|  |  |
| --- | --- |
| 3GPP TS 28.560 V19.2.0 (2025-06) | |
| Technical Specification | |
| 3rd Generation Partnership Project;  Technical Specification Group Services and System Aspects;  Management and orchestration;  Signalling traffic monitoring management  (Stage 1, stage 2, and stage 3)  (Release 19) | |
|  | |
|  |  |
|  | |
| The present document has been developed within the 3rd Generation Partnership Project (3GPP TM) and may be further elaborated for the purposes of 3GPP. The present document has not been subject to any approval process by the 3GPPOrganizational Partners and shall not be implemented. This Specification is provided for future development work within 3GPPonly. The Organizational Partners accept no liability for any use of this Specification. Specifications and Reports for implementation of the 3GPP TM system should be obtained via the 3GPP Organizational Partners' Publications Offices. | |

|  |
| --- |
|  |
| ***3GPP***  Postal address  3GPP support office address  650 Route des Lucioles - Sophia Antipolis  Valbonne - FRANCE  Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16  Internet  https://www.3gpp.org |
| ***Copyright Notification***  No part may be reproduced except as authorized by written permission. The copyright and the foregoing restriction extend to reproduction in all media.  © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).  All rights reserved.  UMTS™ is a Trade Mark of ETSI registered for the benefit of its members  3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners LTE™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners  GSM® and the GSM logo are registered and owned by the GSM Association |

Contents

Foreword 5

Introduction 6

1 Scope 7

2 References 7

3 Definitions of terms, symbols and abbreviations 7

3.1 Terms 7

3.2 Symbols 8

3.3 Abbreviations 8

4 Signalling traffic monitoring management capabilities (stage 1) 8

5 Signalling traffic monitoring management operations (stage 2) 8

5.1 Overview 8

5.2 STM Provisioning 9

5.3 STM Streaming 10

6 Signalling traffic monitoring management Information Model (stage 2) 10

6.1 Imported and associated information entities 10

6.1.1 Imported information entities and local labels 10

6.1.2 Class diagram 10

6.1.2.1 Relationships 10

6.1.2.2 Inheritance 11

6.2 Class definitions 11

6.2.1 StmCtrl <<IOC>> 11

6.2.1.1 Definition 11

6.2.1.2 Attributes 11

6.2.1.3 Attribute constraints 12

6.2.1.4 Notifications 12

6.3 Attribute definitions 12

6.3.1 Attribute properties 12

6.4 Common notifications 13

7 Management services for Signalling traffic monitoring management (stage 3) 13

7.1 Reporting format 13

7.1.1 Protocol 13

7.1.2 Format of the STM reports 13

7.1.2.0 General 13

7.1.2.1 UDP-GRE-PCAPNG Encapsulation 13

7.1.2.2 Generic Type – Length- Value encoding 14

7.2 YANG Definitions 14

Annex A (informative): Use Cases 15

A.1  Signalling Monitoring Activation 15

A.2  Signalling Monitoring Termination 15

A.3  Signalling Traffic Monitoring Streaming 15

Annex B (informative): Plant UML source code 16

B.1 STM architecture 16

B.2 STM architecture 16

B.3 STM control NRM fragment 16

B.4 STM control NRM inheritance relationships 17

B.5 STM encapsulation 17

Annex C (informative): Change history 18

# Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

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.

# Introduction

External monitoring systems are used by Mobile Network Operators (MNOs) to track network activity for analysis and troubleshooting purposes, and subsequently to perform diagnosis and fault analysis of their system. Such monitoring has been usually performed by tapping the connections between the network functions in order to extract the signalling messages for further analysis.

Due to the encryption of the signalling traffic exchanged between network functions in 5G Core, the monitoring of the network activity as performed in legacy systems is not possible. In order to monitor the signalling messages of the 5G core, each core NFs needs to provide copies of signalling messages, that it sends or receives, to the monitoring system.

The present document covers the stage 1, stage 2 and stage 3 aspects for the Signalling Traffic Monitoring.

