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for
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User and System Requirements
for Emergency Telecommunication Services

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General

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Related Documents

Applicable Documents

[AD-1] "Survey of Use Cases", D1.1-1 - WISECOM, Work Package 1.1, 15/11/06

[AD-2] "Regulatory and Licensing Dossier for Emergency Situation Telecom Infrastructures", D2.3-1 - WISECOM, Work Package 2.3, 15/01/07

Reference Documents

[RD-1] "Business Case Analysis", D1.3-1 - WISECOM, Work Package 1.3, 15/05/07

[RD-2] "Overall System Architecture Definition", D2.2-1 - WISECOM, Work Package 2.2, 15/02/07

[RD-3] "Demonstrator Architecture Definition", D3.1-1 - WISECOM, Work Package 1.3, 15/05/07

[RD-4] GSM 06.10 "Digital cellular telecommunications system; Full rate speech transcoding".

[RD-5] ITU-T G.1010, "End-user multimedia QoS categories", November 2001.

[RD-6] ITU-T Y.1541, "Network performance objectives for IP-based services", May 2002.

[RD-7] ITU-T P.800, "Methods for objective and subjective assessment of quality", August 1996.

[RD-8] ITU-T H.323, "Video coding for low bit rate communication", February 1998.

[RD-9] 3GPP TS 23107, "Quality of Service (QoS) concept and architecture (Release 5)", version 5.8.0, March 2003.

[RD-10] Geographical Information System, <http://en.wikipedia.org/wiki/Gis>

[RD-11] Global System Mobile, Wikipedia, <http://en.wikipedia.org/wiki/Gsm>

[RD-12] Universal Mobile Telecommunications System World, <http://www.umtsworld.com>

[RD-13] Terrestrial Trunked Radio Memorandum of Understanding (TETRA MoU), <http://www.TETRAMou.com>

[RD-14] Wireless Fidelity, Wikipedia, <http://en.wikipedia.org/wiki/WiFi>

[RD-15] Worldwide Interoperability for Microwave Access, Wikipedia, <http://en.wikipedia.org/wiki/WiMAX>

[RD-16] "Terrestrial and Satellite Systems for Emergency Situations: State of the Art", D2.3-1 – WISECOM, Work Package 2.3, 15/12/2006

[RD-17] TRACKS:
"http://telecom.esa.int/telecom/www/object/index.cfm?fobjectid=11473"



Acronyms and Abbreviations

2G	2nd Generation (cellular system)
3G	3rd Generation (cellular system)
A-GPS	Assisted-Global Positioning System
AD	Applicable Document
AES	Advanced Encryption Standard
BGAN	Broadband Global Area Network
BGP	Border Gateway Protocol
BoD	Bandwidth on Demand
BTS	Base Transceiver Station
CAC	Connection Admission Control
DNS	Domain Naming System
DS	Disaster-Safe segment (requirements)
DVB	Digital Video Broadcasting
DVB-IP	DVB with Internet Protocol
DVB-RCS	DVB with Return Channel via Satellite
DVB-S	DVB per Satellite
DVB-S2	DVB per Satellite version 2 (evolution)
DVMRP	Distance Vector Multicast Routing Protocol
EMS	Emergency Medical Services
FAP	Fair Access Policy
FCC	Federal Communication Commission
FTP	File Transfer Protocol
GIS	Geographical Information System
GSM	Global System for Mobile communication
H	High (requirements applicability)
HTTP	HyperText Transfer Protocol
HTTPS	HTTP Secure
IE	Internet Explorer
IGMP	Internet Group Management Protocol
IMAP	Internet Messaging Access Protocol
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
IPSec	IP Security



ISDN	I ntegrated S ervice D igital N etwork
ISP	I nternet S ervice P rovider
L	L ow (requirements applicability)
L2TP	L ayer 2 (two) T unnelling P rotocol
LDAP	L ightweight D irectory A ccess P rotocol
LBS	L ocation-based S ervices
LD	L arge D isaster (disaster type)
M	M edium (requirements applicability)
MAC	M edium A ccess C ontrol
MD	M edium D isaster (disaster type)
MoU	M emorandum of U nderstanding
MTBF	M ean T ime B etween F ailure
NA	N ot A pplicable (requirements applicability)
NAT	N etwork A ddress T ranslation
NGO	N on- G overnmental O rganization
NOC	N etwork O perations C entre
OD	O n- D isaster site segment (requirements)
OGC	O pen G eospatial C onsortium
Op	O perator requirements
OPEX	O perational and P erformance E Xpenditures
OV	O verall end-to-end WISECOM system (requirements)
PABX	P rivate A utomatic B ranch e Xchange
PAT	P ort A ddress T ranslation
PCM	P ulse C ode M odulation
PDA	P ersonal D igital A ssistant
PEP	P erformance E nhancing P roxy
PIM	P rotocol I ndependent M ulticast
PLMN	P ublic L and M obile N etwork
PMR	P rivate M obile R adio
PoP	P oint of P resence
POP	P ost O ffice P rotocol
PPTP	P oint-to- P oint T unnelling P rotocol
PSTN	P ublic S witched T elephone N etwork
QoS	Q uality of S ervice
RADIUS	R emote A uthentication D ial I n U ser S ervice



RD	Reference Document
RTSP	Real Time Streaming Protocol
S&R	Search and Rescue
SAMU	Service d'Aide Médicale Urgente
SCP	Secure Copy Protocol
SD	Small Disaster (disaster type)
Se	Service requirements
SFTP	SSH File Transfer Protocol
SIP	Session Initiation Protocol
SLA	Service Level Agreement
SMS	Short Message Service
SMTP	Simple Mail Transport Protocol
SNMP	Simple Network Management Protocol
SOCKS	SOCKET Secure
SP	Service Provider
SS7	Signalling System 7
SSH	Secure SHell
SSL	Secure Socket Layer
STB	Set-Top Box
TBC	To Be Completed / Confirmed
TBD	To Be Defined
TCP	Transmission Control Protocol
TETRA	TErrestrial Trunked RAdio
TKIP	Temporal Key Integrity Protocol
TLS	Transport Layer Security protocol
TM	Transportability and Mobility (requirement category)
TMO	Trunked Mode Operation
ToS	Type of Service
Tr	Transport segment (requirements)
TS	Technical System requirements
UAM	User Authorization Manager program
UDP	User Datagram Protocol
UMTS	Universal Mobile Telecommunications System
Us	User requirements
US	User and Service requirements



VoD	V ideo on D emand
VPN	V irtual P rivate N etwork
WAT	WISECOM Access Terminal
WiFi	W ireless F idelity
WiMAX	W orldwide interoperability for M icrowave A ccess
WISECOM	W ireless I nfrastructure over S atellite for E mergency COM munications
WP	W ork P ackage
WEP	W ired E quivalent P rivacy
WPA	W ireless P rotected A ccess

1 Introduction

1.1 About WISECOM

Disasters are often combined with the destruction of the local telecommunication infrastructure, causing severe problems to the rescue operations. Disasters may also happen where such infrastructures did not exist beforehand. In an emergency situation first line telecommunication services are of paramount importance. Telecommunications offer a way for victims of a disaster to connect to others, and for rescue workers to co-ordinate their efforts.

WISECOM aims at developing a complete telecommunication solution that can be rapidly deployed immediately after the disaster, within the first 24 hours, replacing the traditional use of satellite phones or heavy and cumbersome devices. WISECOM restores local GSM or 3G infrastructures, allowing normal mobile phones to be used, and enables wireless standard data access (e.g. WiFi or WiMAX). The system uses lightweight and rapidly deployable technologies, which can be carried by one person on board a flight and be deployed within minutes. WISECOM also incorporates location-based services for the purposes of location of victims and rescue teams, logistic and disaster management support and targeted disaster messages sending.

This solution for the very first hours and days after an emergency should be easily upgradeable: during the response phase, the capacity and coverage of the WISECOM system could be improved and telecommunication services provided at lower costs, whereas the WISECOM system could be used to re-establish a permanent wireless telecommunication infrastructure in the recovery phase (see Figure 1.1.1).

