

ISITEP

D4.4.1 - REQUIREMENTS FOR TETRAPOL-TETRAPOL INTEROPERABILITY

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Publishable extended abstract

This document specifies the requirements for realizing interoperability between 2 TETRAPOL legacy networks.



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1. INTRODUCTION

1.1. Introduction

ISITEP aims at achieving the interoperability between legacy PMR networks based on TETRA and TETRAPOL technologies. In order to avoid deeply modifying already deployed networks, ISITEP's partners' strategy consists in the implementation of gateways connected to legacy networks.

IN WP43, a hardware and software solution for ISITEP will be developed to allow interoperability between TETRA and TETRAPOL networks whereas in WP44 a hardware and software solution for ISITEP will be developed to allow interoperability between TETRAPOL networks.

1.2. Document scope

This deliverable (D44.1) is the first deliverable issued by WP44. It is corresponding to task T4.4.1 and aims at specifying the requirements for TETRAPOL-TETRAPOL IOP.

1.3. Purpose

This document provides System Requirements applicable to the TETRAPOL-TETRAPOL Gateway system.

The Gateway is used to interconnect TETRAPOL to TETRAPOL Regional Networks. It uses CC-API interface for signalling and analog or S0 digital audio signal for voice.

The system includes a hardware platform and distributed applications:

- Line Connected Terminals (HW and SW)
- CC-API server (SW)
- Voice Switching Matrix (HW and SW)
- RSW and CN (SW)

1.4. Document Overview

After a functional description of the Gateway system, technical requirements are refined for all sub-elements part of the solution.

The Gateway system development involves:

- LCT software evolution to allow Talking Party or Calling identification
- CC-API server software evolution to set the TPA to be transmitted by AG
- Switching Matrix development to realise interconnections and call establishment when needed
- RSW software evolution to route private call to the voice gateway when type of distant RN differs and relay calling address
- CN software evolution to route private call to the voice gateway when type of distant RN differs and relay calling address
- OMC software evolution to declare type of RN and voice gateway implicit address to route private call.

1.5. Acronyms

Acronym	Definition
AG	Access Gate
AI	Air Interface
CN	Control Node (IP TPOL network)
CNA	Code Nature of Address
EMOCH	Emergency Multi site Open Channel
ETH	ETHERnet
GW	GateWay
HW	HardWare
IP	Internet Protocol
LAG	Line Access Gate
LABS	Line Access Base Station
LATC	Line Access Terminal Controller
LCT	Line Connected Terminal
Li	L1st bit (=0 if last element in address list)
MD	Mediation Device in charge of Network Management
MMI	Man Machine Interface
MOCH	Multi site Open Channel
MSW	Main Switch (TDM TPOL network)
NA	Non Applicable
NPI	Numbering Plan Identifier
OA&M	Operation Administration and Maintenance
OMC	Operation & Maintenance Computer
PBM	Product Business Manager
PCM	Pulse Coded Modulation
RN	Regional Network
RSW	Radio Switch (TDM TPOL network)
SSW	Secondary Switch (TDM TPOL network)
SW	SoftWare
ST	System Terminal
TKG	Talk Group
TDM	Time Division Multiplexing
TMP	Technical Management Position
TPA	Talking Party Address
TPOL	TETRAPOL
TPS	Terminal Programming Station
TRS	Technical Requirements Specification

2. SYSTEM REQUIREMENTS

2.1. Functional Requirements

2.1.1. Group communication

SYS_GW_FUNC_010 Group communication loop back

The system shall allow group communication interconnection between 2 TPOL networks.

Only inter-RN group communications are concerned (TKG, MOCH).

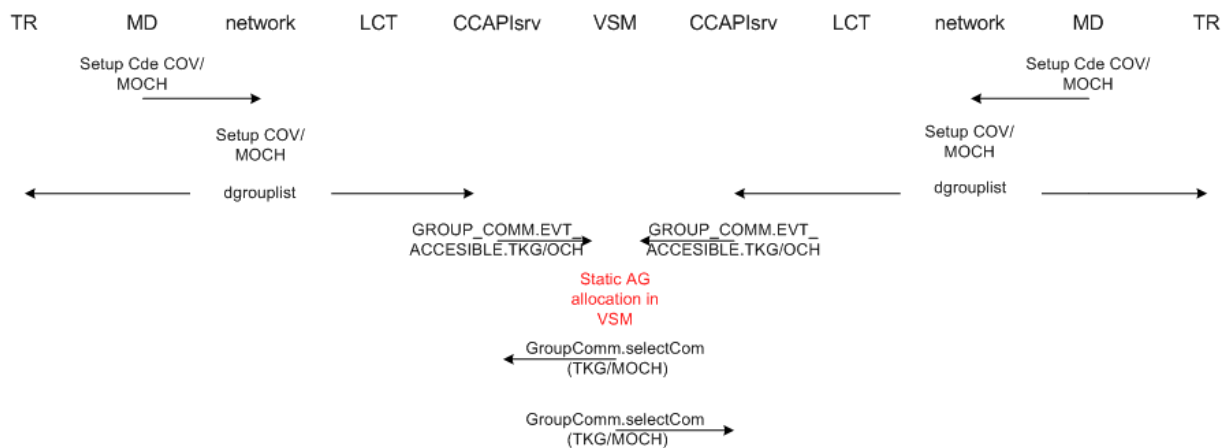
A group communication with same ID is setup on both side (TPOL network 1 and TPOL network 2). The 2 hardware IP LATC used are part of the communication coverages.

GW operators define the list of group communications to be switched permanently (static configuration) and the list of group communications to be switched on voice activity detection (dynamic configuration) if authorised by licence.

For static group communications, the operator can fix the pair of AG to be used. Then, this pair of AG will not be available for any other associations.

