**3GPP SA3LI#81e-b *S3i210326***

**eMeeting, 19-21 May 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **33.128** | **CR** | **0200** | **rev** | **1** | **Current version:** | **16.6.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | LI state transfers in SMF sets | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | SA3LI (PIDS) | | | | | | | | | |
| ***Source to TSG:*** | SA3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LI16 | | | | |  | ***Date:*** | | | 2021-05-19 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | SMF sets share SM context information and together handle PDU sessions for a group of users. The same PDU session can be managed by different SMs, requiring the TF in the SMF sets to share LI state information. The behaviour of LI functions in SMF sets is currently undefined and can violate LI requirements. This might also be an issue for other LI functions in the future. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Define LI\_ST and use of LISSF | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Implementation of LI for SMF sets remains undefined and confusing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.3, 4.2, 5.X, 6.2.3.X, Annex X | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 33.127 CR 0126 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

-----------------------FIRST CHANGE------------------------

# 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".

[3] 3GPP TS 33.126: "Lawful Interception Requirements".

[4] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[5] 3GPP TS 33.127: "Lawful Interception (LI) Architecture and Functions".

[6] ETSI TS 103 120: " Lawful Interception (LI); Interface for warrant information".

[7] ETSI TS 103 221-1: "Lawful Interception (LI); Internal Network Interfaces; Part 1: X1".

[8] ETSI TS 103 221-2: "Lawful Interception (LI); Internal Network Interfaces; Part 2: X2/X3".

[9] ETSI TS 102 232-1: "Lawful Interception (LI); Handover Interface and Service-Specific Details (SSD) for IP delivery; Part 1: Handover specification for IP delivery".

[10] ETSI TS 102 232-7: "Lawful Interception (LI); Handover Interface and Service-Specific Details (SSD) for IP delivery; Part 7: Service-specific details for Mobile Services".

[11] 3GPP TS 33.501: "Security Architecture and Procedures for the 5G System".

[12] 3GPP TS 33.108: "3G security; Handover interface for Lawful Interception (LI)".

[13] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS)".

[14] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General Aspects".

[15] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane nodes".

[16] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[17] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[18] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".

[19] 3GPP TS 23.003: "Numbering, addressing and identification ".

[20] OMA-TS-MLP-V3\_5-20181211-C: "Open Mobile Alliance; Mobile Location Protocol, Candidate Version 3.5", <https://www.openmobilealliance.org/release/MLS/V1_4-20181211-C/OMA-TS-MLP-V3_5-20181211-C.pdf>.

[21] 3GPP TS 29.540: "5G System; SMS Services; Stage 3".

[22] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[23] 3GPP TS 38.413: "NG Application Protocol (NGAP)".

[24] 3GPP TS 29.572: "Location Management Services; Stage 3".

[25] 3GPP TS 29.503: "5G System; Unified Data Management Services".

[26] IETF RFC 815: "IP datagram reassembly algorithms".

[27] IETF RFC 2460: "Internet Protocol, Version 6 (IPv6) Specification".

[28] IETF RFC 793: "Transmission Control Protocol".

[29] IETF RFC 768: "User Datagram Protocol".

[30] IETF RFC 4340: "Datagram Congestion Control Protocol (DCCP)".

[31] IETF RFC 4960: "Stream Control Transmission Protocol".

[32] IANA (www.iana.org): Assigned Internet Protocol Numbers, "Protocol Numbers".

[33] IETF RFC 6437: "IPv6 Flow Label Specification".

[34] IETF RFC 791: "Internet Protocol".

[35] Open Geospatial Consortium OGC 05-010: "URNs of definitions in ogc namespace".

[36] 3GPP TS 33.107: "3G security; Lawful interception architecture and functions".

[37] 3GPP TS 37.340: "Evolved Universal Radio Access (E-UTRA) and NR-Multi-connectivity; Stage 2".

[38] 3GPP TS 36.413: "S1 Application Protocol (S1AP)".

