

## CHANGE REQUEST

⌘ **25.331** **CR 1976** ⌘ rev **3** ⌘ Current version: **3.e.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:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Ciphering Mode info IE in 2G-3G Handover		
<b>Source:</b>	⌘ Ericsson, Nokia		
<b>Work item code:</b>	⌘ TEI	<b>Date:</b>	⌘ 02/06/2003
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ R99
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	<b>F</b> (correction)		2 (GSM Phase 2)
	<b>A</b> (corresponds to a correction in an earlier release)		R96 (Release 1996)
	<b>B</b> (addition of feature),		R97 (Release 1997)
	<b>C</b> (functional modification of feature)		R98 (Release 1998)
	<b>D</b> (editorial modification)		R99 (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

<b>Reason for change:</b>	⌘ Currently section 8.6.5-33.102 states that upon handover to 3G the Serving RNC sends the Security Mode Command to setup Integrity. However, it is not stated if the SMC should include ciphering information or not.
	The inclusion of ciphering information under these conditions is a potential problem for UE implementations. Currently, it is mandated that for the UE to set the ciphering activation time on the HANDOVER TO UTRAN COMPLETE message to a value that is at least 200 frames in advance and lies on an 80ms TTI boundary. If the activation time for TM bearers is chosen such that it would trigger the usage of a new ciphering configuration before the HFN starts being incremented, the UE actions are not defined in the current specification.
	Currently, in case UE receives a new security key set while connected via another RAT, it is not clear what START value that UE shall associate with this new key set.
	Currently, it is not clear that UE, after a handovr to UTRAN, shall continue to use the key set currently in use in the other RAT.
<b>Summary of change:</b>	⌘ It is clarified that the UTRAN should not send the Ciphering Mode Info IE again, until all ciphering activation times for RBs using RLC-TM of the concerned CN domain have expired.
	It is clarified that UTRAN should not include IE Ciphering Mode Info in the Security Mode Command to start Integrity Protection.
	It is clarified that UE shall associate the START values sent in HANDOVER TO UTRAN COMPLETE with the key set in use at the handover to UTRAN.

It is clarified that UE, after a handover to UTRAN, shall continue to use the key set in use in the other RAT prior to handover.

**Impact Analysis:**

This CR only affects functionality covered by "Consequences if not approved"

**Consequences if not approved:**

⌘ The UTRAN may send a SECURITY MODE COMMAND message (e.g. when starting Integrity protection) which contains a ciphering reconfiguration. If this reconfiguration occurs before all the pending ciphering activation times have elapsed, it will have an unpredictable result (i.e. The UE behaviour is not specified) and loss of ciphering synchronisation between UE and UTRAN may occur.

UE (or UTRAN) may apply the wrong START value for ciphering or ciphering key in UTRAN if new keys are received in GSM.

**Clauses affected:**

⌘ 8.3.6.3

**Other specs affected:**

Y	N	
	X	Other core specifications
	X	Test specifications
	X	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.

### 8.3.6.3 Reception of HANDOVER TO UTRAN COMMAND message by the UE

The UE shall be able to receive a HANDOVER TO UTRAN COMMAND message and perform an inter-RAT handover, even if no prior UE measurements have been performed on the target UTRAN cell and/or frequency.

The UE shall act upon all received information elements as specified in subclause 8.6, unless specified otherwise in the following. The UE shall:

- 1> store a U-RNTI value (32 bits), which is derived by the IEs "SRNC identity" (12 bits) and "S-RNTI 2" (10 bits) included in IE "U-RNTI-short". In order to produce a full size U-RNTI value, a full size "S-RNTI" (20 bits) shall be derived by padding the IE "S-RNTI 2" with 10 zero bits in the most significant positions; and
- 1> initialise the variable ESTABLISHED\_SIGNALLING\_CONNECTIONS with the signalling connections that remains after the handover according to the specifications of the source RAT;
- 1> initialise the variable UE\_CAPABILITIES\_TRANSFERRED with the UE capabilities that have been transferred to the network up to the point prior to the handover, if any;
- 1> initialise the variable TIMERS\_AND\_CONSTANTS to the default values and start to use those timer and constants values;
- 1> if IE "Specification mode" is set to "Preconfiguration" and IE "Preconfiguration mode" is set to "Predefined configuration":
  - 2> initiate the radio bearer and transport channel configuration in accordance with the predefined parameters identified by the IE "Predefined configuration identity";
  - 2> initiate the physical channels in accordance with the predefined parameters identified by the IE "Predefined radio configuration identity" and the received physical channel information elements;
  - 2> store information about the established radio access bearers and radio bearers according to the IE "Predefined configuration identity"; and
  - 2> set the IE "RAB Info Post" in the variable ESTABLISHED\_RABS and the IE "Re-establishment timer" in the IE "RAB Info" in the variable ESTABLISHED\_RABS to "useT314".
- 1> if IE "Specification mode" is set to "Preconfiguration" and IE "Preconfiguration mode" is set to "Default configuration":
  - 2> initiate the radio bearer and transport channel configuration in accordance with the default parameters identified by the IE "Default configuration mode" and IE "Default configuration identity";
  - 2> initiate the physical channels in accordance with the default parameters identified by the IE "Default configuration mode" and IE "Default configuration identity" and the received physical channel information elements;

