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CR-Form-v5.1

CHANGE REQUEST

⌘ **33.203 CR 0xx** ⌘ **rev** **-** ⌘ Current version: **5.1.0** ⌘

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

Proposed change affects: ⌘ (U)SIM □ ME/UE ☒ Radio Access Network □ Core Network ☒

Title:	⌘	Clarifications to various issues in TS 33.203		
Source:	⌘	Ericsson		
Work item code:	⌘	IMS-ASEC	***Date:*** ⌘	2002-05-07
Category:	⌘	**F**	***Release:*** ⌘	REL-5

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:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change: ⌘ TS 33.203 is missing references to applicable IETF documents. Some misalignments with the RFCs are also corrected.

Summary of change: ⌘ The following changes have been made

- References to relevant RFCs on IPSec added.
- The "ESP transform identifier" is removed from the list of negotiated parameters. Only the authentication algorithm is actually negotiated
- Key length: the length of IK and CK is fixed by AKA to 128-bit. The length of the derived integrity/encryption keys depends on the algorithm chosen. For instance, HMAC-MD5 requires a 128-bit key and HMAC-SHA-1 requires 160-bit keys. Anyway 128-bit length is the minimum required length for the derived keys.
- The encryption key for the SA inbound from the P-CSCF is CKIM_in (and not CK)
- NULL Authentication algorithm shall not be indicated from UE or P-CSCF
- Anti-replay service shall always be enabled

Consequences if not approved: ⌘ Misalignment between normative references and TS 33.203

Clauses affected:	⌘	2, 7.1, Annex B, Annex D		
Other specs affected:	⌘	□ Other core specifications	⌘	
		□ Test specifications		
		□ O&M Specifications		
Other comments:	⌘			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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 TS 33.102: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; 3G Security; Security Architecture".

[2] 3GPP TS 22.228: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Service Requirements for the IP Multimedia Core Network".

[3] 3GPP TS 23.228: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia (IM) Subsystem".

[4] 3GPP TS 21.133: "3rd Generation Partnership Project; T Technical Specification Group Services and System Aspects; Security Threats and Requirements ".

[5] 3GPP TS 33.210: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; 3G Security; Network domain security; IP network layer security".

[6] IETF RFC 3261 "SIP: Session Initiation Protocol".

[7] 3GPP TS 21.905: "3rd Generation Partnership Project: Technical Specification Group Services and System Aspects; Vocabulary for 3GPP specifications".

[8] 3GPP TS 24.229: "3rd Generation Partnership Project: Technical Specification Group Core Network; IP Multimedia Call Control Protocol based on SIP and SDP".

[9] 3GPP TS 23.002: "3rd Generation Partnership Project: Technical Specification Group Services and System Aspects, Network Architecture".

[10] 3GPP TS 23.060: "3rd Generation Partnership Project: Technical Specification Group Services and System Aspects, General Packet Radio Service (GPRS); Service Description".

[11] 3GPP TS 24.228: "3rd Generation Partnership Project: Technical Specification Group Core Network; Signalling flows for the IP multimedia call control based on SIP and SDP".

[12] IETF RFC 2617 (1999) "HTTP Authentication: Basic and Digest Access Authentication".

[13] IETF RFC 2406 (1998) "IP Encapsulating Security Payload (ESP)".

[14] IETF RFC 2401 (1998) "Security Architecture for the Internet Protocol".

[15] IETF RFC 2403 (1998) "The Use of HMAC-MD5-96 within ESP and AH".

[16] IETF RFC 2404 (1998) "The Use of HMAC-SHA-1-96 within ESP and AH".

7 Security association set-up procedure

The security association set-up procedure is necessary in order to decide what security services that apply and when the security services start. In the IMS authentication of users is performed during registration as in Section 6.1. Subsequent signaling communications in this session will be integrity and optionally confidentiality protected based on the keys derived during the authentication process.

7.1 Security association parameters

For protecting IMS signaling between the UE and the P-CSCF it is necessary to agree on shared keys provided by IMS AKA, on certain protection methods (e.g. an integrity protection method) and a set of parameters specific to a protection method, e.g. the cryptographic algorithm to be used. The parameters negotiated are typically part of the security association to be used for a protection method.

