3GPP TSG-SA WG2#162 S2-2405047r01

Changsha, China, 15-19 April 2024 (was S2-2404160)

**Source: vivo, Qualcomm Incorporated, CMCC, Huawei**

**Title: Solution on PS Data Off Exemption for IMS DC**

**Document for: Discussion/Approval**

**Agenda Item: 19.2**

**Work Item / Release: FS\_NG\_RTC\_Ph2**

*Abstract of the contribution:* *This solution provides a mechanism for the handling of PS Data Off activation/deactivation according to the configuration of exemption on IMS DC.*

# 1. Discussion

## 1.1 Introduction

This solution is used to resolve KI#5:

- Whether and how to enhance the current 3GPP PS Data Off Exempt service information (e.g. list of 3GPP PS Data Off Exempt services) to support 3GPP PS Data Off for services over IMS data channel

In order to support PS Data Off Exemption for IMS DC, following requirements was specified in clause 10.2 of TS 22.011.

*Each of the following operator services shall be configurable by the HPLMN operator to be part of the 3GPP PS Data Off Exempt Services:*

*- MMTel Voice;*

*- SMS over IMS;*

*- USSD over IMS (USSI);*

*- MMTel Video;*

*- Services over IMS Data Channel*

*- Particular IMS services not defined by 3GPP, where each such IMS service is identified by an IMS communication service identifier;*

*- Device Management over PS;*

*- Management of USIM files over PS (e.g. via Bearer Independent Protocol); and*

*- IMS Supplementary Service configuration via the Ut interface using XCAP.*

*NOTE 1a: IMS Data Channel is defined in 3GPP TS 26.114[20].*

*NOTE 1b: Services over IMS Data Channel are treated as a whole to be exempt or not to be exempt. Usage of individual applications on the data channel can be controlled by operators when the PS Data Off Exempt of services over IMS Data Channel is on.*

## 1.2 PS Data Off Exemption for IMS DC and control of DC applications

Based on the clarification in clause 10.2 of TS 22.011, “Services over IMS Data Channel” is configured as a whole service in 3GPP PS Data Off Exempt, but operators may further control whether each individual DC application is allowed when the PS Data Off Exempt of services over IMS Data Channel is on.

In summary, following 3 options for IMS DC may be configured when PS Data Off is on:

1. IMS DC is not an exemption service;
2. IMS DC is an exemption service and all DC applications are allowed.
3. IMS DC is an exemption service, but only partial DC applications are allowed by operator.

For option 1, all the services over IMS DC must be stop when the PS Data Off is activated.

For option 2, no impact to IMS DC services.

For option 3, operators can decide which DC applications are allowed and can be provisioned to the UE when the PS Data Off is activated. From UE perspective, all the network provisioned IMS DC services are exempted.

**Proposal:**

When PS Data Off is activated in the UE, based on operator’s policy, DCSF may determine which DC applications are allowed and provide the UE a specific DC application list for PS Data Off. DCSF can make sure that only the DCs associated to the applications presented in the specific DC application list is allowed in the IMS Session.

## 1.3 Delivery of PS Data Off status indication

As specified in clause Annex X(IMS 3GPP PS Data Off Service Accessibility) of TS 23.228, when the user actives the PS Data Off, the UE will sends a SIP (re-)Registration request to IMS network, the IMS AS shall become aware of the 3GPP Data Off status(active/inactive).

***X.2.1 UE 3GPP PS Data Off Status Reporting***

*The UE shall include an indication that depicts the 3GPP PS Data Off status (active/inactive) at initial IMS registration, and subsequent to that, any time the end user changes the 3GPP PS Data Off status in a (re-)REGISTER request. In all these registration requests the UE shall register the SIP based services that are configured in the UE.*

***X.3.2 Network Enforcement of SIP-Based 3GPP PS Data Off Exempted Services***

*Application Servers implementing the SIP-based services shall enforce the SIP based 3GPP PS Data Off Exempted services for all UEs.*