[39] OMA-TS-MMS\_ENC-V1\_3-20110913-A: "Multimedia Messaging Service Encapsulation Protocol".

[40] 3GPP TS 23.140: "Multimedia Messaging Protocol. Functional Description. Stage 2".

[41] 3GPP TS 38.415: "NG-RAN; PDU Session User Plane Protocol".

[42] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2".

[43] IETF RFC 4566: "SDP: Session Description Protocol".

[44] 3GPP TS 24.193: "Stage 3: Access Traffic Steering, Switching and Splitting (ATSSS)".

[45] 3GPP TS 29.509: "5G System; Authentication Server Services; Stage 3".

[46] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[47] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[48] 3GPP TS 29.504: "5G System; Unified Data Repository Services; Stage 3".

[49] 3GPP TS 29.505: "5G System; Usage of the Unified Data Repository services for Subscription Data; Stage 3".

[X] 3GPP TS 29.598: "5G System; Unstructured Data Storage Services; Stage3".

-----------------------SECOND CHANGE------------------------

## 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].

ADMF LI Administration Function

CC Content of Communication

CSP Communication Service Provider

CUPS Control and User Plane Separation

IRI Intercept Related Information

LALS Lawful Access Location Services

LEA Law Enforcement Agency

LEMF Law Enforcement Monitoring Facility

LI Lawful Interception

LICF Lawful Interception Control Function

LI\_HI1 LI\_Handover Interface 1

LI\_HI2 LI\_Handover Interface 2

LI\_HI3 LI\_Handover Interface 3

LI\_HI4 LI\_Handover Interface 4

LIPF Lawful Interception Provisioning Function

LIR Location Immediate Request

LI\_SI Lawful Interception System Information Interface

LISSF Lawful Interception State Storage Function

LI\_ST Lawful Interception State Transfer Interface

LI\_X1 Lawful Interception Internal Interface 1

LI\_X2 Lawful Interception Internal Interface 2

LI\_X3 Lawful Interception Internal Interface 3

LTF Location Triggering Function

MDF Mediation and Delivery Function

MDF2 Mediation and Delivery Function 2

MDF3 Mediation and Delivery Function 3

MM Multimedia Message

MMS Multimedia Message Service

NPLI Network Provided Location Information

O&M Operations and Management

POI Point Of Interception

SIRF System Information Retrieval Function

SOI Start Of Interception

TF Triggering Function

xCC LI\_X3 Communications Content.

xIRI LI\_X2 Intercept Related Information

------------------------THIRD CHANGE-----------------------

## 4.2 Basic principles for internal interfaces

This clause lists the internal interfaces shown in clause 4.1, indicates the protocol used to realise each interface, and gives a reference to the relevant clauses of the present document that specify how the protocol is to be used for the given interface.

Table 4.2-1: Internal interfaces and related protocols

|  |  |  |  |
| --- | --- | --- | --- |
| Interface | Description | Protocol used to realise interface | Usage |
| LI\_SI | Used to provide system information to the LIPF from the SIRF. | Out of scope of the present document. |  |
| LI\_X1 | Used to configure and audit Directly-provisioned POIs, TFs and MDFs. | ETSI TS 103 221-1 [7]. | See clause 5.2.2 |
| LI\_X1 (Management) | Used to audit Triggered POIs. | ETSI TS 103 221-1 [7]. | See clause 5.2.3 |
| LI\_X2 | Used to pass xIRI from IRI-POIs to the MDF2. | ETSI TS 103 221-2 [8]. | See clause 5.3.2 |
| LI\_X3 | Used to pass xCC from CC-POIs to the MDF3. | ETSI TS 103 221-2 [8]. | See clause 5.3.3 |
| LI\_T2 | Used to pass triggering information from the IRI-TF to a Triggered IRI-POI. | ETSI TS 103 221-1 [7]. | See clause 5.2.4 |
| LI\_T3 | Used to pass triggering information from a CC-TF to a Triggered CC-POI. | ETSI TS 103 221-1 [7]. | See clause 5.2.4 |
| LI\_XQR | Used to pass queries from IQF to ICF and responses from ICF to IQF. | ETSI TS 103 221-1 [7]. | See clause 5.8 |
| LI\_XER | Used to pass identifier association event records from IEFs to ICF. | See Clause 5.9. | See clause 5.9 |
| LI\_XEM1 | Used by the LICF/LIPF to manage IEFs and ICF. | ETSI TS 103 221-1 [7]. | See clause 5.2.7 |
| LI\_ADMF | Used to pass intercept provisioning information form the LICF to the LIPF. | Out of scope of the present document. |  |
| LI\_MDF | Used by MDF2 and MDF3 in interactions necessary to correctly generate CC and IRI from xCC and xIRI. | Out of scope of the present document. |  |
| LI\_IQF | Used to pass information related to IEFs and ICF to IQF. | Out of scope of the present document. |  |
| LI\_ST | Used to transfer LI state information to and from the LISSF | 3GPP TS 29.598 [X] | See clauses 5.X and 6.2.3.X |

