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PSEUDO CHANGE REQUEST

⌘ **33.878** **CR** **CRNum** ⌘**rev** **-** ⌘ Current version: **0.0.3** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: | UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Add optional use of IMSI
Source:	⌘	Nortel Networks
Work item code:	⌘	Early IMS Security
Date:	⌘	15/12/2004
Category:	⌘	
Release:	⌘	

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction 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.

Use one of the following releases:
Ph2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change:	⌘	In early IMS implementations, in one possible deployment option wherein the legacy HLR and the AAA functionalities needed for the HSS are implemented in two different phyisical entities. To support this deployment option, it is desirable to use the IMSI sent from the GGSN, so that the AAA need not interface with legacy HLR in order to map the IMS user identity from the MSISDN to IMSI.
Summary of change:	⌘	Optional use of IMSI as subscriber identity added
Consequences if not approved:	⌘	

Clauses affected:	⌘	7.1, 7.2.1, 7.2.5

Other specs affected: ⌘	Y	N	
	☐	☐	Other core specifications ⌘
	☐	☐	Test specifications
	☐	☐	O&M Specifications

Other comments: ⌘

7 Specification

7.1 Overview

The early IMS security solution works by creating a secure binding in the HSS between the public/private user identity (SIP-level identity) and the IP address currently allocated to the user at the GPRS level (bearer/network level identity). Therefore, IMS level signaling, and especially the IMS identities claimed by a user, can be connected securely to the PS domain bearer level security context.

The GGSN, terminating each user's authenticated PDP context, provides the user's IP address / subscriber's identity (MSISDN or IMSI) pair to the HSS when a PDP context is activated towards the IMS system. The HSS has a binding between the MSISDN or IMSI and the IMPI, and is therefore able to store the currently assigned IP address from the GGSN against the user's IMPI. The GGSN informs the HSS when the PDP context is deactivated/modified so that the stored IP address can be updated in the HSS. When the S-CSCF receives a SIP registration request or any subsequent requests for a given IMPI, it checks that the IP address in the SIP header (verified by the network) matches the IP address that was stored against that subscriber's IMPI in the HSS.

The mechanism assumes that the GGSN does not allow a UE to successfully transmit an IP packet with a source IP address that is different to the one assigned during PDP context activation. In other words, the GGSN must prevent "source IP Spoofing". The mechanism also assumes that the P-CSCF checks that the source IP address in the SIP header is the same as the source IP address in the IP header received from the UE (the assumption here, as well as for the full security solution, is that no NAT is present between the GGSN and the P-CSCF).

The mechanism prevents an attacker from using his own IP address in the IP header but spoofing someone else's IMS identity or IP address in the SIP header, so that he pays for GPRS level charges, but not for IMS level charges. The mechanism also prevents an attacker spoofing the address in the IP header so that he does not pay for GPRS charges. It therefore counters the threat scenarios given in clause 6 above.

The mechanism assumes that only one contact IP address is associated with one IMPI. Furthermore, the mechanism supports the case that there may be several IMPUs associated with one IMPI, but one IMPU is associated with only one IMPI.

In early IMS the IMS user authentication is performed by linking the IMS registration (based on an IMPI) to an authenticated PDP context (based on an IMSI). The mechanism here assumes that there is a one-to-one relationship between the IMSI for bearer access and the IMPI for IMS access.

In the following we use the terms P-CSCF and S-CSCF in a general sense to refer to components of an early IMS system. We note however that early IMS solutions may not have the same functionality split between SIP entities as defined in TS 23.228 [3]. Therefore, the requirements imposed on the SIP/IP core are specified in such a way that they are independent of the functionality split between SIP entities as far as possible. While the exact functionality split of the SIP/IP core may be left open, it is important that any changes to the Cx interface towards the HSS and changes to the interface towards the UE are standardised for vendor interoperability reasons.

7.2 Detailed specification

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 or the IMSI from the "3GPP-IMSI" sub-attribute of the 3GPP Vendor-Specific attribute to find the subscriber's IMPI (derived from IMSI) and then store the IP address against the IMPI. If the "3GPP-IMSI" sub-attribute is not available, then the HSS may use the MSISDN to find the subscriber's IMSI in order to derive 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 start the 3GPP HSS-initiated 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.

