S1 bearer 재요청
- 발생시기
  - UE가 알려지지 않은 Tracking Area 에 진입시
  - T3412 expired
  - RRC가 “load balancing TAU required” 보낼 경우

# EMM Specific Procedure - TAU



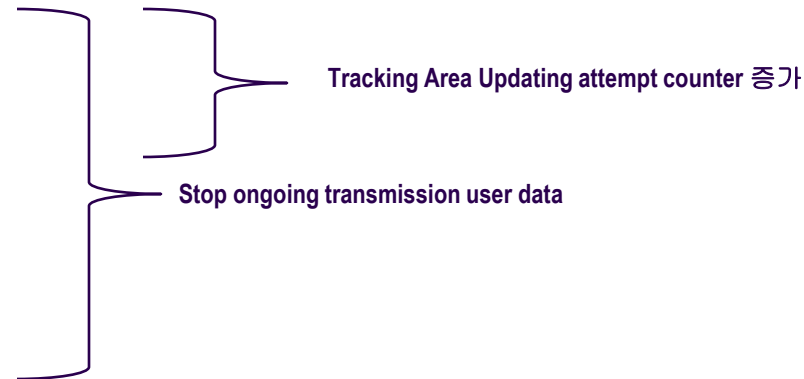
# EMM Specific Procedure - TAU



# EMM Specific Procedure - TAU

## ▪ Abnormal cases in the UE

- Access barred
- Lower layer failure
- T3430 timeout
- TAU REJECT
  - Cause code 에 따른 Action
- Change of cell
- TAU and detach procedure collision
- GUTI reallocation procedure collision
- PDU Transmission failure



## ▪ Tracking Area Updating attempt counter

- Counter < 5
  - T3411 Start, expired TAU restart, 상태 변경
- Counter == 5
  - T3402 start, delete equivalent PLMN list

## ***EMM Specific Procedure – TAU***

- **Abnormal cases on the network side**
  - Lower layer failure
  - Protocol error
  - T3450 timeout
  - TRACKING AREA UPDATE REQUEST duplicated