# 1 Scope

The present document specifies the definitions of signalling traffic monitoring management. This monitoring is performed at network signalling level on 5GC control plane. When the monitoring is enabled, the 5GC network function collects the required decrypted signalling message and forwards it to the configured collection entity.

# 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 28.532: "Generic management services".

[3] 3GPP TS 28.533: "Management and orchestration; Architecture framework".

[4] 3GPP TS 33.501: " Security architecture and procedures for 5G System ".

[5] 3GPP TS 28.622: "Generic Network Resource Model (NRM); Integration Reference Point (IRP); Information Service (IS)".

[6] void.

[7] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[8] IETF RFC8086: GRE-in-UDP Encapsulation.

[9] IETF draft-ietf-opsawg-pcapng-04: PCAP Next Generation (pcapng) Capture File Format.

[10] 3GPP TS 32.160: "Management and orchestration; Management Service Template".

[11] 3GPP TS 28.623: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".

[12] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[13] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane Nodes; Stage 3".

[14] 3GPP TS 28.541: “Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3”

[15] 3GPP TS 23.273: “5G System (5GS) Location Services (LCS); Stage 2”

[16] 3GPP TS 23.502: "Procedures for the 5G System (5GS); Stage 2"

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in 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 TR 21.905 [1].

**STM Data Consumer:** A consumer that receives the signalling traffic message copies which are streamed by the STM Data Producer.

**STM Data Producer:** A producer that has the responsibility to send the signalling traffic message copies to the STM Data Consumer.

NOTE: The STM Data Producer may be part of or outside of a 5GC NF implementation, which is out of scope of the present document.

**STM Management Consumer:** A consumer that can provision STM control NRM fragments on STM Management Producers.

NOTE: It is either located at the operator's OAM system or at the external monitoring system.

**STM Management Producer:** A producer that supports the STM control NRM fragment.

NOTE: The STM Management Producer may be part of or outside of a 5GC NF implementation, which is out of scope of the present document.

## 3.2 Symbols

Void.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 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 TR 21.905 [1].

STM Signalling Traffic Monitoring

# 4 Signalling traffic monitoring management capabilities (stage 1)

The 3GPP management system shall have the capabilities as listed in the following table.

Table 4-1

| Requirement label | Description | Related use case(s) |
| --- | --- | --- |
| **REQ-SM-FUN-1** | The 3GPP system shall have the capability to send copies of the 5G Core control plane signalling messages, of selected interface(s) of selected NF(s), to an external entity that collects these signalling messages. | Signalling Traffic Monitoring Streaming |
| **REQ-SM-FUN-2** | Authorised consumers shall have the capability to control (to configure, to enable, and to disable) sending copies of the 5G Core control plane signalling messages to the external collecting entity. | Signalling Monitoring Activation  Signalling Monitoring Termination |
| **REQ-SM-FUN-3** | The 3GPP system shall have the capability to send the copies of the 5G Core control plane signalling messages in a reliable or unreliable transport manner. | Signalling Traffic Monitoring Streaming |
| **REQ-SM-FUN-4** | Authorised consumers shall have the capability to indicate the network interface type, and optionally the network interface instance and service operations within the specified network interface type, of which the signalling messages are to be monitored. | Signalling Traffic Monitoring Activation |

# 5 Signalling traffic monitoring management operations (stage 2)

## 5.1 Overview

The STM Management Producer is configured by an authorized STM Management Consumer via a secured link. The network signalling messages at 5GC control plane are the target to be collected. Any relevant signalling traffic messages are forwarded by the STM Data Producer to the STM Data Consumer using a secured tunnel.

NOTE: The STM Data Producer, and the STM Data Consumer are left for implementation. They are the endpoints of the interfaces used for streaming of the signalling message copies.

The STM Management Producer may be configured by an authorized STM Management Consumer located in OAM system. And the STM configuration may be enabled/disabled by an authorized STM Management Consumer located in OAM system or located in external monitoring system. When STM Management Consumers are located in different systems, the different STM Management Consumers have different authorization, resulting in a different visibility of the same STM Management Producer. Where the STM Management Consumer is located is out of scope of the present document. Examples of signalling traffic monitoring deployment scenarios are shown in figure 5.1-1 and figure 5.1-2. It is up to implementation, whether the STM Data Producer is located inside the 5G NF as showed in the figure 5.1-1 or outside the 5GC NF as shown in figure 5.1-2.

