ISITEP
D4.5.1 - REQUIREMENTS FOR MOBILE GATEWAY

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REVISION TABLE

Version	Date	Modified Pages	Modified Sections	Comments
V1.0	30/06/14			Final version

Publishable extended abstract

This document specifies the requirements for realizing interoperability between TETRA and TETRAPOL legacy networks through mobile gateway.

CONTENTS

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 WP45, a hardware and software solution for ISITEP will be developed so that interoperabilitybetween TETRA or TETRAPOL networks and ISI over IP networks can be achieved using a mobile gateway.

This system will have two main roles in the ISITEP project:

• Allow fast and reliable integration of TETRA-TETRAPOL interface

• Support field deployment of interoperable solutions and roaming in crisis situations where Tetra/Tetrapol radio coverage is not available and therefore low bandwidth scenarios are to be faced. The deployable gateway will be connected through SAT connection to the national networks

In this task Airbus DS will integrate the deployable gateway for the TETRAPOL components and RM3 will test enhanced terminals in the TETRA-TETRAPOL environment.

1.2 Document scope

This deliverable (D45.1) is the first deliverable issued by WP45. It is corresponding to task T4.5.1 and aims at specifying the requirements for ISITEP mobile gateway.

1.3 Purpose

This document provides System Requirements applicable to the Deployable TETRA-TETRAPOL ISI Gateway system. The first part of the document presents system requirements with no hypothesis on the chosen platform. The second part of the document takes into account constraints to find a cost effective solution, it means constraints that would be required to build a product compliant with the high demanding requirements from critical communications and compliant with the requirement to be easily deployable in harsh environments with a perspective to exploit ISITEP results and answering public safety short term requirements.

1.4 Acronyms

Acronym	*Definition*
AG	Access Gate
AI	Air Interface
CN	Control Node (TETRAPOL network)
CAN	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	LIst 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 (TETRAPOL 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 (TETRAPOL network)
SSW	Secondary Switch (TETRAPOL 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

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2. SYSTEM REQUIREMENTS

2.1. Interface Requirements

SYS_GATEWAY_010

The GATEWAY shall manage interface with TETRAPOL CC-API server

The GATEWAY shall manage interface with TETRA server

SYS_GATEWAY_020

The GATEWAY shall manage voice paths (access on analog links, or S0 links for TETRAPOL and 15 access by TETRA TDM (G703 PCM)).

SYS_GATEWAY_030

The GATEWAY shall be able to manage analog voice switching between TETRAPOL AG and TETRA Access

SYS_GATEWAY_040

The GATEWAY shall be able to manage digital S0 voice switching between TETRAPOL AG and TETRA Access

SYS_GATEWAY_050

The GATEWAY shall be managed / configured through a distant IP access.

2.2 GATEWAY Configuration

SYS_GATEWAY_110

An operator shall be able to define and save the list of group communications to be looped when opened (Static configuration).

SYS_GATEWAY_120

An operator shall be able to configure the GATEWAY to relay or not the crisis communications (EMOCH).

SYS_GATEWAY_130

Modification in the lists of group communications shall be realized without need to stop and restart the GATEWAY

SYS_GATEWAY_140

PTT priority of an AG is higher than the priority of a radio system terminal (priority to the Dispatcher). At the init, the GATEWAY shall reduce the PTT priority of connected AG to a lower value set by configuration.

2.3. Managing group communications

SYS_GATEWAY_210

The GATEWAY shall interconnect a pair of AG as soon as a static configured group communication (MOCH, TKG, TETRA Group Call) is opened on both sides of the gateway.

SYS_GATEWAY_220

When detecting an activation in a configured group communication, the GATEWAY shall realize automatic activation of associated ID group communication on the other side with voice transfer when ACK received

SYS_GATEWAY_230

The GATEWAY shall manage the case of quasi simultaneous activation on paired group communications. In this case the GATEWAY shall ignore the second activation, the two communications remains independent until both sides release PTT

SYS_GATEWAY_240

The GATEWAY shall manage call handling on both sides.