# ***EMM Connection Management Procedure – Service Request***

## ▪ Service Request

### – 목적

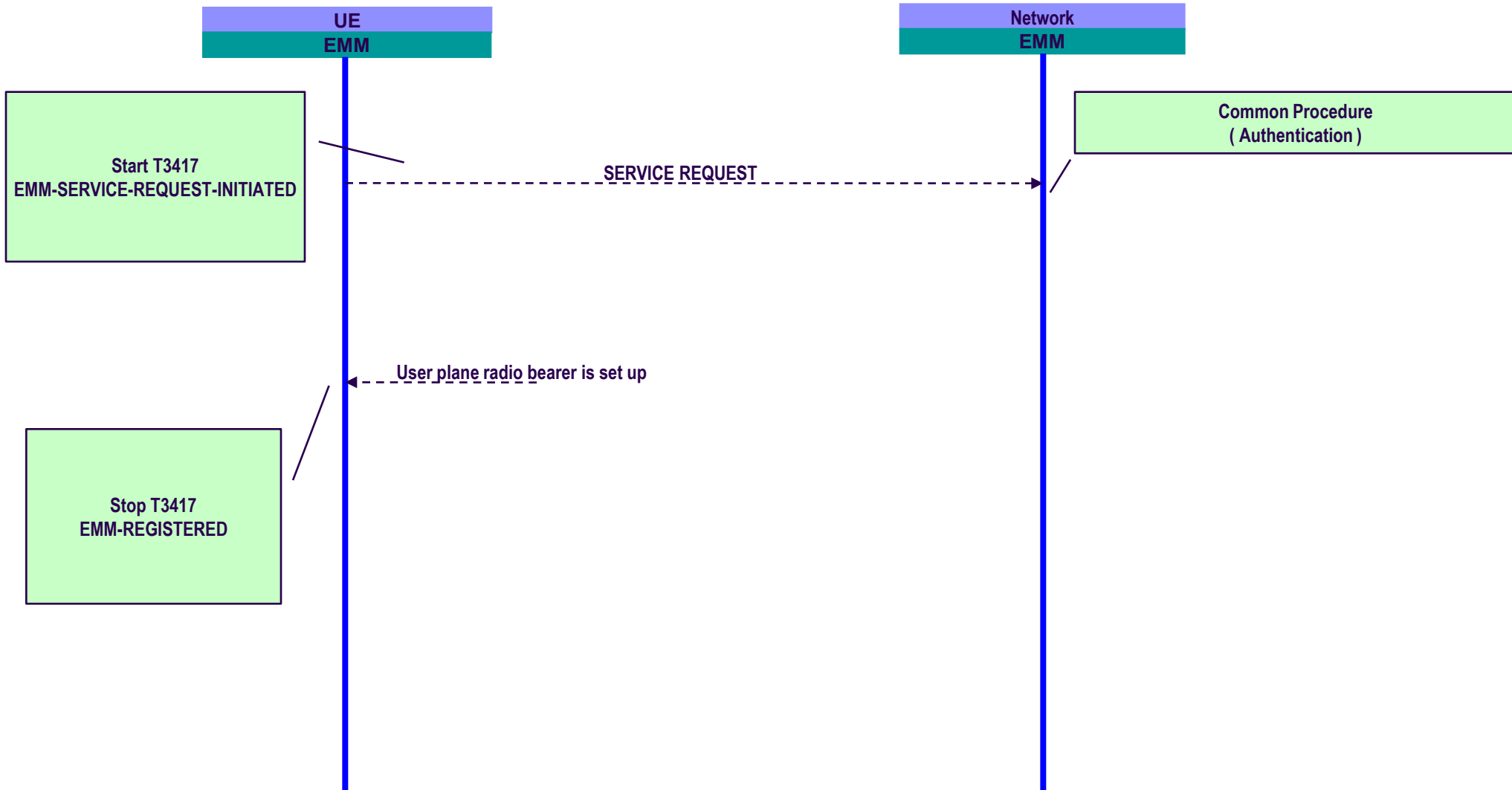
- EMM-IDLE 모드를 EMM-CONNECTED 모드로 변환시키기 위해 사용
- Establish Radio and S1 Bearers

