**3GPP TSG RAN Meeting #69RP-151551**

**Phoenix, USA, Sep. 14 - 16, 2015**

**Source: Samsung, Nokia Networks, Qualcomm, Intel**

**Title: New SID Proposal: Study on Next Generation New Radio Access Technology**

**Document for: Discussion**

**Agenda Item: 14.1.1**

3GPP™ Work Item Description

For guidance, see [3GPP Working Procedures](http://www.3gpp.org/About/WP.htm), article 39; and [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm).  
Comprehensive instructions can be found at <http://www.3gpp.org/Work-Items>

# Title: Study on Next Generation New Radio Access Technology

## Acronym: FS\_NG\_newRAT

## Unique identifier:

NOTE: If this is a RAN WID including Core and Perf. part, then Title, Acronym and Unique identifier refer to the feature WI. Please tick (X) the applicable box(es) in the table below:

|  |  |
| --- | --- |
| **This WID includes a Core part** |  |
| **This WID includes a Performance part** |  |

## 1 3GPP Work Area

|  |  |
| --- | --- |
| X | **Radio Access** |
|  | **Core Network** |
|  | **Services** |

## 2 Classification of WI and linked work items

### 2.0 Primary classification

This work item is a …

|  |  |
| --- | --- |
| X | Study Item (go to 2.1) |
|  | Feature (go to 2.2) |
|  | Building Block (go to 2.3) |
|  | Work Task (go to 2.4) |

NOTE: Core, Performance and Testing parts of RAN WIs are usually Building Blocks.  
If you are in doubt, please contact MCC.

### 2.1 Study Item

|  |  |  |
| --- | --- | --- |
| Related Work Item(s) (if any] | | |
| Unique ID | Title | Nature of relationship |
| FS\_NG\_Req | Study on Scenarios and Requirements for the Next Generation New Radio Access Technology |  |
| FS\_CM\_Above6GHz | Study on channel model for frequency spectrum above 6 GHz |  |

Go to §3.

### 2.2 Feature

|  |  |  |
| --- | --- | --- |
| Related Study Item or Feature (if any) | | |
| Unique ID | Title | Nature of relationship |
|  |  |  |

Go to §3.

### 2.3 Building Block

|  |  |  |
| --- | --- | --- |
| Parent Feature (or Study Item) | | |
| Unique ID | Title | TS |
|  |  |  |

This work item is …

|  |  |
| --- | --- |
|  | Stage 1 (go to 2.3.1) |
|  | Stage 2 (go to 2.3.2) |
|  | Stage 3 (go to 2.3.3) |
|  | Test spec (go to 2.3.4) |
|  | Other (go to 2.3.5) |

#### 2.3.1 Stage 1

|  |  |  |
| --- | --- | --- |
| Source of external requirements (if any) | | |
| Organization | Document | Remarks |
|  |  |  |

Go to §3.

#### 2.3.2 Stage 2

|  |  |  |
| --- | --- | --- |
| Corresponding stage 1 work item | | |
| Unique ID | Title | TS |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| Other source of stage 1 information | | |
| TS or CR(s) | Clause | Remarks |
|  |  |  |

**If no identified source of stage 1 information, justify:**

Go to §3.

#### 2.3.3 Stage 3

|  |  |  |
| --- | --- | --- |
| Corresponding stage 2 work item (if any) | | |
| Unique ID | Title | TS |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| Else, corresponding stage 1 work item | | |
| Unique ID | Title | TS |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| Other justification | | |
| TS or CR(s) or external document | Clause | Remarks |
|  |  |  |

**If no identified source of stage 2 information, justify:**

Go to §3.

#### 2.3.4 Test spec

|  |  |  |
| --- | --- | --- |
| Related Work Item(s) | | |
| Unique ID | Title | TS |
|  |  |  |

Go to §3.

#### 2.3.5 Other

|  |  |  |  |
| --- | --- | --- | --- |
| Related Work Item(s) | | | |
| Unique ID | Title | Nature of relationship | TS / TR |
|  |  |  |  |

Go to §3.