The security mode setup shall support the negotiation of different protection mechanisms. It shall be able to negotiate or exchange the SA parameters required for these different protection mechanisms. Although the supported protection mechanisms could be quite different, there is a common set of parameters that have to be negotiated for each of them. This set of parameters includes:

- Authentication (integrity) algorithm, and optionally encryption algorithm;
- SA_ID that is used to uniquely identify the SA at the receiving side;
- ~~Key length: the length of encryption and authentication (integrity) keys is 128 bits.~~

Parameters specifically related to certain protection methods are kept in the annexes describing the protection methods.

The SA between the UE and the P-CSCF will have a limited lifetime. The lifetime timer shall be the same as the registration timer, which is defined per contact address. When the UE registers the registration timer will be negotiated between the UE, the P-CSCF and the S-CSCF. The S-CSCF will be able to accept, decrease or increase the proposed expiration time from the UE and the final value is sent in the response to the UE. The expiry time in the UE will be shorter than the expiry time in the S-CSCF, such that the UE is able to re-register. For each new successful authentication the SA shall be updated. The S-CSCF shall align the expiration of subsequent registrations with any existing registration timer. The SA is deleted if the registration timers expires in the P-CSCF or in the S-CSCF.

[Editors Note: The support of different mechanisms is FFS.]

Annex B (informative): Mechanisms for IPSec based solution

[Editors Note: If the IPSec solution is finally chosen the chapters below shall be moved into the main body of this TS in the corresponding sections.]

B.1 [6.2] Confidentiality mechanisms

IPsec ESP as specified in reference [13] may optionally be implemented for providing confidentiality of SIP signalling between the UE and the P-CSCF, protecting all SIP signalling messages at the IP level. IPSec ESP general concepts on Security Policy management, Security Associations and IP traffic processing as described in reference [14] shall also be considered. If ESP confidentiality is used, it shall be applied in transport mode between UE and P-CSCF. If ESP confidentiality is provided, it is always provided in addition to ESP integrity protection.

The SAs that are required for ESP shall be derived from the 128-bit integrity key CK_{IM} generated through IMS AKA, as specified in chapter 6.1.

If confidentiality is required, for each direction, there is one ESP SA for both confidentiality and integrity that shall be used between the UE and the P-CSCF. The encryption ~~transform~~ algorithm is identical for the two SAs in either direction. ~~The encryption key for the SA inbound from the P-CSCF is CK.~~

The encryption key for the SA inbound from the P-CSCF is CK_{IM_in}. The encryption key for the SA outbound from the P-CSCF is $CK_{IM\_out.}$

The encryption keys are derived as $CK_{IM\_in} = h1(CK_{IM})$ and $CK_{IM\_out} = h2(CK_{IM})$ using suitable key derivation functions h1 and h2.

The length of the derived encryption keys is 128 bits.

The encryption key derivation on the user side is done in the ISIM. The encryption key derivation on the network side is done in the P-CSCF.

The method to set up ESP security associations during the SIP registration procedure is specified in chapter 7.

B.2 [6.3] Integrity mechanisms

IPsec ESP as specified in reference [13] shall provide integrity protection of SIP signalling between the UE and the P-CSCF, protecting all SIP signalling messages at the IP level. IPSec ESP general concepts on Security Policy management, Security Associations and IP traffic processing as described in reference [14] shall also be considered. ESP integrity shall be applied in transport mode between UE and P-CSCF.

The SAs that are required for ESP shall be derived from the 128-bit integrity key IK generated through IMS AKA, as specified in chapter 6.1. The ~~transform~~ algorithm used for the ESP SA shall be negotiated as specified in chapter 7. ESP shall use two unidirectional SAs between the UE and the P-CSCF, one in each direction. The integrity algorithm is identical for both SAs.

The integrity key for the SA inbound from the P-CSCF is IK_{IM_in}. The integrity key for the SA outbound from the P-CSCF is $IK_{IM\_out.}$

The integrity keys are derived as $IK_{IM\_in} = h1(IK_{IM})$ and $IK_{IM\_out} = h2(IK_{IM})$ using suitable key derivation functions h1 and h2. (They may be the same as those in section 6.2.)

