**3GPP TSG-CT WG4 Meeting #130C4-253419**

**Göteborg, Sweden; 25 - 29 August 2025**

**Source: Qualcomm Incorporated**

**Title: Pseudo-CR on solution for SMF-initiated PDU session release**

**Spec: 3GPP TR 29.867**

**Agenda item: 20.4**

**Document for: Approval**

**1. Introduction**

This solution is proposed to address Key Issue #1: "Preventing UE SIP Registration attempts during IMS Failures." In KI#1, it was requested to identify how to prevent the UE from repeatedly attempting the SIP registration procedure with the IMS in the case of severe IMS failure.

This proposal suggests utilizing the network-requested PDU session release mechanism defined in TS 24.501 to release the PDU session used by the UE to send SIP signalling (e.g. PDU session to the IMS DNN) and thus prevent repeated UE SIP registration attempts. In this solution, IMS failure is detected by the SMF using the P-CSCF Restoration Enhancement Support feature defined in TS 29.512.

Since this solution is based on existing features and therefore works with legacy UEs, it can be applied especially in scenarios where rapid mitigation is needed, and UE compatibility is a concern.

**2. Reason for Change**

To address the problem in a timely manner and support UEs already deployed in the market, this solution is proposed as follows:

**2.1 IMS failure/recovery detection in SMF**

According to the current specification, SMF is capable of detecting IMS failure or recovery, for example, by using the P-CSCF Restoration Enhancement Support feature defined in TS 29.514.

When the PCF detects a temporary network failure, such as a failure of IMS components, it can respond to the AF’s policy authorization request with an HTTP 403 Forbidden status. This response includes a "cause" attribute set to TEMPORARY\_NETWORK\_FAILURE. Upon receiving this response, the SMF can interpret it as an indication of IMS failure.

|  |
| --- |
| Note that [C4-251099](https://www.3gpp.org/ftp/tsg_ct/WG4_protocollars_ex-CN4/CT4_128_Wuhan-2025-04/Docs/C4-251099.zip) (Discussion on IMS resiliency study) outlines various methods including the above mentioned to detect IMS failure by PGW/SMF as below.  Option.1-1: Notification via PCRF/PCF   * The PCRF/PCF determines the IMS failure/recovery based on the status of Rx (Diameter) and sends it to the SMF. * Bulk operation: When the Rx connection is lost and then recovered, the PCRF/PCF can notify the PGW/SMF about the status of the P-CSCF, indicating whether it is down or up   Option.1-2: Detect the IMS failure/recovery through liveness monitoring.  Option.1-3: Manual operation by the Operator. |

**2.2 SMF-initiated PDU session release**

The purpose of the network-requested PDU session release procedure defined in TS 24.501 is to enable the network to release a PDU session. The SMF initiates this procedure by creating a PDU SESSION RELEASE COMMAND message and setting the 5GSM cause IE to indicate the reason for releasing the session.

In this proposal, the SMF releases the PDU session used by the UE to send SIP signalling, sets the 5GSM cause IE in the PDU SESSION RELEASE COMMAND to #67: “Insufficient resources for specific slice and DNN” to prevent UE SIP registration attempts during IMS failures and includes a Back-off timer IE in the PDU SESSION RELEASE COMMAND message indicating for how long the UE shall not re-try establishing a PDU session to send SIP signalling.

When the UE receives a PDU SESSION RELEASE COMMAND with cause #67 and the Back-off timer IE, it interprets this as a network-side rejection, indicating that the requested S-NSSAI and DNN combination cannot be supported due to insufficient resources. Consequently, the UE will terminate the affected PDU session as instructed by the network, will start the back-off timer and will not re-try establishing the PDU session to send SIP signalling until the back-off timer expires.

Given that releasing the PDU session to send SIP signalling with a back-off timer will cause voice-centric UEs to disable N1 mode and possibly fall back to EPS to obtain voice services, existing mechanisms such as Access Control and NAS-level mobility management congestion control should be proactively applied to prevent network congestion.

**2.3 Impacts on services, entities, and interfaces**

SMF:

* Explicit description for detecting IMS failure

UE:

* None

AMF/MME

* None

**3. Conclusions**

We consider that this proposal avoids impact on AMF/MME. Additionally, this approach is compatible with legacy UEs, offering a practical and backward-compatible alternative.

**4. Proposal**

It is proposed to include the following texts to 3GPP TR 29.867.

\* \* \* 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 23.380: "IMS Restoration Procedures".

[3] 3GPP TS 24.229: "IP Multimedia Call Control Protocol based on Session Control Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[4] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

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

[6] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[7] 3GPP TS 38.300: "NR and NG-RAN Overall Description; Stage 2".