NOTE: IE "Default configuration mode" specifies whether the FDD or TDD version of the default configuration shall be used

- 2> set the IE "RAB Info Post" in the variable ESTABLISHED\_RABS and the IE "Re-establishment timer" in the IE "RAB Info" in the variable ESTABLISHED\_RABS to "useT314".
- 1> if IE "Specification mode" is set to "Preconfiguration":
  - 2> use the following values for parameters that are neither signalled within the HANDOVER TO UTRAN COMMAND message nor included within pre-defined or default configuration:
    - 3> 0 dB for the power offset  $P_{\text{Pilot-DPDCH}}$  bearer in FDD;
    - 3> calculate the Default DPCH Offset Value using the following formula:
      - 3> in FDD:
 
$$\text{Default DPCH Offset Value} = (\text{SRNTI 2 mod } 600) * 512$$
      - 3> in TDD:

Default DPCH Offset Value = (SRNTI 2 mod 7)

3> handle the above Default DPCH Offset Value as if an IE with that value was included in the message, as specified in subclause 8.6.6.21.

1> if IE "Specification mode" is set to "Complete specification":

2> initiate the radio bearer, transport channel and physical channel configuration in accordance with the received radio bearer, transport channel and physical channel information elements.

1> perform an open loop estimation to determine the UL transmission power according to subclause 8.5.3;

1> set the IE "START" for each CN domain, in the IE "START list" in the HANDOVER TO UTRAN COMPLETE message equal to the START value for each CN domain stored in the USIM if the USIM is present, or as stored in the UE for each CN domain if the SIM is present;

NOTE: New keys received in another RAT does not trigger the actions in 8.1.12.3.1 in a subsequent security control procedure. If the UE has received new keys in the other RAT before handover, then the START values in the USIM (sent in the HANDOVER TO UTRAN COMPLETE message and in the INTER\_RAT\_HANDOVER\_INFO sent to the BSS while in the other RAT) will not reflect the receipt of these new keys.

1> if ciphering has been activated and ongoing in the radio access technology from which inter- RAT handover is performed:

2> for the CN domain included in the IE "CN domain identity" which is included in the IE "RAB info" of the IE "RAB information to setup", or the CS domain when these IEs are not present:

3> set the variable LATEST\_CONFIGURED\_CN\_DOMAIN to the value indicated in the IE "CN domain identity", or to the CS domain when this IE is not present;

3> set the 20 MSB of the HFN component of the COUNT-C variable for all radio bearers using RLC-TM and all signalling radio bearers to the "START" value included in the IE "UE security information" in the variable "INTER\_RAT\_HANDOVER\_INFO\_TRANSFERRED";

3> set the remaining LSBs of the HFN component of COUNT-C for all radio bearers using RLC-TM and all signalling radio bearers to zero;

3> not increment the HFN component of COUNT-C for radio bearers using RLC-TM, i.e. keep the HFN value fixed without incrementing every CFN cycle;

3> set the CFN component of the COUNT-C variable to the value of the CFN as calculated in subclause 8.5.15;

3> set the IE "Status" in the variable CIPHERING\_STATUS to "Started";

3> apply the algorithm according to IE "Ciphering Algorithm" with the ciphering key set used while in the other radio access technology prior to handover and apply ciphering immediately upon reception of the HANDOVER TO UTRAN COMMAND.

NOTE: If ciphering has been activated and ongoing in the radio access technology from which inter RAT handover is performed, UTRAN should not include the IE "Ciphering mode info" in the SECURITY MODE COMMAND message that starts Integrity protection, and should not send a SECURITY MODE COMMAND including IE "Ciphering mode info" and IE "CN domain identity" set to the same value as UE variable LATEST\_CONFIGURED\_CN\_DOMAIN until all pending ciphering activation times have been reached for the radio bearers using RLC-TM.

1> if ciphering has not been activated and ongoing in the radio access technology from which inter-RAT handover is performed:

2> for the CN domain included in the IE "CN domain identity" which is included in the IE "RAB info" of the IE "RAB information to setup", or the CS domain when these IEs are not present:

3> set the IE "Status" in the variable CIPHERING\_STATUS to "Not Started".