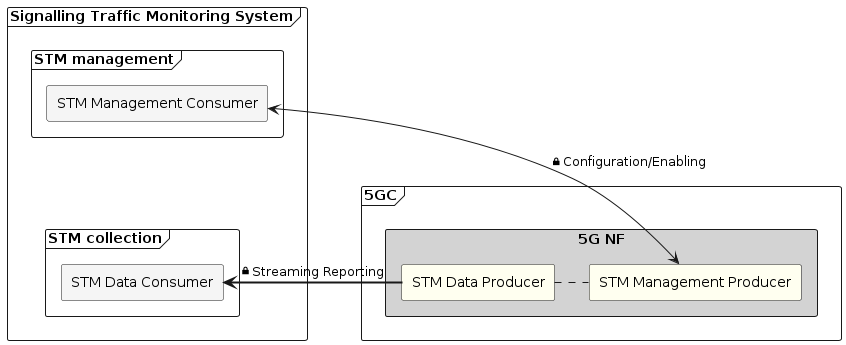


Figure 5.1-1: Signalling traffic monitoring deployment scenario - 1

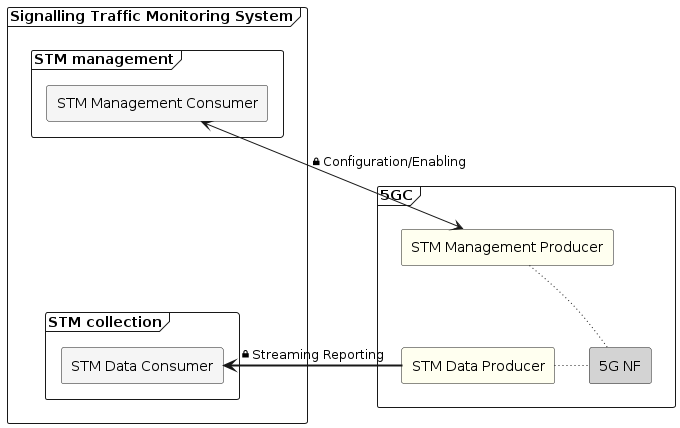


Figure 5.1-2: Signalling traffic monitoring deployment scenario - 2

## 5.2 STM Provisioning

This clause provides the stage 2 definitions of STM provisioning operations, including creation and deletion, as well as enablement and disablement, for managing STM reporting control objects. According to clause 4.2.2 of 3GPP TS 28.533 [3], these operations are the MnS component type A. The operations specified in this clause in combination with a NRM (MnS component type B) constitute a MnS, as defined in clause 4.3 of 3GPP TS 28.533 [3] providing generic provisioning services for supported NRM (MnS component type B) of all MnS.

The creation operation is invoked by STM Management Consumers to request a STM Management Producer to create, one or more STM control objects using createMOI or changeMOIs operations as specified in 3GPP TS 28.532 [2]. Once the STM control object is created, it may be enabled or disabled by the STM Management Consumer.

NOTE: The STM control objects can be also preconfigured, as per MNO decision.

If the STM control object is enabled by the STM Management Consumer, the STM Data Producer shall start reporting the signalling messages according to the STM control object definition. The enablement operation may be invoked by the STM Management Consumer using changeMOI containing only the enablement attribute.

If the STM control object is disabled by the STM Management Consumer, the reporting of the signalling messages shall be stopped. The disablement operation may be invoked by the STM Management Consumer using changeMOI containing only the disablement attribute, without STM control object deletion.

If the STM Management Consumer is located in the external monitoring system, it may be only allowed to perform enabling and disabling operation on the STM control object.

The deletion operation is invoked by STM Management Consumers to request a STM Management Producer to remove one or more STM control objects using deleteMOI or changeMOIs operations as specified in 3GPP TS 28.532 [2]. Upon successful removal of the STM control objects, the STM Data Producer shall stop reporting any signalling traffic.

The STM provision operations shall be secured according to 3GPP TS 33.501 [4].

