**SA WG2 Meeting #S2-147ES2-2107292**

**18 - 22 October, 2021, Electronic meeting** (revision of S2-21yyxxxx)

Source: Intel, Telecom Italia, Spreadtrum, Sandvine, Convida Wireless, KPN, InterDigital, Microsoft, Matrixx, KDDI, AT&T, Deutsche Telekom, Cisco, Charter Communications

Title: New SID: Study on System Enabler for Service Function Chaining

Document for: Approval

Agenda Item: 9.1.3

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: Study on System Enabler for Service Function Chaining

Acronym: FS\_SFC

Unique identifier:

Potential target Release: *Rel-18*

{Note that this field above indicates the proposed Release at the time of submission of the WID to TSG approval. It can later be changed without a need to revise the WID. The updated target Release is indicated in the Work Plan}

# 1 Impacts

{For Normative work, identify the anticipated impacts. For a Study, identify the scope of the study}

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  |  |  | X |  |
| No | X | X | X |  | X |
| Don't know |  |  |  |  |  |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

|  |  |
| --- | --- |
|  | Feature |
|  | Building Block |
|  | Work Task |
| X | Study Item |

## 2.2 Parent Work Item

For a brand-new topic, use “N/A” in the table below. Otherwise indicate the parent Work Item.

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
|  |  |  |  |

### 2.3 Other related Work Items and dependencies

{List here other Work Items which relate to the proposed one, such as a Work Item in an earlier Release if further enhancing the feature from the previous Release)}

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 740005 | Enhancements to the Service-Based 5G System Architecture (5G\_eSBA) | 5G system enhancement  |
| 760066 | Management and orchestration of 5G networks and network slicing (NETSLICE) | Support of 5G network orchestration and management  |
| 900016 | Stage 2 of eEDGE\_5GC (eEDGE\_5GC) | System support of Interaction with Edge Hosting Environment  |
| 870029 | Study on enhancements of edge computing management (FS\_Eedge\_Mgt) | Study of the management aspect of edge computing. |
| 870030 | Study on charging aspects of Edge Computing (FS\_EDGE\_CH) | Study of the charging aspect of edge computing. |
| 860006 | Architecture for enabling Edge Applications (EDGEAPP) | Edge Computing Application Architecture  |

Dependency on non-3GPP (draft) specification:

{This section is to be typically used to identify the IETF dependencies. Delete the header "Dependency on non-3GPP (draft) specification:" if no such dependency}

# 3 Justification

In Rel-18, stage 1 service requirements in TS22.101 clause 30.1, TS22.261 clause 6.35, and TS22.115 clause 5.2.14, have been approved for the enhancement of service function chaining (SFC) for 5G networks, including aspects such as allowing third parties to request to request a chain of service functions provided by the network operator based on operator’s service function chaining policies. Considering different SFC deployments for 5G network including 5G core network and/or Edge Hosting Environment, some issues are identified based on the Rel-17 SA2 specifications:

* Currently, the SMF may be configured with the traffic steering policy related to the mechanism enabling traffic steering to the N6-LAN, DN and/or DNAIs associated with N6 traffic routing requirements provided by the AF. Based on the following service requirement in TS 22.261 clause 6.35, the definition of SFC policy is needed for the 5G network to identify/detect user plane traffic with enough granularity, perform traffic classification, and steer the traffic flow for SFC processing in different SFC deployments.

The network operator shall be able to define and modify service function chaining policies for steering traffic on per application per UE basis through required service function chaining with ordered service functions to improve the user’s QoE.

* New northbound APIs are required for authorized AF to request to use a service function chain provided by the network operator and to request monitoring and reporting of events according to the status of the SFC processing, etc., based on service level agreement with the third party.
* For continuing the SFC processing, some mechanisms and enhancement interfaces are needed to apply the same SFC policies for UE mobility cases that result in the change of routing paths for user plane traffics requiring SFC including:
* Upon UE moves within the same operator’s network depending on the applicable SFC deployments, e.g. at the 5G core network and/or Edge Hosting Environment.
* Upon UE moves with the changes of operator’s networks, e.g. from the same serving network to different operator’s Edge Hosting Environments.
* For handling SFC processing based on SFC policy, the enhancement of service-based architecture will be needed for some NFs and their services, e.g. PCF, NEF, UPF event exposure, SMF, etc., as well as the corresponding interfaces and procedures for different SFC deployments. For example:
* a UPF with SFC capabilities that can support different event exposure service(s) and flexible SFC configuration for a PDU session that requires different SFC processing for applications.
* the procedures to enforce both of SFC policies and traffic steering policies to traffic flows of the UEs requiring service function chains for their applications.

