**SA WG2 Meeting #S2-147ES2-2107137**

**18 - 22 October, 2021, Electronic meeting** (revision of S2-2105500)

**Source: Ericsson**

**Title: New SID: Extensions to the TSC Framework to support DetNet**

**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:

Extensions to the TSC Framework to support DetNet

Acronym:

FS\_DetNet

Unique identifier:

{A number to be provided by MCC at the plenary}

Potential target Release: *Rel-18*

# 1 Impacts

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

# 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

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

### 2.3 Other related Work Items and dependencies

|  |  |  |
| --- | --- | --- |
| Other related Work /Study Items (if any) | | |
| Unique ID | Title | Nature of relationship |
|  |  |  |

Dependency on non-3GPP (draft) specification:

RFC 8939, RFC 8655. RFC 9016, draft-ietf-detnet-yang-12

# 3 Justification

Deterministic Networking (DetNet), as standardized in the IETF, operates at the IP and Multiprotocol Label Switching (MPLS) layers and provides time-sensitive features that guarantee almost zero packet loss rates and bounded latency. DetNet is targeted for networks that are under a single administrative control or within a closed group of administrative control, so it is not intended for large groups of domains such as the Internet. There is close cooperation between the IETF DetNet WG and the IEEE Time-Sensitive Networking (TSN) TG. DetNet functions are very similar to the TSN ones.

DetNet has reached a technical level of maturity in IETF. Many RFCs have been published and some of the IETF drafts are waiting for publication by the RFC editor. DetNet can be applicable to many use cases in Industrial Automation verticals, for industrial machine-to-machine communication, smart grid. DetNet is able to provide deterministic QoS when UDP/IP is the transport selected for deterministic field-level communication.

In this work the 5GS is being placed within a DetNet IP data plane network. In this case, DetNet support in 3GPP can be achieved by reusing the TSC framework for deterministic QoS and time synchronization services included in Release 17.

# 4 Objective

The objective of WT#1 is to:

1. Study which DetNet functions are essential in typical 5GS deployments for basic DetNet integration.2. Study solutions to enable 3GPP support for DetNet such that a mapping is provided between the central DetNet controller entity (as defined in IETF) and the 5G system. Mapping involves translation of DetNet traffic profile and flow specification to 5GS QoS parameters and TSCAI. The mapping uses DetNet YANG configuration.

The study has the following assumptions:

* Only IP based DetNet is in the scope of the work; MPLS based DetNet is out of scope.
* IP based DetNet traffic is carried in PDU Sessions of IP type. (DetNet over Ethernet TSN is not in the scope of the work as it can be supported based on existing 3GPP and IETF standards.)
* The solutions should reuse the functionality of the TSC framework defined in Release 17 where applicable.
* The solutions support a request from the DetNet controller entity including DetNet configuration for flow path establishment.
* Since synchronization mechanisms that can be used are out of the scope in IETF DetNet specifications, the time synchronization framework in Release 17 is not modified for this item.
* Existing 3GPP routing mechanisms can be re-used for DetNet; no new routing function in the 3GPP system is to be defined.
* The existing filtering mechanisms can be re-used in the UE and in the UPF to identify the traffic for QoS differentiation.

It is out of scope to extend 3GPP multicast mechanisms, but the existing multicast capabilities can be re-used for DetNet communications.

It is out of scope to support for edge DetNet node functions in the 3GPP network.

Note: The results of the Study on 5G Timing Resiliency and TSC&URLLC enhancements maybe applied, if dependency identified.

## TU estimates and dependencies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Work Task ID | TU Estimate  (Study) | TU Estimate  (Normative) | RAN Dependency  (Yes/No/Maybe) | Inter Work Tasks Dependency |
| WT#1 | 3 | 2 | Maybe | WT#1 is self-contained |
|  |  |  |  |  |

Total TU estimates for the study phase: 3

Total TU estimates for the normative phase: 2

Total TU estimates: 43 + 2 = 5

# 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 5GS DetNet interworking | *SA#96*  *June*  2022 | *SA#97*  *Sep*  2022 | Miklós, György, Ericsson, gyorgy.miklos@ericsson.com |
|  |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} | | | |
| TS/TR No. | Description of change | Target completion plenary# | Remarks |
| 23.501 | Addition of text for DetNet interworking | SA#97  Sep 2022 |  |
| 23.502 | Addition of text for DetNet interworking | SA#97  Sep 2022 |  |
| 23.503 | Addition of text for DetNet interworking | SA#97  Sep 2022 |  |

# 6 Work item Rapporteur(s)

Miklós, György, Ericsson, gyorgy.miklos@ericsson.com

# 7 Work item leadership

SA2

# 8 Aspects that involve other WGs

None identified yet.

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Ericsson |
| Verizon |
| Qualcomm |
| China Mobile |
| Lenovo |
| Motorola Mobility |
| AT&T |
| ETRI |
| NTT DoCoMo |
| Matrixx |
| Sennheiser |