**3GPP TSG-SA5 Meeting #134e *S5-206124***

**16-25 November 2020, E-meeting**

**Source: China Telecom**

**Title:** **Discussion Paper** **on** **providing cell energySaving Status information to NWDAF**

**Document for: Endorsement**

**Agenda Item: 6.4.7**

# 1 Decision/action requested

***The group is asked to discuss and endorse on the proposal.***

# 2 References

[1] 3GPP TS 28.310: " Management and orchestration; Energy efficiency of 5G".

[2] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3"

[3] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services; Stage 2".

[4] 3GPP TS 28.552: "5G performance measurements."

[5]  3GPP TS 28.532: "Management and orchestration; Generic management services"

[6] 3GPP TS 28.550: "Management and orchestration; Performance assurance"

[7] 3GPP TS 28.545: "Management and orchestration; Fault Supervision (FS)"

[8] 3GPP TS 38.214: "NR; Physical layer procedures for data".

[9] 3GPP TS 38.215: "NR; Physical layer measurements".

# 3 Rationale

3.1 Background

The energySaving state for the cell is defined in TS 28.310 [1] as: "state in which some functions of a cell or a network element or network function are powered-down", but how does OAM provide the cell energySaving state is not defined.

3.2 Discussion

The definition of the energySaving State is provided in TS 28.541[2] clause 4.4 as the following:

*Specifies the status regarding the energy saving in the cell*

And as discussed in S5-205144, the cell energySaving State is related to the power-down of the cell, therefore, it has an impact on the measurement of the RSRP, RSRQ etc.

Due to the power-down of the cell, the measurement such as the PNF Power Consumption may also be affected.

Without this information, it will not be able to distinguish the data measured with respect to the cells with and without power-down. And the analytics made based on these measurement data may contain unexpected error.

The service provided by the 5GC NWDAF (such as the observed service experience analytics) may be influenced by this issue. It may also affect the MDAS for energy saving assistance, for the similar reason.

**Observation 1: Providing the access to the cell energySaving state information is beneficial to both the NWDAF and MDAS.**

In the SA5#133e, the issue about providing cell energySaving State information to the NWDAF was discussed. And it was agreed that the OAM may provide this information to the NWDAF.

As defined in the TS 23.288[3], NWDAF may collect data from the OAM based on the following principles:

*The NWDAF may collect relevant management data from the services in the OAM as configured by the PLMN operator.*

*‐ NG RAN or 5GC performance measurements as defined in TS 28.552[4].*

…

*NWDAF shall use the following services to have access to the information provided by OAM:*

*- Generic performance assurance and fault supervision management services as defined in TS 28.532[5].*

*‐PM (Performance Management) services as defined in TS 28.550 [6].*

*‐FS (Fault Supervision) services defined in TS 28.545 [7].*

**Observation 2: The NWDAF may consume the management services, such as** **the PM services defined in TS 28.550, to gain access to the performance measurements defined in TS 28. 552.**

From the SA5's perspective, in order to provide this information, the potential solutions can be categorized into two groups:

1. Enhancing the OAM services defined in SA5 that are also identified in the SA2 TS 23.288 that the NWDAF may consume, such as the PM services defined in TS 28.550.
2. Enhancing the OAM service defined in SA5 that is not identified in the SA2 TS 23.288 that the NWDAF may consume, such as MDAS.

For the potential solutions in each of the groups, the cell energySaving State information can be provided to the NWDAF, from the SA5's perspective. The additional Pros and Cons are listed in the following table:

|  |  |  |
| --- | --- | --- |
| Group Index | Pros | Cons |
| Group 1 | 1. There is no impact on the interaction between the NWDAF and the OAM, from the NWDAF's perspective. Nothing new needs to be defined on the architecture level for NWDAF in SA2. | 1. new contend needs to be specified, for the service chosen by SA5. |
| Group 2 | 1. the information more than or better than the raw cell energySaving state (i.e. this IOC attribute required) can be provided | 1. SA2 needs to decide whether such service can be supported by NWDAF. A few rounds of LSs may be needed. Some normative works in SA2 is expected. 2. new contend needs to be specified, e.g. for MDAS, in SA5. |

Therefore, in order to minimize the impact and to simplify the coordination, it is possible to provide the cell energySaving state by enhancing the OAM services defined by SA5 that are also identified in the SA2 TS 23.288 that the NWDAF may consume. For example, by making this information as a part the NG-RAN or 5GC performance measurements, the NWDAF may consume the management services, such as the PM services defined in TS 28.550[6], to gain access to this information.