If the UE succeeds in establishing the connection to UTRAN, it shall:

- 1> if the IE "Status" in the variable CIPHERING\_STATUS of a CN domain is set to "Started" and transparent mode radio bearers have been established by this procedure for that CN domain:
  - 2> include the IE "COUNT-C activation time" in the response message and specify a CFN value other than the default, "Now", that is a multiple of 8 frames ( $CFN \bmod 8 = 0$ ) and lies at least 200 frames ahead of the CFN in which the response message is first transmitted;
  - 2> at the CFN value as indicated in the response message in the IE "COUNT-C activation time" for radio bearers using RLC-TM:
    - 3> set the 20 MSB of the HFN component of the COUNT-C variable common for all transparent mode radio bearers of this CN domain to the START value as indicated in the IE "START list" of the response message for the relevant CN domain; and
    - 3> set the remaining LSBs of the HFN component of COUNT-C to zero;
    - 3> increment the HFN component of the COUNT-C variable by one even if the "COUNT-C activation time" is equal to zero;
    - 3> set the CFN component of the COUNT-C to the value of the IE "COUNT-C activation time" of the response message. The HFN component and the CFN component completely initialise the COUNT-C variable;
    - 3> step the COUNT-C variable, as normal, at each CFN value. The HFN component is no longer fixed in value but incremented at each CFN cycle.
- 1> if the IE "Status" in the variable CIPHERING\_STATUS of a CN domain is set to "Not Started" and transparent mode radio bearers have been established by this procedure for that CN domain:
  - 2> initialise the 20 MSB of the HFN component of COUNT-C common for all transparent mode radio bearers of this CN domain with the START value as indicated in the IE "START list" of the response message for the relevant CN domain;
  - 2> set the remaining LSBs of the HFN component of COUNT-C to zero;
  - 2> do not increment the COUNT-C value common for all transparent mode radio bearers for this CN domain.
- 1> transmit a HANDOVER TO UTRAN COMPLETE message on the uplink DCCH, using, if ciphering has been started, the new ciphering configuration;
- 1> when the HANDOVER TO UTRAN COMPLETE message has been submitted to lower layers for transmission:
  - 2> enter UTRA RRC connected mode in state CELL\_DCH;
  - 2> initialise variables upon entering UTRA RRC connected mode as specified in subclause 13.4;
  - 2> update the variable UE\_CAPABILITY\_TRANSFERRED with the UE capabilities stored in the variable INTER\_RAT\_HANDOVER\_INFO\_TRANSFERRED;
  - 2> for all radio bearers using RLC-AM or RLC-UM:
    - 3> set the 20 MSB of the HFN component of the uplink and downlink COUNT-C variable to the START value indicated in the IE "START list" of the response message for the relevant CN domain; and
    - 3> set the remaining LSBs of the HFN component of COUNT-C to zero;
    - 3> increment the HFN component of the COUNT-C variable by one;
    - 3> start incrementing the COUNT-C values.
- 1> and the procedure ends.

CR-Form-v7

## CHANGE REQUEST

⌘ **25.331** **CR 1977** ⌘ rev **3** ⌘ Current version: **4.9.0** ⌘

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**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Cipherng Mode info IE in 2G-3G Handover		
<b>Source:</b>	⌘ Ericsson, Nokia		
<b>Work item code:</b>	⌘ TEI	<b>Date:</b>	⌘ 02/06/2003
<b>Category:</b>	⌘ <b>A</b>	<b>Release:</b>	⌘ Rel-4
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	<b>F</b> (correction)		2 (GSM Phase 2)
	<b>A</b> (corresponds to a correction in an earlier release)		R96 (Release 1996)
	<b>B</b> (addition of feature),		R97 (Release 1997)
	<b>C</b> (functional modification of feature)		R98 (Release 1998)
	<b>D</b> (editorial modification)		R99 (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

<b>Reason for change:</b>	⌘ Currently section 8.6.5-33.102 states that upon handover to 3G the Serving RNC sends the Security Mode Command to setup Integrity. However, it is not stated if the SMC should include cipherng information or not.
	The inclusion of cipherng information under these conditions is a potential problem for UE implementations. Currently, it is mandated that for the UE to set the cipherng activation time on the HANDOVER TO UTRAN COMPLETE message to a value that is at least 200 frames in advance and lies on an 80ms TTI boundary. If the activation time for TM bearers is chosen such that it would trigger the usage of a new cipherng configuration before the HFN starts being incremented, the UE actions are not defined in the current specification.
	Currently, in case UE receives a new security key set while connected via another RAT, it is not clear what START value that UE shall associate with this new key set.
	Currently, it is not clear that UE, after a handovr to UTRAN, shall continue to use the key set currently in use in the other RAT.
<b>Summary of change:</b>	⌘ It is clarified that the UTRAN should not send the Cipherng Mode Info IE again, until all cipherng activation times for RBs using RLC-TM of the concerned CN domain have expired.
	It is clarified that UTRAN should not include IE Cipherng Mode Info in the Security Mode Command to start Integrity Protection.
	It is clarified that UE shall associate the START values sent in HANDOVER TO UTRAN COMPLETE with the key set in use at the handover to UTRAN.