SYS_GW_FUNC_020 GW static AG switching configuration

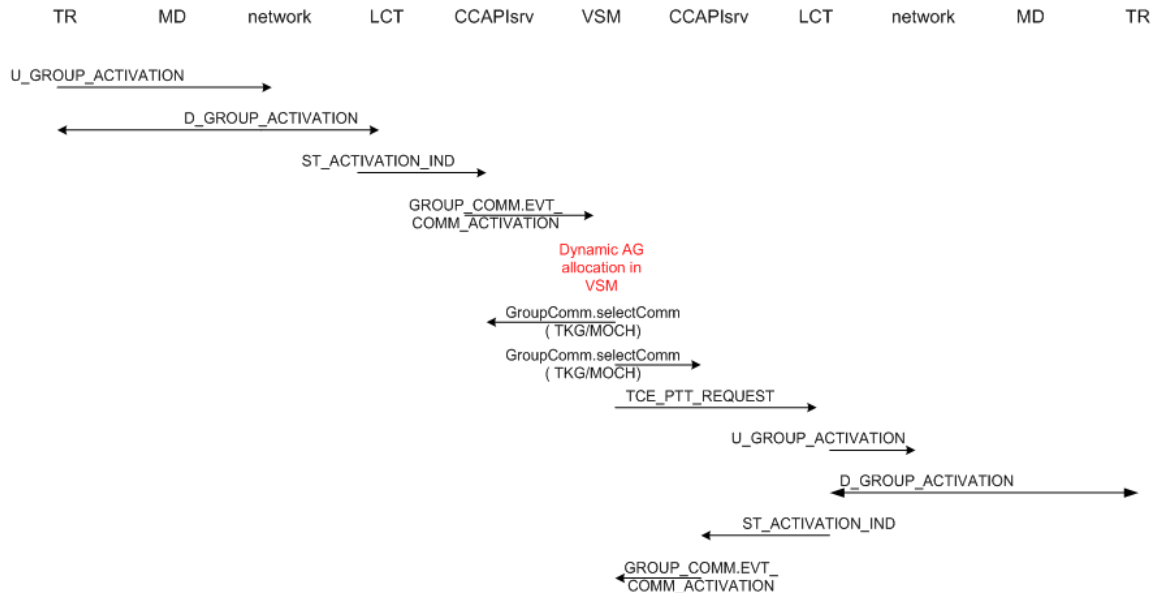
According to the configuration, the system shall realise permanent AG switching after same group communication identity setup on both parts. The list of static group communications to be switched shall be defined by the GW operator.



Static association switching

SYS_GW_FUNC_030 GW dynamic AG switching configuration

According to the configuration, the system shall realise dynamic AG switching on monitored group communications activity detection. The list of dynamic group communications to be switched shall be defined by the GW operator.

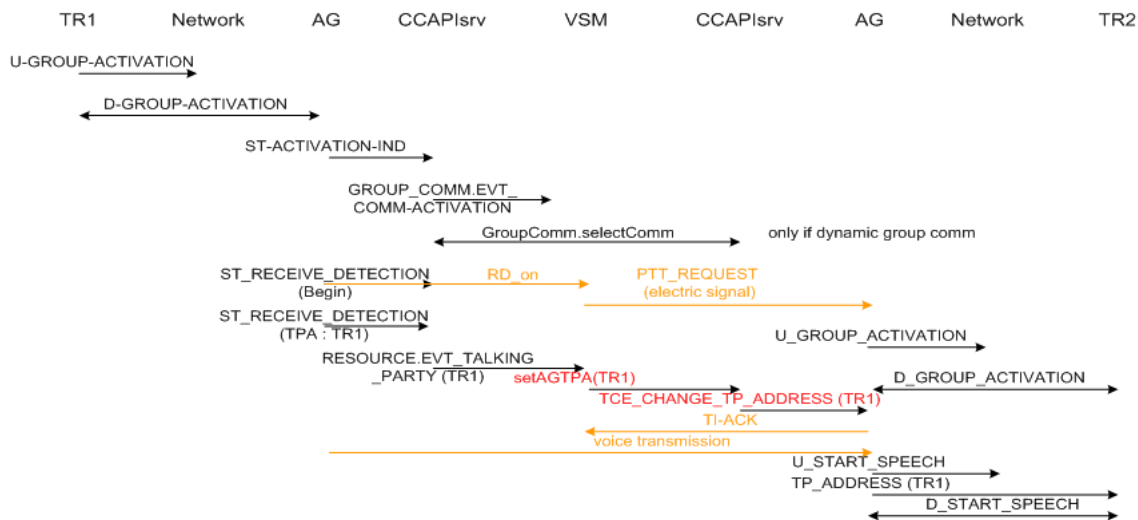


Dynamic association switching

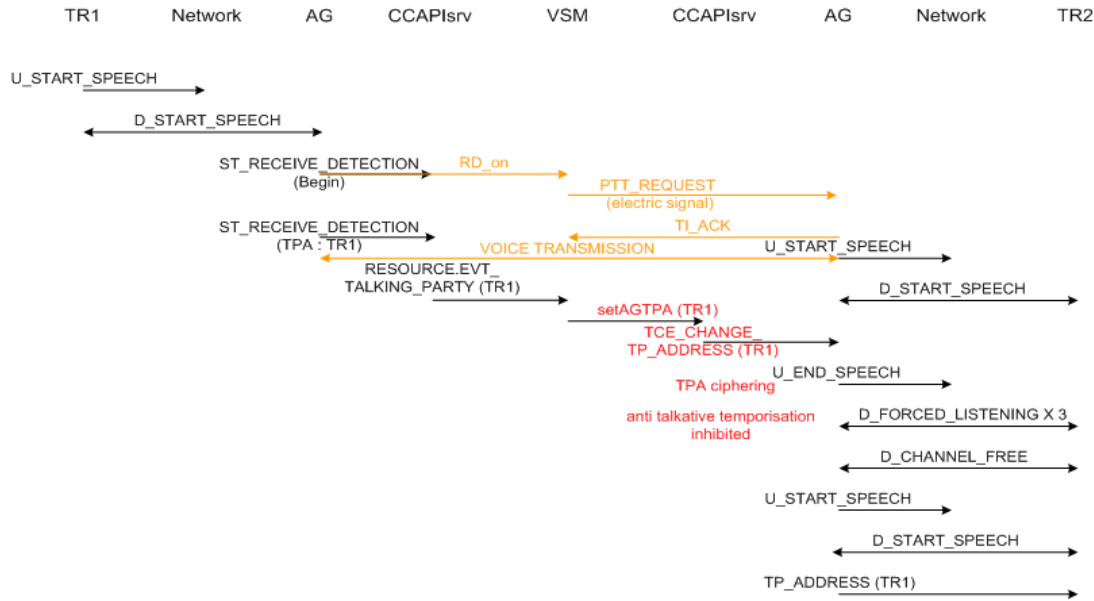
Talking party identifier is received once when the speech is transmitted. The speaker RFSI has to be transmitted on the switched group communication.

SYS_GW_FUNC_040 Group communication TPA transfer

According to the configuration, the system shall allow talking party identification on both sides of the GW. The TPA is relayed through CC-API.



TPA transfer after activation



TPA transfer on PTT

The audio signal is looped on the paired AG selected by the VSM.

SYS_GW_FUNC_050 Audio signal forwarding

The system shall realise audio signal forwarding between the two AG selected for the group communication. Audio signal is buffered to transmit the complete voice message after communication activation.