## 5.3 STM Streaming

STM reporting consists of STM signalling message copies that shall be output to streams. The STM Data Consumer URI is provided by a STM Management Consumer to indicate where the STM report shall be streamed to.

In case of a failure to report the requested signalling protocol messages, a STM administrative message may be sent to the STM Data Consumer.

The STM streaming service shall be secured according to 3GPP TS 33.501 [4].

# 6 Signalling traffic monitoring management Information Model (stage 2)

## 6.1 Imported and associated information entities

### 6.1.1 Imported information entities and local labels

|  |  |
| --- | --- |
| Label reference | Local label |
| 3GPP TS 28.622 [5], IOC, SubNetwork | SubNetwork |
| 3GPP TS 28.622 [5], IOC, ManagedElement | ManagedElement |
| 3GPP TS 28.622 [5], IOC, ManagedFunction | ManagedFunction |

### 6.1.2 Class diagram

#### 6.1.2.1 Relationships

This clause provides the overview of the relationships of relevant classes in UML. Subsequent clauses provide more detailed specification of various aspects of these classes. The following figure shows the containment/naming hierarchy and the associations of the classes defined in the present document.

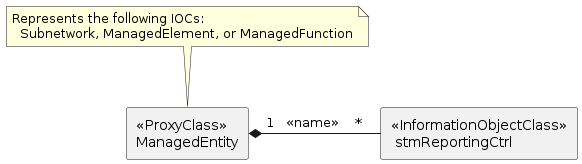


Figure 6.1.2.1-1: STM control NRM fragment

#### 6.1.2.2 Inheritance

This clause depicts the inheritance relationships.



Figure 6.1.2.2-1: STM control NRM inheritance relationships

## 6.2 Class definitions

### 6.2.1 StmCtrl <<IOC>>

#### 6.2.1.1 Definition

This IOC represents STM jobs. It can be name-contained by SubNetwork, ManagedElement, or ManagedFunction.

reportingNFList specifies the network function whose signalling traffic is to be monitored. If this parameter is not present or it is empty, then all Network Functions within the SubNetwork or ManagedElement shall be monitored. This parameter shall be omitted if the STM control object is specified under a ManagedFunction.

networkInterfaceList specifies the target network interfaces to be monitored. If this parameter is not present or it is empty, then all applicable interfaces from the target NF shall be monitored.

stmTargetUri is the URI of the STM consumer that shall receive the monitored signalling message copies.

administrativeState is used by the STM consumer to lock or unlock the StmCtrl instance in order to stop or start the signalling traffic monitoring.

operationalState is used by STM consumer to report its working state.

#### 6.2.1.2 Attributes

The StmCtrl IOC includes attributes inherited from Top IOC (defined in 3GPP TS 28.622 [5] subclause 4.3.29) and the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable | isWritable | isInvariant | isNotifyable |
| reportingNFList | CM | T | T | F | T |
| targetInterfaceInfoList | M | T | T | F | T |
| stmTargetUri | M | T | T | T | T |
| administrativeState | M | T | T | F | T |
| operationalState | M | T | F | F | T |

#### 6.2.1.3 Attribute constraints

None.

#### 6.2.1.4 Notifications

The common notifications defined in 3GPP TS 28.622 [5] subclause 4.5 are valid for this IOC, without exceptions or additions.

### 6.2.2 NetworkInterface <<dataType>>

#### 6.2.2.1 Definition

This defines the network interface for which signalling traffic messages are to be copied and sent to the external entity.

The attribute networkInterfaceType specifies the network interface type to be monitored. The optional attribute networkInterfaceInstanceList specifies the network interface instances to be monitored. It is a list of applicable network interface instances of the network interface type specified by networkInterfaceType. The optional attribute serviceOperationList specifies the service operations to be monitored. It is a list of applicable service operations exchanged over the network interface instances specified by networkInterfaceInstanceList, or, if networkInterfaceInstanceList is not present, it is list of applicable service operations exchanged over the network interface type specified by networkInterfaceType.