### 2.4 Work task

|  |  |  |
| --- | --- | --- |
| Parent Building Block | | |
| Unique ID | Title | TS |
|  |  |  |

## 3 Justification

ITU-R WP5D meeting #22 in June 2015 completed two documents related to IMT-2020 development, **Draft new Recommendation ITU-R M.[IMT.VISION] - IMT Vision - "Framework and overall objectives of the future development of IMT for 2020 and beyond"** and **Draft new Report ITU-R M.[IMT.ABOVE 6 GHz] - Technical feasibility of IMT in bands above 6 GHz.** The ITU-R Study Group 5 meeting #10 in July 2015 approved the above 6 GHz report as M.2376 and set the vision recommendation under the ITU approval procedure. A joint RAN-SA document [SP-150149] from RAN#67 outlines the “5G” timeline for 3GPP, and the 3GPP preparatory work for the next generation system development has already started with the SA1 study item New Services and Markets Technology Enablers (SMARTER) and the 3GPP RAN workshop on 5G.

The [SP-150149] foresaw the following timeline

1. September 2015: RAN workshop
2. September 2015: Initiation of the channel modelling work needed for the next generation radio
3. December 2015: Initiation of the RAN Study Item: scope & requirements for the next generation radio
4. March 2016: Initiation of the RAN WG SI: Evaluation of solutions

RAN#68 saw the draft study item proposals for discussion for points 2) [RP-150781] and 3) [RP-150813].

This study item will address point 4) and build on the work done in the three preceding steps. More specifically this study item will aim at identifying and developing the technology components needed for successfully standardizing the next generation system timely satisfying both the urgent market needs, and the more long-term requirements set forth by the ITU-R IMT-2020 process. The outcome of the study item will consist of solutions answering to all the use cases and deployment environments identified for the IMT-2020 system and the identified technology components will provide solutions applicable for a wide range of frequency ranges at least up to 100 GHz, so that 3GPP will be able to offer solutions to any spectrum band that may be made available for wireless communications even in a more distant future.

## 4 Objective

### 4.1 Objective of SI or Core part WI or Testing part WI

The study aims to develop a next generation new radio access technology to meet a broad range of use cases including enhanced mobile broadband, massive MTC, critical MTC, and additional requirements defined during the RAN requirements study.

The new RAT will consider frequency ranges up to 100 GHz.

Detailed objectives of the study item are:

1. Target a single technical framework addressing all use cases and requirements
   * Enhanced mobile broadband up to 100 GHz
   * Massive machine-type-communication and Internet of Things
   * Critical communication
   * All deployment scenarios
   * Other requirements
2. The technical framework shall provide mechanisms for forward compatibility to allow a phased introduction, and introduction of new features in the future
   * It is assumed that the normative specification phase will occur with two phases: Phase 1 (to be completed in September 2018) and Phase 2 (to be completed in December 2019)
   * Phase I of the new RAT must be forward compatible with Phase II and beyond, and will not be backward compatible to LTE
   * Phase II of the new RAT builds on the foundation Phase I, and meets all the set requirements for the new RAT. Smooth future evolution beyond Phase II needs to be ensured.
3. Develop technical solutions that enable a phasing of the enhanced mobile broadband part such that the new radio access can have a Phase 1 with the following attributes
   * Support frequency bands up to at least 40 GHz from a physical layer perspective
   * Tight integration between the new RAT and LTE
   * Support of TDD, FDD, and unlicensed band
   * Support of channel bandwidth of up to ~300 MHz
   * Focus on urban macro, urban micro, and indoor hotspot deployments
   * Maximize device & network energy efficiency
   * User plane latency < 1ms
   * Support forward compatibility to Phase II and efficient service multiplexing
4. Develop technical solutions that enable Phase II of new RAT to support all use cases and deployment scenarios in an optimized manner
5. Provide performance evaluation of the technologies identified for new RAT and analysis of the expected specification work

The study of new RAT should be performed in the following areas

* Physical layer (RAN1)
* Layer 2 and layer 3 (RAN2)
* Network aspects related to air interface (RAN3)
* RF aspects (RAN4)

### 4.2 Objective of Performance part WI

NOTE: Leave empty if the WI proposal does not contain a RAN performance part.

