

ETSI TS 122 346 V15.0.0 (2018-07)



**Universal Mobile Telecommunications System (UMTS);  
LTE;  
Isolated Evolved Universal Terrestrial  
Radio Access Network (E-UTRAN) operation for public safety;  
Stage 1  
(3GPP TS 22.346 version 15.0.0 Release 15)**



## Reference

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RTS/TSGS-0122346vf00

## Keywords

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LTE,UMTS

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# 1 Scope

The present document specifies the service requirements for Isolated E-UTRAN Operation in support of mission critical network operation for Public Safety. In particular, requirements are specified for:

- Initiation of Isolated E-UTRAN operation.
- Ongoing Isolated E-UTRAN operation.
- Termination of Isolated E-UTRAN operation.
- Security aspects of Isolated E-UTRAN operation.

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
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- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 22.101: "Services aspects; Service principles".

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# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**Isolated E-UTRAN:** either an E-UTRAN without normal connectivity with the EPC or deployed NeNBs with E-UTRAN functionality.

**Isolated E-UTRAN operation:** Comprises two situations: 1) In the event of an interruption to normal backhaul connectivity Isolated E-UTRAN operation aims to adapt to the failure and maintain an acceptable level of network operation in the Isolated E-UTRAN. The restoration of service is the eventual goal. 2) Operation following the deployment of one or more Nomadic eNBs either without backhaul or with limited backhaul.

**Limited backhaul capability:** Isolated E-UTRAN operation supports operation where the Isolated E-UTRAN has no backhaul capability to the EPC. Furthermore Isolated E-UTRAN operation may have limited backhaul capability to the EPC. For the case of limited backhaul capability to the EPC only the signalling of public safety Ues can reliably be communicated to the EPC; in addition users may have the possibility to transmit a limited amount of user data with no guarantee of service.

**Nomadic eNB (NeNB):** An NeNB is a nomadic cell and may consist: base station, antennas, microwave backhaul and support for local services. The NeNB is intended for Public Safety use providing coverage or additional capacity where: 1) coverage was never present (e.g. forest fire or underground rescue) or 2) where, for example, due to natural disaster coverage is no longer present.

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

NeNB            Nomadic eNB

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## 4 Overview

### 4.1 Service description

Ensuring the continued ability of Public Safety users to communicate within mission critical situations is of the utmost importance. The Isolated E-UTRAN mode of operation provides the ability to maintain a level of communications for Public Safety users, via an eNB (or set of connected eNBs), following the loss of backhaul communications. The Isolated E-UTRAN mode of operation also provides the ability to create a serving radio access network without backhaul communications, from a deployment of one or more standalone Nomadic eNBs (NeNBs). In addition the Isolated E-UTRAN feature also addresses the scenario where a fixed or nomadic set of eNBs is without normal backhaul communications but has been provided with an alternative (non-ideal) limited bandwidth backhaul.

An Isolated E-UTRAN may comprise a deployment of one or more NeNBs. In this case operator control would initiate Isolated E-UTRAN operation for a group of NeNBs in a given incident area. An Isolated E-UTRAN derived from NeNBs exhibits similar behaviour to an Isolated E-UTRAN derived from eNBs including: support for Public Safety Ues in the coverage area, communication between NeNBs and support for limited backhaul connectivity.

The Isolated E-UTRAN may comprise a single or multiple eNBs, a single or multiple NeNBs, or a mixed group of eNBs and NeNBs. An Isolated E-UTRAN comprising multiple (N)eNBs, with connections between the (N)eNBs, can provide communication between Ues across a wider area of coverage than can be provided by a single isolated (N)eNB. The Ues in the coverage of the Isolated E-UTRAN are able to continue communicating and provide a restricted set of services supporting voice, data and group communications, to their Public Safety users.

An Isolated E-UTRAN is characterized by having no, or a limited, backhaul connection. In particular, the Isolated E-UTRAN feature enables services to be provided to Public Safety Ues in the following backhaul scenarios (see also Table 4.1-1):

- No backhaul;
- Limited bandwidth signalling only backhaul;
- Limited bandwidth signalling and user data backhaul.

**Table 4.1-1: Isolated E-UTRAN scenarios**

IOPS Scenario	Signalling backhaul status	User Data backhaul status	Comment
<b>No backhaul</b>	Absent	Absent	Fully Isolated E-UTRAN operation using local routing of UE-UE data traffic and possible support for access to the public internet via a local gateway
<b>Signalling only backhaul</b>	Limited	Absent	User data traffic offload at the E-UTRAN using local routing of UE-UE data traffic and possible support for access to the public internet via a local gateway
<b>Limited backhaul</b>	Limited	Limited	Selective user data traffic offload at the E-UTRAN using local routing of UE-UE data traffic and possible support for access to the public internet via a local gateway
<b>Normal backhaul</b>	Normal	Normal	Normal EPC connected operation



## 5 Service requirements

### 5.1 General requirements

Isolated E-UTRAN operation shall not impact either GSM or UMTS.

The use of Isolated E-UTRAN operation shall be authorized by the operator. The network controls the use of E-UTRAN resources used for Isolated E-UTRAN operation.

When a Public Safety UE communicates within the Isolated E-UTRAN, the PLMN operator shall be able to collect accounting data for this communication.

### 5.2 Subscriber and service management requirements

#### 5.2.1 Introduction (informative)

In order to provide efficient Isolated E-UTRAN operation it is necessary that eNBs (and NeNBs) capable of forming and joining an Isolated E-UTRAN are able to support certain functions locally thereby providing services of importance to the Public Safety community.

#### 5.2.2 Requirements

Public Safety Ues served only by an Isolated E-UTRAN will not possess user plane connectivity to an external IP network due to the absence of backhaul connectivity to the Mobile Operator Network. The Isolated E-UTRAN may support Selected IP Traffic Offload at the Local Network, compatible with the service principles defined in [2], in order to provide connectivity to external IP networks (e.g. internet) when a backhaul connection (limited or otherwise) is present.

The Isolated E-UTRAN shall be able to make use of a limited backhaul connection to exchange control plane signalling with the EPC.

The Isolated E-UTRAN may use the limited backhaul connection to exchange user plane data with the EPC.

NOTE: There is no quality of service expectations for user plane data.

The Isolated E-UTRAN shall support mobility for Public Safety Ues between the eNBs comprising the Isolated E-UTRAN.

The Isolated E-UTRAN shall be able to establish 'local routing' and ProSe Group Communication for the Public Safety Ues in coverage of the Isolated E-UTRAN.

The Isolated E-UTRAN shall be able to provide voice and data communications services to all Public Safety Ues and groups under the coverage of the Isolated E-UTRAN.

The Isolated E-UTRAN shall allow Public Safety Ues under its coverage to initiate and maintain voice and data communications with other Public Safety Ues and groups under the coverage of the Isolated E-UTRAN.

The Isolated E-UTRAN shall be capable of informing served Public Safety Ues about which other Public Safety Ues the Isolated E-UTRAN is serving. The Isolated E-UTRAN shall support restrictions upon the provision of this information according to security policy.

NOTE: For example, information on users within a served user's organization could be sent to that served user, and information on users could be provided to other users within the same group. Lists of served users and/or served groups could be obtained from the network or could be compiled from information collected from the Ues served by the isolated system.

#### 5.2.3 Interoperability with MCPTT

The following requirements define a minimal set of MCPTT capabilities that are needed to provide MCPTT support under Isolated E-UTRAN operation. These requirements apply only to users under coverage of the same Isolated E-UTRAN.