#### 6.2.2.2 Attributes

The NetworkInterface data type contains the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable | isWritable | isInvariant | isNotifyable |
| networkInterfaceType | M | T | T | F | T |
| networkInterfaceInstanceList | O | T | T | F | T |
| serviceOperationList | O | T | T | F | T |

#### 6.2.2.3 Attribute constraints

None.

#### 6.2.2.4 Notifications

The common notifications defined in 3GPP TS 28.622 [5] subclause 4.5 are valid for this IOC, without exceptions or additions.

## 6.3 Attribute definitions

### 6.3.1 Attribute properties

The following table defines the properties of attributes specified in the present document.

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| reportingNFList | List of Network Function Distinguished Name.  allowedValues: N/A | Type: DN  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| targetInterfaceInfoList | List of network interfaces to be monitored. | Type: NetworkInterface  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| networkInterfaceType | The network interface type to be monitored.  The applicable network interface type names are specified based on subclause 4.2.3 of 3GPP TS 23.501 [7] and clause 4.2.1 of 3GPP TS 23.273 [15]. The value "ALL" is specified for the case if all the applicable interface type of the network function shall be monitored.  allowedValues: ALL, N2, N4, N5, N7, N8, N10, N11, N12, N13, N14, N15, N16, N17, N18, N20, N21, N22, N23, N26, N28, N29, N30, N33, N34, N35, N36, N37, N40, N41, N42, N51, N52, N58, N59, N60, N61, N62, N63, N80, N81, N82, N83, N84, N85, N86, N87, N88, N89, N96, NL1, NL2, NL5, NL6, NL8, NL9. | Type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: False  defaultValue: ALL  isNullable: False |
| networkInterfaceInstanceList | The list of applicable network interface instances, for which the monitoring is to be performed, of the network interface type specified by networkInterfaceType.  allowedValues: DN of MOIs of the following endpoints IOCs as specified in subclause 5.2.1 of 3GPP TS 28.541 [14]:  EP\_N2, EP\_N4, EP\_N5, EP\_N7, EP\_N8, EP\_N10, EP\_N11, EP\_N12, EP\_N13, EP\_N14, EP\_N15, EP\_N16, EP\_N17, EP\_N18, EP\_N20, EP\_N21, EP\_N22, EP\_N23, EP\_N26, EP\_N28, EP\_N29, EP\_N30, EP\_N33, EP\_N34, EP\_N35, EP\_N36, EP\_N37, EP\_N40, EP\_N41, EP\_N42, EP\_N51, EP\_N52, EP\_N58, EP\_N59, EP\_N60, EP\_N61, EP\_N62, EP\_N63, EP\_N80, EP\_N81, EP\_N82, EP\_N83, EP\_N84, EP\_N85, EP\_N86, EP\_N87, EP\_N88, EP\_N89, EP\_N96, EP\_NL1, EP\_NL2, EP\_NL5, EP\_NL6, EP\_NL8, EP\_NL9. | Type: DN  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| serviceOperationList | The list of applicable service operations, exchanged over the network interface instances specified by networkInterfaceInstanceList, that needs to be monitored Or,  If networkInterfaceInstanceList is not present, the list of applicable service operations exchanged over the network interface type specified by networkInterfaceType, that needs to be monitored  allowedValues: refer to subclause 5.2 of 3GPP TS 23.502 [16]. | Type: String  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| stmTargetUri | It specifies the Uniform Resource Identifier (URI) of the streaming target where the signalling traffic shall be sent. The detailed URI structure is defined in clause 4.4 of 3GPP TS 32.158 [6]. | type: Uri  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| administrativeState | Administrative state of a managed object instance. The administrative state describes the permission to use or prohibition against using the object instance. The administrative state is set by the STM consumer.  allowedValues: LOCKED, UNLOCKED. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: LOCKED  isNullable: False |
| operationalState | Operational state of manged object instance. The operational state describes if an object instance is operable ("ENABLED") or inoperable ("DISABLED"). This state is set by the object instance or the STM producer and is hence READ-ONLY.  allowedValues: ENABLED, DISABLED. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: DISABLED  isNullable: False |

## 6.4 Common notifications

This clause presents a list of notifications, defined in 3GPP TS 28.533 [3], that a STM consumer can receive.

| Name | S | Notes |
| --- | --- | --- |
| notifyMOICreation | O |  |
| notifyMOIDeletion | O |  |
| notifyMOIAttributeValueChanges | O |  |
| notifyMOIChanges | O |  |

# 7 Management services for Signalling traffic monitoring management (stage 3)

## 7.1 Reporting format

### 7.1.1 Protocol

The STM report shall be sent as payload on either UDP or TCP transport protocols based on operator's policy.

