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Agenda item: Early IMS
Title: Optimization of de-registration
Source: Huawei
Document for: Discussion and Decision

1 Introduction

In section “7.2.1 Update of UE’s IP address in HSS depending on PDP context state” in TR 33.878, after the GGSN assign a new IP address to UE, the GGSN will notify HSS with the new pair of MSISDN/ IP address, then HSS initiate a deregister procedure right now. Usually when IMS UE change the IP address, it will initiate a new SIP registration, then the de-registration can be combined into the new SIP registration procedure. So we think that the HSS-initiated de-registration is not always necessary, and it should be optimized.

2 Discussion

In the present TR, there are two cases the HSS will initiate a de-registration procedure:

Case 1: The GGSN sends an "ACCOUNTING-REQUEST STOP" message to the HSS after the idle timer in the GGSN expires, then HSS compares the received IP address with the stored IP address , if it’s same, the HSS will initiate a de-registration procedure to release the resource, the IP address stored by S-CSCF during registration is invalid.

Case 2: If the UE’s PDP context creation request is processed by a different SGSN compared to the old PDP context, the GGSN may assign a new IP address to UE, and send "ACCOUNTING-REQUEST START" to the HSS with the new IP address, then HSS initiate a de-registration procedure right now.

With the case2, there are also some different possible implementations.

UE register right now with different S-CSCF after update of UE’s IP address:

The HSS need to notify the old S-CSCF the UE’s old IP is invalid, then the HSS-initiated de-registration procedure is not overlapped with UE’s new registration procedure.

UE register right now with same S-CSCF after update of UE’s IP address:

The HSS-initiated de-registration procedure is overlapped with UE’s new registration procedure. In this case , the HSS-initiated de-registration procedure is not necessary.

UE register later after update of UE’s IP address:

The HSS don't know when the UE will register, and the stored IP address and registration status in S-CSCF should keep consistency with UE, so the HSS-initiated de-registration is needed in this case.

On the other hand, when the UE change the IP address, the binding between the old IP address and UE was invalid. But for the GGSN, it will keep that IP address until it sends the "ACCOUNTING-REQUEST STOP" request, i.e. the old IP address will still not be available for other user. Then until the "ACCOUNTING-REQUEST STOP" message , the risk of user using other user's IP address to cheat IMS network is impossible.

From the view of implementation, the possibility of UE registering with same S-CSCF is high, so it's important to avoid the overlapping of UE-initiated registration and the HSS-initiated de-registration for the reason of saving resource.

To avoid the overlapping, the HSS should not initiate the de-registration after receiving the "ACCOUNTING-REQUEST START" with different IP address compared to the stored by HSS right now. The HSS may wait the UE's registration for a short limited time, within the limited time, if the HSS receive the UE's registration with same S-CSCF, the HSS will not initiate a de-registration procedure, and the IP address stored by S-CSCF can be updated with UE's registration procedure, otherwise the HSS will initiate a de-registration procedure.

3 Conclusion

After the HSS receive the notification of update of UE's IP address, for the reason of saving the resource, the HSS should wait with a short time before the HSS-initiated de-registration procedure to decide whether a de-registration is needed.

4 Proposal

Including the follow text to TR 33.878

7.2.1 Update of UE's IP address in HSS depending on PDP context state

During PDP context request towards the IMS, the GGSN shall send a RADIUS "ACCOUNTING-REQUEST START" message to a RADIUS server attached to the HSS. The message shall include the UE's IP address and MSISDN. The format of the message shall be compliant with 3GPP TS 29.061 [4]. On receipt of the message, the HSS shall use the MSISDN to find the subscriber's IMPI (derived from IMSI) and then store the IP address against the IMPI.

NOTE1: It is assumed here that the RADIUS server for handling the accounting request to receive the IP address from the GGSN is different to the RADIUS server that the GGSN may use for access control and IP address assignment. However, according to TS 23.060 [5] there is no limitation on whether RADIUS servers for Accounting and Access control have to be separate or combined.

NOTE2: It is also possible to utilize RADIUS to DIAMETER conversion in the interface between GGSN and HSS. This makes it possible to utilize the existing support for DIAMETER in the HSS. One possibility to implement the conversion is to re-use the AAA architecture of I-WLAN i.e. the 3GPP AAA Proxy or Server and its capability to perform RADIUS to DIAMETER conversion. It should be noted that the GGSN shall always uses RADIUS for this communication. Furthermore, it should be noted that DIAMETER is not mandatory to support in the HSS for communication with the GGSN.

GGSN shall not activate the PDP context if the accounting start message is not successfully handled by the HSS. In particular, it shall not be possible to have an active IMS PDP context if the corresponding IP address is not stored in the HSS.

In case of PDP context deletion, the GGSN sends an "ACCOUNTING-REQUEST STOP" message to the HSS after the idle timer in the GGSN expires. The HSS shall then start the 3GPP HSS-initiated de-registration procedure.

If the UE establishes a new PDP context and therefore gets a new IP address, the UE shall start the IMS initial registration procedure. Because the idle timer in the GGSN could be set with a large value, e.g. 1 hour, it is quite likely that the UE will send a PDP context creation request before the idle timer expires. Two cases are distinguished:

- If the PDP context creation request is processed by the same SGSN as the old PDP context, then the SGSN will assign the existing PDP context to the UE. Therefore the IP address of the UE is unchanged and the IMS registration is still valid.
- If the PDP context creation request is processed by a different SGSN compared to the old PDP context, e.g. in case of a routing area update, the SGSN will create a new PDP context for the UE. In this case the GGSN shall send an "ACCOUNTING-REQUEST START" to the HSS with the new IP address. Because this IP address is different to the IP address the UE registered with, the HSS shall decide whether start the 3GPP HSS-initiated de-registration procedure or not. When the HSS receive the "ACCOUNTING-REQUEST START", it should wait UE's registration for a short limited time. If the HSS receive the UE's registration from the same S-CSCF before the permitted time expired, the de-registration is not needed, otherwise, it shall start a de-registration procedure. Later, the idle timer for the old PDP context expires and the old PDP context will be deleted by the GGSN. The HSS will be informed about the event via the "ACCOUNTING-REQUEST STOP" message. The HSS checks the IP address indicated by the "ACCOUNTING-REQUEST STOP" message against the IP address stored in the HSS. If they are the same, a network-initiated de-registration procedure shall be started. In this case they are different, so the HSS shall then ignore the message.