********** NEXT SET OF CHANGES **********

7.2.5 Message flows

7.2.5.1 Successful registration

Figure 1 below describes the message flow for successful registration to the IMS that is specified by the early IMS security solution.

Note, that the “received” parameter is only sent from P-CSCF to S-CSCF under the conditions given in clause 7.2.3.1.

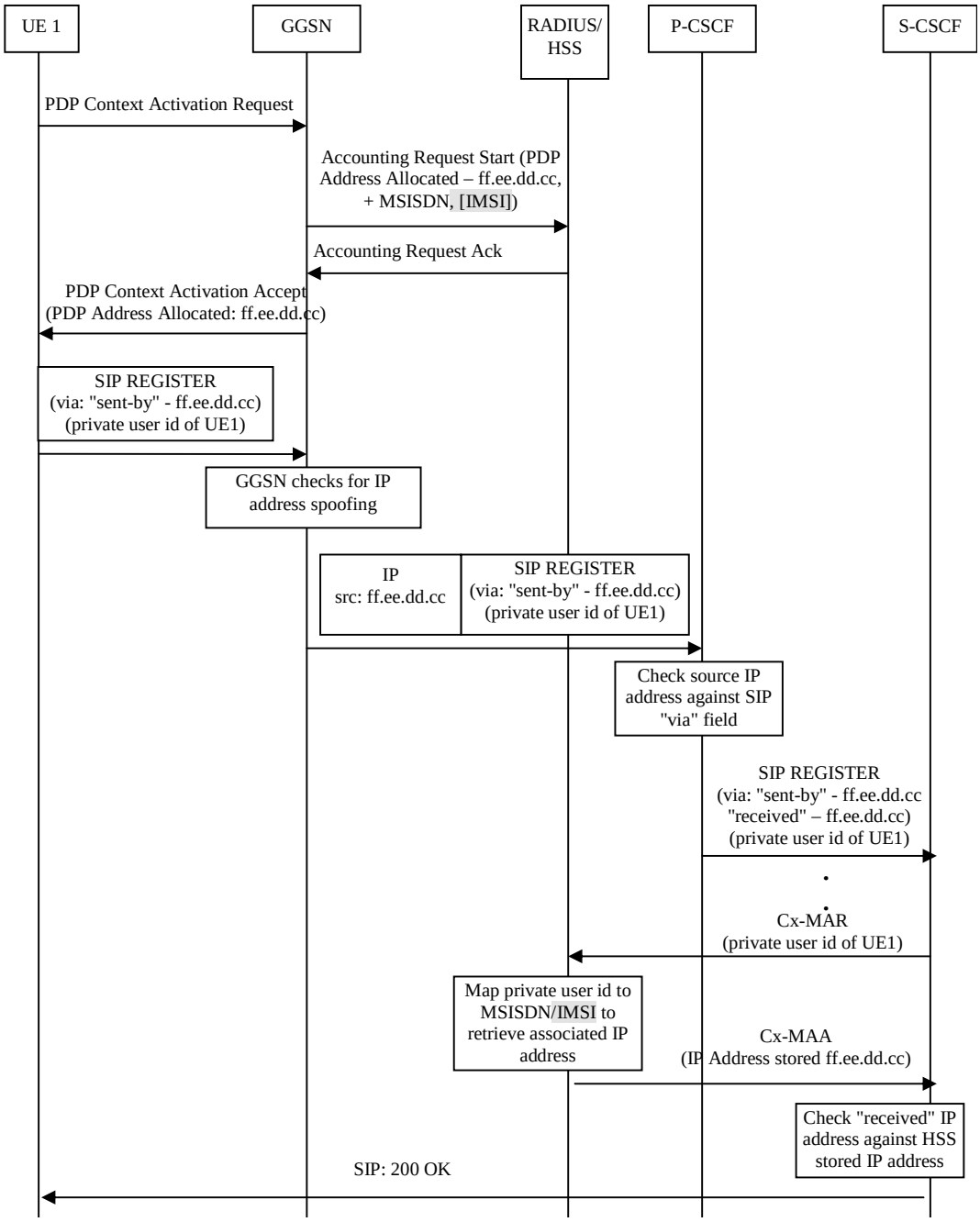

Figure 1: Message sequence for early IMS security showing a successful registration

7.2.5.2 Unsuccessful registration

Figure 2 below gives an example message flow for the unsuccessful attempt of an attacker trying to spoof the IMS identity of a valid IMS user.