It is clarified that UE, after a handover to UTRAN, shall continue to use the key set in use in the other RAT prior to handover.

**Impact Analysis:**

This CR only affects UTRAN and its impact is covered by "Consequences if not approved"

**Consequences if not approved:**

⌘ The UTRAN may send a SECURITY MODE COMMAND message (e.g. when starting Integrity protection) which contains a ciphering reconfiguration. If this reconfiguration occurs before all the pending ciphering activation times have elapsed, it will have an unpredictable result (i.e. The UE behaviour is not specified) and loss of ciphering synchronisation between UE and UTRAN may occur.

UE (or UTRAN) may apply the wrong START value for ciphering or ciphering key in UTRAN if new keys are received in GSM.

**Clauses affected:** ⌘ 8.3.6.3

**Other specs affected:**

Y	N	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Other core specifications
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Test specifications
<input checked="" type="checkbox"/>	<input type="checkbox"/>	O&M Specifications

⌘

**Other comments:** ⌘

**How to create CRs using this form:**

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### 8.3.6.3 Reception of HANDOVER TO UTRAN COMMAND message by the UE

The UE shall be able to receive a HANDOVER TO UTRAN COMMAND message and perform an inter-RAT handover, even if no prior UE measurements have been performed on the target UTRAN cell and/or frequency.

The UE shall act upon all received information elements as specified in subclause 8.6, unless specified otherwise in the following.

The UE may:

- 1> maintain a list of the set of cells to which the UE has Radio Links if the IE "Cell ID" is present.

The UE shall:

- 1> store a U-RNTI value (32 bits), which is derived by the IEs "SRNC identity" (12 bits) and "S-RNTI 2" (10 bits) included in IE "U-RNTI-short". In order to produce a full size U-RNTI value, a full size "S-RNTI" (20 bits) shall be derived by padding the IE "S-RNTI 2" with 10 zero bits in the most significant positions; and
- 1> initialise the variable ESTABLISHED\_SIGNALLING\_CONNECTIONS with the signalling connections that remains after the handover according to the specifications of the source RAT;
- 1> initialise the variable UE\_CAPABILITIES\_TRANSFERRED with the UE capabilities that have been transferred to the network up to the point prior to the handover, if any;
- 1> initialise the variable TIMERS\_AND\_CONSTANTS to the default values and start to use those timer and constants values;
- 1> if IE "Specification mode" is set to "Preconfiguration" and IE "Preconfiguration mode" is set to "Predefined configuration":
  - 2> initiate the radio bearer and transport channel configuration in accordance with the predefined parameters identified by the IE "Predefined configuration identity";
  - 2> initiate the physical channels in accordance with the predefined parameters identified by the IE "Predefined radio configuration identity" and the received physical channel information elements;
  - 2> store information about the established radio access bearers and radio bearers according to the IE "Predefined configuration identity"; and
  - 2> set the IE "RAB Info Post" in the variable ESTABLISHED\_RABS and the IE "Re-establishment timer" in the IE "RAB Info" in the variable ESTABLISHED\_RABS to "useT314".
- 1> if IE "Specification mode" is set to "Preconfiguration" and IE "Preconfiguration mode" is set to "Default configuration":
  - 2> initiate the radio bearer and transport channel configuration in accordance with the default parameters identified by the IE "Default configuration mode" and IE "Default configuration identity";
  - 2> initiate the physical channels in accordance with the default parameters identified by the IE "Default configuration mode" and IE "Default configuration identity" and the received physical channel information elements;

NOTE: IE "Default configuration mode" specifies whether the FDD or TDD version of the default configuration shall be used

- 2> set the IE "RAB Info Post" in the variable ESTABLISHED\_RABS and the IE "Re-establishment timer" in the IE "RAB Info" in the variable ESTABLISHED\_RABS to "useT314".
- 1> if IE "Specification mode" is set to "Preconfiguration":
  - 2> use the following values for parameters that are neither signalled within the HANDOVER TO UTRAN COMMAND message nor included within pre-defined or default configuration:
    - 3> 0 dB for the power offset  $P_{\text{Pilot-DPDCH}}$  bearer in FDD;
    - 3> calculate the Default DPCH Offset Value using the following formula:



3> in FDD:

Default DPCH Offset Value = (SRNTI 2 mod 600) \* 512

3> in TDD:

Default DPCH Offset Value = (SRNTI 2 mod 7)

3> handle the above Default DPCH Offset Value as if an IE with that value was included in the message, as specified in subclause 8.6.6.21.