SYS_GW_FUNC_060 Network signalisation management

The system shall manage TPOL Network signalisation on the group communications.

SYS_GW_FUNC_070 Group comm. AG release conditions

The system shall release the AG as soon as:

- for dynamic groups, the communication is inactive even if it is still present in the available monitored group communications list
- for static groups, the communication is released on one side (communication is no more present in the AG monitored group communications)

2.1.2. Private communication

When an individual call is setup, the Regional Network (MSW or CN) where the calling terminal is registered shall locate the called terminal. If the called terminal is situated inside a different type of RN, the call shall be forwarded to the GW. Otherwise it can be routed directly within the group of regional networks running in the same TETRAPOL solution.

SYS_GW_FUNC_080 RN type knowledge

The system shall know the type of each RN (TETRA or TETRAPOL).

If the call has to be routed through the Gateway, an individual call is setup between the calling System Terminal and the gateway with as sub-numbering address the called ST identifier.

NB: this requirement is here to maintain consistency between TPOL TPOL GW and TETRA TPOL GW. In this document, we only deal with TPOL TPOL IOP

SYS_GW_FUNC_090 Private Call forwarding when type differs

When the distant RN type differs, the system shall route the private call to the implicit address of the gateway associated to the destination RN.

SYS_GW_FUNC_100 Called address sub-numbering

The system shall add the called identifier address as sub-numbering part of the calling address.

SYS_GW_FUNC_110 GW sharing

Even if the GW is attached physically to a pair of RN, same GW (address) can be used to join distant RN in link with the pair of RN.

CC-API server attached to the GW will transmit the called address information to the Switching Matrix that will dial this one in the target regional network side.

SYS_GW_FUNC_120 Distant call establishment

The system shall establish and handle the private call between the Gateway and the called system terminal.

SYS_GW_FUNC_130 Call acceptance management

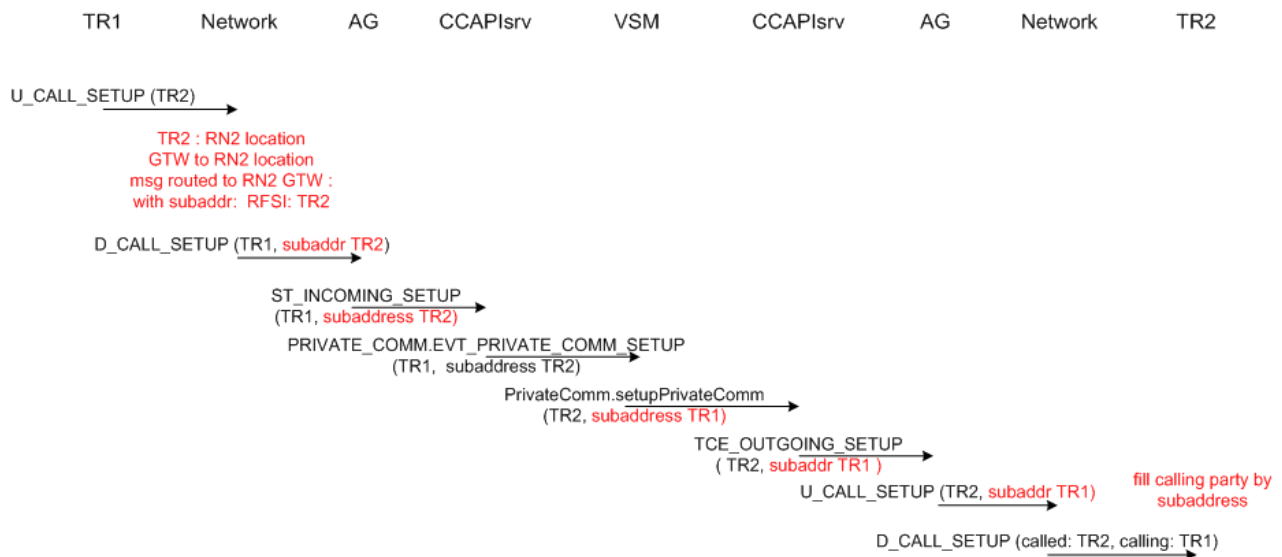
The system shall handle the private communication (acceptation / release) with the calling ST after the answer of the called ST.

SYS_GW_FUNC_140 Private call AG switching

The system shall interconnect both AG engaged in the private communication before the establishment of the communication in the remote RN.

SYS_GW_FUNC_150 Calling address transfer in private communication

According to the configuration, the system shall allow identification of the calling ST. The calling RFSI shall be transferred during the call setup as sub-numbering part of the called address and interpreted by attached radio network as the calling address to be displayed on the called ST.



Private Call transfer

Multi party private call is not managed by the GW as this communication is always mono RN.

SYS_GW_FUNC_155 ST call transfer

If the called ST is transferred to another ST passing through the GW, the number of transfers shall not be incremented twice.

SYS_GW_FUNC_160 Private Comm. AG release conditions

The system shall release the AG as soon as one of the ST engaged in the private call hung-up.

2.1.3. Crisis communication

According to the configuration, crisis communication (EMOCH) opened on one side of the gateway will be spread on the other side if the feature is enabled. Otherwise when the crisis communication is released on one side, the GW shall release the crisis on the other side.

SYS_GW_FUNC_170 Crisis communication spreading

According to the configuration, when a declared crisis communication is opened on one of the two RN, the gateway shall establish the same crisis communication identifier (associated to the organisation of the ST in emergency) on the other RN and interconnect the two AG involved in the communication.

