**SA WG2 Meeting #160S2-2312689**

**Nov 13th – 17th, 2023; Chicago, US (revision of S2-2311657, S2-2311030)**

**Source: NTT DOCOMO**

**Title: New SID on System aspects of 5G NR Femto**

**Document for: Approval**

**Agenda Item: 30.1**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: Study on System aspects of 5G NR Femto

Acronym: FS\_5G\_Femto

Unique identifier: TBD

Potential target Release: Rel-19

# 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  | X | X | X |  |
| No | X |  |  |  |  |
| Don't know |  |  |  |  |  |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

|  |  |
| --- | --- |
| X | Study  |
|  | Normative – Stage 1 |
|  | Normative – Stage 2 |
|  | Normative – Stage 3 |
|  | Normative – Other\* |

**\* Other = e.g. testing**

## 2.2 Parent Work Item

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| N/A |  |  |  |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 830042 | Vertical\_LAN | CAG introduction |
| 900015 | Enhanced support of Non-Public Networks | CAG enhancements |

# 3 Justification

In 3G and 4G, 3GPP defined an architecture for Home eNodeB (HeNB)/Home NodeB (HNB) (or Femto/Femtocell is synonymous of HeNB/HNB in 3GPP and is also well-defined by other STD organizations such as Broadband Forum TR-196) in TS 22.220 and TS 36.300 that enables small access points deployed in customer premises (on a campus or at home) for access to operator, Internet and local services like local printers or local servers. For 5G, SA1 has defined normative requirements for Premises Radio Access Station (PRAS) as part of the PIRates WID (see TS 22.261, clause 6.38). In fact, NR Femto access is limitedly specified (e.g., TS 38.104) since the 5GS architecture is introduced in a flexible manner and no specific architecture for 5G NR Femto access deemed necessary so far.

This study item aims at studying potential overall (end-to-end) architecture enhancement and required functional and procedural impacts for supporting deployments of 5G NR Femto with focus on enabling access control for “5G NR Femto” use cases. For example, 5G NR Femto extends e.g., coverage using higher frequency bands (e.g., FR2 bands), also improves 5G indoor coverage, offloads traffic from the macro network, enables better voice quality, and better supports enterprise mobility. This will improve the overall customer service experience. In fact, it is already possible for operator to deploy 5G NR Femto for the purpose of coverage improvement. However, some enhancements for 5G NR Femto are required so that customers are willing to put it at their premises. For example, 5G NR femto enhanced such that it starts working in a plug-and-play manner and the owner needs to be able to control who can use cells of the enhanced 5G NR Femto.

In addition, for a mixed 4G/5G femto deployment, interworking should also be investigated when a 5G CAG UE can be moved to a CSG femto cell, assuming that the CAG cell is connected to the 5GC and the CSG cell is connected to the EPC in the same premise.

Following are the justifications for the study objectives:

* Concept of a 5G NR Femto is currently not explicitly specified in 3GPP standards. For example, whether and how to define the overall architecture and required functional and procedural impacts for supporting 5G NR Femto deployment.
* How to define the 5G NR Femto access control mechanism based on the existing CAG concept such that the 5G NR Femto owner able to control the access.
* How to enable provisioning of subscribers allowed to access 5G NR Femto cells and how to manage 5G NR Femto access control by the Closed Access Group (CAG) owner or an authorized administrator.

# 4 Objective

The following aspects will be studied:

WT#1: Based on RAN3 outcome, enhance the overall architecture and enable the required functional and procedural changes for supporting 5G NR Femto deployment.

NOTE 1: It assumed that RAN3 will study the need for potential architecture enhancement for supporting 5G NR Femto deployment.

WT#2: How to enable interworking between CAG and CSG cells, e.g., to allow a UE to move from a CAG to CSG cell.

NOTE 2: It is expected that EPC (e.g., MME),E-UTRAN and NG-RAN impacts are avoided.

NOTE x: it is assumed that the CAG defined for PNI-NPN is used as it is without impacting the PNI-NPN

WT#3: Study whether and how to support enabling the provisioning of subscribers allowed to access CAG cell and to manage access control by the CAG owner or an authorized administrator.

NOTE 3: Ownership of the 5G NR Femto (or CAG or both) concept and a mechanism will be defined in coordination with SA3.

## TU estimates and dependencies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Work Task ID | TU Estimate(Study) | TU Estimate(Normative) | RAN Dependency(Yes/No/Maybe)  | Inter Work Tasks Dependency Editor’s Note: This column should highlight if WT#x is self-contained, or it depends on the completion of other WTs |
| WT#1 | 0 | 1 | Yes | self-contained |
| WT#2 | 1 | 1 | No | self-contained |
| WT#3 | 1 | 1 | No | self-contained |

Total TU estimates for the study phase: 2

Total TU estimates for the normative phase: 3

Total TU estimates: 2 + 3 = 5

# 5 Expected Output and Time scale

|  |
| --- |
| New specifications {One line per specification. Create/delete lines as needed} |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
| Internal TR | 23.XXX | Study on System aspects of 5G NR Femto | TSG#104(June) | TSG#104(June) | TBD |
|  |  |  |  |  |  |

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |
|  |  |  |  |

# 6 Work item Rapporteur(s)

TBD

# 7 Work item leadership

SA2

# 8 Aspects that involve other WGs

RAN impacts covered by RAN WGs (RAN3).

Security impacts covered by SA3.

Charging aspects covered by SA5.

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| NTT DOCOMO |
| Nokia |
| Nokia Shanghai Bell |
| Verizon |
| T-Mobile USA |
| AT&T |
| Samsung |
| Casa Systems |
| BT |
| Oracle |
| SK Telecom |
| Cisco |
| MATRIXX Software |
| Charter Communications |
| NEC |
| Rakuten Mobile |
| Reliance Jio |
| Telefonica |
| KPN |
| DISH Network |