1> if IE "Specification mode" is set to "Complete specification":

2> initiate the radio bearer, transport channel and physical channel configuration in accordance with the received radio bearer, transport channel and physical channel information elements.

1> perform an open loop estimation to determine the UL transmission power according to subclause 8.5.3;

1> set the IE "START" for each CN domain, in the IE "START list" in the HANDOVER TO UTRAN COMPLETE message equal to the START value for each CN domain stored in the USIM if the USIM is present, or as stored in the UE for each CN domain if the SIM is present;

NOTE: New keys received in another RAT does not trigger the actions in 8.1.12.3.1 in a subsequent security control procedure. If the UE has received new keys in the other RAT before handover, then the START values in the USIM (sent in the HANDOVER TO UTRAN COMPLETE message and in the INTER\_RAT\_HANDOVER\_INFO sent to the BSS while in the other RAT) will not reflect the receipt of these new keys.

1> if ciphering has been activated and ongoing in the radio access technology from which inter- RAT handover is performed:

2> for the CN domain included in the IE "CN domain identity" which is included in the IE "RAB info" of the IE "RAB information to setup", or the CS domain when these IEs are not present:

3> set the variable LATEST\_CONFIGURED\_CN\_DOMAIN to the value indicated in the IE "CN domain identity", or to the CS domain when this IE is not present;

3> set the 20 MSB of the HFN component of the COUNT-C variable for all radio bearers using RLC-TM and all signalling radio bearers to the "START" value included in the IE "UE security information" in the variable "INTER\_RAT\_HANDOVER\_INFO\_TRANSFERRED";

3> set the remaining LSBs of the HFN component of COUNT-C for all radio bearers using RLC-TM and all signalling radio bearers to zero;

3> not increment the HFN component of COUNT-C for radio bearers using RLC-TM, i.e. keep the HFN value fixed without incrementing every CFN cycle;

3> set the CFN component of the COUNT-C variable to the value of the CFN as calculated in subclause 8.5.15;

3> set the IE "Status" in the variable CIPHERING\_STATUS to "Started";

3> apply the algorithm according to IE "Ciphering Algorithm" with the ciphering key set used while in the other radio access technology prior to handover and apply ciphering immediately upon reception of the HANDOVER TO UTRAN COMMAND.

NOTE: If ciphering has been activated and ongoing in the radio access technology from which inter RAT handover is performed, UTRAN should not include the IE "Ciphering mode info" in the SECURITY MODE COMMAND message that starts Integrity protection, and should not send a SECURITY MODE COMMAND including IE "Ciphering mode info" and IE "CN domain identity" set to the same value as UE variable LATEST\_CONFIGURED\_CN\_DOMAIN until all pending ciphering activation times have been reached for the radio bearers using RLC-TM.

1> if ciphering has not been activated and ongoing in the radio access technology from which inter-RAT handover is performed:

- 2> for the CN domain included in the IE "CN domain identity" which is included in the IE "RAB info" of the IE "RAB information to setup", or the CS domain when these IEs are not present:
- 3> set the IE "Status" in the variable CIPHERING\_STATUS to "Not Started".

If the UE succeeds in establishing the connection to UTRAN, it shall:

