**3GPP TSG-SA3 Meeting #81-LI-e-b *s3i210341***

**Online, , 19th May 2021 - 21st May 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **33.127** | **CR** | **0129** | **rev** | **1** | **Current version:** | **16.7.0** |  |
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| *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:*** | Addition of TWIF and TNGF as Non-3GPP Accesses | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | SA3-LI (OTD, OFCOM(CH), Nokia, Nokia Shanghai Bell) | | | | | | | | | |
| ***Source to TSG:*** | SA3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LI16 | | | | |  | ***Date:*** | | | 2021-05-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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:*** | | Additional types of Non-3GPP access were defined in Release 16 with the addition of the TWIF and TNGF. The current version of TS 33.127 does not support these changes. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Addition of TWIF and TNGF to non-3GPP Access descriptions and diagrams. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | TS 33.127 will not align with other documents. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.3, 6.2.2.6, 6.2.2.7, 6.2.3.6, 6.2.5.6, A.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 33.127 CR 0130 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | TS 33.127 CR 0130 (TDoc s3i210342) is the Rel 17 Mirror to this document. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | S3i210341 | | | | | | | | |

\*\*\* Start of First 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].

5GC 5G Core Network

5GS 5G System

ADMF LI Administration Function

AMF Access and Mobility Management Function

AS Application Server

AUSF Authentication Server Function

BBIFF Bearer Binding Intercept and Forward Function

BSS Business Support System

CAG Closed Access Group

CC Content of Communication

CP Control Plane

CSI Cell Supplemental Information

CSP Communication Service Provider

CUPS Control and User Plane Separation

DN Data Network

DNAI Data Network Access Identifier

E-CSCF Emergency – Call Session Control Function

GPSI Generic Public Subscription Identifier

HMEE Hardware Mediated Execution Enclave

HR Home Routed

IBCF Interconnection Border Control Functions

ICF Identifier Caching Function

IEF Identifier Event Function

IMS-AGW IMS Access Gateway

IM-MGW IM Media Gateway

IP Interception Product

IQF Identifier Query Function

IRI Intercept Related Information

LALS Lawful Access Location Services

LBO Local Break Out

LEA Law Enforcement Agency

LEMF Law Enforcement Monitoring Facility

LI Lawful Interception

LI CA Lawful Interception Certificate Authority

LICF Lawful Interception Control Function

LI\_HI1 Lawful Interception Handover Interface 1

LI\_HI2 Lawful Interception Handover Interface 2

LI\_HI3 Lawful Interception Handover Interface 3

LI\_HI4 Lawful Interception Handover Interface 4

LI\_HIQR Lawful Interception Handover Interface Query Response

LIID Lawful Interception Identifier

LIPF Lawful Interception Provisioning Function

LIR Location Immediate Request

LI\_SI Lawful Interception System Information Interface

LI\_T1 Lawful Interception Internal Triggering Interface 1

LI\_T2 Lawful Interception Internal Triggering Interface 2

LI\_T3 Lawful Interception Internal Triggering Interface 3

LI\_X0 Lawful Interception Internal Interface 0

LI\_X1 Lawful Interception Internal Interface 1

LI\_X2 Lawful Interception Internal Interface 2

LI\_X3 Lawful Interception Internal Interface 3

LI\_X3A Lawful Interception Internal Interface 3 Aggregator

LI\_XEM1 Lawful Interception Internal Interface Event Management Interface 1

LI\_XER Lawful Interception Internal Interface Event Record

LI\_XQR Lawful Interception Internal Interface Query Response

LMF Location Management Function

LMISF LI Mirror IMS State Function

LMISF-CC LMISF for the handling of CC

LMISF-IRI LMISF for the handling of IRI

LTF Location Triggering Function

MA Multi-Access

MANO Management and Orchestration

MDF Mediation and Delivery Function

MDF2 Mediation and Delivery Function 2

MDF3 Mediation and Delivery Function 3

MRFP Multimedia Resource Function Processor

N9HR N9 Home Routed

N3IWF Non 3GPP Inter Working Function

NFV Network Function Virtualisation

NFVI Network Function Virtualisation Infrastructure

NFVO Network Function Virtualisation Orchestrator

NPLI Network Provided Location Information

NR New Radio

NRF Network Repository Function

NSSF Network Slice Selection Function

OSS Operations Support System

