3GPP TSG-SA WG2 Meeting #166 S2-24xxxxx

Hyderabad, India, 14-18 October 2024

**Agenda item: 19.4.2**

**Source: Nokia, Verizon, Lenovo**

**Title: Discussion on EIF**

**WI/Release: EnergySys/Rel-19**

**Document for: Discussion and Decision**

# 1 Discussion

This discussion paper aims at stabilizing the function supported by the EIF and at resolving this editor’s note in some agreed CRs at SA2#165:

Editor’s NOTE: It is FFS whether or not EIF will use network data analytics framework as defined in TS 23.288.

At SA2#165, in line with the confirmed WA#64 at SA#105, a new NF has been defined to address KI#1.

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| The SA WG2 Chair declared the Feasibility Study on 5GS Enhancement for Energy Efficiency and Energy Saving Key Issue #1 conclusion updates contained in S2-2409296 as a Working Agreement. | Challenged but confirmed by vote at SA#105 | [S2-2409296](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_164_Maastricht_2024-08/Docs/S2-2409296.zip) [S2-2409559](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_164_Maastricht_2024-08/Docs/S2-2409559.zip) |

As a reminder the WA applies to KI#1 (see above) which is summarized in Table 1, by an excerpt of TR23.700-66:

Table 1 – KI#1 description from TR 23.700-66

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| --- |
| 5.1 Key Issue #1: Network energy related information exposure5.1.1 Description Subject to operator policy, network energy related information (e.g. energy consumption related information, energy efficiency related information, renewable energy and carbon emission related information) may be exposed by the network to the authorized consumers.  To support network energy related information exposure, the following aspects are to be studied:  - Whether and what network energy related information can be exposed.  - At what granularity (e.g. per network slice, UE, NF, PDU Session, QoS flow, etc) the network energy related information can be exposed.  - How the network energy related information is exposed.  - How and what network energy related information from the Network entities (i.e. RAN nodes, 5GC NFs) can be obtained in order to support network energy related information exposure.  NOTE 1: Existing mechanism and information (e.g. information collected by OAM as defined in TS 28.310 [7]) are reused when possible. |

As it can be seen, the KI#1 pertains solely to Network energy related information exposure. Additionally, it was the understanding from the start of the work that existing mechanisms should be reused when possible. This will be further discussed later in the paper.

The agreed text of CR [S2-2411073](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_165_Hyderabad_2024-10/Docs/S2-2411073.zip) at SA#165 which outlines the agreed EIF functionalies is in Table 2.

Table 2 – Excerpt from S2-2411073

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| --- |
| 6.2.x EIF  The Energy Information Function (EIF) includes support for the following functionalities:   * Collect data from OAM and 5GC NF(s) to assist the calculation of energy related information. * Calculate the energy related information (including energy consumption information and renewable energy information) of user plane communication. * Expose the calculated energy related information to authorized consumers.   Editor’s Note: It is FFS whether this NF performs other functionalities.  Editor's Note: It is FFS whether or not EIF will use network data analytics framework as defined in TS 23.288 [86]. |

Based on the fact the EIF is the result of a working agreement on KI#1, and based the agreed CR, we can recognize that the main goal of this new NF is to indeed expose the energy related information it produces, and its consumers are interested in such information. Even in the event some control logic was agreed to be standardized as part of EnergySys upon the information produces by the EIF, that functionality should not be added to the EIF to change its nature into a controller.

It is in fact common practice to export policy control to dedicated NFs in the 5GS (e.g. PCF, NSACF) and these functions are receiving s input the information they need to then trigger the necessary policy actions. It is not a modular design to augment therefore this NF with other capabilities that are not strictly related to the scope of WA#64.

**Proposal#1: The EIF role is limited to the functionalities listed in CR** [**S2-2411073**](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_165_Hyderabad_2024-10/Docs/S2-2411073.zip) **and the name EIF is retained on that basis.**

In addition, as already mentioned, in Table 1 there is clear statement that we should strive to reuse existing functionalities. While this is a goal in the KI, and not a conclusion of the TR (which anyhow is not precluding still adhering to this principle), it reflects an understanding we had at the beginning of the work that we should have not attempted to develop needless new capabilities if already available. In that spirit, let’s now attempt to consider the functionalities in the agreed CR text captured in Table 2 above and check whether it is possible to reuse existing capabilities. Let’s consider for instance Table 3.

Table 3 – Proposed way forward for capability reuse

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| Functionality | Comments | Proposal |
| Collect data from OAM and 5GC NF(s) to assist the calculation of energy related information. | The data needs to be retrieved from OAM from 5G NFs and conceivably stored for each period T on a per NF and per UE basis based on EIF storage policy. | Reuse the 23.288 data collection framework and data storage framework to collect and store the necessary data for calculation.  The necessary data is defined as input to the new analytics and is collected from NFs and OAM as per the following clauses of TS 23.288  6.2.2 “Data Collection from NFs”  6.2.3 “Data Collection from OAM”  The collected data can be stored in ADRF the following clause  TS 23.288 6.2B.2 “Historical Data and Analytics storage” |
| Calculate the energy related information (including energy consumption information and renewable energy information) of user plane communication. | Perform new analytic(s) for the desired output and store the analytics as per storage policy | Introduce a(some) new analytics ID in TS 23.288 clause 7.1. Define for this(these) new analytic(s) the desired outputs and define, as per discussion at SA#165, a default formula to use based on the defined inputs and outputs for the analytic in TS 23.288 clause 6.  The framework for this type of analytics can reuse concepts which were developed for  “6.7 UE related analytics”  And the OAM interaction can be modeled along the lines of  “6.18 End-to-end data volume transfer time analytics”  The output can be stored in ADRF for further use.  See TS 23.288 clause 6.2B.2 “Historical Data and Analytics storage” |
| Expose the calculated energy related information to authorized consumers. | It is possible to reuse analytics exposure framework | Reuse the 23.288 analytics exposure framework, including e.g.  6.1 “Procedures for analytics exposure”  6.2.9 “User consent for analytics”  to enable the identification of EIF providing energy analytics for a UE.  TS 23.288 clause 6.1C.2 “NWDAF Registration in UDM” |

We conclude that the table above shows it is possible to benefit from existing capabilities defined in TS 23.288 and the estimation of the energy consumption can be modeled as new analytics.

**Proposal#2: The EIF is specified in as a new NF that is specialized for the Energy Information analytics and their exposure and it reuses the capabilities already available from the architecture for Network Data Analytics in TS 23.288.**

# 2 Conclusions

It is proposed that the Proposal here below are agreed.

**Proposal#1: The EIF role is limited to the functionalities listed in CR** [**S2-2411073**](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_165_Hyderabad_2024-10/Docs/S2-2411073.zip) **and the name EIF is retained on that basis.**

**Proposal#2: The EIF is specified in as a new NF that is specialized for the Energy Information analytics and their exposure and it reuses the capabilities already available from the architecture for Network Data Analytics in TS 23.288.**