- 1> if the IE "Status" in the variable CIPHERING\_STATUS of a CN domain is set to "Started" and transparent mode radio bearers have been established by this procedure for that CN domain:
  - include the IE "COUNT-C activation time" in the response message and specify a CFN value for this IE other than the default, "Now", that is a multiple of 8 frames ( $CFN \bmod 8 = 0$ ) and lies at least 200 frames ahead of the CFN in which the response message is first transmitted;
  - 2> at the CFN value as indicated in the response message in the IE "COUNT-C activation time" for radio bearers using RLC-TM:
    - 3> set the 20 MSB of the HFN component of the COUNT-C variable common for all transparent mode radio bearers of this CN domain to the START value as indicated in the IE "START list" of the response message for the relevant CN domain; and
    - 3> set the remaining LSBs of the HFN component of COUNT-C to zero;
    - 3> increment the HFN component of the COUNT-C variable by one even if the "COUNT-C activation time" is equal to zero;
    - 3> set the CFN component of the COUNT-C to the value of the IE "COUNT-C activation time" of the response message. The HFN component and the CFN component completely initialise the COUNT-C variable;
    - 3> step the COUNT-C variable, as normal, at each CFN value. The HFN component is no longer fixed in value but incremented at each CFN cycle.
- 1> if the IE "Status" in the variable CIPHERING\_STATUS of a CN domain is set to "Not Started" and transparent mode radio bearers have been established by this procedure for that CN domain:
  - 2> initialise the 20 MSB of the HFN component of COUNT-C common for all transparent mode radio bearers of this CN domain with the START value as indicated in the IE "START list" of the response message for the relevant CN domain;
  - 2> set the remaining LSBs of the HFN component of COUNT-C to zero;
  - 2> do not increment the COUNT-C value common for all transparent mode radio bearers for this CN domain.
- 1> transmit a HANDBOVER TO UTRAN COMPLETE message on the uplink DCCH, using, if ciphering has been started, the new ciphering configuration;
- 1> when the HANDBOVER TO UTRAN COMPLETE message has been submitted to lower layers for transmission:
  - 2> enter UTRA RRC connected mode in state CELL\_DCH;
  - 2> initialise variables upon entering UTRA RRC connected mode as specified in subclause 13.4;
  - 2> update the variable UE\_CAPABILITY\_TRANSFERRED with the UE capabilities stored in the variable INTER\_RAT\_HANDBOVER\_INFO\_TRANSFERRED;
  - 2> for all radio bearers using RLC-AM or RLC-UM:
    - 3> set the 20 MSB of the HFN component of the uplink and downlink COUNT-C variable to the START value indicated in the IE "START list" of the response message for the relevant CN domain; and
    - 3> set the remaining LSBs of the HFN component of COUNT-C to zero;
    - 3> increment the HFN component of the COUNT-C variable by one;
    - 3> start incrementing the COUNT-C values.

1> and the procedure ends.

## CHANGE REQUEST

# **25.331** **CR 1978** # rev **3** # Current version: **5.4.0** #

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

**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	# Ciphering Mode info IE in 2G-3G Handover		
<b>Source:</b>	# Ericsson, Nokia		
<b>Work item code:</b>	# TEI	<b>Date:</b>	# 02/06/2003
<b>Category:</b>	# <b>A</b>	<b>Release:</b>	# Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	<b>F</b> (correction)		2 (GSM Phase 2)
	<b>A</b> (corresponds to a correction in an earlier release)		R96 (Release 1996)
	<b>B</b> (addition of feature),		R97 (Release 1997)
	<b>C</b> (functional modification of feature)		R98 (Release 1998)
	<b>D</b> (editorial modification)		R99 (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

<b>Reason for change:</b>	# Currently section 8.6.5-33.102 states that upon handover to 3G the Serving RNC sends the Security Mode Command to setup Integrity. However, it is not stated if the SMC should include ciphering information or not.
	<p>The inclusion of ciphering information under these conditions is a potential problem for UE implementations. Currently, it is mandated that for the UE to set the ciphering activation time on the HANDOVER TO UTRAN COMPLETE message to a value that is at least 200 frames in advance and lies on an 80ms TTI boundary. If the activation time for TM bearers is chosen such that it would trigger the usage of a new ciphering configuration before the HFN starts being incremented, the UE actions are not defined in the current specification.</p> <p>Currently, in case UE receives a new security key set while connected via another RAT, it is not clear what START value that UE shall associate with this new key set.</p> <p>Currently, it is not clear that UE, after a handovr to UTRAN, shall continue to use the key set currently in use in the other RAT.</p>
<b>Summary of change:</b>	# It is clarified that the UTRAN should not send the Ciphering Mode Info IE again, until all ciphering activation times for RBs using RLC-TM of the concerned CN domain have expired.
	It is clarified that UTRAN should not include IE Ciphering Mode Info in the Security Mode Command to start Integrity Protection.
	It is clarified that UE shall associate the START values sent in HANDOVER TO UTRAN COMPLETE with the key set in use at the handover to UTRAN.

It is clarified that UE, after a handover to UTRAN, shall continue to use the key set in use in the other RAT prior to handover.

**Impact Analysis:**

This CR only affects UTRAN and its impact is covered by "Consequences if not approved"

**Consequences if not approved:**

⌘ The UTRAN may send a SECURITY MODE COMMAND message (e.g. when starting Integrity protection) which contains a ciphering reconfiguration. If this reconfiguration occurs before all the pending ciphering activation times have elapsed, it will have an unpredictable result (i.e. The UE behaviour is not specified) and loss of ciphering synchronisation between UE and UTRAN may occur.

UE (or UTRAN) may apply the wrong START value for ciphering or ciphering key in UTRAN if new keys are received in GSM.

**Clauses affected:**

⌘ 8.3.6.3

**Other specs affected:**

Y	N	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Other core specifications
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Test specifications
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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.