PAG POI Aggregator

PCF Policy Control Function

P-CSCF Proxy - Call Session Control Function

PEI Permanent Equipment Identifier

PGW PDN Gateway

PGW-U PDN Gateway User Plane

POI Point Of Interception

PLMN Public Land Mobile Network

PTC Push to Talk over Cellular

S8HR S8 Home Routed

SIRF System Information Retrieval Function

S-CSCF Serving - Call Session Control Function

SMF Session Management Function

SMSF SMS-Function

SUCI Subscriber Concealed Identifier

SUPI Subscriber Permanent Identifier

TF Triggering Function

TNGF Trusted Non-3GPP Gateway Function

TWIF Trusted WLAN Interworking Function

TrGW Transit Gateway

UDM Unified Data Management

UDR Unified Data Repository

UDSF Unstructured Data Storage Function

UPF User Plane Function

VNF Virtual Network Function

VNFC Virtual Network Function Component

xCC LI\_X3 Communications Content

xIRI LI\_X2 Intercept Related Information

\*\*\* Start of Change 2 of 5 \*\*\*

#### 6.2.2.6 Specific IRI parameters

The list of parameters in each xIRI are defined in TS 33.128 [15]. The following give a summary.

The registration xIRI shall include the following:

- Registration type information.

- Access type information.

- Requested slice information.

The deregistration xIRI shall include the following:

- UE initiated de-registration.

- Access type information.

- Network initiated de-registration.

The location update xIRI shall include the following:

- Location of the target UE (see clause 7.3).

The identifier association xIRI shall include the following:

- Subscription permanent identifier.

- Temporary identifier association (i.e. SUCI or 5G-GUTI).

- Association change type indication.

The start of interception with already registered UE xIRI shall include the following:

- Access type information.

- Requested slice information.

The unsuccessful communication attempt xIRI shall include the following:

- Rejected type of communication attempt.

- Access type information.

- Failure reason.

When the access type is non-3GPP, the IP address used by the UE to reach the N3IWF, TNGF or TWIF shall be reported. The port shall also be reported if available.

#### 6.2.2.7 Network topologies

The AMF shall provide the IRI-POI functions in the following network topology cases:

- Non-roaming case.

- Roaming case, in VPLMN.

- Roaming case, in HPLMN for non-3GPP access.

In a roaming case, it is possible that the target UE may use non-3GPP access with the N3IWF, TNGW or TWIF present in the HPLMN.

\*\*\* Start of Change 3 of 5 \*\*\*

#### 6.2.3.6 Network topologies

The SMF shall provide the IRI-POI functions in the following network topology cases:

- Non-roaming case.

- Roaming case, in VPLMN.

- Roaming case, in HPLMN.

- Non-3GPP access case, in the PLMN where N3IWF, TNGF or TWIF resides.

When the target UE has multiple PDU sessions active, the generation and delivery of xCC for each PDU session shall be done independently, each with separate correlation information.

When a target UE's PDU session involves multiple Data Network (DN) connections (i.e. multiple connections to the same DN as described in clause A.3 of the present document), the generation and delivery of xCC shall be done in such a way that:

- All applicable user plane packets are captured and delivered.

- Duplicate delivery of CC is suppressed to the extent possible.

- Each user plane packet is delivered with the associated DN Access Identifier (DNAI).

A PDU session may involve more than one UPFs. In that case, the CC-TF present in the SMF shall determine which UPF(s) is (are) more suitable to provide the CC-POI functions adhering to the above requirements. Furthermore, independent of which UPF is used to generate the xCC, the CC delivered from the MDF3 shall be correlated to the IRI messages related to the PDU session.

\*\*\* Start of Change 4 of 5 \*\*\*

#### 6.2.5.6 Network topologies

The SMSF shall provide the IRI-POI functions in the following network topology cases:

- Non-roaming case.

- Roaming case, in VPLMN.

NOTE: SMS message delivery over non-3GPP access with N3IWF, TNGF or TWIF in the HPLMN is considered a non-roaming case.

\*\*\* Start of Change 5 of 5 \*\*\*

Annex A (informative):  
5G LI network topology views

# A.1 Non-roaming scenario

## A.1.1 General

In a non-roaming scenario, the POIs present in the following NFs provide the LI functions:

- AMF.

- UDM.

- SMF.

- UPF.

- SMSF.

For the interception of PDU sessions, the EPC CUPS LI model is not extended to 5G where SMF and UPF are involved in delivering the xIRI and xCC associated with the PDU sessions.

