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Technical Report

3rd Generation Partnership Project; Technical Specification Group RAN; Study on LTE Device to Device Proximity services;

(Release 12)



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Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

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1 Scope

The present document defines scope of the D2D study item.

The Feasibility Study on Proximity-based Services (FS_ProSe, TR 22.803 [2]) has identified services that could be provided by the 3GPP system based on UEs being in proximity to each other. The identified areas include services related to commercial services and Public Safety that would be of interest to operators and users.

The objectives of this feasibility study are to evaluate LTE device-to-device proximity services, as follows

	Within network coverage	Outside network coverage
Discovery	Non public safety & public safety requirements	Public safety only
Direct Communication	At least public safety requirements	Public safety only

In particular:

1. Define an evaluation methodology and channel models for LTE device-to-device proximity services, including scenarios to compare different technical options to realize proximal device discovery and communication, appropriate performance metrics, and performance targets (e.g. range, throughput, number of UEs supported). [RAN1]
2. Identify physical layer options and enhancements to incorporate in LTE the ability for devices within network coverage: [RAN1]
 - o to discover each other in proximity directly in a power-efficient manner
 - o to communicate directly, including enhancements to LTE interference management and scheduling that allow the LTE network to enable, manage, and continuously control all direct, over the air, device to device communications.
3. Identify and evaluate options, solutions and enhancements to the LTE RAN protocols within network coverage [RAN2 primary, RAN3 secondary]:
 - o to enable proximal device discovery among devices under continuous network management and control,
 - o to enable direct communication connection establishment between devices under continuous network management and control,
 - o to allow service continuity to/from the macro network
4. Consider terminal and spectrum specific aspects, e.g. battery impact and requirements deriving from direct device-to-device discovery and communication [RAN4]
5. Evaluate, for non public safety use cases, the gains obtained by LTE device-to-device direct discovery with respect to existing device-to-device mechanisms (e.g. WiFi Direct, Bluetooth), and existing location techniques for proximal device discovery (e.g. in terms of power consumption, and signaling overhead) [RAN1, RAN2]
6. The possible impacts on existing operator services (e.g. voice calls) and operator resources should be investigated [RAN1]
7. For the purposes of addressing public safety requirements, identify and study the additional enhancements and control mechanisms required to realize discovery and communication outside network coverage [RAN1, RAN2]

The identified options/enhancements should reuse the features of LTE as much as possible.

The study will cover:

- Single and multi-operator scenarios, including the spectrum sharing case where a carrier is shared by multiple operators (subject to regional regulation and operator policy)
- LTE FDD and LTE TDD operations

In this study item, the study of direct communication shall address at least public safety requirements and use cases..

It is assumed that aspects related to service authorization, system level architecture, security, and lawful interception are covered in the SA Working Groups.

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.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TR 22.803: "Feasibility study for Proximity Services (ProSe)"

3 Definitions, symbols and abbreviations

3.1 Definitions

Void

3.2 Symbols

Void

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply.

D2D	Device to device
ProSe	Proximity based services

Annex A: Simulation model

- A.1 Link simulation Scenarios
- A.2 System simulation Scenarios
 - A.2.1 System simulation assumptions
 - A.2.1.1 Reference system deployments
 - A.2.1.2 Channel models
 - A.2.1.3 Traffic models
 - A.2.1.4 Performance evaluation metrics
 - A.2.2 System level simulator calibration
- A.3 Detailed simulation results

Annex B: Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
04 2013	R1#72bis	R1-131717			TR Skeleton		0.1.0