Again, the “received” parameter is only present between P-CSCF to S-CSCF under the conditions given in clause 7.2.3.1.

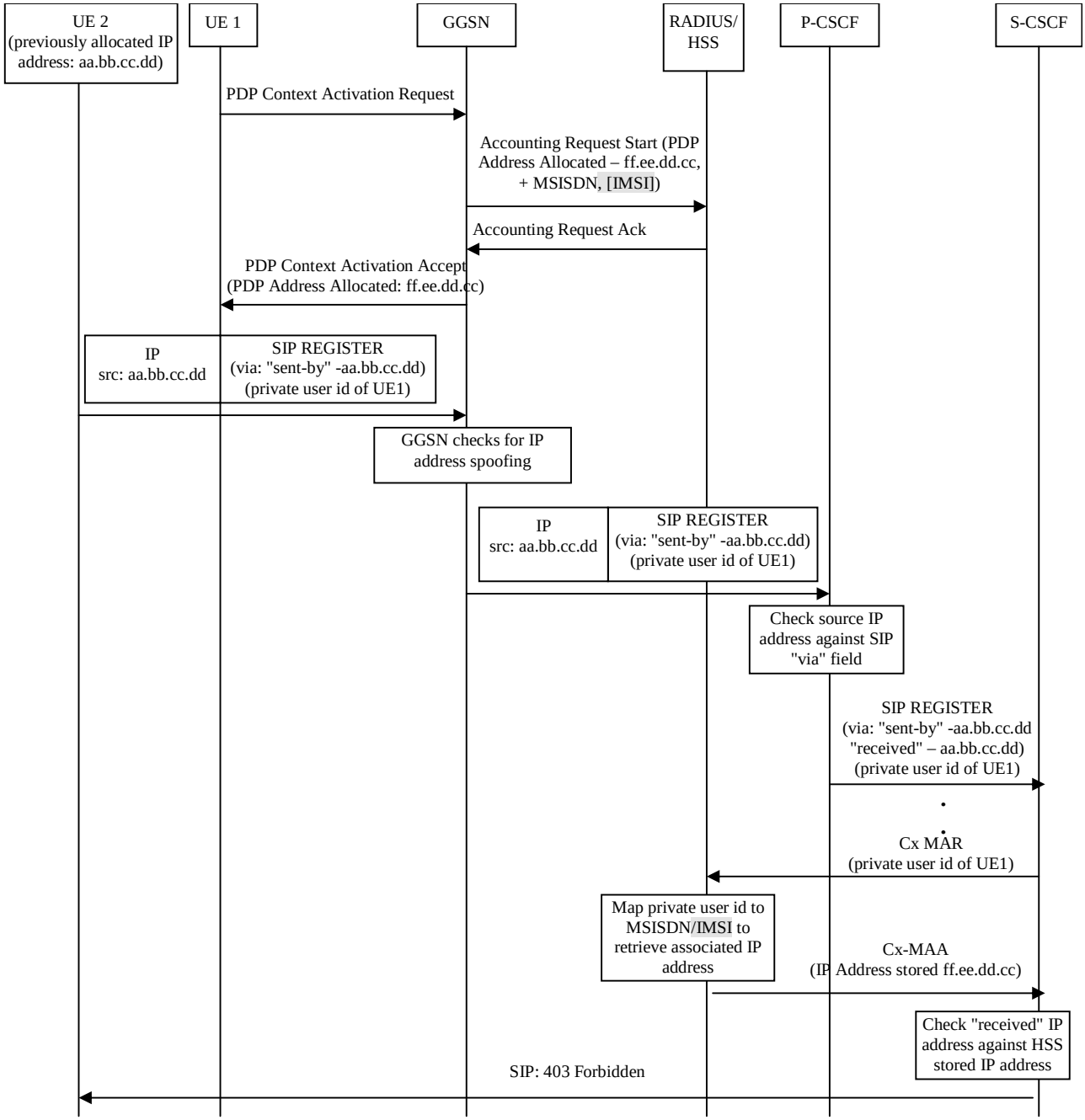

Figure 2: Message sequence for early IMS security showing an unsuccessful identity theft

7.2.5.3 Successful registration for a selected interworking case

Figure 3 below describes the message flow for successful registration to the IMS in the case that the UE supports both fully compliant and early IMS access security and the network supports early IMS only. This case is denoted as case 3 in clause 7.2.4.

