**3GPP TSG-SA5 Meeting #148-e S5-233498rev1**

**e-Meeting, 17th-25th April, 2023**

**Source: China Unicom**

**Title: Add New Key issue and solution on Energy Efficiency of URLLC network slice- RAN based**

**Document for: Approval**

**Agenda Item: 6.9.1 Study on new aspects of Energy Efficiency (EE) for 5G Phase 2**

# 1 Decision/action requested

***The group is asked to approve the proposal.***

# 2 References

[1] SP-211440: "New Study on new aspects of EE for 5G networks Phase 2"

[2] 3GPP TR 28.913: “Study on new aspects of Energy Efficiency (EE) for 5G Phase 2”

[3] 3GPP TS 28.554: “Management and orchestration; 5G end to end Key Performance Indicators (KPI)”

# 3 Rationale

In SP-211440 [1], the second objective (“• On the energy efficiency KPIs”) includes the following sub-objective: “Investigate on the definition of new EE KPIs which consider aspects such as e.g. coverage area, user experience, reliability of URLLC network slice”.

This pCR proposes to introduce a new Key Issue for EE (Energy Efficiency) KPI of URLLC slice based on NG-RAN into TR 28.913 [2].

# 4 Detailed proposal

This contribution proposes to make the following changes in [2].

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| **1st Change** |

## 4.X Key Issue #<A>: Energy Efficiency KPI of URLLC Network slice – RAN-based

### 4.X.1 Descriptionr

In TS 28.554[3], the existing EE KPI definition for URLLC network slice is defined in 6.7.2.3 and the measurements used to calculate EE KPI for URLLC slice are made at UPFs. Therefore, it can’t apply in case of only requirement for measure of RAN NFs in URLLC or when the operator prefers to use RAN measurements to calculate the EE KPI of network slice providing URLLC service. At the same time, there are two EE KPIs for eMBB network slice defined in clause 6.7.2 in TS 28.554. One is based on UPF measuements and the other is based on RAN measurements.

Hence, it is necessary to investigate the possibility and potential solutions to provide energy efficiency of URLLC network slice based on RAN measurements. This contribution proposes key issue for the same.

define a EE KPI based on RAN measurements for URLLC network slice.

### 4.X.2 Potential solutions

#### 4.X.2.1 Solution for energy efficiency of URLLC network slice – RAN based

##### 4.X.2.1.1 Introduction

Reliability is one of the key performance of URLLC network slice. When evaluating the energy efficiency of URLLC network slice, reliability should be taken into consideration. There are some measurements and KPIs performed by NG-RAN related to reliability defined in TS 28.552 and TS 28.554. Therefore, it’s feasible that EE KPIs based on RAN measurements for URLLC network slice can be defined.

In this potential solution, it’s proposed to add new KPIs for energy efficiency of URLLC network slice based on measurements performed in NG-RAN.

##### 4.X.2.1.2 Detaied description

This clause proposes one possible solution for EE KPI of URLLC network slice based on measurements performed by NG-RAN.

##### Energy efficiency of URLLC network slice based on NG-RAN with reliability

a) A KPI that shows the energy efficiency of network slices of type URLLC based on NG-RAN with reliability. The Pns for a network slice of type URLLC is the RAN packet transmission reliability of the network slice. In this KPI variant, reliability is the factor considered for evaluating the performance of network slice.

b)



Where,

 represents the performance of the network slice considering reliability for evaluating of URLLC, which shows the achievable reliability.

 is the reliability of URLLC network slice in RAN side obtained by UL reliability multiplied by DL reliability.

c)



Where,

 is the energy efficiency of network slices of type URLLC based on RAN measurement taking reliability into consideration.

 is the energy consumption of the RAN-only network slice over the same observation period.

d) The KPI object is network slice.

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| **End of changes** |