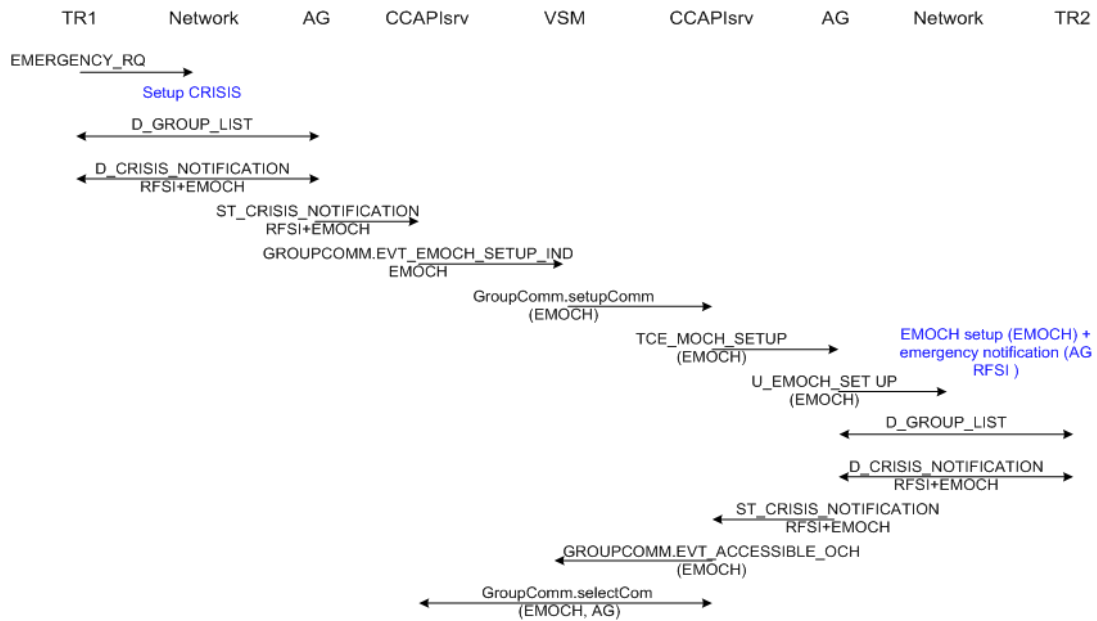
AG will be selected in the available free AG or in the (free) group communication resources or in the private communication resources if all AG of the first groups are engaged. As crisis is a mono RN group communication, the crisis will be established only on the two RN in direct link with the GW.

SYS_GW_FUNC_180 Crisis communication spreading

Once opened; the crisis communication shall be managed by the system as a static group communication

SYS_GW_FUNC_190 Crisis communication release

According to the configuration, when a crisis communication is closed on one of the two RN, the voice gateway shall release same crisis communication on the other RN before releasing the pair of AG involved in the communication.



Crisis communication spreading

2.1.4. Ressources management

SYS_GW_FUNC_200 GW dedicated resources

The system shall have dedicated TPOL resources (CC-API server, AG)

SYS_GW_FUNC_205 Analog or Digital S0 GW

The system shall manage Analog AG or Digital AG. Mixed configuration is not allowed.

SYS_GW_FUNC_210 AG type of communication configuration

One system AG can manage a group or a private communication following at the Switching Matrix.

SYS_GW_FUNC_220 AG selection

The system shall select the AG to interconnect following the communication configuration (group or private) and the availability of the AG resources.

SYS_GW_FUNC_230 AG overloading

If no resource is available, group communications AG switching shall be pending and private calls shall be rejected.

SYS_GW_FUNC_240 AG withdraw

The system shall withdraw the AG after communication release from one of the two RN or communication inactivity for dynamic group communication.

SYS_GW_FUNC_250 System monitoring

The system shall monitor periodically the AG availability to establish pending interconnections when AG are freed.

2.1.5. Configuration management

SYS_GW_FUNC_260 RN type configuration

The system shall allow configuration of the legacy network type. In each RN upgraded it is necessary to declare at the OMC the type of distant RN.

SYS_GW_FUNC_270 GW implicit address configuration

The system shall allow configuration of the gateway implicit addresses for private call forwarding. This address shall include only the GW AG configured for private communications. In each RN upgraded it is necessary to declare at the OMC the gateways implicit addresses for distant RN which type differs.

SYS_GW_FUNC_280 Reserved AG for private communications

The system shall allow configuration of dedicated AG resources. Some AG shall be reserved for private calls but could be used also for crisis communication if no other AG resource dedicated for group communication is available.

SYS_GW_FUNC_285 Reserved AG for group communications

The system shall allow configuration of dedicated AG resources. Some AG shall be reserved for group communications and could be used for crisis communication.

SYS_GW_FUNC_290 GW communication configuration

The system shall allow configuration of lists of group communications to be paired, one for static communications, one for dynamic communications. This configuration will be done in the Switching Matrix element.

SYS_GW_FUNC_300 Maximum number of dynamic group comm.

The system should limit the number of managed Dynamic group communications. When the limit is reached, new activations on monitored dynamic group communications are pending.

SYS_GW_FUNC_310 Maximum number of crisis group comm.

The system should limit the number of managed crisis group communications. When the limit is reached, new crisis communications are pending.

SYS_GW_FUNC_320 Dynamic switching feature activation

The system shall authorise dynamic switching only if dynamic feature is enabled.

SYS_GW_FUNC_330 TPA transfer activation

The system shall realise the TPA transfer only if the feature is activated at SM initialisation.

SYS_GW_FUNC_340 Calling address transfer activation

The system shall realise the Calling address transfer only if the feature is activated at VSM initialisation.

2.2. Interfaces Requirements

SYS_GW_IRS_010 GW physical interface

The system shall be connected on one side to one or several LABS (up to 12 LCT) or LAG (up to 30 LCT) or several iLATC (up to 8 LCT) in the TPOL networks.

SYS_GW_IRS_020 TPOL signalisation management with analog switching

The system shall manage TPOL voice protocols to realise the switching of analog voice between 2 AG.

SYS_GW_IRS_030 TPOL signalisation management with digital switching

The system shall manage TPOL voice protocols to realise the switching of S0 digital voice between 2 AG.

All system AG will be interfaced through analog audio lines or S0 digital audio lines exclusively. The VSM hardware equipments are specific to the audio interface.

2.3. Performance Requirements

2.3.1. Efficiency Requirements

SYS_GW_PERF_010 Maximum number of communications managed

The system shall manage up to 30 (group and private) communications.

SYS_GW_PERF_020 Group communication switching preset

To perform quick transmission between two communications, the system shall prioritize static AG interconnection (configuration preset at the VSM).

SYS_GW_PERF_030 Minimum transfer delay

The system shall realise the switching in less than 100ms after communication activation on both sides (time between electric signal TI_ACK and the transmission of audio signal).

2.3.2. Effectiveness Requirements

SYS_GW_PERF_040 System warning LEDs management

LEDs should show system element health: Critical, Major, Minor Alarm, Power supply.

SYS_GW_PERF_050 System supervision through a normalised interface (SNMP for example)

SM element supervision shall be possible through a SNMP interface.

2.3.3. Reliability Requirements

SYS_GW_PERF_060 System availability

The system shall guarantee 99.9% availability.

SYS_GW_PERF_070 Equipments redundancy

The system should manage equipment redundancy with no outage in the services provided.

SYS_GW_PERF_080 System automatic start at power up

In case of power failure, the system shall restart automatically after energy restoration and the SM shall reload previous settings.