### 8.3.6.3 Reception of HANDOVER TO UTRAN COMMAND message by the UE

The UE shall be able to receive a HANDOVER TO UTRAN COMMAND message and perform an inter-RAT handover, even if no prior UE measurements have been performed on the target UTRAN cell and/or frequency.

The UE shall act upon all received information elements as specified in subclause 8.6, unless specified otherwise in the following.

The UE may:

- 1> maintain a list of the set of cells to which the UE has Radio Links if the IE "Cell ID" is present.

The UE shall:

- 1> store a U-RNTI value (32 bits), which is derived by the IEs "SRNC identity" (12 bits) and "S-RNTI 2" (10 bits) included in IE "U-RNTI-short". In order to produce a full size U-RNTI value, a full size "S-RNTI" (20 bits) shall be derived by padding the IE "S-RNTI 2" with 10 zero bits in the most significant positions; and
- 1> initialise the variable ESTABLISHED\_SIGNALLING\_CONNECTIONS with the signalling connections that remains after the handover according to the specifications of the source RAT;
- 1> initialise the variable UE\_CAPABILITIES\_TRANSFERRED with the UE capabilities that have been transferred to the network up to the point prior to the handover, if any;
- 1> initialise the variable TIMERS\_AND\_CONSTANTS to the default values and start to use those timer and constants values;
- 1> if IE "Specification mode" is set to "Preconfiguration" and IE "Preconfiguration mode" is set to "Predefined configuration":
  - 2> initiate the radio bearer and transport channel configuration in accordance with the predefined parameters identified by the IE "Predefined configuration identity";
  - 2> initiate the physical channels in accordance with the predefined parameters identified by the IE "Predefined radio configuration identity" and the received physical channel information elements;
  - 2> store information about the established radio access bearers and radio bearers according to the IE "Predefined configuration identity"; and
  - 2> set the IE "RAB Info Post" in the variable ESTABLISHED\_RABS and the IE "Re-establishment timer" in the IE "RAB Info" in the variable ESTABLISHED\_RABS to "useT314".
- 1> if IE "Specification mode" is set to "Preconfiguration" and IE "Preconfiguration mode" is set to "Default configuration":
  - 2> initiate the radio bearer and transport channel configuration in accordance with the default parameters identified by the IE "Default configuration mode" and IE "Default configuration identity";
  - 2> initiate the physical channels in accordance with the default parameters identified by the IE "Default configuration mode" and IE "Default configuration identity" and the received physical channel information elements;

NOTE: IE "Default configuration mode" specifies whether the FDD or TDD version of the default configuration shall be used

- 2> set the IE "RAB Info Post" in the variable ESTABLISHED\_RABS and the IE "Re-establishment timer" in the IE "RAB Info" in the variable ESTABLISHED\_RABS to "useT314".
- 1> if IE "Specification mode" is set to "Preconfiguration":
  - 2> use the following values for parameters that are neither signalled within the HANDOVER TO UTRAN COMMAND message nor included within pre-defined or default configuration:
    - 3> 0 dB for the power offset  $P_{\text{Pilot-DPDCH}}$  bearer in FDD;
    - 3> calculate the Default DPCH Offset Value using the following formula:

3> in FDD:

Default DPCH Offset Value = (SRNTI 2 mod 600) \* 512

3> in TDD:

Default DPCH Offset Value = (SRNTI 2 mod 7)

3> handle the above Default DPCH Offset Value as if an IE with that value was included in the message, as specified in subclause 8.6.6.21.

1> if IE "Specification mode" is set to "Complete specification":

2> initiate the radio bearer, transport channel and physical channel configuration in accordance with the received radio bearer, transport channel and physical channel information elements.

1> perform an open loop estimation to determine the UL transmission power according to subclause 8.5.3;

1> set the IE "START" for each CN domain, in the IE "START list" in the HANDOVER TO UTRAN COMPLETE message equal to the START value for each CN domain stored in the USIM if the USIM is present, or as stored in the UE for each CN domain if the SIM is present;

NOTE: New keys received in another RAT does not trigger the actions in 8.1.12.3.1 in a subsequent security control procedure. If the UE has received new keys in the other RAT before handover, then the START values in the USIM (sent in the HANDOVER TO UTRAN COMPLETE message and in the INTER\_RAT\_HANDOVER\_INFO sent to the BSS while in the other RAT) will not reflect the receipt of these new keys.

