**3GPP TSG-SA5 Meeting #156 *S5-244867***

Maastricht, Netherlands, 19th Aug 2024 - 23rd Aug 2024

**Source: ZTE Corporation**

**Title: Add potential solutions on Inactive RedCap UEs**

**Document for: Approval**

**Agenda Item: 6.19.17**

# 1 Decision/action requested

***The group is asked to discuss and approval.***

# 2 References

# 3 Rationale

This contribution proposes to add potential solutions for Inactive UEs for RedCap.

# 4 Detailed proposal

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| **1st Change** |

## 5.3 Use case #3: Monitoring of RRC connection number for RedCap service

### 5.3.1 Description

Industry sensors scenario is a typical use case of RedCap technology. It’s desirable in this scenario to connect different kinds of sensors to 5G network as mentioned in TR 38.875 [6]. According to TS 22.104 [8] and TR 22.804 [9], this use case has a requirement on UE density to ensure enough number of devices enjoying communication service.

RRC connection number is an indispensable performance metric for 5G NR, indicating the number of UEs connected to gNB simultaneously. lt can reflect NR performances to operators.

The current measurements related to RRC connection number specified in TS 28.552 [10] are all performed without recognizing the UE type. Therefore, it’s difficult to accurately determine the number of RedCap UEs connected to NR, especially when different type of UEs co-exist. Consequently, it is important to investigate how to define metric for RRC connection number of RedCap UEs. It will assist operators in understanding the resource load brought by RedCap and enable dynamic resource allocation.

The measurements of inactive RedCap UEs can help operators better understand the status of inactive UEs for RedCap service, thereby optimizing resource allocation and avoiding resource waste. Understanding their inactivity status helps to perform load balancing and ensure network stability and efficient operation.

Monitoring of inactive RRC connection number for RedCap UEs can help operators use this information for dynamic frequency resource allocation or load balance purpose. Moreover, it is an important factor to be evaluated in the radio network capacity enhancement decision-making.

Monitoring of RRC connection resuming of RedCap UEs, or measuring the time it takes for a RedCap UE to resume from an inactive state to an active state, can help operators optimize connection recovery process and improve user experience. The success or failure of a RRC connection resuming directly impacts the quality level for delivering the service by the networks and user experience.

### 5.3.2 Potential requirements

**REQ-RedCap\_Perf\_RRCNum-1:** The 3GPP management system should have capability to provide measurements or KPIs related to RedCap RRC connection number in NR network.

**REQ-RedCap-Perf-InactiveUEs:** The 3GPP management system should have capability to provide measurements related to inactive RedCap UEs.

### 5.3.3 Potential Solutions

#### 5.3.3.1 Potential solution #1

This solution proposes to reuse and enhance the exsiting measurements related to RRC connection number defined in TS28.552 [10] for this use case.

Current measurements about RRC connection number includes *Mean number of RRC Connections, Max number of RRC Connections, Mean number of stored inactive RRC Connections, Max number of stored inactive RRC Connections, RRC connection resuming of RedCap UEs, success or failure of a RRC connection resuming,etc.* In order to achieve the requirement in clause 5.3.2, most aspects of the existing measurments can be reused and some enhancements also need to be introduced.

In radio access procedure in 5G system, UEs (no matter legacy UEs or RedCap UEs) need to report to gNB about the NR UE Radio Access Capability Parameter using *UE-NR-Capability* IE, which is specified in clause 6.3.3 in TS 38.331 [2]. RedCapParameters is part of *UE-NR-Capability* IE which can be deliverd by the UE capability inquiry process.

Based on the procedures above, gNB can be aware of whether the UE is RedCap or not when a UE tries to access to NG-RAN. Consequestly, the measurements that performed after the inquiry of UE capability can be seperated for different types of UEs.

When there is more than one type of UEs (e.g. RedCap UEs, eMBB UEs) covered by a cell, the measurements can be optionally split into subcounters to represent the RRC connection number for RedCap UEs.

The related measurements will create a subcounter which can be named as per UE type.

Take the Mean number of RRC Connection as an example:

* RRC.ConnMean can be optionally split as RRC.ConnMean.UeType to represent RedCap RRC connection number when the value of UeType is RedCap.

The subcounters filtered by the value of RedCap can be used as measurementsof RRC connection number for RedCap UEs.

### 5.3.4 Evaluation of potential solutions

TBD

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| **End of change** |