*Each Application Server shall be configured with up to two lists of 3GPP PS Data Off Exempt Services, one list for non-roaming users, and the other list for users roaming in the various VPLMNs with whom roaming agreements exist.*

*The AS shall become aware of the UE 3GPP Data Off status (active/inactive) at IMS (re-)Registration through third party registration. If the UE has changed its 3GPP PS Data Off status from inactive to active, the AS shall ensure that only SIP-based services which are part of the SIP-based 3GPP PS Data Off Exempt Services are permitted.*

*If the UE has changed its 3GPP PS Data Off status from active to inactive, the AS shall also let through the terminating requests to the UE for services that were not Data Off exempt.*

**Proposal:**

Upon receiving the indication of PS Data Off activation, the IMS AS can notify the DCSF in flowing two scenarios:

**Scenario 1**: IMS Session with DCs has been established when the user actives PS Data Off

The IMS AS notifies the DCSF the 3GPP Data Off status (active). The DCSF may create a specific DC application list for PS Data Off and trigger the release of DCs associated with the applications not in the list. The DCSF provides UE the specific DC application list for PS Data Off which contains only the allowed applications.

**Scenario 2**: IMS session with DC is not established when the user actives PS Data Off

When the UE requests to establish a bootstrap DC, the IMS AS notifies the DCSF the 3GPP Data Off status (active). When receiving the UE request of DC application list through bootstrap DC, the DCSF sends UE the specific DC application list for PS Data Off which contains only the allowed applications.

# 2. Text proposal

It is proposed to agree the following changes vs. TS 23.700-77:

>>>>BEGINNING OF CHANGES<<<<

## 6.0 Mapping of Solutions to Key Issues

Table 6.0-1: Mapping of Solutions to Key Issues

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Key Issues | | | | | | | |
| Solutions | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | X |  |  |  |  |  |  |  |
| 2 | X |  |  |  |  |  |  |  |
| 3 | X |  |  |  |  |  |  |  |
| 4 | X |  |  |  |  |  |  |  |
| 5 | X |  |  |  |  |  |  |  |
| 6 |  | X |  |  |  |  |  |  |
| 7 | X | X |  |  |  |  |  |  |
| 8 |  |  | X |  |  |  |  |  |
| 9 |  |  | X |  |  |  |  |  |
| 10 |  |  |  | X |  |  |  |  |
| 11 |  |  |  | X |  |  |  |  |
| 12 |  |  |  | X |  |  |  |  |
| 13 |  |  |  | X |  |  |  |  |
| 14 |  |  |  |  |  | X |  |  |
| 15 |  |  |  |  |  | X |  |  |
| 16 |  |  |  |  |  | X |  |  |
| 17 |  |  |  |  |  |  |  | X |
| 18 |  | X |  |  |  |  |  |  |
| 19 |  |  |  |  |  | X |  |  |
| 20 |  |  |  |  |  | X |  |  |
| 21 |  |  |  |  |  | X |  |  |
| 22 |  |  |  |  |  |  | X |  |
| 23 |  |  |  |  |  |  |  | X |
| 24 |  |  |  |  |  |  |  | X |
| 25 |  |  |  |  |  |  |  | X |
| 26 |  |  |  |  |  |  |  | X |
| 27 |  |  |  |  |  |  |  | X |
| X |  |  |  |  | X |  |  |  |

>>>>NEXT 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; Stage 2".

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

[4] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System".

[5] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS)".

[6] 3GPP TS 26.114: "Media handling and interaction".

[7] 3GPP TS 22.261: "Service requirements for the 5G system".

[8] 3GPP TR 26.813: "Study of Avatars in Real-Time Communication Services".

[9] 3GPP TS 22.156: "Mobile Metaverse Services".

[10] 3GPP TS 24.229: "IP Multimedia Call Control based on SIP and SDP; Stage 3".

[11] 3GPP TS 24.607: "Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR) using IP Multimedia (IM) Core Network (CN) subsystem".

[12] 3GPP TS 29.175: "IP Multimedia Subsystem; IP Multimedia Subsystem (IMS) Application Server (AS) Services Stage 3 (Release 18)".