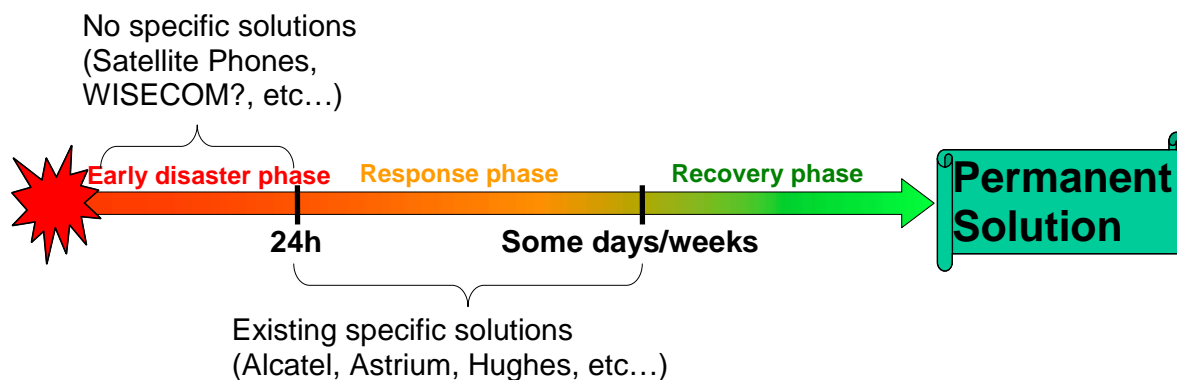


Figure 1.1.1 WISECOM Relation to a Disaster Timeline
(Early disaster, response and recovery Phases).

In [RD-1], short, medium and long terms have been defined to reflect consecutive and different phases of a disaster. As a first assumption, it has been assumed that the short, medium and long terms last typically in the order of one day, one week and one month respectively.

The short term corresponds to a phase right after the disaster, during which rescue teams are not yet well organised, post-disaster area has not been secured, and a high amount of casualties should be quickly rescued.

The medium term was defined as a phase during which rescue teams are better organized, rescue materials are brought on the post-disaster phase and post-disaster area has been cleaned up. In this phase, casualties have all been transferred in field hospitals where they can be nursed.

Finally, the long term was defined as a phase during which all the casualties have likely been transferred to a hospital, and during which infrastructures are re-built.

In order to adopt a terminology suiting better to emergency situations, the early disaster phase, the response phase and the recovery phase will replace in this document and in all other ones the short, medium and long terms respectively. This new adopted terminology for the disaster phases is more sensible than the previous one, not only considering the pure time scale but really the state of the emergency site, the time scale varying significantly from disaster to disaster.

1.2 Scope of the Document

The first aim of the WISECOM system is to answer the telecommunication needs of relief teams and victims in case of emergency and especially of mass casualties' situations.

According to WP1.1 ([AD-1]), telecommunication devices used in emergency situations and addressed by the WISECOM system are subject to different requirements compared to those on telecommunication devices used in the everyday life, in particular because of:

- The hostile environment in which the emergency telecommunication devices must operate,
- The stress condition of the operator of the telecommunication device,
- The required type of telecommunication services in case of emergency.

In WP1.1 ([AD-1]), it has been seen that a specific set of characteristics is common to all disaster situations, and should be taken into account in the design of the WISECOM system.

For this reason, the set of requirements aiming at the careful and realistic design of the WISECOM system is provided in this document.

The aim of this document is therefore to define a comprehensive set of requirements for the WISECOM telecommunication solution for emergency cases.

In the following, a **requirement** is defined as a single documented need of what a particular product or service should be or do. A requirement can also be seen as a condition or a capability that must be met or possessed by a system to satisfy a contract, a service, a specification, a standard, or other formally imposed document. Another definition of a **requirement** is a statement of a behaviour or attribute that a system must possess for the system to be acceptable to a user or an operator. Requirements are always derived from the statement of a given problem, and all the expressed requirements might not be satisfied.

Based on the Survey of Use Cases performed in WP 1.1 ([AD-1]), requirements related to post-disaster or emergency telecommunication solutions should be



expressed in this document, so that the architecture of the target emergency communication system can be easily defined in WP 2.2 ([RD-1]). It is envisaged that this document will be used as a basis for the identification of the needs and the definition of an architecture for emergency telecommunication solutions.

It is important to emphasize right at the beginning of this document that **the requirements expressed in this document are related to the envisaged target emergency telecommunication system, called WISECOM system in the following**, which will of course be different of the demonstrator specified and developed in task 3.

With this respect, only a sub-section of the requirements presented in this document are applicable to the WISECOM demonstrator, whose aim is to demonstrate only the key features of the WISECOM system.

In addition, this document aims in section 2 at defining a high level WISECOM architecture and terminology, used to consistently and coherently express requirements.

1.3 Relationship with other Work Packages

This document presents user and system requirements of a system for emergency communication, capable of addressing all major telecommunication expectations of users under emergency situations as described in the Work Package 1.1 “Survey of Use Cases” ([AD-1]). Especially, the top-level user and service requirements given in D1.1-1 as well as the derived system requirements are investigated in further details in this document.

The user and system requirements specifications hereafter described represent the reference to define the overall architecture of the target system and of the demonstrator, as performed under the frame of the Work Packages 2.2 “Overall System Architecture Definition” ([RD-2]) and 3.1 “Demonstrator Architecture Definition” ([RD-3]) respectively. Please note again that **NOT all the requirements defined in this document apply to the demonstrator, showing only a limiting amount of key features representative of the WISECOM system.**

User and system requirements have also been defined simultaneously and interactively with WP2.3, “Regulatory and Licensing Aspects” ([AD-2]), in particular to identify the eligible frequency bands, relevant to the WISECOM system.

This deliverable also uses as input the business case analysis performed under the frame of the Work Package 1.3 of WISECOM ([RD-1]). It might be used to improve this business case, especially with respect to the definition of the requirements of the several entities in the system involved in the provision of services needed to provide the final end-to-end emergency services and involved in the billing chain.

A summary of the dependencies between work packages related to WP1.2 is provided in Figure 1.3.1.

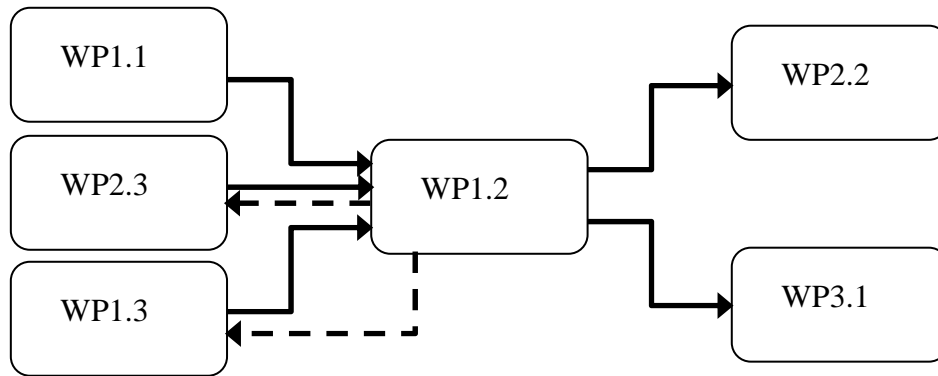


Figure 1.3.1 Dependencies between WP1.2 “User and System Requirements for Emergency Telecommunication Services” and other associated Work Packages.

1.4 Methodology

1.4.1 Classification of Disaster Scenarios

As shown in D1.1-1 ([AD-1]), disasters can be classified into 3 categories with respect to the geographical expanse of the disaster and the amount of damage done: small, medium and large disasters. In addition, several consecutive post-disaster phases can be distinguished, characterized by different emergency levels and the clearing, relief and rescue work already performed on-site. In the immediate or early disaster phase, it is likely that cars and trucks cannot move and that rescue teams are exposed to a dangerous environment with fire, smoke, water, and risk of resulting consecutive disasters. This amounts altogether in the definition of 9 disaster categories, from large disaster with large amount of casualties and dangerous environment to small disasters in their recovery phase. These categories are summarized in Table 1.1.

Table 1.1 Classification of Disaster Scenarios according to the Type and Phase of the Disaster.

