

Technical Specification
of the SIP (Gm) interface
between the User Equipment (UE)
and the NGN platform of
Deutsche Telekom

1 TR 114

Version: 3.0.0

Amendment 1.2 (SIP REGISTER
Retry Mechanism in Failure Cases)

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1 Scope

This Amendment is an addition to 1 TR 114 V3.0.0

2 Additions to 1 TR 114 for the SIP REGISTER Retry Mechanism in Failure Cases

2.1 General

This section is a General overview and extension of existing procedures within Annex B of this document and RFC3261 and RFC5626. This Overview overrides the text stated in Annex B (Sections 5.1.1 and 5.1.1.2.1).

2.2 Basic Guideline for re-transmissions of REGISTER requests is defined within RFC3261.

RFC3261 defines the following timers:

Timer E initially T1 [Section 17.1.2.2](#) non-INVITE request
retransmit interval,
UDP only

[Note DT: Timer E is the retransmission timer. When timer E fires then the UA sends the request again. \(retransmission of request\)](#)

Timer F 64*T1 [Section 17.1.2.2](#) non-INVITE transaction
timeout timer

[Note DT: When timer F fires then no response to one of the previous sent request \(including the retransmitted requests\) was received by the UA](#)

17.1.2.2 Formal Description

The state machine for the non-INVITE client transaction is shown in Figure 6. It is very similar to the state machine for INVITE.

The "Trying" state is entered when the TU initiates a new client transaction with a request. When entering this state, the client transaction SHOULD set timer F to fire in 64*T1 seconds. The request MUST be passed to the transport layer for transmission. If an unreliable transport is in use, the client transaction MUST set timer E to fire in T1 seconds. If timer E fires while still in this state, the timer is reset, but this time with a value of MIN(2*T1, T2). When the timer fires again, it is reset to a MIN(4*T1, T2). This process continues so that retransmissions occur with an exponentially increasing interval that caps at T2. The default value of T2 is 4s, and it represents the amount of time a non-INVITE server transaction will take to respond to a request, if it does not respond immediately. **For the default values of T1 and T2, this results in intervals of 500 ms, 1 s, 2 s, 4 s, 4 s, 4 s, etc.**

2.3 For 1TR114 implementation the following procedures shall apply when no response is received for a REGISTER Request

Apply procedures for timer E and timer F as described within RFC3261.

NOTE 1: Timer F runs and has a value of 32sec when T1 is set to default (500ms) i.e. a Request was already 10 times sent and no answer was received before timer F fires.

When timer F fires (no response received) then select a different P-CSCF address from the list of P-CSCF addresses discovered during the procedures described in section 4.2.7 in this document and subclause 9.2.1 of 1TR114 Annex B (hint: SRV record). The next Register request shall be sent to the now selected P-CSCF.

NOTE 2: This was delivered via SRV records when requesting the DNS for P-CSCF addresses. As a minimum two addresses are delivered by the DNS. (see also Section 4.2.7 in this document [1TR114])

NOTE 3: It is a normal procedure of the DT end devices to request the DNS (under consideration of the TTL) before sending REGISTER requests (see also Section 4.2.7 in this document [1TR114]).

Proceed with: Subclause "2.5 Procedures after a minimum of 2 consecutive unsuccessful initial registration attempts."

2.4. For 1TR114 implementation the following procedures shall apply when an unsuccessful response is received for a REGISTER Request

For Failure Cases where SIP Requests are answered with 408 (Request Timeout) response or 500 (Server Internal Error) response or 503 (Service Unavailable) response or 504 (Server Time-Out) response or 600 (Busy Everywhere) response the following procedures shall apply:

If the retry after header is included then:

The UE shall attempt to perform initial registration after the value given within the retry after header. A different P-CSCF address from the list of P-CSCF addresses shall not be used.