SYS_GW_PERF_090 AG failure management

In case of AG failure, the system shall select a new AG when available and reconfigure the SM.

SYS_GW_PERF_100 Start-up time

System cold start-up time should be inferior to 5 minutes.

SYS_GW_PERF_110 Equipment switch-over time

Switch-over time between redundant equipments shall be less than 2 minutes.

SYS_GW_PERF_120 System auto-tests

Firmware shall include auto-tests with various levels.

SYS_GW_PERF_130 Error handling

The system shall be able to handle errors.

The system doesn't manage group communication priority (except for crisis that will be managed separately). No AG pre-emption is required.

2.4. Security Requirements

SYS_GW_SEC_010 User access control

The system configuration equipment access shall be protected by a login / password.

SYS_GW_SEC_020 Equipments co-localisation

The system equipments should be situated in the same location to prevent voice intrusion (as voice is devocoded).

SYS_GW_SEC_030 Configuration reserved to authorised users

System configuration shall be reserved to authorised users only.

User rights are attached to user profiles (for instance Administrator or Operator)

2.5. Safety Requirements

SYS_GW_SAF_010 Voltage protection

The system hardware equipments shall be protected against AC supply transients and voltage surges.

SYS_GW_SAF_020 ROHS & WEEE compliance

The system equipments shall be compliant with ROHS and WEEE instructions.

2.6. Usability Requirements

SYS_GW_USE_010 System configuration and monitoring MMI

The system shall offer a MMI for configuration and equipment supervision.

SYS_GW_USE_020 System distant access

The system shall be monitored and configured with distant access.

SYS_GW_USE_030 Edit/modify user access configuration

The system shall offer different level of access (edit / modify)

SYS_GW_USE_040 Operating manuals

The system shall be delivered with operating manuals in English and French, describing installation, configuration and maintenance procedures.

2.7. Physical parameters Requirements

SYS_GW_HW_010 19" cabinet sizing

System equipments should be installed in racks to be placed in a 19" 40U cabinet.

SYS_GW_HW_020 19" rack sizing

Individual system equipments shall not exceed 5U / 25kg / 600mm depth.

SYS_GW_HW_030 Modules handling

The system equipments should be easily handled (if necessary grab handle shall be added).

SYS_GW_HW_040 Front panel connection

System equipments should be connected in front panel. Power supply switches shall be placed on front panel.

SYS_GW_HW_050 AC power supply

System equipments shall be connected to AC power supply (110-240V~).

SYS_GW_HW_060 DC power supply

System equipments could be connected to DC power supply (-48V)

2.8. Portability Requirements

SYS_GW_HW_070 Sub-system racks delivery

The system equipments shall be provided in separate elements (racks).

SYS_GW_HW_080 One day roll out

The system equipments shall be installed and configured by one person in less than 8 hours.

SYS_GW_HW_090 Cabinet easy moving

As the system will not be installed permanently, the cabinet may be provided with wheels to be easily moved when necessary.

2.9. Maintainability Requirements

SYS_GW_HW_100 Working status LED

System equipments shall indicate working status and alarms with LED on front panel.

SYS_GW_HW_110 Hot standby system modules

In case of failure, redundant system equipments should be replaced in hot standby.

SYS_GW_HW_120 SNMP interface

The system shall provide SNMP interface for all non TETRAPOL equipment supervision (VSM).

SYS_GW_HW_130 System auto-test

The system shall authorise auto-test when installing equipments or for maintenance purpose.

SYS_GW_HW_140 Error logging

All system errors shall be saved in logs files accessible at distance.

3. SYSTEM ELEMENT REQUIREMENTS

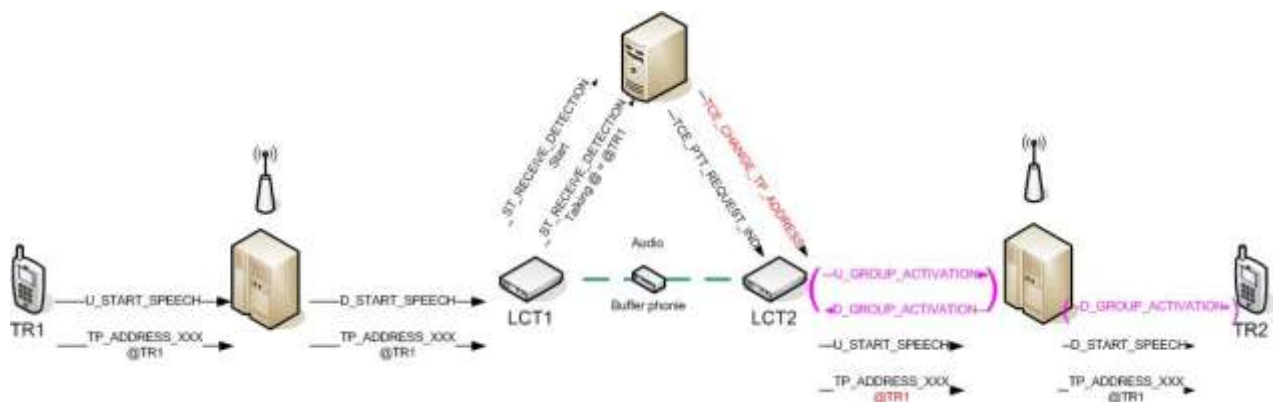
The Gateway System can be split in system elements:

- The Line Connected Terminal
 - Development of the TPA and calling address transfer solution
- The CC-API server
 - Development of the TPA setting method
- The Switching Matrix
 - Development of group communication switching, crisis communication spreading and private communication routing
 - Implementation of voice switching (fix and dynamic configuration)
- The CN
 - Development of the private call routing if distant RN type differs with calling address transmission
- The OMC/MD
 - RN type identification
 - Private call implicit address configuration

3.1. Line Connected Terminal software release

3.1.1. Functional requirements

The LCT used in the Gateway is an existing TPOL terminal product. To realise the Talking Party Identifier transmission in the associated group communication, the TPA has to be set in the LCT relaying the voice communication.



SYS_GW_LCT_010 LCT TPA setting command

The GW LCT shall accept the TPA setting STCP command sent by the CC-API server

SYS_GW_LCT_020 LCT TPA replacing

When receiving the TPA setting STCP command, the GW LCT shall relay the new TPA in the voice message. If the command is not received before the start of voice transmission, the LCT shall mask its own TPA.

SYS_GW_LCT_030 LCT TPA delay

If the TPA is not received before the network PTT acknowledgement, the acknowledgement indication shall be delayed by the LCT (to a maximum configurable tempo value) until the reception of the TPA.