[13] 3GPP TS 23.222: "Functional architecture and information flows to support Common API Framework for 3GPP Northbound APIs; Stage 2".

[14] IETF RFC 3725: "Best Current Practices for Third Party Call Control (3pcc) in the Session Initiation Protocol (SIP)".

[15] 3GPP TS 24.341: "Support of SMS over IP networks".

[16] 3GPP TR 22.873: "Study on evolution of the IP Multimedia Subsystem (IMS) multimedia telephony service".

[17] ATIS-1000074: "Signature-based Handling of Asserted information using Tokens (SHAKEN)".

[18] IETF draft-ietf-stir-passport-rcd-26: "PASSporT Extension for Rich Call Data".

Editor's note: The above document cannot be formally referenced until it is published as an RFC.

[19] IETF draft-ietf-sipcore-callinfo-rcd-08: "SIP Call-Info Parameters for Rich Call Data".

Editor's note: The above document cannot be formally referenced until it is published as an RFC.

[20] IETF RFC 4028: "Session Timers in the Session Initiation Protocol (SIP)".

[21] 3GPP TR 22.856: "Feasibility Study on Localized Mobile Metaverse Services".

[Y] 3GPP TS 22.011: "Service accessibility".

>>>>NEXT CHANGE （all new text）<<<<

## 6.X Solution #X: Configuration of PS Data Off exemption on IMS DC

### 6.X.1 Description

Based on the clarification in clause 10.2 of TS 22.011[Y], “Services over IMS Data Channel” is configured as a whole service in 3GPP PS Data Off Exempt. Operators may further control whether each individual DC application is allowed when the PS Data Off Exempt of services over IMS Data Channel is on.

In summary, following 3 options for IMS DC may be configured when PS Data Off is on:

1. IMS DC is not an exemption service;
2. IMS DC is an exemption service and all DC applications are allowed.
3. IMS DC is an exemption service, but only partial DC applications are allowed by operator.

For option 1, all the services over IMS DC must be stop when the PS Data Off is activated.

For option 2, no impact to IMS DC services.

For option 3, when the PS Data Off is activated, operators can decide which DC applications are allowed and can be provisioned to the UE. From UE perspective, all the network provisioned IMS DC services are exempted.

When the user actives the PS Data Off and IMS AS receives the indication of PS Data Off status,

* If IMS Session with DCs has been established:

The IMS AS notifies the DCSF the 3GPP Data Off status (active) or DCSF get the PS Data Off status from HSS. The DCSF may choose a specific DC application list for PS Data Off and trigger the release of DCs associated with the applications not in the list. The DCSF provides UE the specific DC application list for PS Data Off which contains only the allowed applications when receiving DC application list request from UE.

* If IMS session with DC is not established:

When the UE requests to establish a bootstrap DC, the IMS AS notifies the DCSF the 3GPP Data Off status (active) or DCSF get the PS Data Off status from HSS. When receiving the UE request of DC application list through bootstrap DC, the DCSF sends UE the specific DC application list for PS Data Off which contains only the allowed applications.

For the roaming scenario, the DCSF may determine that the UE is in roaming state and choose a specific DC application list for PS Data Off of roaming users.

As an option, the specific DC application list for PS Data Off can be provided to the UE through Device Management.

### 6.X.2 Procedures

### 6.X.2.1 PS Data Off activation with existing IMS Session with DCs

Figure 6.X.2.1-1 provides the procedures of PS Data Off activation when an IMS Session with DCs has been established for the UE.



Choose

Figure 6.X.2.1-1: Activation of PS Data Off when IMS Session with DCs has been established

0. An IMS session with data channels has been established between UE-1 and UE-2.

1. When the user actives PS Data Off in the UE, an PS Data Off status indication is sent to the S-CSCF via (re-)REGISTER request. The S-CSCF informs IMS-AS the PS Data Off status change.

