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TECHNICAL SPECIFICATION

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the stage 3 protocol and data model for the Ntsctsf Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the TSCTSF.

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [19].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [4] and 3GPP TS 29.501 [5].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

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

[3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[5] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[6] OpenAPI: "OpenAPI Specification Version 3.0.0", https://spec.openapis.org/oas/v3.0.0.

[7] 3GPP TR 21.900: "Technical Specification Group working methods".

[8] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

[9] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[10] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[11] IETF RFC 9113: "HTTP/2".

[12] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

[13] IETF RFC 9457: "Problem Details for HTTP APIs".

[14] 3GPP TS 29.534: "5G System; Access and Mobility Policy Authorization Service; Stage 3".

[15] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".

[16] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".

[17] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[18] IEEE Std 802.1Q-2018: "IEEE Standard for Local and metropolitan area networks--Bridges and Bridged Networks".

[19] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System".

[20] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[21] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".

[22] IETF RFC 7396: "JSON Merge Patch".

[23] 3GPP TS 29.521: "5G System; Binding Support Management Service; Stage 3".

[24] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

[25] IEEE Std 1588-2019: "IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control".

[26] IEEE Std 802.1AS-2020: "IEEE Standard for Local and metropolitan area networks--Timing and Synchronization for Time-Sensitive Applications".

[27] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[28] IETF RFC 9633: "Deterministic Networking (DetNet) YANG Data Model".

[29] IETF RFC 6241: "Network Configuration Protocol (NETCONF)".

[30] IETF RFC 8040: "RESTCONF Protocol".

[31] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3".

[32] IETF RFC 8939: "Deterministic Networking (DetNet) Data Plane: IP".

[33] IETF RFC 7950: "The YANG 1.1 Data Modeling Language".

[34] IETF RFC 8407: "Guidelines for Authors and Reviewers of Documents Containing YANG Data Models".

[35] IETF RFC 6020: "YANG – A Data Modeling Language for the Network Configuration Protocol (NETCONF)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

Void

3.2 Symbols

For the purposes of the present document, the following symbols apply:

Void

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

ASTI Access Stratum Time distribution

BAT	Burst Arrival Time
DetNet	Deterministic Networking
DS-TT	Device-side TSN translator
NW-TT	Network-side TSN translator
PTP	Precision Time Protocol
TA	Tracking Area
TSC	Time Sensitive Communication
TSCAI	TSC Assistance Information
TSCTSF	Time Sensitive Communication and Time Synchronization function

4 Overview

4.1 Introduction

The Ntsctsf services are offered by the TSCTSF to support the Time Sensitive Communications and Time Synchronization.

The following Ntsctsf services are specified:

- Ntsctsf_TimeSynchronization service;
- Ntsctsf_QoSandTSCAssistance service.
- Ntsctsf_ASTI service.

To enable the reporting of 5GS DetNet node configuration and the provisioning and configuration data for DetNet flows, the TSCTSF offers RESTCONF (IETF RFC 8040 [30]) and/or NETCONF (IETF RFC 6241 [29]) interfaces to the DetNet controller to access the 3GPP extended Deterministic Networking (DetNet) YANG Model as specified in Annex B.

4.2 Service Architecture

The 5G System Architecture is defined in 3GPP TS 23.501 [2].

The known NF service consumers of the Ntsctsf services are the Application Function (AF) within the operator's trust domain and the Network Exposure Function (NEF).

The Ntsctsf services are provided by the TSCTSF and consumed by the NF service consumers (e.g. AF, NEF), as shown in figure 4.2-1 for the SBI representation model and in figure 4.2-2 for the reference point representation model.

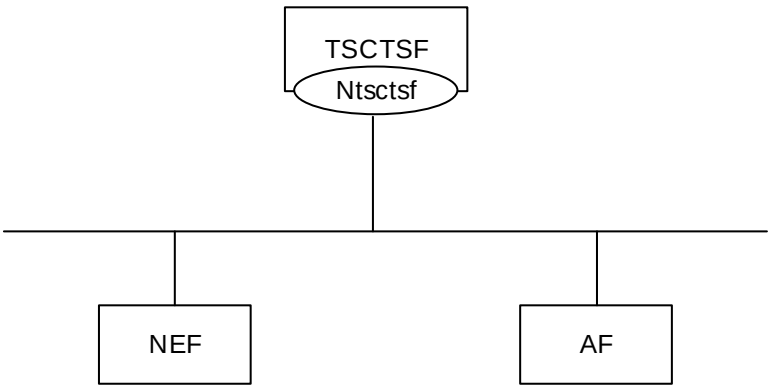

Figure 4.2-1: Ntsctsf services architecture, SBI representation

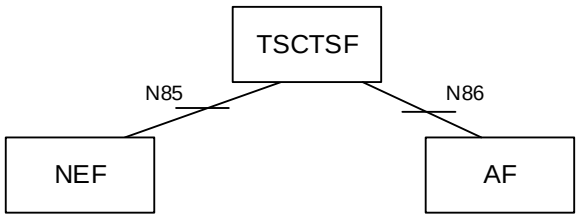

Figure 4.2-2: Ntsctsf services architecture, reference point representation

The DetNet controller, as specified in clause 4.4.8.4 of 3GPP TS 23.501 [2], is the TSCTSF's consumer that accesses the 3GPP extended DetNet YANG model, as specified in Annex B, clause B.1.1.

5 Services offered by the TSCTSF

5.1 Introduction

Table 5.1-1 summarizes the corresponding APIs defined for this specification.

Table 5.1-1: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	apiName	Annex
Ntsctsf_TimeSynchronization	6.1	Provides the support to subscribe/unsubscribe to the notification about time synchronization capabilities or changes in time synchronization status information. Also allows to activate and deactivate the time synchronization configuration.	TS29565_Ntsctsf_TimeSynchronization.yaml	ntsctsf-time-sync	A.2
Ntsctsf_QoSandTSCAssistance	6.2	Provides the support to request specific QoS and provide assistance for handling traffic characterized by TSC QoS parameters.	TS29565_Ntsctsf_QoSandTSCAssistance.yaml	ntsctsf-qos-tscai	A.3
Ntsctsf_ASTI	6.3	Provides support for time synchronization service based on 5G access stratum time distribution method. Allows the NF consumer to configure the 5GC and RAN for 5G access stratum based time synchronization service for the UEs and subscribe to get informed about changes in time synchronization status information.	TS29565_Ntsctsf_ASTI.yaml	ntsctsf-asti	A.4