# 4 Objective

Following objectives will be studied:

WT#1: Consider different SFC deployments and investigate the potential required coordination between the 5G Network and the Edge Hosting Environment for SFC processing.

WT#2: Providing a definition of SFC policies for the 5G network with SFC capabilities to identify/detect/classify user plane traffic with enough granularities and steer the traffic to a chain of ordered service functions for SFC processing.

* WT#2.1: Studying the relation between the SFC policy and Traffic steering policy.

WT#3: Enabling northbound APIs for allowing an AF to request network capability exposure functionalities, e.g. request a service function chain for a certain traffic flow, monitoring and reporting events according to the status of the SFC use, etc., based on service level agreement with the third party.

WT#4: Investigating solutions for handling SFC processing based on SFC policy, including the enhancement of service-based architecture for some NFs and their services, e.g. PCF, NEF, UPF event exposure, SMF, CHF, etc., as well as the corresponding interfaces and procedures for different SFC deployments.

WT#5: Investigating solutions for applying the same SFC policies to a UE when the traffic of the UE is offloaded at different locations (due e.g. to UE mobility) and results in the traffic routing path changes for SFC processing in different SFC deployments scenarios.

NOTE: This study considers only traffic handled over N6 by PSA UPF(s) in 5G network.

NOTE: The definition of terms in RFC 7665 may be re-used when applicable. The study targets the use of traffic steering concept, e.g. defined by 3GPP (FMSS) and SFC mechanisms defined in IETF when applicable. Especially the study does NOT define alternatives to user plane mechanisms (e.g. vxLAN, NSH, …) defined at IETF to support SFC as these mechanisms shall be reused by this study, as applicable.

NOTE: The study for SFC will ensure that existing (per 3GPP R17) deployments flexibility can be preserved in deployments of SFC in 5G network.

NOTE: Following case is not considered in the study: the case where SFC applies for an HR roaming PDU Session at an offloading point in a VPLMN

## TU estimates and dependencies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Work Task ID | TU Estimate(Study) | TU Estimate(Normative) | RAN Dependency(Yes/No/Maybe)  | Inter Work Tasks Dependency  |
| WT#1 | 1.0 | 0.5 | No | WT#1 is self-contained |
| WT#2 | 2.5 | 1.0 | No | WT#2 is self-contained |
|  |  |  |  |  |
| WT#3 | 1.0 | 0.5 | No | WT#3 is self-contained |
| WT#4 | 2.0 | 1.0 | No | depended on completion of WT#2 |
| WT#5 | 1.0 | 0.5 | No | depended on completion of WT#1 and WT#2 |

Total TU estimates for the study phase: 8

Total TU estimates for the normative phase: 4

Total TU estimates: 8 + 4 = 12

# 5 Expected Output and Time scale

|  |
| --- |
| New specifications {One line per specification. Create/delete lines as needed} |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
|  |  |  |  |  |  |
| Internal TR | 23.abc | Study on System Enabler for Service Function Chaining | TSG SA#97 Sept 2022 (TBD) | TSG SA#98Dec 2022 (TBD) | *Ellen Liao, Intel,* *ellen.c.liao@intel.com* |

{Note 1: Only TSs may contain normative provisions. Study Items shall create or impact only TRs.
"Internal TR" is intended for 3GPP internal use only whereas "External TR" may be transposed by OPs.}

{Note 2: The first listed Rapporteur is the specification primary Rapporteur. Secondary Rapporteur(s) are possible for particular aspect(s) of the TS/TR. In this case, their responsibility has to be provided as "Remarks".}

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| {e.g. "22.281"} | {Possible values: - either free text (e.g. “CS aspects to be removed") - or “Specification to be withdrawn”} | {e.g. "TSG#89"} | {Free text} |
|  |  |  |  |

# 6 Work item Rapporteur(s)

*Ellen Liao, Intel,* ellen.c.liao@intel.com

# 7 Work item leadership

SA2

# 8 Aspects that involve other WGs

SA3 for security aspects. SA5 for management and charging aspects. SA6 for application layer aspects.

# 9 Supporting Individual Members

{At least 4 supporting Individual Members are needed. There is an expectation that these companies will provide resources to progress the work. Note that having 4 supporting companies is a necessary but not sufficient condition: the usual TSG approval process by consensus is needed for the WID approval}

|  |
| --- |
| Supporting IM name |
| Intel |
| Telecom Italia |
| Spreadtrum |
| Sandvine |
| Convida Wireless |
| KPN |
| InterDigital |
| Microsoft |
| Matrixx |
| KDDI |
| AT&T |
| Deutsche Telekom |
| Cisco |
| Charter Communications |
| Spirent |
| Lenovo |
| Motorola Mobility |
| Allot |
| Telstra |
|  |
|  |
|  |
|  |
|  |