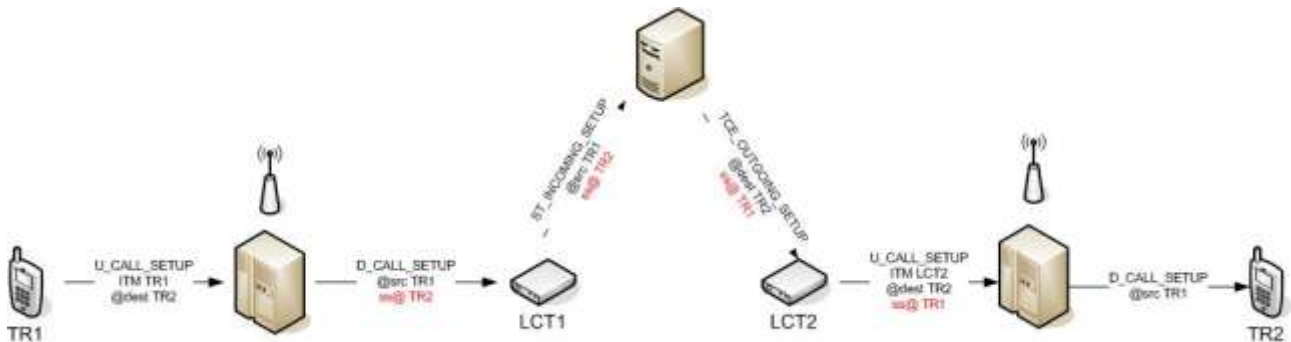
SYS_GW_LCT_040 LCT D_CALL_SETUP with called RFSI in sub-address

The LCT shall relay the called RFSI sub-address received in the downlink call setup calling address to CC-API server.

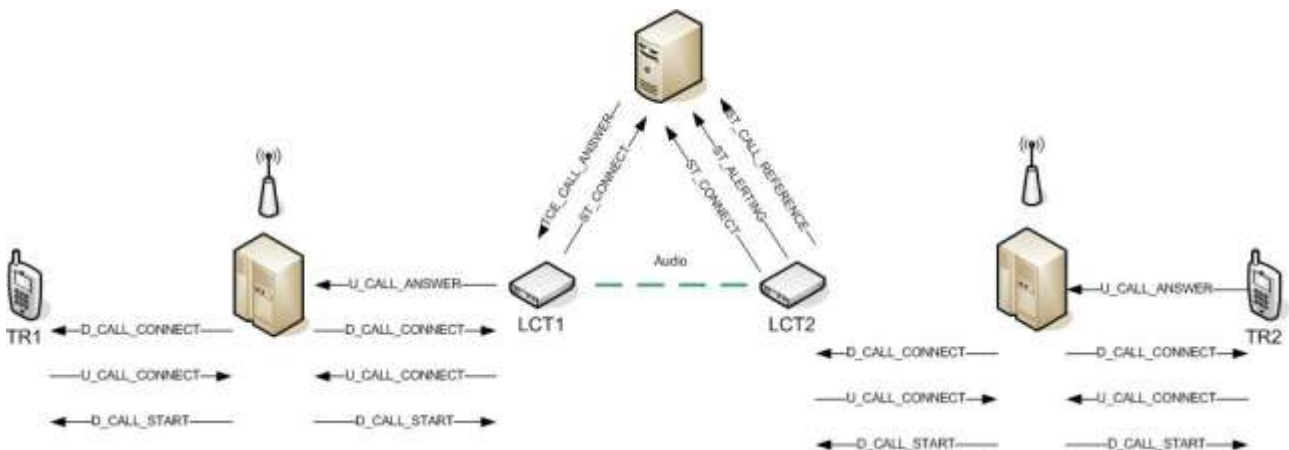
SYS_GW_LCT_050 LCT U_CALL_SETUP with calling RFSI in sub-address

According to the configuration, the LCT shall relay the calling RFSI sub-address received in the call setup STCP command in the uplink call setup AI message.

Hereafter is a description of the private call routing to be realised by the system.



Uplink private call establishment (TR1 → TR2)



Downlink private call establishment (TR2 → TR1)

3.1.2. Interfaces Requirements

In one side, the LCT is connected to a an iLATC in the TPOL RN. On the other side, the LCT is connected to the CC-API server and to the Switching Matrix.

Those LCT are piloted by the CC-API server.

SYS_GW_LCT_100 RSW interface message compatibility

The LCT shall interpret the new type of sub-address (RFSI) managed in the RSW interface and manage the following STCP messages:

ST_INCOMING_SETUP

Direction: ST ⇒ TCE

Short description: This PDU shall indicate an incoming private call.

ST_INCOMING_SETUP

Information element	Length	Comment
Codop	2	
Call_reference	1	
Call_type	1	
Address	5	Calling ST address
Call_priority	1	
Subaddress_quartet_length	1	Called ST RFSI is 10 quartets
Subaddress	SUBADDRESS_BYTE_MAXLENGTH	Called ST RFSI
Behaviour_on_incoming_call	1	

There is no information on the type of sub-address but as the LCT is specific for the GW, the sub-address will be always interpreted as RFSI.

TCE_OUTGOING_SETUP**Direction:** ST ⇌ TCE**Short description:** This PDU shall be sent for an outgoing private call set-up request.**TCE_OUTGOING_SETUP**

Information element	Length	Comment
Codop	2	
Call_priority	1	
Number	1	Number of addresses of the list
Address[]	5 x ADR_MAXNB	
Subaddress_quartet_length	1	Calling ST RFSI is 10 quartets
Subaddress	SUBADDRESS_BYTE_MAXLENGTH	Calling ST RFSI
Behaviour_on_incoming_call	1	
Type_address	1 x ADR_MAXNB	

Type_address will have new value to indicate a GW outgoing call with RFSI sub-address format:

RFSI_GTW_ADDRESS 0x02

The RFSI sub-address shall be coded on 5 bytes like an RFSI address (10 quartets).

SYS_GW_LCT_110 CC-API interface message compatibility

The LCT shall interpret the new type of STCP command sent by CC-API server:

TCE_CHANGE_TP_ADDRESS**Direction:** ST ⇌ TCE**Short description:** This PDU shall be sent for modifying the TPI ADDRESS in group communication.**TCE_CHANGE_TP_ADDRESS**

Information element	Length	Comment
Codop	2	
Address	5	

TCE_CHANGE_TP_ADDRESS

TCE_MSG+0x37

SYS_GW_LCT_120 Voice decryption and devocoding

Once connected in a group communication, the LCT shall decrypt and devocode the voice signal coming from the TPOL network and send the clear voice to the SM

SYS_GW_LCT_130 Voice vocoding and encryption

On the other side, the LCT shall vocode and encrypt the voice signal coming from the SM and transmit it to the TPOL network.