[8] 3GPP TR 29.866: "Study on IMS Disaster Prevention and Restoration Enhancement".

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

[z] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

\* \* \* Next Change \* \* \*

## 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].

CSCF Call Server Control Function

HSS Home Subscriber Server

I‑CSCF Interrogating‑CSCF

IMS IP Multimedia Subsystem

PCF Policy Control Function

P‑CSCF Proxy‑CSCF

PGW PDN Gateway

S-CSCF Serving CSCF

UDM Unified Data Management

DNN Data Network Name

SMF Session Management Function

PDU Protocol Data Unit

\* \* \* Next Change \* \* \*

# 6 Solutions

## 6.X Solution #X: SMF-initiated PDU session release

### 6.X.1 General

This solution is proposed to address Key Issue #1: "Preventing UE SIP Registration attempts during P-CSCF Failures." In KI#1, it was requested to identify how to prevent the UE from repeatedly attempting the SIP registration procedure with the P-CSCF in the case of P-CSCF failure.

This proposal suggests utilizing the network-requested PDU session release mechanism defined in TS 24.501 [6] to release the PDU session used by the UE to send SIP signalling (e.g. PDU session to the IMS DNN) and thus prevent repeated UE SIP registration attempts. In this solution, P-CSCF failure is detected by the SMF using the P-CSCF Restoration Enhancement feature defined in TS 29.514 [y].

### 6.X.2 Description

#### 6.X.2.1 IMS failure/recovery detection in SMF

According to the current specification, the SMF is capable of detecting IMS failure, for example, by using the P-CSCF Restoration Enhancement Support feature defined in the clause 4.2.2.27 of TS 29.514 [y].

In P-CSCF restoration enhancements procedure, the P-CSCF includes the following in the "PcscfRestorationRequestData" data type of the content of the HTTP POST request:

- the IP address (IPv4 or IPv6) of the UE in the "ueIpv4" or "ueIpv6" attribute, and if the IP address is not unique (e.g. private IPv4 case), the "ipDomain" attribute or the "sliceInfo" attribute if available; or

- if the IP address is not available or if the IP address is not unique and the "ipDomain" attribute and the "sliceInfo" attribute are not available, the SUPI in the "supi" attribute and the DNN in the "dnn" attribute.

The PCF shall identify the PDU session for which the HTTP POST request applies. If the PCF fails in identifying the PDU session, the PCF shall reject the "P-CSCF restoration" custom operation with an HTTP "500 Internal Server Error" status code with the response body including the ProblemDetails data structure with the "cause" attribute set to "PDU\_SESSION\_NOT\_AVAILABLE".

The PCF sends a request for P-CSCF restoration to the SMF for the corresponding PDU session as described in the clause 4.2.3.18 of 3GPP TS 29.512 [z],

#### 6.X.2.2 SMF-initiated PDU session release

The purpose of the network-requested PDU session release procedure defined in TS 24.501 [6] is to enable the network to release a PDU session. The SMF initiates this procedure by creating a PDU SESSION RELEASE COMMAND message and setting the 5GSM cause IE to indicate the reason for releasing the session.

In this proposal, the SMF releases the PDU session used by the UE to send SIP signalling, sets the 5GSM cause IE in the PDU SESSION RELEASE COMMAND to #67: “Insufficient resources for specific slice and DNN” to prevent UE SIP registration attempts during IMS failures and includes a Back-off timer IE in the PDU SESSION RELEASE COMMAND message indicating for how long the UE shall not re-try establishing a PDU session to send SIP signalling .

When the UE receives a PDU SESSION RELEASE COMMAND with cause #67 and the Back-off timer IE, it interprets this as a network-side rejection, indicating that the requested S-NSSAI and DNN combination cannot be supported due to insufficient resources. Consequently, the UE will terminate the affected PDU session as instructed by the network, will start the back-off timer and will not re-try establishing the PDU session to send SIP signalling until the back-off timer expires.

Given that releasing the PDU session to send SIP signalling with a back-off timer will cause voice-centric UEs to disable N1 mode and possibly fall back to EPS to obtain voice services, existing mechanisms such as Access Control and NAS-level mobility management congestion control should be proactively applied to prevent network congestion.

### 6.X.3 Impacts on services, entities, and interfaces

**SMF:**

* Explicit description for detecting the IMS failure

### 6.X.4 Pros

This solution avoids impact on AMF/MME and is compatible with legacy UEs, thus offering a practical and backward-compatible alternative.

### 6.X.5 Cons

*Editor’s note: To be added*

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