### – 발생조건

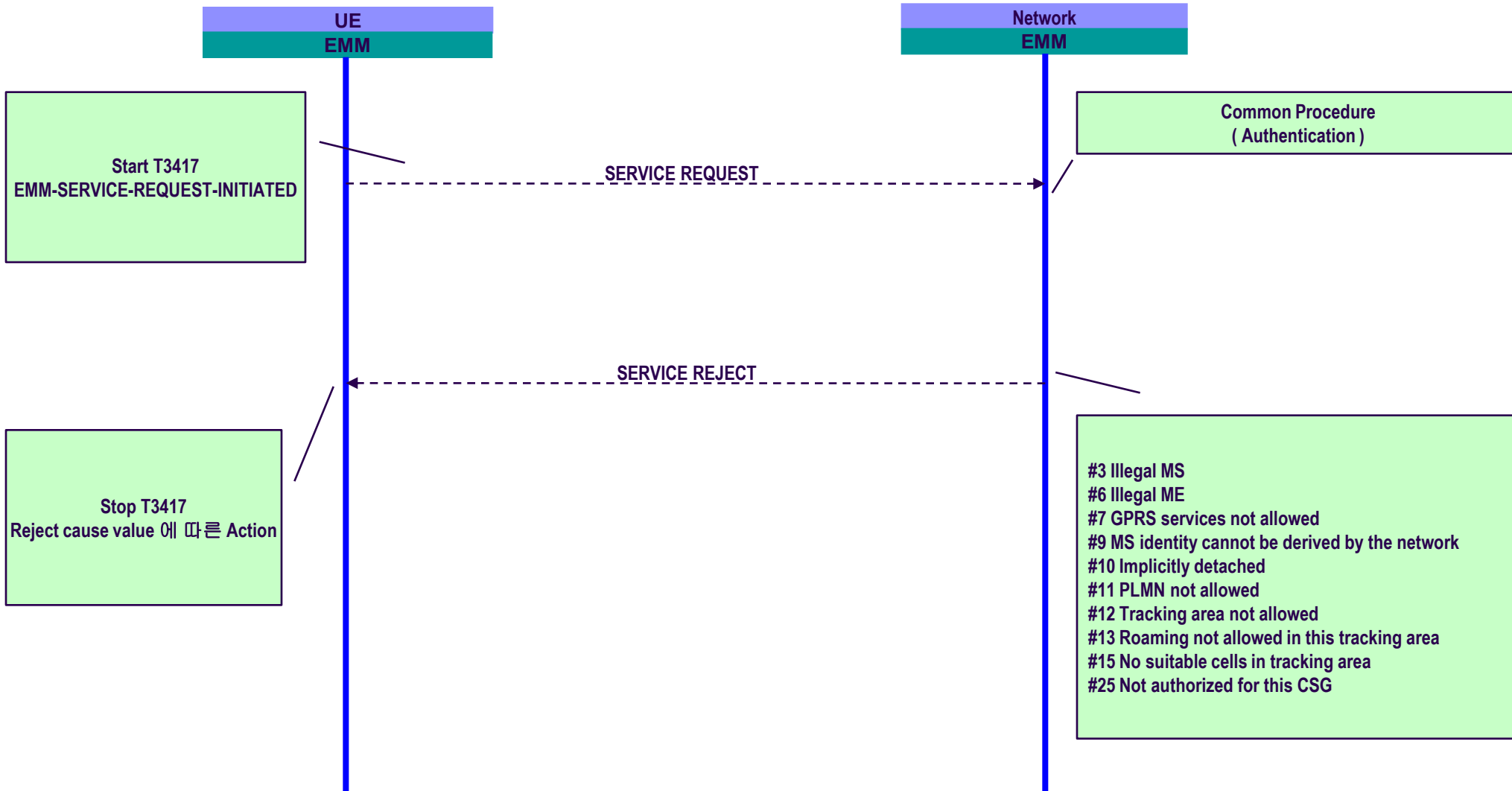
- Network 가 Downlink signal pending 상태일 때
- UE 가 Uplink signal pending 상태일 때
- UE 가 IDLE MODE 이고 Data pending 상태일 때
- UE 가 IDLE MODE 이고 Paging Request 를 받을 경우

### – UE 에서 시작

# EMM Connection Management Procedure - Service Request



# EMM Connection Management Procedure - Service Request



# ***EMM Connection Management Procedure – Service Request***

- **Abnormal cases in the UE**

- Access barred
- Lower layer failure
- T3417 timeout
- SERVICE REJECT
  - Cause code 에 따른 Action
- TAU procedure triggered
- Power off
- Procedure collision
- Dedicated / Default Bearer set up failure
- PDU Transmission failure

# ***EMM Connection Management Procedure – Service Request***

- **Abnormal cases on the network side**

- Lower layer failure
- Protocol error
- SERVICE REQUEST duplicated
- ATTACH REQUEST received
- TAU REQUEST received