SYS_GW_LCT_140 LCT software specific release

To identify the availability of the new feature, the LCT software version shall be specific.

SYS_GW_LCT_150 Error handling

In case of error during TPA setting, an alarm shall be transmitted to the CC-API server.

3.1.3. Performance Requirements

3.1.3.1. Efficiency Requirements

SYS_GW_LCT_210 LCT behaviour preservation

LCT performance behaviour shall not be degraded after the software upgrade.

3.1.3.2. Effectiveness Requirements

SYS_GW_LCT_220 LCT RFSI preservation

The LCT new identity is used only for TPA transmission; it doesn't replace the terminal RFSI. LCT identity shall never be displayed on ST listening to the group communication.

3.1.3.3. Reliability Requirements

SYS_GW_LCT_230 Absence of TPA handling

In the case of absence of TPA setting command, the LCT shall mask current RFSI when transmitting its TPA.

SYS_GW_LCT_240 TPA Error handling

In case of error during the TPA setting, the LCT shall mask current RFSI when transmitting its TPA.

3.1.4. Security Requirements

SYS_GW_LCT_310 TPA setting reserved for the GW

The LCT TPA setting feature shall be restricted to VSM solution exclusively (and shall not be documented for customers).

3.1.5. Safety Requirements

NA.

3.1.6. Usability Requirements**SYS_GW_LCT_410 Transparent settings**

The TPA and calling RFSI setting features shall be transparent for the system users. No user action required.

SYS_GW_LCT_420 LCT RFSI masking

In the private communication, the TPA is not relayed. The GW LCT shall be configured to not display its RFSI when relaying the voice message and shall ignore TPA setting command if received.

3.1.7. Physical parameters Requirements

NA. The LCT used for the VSM is a common TPOL terminal product.

3.1.8. Portability Requirements

NA. The LCT used for the VSM is a common TPOL terminal product.

3.1.9. Maintainability Requirements**SYS_GW_LCT_510 LCT repackaging**

The gateway LCT could be converted in standard LCT after nominal software reload.

3.1.10. Marginal Conditions

SYS_GW_LCT_610 GW LCT specific software

The TPA setting and calling RFSI transfer features shall be developed as specific LCT software.

3.2. CC-API server software release

3.2.1. Functional Requirements

To identify the speaker in a group communication, the TPA is transmitted once during the speech transmission.

SYS_GW_CCAPI_010 CC-API new method

The CC-API shall offer a new functionality to set the TPA of an attached LCT (AG). This method shall be added in the RESOURCE manager.

SYS_GW_CCAPI_020 setAGTPA method

The speaker identifier shall be retransmitted in a new CC-API method called setAGTPA and described below:

Object:

Modify the TPA to be sent during a voice PTT on a specified line-connected AG.

When PTT is looped by the GW, the RFSI of the speaker ST is set on the interconnected transmitter AG.

Parameters:

i/o	Type	Parameter	Description
in	ClientId_T (mo_types.idl)	clientId	Client identifier used to connect to CC-API server. It shall be a known identifier.
in	RAddr_T	talkingPartyAddr	Talking party RFSI address
in	AGId_T (mo_types.idl)	AGId	Identifier of the Access Gate for which RFSI has to be updated.

Asynchronous result:

None

When setting-up the private communication with the called ST, the calling RFSI will be added as sub-address parameter in the method called.

SYS_GW_CCAPI_030 Private communication setup with RFSI sub-address

CC-API shall transfer the new type of sub-address (RFSI) in the STCP command.

3.2.2. Interfaces Requirements

SYS_GW_CCAPI_110 SM interface

The new method setAGTPA should be called by the SM (ideally) before switching the speech. In fact the TPA shall be set asynchronously during the PTT to not delay voice transmission.

SYS_GW_CCAPI_120 LCT interface

CC-API shall implement a new STCP command to communicate the TPA to the LCT.

SYS_GW_CCAPI_130 RFSI sub address compatibility

CC-API shall authorise new type of sub-address (RFSI) in the private communication methods.

3.2.3. Performance Requirements

3.2.3.1. Efficiency Requirements

SYS_GW_CCAPI_210 Instantaneous method call

The TPA should be transmitted to the LCT in less than 20 ms after method call.

3.2.3.2. Effectiveness Requirements

The Talking Party Identification is not guaranteed. It applies when the speech is transmitted from the radio switch to the SM. This address is transmitted once at maximum for relayed and unrelayed communications; it is not repeated until the speech transmission stops. Usually TPA is transmitted in the 3 first and 3 last frames of the voice message.

SYS_GW_CCAPI_220 TPA broadcast

The TPA shall be transmitted to the LCT on reception of all AG TPA setting command.

3.2.3.3. Reliability Requirements

SYS_GW_CCAPI_230 CC-API Error handling

If an error occurred when setting the TPA, the client application shall be noticed.

SYS_GW_CCAPI_240 CC-API compatibility handling

If the LCT doesn't have TPA setting feature (specific software version) the method is not allowed and an error shall be raised.

3.2.4. Security Requirements

SYS_GW_CCAPI_310 setAGTPA reserved for the GW

The setAGTPA method is reserved for the GW and is not available in the CC-API external interface specification.

3.2.5. Safety Requirements

NA

3.2.6. Usability Requirements

NA

3.2.7. Physical parameters Requirements

NA

3.2.8. Portability Requirements

SYS_GW_CCAPI_410 Standard CC-API software installation

The software release shall be installed following current CC-API installation procedures.

3.2.9. Maintainability Requirements

SYS_GW_CCAPI_510 CC-API errors logging

All detected errors in the CC-API method shall be logged in maintenance files.

