

10.14. DE-REGISTRATION

10.14.1. Overview

All things come to an end at some point, and this is also true for the registration of a user to the IMS. Tobias might want to be undisturbed after he called his sister and switches off his mobile phone. When doing so, his phone sends another REGISTER request to the S-CSCF, including all the information we have already seen, but indicating that this time it is for de-registration (Figure 10.15). The S-CSCF will then clear all the information it has stored for Tobias, update the data in the HSS and send a 200 (OK) response to Tobias's UE.

Sometimes the network sees the need to de-register the user (Figure 10.16): maybe the S-CSCF needs to be shut down or maybe Tobias is using a pre-paid card and has ran out of money. In these cases the S-CSCF would simply send another NOTIFY message with registration-state information to Tobias's UE, this time indicating that he has been de-registered.

Figure 10.15. User-initiated de-registration.

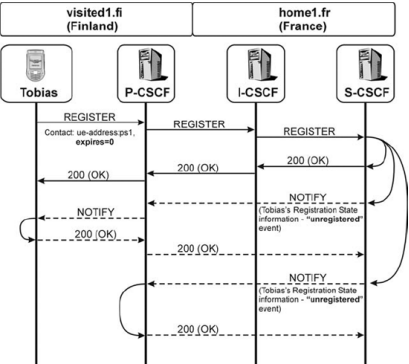
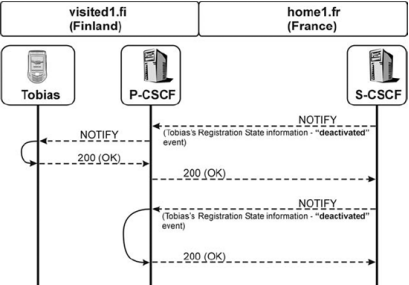


Figure 10.16. Network-initiated de-registration.



In both cases the S-CSCF will send NOTIFY requests to the P-CSCF and all other subscribers to Tobias's registration-state information, indicating that Tobias has been de-registered. By sending these NOTIFY requests the dialogs that were created during subscription to the registration-state



If Tobias decides to switch off his phone, the UE will send a REGISTER request to the network in order to de-register:

```
REGISTER sip:home1.fr SIP/2.0
Via: SIP/2.0/UDP [5555:1:2:3:4]:1357;comp=sigcomp;branch=99ueth
Route: sip:[5555:1:2:3:4]:7531;comp=sigcomp;lr
Max-Forwards: 70
From: <sip:tobias@home1.fr>;tag=ulkomaa
To: <sip:tobias@home1.fr>;tag=kotimaa
Authorization: Digest username="user1_private@home1.fr",
               realm="home1.fr",
               nonce="34CwFva37UYWpGNB34JP, algorithm=AKAV1-MD5,
               uri="sip:home1.fr",
               response="6629fae49393a05397450978507c4ef1",
               integrity-protected="yes"
               uri="sip:home1.fr",

Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: tls ;q=0.2, IPsec-3gpp ;q=0.1 ;alg=hmac-sha-1-96
                  ;spi-c=98765434 ;spi-s=87654322
                  ;port-c=8644 ;port-s=7533
Security-Client: digest, IPsec-3gpp ;alg=hmac-sha-1-96
                  ;spi-c=23456790 ;spi-s=12345679
                  ;port-c=2472 ;port-s=1357

Contact: <sip:[5555:1:2:3:4]:1357;comp=sigcomp>;expires=0
Call-ID: apb03a0s09dkjdfglkj49222
CSeq: 49 REGISTER
Content-Length: 0
```

This is principally the same information that we have already seen in the other REGISTER requests; the main difference is that the expires value is set to 0, which means that the user wants to de-register the binding between the public user identity (in the To header) and the IP address (in the Contact header).

This REGISTER request will be routed in exactly the same way as every other REGISTER request (i.e., it will not follow the stored Service-Route). Therefore, it will:

- traverse the P-CSCF – which checks for integrity protection and adds the integrity-protected=yes flag to the Authorization header;
- traverse the I-CSCF – which will ask the HSS for the S-CSCF address that was selected for the user; and
- finally, be received at the S-CSCF – where de-registration will take place.

The S-CSCF will immediately send back a 200 (OK) response to the UE, which will also include the expires header set to the value 0.

Afterwards, the S-CSCF will generate NOTIFY requests to all subscribers of the registration-state information of Tobias, including Tobias's UE. Each of these NOTIFY requests will include the Subscription-State header set to the value "terminated", which indicates that the subscription to the registration-state information of that user has been terminated. For example:

```
NOTIFY sip:[5555:1:2:3:4]:1357;comp=sigcomp SIP/2.0
Subscription-State: terminated
```

The body of these NOTIFY requests will include Tobias's registration-state information:

```
<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo" version="3" state
```

Once again, this XML document includes a "partial"-state notification, as it does not explicitly list those public user identities that have not been registered (see Section 10.12.7):

```
<registration sorn="sip:tobias@home1.fr" id="s1" state="active">
  <contact id="15" state="terminated" event="unregistered">
    sip:[5555:1:2:3:4]
  </contact>

  <contact id="20" state="active" event="registered">
    sip:[5555:1:71:171:172:173]
  </contact>
</registration>
```

The public user identity sip:tobias@home1.fr is still active, as it was registered by Tobias's pager (see Section 10.12.10). Only the contact address of the mobile phone was set to terminated:



```
</contact>
</registration>
```

Tobias's tel URL has been completely de-registered:

```
<registration aor="sip:gameMaster@home1.fr" id="c1" state="active"
  <contact id="45" state="active" event="refreshed">
    sip:[5555:101:102:103:104]
  </contact>

  <contact id="19" state="terminated" event="unregistered">
    sip:[5555:112:3:4]
  </contact>
</registration>
</reginfo>
```

Finally, the gaming URI sip:gameMaster@home1.fr also remains registered, as another UE is still actively using it. Only the contact that was explicitly de-registered ended up being removed.

10.14.3. Network-initiated de-registration

Whenever the network sees the need to de-register the user or some of the user's identities, the S-CSCF will generate NOTIFY requests in the same way as described in Section 10.14.2, only the content of the XML document will look different:

```
<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo" version="3" state
  <registration aor="sip:tobias@home1.fr" id="a1" state="terminat
    <contact id="15" state="terminated" event="deactivated">
      sip:[5555:112:3:4]
    </contact>

    <contact id="20" state="terminated" event="deactivated">
      sip:[5555:171:171:172:173]
    </contact>
  </registration>
  <registration aor="tel:+44-123-456-789" id="a2" state="terminat
    <contact id="16" state="terminated" event="deactivated">
      sip:[5555:112:3:4]
    </contact>
  </registration>
  <registration aor="sip:gameMaster@home1.fr" id="c1" state="term
    <contact id="45" state="terminated" event="deactivated">
      sip:[5555:101:102:103:104]
    </contact>

    <contact id="19" state="terminated" event="deactivated">
      sip:[5555:112:3:4]
    </contact>
  </registration>
</reginfo>
```

All public user identities are now set to "terminated", as the network consequently de-registered every registration that was active for Tobias, even those from other terminals. The event has changed to "de-activated", which indicates that it was the network that de-registered, not the user.

10.14.4. Related standards

Specifications relevant to Section 10.14 are:

RFC3265	Session Initiation Protocol (SIP)-specific Event Notification.
RFC3680	A Session Initiation Protocol (SIP) Event Package for Registrations.

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