# ***EMM Connection Management Procedure – Paging***

## ▪ **Paging**

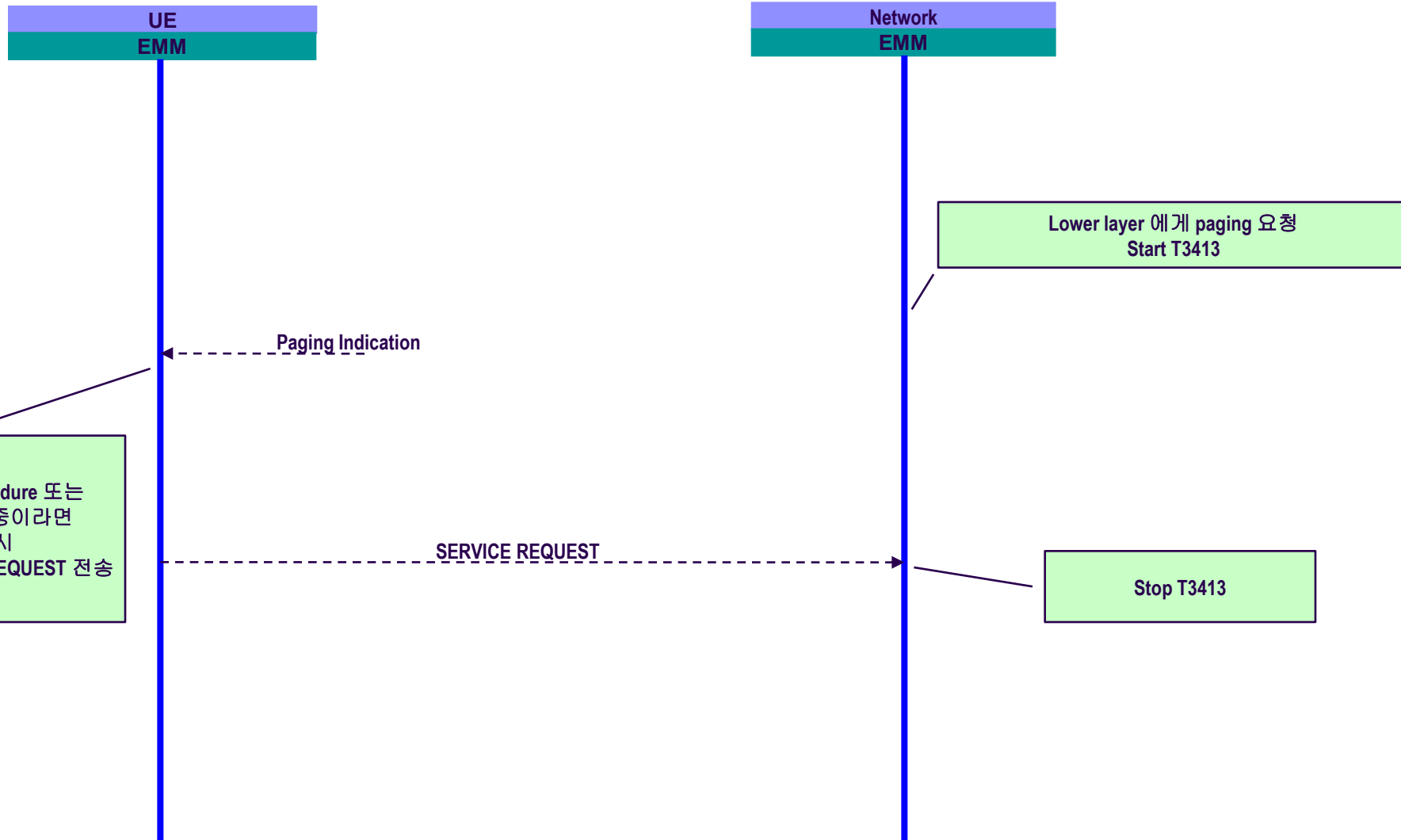
- 목적
  - UE에게 NAS signalling connection 설립을 요청하기 위해 사용
  - Init mobile terminating CS fallback procedure
- Network 에서 시작
- 종류
  - Using S-TMSI : NAS signalling connection
  - Using IMSI : abnormal procedure for error recovery

## ▪ **NAS Signalling connection**

- S1 mode 에서 UE와 MME 사이의 Peer to Peer Connection
- LTEuu 인터페이스 + S1AP Connection

# EMM Connection Management Procedure - Paging

Using S-TMSI



# EMM Connection Management Procedure – Paging

Using IMSI

UE  
EMM

Network  
EMM

Paging Indication

Lower layer 에게 paging 요청  
Start T3413

EMM specific procedure 또는  
Service Request 중이라면  
Paging 무시  
Deactivate EPS bearer context  
Detach from EPS  
Delete TAI, GUTI, KSI  
EMM-DEREGISTERED

ATTACH REQUEST

Stop T3413  
Attach Procedure 진행



# ***EMM STATUS message***

- **EMM STATUS message**

- 목적
  - EMM Protocol Data 수신 시 검출되는 error conditions 을 Report 하기 위해서 사용
- UE 또는 Network 에서 시작
- Implementation dependent

# Question & Answer