3.2.10. Marginal Conditions

NA

3.2.11. Non-Technical Requirements

NA

4. REQUIREMENTS CLASSIFICATION

All presented requirements are summarised in the following table:

<i>REQ_ID</i>	<i>Title</i>	<i>Status</i>
<i>System</i>		
SYS_GW_FUNC_010	Group communication loop back	M
SYS_GW_FUNC_020	GW static AG switching configuration	M
SYS_GW_FUNC_030	GW dynamic AG switching configuration	M
SYS_GW_FUNC_040	Group communication TPA transfer	M
SYS_GW_FUNC_050	Audio signal forwarding	M
SYS_GW_FUNC_060	AG signalisation management	M
SYS_GW_FUNC_070	Group comm. AG release conditions	M
SYS_GW_FUNC_080	RN type (TDM or IP) knowledge	M
SYS_GW_FUNC_090	Private call forwarding when type differs	M
SYS_GW_FUNC_100	Called address sub-numbering	M
SYS_GW_FUNC_110	GW sharing	M
SYS_GW_FUNC_120	Distant call establishment	M
SYS_GW_FUNC_130	Call acceptance management	M
SYS_GW_FUNC_140	Private call AG switching	M
SYS_GW_FUNC_150	Calling address transfer in private communication	M
SYS_GW_FUNC_155	ST call transfer	M
SYS_GW_FUNC_160	Private Comm. AG release conditions	M
SYS_GW_FUNC_170	Crisis communication spreading	M
SYS_GW_FUNC_180	Crisis communication spreading	M
SYS_GW_FUNC_190	Crisis communication release	M
SYS_GW_FUNC_200	GW dedicated resources	M
SYS_GW_FUNC_205	Analog or Digital S0 GW	M
SYS_GW_FUNC_210	AG type of communication configuration	M
SYS_GW_FUNC_220	AG selection	M
SYS_GW_FUNC_230	AG overloading	M
SYS_GW_FUNC_240	AG withdraw	M
SYS_GW_FUNC_250	System monitoring	M
SYS_GW_FUNC_260	RN type configuration	M
SYS_GW_FUNC_270	GW implicit address configuration	M

SYS_GW_FUNC_280	Reserved AG for private communications	M
SYS_GW_FUNC_285	Reserved AG for group communications	M
SYS_GW_FUNC_290	GW communication configuration	M
SYS_GW_FUNC_300	Maximum number of dynamic group comm.	NTH
SYS_GW_FUNC_310	Maximum number of crisis group comm.	NTH
SYS_GW_FUNC_320	Dynamic switching feature activation	M
SYS_GW_FUNC_330	TPA transfer activation	M
SYS_GW_FUNC_340	Calling address transfer activation	M
SYS_GW_IRS_010	GW physical interface	M
REQ_ID	Title	Status
SYS_GW_IRS_020	TPOL signalisation management with analog switching	M
SYS_GW_IRS_030	TPOL signalisation management with digital switching	M
SYS_GW_PERF_010	Maximum number of communications managed	M
SYS_GW_PERF_020	Group communication switching preset	M
SYS_GW_PERF_030	Minimum transfer delay	M
SYS_GW_PERF_040	System warning LEDs management	NTH
SYS_GW_PERF_050	System supervision through SNMP	M
SYS_GW_PERF_060	System availability	M
SYS_GW_PERF_070	Equipments redundancy	NTH
SYS_GW_PERF_080	System automatic start at power up	M
SYS_GW_PERF_090	AG failure management	M
SYS_GW_PERF_100	Start-up time	E
SYS_GW_PERF_110	Equipment switch over time	M
SYS_GW_PERF_120	System auto-tests	M
SYS_GW_PERF_130	Error handling	M
SYS_GW_SEC_010	User access control	M
SYS_GW_SEC_020	Equipments co-localisation	NTH
SYS_GW_SEC_030	Configuration reserved to authorised users	M
SYS_GW_SAF_010	Voltage protection	M
SYS_GW_SAF_020	ROHS & WEEE compliance	M
SYS_GW_USE_010	System configuration and monitoring MMI	M
SYS_GW_USE_020	System distant access	M
SYS_GW_USE_030	Edit/modify user access configuration	M
SYS_GW_USE_040	Operating manuals	M

SYS_GW_HW_010	19" cabinet sizing	E
SYS_GW_HW_020	19" rack sizing	M
SYS_GW_HW_030	Modules handling	NTH
SYS_GW_HW_040	Front panel connection	NTH
SYS_GW_HW_050	AC power supply	M
SYS_GW_HW_060	DC power supply	M
SYS_GW_HW_070	Sub-system racks delivery	M
SYS_GW_HW_080	One day roll out	M
SYS_GW_HW_090	Cabinet easy moving	NTH
SYS_GW_HW_100	Working status LED	M
SYS_GW_HW_110	Hot standby system modules	NTH
SYS_GW_HW_120	SNMP interface	M
SYS_GW_HW_130	System auto-test	M
SYS_GW_HW_140	Error logging	M
<i>LCT System Element</i>		
SYS_GW_LCT_010	LCT TPA setting command	M
SYS_GW_LCT_020	LCT TPA replacing	M
SYS_GW_LCT_030	LCT TPA delay	M
<i>REQ_ID</i>	<i>Title</i>	<i>Status</i>
SYS_GW_LCT_040	LCT D_CALL_SETUP with called RFSI in sub-address	M
SYS_GW_LCT_050	LCT U_CALL_SETUP with calling RFSI in sub-address	M
SYS_GW_LCT_100	RSW interface message compatibility	M
SYS_GW_LCT_110	CC-API interface message compatibility	M
SYS_GW_LCT_120	Voice decryption and devocoding	M
SYS_GW_LCT_130	Voice vocoding and encryption	M
SYS_GW_LCT_140	LCT software specific release	M
SYS_GW_LCT_150	Error handling	M
SYS_GW_LCT_210	LCT behaviour preservation	M
SYS_GW_LCT_220	LCT RFSI preservation	M
SYS_GW_LCT_230	Absence of TPA handling	M
SYS_GW_LCT_240	TPA Error handling	M
SYS_GW_LCT_310	TPA setting reserved for the GW	M
SYS_GW_LCT_410	Transparent settings	M
SYS_GW_LCT_420	LCT RFSI masking	M

SYS_GW_LCT_510	LCT repackaging	M
SYS_GW_LCT_610	GW LCT specific software	M
<i>CC-API System Element</i>		
SYS_GW_CCAPI_010	CC-API new method	M
SYS_GW_CCAPI_020	setAGTPA metod	M
SYS_GW_CCAPI_030	Private communication setup with RFSI sub-address	M
SYS_GW_CCAPI_110	VSM interface	E
SYS_GW_CCAPI_120	LCT interface	M
SYS_GW_CCAPI_130	RFSI sub address compatibility	M
SYS_GW_CCAPI_210	Instantaneous method call	E
SYS_GW_CCAPI_220	TPA broadcast	M
SYS_GW_CCAPI_230	CC-API Error handling	M
SYS_GW_CCAPI_240	CC-API compatibility handling	M
SYS_GW_CCAPI_310	setAGTPA reserved for the GW	M
SYS_GW_CCAPI_410	Standard CC-API software installation	M
SYS_GW_CCAPI_510	CC-API errors logging	M

* M = Mandatory, E = Expected, NTH = Nice To Have

GW System Requirements