### 7.1.2 Format of the STM reports

#### 7.1.2.0 General

The STM report may be formatted based on operator policy by UDP – GRE – PCAPNG encapsulation or by a generic Type – Length – Value encoding.

#### 7.1.2.1 UDP-GRE-PCAPNG Encapsulation

Encoding of STM Payloads shall be performed using GRE in UDP Encapsulation as specified in IETF RFC 8086 [8]. The packet is encapsulated as IP header, UDP header, GRE header, and STM Payload.

The encapsulated STM Payload is shown in figure 7.1.2-1.

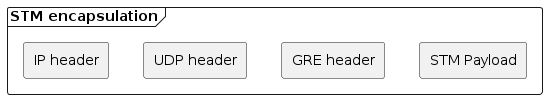


Figure 7.1.2.1-1: STM encapsulation

The STM payload contains the PCAPNG header and payload (IETF draft-ietf-opsawg-pcapng-04 [9]). The PCAPNG payload contains the collected signalling messages. The STM payload has following attributes, as specified in the table 7.1.2.1-1.

Table 7.1.2.1-1: STM Payload

|  |  |
| --- | --- |
| STM Payload attribute name | Description |
| PCAPNG Header (M) | The received HTTP header of the collected signalling message, over the service-based interfaces, as defined in subclause 5.2 of 3GPP TS 29.500 [12]. See Note 1. or The received PFCP message header of the collected signalling message, over the N4 reference point, as defined in subclause 5.2.2.3 of 3GPP TS 29.244 [13]. See Note 2. |
| PCAPNG Payload (M) | The collected signalling messages.  The collected signalling message is sent before security encapsulation, or received after security decapsulation. |
| Note 1: the PCAPNG header shall include the received 3gpp-sbi-nf-peer-info.  Note 2: the the PCAPNG header shall include the PFCP Entity which is the endpoint in a CP (or UP) function supporting PFCP, that is identified by the IP address. | |

#### 7.1.2.2 Generic Type – Length- Value encoding

Depending on operator policy the STM payload shall be transferred over UDP or TCP.

The STM payload is formatted as generic Type - Length - Value (TLV) encoding.

Each message starts with four bytes protocol ID, followed by two bytes to indicate the number of bytes of the whole message (including protocol ID and length). The rest of the message consists of a non-empty list of data chunks.

Each data chunk is composed by a chunk type, the total lengths of the chunk, and the payload of the chunk.

Each chunk type reflects an information element that is used by the various signalling protocols on the different protocol layers.

NOTE: In this release of the specification there is no defined format for Type-Length-Value encoding and it is considered informative.

## 7.2 YANG Definitions

The present clause contains the YANG definitions for the STM NRM.

The Information Service (IS) of the STM NRM is defined in subclause 6.2.

Mapping rules to produce the YANG definition based on the IS are defined in 3GPP TS 32.160 [10].

YANG definitions are specified in 3GPP Forge, refer to clause 4.4 of TS 28.623 [11] for the Forge location.

Directory: yang-models

Files: \_3gpp-stm-nrm-stmfunction.yang

Annex A (informative):  
Use Cases

# A.1  Signalling Monitoring Activation

External monitoring systems are often used by mobile network operators (MNOs) to track network activity for analysis and troubleshooting purposes, and subsequently to perform diagnosis and analysis of their system. Such monitoring system(s) are fully under the control of the MNOs, and the monitoring is performed at signalling level.

The goal of this use case is to enable the authorized consumer (signalling monitor consumer) to activate the streaming of packets from a specific NF or entity acting on behalf of the NF (signalling monitor producer) for a list of network interface type and applicable interface instances and service operations. In this activation it will be requested the desired reliability for the streaming of the signalling traffic, along with the targeted interface(s).