2.4. Managing private communication

SYS_GATEWAY_310

When receiving a private call, the GATEWAY shall control that a sub-address is present or provide a destination number.

SYS_GATEWAY_320

The GATEWAY shall manage the release of the private call on both side as soon as GATEWAY detects the communication release on one side.

2.5. Managing resources

SYS_GATEWAY_410

The number of group communications managed by the GATEWAY can be higher than the number of reserved AG resources. In this case group communications use either a part of non-reserved AG resources or are not interconnected if there is no available resources

SYS_GATEWAY_420

The GATEWAY shall manage the case of system overloading. When no resource is available, the GATEWAY doesn't have to release any AG resource. Group communication switching shall be pending and private communication shall be rejected.

SYS_GATEWAY_430

The GATEWAY shall monitor periodically the state of the AG and realize the pending group communication interconnection as soon as a pair of AG is available.

2.6. Performance

SYS_GATEWAY_510

When transferred, the voice shall not be truncated (loss of first words)

SYS_GATEWAY_520

When transferred, the voice shall not be distorted (similar to the one received in normal condition)

SYS_GATEWAY_540

When transferred, the audio level shall not be affected (similar to the one received in normal condition)

SYS_GATEWAY_550

When transferred, the voice quality shall not be downgraded (similar to the one received in normal condition)

SYS_GATEWAY_560

AG switching delay in the gateway shall not exceed 200 ms.

SYS_GATEWAY_570

PTT transfer delay in the gateway shall not exceed 100 ms.

SYS_GATEWAY_580

Whatever the number of voice paths managed, the switching delay shall not vary

SYS_GATEWAY_590

When the voice switching is activated, all PTT voice messages shall be transferred from one side to the other (no lost PTT)

2.7. Reliability

SYS_GATEWAY_610

The GATEWAY shall manage automatic service recovery after a power supply failure (GATEWAY reconfiguration with previous configured parameters)

SYS_GATEWAY_620

The GATEWAY shall manage automatic service recovery after an AG link failure (Withdraw and selection of the communication on a new free AG)

SYS_GATEWAY_630

The GATEWAY shall offer high reliability with GATEWAY equipment redundancy

SYS_GATEWAY_640

In case of redundant equipment, the GATEWAY shall manage automatic service recovery

SYS_GATEWAY_650

In case of redundant equipment, the GATEWAY should switch automatically to secondary hardware without service outage

2.8. Maintenance

SYS_GATEWAY_710

The GATEWAY shall offer alarm management services through SNMP

SYS_GATEWAY_720

Notably following traps shall be sent : Group communication switching with comm. ID and cause, AG failure

SYS_GATEWAY_730

The GATEWAY shall offer remote access for distant configuration, monitoring and maintenance.

3. TECHNICAL REQUIREMENTS

3.1. Functional requirements

TCH_GATEWAY_010

Package shall be a19" 2U Rack to make easier the integration in standard 19" cabinet.

TCH_GATEWAY_020

19" rack power supply shall be AC : 110-240 V 50-60Hz

TCH_GATEWAY_030

19" rack power supply shall be DC : 10-36V

TCH_GATEWAY_040

Power supply shall be remotely switched on/off through IP link

3.2. Hardware requirements

TCH_GATEWAY_110

Antenna output shall be available on the front side of the GATEWAY.

TCH_GATEWAY_120

The included AC power supply shall be able to supply all the equipments in the GATEWAY

TCH_GATEWAY_130

In case of local use of audio equipment, connector for audio equipment (as used for the LCT) and connector for serial link to control room interface shall be available in the front side of the GATEWAY.

TCH_GATEWAY_140

In case of IP link connectivity (through IP converter), a RJ45 connector shall be available in the front side of the GATEWAY. Buttons and leds available on the IP converter shall be visible on the front side of the GATEWAY.