Disaster Phase \ Disaster Size	Small Disaster	Medium Disaster	Large Disaster
Early Disaster Phase	SD1	MD1	LD1
Response Phase	SD2	MD2	LD2
Recovery Phase	SD3	MD3	LD3

According to the selected disaster scenario, the envisaged emergency telecommunication system undergoes different constraints. Therefore, the requirements expressed in this document are applicable to the different selected disaster categories and phases at different levels.



For instance in case of the recovery phase in a small disaster, heavy telecommunication equipment can be carried on-site with cars and trucks, and the stress situation of the rescue team using the device has fallen away, whereas in case of the early phase of a large disaster, only light, portable equipments able to resist severe environmental conditions (e.g. shocks, heat and humidity) should be used by highly stressed rescue teams.

The WISECOM system and the user and service requirements expressed in this document focus on emergency situations. For this reason, scenarios SD2, SD3 and MD3 (bottom left scenarios in Table 1.1) are not really targeted in WISECOM, even if some requirements described in this work package apply to them.

From a general point of view, in case of emergency or disaster situations, portable wireless telecommunication equipments should be carried on-site and should be rapidly deployed by the rescue team. The target emergency telecommunication device (WISECOM Access Terminal) is not used in normal conditions (everyday life) and should be accordingly designed. In WP1.1 ([AD-1]), the high-level user and service requirements for such systems have been defined. As a summary, WISECOM Access Terminal should be as light and small as possible so that it can be easily carried by a single person. This device should be resistant to shock, water, humidity, dust, heating and chemicals. It should have its own independent and redundant set of power supplies, and should be user friendly and easy to use by stressed staffs with different origins, languages, knowledge and background and who do not have time to get a deep insight of the system. Additionally, the WISECOM Access Terminal should enable the use of standard telecommunication devices and should be integrated into future restored telecommunication systems. Finally, the costs resulting from the production of the WISECOM Access Terminals and from the supported telecommunication services should be as reduced as possible.

Of course, the WISECOM system should enable the use in emergency situations of a wide set of telecommunication applications, ranging from classical voice services to the transfer of data and the location-based broadcasting of information to on-site spread rescue teams or to the population. This last service could be especially useful to warn people about dangers (poisoned water, further risks of collapse in case of earthquake, etc...) related to emergency situations.

1.4.2 Template for the Expression of a Requirement

Requirements have been composed by applying the principles explained here below:

1.4.2.1 Requirement Identifier (Req_Id)

The Requirement Identifier (Req_Id) helps in referencing and classifying requirements.

The requirement identifier (Req_Id) is written in the form [Req_Type]_[Req_Cat]_[Number].

Where Req_Type corresponds to the main type of selected requirements (User and Service (US), Technical System (TS)), [Req_Cat] identifies a given category among the selected type of requirements (transportability and mobility [TM], etc...) and number is a two digits number.

1.4.2.2 Concise Requirement Expression

The expression of a requirement is short and concise.

Only one verb (*shall*) is used for the expression of the requirements.

1.4.2.3 Requirement Justification and Detailed Description

When necessary, requirements are explained with further details and duly justified with respect to the use of telecommunication systems in emergency and/or post-disaster situations.

1.4.2.4 Requirement Level of Applicability per Scenario Case

As illustrated in Table 1.1, 9 possible disaster scenarios have been identified. The level of applicability of each expressed requirement to the target WISECOM system has been defined. The level of applicability qualifies the relevance of a requirement in each disaster type and phase (Not Applicable (NA), Low (L), Medium (M), and High (H)), and is presented in the current report through the identifier “Appl. Sys”, which stands for “Applicability to the WISECOM system”.

1.4.2.5 Requirement Synthesis Table

On the basis of principles presented here above, the template used for description of each requirement is the one presented in Table 1.2. The levels of applicability to the WISECOM system have been illustratively filled with NA, L, M, an H for Not Applicable, Low, Medium and High applicability level.

Table 1.2 Template of a Requirement Synthesis Table.

Req_Id	US_Us_01								
Concise expression of the requirement									
Requirement justification and detailed description									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	NA	L	M	H					

As much as possible, the authors of this document have respected the following guidelines to select and write the mission and system requirements:

- Necessary – Something that must be included, otherwise an important element of the system will be missing for which other system components will not be able to compensate.
- Unambiguous – Susceptible to only one interpretation.
- Concise – Stated in language that is brief and easy to read, yet conveys the essence of what is required.
- Consistent – Does not contradict other stated requirements nor is contradicted by other requirements.



- Complete – Stated entirely in one place and in a manner that does not force the reader to look at additional text to know what the requirement means.

It should be noted that the set of requirements presented in this document will be expressed for the target WISECOM system. Note that NOT all the requirements expressed in this document apply therefore to the WISECOM demonstrator, focussed on the implementation of the key features of the WISECOM system.

Last but not least, despite the efforts made in the writing of this document for the expression of the requirements related to an emergency telecommunication system, the list of system requirements is not meant to be exhaustive but takes into account the most important aspects of WISECOM and its target environment.

1.5 Structure of the Document

The aim of the present document, “User and System Requirements for Emergency Telecommunication Services”, is to define on the one hand the requirements related to the users of emergency telecommunication services (users, operators and service requirements) and on the other hand the associated technical requirements (technical end-to-end WISECOM system requirements).

After the first section describing the overall background of emergency telecommunications and the way requirements have been expressed, the second section aims at providing a high-level description of the logical and functional architectures of the WISECOM system. This second section is necessary so that requirements expressed in the following sections are all based upon a standard and coherent terminology and all refer to the same WISECOM system.

In the following sections 3 and 4, requirements have then been classified as explained in 1.5.1.

1.5.1 Requirements Organisation and Classification

This section is intended to explain how the user and system requirements are organized/classified in the rest of the document, and which sections of the document to refer to in order to find specific categories of requirements. The classification of the requirements in this document is performed as represented in Figure 1.5.1. The organisation of WP1.2 is directly derived from the logical organisation of the requirements presented in Figure 1.5.1.

From the general requirements, two main types of requirement can be distinguished: the user and service requirements (Req_Type = US) expressed in section 3 and the end-to-end WISECOM system requirements (Req_Type = WS) expressed in section 4. The end-to-end WISECOM system requirements are supposed to fulfil as well as possible the expressed user and service requirements.

The user and service requirements can be further divided into the user, service and operator requirements (Req_Cat = Us, Se, and Op respectively) expressed in sections 3.1, 3.2 and 3.3 respectively.

The end-to-end WISECOM system requirements can also be further divided into the Overall End-to-End WISECOM system, On-Disaster Site Segment, Transport and Disaster Safe Segment requirements (Req_Cat = OV, OD, Tr, and DS respectively) expressed in sections 4.1, 4.2, 4.3 and 4.4 respectively.