The length of the derived integrity keys is 128 bits.

The integrity key derivation on the user side is done in the ISIM. The integrity key derivation on the network side is done in the P-CSCF.

The method to set up ESP security associations during the SIP registration procedure is specified in chapter 7.

Annex D (informative): Set-up procedures for IPSec based solution

[Editors Note: If the IPSec solution is finally chosen the chapters below shall be moved into the main body of this TS in the corresponding sections.]

This section is based on section 7 and provides additional specification for the support of IPsec ESP.

D.1 Security association parameters

The SA parameters, identifiers and attributes that shall be negotiated between UE and P-CSCF, are

- ~~ESP transform identifier~~
- Authentication (integrity) algorithm
- SPI

~~Further~~ Other parameters required to set-up the SA (not negotiated):

- Life type: the life type is always seconds
- SA duration: the SA duration has a fixed length of 2^{32}-1.
- ~~Key length: the length of encryption and authentication (integrity) keys is 128 bits.~~

Selectors:

The security associations (SA) have to be bound to specific parameters (selectors) of the SIP flows between UE and P-CSCF, i.e. IP addresses and ports. Both sides have to use the same policy here, but since the required selectors will be known from the SIP messages, there is no need to negotiate them. However, it is critical to keep the source IP address and source port number, the selector pair unique in P-CSCF. The P-CSCF must reject any REGISTER message sent from a valid SA's selector pair corresponding to a different IMPI than the one that is bound to this selector pair. The only parameter that shall be negotiated, is a fixed port for specific unprotected SIP messages at the P-CSCF:

1. For the inbound SA at the P-CSCF (outbound for the UE) the P-CSCF shall use a fixed port. This may be port 5060 as the standard SIP port, or any other fixed port where the server accepts SIP messages from the UE. In addition, another port for specific unprotected SIP messages from the UE to the server is fixed.
   For the outbound SA at the P-CSCF (inbound for the UE) ANY port number shall be allowed at the P-CSCF.

2. On the UE side, the SIP UAs shall use the same port for both sending and receiving SIP signalling to the P-CSCF.

3. If there are multiple SIP UAs belonging to different ISIMs in one UE they shall use different SAs and bind them to different ports on the UE side.

4. The UE may send only the following messages to the fixed port for unprotected messages:

   - initial REGISTER message;
   - REGISTER message with network authentication failure indication;
   - REGISTER message with synchronization failure indication.

   All other messages incoming on this port must be discarded by the SIP application on the P-CSCF.

[Editors' note:It is ffs whether case 3 can actually occur.]

For each incoming message the SIP application must verify that the correct inbound SA associated with the public ID (IMPU) given in the SIP message has been used. This shall be done by verifying that the correct source IP address and source port bound to the public ID (IMPU) of the SIP message have been used for sending the message.

D.2 Security mode setup for IPsec ESP

This section describes how the security mode setup described in chapter 7 shall be used for negotiating ESP as protection mechanism and setting up the parameters required by ESP.

D.2.1 General procedures specific to the ESP protection mechanism

The integrity and encryption mechanisms both have the value "esp". The fields SA_ID_U and SA_ID_P carry the SPI values to be exchanged, to identify the ESP SAs. The list of supported algorithms shall not include "NULL Authentication algorithm".

The anti-replay service shall be enabled in the UE and the P-CSCF on all established SAs.

The P-CSCF shall use an unprotected port to be able to receive specific unprotected messages. This unprotected port has to be communicated to the UE, by using the *info* field of message SM6. This unprotected port is required, when an IPsec SA is already in place at the P-CSCF, but the UE due to any reason is not able to use this SA. In this case, the UE shall send error messages or a new REGISTER message in the clear to the P-CSCF port received in the *info* field within SM6. Otherwise at the P-CSCF side, ESP would simply drop all IP packets from the UE that fail the integrity check.

The error messages that shall be sent in the clear from the UE to the P-CSCF are these for network authentication failures (sections 7.3.1.2) and synchronization failures (section 7.3.1.3).