# A.2  Signalling Monitoring Termination

Once the signalling traffic monitoring is not needed anymore it needs to be possible to stop the streaming of signalling traffic. The goal of this use case is to enable the authorized consumer (signalling monitoring consumer) to request a specified NF to terminate the streaming of signalling traffic.

# A.3  Signalling Traffic Monitoring Streaming

For the signalling traffic to be sent to a signalling monitor consumer it needs to be streamed by the signalling monitor producer. The signalling traffic streams will be transported in a reliable or unreliable way depending on the request at the time of activation.

Annex B (informative):  
Plant UML source code

# B.1 STM architecture

The following PlantUML source code is used to describe STM architecture. As depicted by Figure 5.1-1:

@startuml

frame "Signalling Traffic Monitoring System" as STMsystem {

  frame  "STM management" as Zone2 {

    rectangle "STM Management Consumer" as STMConsumer1 #whitesmoke

  }

  frame "STM collection" as Zone3 {

    rectangle "STM Data Consumer" as STMConsumerURI #whitesmoke

  }

}

frame "5GC" as Zone1 {

  rectangle "5G NF" as NF1 #lightgrey {

    rectangle "STM Management Producer" as STMProducer2 #ivory

    rectangle "STM Data Producer" as STMProducer1 #ivory

  }

}

STMConsumer1 <-> STMProducer2  : <&lock-locked>Configuration/Enabling

STMConsumer1 -[hidden]- STMConsumerURI

STMProducer1 => STMConsumerURI: <&lock-locked>Streaming Reporting

STMProducer1 . STMProducer2

@enduml

# B.2 STM architecture

The following PlantUML source code is used to describe STM architecture. As depicted by Figure 5.1-2:

@startuml

frame "Signalling Traffic Monitoring System" as STMsystem {

  frame  "STM management" as Zone2 {

    rectangle "STM Management Consumer" as STMConsumer1 #whitesmoke

  }

  frame "STM collection" as Zone3 {

    rectangle "STM Data Consumer" as STMConsumerURI #whitesmoke

  }

}

frame "5GC" as Zone1 {

  together {

    rectangle "5G NF" as NF2 #lightgrey

    rectangle "STM Data Producer" as STMProducer2 #ivory

    rectangle "STM Management Producer" as STMProducer1 #ivory

  }

}

STMConsumer1 -[hidden]-- STMConsumerURI

STMProducer2 ~ NF2

STMProducer1 ~ NF2

STMProducer1 -[hidden]- STMProducer2

STMConsumer1 <--> STMProducer1 : <&lock-locked>Configuration/Enabling

STMProducer2 ==> STMConsumerURI : <&lock-locked>Streaming Reporting

@enduml

# B.3 STM control NRM fragment

The following PlantUML source code is used to describe STM control NRM fragment. As depicted by Figure 6.1.2.1-1:

@startuml

rectangle "<<InformationObjectClass>>\n stmReportingCtrl" as stmReportingCtrl

rectangle "<<ProxyClass>>\nManagedEntity" as ManagedElement

stmReportingCtrl -left-\* ManagedElement : 1   <<name>>    \*

note top of ManagedElement

  Represents the following IOCs:

    Subnetwork, ManagedElement, or ManagedFunction

end note

@enduml

# B.4 STM control NRM inheritance relationships

The following PlantUML source code is used to describe STM control NRM inheritance relationships. As depicted by Figure 6.1.2.2-1:

@startuml

skinparam defaultTextAlignment center

rectangle "<<InformationObjectClass>>\n//Top//" as top

rectangle "<<InformationObjectClass>>\nstmReportingCtrl" as stm

top <|-- stm

@enduml

# B.5 STM encapsulation

The following PlantUML source code is used to describe STM encapsulation. As depicted by Figure 7.1.2-1:

@startuml

frame "STM encapsulation" {

rectangle "GRE header" as GRE

rectangle "STM Payload" as Payload

rectangle "UDP header" as UDP

rectangle "IP header" as IP

IP-[hidden]>UDP

UDP-[hidden]>GRE

GRE-[hidden]>Payload

}

@enduml

Annex C (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Change history | | | | | | | |
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
| 2024-10 | SA5#157 | S5-245983 | - | - | - | Initial skeleton (v0.0.0) | 0.0.0 |
| 2024-10 | SA5#157 | S5-245986 |  |  |  | pCR of draft TS28.abc Stage 1 skeleton | 0.1.0 |
| 2024-10 | SA5#157 | S5-245987 |  |  |  | pCR of draft TS28.abc Stage 2 skeleton | 0.1.0 |
| 2024-10 | SA5#157 | S5-245988 |  |  |  | pCR of draft TS28.abc Stage 3 skeleton | 0.1.0 |
| 2024-10 | SA5#157 | S5-245984 |  |  |  | pCR of draft TS28.abc Introduction | 0.1.0 |
| 2024-10 | SA5#157 | S5-245985 |  |  |  | pCR of draft TS28.abc Scope | 0.1.0 |
| 2024-10 | SA5#157 | S5-245989 |  |  |  | pCR of draft TS28.abc Stage 1 requirements | 0.1.0 |
| 2024-11 | SA5#158 | S5-247351 |  |  |  | Rel-19 pCR TS 28.abc Add introduction | 0.2.0 |
| 2024-11 | SA5#158 | S5-247072 |  |  |  | Signalling traffic monitoring Abbreviations of the drafted TS28.abc | 0.2.0 |
| 2024-11 | SA5#158 | S5-247074 |  |  |  | Signalling traffic monitoring management operations of the drafted TS28.abc | 0.2.0 |
| 2024-11 | SA5#158 | S5-247075 |  |  |  | Signalling traffic monitoring management NRM of the drafted TS28.abc | 0.2.0 |
| 2024-11 | SA5#158 | S5-247359 |  |  |  | Signalling traffic monitoring Report Format of the drafted TS28.abc | 0.2.0 |
| 2024-11 | SA5#158 | S5-247073 |  |  |  | Rel-19 pCR TS 28.abc Clarify requirements for controlling the monitoring of signalling | 0.2.0 |
| 2024-11 | SA5#158 | S5-247077 |  |  |  | Signalling traffic monitoring management NRM stage 3 of the drafted TS28.abc | 0.2.0 |
| 2024-11 | SA5#158 | Forge |  |  |  | Originally based on MR <https://forge.3gpp.org/rep/sa5/MnS/-/merge_requests/1524> |  |
| 2024-12 |  |  |  |  |  | editHelp's cleanup | 0.2.1 |
| 2024-12 | SA#106 | SP-241610 |  |  |  | Presented at SA#105 for Information and Approval | 1.0.0 |
| 2024-12 | SA#106 | SP-241951 |  |  |  | TS number added | 2.0.0 |
| 2024-12 | SA#106 |  |  |  |  | Upgrade to change control version | 19.0.0 |
| 2025-01 | SA#106 |  |  |  |  | Adding the YANG file as an attachment | 19.0.1 |
| 2025-03 | SA#107 | SP-250180 | 0001 | 1 | F | Rel-19 CR 28560-j00 Corrections according to Edit Helpdesk | 19.1.0 |
| 2025-06 | SA#108 | SP-250559 | 0003 | 1 | F | Rel-19 CR TS 28.560 Corrections on PCAPNG header | 19.2.0 |
| 2025-06 | SA#108 | SP-250539 | 0005 | 1 | D | Removal of already addressed Editor's Note | 19.2.0 |
| 2025-06 | SA#108 | SP-250539 | 0007 | 1 | C | Removal of Editor's Note on encoding | 19.2.0 |
| 2025-06 | SA#108 | SP-250539 | 0008 | 1 | F | Correction of the description of the attribute stmTargetUri | 19.2.0 |
| 2025-06 | SA#108 | SP-250539 | 0009 | 2 | C | Rel-19 CR TS 28.560 Corrections on STM NRM | 19.2.0 |
| 2025-06 | SA#108 | SP-250539 | 0010 |  | C | Rel-19 CR 28.560 Rename YANG module for stmfunction | 19.2.0 |