If the retry after header is not included then:

1. The UE shall attempt to perform initial registration after 15 sec.
2. After a consecutive unsuccessful initial registration attempt then select a different P-CSCF address from the list of P-CSCF addresses discovered during the procedures described in subclause 9.2.1 of 1TR114 Annex B (SRV record), and
3. The UE shall attempt to perform initial registration to the now selected P-CSCF.
4. After a consecutive unsuccessful initial registration attempt then the UE shall attempt to perform initial registration either after the value given within the retry after header or after 15 sec.
5. If the selected P-CSCF address was the last address resolved then proceed with step 6. If a further P-CSCF address is available then proceed with step 2.
5. After 2 consecutive unsuccessful initial registration proceed with: Subclause "2.5 Procedures after a maximum of 2 consecutive unsuccessful initial registration attempts".

2.5 Procedures after a minimum of 2 consecutive unsuccessful initial registration attempts

NOTE: This is valid for REGISTER requests either receiving an unsuccessful response or no response.

After a minimum of 2 consecutive unsuccessful initial registration attempts, the UE shall implement the mechanism defined in subclause 4.5 of RFC 5626 [92] for new registration attempts. The UE shall use the values of the parameters max-time and base-time, of the algorithm defined in subclause 4.5 of RFC 5626 [92]. If no values of the parameters max-time and base-time have been provided to the UE by the network, the default values defined in in subclause 4.5 of RFC 5626 [92] shall be used.

The values of max-time and base-time may be provided by the network to the UE using OMA-DM with the management objects specified in 3GPP TS 24.167 [8G]. Other mechanisms may be used as well and are outside the scope of the present specification.

RFC 5626 [92] Section 4.5 is valid as follows:

4.5. Flow Recovery

When a flow used for registration (through a particular URI in the outbound-proxy-set) fails, the UA needs to form a new flow to replace the old flow and replace any registrations that were previously sent over this flow. Each new registration MUST have the same reg-id value as the registration it replaces. This is done in much the same way as forming a brand new flow as described in Section 4.2; however, if there is a failure in forming this flow, the UA needs to wait a certain amount of time before retrying to form a flow to this particular next hop.

The amount of time to wait depends if the previous attempt at establishing a flow was successful. For the purposes of this section, a flow is considered successful if outbound registration succeeded, and if keep-alives are in use on this flow, at least one subsequent keep-alive response was received.

The number of seconds to wait is computed in the following way. If all of the flows to every URI in the outbound proxy set have failed, the base-time is set to a lower value (with a default of 30 seconds); otherwise, in the case where at least one of the flows has not failed, the base-time is set to a higher value (with a default of 90 seconds). The upper-bound wait time (W) is computed by taking two raised to the power of the number of consecutive registration failures for that URI, and multiplying this by the base-time, up to a configurable maximum time (with a default of 1800 seconds).

$$W = \min(\text{max-time}, (\text{base-time} * (2 \wedge \text{consecutive-failures})))$$

These times *MAY* be configurable in the UA ([via TR-069 \[72\] Reference number out of 1 TR 114](#)). The three times are:

- max-time with a default of 1800 seconds
- base-time (if all failed) with a default of 30 seconds
- base-time (if all have not failed) with a default of 90 seconds

For example, if the base-time is 30 seconds, and there were three failures, then the upper-bound wait time is $\min(1800, 30 * (2^3))$ or 240 seconds. The actual amount of time the UA waits before retrying registration (the retry delay time) is computed by selecting a uniform random time between 50 and 100% of the upper-bound wait time. The UA MUST wait for at least the value of the retry delay time before trying another registration to form a new flow for that URI (a 503 response to an earlier failed registration attempt with a Retry- After header field value may cause the UA to wait longer).

To be explicitly clear on the boundary conditions: when the UA boots, it immediately tries to register. If this fails and no registration on other flows succeed, the first retry happens somewhere between 30 and 60 seconds after the failure of the first registration request. If the number of consecutive-failures is large enough that the maximum of 1800 seconds is reached, the UA will keep trying indefinitely with a random time of 15 to 30 minutes between each attempt.