TCH_GATEWAY_150

Remote IP switchable power supply shall be available at the rear side of the GATEWAY (power supply and RJ45 connectors).

TCH_GATEWAY_160

Minimum MTBF: 30 000 hours

3.3. Environmental requirement

TCH_GATEWAY_210

In operating mode, the GATEWAY should conform with : ETSI EN300-019-1-3 class 3.1

operating temperature

IEC 60068-2-2

Dry heat +55°C unlimited time at 15W, 30% RH

without solar ray (65°C at 2W)

IEC 60068-2-1

Cold -10°C

TCH_GATEWAY_220

In operating mode, the GATEWAY should conform with : ETSI EN300-019-1-3 class 3.1

Mechanical Class 3M1

IEC 60068-2-6

sinusoidal vibrations: 0.3mm from 2 to 9Hz; 1m/s2 from 9 to 200Hz

IEC 60068-2-29

Bump : 0,4g/11ms on 3 axes

TCH_GATEWAY_230

In storage, the GATEWAY should conform with : ETSI EN300-019-1-1 class 1.2

Storage temperature

IEC 60068-2 Dry heat +70°C/30% RH

IEC 60068-1 Cold -25°C

IEC 60068-56 Damp heat +55°C/93% RH

TCH_GATEWAY_240

In transport (In his packing), the GATEWAY should conform with : ETSI EN300-019-1-2 class 2.2

Mechanical : class 2.2

EC 60068-2-6

Sinusoidal vibrations: 3,5mm from 2 to 200Hz;

10m/s2 from 9 to 200Hz, 15m/s2 from 200Hz to 500Hz

IEC 60068-2-64

Random vibrations: 1m2/s3 from 10 to 200Hz,

0.3m2/s3 from 200 to 2000Hz

IEC 60068-2-29

Bump 10g/11ms on 3 axes

IEC 60068-2-32

Falls : 0.25m

TCH_GATEWAY_250

In transport (In his packing), the GATEWAY should conform with : ETSI EN300-019-1-2 class 2.2 tightness

IEC 60529 IP20

TCH_GATEWAY_260

EN 60950 CE label

TCH_GATEWAY_270

ROHS compliant

TCH_GATEWAY_280

REACH compliant

3.4. ROLL-OUT Requirements

TCH_GATEWAY_310

It shall be possible to install the equipment by only one people.

3.5. Training and documentation requirements

TCH_GATEWAY_410

A technical manual shall be available. It shall describe the equipment, the installation and the set up (installation has to explained also the IP converter configuration)

TCH_GATEWAY_420

This technical manual shall be used for option installation and spare purpose.

TCH_GATEWAY_425

Technical documentation shall be available in main European languages

TCH_GATEWAY_430

Datasheet shall be available.

TCH_GATEWAY_440

Relevant training modules shall be updated. No specific training module shall be built for the GATEWAY

4. REQUIREMENTS CLASSIFICATION

All presented requirements are summarised in the following table with their status :