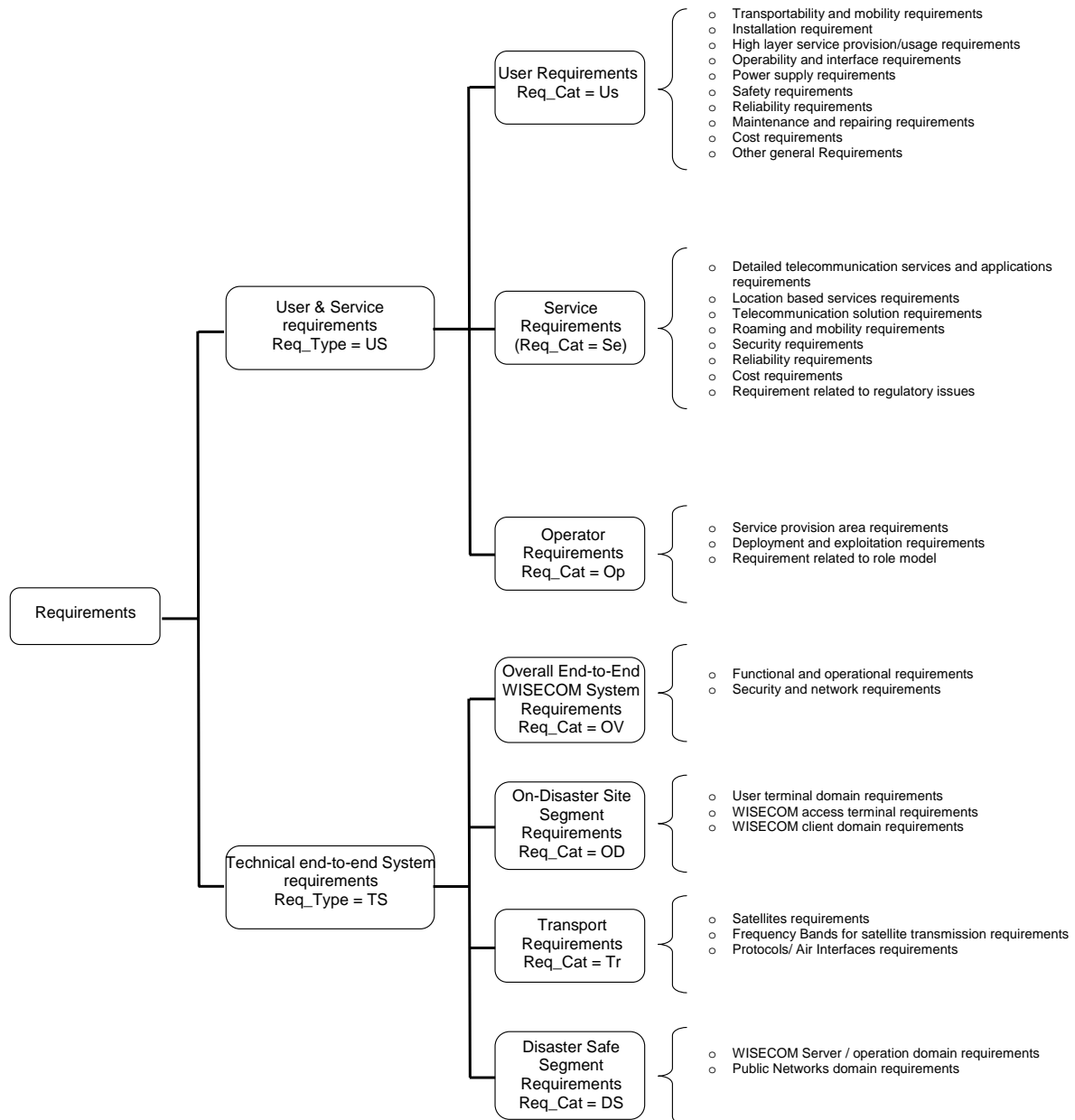


Figure 1.5.1 Logical Organisation of the Requirements.

1.5.1.1 User Requirements

The user requirements can usually be split into several requirement categories. In the case of the WISECOM system, 10 different categories of user requirements have been identified and have been used in section 3.1 to classify the user requirements for the WISECOM system.

1. Transportability and mobility requirements:

The WISECOM Access Terminal¹ are planned to be carried by the rescue team on the scene of the disaster, using different means of transportation

¹ See section 2.2 for definition of the WISECOM Access Terminal (WAT).

according to the type of disaster and the phase of the disaster. The scene of the disaster may be a very unusual, unfavourable and unsafe environment for telecommunication devices, and its specificities have to be taken into account in the design of the WAT, especially for transportability purposes.

2. Installation requirements:

The WISECOM Access Terminal is intended to be carried by the emergency rescue team, and deployed on the scene of a disaster. This type of requirement encompasses deployment and installation of antennas, of power supply devices, plug of cables and wires, of headset, etc..., also taking into account environment related constraints.

3. High layer service provision / usage requirements:

This type of requirement defines the high-layer (type of services) telecommunication and location-based services provided by the WISECOM system to the end-user. Services are defined as successfully running location and telecommunication applications helping rescue teams to successfully manage emergency situations and post-disaster crisis, and victims to be rescued as quickly as possible.

4. Operability and interface requirements:

Operability requirements are necessary to keep a system in a functioning and operating condition in emergency situation. Interface requirements describe how the operator interacts with the WISECOM Access Terminal. This category of requirement encompasses intuitive and user friendly WISECOM Access Terminal interface, adaptation of the user interface to the disaster environment, etc...

5. Power supply requirements:

Power supply requirements are related to the provision of power to the WISECOM Access Terminal and its autonomy.

6. Safety requirements:

Safety user requirements are also related to the safety of the users of the WISECOM Access Terminal, minimizing the probability of injuries due to a possible misuse of the equipment.

7. Reliability requirements:

The reliability of the WISECOM Access Terminal and WISECOM system is characterized by the level of trust in which the emergency rescue can depend on the device. In case of emergency, the emergency team might completely rely upon the information received and transferred by the mean of the WISECOM system.

8. Maintenance and repair requirements:

The maintenance requirements indicate the set of actions that should be taken to keep the WISECOM Access Terminal functioning or in service, on a long term basis but in conditions which can be slightly different from the real post-disaster situation.

The repairing requirements indicate the set of actions that should be taken to make the WISECOM Access Terminals functioning after a break down.



9. Cost requirements:

These requirements indicate how cheap or expensive the whole WISECOM Access Terminal and network entities composing the Local Access Network should be, and have a high potential impact on the selected technologies.

10. Other general requirements:

All other requirements not previously listed, for instance describing the mechanical, electrical, electromagnetic and logical requirements related to the physical WISECOM Access Terminal and Local Access Network entities.

1.5.1.2 Service Requirements

The service requirements can be split into several requirement categories. In the case of the WISECOM system, eight (8) different categories of service requirements have been identified and are described below.

The hereafter defined categories of service requirements will be used in section 3.2 to classify the service requirements for the WISECOM system.

1. Detailed telecommunication services and applications requirements:

This type of requirement defines the detailed telecommunication services provided by the WISECOM system to the end-user (type of telecommunication services, expected bit rate, maximum peak data rate, delay tolerance, loss tolerance, required Quality of Service, connectivity scenario, asymmetry level, etc...).

2. Detailed location-based services requirements:

Detailed requirements related to location-based services supported by the WISECOM system should be expressed in this section (accuracy of the location-based services for different type of location-based services, required throughput and transmission delay).

3. Telecommunication solution requirements:

Requirements expressed in this section define which kind of telecommunication solution should be used in the framework of the WISECOM system: portable solution using GSM/UMTS and WiFi / WiMAX standards, and optionally TETRA.

4. Roaming and mobility requirements:

These requirements are related to the mobility of the end-user within several different wireless cells managed by the same WISECOM Client, different WISECOM networks and terrestrial networks. The end-user should in all cases seamlessly perform its telecommunication service whatever its mobility profile and location are.

5. Security requirements:

Security requirements are related to the access to information and its transfer. With this respect, access to the information should be secured and restricted to a limited amount of users (the rescue team, with mechanisms such as login and password) whereas the integrity and privacy of the transmitted and received information should be enforced.

6. Reliability requirements:

This type of requirement expresses the ability of the WISECOM system to continuously and successfully transmit data with the performance requirement expressed in the “detailed services and application requirements” section. In addition, in case of emergency, the availability of the service is of high importance.

7. Cost requirements:

In this section, requirements related to the cost of the used telecommunication services are expressed. These requirements are important since they might prevent the use of too expensive telecommunication services or telecommunication systems in the WISECOM telecommunication chain.

8. Requirement related to regulatory issues:

In this section, requirements concerning the regulatory issues related to the use of given telecommunication services in different countries with a wide range of policies concerning the use of given ranges of frequency and different telecommunication services are expressed.

1.5.1.3 Operator Requirements

In this section, requirements related to the different operators involved in the provision of the end-to-end WISECOM service and their relationships are presented.

1. Service provision area requirements:

In this section, requirements related to the area over which the WISECOM system shall be able to provide services are defined. Especially, emphasize is put on the local and global coverage of the WISECOM system.

2. Deployment and exploitation requirements:

In this section, requirements related to the deployment and the exploitation of the WISECOM system are presented.

3. Requirement related to the role model:

This section aims at presenting requirements related to the role model with special focus on the services that shall be jointly provided in case of management of a post-disaster crisis.

1.5.1.4 Overall End-to-End WISECOM system Requirements

The overall end-to-end WISECOM system requirements can be split into several requirement categories. In the case of the WISECOM system, two (2) different categories of requirements have been identified and are described in the section 4.1.