NOTE: The above list of NFs that provide the POI functions may have to be expanded once a deployment scenario for such a case is defined in the normative part of the present document.

## A.1.2 Service-based representation with point-to-point LI system

The overall network configuration for 5G in a non-roaming scenario with the LI aspects is shown in figure A.1-1 using the service-based representation (as shown in TS 23.501 [2]) with the use of point-to-point LI system.

Figure A.1-1: Network topology showing LI for 5G (service-based representation) with point-to-point LI system

Figure A.1-1 shows the network topology of 5G system in a service-based representation, however, all the LI-related interfaces remain to be point-to-point.

The IRI-POIs present in the AMF, UDM, SMF and SMSF deliver the xIRI to the MDF2 and CC-POI present in the UPF delivers the xCC to the MDF3. The MDF3 address to CC-POI present in UPF is provided by the CC-TF present in the SMF over LI\_T3 reference point.

The LIPF present in the ADMF provisions the IRI-POIs and the CC-TF present in the NFs with the intercept related data. The LI\_X1 interfaces between the LIPF and the UPF is to monitor the user plane data.

# A.2 Interworking with EPC/E-UTRAN

## A.2.1 General

In EPC/E-UTRAN, the NFs that provide the POI functions are:

- MME.

- SGW.

- PGW (optional).

- HSS.

In a 5GS, the NFs that provide the POI functions are:

- AMF.

- SMF/UPF.

- UDM.

- SMSF.

In an interworking scenario between the EPC and the 5GS, the AMF in 5GS and MME in EPC provide the IRI-POI functions for the related attach/registration related aspects. When the network topology includes SMF + PGW-C and UPF + PGW-U as the interworking NFs, it is recommended that these provide the POI functions for the PDU sessions as the target communication traffic coming from either of the two interworking networks pass through these NFs. In that case, the interception at the SGW and UPF (if present between the NG-RAN and the UPF + PGW-U) is not required unless the condition specified in NOTE in clause A.2.2 applies.

In a non-roaming scenario, the IRI-POI present in the HSS + UDM also provide the LI functions. The IRI-POI present in the SMSF provides the LI functions for the SMS-related IRI events.

## A.2.2 Topology view for a non-roaming scenario

The overall network configuration for interworking between EPC-EUTRAN and 5GS in non-roaming scenario with the LI aspects is shown in figure A.2-1.

The 5G core system is shown using the service-based representation (as shown in TS 23.501 [2]) with the use of point-to-point LI system.



Figure A.2-1: Network topology showing LI for interworking with EPC/E-UTRAN

Figure A.2-1 shows the network topology of 5G system in a service-based representation, however, all the LI-related interfaces remain to be point-to-point.

The IRI-POIs present in the AMF, MME, UDM, SMSF and SMF + PGW-C deliver the xIRI to the MDF2 and CC-POI present in the UPF + PGW-U delivers the xCC to the MDF3. The MDF3 address to CC-POI present in UPF + PGW-U is provided by the CC-TF present in the SMF over LI\_T3 reference point.

The LIPF present in the ADMF provisions the IRI-POIs and the CC-TF present in the NFs with the intercept related data. The LI\_X1 interfaces between the LIPF and the UPF + PGW-U is to monitor the user plane data.

NOTE: The TS 23.501 [2] notes that there can another UPF between the NG-RAN and PGW-U + UPF. In that case, the other UPF may also provide the CC-POI functions for any user plane packets that do not reach the PGW-U + UPF.

# A.3 Multiple DN connections in a PDU session

## A.3.1 General

According to 3GPP TS 23.501 [2], a PDU session can involve multiple UPFs, but regardless of how many UPFs are involved in the session, the session only connects to a single DN through one or more DN connections (i.e. connections to the same DN).

When a PDU session involves multiple UPFs, the interception of user plane packets can be done in two ways:

- At one UPF (branching UPF) through which all the user plane packets pass through.

- At anchor UPFs.

When the second approach is chosen with branching UPF being one of the anchor UPFs, redundant delivery of CC should be avoided.

In a non-roaming scenario, the IRI-POI present in UDM also provide the LI functions.

## A.3.2 Topology view for a non-roaming scenario

The overall network configurations to illustrate the LI with multiple DN connections (to the same DN) in a PDU session is illustrated in figure A.3-1 and A.3-2.