----------------------- FOURTH CHANGE-----------------------

## 5.X Protocols for LI\_ST interface

### 5.X.1 Overview

LI\_ST shall be realised using a dedicated separate instance of the Nudsf\_DataRepository service as defined in TS 29.598 [X] subject to the following terms.

The LISSF shall adopt the role of the NF Service Provider as described in TS 29.598 [X] clause 5.2.1. The LISSF may be realised as a standalone function or within the ADMF. In either case it shall meet the requirements set out in TS 33.127 [5] clause 6.2.X.

An LI function may only store state over LI\_ST using an LISSF identified by the LIPF via LI\_X0. The LIPF shall provide the necessary details for connection, including the relevant apiRoot, apiVersion, realmId and storageId values (see TS 29.598 [X] clause 6.1.3.1) and any necessary keys for authentication.

### 5.X.2 Storage

When an LI function wishes to store LI state in the LISSF, it shall perform the Record Create service operation as described in TS 29.598 [X] clause 5.2.2.3.1. Unless otherwise specified, the recordId shall be a randomly-assigned UUID. The record metadata shall include at least the following information as tag value pairs (see TS 29.598 [X] clause 6.1.6.2.3)

Table 5.X.2-1: Minimum information elements for RecordMeta structure

|  |  |  |
| --- | --- | --- |
| Field Name | Description | M/C/O |
| NFInstanceID | The NF instance ID associated with the NF in which the LI function is located, if applicable (see TS 29.571 [17] clause 5.3.2. | C |
| NEID | The LI\_X1 identifier associated with the LI function | M |
| XID | XID for the Task that the state is associated with, if applicable | C |
| DID | DID for the Destination that the state is associated with, if applicable | C |

Further details on the contents of the Record Blocks is given in the relevant clauses.

The LIPF shall always be able to store records in the LISSF.

### 5.X.3 Retrieval

When an LI function wishes to retrieve records from the LISSF and knows the RecordID of the relevant state information, it shall perform a Record Retrieval operation as described in TS 29.598 [X] clause 5.2.2.2.2. If the LI function does not know the RecordID, it shall perform a search as described in TS 29.598 [X] clause 5.2.2.2.6 using appropriate search criteria. The details for choosing search criteria are specific to each LI function and are therefore given in later clauses specific to that LI function.

The LIPF shall always be able to retrieve records from the LISSF.

### 5.X.4 Removal

When an LI function wishes to remove records from the LISSF, it shall perform a Record Delete service operation as described in TS 29.598 [X] clause 5.2.2.5.

The LIPF shall always be able to remove records from the LISSF.

------------------------ FIFTH CHANGE----------------------

#### 6.2.3.X Sharing LI state information over LI\_ST

##### 6.2.3.X.1 Overview

TFs in SMFs in SMF sets need to share LI state information to avoid losing track of the XIDs and CorrelationIDs used in the tasks activated in the POI in the UPF when the triggered task control is transferred from one TF to another.

