**3GPP TSG-SA5 Meeting #155 *S5-243310***

Jeju, South Korea, 27 - 31 May 2024

**Source: MATRIXX Software**

**Title:** **Discussion paper on AIML charging considerations for a new Rel-19 Study proposal**

**Document for: Discussion**

**Agenda Item: 7.2**

# 1 Decision/action requested

***This discussion paper is to present AIML charging considerations for a new Rel-19 Study proposal based on current status across 3GPP WGs***

***This is a revision of S5-242861***

# 2 References

[1] 3GPP TS 22.261: "Service requirements for the 5G system".

[2] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[3] 3GPP TS 23.502: "Procedures for the 5G System (5GS)".

[4] TR 23.700-84 "Study on Core Network Enhanced Support for Artificial Intelligence (AI) / Machine Learning (ML)"

[5] TR 23.700-82 "Study on application layer support for AI/ML services" (SA6)

[6] TR 28.908: "Study on Artificial Intelligence/Machine Learning (AI/ ML) management" (SA5)

# 3 Rationale

This discussion paper provides an overview of current status across 3GPP WGs for AI/ML in order to further explore charging considerations

## Rel-18 (frozen)

SA1 WID "AI/ML Model Transfer" (AIML\_MT):

Two new clauses introduced in TS 22.261 [1] on requirements for 5GS

* 6.40 AI/ML model transfer in 5GS for "AI/ML Service Requirements" with clause 6.40.2 requirements on 5GS system (SA1-1)
* 7.10 KPIs for AI/ML model transfer in 5GS (SA1-2)

And following charging requirement in clause 9.1 (related to (SA1-1)): "The 5G system shall be able to support collection of charging information for a group of UEs, e.g. UEs of a AI/ML FL group." (SA1-3)

SA2 WID "System Support for AI/ML-based Services" (AIMLsys):

TS 23.501 [2] and TS 23.502 [3]: Architecture Enhancement for Application AI/ML Operation: 5G Core is extended to assist Application AI/ML operation. AF remains to control the logic of the application layer AI/ML operation

Following capabilities (SA2-1) where introduced :

* Planned Data Transfer with QoS:
* Enhanced external parameter provisioning:
* Member UE selection assistance functionality for application operation.
* Multi-member AF session with required QoS:
* End-to-end data volume transfer time analytics:
* NEF new monitoring events

SA2 eNA\_Ph3 TS 23.288 NWDAF evolutions (SA2-2):

* NWDAF decomposed into Model Training logical function (MTLF) and Analytics logical function (AnLF) and interactions between them was introduced from Rel-17.
* Rel-18 improvements:
  + Improve correctness of NWDAF analytics (clause 5.C)
  + trained ML model interoperability
  + Federated Learning (FL) among multiple NWDAFs (clause 5.3, 6.2C)

SA5 Charging: WID "NEF Charging enhancement to support AI/ML in 5GS" (AIMLsysNEF\_CH )(SA5-CH-1)

* TS 32.254 with new clause 5.1.2 AI/ML support (APIs supported by NEF charging) and support of multiple UEs

SA5 OAM: "AI/ML management (AIML\_MGT WID) (SA5-OAM-1)

TS 28.105 "Artificial Intelligence/ Machine Learning (AI/ML) management" with the scope "Artificial Intelligence / Machine Learning (AI/ML) management capabilities and services for 5GS where AI/ML is used, including management and orchestration"

TS 28.104 "Management and orchestration; Management Data Analytics (MDA)" includes "AI/ML support for MDA".

### Status summary Rel-18 - charging

SA1 charging requirement (SA1-3) is covered by (SA5-CH-1) based on SA2 defined network capabilities (SA2-2)

SA1 requirements on KPIs (SA1-2): no activity in SA5 Charging

SA2 NWDAF related evolutions (SA2-2) and SA5 OAM (SA5-OAM-1) : no activity in SA5 Charging

## Rel-19 (ongoing)

SA1 WID "AI/ML Model Transfer Phase 2" (AIML\_MT\_Ph2)

Two new clauses introduced in TS 22.261[1] on requirements for 5GS

* 6.40.2.2 Requirements for direct device connection (SA1-4)
* 7.10.2 KPI requirement for direct device connection (SA1-5)

And following charging requirement in clause 9.1 (related to (SA1-4)):: "The 5G system shall be able to support charging mechanism for multiple UE exchange data for the same service using the direct device connection.." (SA1-6)

SA2 SID "Study on Core Network Enhanced Support for Artificial Intelligence (AI)/Machine Learning (ML)" (FS\_AIML\_CN) **targets completion in June (SA#104)** **(SA2-3)**

TR 23.700-84 [4] "Study on Core Network Enhanced Support for Artificial Intelligence (AI) / Machine Learning (ML)":

* Enhancements to LCS to support Direct AI/ML based Positioning (SA2-3.1)
* 5GC Support for Vertical Federated Learning (SA2-3.2)
* NWDAF-assisted policy control and QoS enhancement (SA2-3.3)
* NWDAF enhancements to support network abnormal behaviours (i.e. signalling storm) mitigation and prevention (SA2-3.4)

SA5 OAM SIDs **target completion in September SA#105) (SA5-OAM.2)**:

* "Study on AI/ML management - phase 2" (FS\_AIML\_MGT\_Ph2): Continuation of TR 28.908 [6]: "Study on Artificial Intelligence/Machine Learning (AI/ ML) management"
* "Study on Management Data Analytics (MDA) – Phase 3 (FS\_eMDAS\_Ph3) TR 28.866

SA6 SID "Study on application layer support for AI/ML services" (FS\_AIMLAPP) **targets completion in September SA#105 (SA6-1)**

TR 23.700-82 [5] "Study on application layer support for AI/ML services" (SA6)

# 4 Detailed proposal

It is proposed to discuss, based above Rel-18 and Rel-19 collection, identified potential SA5 charging activity:

SA1 input

SA1 charging requirement (SA1-6) is based on requirement (SA1-4) for SA2 solution. It is expected to be SA2 "Proximity based Services (ProSe) related solution: to be confirmed whether this is covered under SA2 ongoing study on ProSe.

SA1 requirements on KPIs (SA1-5): to be confirmed whether this is covered by SA2

=> input from SA1 cannot be used at this stage to start activity in SA5 Charging

SA2 study (SA2-3):

(SA2-3.1) when concluded, expected to be LCS solution

=> potential SA5 charging activity

(SA2-3.2), (SA2-3.3) and (SA2-3.4) when concluded expected to be solutions based on NWDAF evolution

=> potential SA5 charging activity considering to also cover Rel-18 (SA2-2)

SA5 OAM study (SA5-OAM.2) :

=> potential SA5 charging activity considering to also cover Rel-18 (SA5-OAM-1)

SA6 study (SA6-1) when concluded:

=> potential SA5 charging activity

It is proposed in particular to collect the group view on investigation on following area:

* NWDAF: (SA2-2) and later on (SA2-3.2), (SA2-3.3) and (SA2-3.4) result.
* OAM: (SA5-OAM-1) and later on (SA5-OAM-2) result.
* Later on: SA6 study (SA6-1) result.