1. Functional and operational requirements:

In this section, requirements related to the all the WISECOM system in terms of functionalities and operational matters are expressed. These requirements are important to offer a general overview of the main functionalities and technologies the system shall support.

2. Security and network requirements:

This section defines the main important requirements for the security and network domain provided by the WISECOM system. Different categories are detailed: performance, quality of services, authentication, security and confidentiality, network management, protocols.



1.5.1.5 On-Disaster Site Segment Requirements

The on-disaster site segment requirements can be split into several requirement categories. In the case of the WISECOM system, three (3) different categories of requirements have been identified and are described in the section 4.2.

1. User-terminal domain requirements:
This section expresses requirements and recommendations for the end-users terminals, for example mobile phone or others handheld units.
2. WISECOM Access Terminal requirements:
Two (2) main classes of WISECOM Access Terminals have been identified: portable and transportable. The WAT provide an easy access for the end-users to the WISECOM system.
3. WISECOM client domain requirements:
The WISECOM client domain requirements are necessary to define functionalities supported by the WISECOM client for an efficient use of the services provided by the WISECOM system.

1.5.1.6 Transport Requirements

The transport requirements can be split into several requirement categories. In the case of the WISECOM system, three (3) different categories of requirements have been identified and are described in the section 4.3.

1. Satellites requirements:
The WISECOM system provided means of communication in emergency situations. The system will use existing satellites and existing technologies and will not create them.
2. Frequency bands for satellite transmission requirements:
Referring to the regulatory and licensing aspects, this section describes the frequency bands which are available and might be used for satellite transmission for the WISECOM system.
3. Protocols / air interfaces requirements:
Protocols and air interfaces requirements are related to the different existing technologies in terms of satellite transmissions. They might be used by the WISECOM system.

1.5.1.7 Disaster-Safe Segment Requirements

The transport requirements can be split into several requirement categories. In the case of the WISECOM system, two (2) different categories of requirements have been identified and are described in the section 4.4.

1. WISECOM server / operation domain requirements:
Detailed requirements related to the WISECOM server / operation domain should be expressed in this section. The WISECOM server located at the disaster-safe segment has an important role for the global management and the services offered by the WISECOM system.
2. Public Networks domain requirements:
Requirements related to the link between the WISECOM server/ operation domain and the public networks domain are expressed in the section 4.4.2. It



concerns the ISP services and the Service Level Agreement for a coherent and reliable WISECOM system.

1.5.2 Overall Document Organisation

The present document is structured as follows:

- The section 1 introduces the general background, the methodology of the expression of the requirements and the organization of the document.
- The section 2 introduces briefly the user needs as well as the reference architecture and terminology, which are the basis to set-up user and system requirements.
- The section 3 presents detailed user, service and operator requirements.
- The section 4 presents detailed system technical requirements of the WISECOM system aiming at meeting user needs under emergency situation.
- Conclusion is drawn at the end.

2 Context Overview

2.1 Overview of User Needs

Depending on the disaster size, the users and therefore their specific needs for telecommunication services may vary. In work package 1.1 [AD-1] three different types of disaster sizes were defined. A common or small size disaster with localized destruction, like an explosion at a chemical plant or factory has been first envisaged. In this case, breakdown of usual terrestrial backbones like GSM does not happen due to destruction of the infrastructure, but because of the high use of mobiles by spectators. A medium size disaster, like a localized earthquake requires the use of further infrastructure, as the availability of communication resources within the affected area is reduced to almost zero. Finally a worst-case scenario, like a Tsunami may be so large that the telecommunication infrastructure will be insufficient for a long time period. Specialized rescue forces and special infrastructure reconstruction teams have to rely on a functioning telecommunication system.

In the early phase of a disaster, the first organizations on-site are the rescue teams. They usually consist of firemen, Emergency Medical Services (EMS, like SAMU), and police officers. They come and search the survivors in the destroyed buildings or area. They evacuate the injured people to the nearest hospital.

In the response phase further forces are brought to the area to evaluate the overall damage and organize the specialized rescue forces. Teams will survey the site to prevent the area from further damage and to exclude imminent danger. Further rescue teams, like soldiers from other cities in the country or experts, chemical disaster managers will be brought to the destroyed area.

In the recovery phase European Union (EU) civil protection, food aid, Non Governmental Organization (NGO), medical aid and international aid will merge with the existing rescue forces to establish a new infrastructure.

In all disaster situations, the search and rescue of survivors has maximal priority. As time is the most crucial factor for survival, the victims have to be found as fast as possible and transportation to final treatment has to be established. Search and rescue can only be provided, when the forces are safe in the area of destruction. Therefore immediate communication about the risks at the site is essential not to harm the rescue forces. For these activities in the early phase after a disaster, a central organisation platform with superior communication devices is essential. Communication is usually the bottleneck of the early phase logistical management of the disaster.

One major aspect in search and rescue of victims is the fast localisation of the persons. As mobiles are more and more available even in remote areas, LBS represent a modern tool to reduce time delay to find the victim. Using adequate communication with the logistical centre, rescue forces can be directed to the areas, where victims are expected.

Nowadays these rescue teams usually communicate with each other with analogue radio communication. Modern digital communication systems are expensive and not readily available. GSM mobiles in disaster areas lack either availability of free connectivity due to overload or lack of antennas, or have communication limits due to



one directional communication. Only a highly developed communication network between the disaster site and the logistical centre can improve the local lack of communication.

The requested communication network has to provide several features. It has to provide electricity and communication tools, like phones, internet access, PCs, etc. It also has to overcome the interoperability between all the communication tools used by different organizations or rescue teams. Furthermore, videoconferencing and telemedicine applications would be beneficial. The use of specialized data banks and transfer of data to the rescue forces on the site would improve the ability of the forces to provide adequate measurements.

A fully installed command centre to manage logistics and communication does need a separate communication platform. As the platform has to be independent, satellite communication seems to be one of the favourable systems. Furthermore collection of all available information about the situation, like data satellites images or climatic forecasts can improve local activities. Communications between the command centre and the local hospitals, the civil protections and other further apart forces has to be established, too. Again, the command centre must be installed as quickly as possible.

2.2 Reference Architecture of the WISECOM system

The WISECOM system represents the technical answer to telecommunication needs of people involved in a post-disaster emergency situation as expressed in the section 3 “User and Service Requirements” of the present document. The reference architecture of this WISECOM system, illustrated in Figure 2.2.1, is based on a modular approach where several access and transport solutions can be supported without a need to have more than at least one of each. A WISECOM Client, able to interwork between the various access and transport solutions, as well as providing additional functionality, binds the two domains together in the WISECOM Access Terminal (WAT).

The WISECOM system is also upgradeable in order to meet the different user and services requirements of the post-disaster scenarios introduced in section 1.4.1, and to benefit from the next development. As a consequence, the WISECOM system is not unique and may benefit in its first step of realisation from a number of current off-the-self technical systems and ad-hoc solutions using both terrestrial- and satellite-based telecommunication technologies. The variety of needs coming from the various defined disaster phases may be addressed thanks to very different combinations of telecommunication solutions.

Despite the multitude of technical solutions that could be used to realise the WISECOM system, several distinct logical blocs can be distinguished. It is the aim of this section to define these logical blocs, so that a common high-level WISECOM reference architecture and terminology can be used in the rest of the document when the technical End-to-End WISECOM system requirements are expressed. In this section, the specific WISECOM terminology is introduced.

The WISECOM system enables the communication between the disaster end-users (victims, rescue teams or any other kind of involved people) located inside or outside the disaster area using different kinds of communication devices; the transmission occurs across a number of *network elements*, which compose the *WISECOM communication chain*.



The *segments* represent sections of the WISECOM communication chain involving network elements physically located in the same geographical area with respect to the disaster. All network elements in the same segment undergo very similar usage constraints.

The *network elements* involved in the WISECOM communication chain and playing logically neighbouring functionalities in this chain (e.g. a wireless LAN access point or an UMTS Node B) or jointly enabling the provision of a given functionality (e.g. local access) belong to the same *domain*.