Note, that the “received” parameter is only sent from P-CSCF to S-CSCF under the conditions given in clause 7.2.3.1.

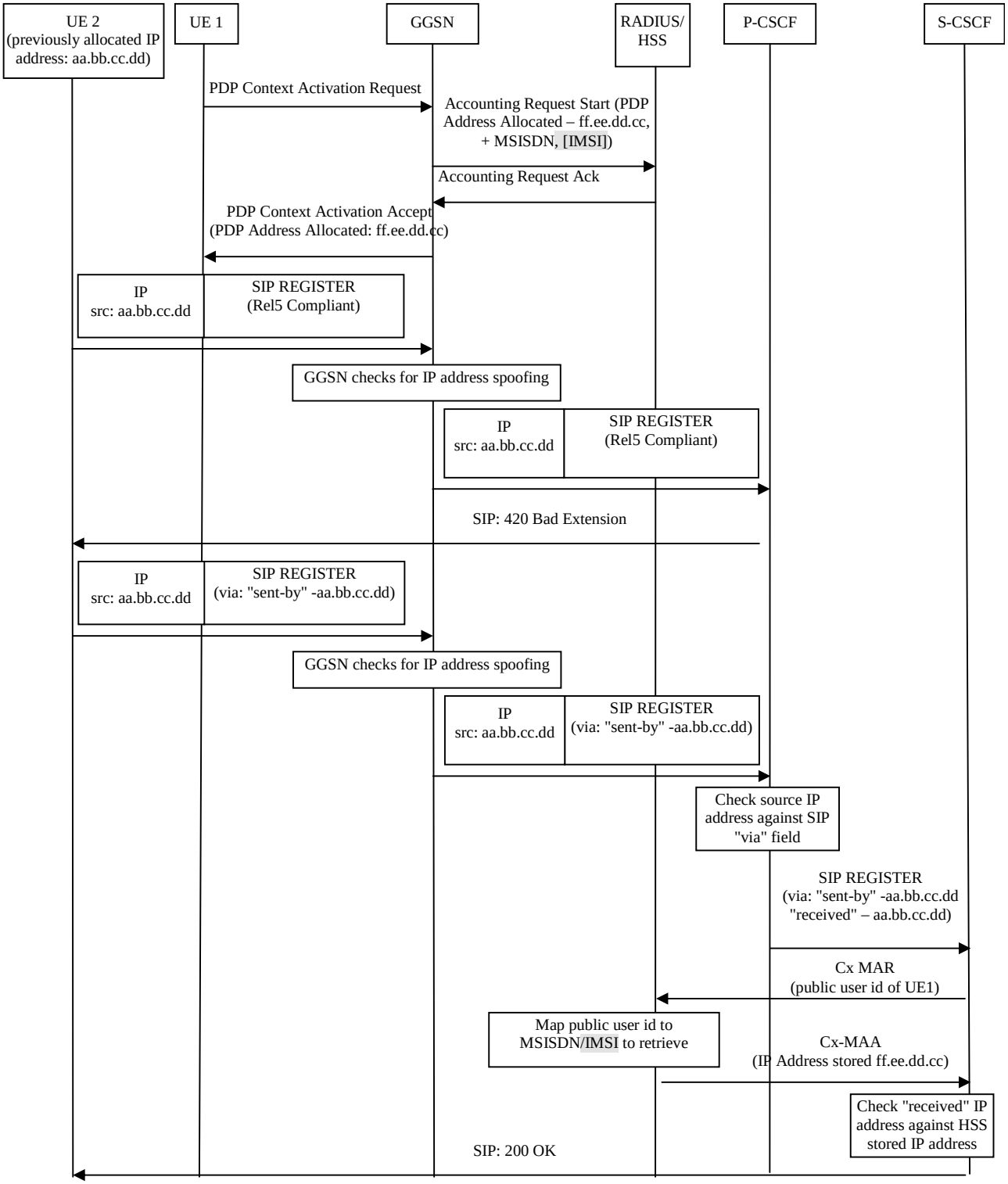

Figure 3: Message sequence for early IMS security showing interworking case where UE supports both fully compliant and early IMS access security and network supports early IMS security only