Req ID	Description of the Requirement	Status
Interface Requirements		
SYS_GATEWAY_010	The GATEWAY shall manage interface with TETRAPOL and TETRA	Mandatory
SYS_GATEWAY_020	The GATEWAY shall manage voice paths (access on analog links, or S0 links for TETRAPOL and 15 access by TETRA TDM (G703 PCM)).	Mandatory
SYS_GATEWAY_030	The GATEWAY shall be able to manage analog voice switching between TETRAPOL AG and TETRA Access	Mandatory
SYS_GATEWAY_040	The GATEWAY shall be able to manage digital S0 voice switching between TETRAPOL AG and TETRA Access	Mandatory
SYS_GATEWAY_050	The GATEWAY shall be managed / configured through a distant IP access.	Mandatory
GATEWAY Configuration		
SYS_GATEWAY_110	An operator shall be able to define and save the list of group communications to be looped when opened (Static configuration).	Mandatory
SYS_GATEWAY_120	An operator shall be able to configure the GATEWAY to relay or not the crisis communications (EMOCH).	Nice to have
SYS_GATEWAY_130	Modification in the lists of group communications shall be realized without need to stop and restart the GATEWAY	Mandatory
SYS_GATEWAY_140	PTT priority of an AG is higher than the priority of a radio system terminal (priority to the Dispatcher). At the init, the GATEWAY shall reduce the PTT priority of connected AG to a lower value set by configuration.	Mandatory
Managing group communications		
SYS_GATEWAY_210	The GATEWAY shall interconnect a pair of AG as soon as a static configured group communication (MOCH, TKG, TETRA Group Call) is opened on both sides of the gateway	Mandatory
SYS_GATEWAY_220	When detecting an activation in a configured group communication, the GATEWAY shall realize automatic activation of associated ID group communication on the other side with voice transfer when ACK received	Mandatory
SYS_GATEWAY_230	The GATEWAY shall manage the case of quasi simultaneous activation on paired group communications. In this case the GATEWAY shall ignore the second activation, the two	Mandatory

	communications remains independent until both sides release PTT	
SYS_GATEWAY_240	The GATEWAY shall manage call handling on both sides	Mandatory
Managing private communications		
SYS_GATEWAY_310	When receiving a private call, the GATEWAY shall control that a sub-address is present or provide a destination number.	Expected
SYS_GATEWAY_320	The GATEWAY shall manage the release of the private call on both side as soon as GATEWAY detects the communication release on one side	Expected
Managing resources		
SYS_GATEWAY_410	The number of group communications managed by the GATEWAY can be higher than the number of reserved AG resources. In this case group communications use either a part of non-reserved AG resources or are not interconnected if there is no available resources	Mandatory
SYS_GATEWAY_420	The GATEWAY shall manage the case of system overloading. When no resource is available, the GATEWAY doesn't have to release any AG resource. Group communication switching shall be pending and private communication shall be rejected.	Mandatory
SYS_GATEWAY_430	The GATEWAY shall monitor periodically the state of the AG and realize the pending group communication interconnection as soon as a pair of AG is available.	Mandatory
Performance		
SYS_GATEWAY_510	When transferred, the voice shall not be truncated (loss of first words)	Expected
SYS_GATEWAY_520	When transferred, the voice shall not be distorted (similar to the one received in normal condition)	Expected
SYS_GATEWAY_540	When transferred, the audio level shall not be affected (similar to the one received in normal condition)	Expected
SYS_GATEWAY_550	When transferred, the voice quality shall not be downgraded (similar to the one received in normal condition)	Expected
SYS_GATEWAY_560	AG switching delay in the gateway shall not exceed 200 ms.	Expected
SYS_GATEWAY_570	PTT transfer delay in the gateway shall not exceed 100 ms.	Expected
SYS_GATEWAY_580	Whatever the number of voice paths managed, the switching delay shall not vary	Expected

SYS_GATEWAY_590	When the voice switching is activated, all PTT voice messages shall be transferred from one side to the other (no lost PTT)	Expected
Reliability		
SYS_GATEWAY_610	The GATEWAY shall manage automatic service recovery after a power supply failure (GATEWAY reconfiguration with previous configured parameters)	Nice to Have
SYS_GATEWAY_620	The GATEWAY shall manage automatic service recovery after an AG link failure (Withdraw and selection of the communication on a new free AG)	Nice to Have
SYS_GATEWAY_630	The GATEWAY shall offer high reliability with GATEWAY equipment redundancy	Expected
SYS_GATEWAY_640	In case of redundant equipment, the GATEWAY shall manage automatic service recovery	Expected
SYS_GATEWAY_650	In case of redundant equipment, the GATEWAY should switch automatically to secondary hardware without service outage	Nice to Have
Maintenance		
SYS_GATEWAY_710	The GATEWAY shall offer alarm management services through SNMP	Expected
SYS_GATEWAY_720	Notably following traps shall be sent : Group communication switching with comm. ID and cause, AG failure	Expected
SYS_GATEWAY_730	The GATEWAY shall offer remote access for distant configuration, monitoring and maintenance	Mandatory