The white boxes in each different domain represent possible groups of network elements with complementary or close characteristics, or supporting the same type of technology. Inside a network element group there might be several network elements involved in the communication. The physical implementation of the domain in the WISECOM system may include at the same time technologies belonging to one or several network element groups, but the communication chain will always flow across one of group of network entities per domain at a time.

Functional architectures describing the organisation of the different network elements in different groups of network elements, domains, and segments are provided for the early disaster, response and recovery phases in Figure 2.2.1.

Two main segments are defined in WISECOM:

- the On-Disaster Site Segment,
- the Disaster-Safe Segment.

The former consists of the User-terminal Domain, the Local Access Domain, the WISECOM Client Domain and the group of network elements responsible for the access to the transport domain from the disaster area (satellite terminals, wireless terminals, etc...).

The later comprises the group of network elements responsible for the access and control of the transport domain, the WISECOM Server / Operator Domain, the Public Networks Domain and the Home Networks Domain.

The interface between the two segments is provided by the Transport Domain. Nevertheless, part of the network elements of the Transport Domain is located in the On-Disaster Site Segment whereas another part is located in the Disaster-Safe Segment.

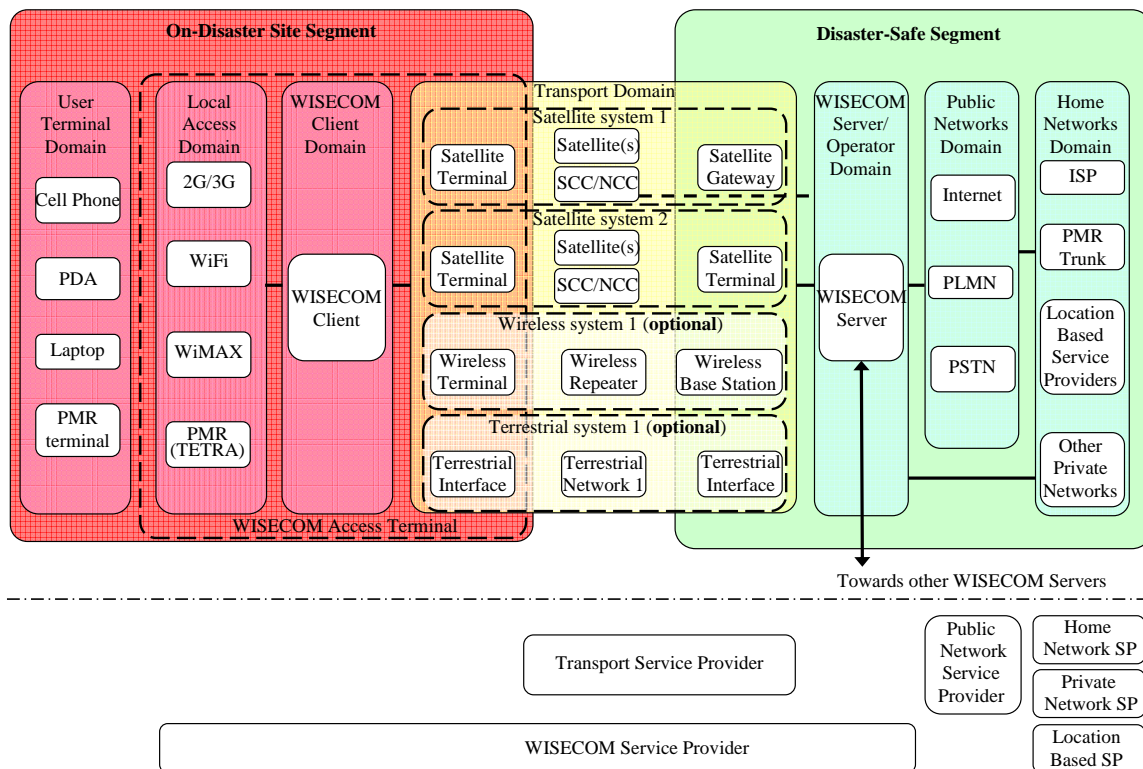


Figure 2.2.1 High-Level WISECOM Functional Architecture^{2,3,4,5}.

A definition of the different network elements is given in the following sub-section 2.2.1 to 2.2.3, and an illustrative example of the implication of these network elements in the WISECOM communication chain is provided in Figure 2.2.2.

WISECOM system: the WISECOM system is the whole set of heterogeneous current off-the-shelf telecommunication devices and ad-hoc solutions used in the end-to-end WISECOM communication chain to provide the emergency telecommunication service to the end-user (victim, rescue team, and other involved people).

2.2.1 On-Disaster Site Segment

² In this Figure, the full lines between the WISECOM Server / Operator Domain and the Home Networks Domain are used to represent a possible direct connection between a WISECOM server and some special networks or services dedicated to emergency situations. Of course, this connection can also be achieved via public networks.

³ In this figure, it is assumed that Location-based Services are logically provided in the Home Network Domain. Actually, Location-based Services are supported thanks to the LBS local and global servers, co-located in the WISECOM client and Server / Operator domains respectively.

⁴ The different providers shown in this figure are only presented as an illustrative example. For more information about the different operators and service providers involved in the provision of services for the WISECOM systems, the relationship and the network entities they are responsible for please refer to section 2.3.



2.2.1.1 User-terminal Domain

The User-terminal Domain is composed of all possible types of user-terminals that might be used in the on-disaster site segment.

User-terminals: any 2G/3G, WiFi, WiMAX, TETRA, etc... terminal (e.g. cell phone, PDA, laptop, PMR terminal, etc...) enabling the end-user (victim, rescue team or other involved people) to connect to the closest appropriate local access base station in order to benefit from the provided emergency telecommunication services. Among them, some special LBS-enhanced terminals may be used by the rescue team members to benefit from advanced LBS.

End-User: end-user is a generic expression gathering the victims, the members of rescue teams and the other people involved in a post-disaster situation as defined below.

- Victims: victims are people directly affected by the disaster and requiring help (medical assistance, rescue, information about the area and the potential dangers). Some victims may carry telecommunication device(s) and may benefit from the emergency telecommunication services provided by the WISECOM system.
- Rescue Teams: rescue teams are professional workers sent by governmental or non governmental organizations to the disaster area to help the victims of the disaster or to limit the damage done by the disaster. Members of the rescue teams can be further sub-divided into:
 - Field operative: end-users belonging to this group are members of a rescue team, and using a user-terminal to access to the WISECOM Access Terminal and to benefit from the offered telecommunication services,
 - WISECOM Access Terminal responsible: this specific member of a rescue team is responsible for transporting, deploying, setting up and controlling the WISECOM Access Terminal brought on the disaster scene. After successful deployment and setting up of the WISECOM Access Terminal, the WISECOM Access Terminal responsible may become a field operative,
 - Rescue Team Manager: located or not on the disaster scene, the rescue team manager is responsible for commanding and controlling the rescue team, monitoring the positions and reports from each of the field operative. In principle, this end-user type has a web interface to WISECOM services such as LBS, and can be located anywhere on the Internet. In practice, the operations management may be delegated at least partially to someone on the disaster site. In this case, he would need to have access to the WISECOM servers via the satellite network.
- Other involved people: such people are close to the scene of a disaster, but neither affected by the disaster nor taking part in the rescue effort. Access to the telecommunication services provided by the WISECOM system should in principle be restricted. On the other hand, such people might also try to use the telecommunication services to voluntarily provide valuable information about things that may not be already noticed by the rescue teams. In addition, such people might become victims because of various post-disaster dangers, so it should be possible to send them practical safety information.



2.2.1.2 Local Access Domain

The local access domain includes all the network entities (such as antennas, base stations, access points) enabling the user-terminals to establish a wireless connection to the WISECOM client.

- 2G/3G: this group belonging to the Local Access Domain gathers all the network elements involved in the provision of 2G/3G radio access to 2G/3G terminals (e.g. GSM or UMTS terminals), and especially the 2G/3G base stations (BTS or Node B),
- WiFi: this group belonging to the Local Access Domain gathers all the network elements involved in the provision of WiFi radio access to WiFi capable terminals (e.g. Laptop or PDA), and especially the WiFi wireless access point,
- WiMAX: this group belonging to the Local Access Domain gathers all the network elements involved in the provision of WiMAX radio access to WiMAX capable terminals (e.g. Laptop), and especially the WiMAX wireless access point,
- PMR: Professional Mobile Radio, TETRA for instance. This group belonging to the Local Access Domain gathers all the network elements involved in the provision of PMR access to PMR capable terminals (e.g. TETRA user-terminal), and especially the PMR access point (TETRA Base Station).