**Proposal 1:** **It is possible to provide the cell energySaving state by enhancing the OAM services defined by SA5 that are also identified in the SA2 TS 23.288 that the NWDAF may consume to provide this information.**

The RSRP measurement is defined in TS 28.552[4] clause 5.1.1.22. It provides the distribution of SS-RSRP per SSB (see TS 38.215 [9]) received by gNB from UEs in the cell when SS-RSRP is used for L1-RSRP as configured by reporting configurations as defined in TS 38.214 [8], in case the L1-RSRP report function is enabled. As discussed in the S5-205144, the RSRP measured by the UE is related to the cell energySaving state and the NWDAF may collect the SS-RSRP as input data for its analytics services as described in clause 6.4.2 in TS 23.288[3].

If the cell energySaving state information were made as a component of the RSRP measurement, it can be provided to the NWDAF via some management services provided by OAM.

However, one problem about this potential solution is that the RSRP measurement is the L1 report generated at the UE, while the cell energySaving State is the energy consumption related information generated and/or configured on the cell level. It is somehow strange to see that these two kinds of information are provided within the same measurement.

Besides the RSRP measurement, in TS 28.552[4] clause 5.1.1.19, the Power, Energy and Environmental (PEE) measurements is defined, and the following performance measurements are provided:

- PNF Power Consumption

- PNF Energy Consumption

- PNF Voltage

- PNF Current

- PNF Humidity

Since the cell energySaving state has strong relationship with the other information provided by PEE measurement service, the PEE measurement service can be taken as another candidate measurement that can be enhanced to provide the cell energySaving state information to the NWDAF.

Moreover, as the cell energySaving state is often discussed with the power and energy related topics, it is more intuitive if the cell energySaving state were provided within PEE measurement.

**Observation 3: the RSRP measurement and the PEE measurement specified in TS 28.552 are two measurements provided by OAM and are related to the cell energySaving state information. And PEE measurement has a more intuitive relationship with the cell energySaving state information.**

Based on the above observation and proposal, we had the following proposal:

**Proposal 2: The information of the cell energySaving state, such as the energySavingState attribute and its value defined in TS 28.541, may be provided as a part of the PEE measurement, which is one of the performance measurements defined in TS 28.552. The detail is FFS.**

NOTE: The information about the energySavingState attribute is provided in TS 28.541 clause 4.3.58 DESManagementFunction and clause 4.3.63 CESManagementFunction.

3.3 Conclusions

According to the discussion above, we have the following findings and proposal:

**Observation 1: Providing the access to the cell energySaving state information is beneficial to both the NWDAF and MDAS.**

**Observation 2: The NWDAF may consume the management services, such as the PM services defined in TS 28.550, to gain access to the performance measurements defined in TS 28. 552.**

**Proposal 1:** **It is possible to provide the cell energySaving state by enhancing the OAM services defined by SA5 that are also identified in the SA2 TS 23.288 that the NWDAF may consume to provide this information.**

**Observation 3: the RSRP measurement and the PEE measurement specified in TS 28.552 are two measurements provided by OAM and are related to the cell energySaving state information. And PEE measurement has a more intuitive relationship with the cell energySaving state information.**

**Proposal 2: The information of the cell energySaving state, such as the energySavingState attribute and its value defined in TS 28.541, may be provided as a part of the PEE measurement, which is one of the performance measurements defined in TS 28.552. The detail is FFS.**

# 4 Detailed proposal

SA5 is asked to endorse the followings as the working assumption in the discussions related to providing the cell energySaving state information to NWDAF:

* It is possible to provide the cell energySaving state by enhancing the OAM services defined by SA5 that are also identified in the SA2 TS 23.288 that the NWDAF may consume to provide this information. `
* The information of the cell energySaving state, such as the energySavingState attribute and its value defined in TS 28.541, may be provided as a part of the PEE measurement, which is one of the performance measurements defined in TS 28.552. The detail is FFS.