3GPP TSG-RAN WG3 Meeting #124 R3-243853

Fukuoka, Japan, 20 – 24 May 2024

**Agenda item: 12.3**

**Source: Nokia**

**Title: [TP for TR 38.799] Evaluation of NR Femto Architecture Options**

**WID/SID: FS\_WAB\_5GFemto\_NR - Release 19**

**Document for: Discussion and Decision**

# 1 Introduction

This TP is the result of the evaluation of architecture options related to NG interface.

# 2 TP for Evaluation of architecture options

5.2.x Evaluation of Architecture options for the NG interface

**Option1: direct connection of NR Femto to 5GC**

**Pros**:

1. Already supported by current architecture.
2. Less CP latency and no processing delay due to absence of a concentration stage.
3. Suitable for certain deployments depending on number of NR Femtos to connect and/or virtualization support of the 5GC.
4. Local breakout can be supported.

**Cons:**

1. Not suitable for certain deployments with large number of NR Femtos and/or 5GC not virtualized.
2. Not suitable for residential deployments with frequent switch on/off of NR Femtos.

**Option 2: NR Femto GW**

**Pros:**

1. Only one SCTP association from 5GC to NR Femto GW,so it can support large number of femtos and/or no virtualization of 5GC.
2. 5GC is shielded from frequent switch on/off of the NR Femtos.
3. Enables operators who have already deployed 4G Femto using HeNB GW to capitalize on operating model and integration process of 5G Femtos.
4. Foreseen specification impact are already well known from 4g.
5. Allows to decouple concentration of CP and concentration of UP: concentration of UP is optional i.e. the NR Femto GW can concentrate CP only while the NR Femto connects directly to the UPF.
6. Local breakout can be supported.

**Cons:**

1. Some stage3 specification impact.
2. Some processing delay for CP message.

**Option 3: SCTP concentrator**

**Pros:**

1. Only one SCTP association from 5GC to SCTP concentrator due to using multi-streaming.
2. Local breakout can be supported.
3. Only stage2 specification impact.

**Cons:**

1. The solution requires consistent configuration and handling of SCTP stream identifiers.
2. The solution requires consistent SCTP implementation of AMF, SCTP concentrators and NR femtos.
3. Some processing delay for CP message.
4. Does not provide an evolution path for operators that have already deployed a HeNB GW for E-UTRAN.

**Option 4: NR Femto as a gNB-DU**

**Pros:**

1. Reuse existing split gNB architecture.

**Cons:**

1. F1-C was not designed to face frequent switch on/off. Usually F1-C is operated by the network operator and statically configured.
2. Forseen additional Interoperability issue of F1 compared to NG.:
3. F1-C carried over internet backhaul can lead to latency and reliability issue not meeting the stringent requirement for F1-C interface.
4. This option forces the concentration of User Plane and not only control plane i.e. concentration of CP only while NR femto UP connects directly to UPF is not possible.
5. Does not provide an evolution path for operators that have already deployed a HeNB GW for E-UTRAN.
6. Specification impact for F1 needs to be further assessed.
7. Local breakout cannot be supported.