Operator: an operator is an entity providing a service necessary to the establishment of the end-to-end WISECOM communication chain. Note that an operator can rely upon the services of other operators to provide its service. Contractual relationships may exist between operators (guaranteed service and fee).

2.2.1.3 WISECOM Client Domain

- WISECOM Client: the WISECOM Client acts as an interface between the different possible groups of network elements composing the Local Access Domain and the ones belonging normally to a single back-hauling solution in the Transport Domain. The WISECOM Client may directly integrate the different local access domain technologies. The WISECOM Client is always located on or close to the disaster area.

The WISECOM Client Domain may also include functions of resource management, classification and queuing of data streams, fair access policy, security (authorisation, authentication of users, etc). It may also include some caching functions, in order for instance to store close to the end-users useful information, easily and quickly accessible without having to request them through the Transport Domain. As an example, fresh picture information taken by Earth Observation satellites could be stored in the remote domain and updated regularly. This feature would also enable to avoid congestion of networks when high volume information is asked by end-users. A LBS local server is also co-located with the WISECOM Client, for efficient provision of LBS services.

2.2.1.4 Transport Domain

- Satellite Terminals: satellite terminals are light terminals with reduced antenna size and power consumption brought on the disaster scene and enabling the access to the associated satellite system belonging to the transport domain, used



to back-haul the bulk of data between the WISECOM Client and the WISECOM server.

- Wireless Terminals (**optional**, only considered in the response and recovery phases): Wireless Terminals are light terminals with reduced antenna size and power consumption brought on the disaster scene and enabling the access to the associated wireless system belonging to the transport domain, used to back-haul the bulk of data between the WISECOM Client and the WISECOM server. Wireless repeater may be used to increase the communication range between the Wireless terminal connected to the WISECOM client and the wireless base station connected to the WISECOM server, potentially via a terrestrial network.
- Terrestrial Interface (**optional**, only considered in the response and recovery phases): Terrestrial Interfaces enable the WISECOM Client to access the terrestrial network belonging to the transport domain and used to back-haul the bulk of data between the WISECOM Client and the WISECOM server.

2.2.1.5 WISECOM Access Terminal

The WISECOM Access Terminal gathers all network elements brought by a rescue team on the disaster site in order to provide wireless connectivity to the end-users in a post-disaster emergency situation. These network elements include all the networks elements included in the on-disaster site segment except for the end-users and their user-terminals. Many requirements defined in section 3 address the entire WISECOM Access Terminal, composed of:

- The Local Access Domain,
- The WISECOM Client Domain,
- Network elements of the Transport Domain, i.e. satellite terminals, wireless terminals, etc....

2.2.2 Transport Domain

- Satellite systems 1 and 2 represent 2⁽⁵⁾ different satellite systems (e.g. Inmarsat BGAN or Iridium or DVB-RCS system) used to backhaul the bulk of data generated by the end-users from the WISECOM Client to the WISECOM server and reciprocally. Outside the on-disaster site and the disaster safe segments, the Transport Domain only includes the following network elements:
 - Satellite(s): represent a satellite constellation of one or several satellites, used to transmit the signal between the different satellite terminals and the gateways.
 - Satellite Control Centre(s) (SCC): this network element is responsible for the control of the attitude of the satellite in the considered satellite constellation,
 - Network Control Centre(s) (NCC): this network element belonging the transport domain is responsible for the satellite network management,

⁵ The number 2 of envisaged satellite systems in the transport domain is just illustrative and does not represent a formal requirement for the WISECOM system.

control and monitoring (satellite terminals synchronization, up-link resource management, security, etc...). An interface between the WISECOM server and the NCC of a given satellite system may exist, enabling the release of satellite communication resources used by users in non-emergency situations and the attribution of these resources to the WISECOM system.

- **Wireless System 1 (optional, only considered in the response and recovery phases):** Wireless System 1 represents a wireless backhauling solution (e.g. WIMAX) used to transmit the bulk of data generated by the end-users from the WISECOM Client to the WISECOM server and reciprocally. Outside the on-disaster site and the disaster safe segments, the Transport Domain only includes wireless repeaters used for the extension of the range of the wireless connection. Also, an intact terrestrial network might be used to carry the information between the Wireless base station and the WISECOM server, which may be far away from the WISECOM client.
- **Terrestrial System 1 (optional, only considered in the response and recovery phases):** Terrestrial System 1 represents a terrestrial wired backhauling solution used to transmit the bulk of data generated by the end-users from the WISECOM Client to the WISECOM server and reciprocally. This solution is only foreseen for the restoration of the fixed telecommunication infrastructure, and might consist in the restored terrestrial network on the disaster area. Outside the on-disaster site and the disaster safe segments, the Transport Domain is composed of any terrestrial network with its set of routers/switches, transmission lines, etc...

2.2.3 Disaster-Safe Segment

2.2.3.1 Transport Domain

- **Gateway:** this network element belonging to a satellite system acts as an interface and realises protocol and format conversions and translations between the ad-hoc satellite network and the IP based terrestrial networks. In addition, this network element acts as a satellite terminal with enhanced functionalities.
- **Satellite Terminal:** as defined in section 2.2.1.4, without power, weight and size constraints. Satellite terminals can be used in the disaster safe segment in case of fully meshed DVB-RCS satellite networks.
- **Wireless Base Station (optional, only considered in the response and recovery phases):** Wireless Base Stations enable the WISECOM server to access the wireless transport system (possibly via a the use of terrestrial network), with additional functionalities when compared to the wireless terminals belonging to the transport domain and without constraints in terms of weight, size and power consumption.
- **Terrestrial Interface (optional, only considered in the response and recovery phases):** please refer to section 2.2.1.4.

2.2.3.2 WISECOM Server / Operator Domain

- **WISECOM Server:** the WISECOM server acts as an interface between the different possible groups of network elements composing the Public Network



Domain and Home Network Domain and the ones belonging to the Transport Domain in the Disaster-Safe segment. The WISECOM server is always located remotely from the disaster area, in a safe place. The WISECOM server can be in charge of the management of several WISECOM Clients and may use different wireless back-hauling telecommunication systems (e.g. satellite systems, even if terrestrial lines could replace the wireless system in the recovery phase) for the backhauling of data between them and itself. The WISECOM server can be directly connected to different home networks, or via different public networks. A Location-Based Services global server is in principle co-located with the WISECOM server. In addition, the WISECOM server managed by a given WISECOM operator may be connected to other WISECOM servers managed by other operators, so that several WISECOM servers managed by different operators can collaboratively inter-operate and extend the range of services provided to the end-users.

2.2.3.3 Public Networks Domain

- Internet: Internet represents here Internet-based networks used to connect the WISECOM server to different home networks, with packet data transmission mode. Some of the Internet networks may not provide Quality of Service guarantees.
- PLMN: PLMN (Public Land Mobile Network) is a category of the Public Network Domain representing all other distant, intact 2G/3G home network domains, a given 2G/3G terminal in the On-Disaster Site Segment may connect to. According to Figure 2.2.1, the WISECOM server can be directly connected to PLMN (private leased lines) or via public networks.
- PSTN: PSTN (Public Switched Telephone Network) represents here a set of connection oriented networks used to connect the WISECOM server to different home networks.

2.2.3.4 Home Networks Domain

- ISP: ISP (Internet Service Provider) is a category of the Home Network Domain representing the Internet Service Provider of given end-users. According to Figure 2.2.1, the WISECOM server can be directly connected to ISP (private leased lines or ISP directly at the location of the WISECOM server) or via public networks.
- Location-Based Services Providers are responsible for the management of information related to the location of end-users of the WISECOM system (position, movements, etc...), and to the provision of information to the end-users related to its location (maps, practical information, etc...).
- PMR trunk: PMR (Private Mobile Radio) trunk represents the connection to other possible PMR networks such as TETRA. According to Figure 2.2.1, the WISECOM server can be directly connected to PMR trunks (private leased lines) or via public networks.
- Other Private Networks: Other Private Networks gather all other kinds of networks (governmental networks, army networks, etc...) susceptible to provide a specific emergency related service to the end-user. This category of Home Network Domain also encompasses Location-Base Service Providers. According to Figure



2.2.1, the WISECOM server can be directly connected to this kind of private networks (private leased lines) or via public networks.