NOTE: When the PS Data Off is activated by the user, some information may be presented to the user to indicate that some or all of the IM DC applications are not accessible in case of PS Data Off. How to delivery this information is out of the scope of this specification.

2. The IMS AS response the (re-)REGISTER with 200 OK.

3. Based on operator’s policy, the IMS-AS notifies the DCSF of the PS Data Off status change to active in the UE when the IMS-AS determines that DCs have been established.

Optionally, DCSF is aware of the PS Data Off status of the UE through HSS.

4. If IMS DC service is included in the exemption list of PS Data Off, and based on the operator’s policy, only partial of the DC applications are allowed in case of PS Data Off being activated, the DCSF chooses a specific DC Application list for PS Data Off.

For the roaming scenario, the DCSF may determine the UE is in roaming state by the receivedroaming indication from IMS-AS, and DCSF may choose a specific DC application list for PS Data Off of roaming users.

5. If any of the existing application DCs are not allowed according to the specific DC Application list for PS Data Off, the DCSF requests the IMS-AS to release these DCs.

6. The IMS-AS releases the not allowed DCs via SDP negotiation, e.g., via setting the associated SCTP ports to 0 or delete the a=dcmap lines of the not allowed DCs. If PS Data Off is activated and IMS DC service is not included in the exemption list of PS Data Off, the IMS-AS releases all DCs of the UE.

7. The DCSF sends response of the event notification. Only the DC application list for PS Data Off is provided to the UE in the following IMS Sessions, until PS Data Off is deactivated by the user.

8. The UE downloads the specific DC application list for PS Data Off via Bootstrap DC. Based on the new application list, the UE can only initiate the DCs that associated with the applications in the specific DC Application list for PS Data Off. Otherwise, the application DC request in the SDP is rejected by the network.

### 6.X.2.2 PS Data Off activation without existing IMS session with DCs

Figure 6.X.2.2-1 provides the procedure of active PS Data Off when the bootstrap DC and application DC is not established.



Figure 6.X.2-1: Active PS Data Off when the bootstrap DC and application DC is not established

1. When the user of UE-1 active the PS Data Off, the UE-1 sends the (re)Register message contains the indication of PS Data Off is active as specified in Annex X of TS 23.228[5].

2. IMS AS response 200 OK and stores the PS Data Off status of UE-1 when the IMS-AS determines that DCs have not been established.

3. UE-1 sends the SIP (re-)INVITE request with an initial SDP to the IMS AS, through P-CSCF and S-CSCF in the originating network. The initial SDP contains offers for the bootstrap data channel establishment request with bootstrap DC stream ID.

4. IMS AS validates user subscription data to determine whether the data channel call request should be notified to DCSF.

5. IMS AS notifies the DCSF of the DC call event by sending Nimsas\_SessionEventControl\_Notify request to the DCSF. The IMS AS shall notify the DCSF that the PS Data Off is active based on the indication received in step 1.

Optionally, DCSF is aware of the PS Data Off status of the UE through HSS.

6. Finish the bootstrap DC establishment procedure as specified in AC.7.1 of TS 23.228[5].

7. UE-1 request to download the application list through the established bootstrap DC.

8. DCSF chooses the specific DC application list for PS Data Off, which contains only the allowed applications according to operator’s policy, and sends the specific DC application list to the UE.

For the roaming scenario, the DCSF determine the UE is in roaming state by the received roaming indication from IMS AS, and DCSF may choose a specific DC application list for PS Data Off of roaming users.

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

DCSF:

- Receive notification from IMS AS for the indication of PS Data Off status.

- Determine the UE is in roaming state by the received roaming indication

- Choosespecific DC application list for PS Data Off which contains only allowed applications.

- Trigger the release of application DCs that not associated with the allowed applications.

IMS AS:

- Receive indication of PS Data Off status from UE via CSCF.

- Notify DCSF upon receiving indication of PS Data Off status.

- Notify DCSF PS Data Off status when UE request to establish bootstrap DC.

- Provide the roaming indication to DCSF.

>>>>END OF CHANGES<<<<