Req ID	Description of the Requirement	Status
Functional Requirements		
TCH_GATEWAY_010	Package shall be a19" 2U Rack to make easier the integration in standard 19" cabinet.	Mandatory
TCH_GATEWAY_020	19" rack power supply shall be AC : 110-240 V 50-60Hz	Mandatory
TCH_GATEWAY_030	19" rack power supply shall be DC : 10-36V	Nice to Have
TCH_GATEWAY_040	Power supply shall be remotely switched on/off through IP link	Mandatory
Hardware Requirements		
TCH_GATEWAY_110	Antenna output shall be available on the front side of the GATEWAY.	Expected
TCH_GATEWAY_120	The included AC power supply shall be able to supply all the equipments in the GATEWAY	Mandatory
TCH_GATEWAY_130	In case of local use of audio equipment, connector for audio equipment (as used for the LCT) and connector for serial link to control room interface shall be available in the front side of the GATEWAY.	Expected
TCH_GATEWAY_140	In case of IP link connectivity (through IP converter), a RJ45 connector shall be available in the front side of the GATEWAY. Buttons and leds available on the IP converter shall be visible on the front side of the GATEWAY.	Mandatory
TCH_GATEWAY_150	Remote IP switchable power supply shall be available at the rear side of the GATEWAY (power supply and RJ45 connectors).	Mandatory
TCH_GATEWAY_160	Minimum MTBF: 30 000 hours	Expected
Environmental Requirements		
TCH_GATEWAY_210	operating temperature IEC 60068-2-2 Dry heat +55°C unlimited time at 15W, 30% RH without solar ray (65°C at 2W) IEC 60068-2-1 Cold -10°C	Mandatory
TCH_GATEWAY_220	Mechanical Class 3M1 IEC 60068-2-6	Mandatory

	sinusoidal vibrations: 0.3mm from 2 to 9Hz; 1m/s2 from 9 to 200Hz IEC 60068-2-29 Bump : 0,4g/11ms on 3 axes	
TCH_GATEWAY_230	Storage temperature IEC 60068-2 Dry heat +70°C/30% RH IEC 60068-1 Cold -25°C IEC 60068-56 Damp heat +55°C/93% RH	Mandatory
TCH_GATEWAY_240	Mechanical : class 2.2 EC 60068-2-6 Sinusoidal vibrations: 3,5mm from 2 to 200Hz; 10m/s2 from 9 to 200Hz, 15m/s2 from 200Hz to 500Hz IEC 60068-2-64 Random vibrations: 1m2/s3 from 10 to 200Hz, 0.3m2/s3 from 200 to 2000Hz IEC 60068-2-29 Bump 10g/11ms on 3 axes IEC 60068-2-32 Falls : 0.25m	Mandatory
TCH_GATEWAY_250	tightness IEC 60529 IP20	Mandatory
TCH_GATEWAY_260	EN 60950 CE label	Mandatory
TCH_GATEWAY_270	ROHS compliant	Mandatory
TCH_GATEWAY_280	REACH compliant	Mandatory
Roll-out Requirements		
TCH_GATEWAY_310	It shall be possible to install the equipment by only one people.	Expected
Training and documentation		
TCH_GATEWAY_410	A technical manual shall be available. It shall describe the equipment, the installation and the set up (installation has to explained also the IP converter configuration)	Mandatory

TCH_GATEWAY_420	This technical manual shall be used for option installation and spare purpose.	Mandatory
TCH_GATEWAY_425	Technical documentation shall be available in main European languages	Mandatory
TCH_GATEWAY_430	Datasheet shall be available.	Mandatory
TCH_GATEWAY_440	Relevant training modules shall be updated. No specific training module shall be built for the GATEWAY	Mandatory