POIs in SMFs in SMF sets need to share LI state information to avoid losing track of the CorrelationIDs and sequence numbers used in the generation of xIRI when the interception is moved to another POI in the same SMF set.

The LIPF may request, store or remove any LI state records at any moment. The LIPF may revoke the credentials of any LI function to use the LI\_ST function via LI\_X0.

##### 6.2.3.X.2 Storing LI state

The TF in the SMF shall store the LI state (related to a task active in the UPF POI) in the LISSF whenever the parent SMF stores session state for the relevant PDU session in the UDSF and whenever the parent SMF sends session state for the relevant PDU session to another SMF.

The POI in the SMF shall store the LI state (related to a task active in the SMF POI) in the LISSF whenever the parent SMF stores session state for the relevant PDU session in the UDSF and whenever the parent SMF sends session state for the relevant PDU session to another SMF.

When storing state, the LI function in the SMF shall use the state storage procedure specified in clause 5.X.2. During this procedure, the LI function shall add the following metadata to the RecordMeta for the record.

Table 6.2.3.X.2-1: Additional metadata for the RecordMeta

|  |  |  |
| --- | --- | --- |
| Field Name | Description | M/C/O |
| PDUSessionID | Identifier for the PDU session related to task. | M |
| UDSFRecordID | The recordID used by the parent SMF to store the associated SMF session information in the UDSF | M |
| LIStateRecordType | Identifier for the record type which can be "TFLIState" or "POILIState" | M |

The TF shall store the following information as the first record block (see TS 29.598 [X] clause 6.1.3.3.3.2), encoded as XML following the XSD schema given in Annex X.

Table 6.2.3.X.2-2: TFLIState structure for storing TF state information in the LISSF

|  |  |  |
| --- | --- | --- |
| Field Name | Description | M/C/O |
| PDUSessionID | Identifier for the PDU session related to task. | M |
| XID | XID of the Task Object associated with the interception at the TF | M |
| CorrelationID | Correlation ID to assign to interception product generated by the POI in the UPF. | M |
| TriggeredTasks | Collection of information about Tasks that the TF has activated in triggered functions due to interception for this session. As a list of TriggeredTask, see Table 6.2.3-X3 below. | M |

Table 6.2.3.X.2-3: TriggeredTask

|  |  |  |
| --- | --- | --- |
| Field Name | Description | M/C/O |
| XID | XID of the Task Object associated with the interception at the triggered function | M |
| NEID | NEID used in LI\_T2/T3 communication by the triggered function | M |

The TF needs to specify the XID in order to avoid removing the LI state related to the same ProductID but a different task in the UPF POI, for example if there is more than one PDU session.

The SMF POI shall store the following information as the first record block (see TS 29.598 [X] clause 6.1.3.3.3.2), encoded as XML following the XSD schema given in Annex X.

Table 6.2.3.X.2-2: POILIState structure for storing POI state information in the LISSF

|  |  |  |
| --- | --- | --- |
| Field Name | Description | M/C/O |
| PDUSessionID | Identifier for the PDU session related to task. | M |
| XID | XID of the Task Object associated with the interception at the TF | M |
| SequenceNumber | Last sequence number used in the generation of xIRI | M |
| CorrelationID | Correlation ID to assign to interception product generated by the POI in the UPF. | M |

##### 6.2.3.X.3 Retrieving LI state

When the TF in an SMF in an SMF set is provisioned by the LIPF with a specific XID and access to an LISSF function, the TF shall use the LISSF to retrieve LI state information.

If the implementation of the SMF set does not ensure that active SM contexts are always present in some SMF of the SMF set, when a task previously provisioned by the LIPF in the TF is deactivated, the TF shall request the records associated to the XID (received from the LIPF) from the LISSF, by performing a search as described in clause 5.X.3, using the XID as a search criteria. If no records are found, the TF may assume that no previous interception has occurred and proceed accordingly.