1> if ciphering has been activated and ongoing in the radio access technology from which inter- RAT handover is performed:

2> for the CN domain included in the IE "CN domain identity" which is included in the IE "RAB info" of the IE "RAB information to setup", or the CS domain when these IEs are not present:

3> set the variable LATEST\_CONFIGURED\_CN\_DOMAIN to the value indicated in the IE "CN domain identity", or to the CS domain when this IE is not present;

3> set the 20 MSB of the HFN component of the COUNT-C variable for all radio bearers using RLC-TM and all signalling radio bearers to the "START" value included in the IE "UE security information" in the variable "INTER\_RAT\_HANDOVER\_INFO\_TRANSFERRED";

3> set the remaining LSBs of the HFN component of COUNT-C for all radio bearers using RLC-TM and all signalling radio bearers to zero;

3> not increment the HFN component of COUNT-C for radio bearers using RLC-TM, i.e. keep the HFN value fixed without incrementing every CFN cycle;

3> set the CFN component of the COUNT-C variable to the value of the CFN as calculated in subclause 8.5.15;

3> set the IE "Status" in the variable CIPHERING\_STATUS to "Started";

3> apply the algorithm according to IE "Ciphering Algorithm" with the ciphering key set used while in the other radio access technology prior to handover and apply ciphering immediately upon reception of the HANDOVER TO UTRAN COMMAND.

NOTE: If ciphering has been activated and ongoing in the radio access technology from which inter RAT handover is performed, UTRAN should not include the IE "Ciphering mode info" in the SECURITY MODE COMMAND message that starts Integrity protection, and should not send a SECURITY MODE COMMAND including IE "Ciphering mode info" and IE "CN domain identity" set to the same value as UE variable LATEST\_CONFIGURED\_CN\_DOMAIN until all pending ciphering activation times have been reached for the radio bearers using RLC-TM.

1> if ciphering has not been activated and ongoing in the radio access technology from which inter-RAT handover is performed:

- 2> for the CN domain included in the IE "CN domain identity" which is included in the IE "RAB info" of the IE "RAB information to setup", or the CS domain when these IEs are not present:
- 3> set the IE "Status" in the variable CIPHERING\_STATUS to "Not Started".

If the UE succeeds in establishing the connection to UTRAN, it shall:

- 1> if the IE "Status" in the variable CIPHERING\_STATUS of a CN domain is set to "Started" and transparent mode radio bearers have been established by this procedure for that CN domain:
  - include the IE "COUNT-C activation time" in the response message and specify a CFN value for this IE other than the default, "Now", that is a multiple of 8 frames ( $CFN \bmod 8 = 0$ ) and lies at least 200 frames ahead of the CFN in which the response message is first transmitted;
  - 2> at the CFN value as indicated in the response message in the IE "COUNT-C activation time" for radio bearers using RLC-TM:
    - 3> set the 20 MSB of the HFN component of the COUNT-C variable common for all transparent mode radio bearers of this CN domain to the START value as indicated in the IE "START list" of the response message for the relevant CN domain; and
    - 3> set the remaining LSBs of the HFN component of COUNT-C to zero;
    - 3> increment the HFN component of the COUNT-C variable by one even if the "COUNT-C activation time" is equal to zero;
    - 3> set the CFN component of the COUNT-C to the value of the IE "COUNT-C activation time" of the response message. The HFN component and the CFN component completely initialise the COUNT-C variable;
    - 3> step the COUNT-C variable, as normal, at each CFN value. The HFN component is no longer fixed in value but incremented at each CFN cycle.
- 1> if the IE "Status" in the variable CIPHERING\_STATUS of a CN domain is set to "Not Started" and transparent mode radio bearers have been established by this procedure for that CN domain:
  - 2> initialise the 20 MSB of the HFN component of COUNT-C common for all transparent mode radio bearers of this CN domain with the START value as indicated in the IE "START list" of the response message for the relevant CN domain;
  - 2> set the remaining LSBs of the HFN component of COUNT-C to zero;
  - 2> do not increment the COUNT-C value common for all transparent mode radio bearers for this CN domain.
- 1> transmit a HANDBOVER TO UTRAN COMPLETE message on the uplink DCCH, using, if ciphering has been started, the new ciphering configuration;
- 1> when the HANDBOVER TO UTRAN COMPLETE message has been submitted to lower layers for transmission:
  - 2> enter UTRA RRC connected mode in state CELL\_DCH;
  - 2> initialise variables upon entering UTRA RRC connected mode as specified in subclause 13.4;
  - 2> update the variable UE\_CAPABILITY\_TRANSFERRED with the UE capabilities stored in the variable INTER\_RAT\_HANDBOVER\_INFO\_TRANSFERRED;
  - 2> for all radio bearers using RLC-AM or RLC-UM:
    - 3> set the 20 MSB of the HFN component of the uplink and downlink COUNT-C variable to the START value indicated in the IE "START list" of the response message for the relevant CN domain; and
    - 3> set the remaining LSBs of the HFN component of COUNT-C to zero;
    - 3> increment the HFN component of the COUNT-C variable by one;
    - 3> start incrementing the COUNT-C values.



1> and the procedure ends.