### 4.3 RAN time budget proposal

NOTE: For WIs/SIs under RAN WG5 leadership this section is not filled out. Otherwise:  
For a not yet approved WI/SI the rapporteur has to fill out the last row of the table(s) below up to the target date of the WI/SI (if necessary add further tables): Indicate the number of time units (1 TU ~ 2h), i.e. one value for each session/field. If no time unit is needed, leave the field empty.  
For WI/SI already approved in the past, the tables below will no longer be updated in the WI/SI description (i.e. the tables reflect the status of the initial approval). But changes can be proposed in the status report of the WI/SI.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **RAN #69 Q4/2015 RAN #70** | | | | | | | | | | | | | | | | | | | |
| R1L | R1U | R2L | R2U | R2J | R3 | R4RF  Core | R4RD Core | R4RF  Perf | R4RD Perf | R1L | R1U | R2L | R2U | R2J | R3 | R4RF  Core | R4RD Core | R4RF Perf | R4RD Perf |
| 82bis | 82bis | 91bis | 91bis | 91bis | 89bis | 76bis | 76bis | 76bis | 76bis | 83 | 83 | 92 | 92 | 92 | 90 | 77 | 77 | 77 | 77 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

L: LTE, U: UMTS, J: Joint, RD: RRM/demodulation

NOTE: In case further explanation of the time budget proposal is needed, then please explain this below.

**additional comments to the time budget proposal:**

Completion date is proposed to be June 2018. Exact TU allocation for each involved WG is TBD.

## 5 Service Aspects

## 6 MMI-Aspects

## 7 Charging Aspects

## 8 Security Aspects

## 9 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Affects:** | UICC apps | ME | AN | CN | Others |
| **Yes** |  |  |  |  |  |
| **No** |  |  |  |  |  |
| **Don't know** |  |  |  |  |  |

## 10 Expected Output and Time scale

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| New specifications [If Study Item, one TR is anticipated] | | | | | | |
| Spec No. | Title | 1st rsp. WG | 2nd rsp. WG(s) | Presented for information at plenary# | Approved at plenary # | Comments |
| 36.xxx | TR for Study on Next Generation New Radio Access Technology | RAN1 | RAN2, RAN3, RAN4 | RAN#75 | 1st approval in RAN#76 (June 2017)  2nd approval in RAN#80 (June 2018) | 1st approval is to start normative work for Phase I of new RAT.  2nd approval is to start normative work for Phase II of new RAT. |
|  |  |  |  |  |  |  |

NOTE: If this is a RAN WID including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Comments for each spec.  
By default a new specs can only be new for one of both parts.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Affected existing specifications [None in the case of Study Items] | | | | |
| Spec No. | CR | Subject of the CR | Approved at plenary# | Comments |
|  |  |  |  |  |
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NOTE: If this is a RAN WID including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Comments for each spec.  
If an existing spec is affected by both (Core part and Perf. part), then it has to be listed twice with appropriate approval dates.

## 11 Work item rapporteur(s)

No rapporteur is indicated or suggested in this draft; choosing a rapporteur is not the main goal of a Study Item drafting.

<FamilyName>, <GivenName>

**Company:**

**Email:**

## 12 Work item leadership

RAN1 (primary), RAN2/3/4 (secondary)

NOTE: If this is a RAN WID including Core and Perf. part, then this WG specifies the WG leading the Core part.  
RAN WG4 is by default leading the Perf. part.

## 13 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Samsung |
| Nokia Networks |
| Qualcomm |
| Intel |

form change history:

2013-12-06 v1.14.1 modified §11 to read: <FamilyName>, <GivenName>, (If the person is new to 3GPP work, give full contact coordinates, in particular, email address.)

2013-10-03 v1.14.0 removal of embedded help text

v1.13.2: adds tdoc header

v1.13.1: minor changes resulting from discussions at CT#41 & SA#41

v1.13.0: mods to enforce linkage amongst stages 1, 2, 3

draft mods Scarrone-Meredith 2008-07 ff

v1.12.1: removes revision marks following approval at SP-29  
v1.12.0: includes provision for Study Items (SP-29)

v1.11.0: includes those changes from v1.8.0 agreed at SP-25.

v1.10.0: full circle

v1.9.0: a clean sheet

v1.8.0: includes comments from SA#24

v1.7.0: includes comments from RAN, CN and T #24; also includes “early implementation” data

v1.6.0: includes comments made during review period prior to TSGs#24

v1.5.0: includes comments made at TSGs#23 (Phoenix)

v1.4.0: offered to SA#23 for approval

v1.3.0: offered to CN#23, RAN#23 and T#23 for comments

DRAFT4 v1.3.0: 2004-03-09: Incorporation of comments from Leaders list

DRAFT3 v1.3.0: 2004-02-19: Incorporation of comments from MCC members

DRAFT2 v1.3.0: 2004-01-29: Complete redraft:

v1.2.0: 2002-07-04: "USIM" box changed to "UICC apps"

2003-05-28: spelling of “rapporteur” corrected

2002-07-04: "USIM" box changed to "UICC apps"