When a TF detects that its parent SMF is retrieving state for a targetted PDU session from the UDSF, the TF shall request records associated with that PDU session from the LISSF by performing a search as described in clause 5.X.3 and using the UDSFRecordID used by the SMF as a search criteria. When a TF detects that its parent SMF is receiving state for a targetted PDU session from another SMF, the TF shall request records associated with that PDU session from the LISSF by performing a search as described in clause 5.X.3 and using the XID of the task related to the target of that PDU session. If no records are found, the TF may assume that no previous interception has occurred and proceed accordingly. Implementers should be aware that multiple records may be returned.

When an SMF POI detects that its parent SMF is retrieving state for a targetted PDU session from the UDSF, the POI shall request records associated with that PDU session from the LISSF by performing a search as described in clause 5.X.3 and using the UDSFRecordID used by the SMF as a search criteria. When an SMF POI detects that its parent SMF is receiving state for a targetted PDU session from another SMF, the SMF POI shall request records associated with that target PDU session from the LISSF by performing a search as described in clause 5.X.3 and using the XID of the task related to the target of that PDU session. If no records are found, the SMF POI may assume that no previous interception has occurred and proceed accordingly.

##### 6.2.3.X.4 Removing LI state

When a task is deactivated successfully in the UPF POI, the TF shall remove the LI state record from the LISSF as described in clause 5.X.4.

When a task is deactivated in the SMF POI, the POI shall remove the LI state record from the LISSF as described in clause 5.X.4.

------------------------- SIXTH CHANGE------------------------

Annex X (normative): XSD Schema for State Transfers

<?xml version="1.0" encoding="utf-8"?>

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"

           xmlns:etsiX1="http://uri.etsi.org/03221/X1/2017/10"

           xmlns="urn:3GPP:ns:li:3GPPStateTransfer:r16:v1"

           targetNamespace="urn:3GPP:ns:li:3GPPStateTransfer:r16:v1"

           elementFormDefault="qualified">

  <xs:import namespace="http://uri.etsi.org/03221/X1/2017/10"/>

  <xs:element name="TFLIState" type="TFLIState"></xs:element>

  <xs:complexType name="TFLIState">

    <xs:sequence>

      <xs:element name="PDUSessionID" type="PDUSessionID"></xs:element>

      <xs:element name="XID" type="etsiX1:XId"></xs:element>

      <xs:element name="CorrelationID" type="xs:nonNegativeInteger"></xs:element>

      <xs:element name="TriggeredTasks" type="ListOfTriggeredTasks"></xs:element>

    </xs:sequence>

  </xs:complexType>

 <xs:element name="POILIState" type="POILIState"></xs:element>

  <xs:complexType name="POILIState">

    <xs:sequence>

      <xs:element name="PDUSessionID" type="PDUSessionID"></xs:element>

      <xs:element name="XID" type="etsiX1:XId"></xs:element>

      <xs:element name="SequenceNumber" type="xs:unsignedInt"></xs:element>

      <xs:element name="CorrelationID" type="xs:nonNegativeInteger"></xs:element>

    </xs:sequence>

  </xs:complexType>

  <xs:complexType name="ListOfTriggeredTasks">

    <xs:sequence>

      <xs:element name="TriggeredTask" type="TriggeredTask" minOccurs="0" maxOccurs="unbounded"></xs:element>

    </xs:sequence>

  </xs:complexType>

  <xs:complexType name="TriggeredTask">

    <xs:sequence>

      <xs:element name="XID" type="etsiX1:XId"></xs:element>

      <xs:element name="NEID" type="etsiX1:NeIdentifier"></xs:element>

    </xs:sequence>

  </xs:complexType>

  <xs:simpleType name="PDUSessionID">

    <xs:restriction base="xs:unsignedInt">

      <xs:minInclusive value="0"/>

      <xs:maxInclusive value="255"/>

    </xs:restriction>

  </xs:simpleType>

</xs:schema>

--------------------THE END OF CHANGES--------------------