The 5G core system is shown using the service-based representation (as shown in TS 23.501 [2]) with the use of point-to-point LI system.



Figure A.3-1: Network topology showing CC-POI at one UPF

The IRI-POIs present in the AMF, MME, UDM, SMSF and SMF deliver the xIRI to the MDF2 and CC-POI present in the branching UPF (shown as UPF-1) on the common path to both DN connections delivers the xCC to the MDF3. The MDF3 address to CC-POI present in UPF-1 is provided by the CC-TF present in the SMF over LI\_T3 reference point. In this view, all user plane packets pass through UPF-1.

The LIPF present in the ADMF provisions the IRI-POIs and the CC-TF present in the NFs with the intercept related data. The LI\_X1 interfaces between the LIPF and the UPF is to monitor the user plane data.



Figure A.3-2: Network topology showing CC-POI at two UPFs

The IRI-POIs present in the AMF, MME, UDM, SMSF and SMF deliver the xIRI to the MDF2. In this example, there is a branching UPF (UPF-B), an anchor UPF for the DN (UPF-A1) and another anchor UPF for the same DN (UPF-A2). The second approach (i.e. CC interception at the anchor UPFs) mentioned in A.3.1 is used to provide the CC interception. The UPF-A1 delivers the xCC generated from the user plane packets that flow from UE to the DN via UPF-A1 to the MDF3. The CC-POI present in the UPF-A2 delivers the xCC generated from the user plane packets that flow UE to the DN via UPF-A2 to the MDF3. The MDF3 address in the CC-POIs present in UPF-1 and UPF-2 are provided by the CC-TF present in the SMF over LI\_T3 reference point.

The LIPF present in the ADMF provisions the IRI-POIs and the CC-TF present in the NFs with the intercept related data. The LI\_X1 interfaces between the LIPF and the UPFs are to monitor the user plane data.

NOTE: In some cases, the branching UPF may be merged with one of the anchor UPFs. In this case care needs to be taken to avoid duplication of xCC e.g. by intercepting only on the external N6 interface of each anchor UPF.

# A.4 Non-3GPP access in a non-roaming scenario

## A.4.1 General

When the target UE is connected to the 5G core network via non-3GPP access, the POIs present in the following NFs of the PLMN where the N3IWF, TNGF or TWIF resides provide the LI functions:

- AMF.

- SMF.

- UPF.

- SMSF.

When the PLMN that has the N3IWF, TNGF or TWIF is the HPLMN, as illustrated in clause A.1, the IRI-POI present in the UDM also provide the LI functions.

When the PLMN that has N3IWF, TNGF or TWIF is different from the PLMN that provides the 3GPP access to the target UE, two different AMFs are involved in handling the target UE's registration accepts (this is not illustrated in this clause). In this case, depending on the operator policy, the SMSF present in either of the two networks may perform the routing of SMS messages to and from the target UE.

The PLMN that provides the 3GPP access can be a VPLMN and PLMN where the N3IWF, TNGF or TWIF resides can be the HPLMN. In this case, the AMF in the HPLMN provides the IRI-POI functions for non-3GPP access related registration events when the target UE is roaming. The SMSF present in the HPLMN may have to provide the IRI-POI functions for the SMS related messages routed via non-3GPP access network.

## A.4.2 Topology view

The overall network configuration for non-3GPP access in a non-roaming scenario with the LI aspects is shown in figures A.4-1, A.4-Fi1 and A.4-Fi2. In these views, the target UE is not connected to a 3GPP access network.

The 5G core system is shown in the following figures using the service-based representation (as shown in TS 23.501 [2]) with the use of point-to-point LI system.



Figure A.4-1: Network topology showing LI for non-3GPP access to 5G via N3IWF



Figure A.4-Fi1: Network topology showing LI for non-3GPP access to 5G via TNGF



Figure A.4-Fi2: Network topology showing LI for non-3GPP access to 5G via TWIF

The IRI-POIs present in the AMF, UDM, SMSF and SMF deliver the xIRI to the MDF2 and CC-POI present in the UPF delivers the xCC to the MDF3. The MDF3 address to CC-POI present in UPF is provided by the CC-TF present in the SMF over LI\_T3 reference point.

The LIPF present in the ADMF provisions the IRI-POIs and the CC-TF present in the NFs with the intercept related data. The LI\_X1 interfaces between the LIPF and the UPF is to monitor the user plane data.

\*\*\* End of All Changes \*\*\*