2.6 Changes to 1TR114 Annex B

2.6.1 In Section 5.1.1. Annex B of 1TR114 following text shall be deleted:

~~If the following criteria apply the Response Code 503 indicates for the UE to "fail over" to the other backup P-CSCF:~~

- ~~— If there's no retry after value provided then proceed to switch over;~~
- ~~— else if it's the first 503 AND the value of retry after is less than 50% of the total time required for failure detection and reaction then retry;~~
- ~~— In any other case then proceed to switch over.~~

~~The list of available outbound proxies (primary and backup) is indicated by the SRV records.~~

~~Note: — This belongs to IAD connecting more than one device towards the IMS.
"Fail over" shall also apply if the IP Transport level is not reachable (e.g. not possible to establish a TCP connection) or the time out of SIP Messages.~~

2.6.2 In Section 5.1.1.2.1 Annex B of 1TR114 the following text shall be deleted:

~~On receiving a 408 (Request Timeout) response or 500 (Server Internal Error) response or 504 (Server Time Out) or 600 (Busy Everywhere) response for an initial registration, the UE may attempt to perform initial registration again.~~

~~When the timer F expires at the UE, the UE may:~~

- ~~a) — select a different P-CSCF address from the list of P-CSCF addresses discovered during the procedures described in subclause 9.2.1 or from its pre-configured list of P-CSCF's IP addresses or domain names;~~
- ~~b) — if no response has been received when attempting to contact all P-CSCFs known by the UE, get a new set of P-CSCF addresses as described in subclause 9.2.1 unless otherwise specified in the access specific annexes (as described in Annex B or Annex L); and~~
- ~~e) — perform the procedures for initial registration as described in subclause 5.1.1.2.~~

~~NOTE 14: It is an implementation option whether these actions are also triggered by other means than expiration of timer F, e.g. based on ICMP messages.~~

~~After a first unsuccessful initial registration attempt, if the Retry-After header field was not present and the initial registration was not performed as a consequence of a failed reregistration, the UE shall not wait more than 5 minutes before attempting a new registration.~~

Version	Published	Remarks
3.0.0		<ul style="list-style-type: none">-locating P-CSCF and correct prioritization of P-CSCF in case of registration including maintenance procedures.-Preconditions support "passive" better described-Early-Media Header and indication of early media described to avoid misinterpretation. And allow handling of calls initiated by mobile devices.- use of from-change. No default setting

Version	Published	Remarks
		<ul style="list-style-type: none"> - deletion of Annex A - Update of Annex B - Deletion of TS 124.503 - UPDATE to 3GPP Release 11 documents -Correction of *# Procedures using PIN (ECT, OCB, Kick Out, Black List, White List, ACR, CB, ICB) - CLIR 3 included in D.2.0 - Documentation Update TIP/TIR and OIP/OIR -MWI voided - Documentation Update of " 8.6 Support of NAT traversal by the UE" -MIME Type UPDATE Table 7-5 -UPDATE Table 7-4 SIP Headers - add references TR-069, TR-104 and TR-181 - add reference 3GPP TS 23.003 - C.2.8 allow implementations acting on "application/vnd.3gpp.cw+xml" <p>All changes are backward compatible with the procedures described within 1TR114 Version 2.4.0</p>
Amendment 1	02.05.2014	Additions and clarification to 1 TR 114 for the SIP REGISTER Retry Mechanism in Failure Cases
Amendment 1.1	03.11.2014	<p>Replacement of Amendment 1.</p> <p>Timer configuration for TR-069 set to form MUST to MAY:</p> <p>"These times MAY be configurable in the UA (via TR-069 [72] Reference number out of 1 TR 114). The three times"</p>
Amendment 1.2	16.12.2014	<p>Replacement of Amendment 1.1</p> <p>Procedure clarification if more than 2 P-CSCF addresses are received via DNS resolution. (Section 2.3, 2.4 and 2.5)</p> <p>Editorial: Section 2.5 appeared twice.</p>