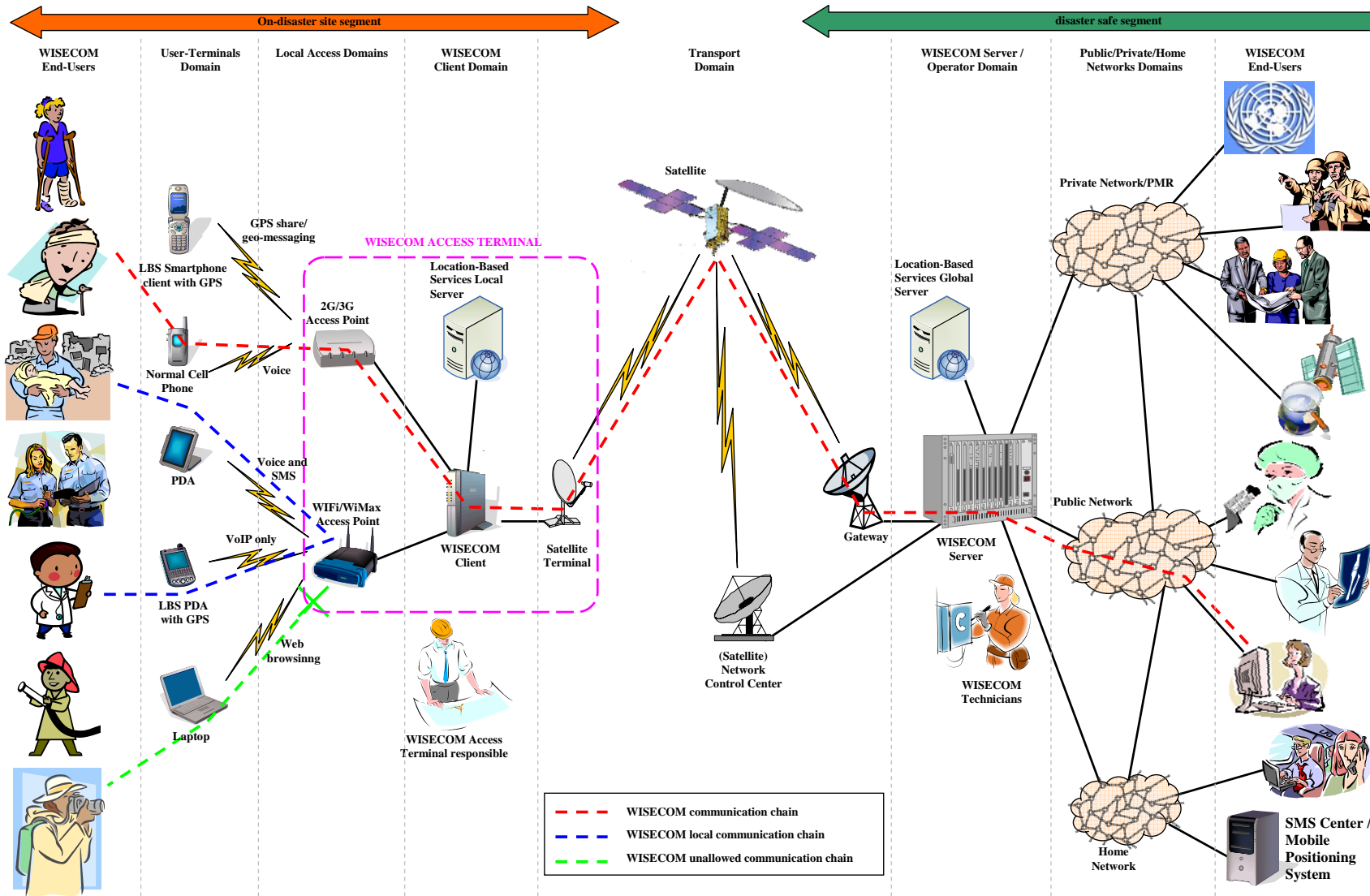


Figure 2.2.2 Identification of the Main WISECOM Functional Elements.

2.3 The Role Model to operate the WISECOM system

The definition of roles in the WISECOM communication system has to closely follow the typical organisational structures in handling of global, regional or national disasters, whereby current practice but also ongoing efforts and future plans for a improved (re)organisation of disaster relief operations must be taken into account. It is still to be studied and evaluated in the framework of this project, mainly under WP 1.3 [RD-1], in how far the role model and system architecture of the WISECOM communication system can in turn have an active influence on these future organisational structures.

The role models and the interfacing also go hand in hand with the WISECOM architectural and functional description as displayed in Figure 2.2.1 and Figure 2.2.2.

The following roles can be identified:

- **WISECOM operator or service provider** – being the central role in the considered system and interfacing to all of the following roles, as illustrated in Figure 2.3.1; usually, each WISECOM operator owns one WISECOM server to which one or several WISECOM clients (or WISECOM Access Terminals, WAT) are connected; the WISECOM operator acts as a kind of “concentrator” for a complete and tailored service provisioning – in terms of communications services, content, and infrastructure – to the system users, and is their main/single direct interface;
- **victims**, which come in as passive or active end users from a communications system viewpoint via their standard equipment (mainly mobile phones), which may be used both in active and passive modes (active calling or sending SMS or being located within a certain cell);
- **search and rescue (S&R) users**, including both early phase (immediate search & rescue) and response phase (rescue, transport and medical treatment etc.) forces; here the main relation is provisioning of services (comms, LBS, and content) via WISECOM Access Terminals available to the rescue organisations;
- **S&R coordination centres** which mainly coordinate and command the field rescue forces throughout all disaster phases;
- **PMR operators** like national/regional TETRA operators, which have an established operator/provider relationship with the users and obviously must be interfaced also in the more general WISECOM role model and architecture;
- **content providers** like GIS/map data providers; in general, the WISECOM service provider should be the central entity responsible for the integrity of all content provided to end-users; for instance the WISECOM service provider would buy and regularly update static reliable GIS map information from various respective content providers and take care of central provisioning to all end-users; for dynamic real-time data, on the other hand, he would preferably secure via agreements reliable and permanent on-line access to content hosted by those providers, for the sake of efficiency and timeliness;
- **satellite transport service operator/provider** which provides the key backhauling link from the disaster areas to the disaster-safe segment; here the relation between the WISECOM operator and the satellite operator should be preferably simple and direct, i.e., the WISECOM service provider would ideally be



or become a service provider of the satellite backhauling capacity at the same time; in the case of one global satellite system like Inmarsat, one could think of one truly global WISECOM provider which could be a key advantage in support of streamlining global coordination of disaster management;

- **Internet Service Provider**, providing access to the Internet;
- **PLMN/PSTN operator/provider** providing voice/data communication and connection to the fixed and mobile legacy networks, mobile positioning and messaging;
- for the local access domain, a **mobile network operator (MNO)** – potentially the same as the previously mentioned PLMN operator/provider – may come in as a specific player if the WISECOM operator/provider does not act at the same time as a (virtual) MNO itself; here the main relation would be a tailored contract for provisioning of vendor-specific SIM cards, specific roaming agreements and use of its licensed frequencies; note that in such a case one unique provider per considered WISECOM service area would be preferable, to keep the number of involved partners low and thus the complexity of contractual, technical, and service level frameworks;

Finally, a general and long-term (maybe only indirect or implicit) relation exists between WISECOM operators /providers and **regulatory and licensing bodies**; the related issues are the whole licensing process for dedicated reserved emergency frequency bands (both terrestrial wireless and satellite) or potential pre-emption usage of general frequencies only in emergency situations etc; this role and relationship has its own complexity and is thus addressed in a dedicated WISECOM workpackage.

The schematic representation of the role model and of the relationship between the different operators involved in the WISECOM system is presented in Figure 2.3.1.

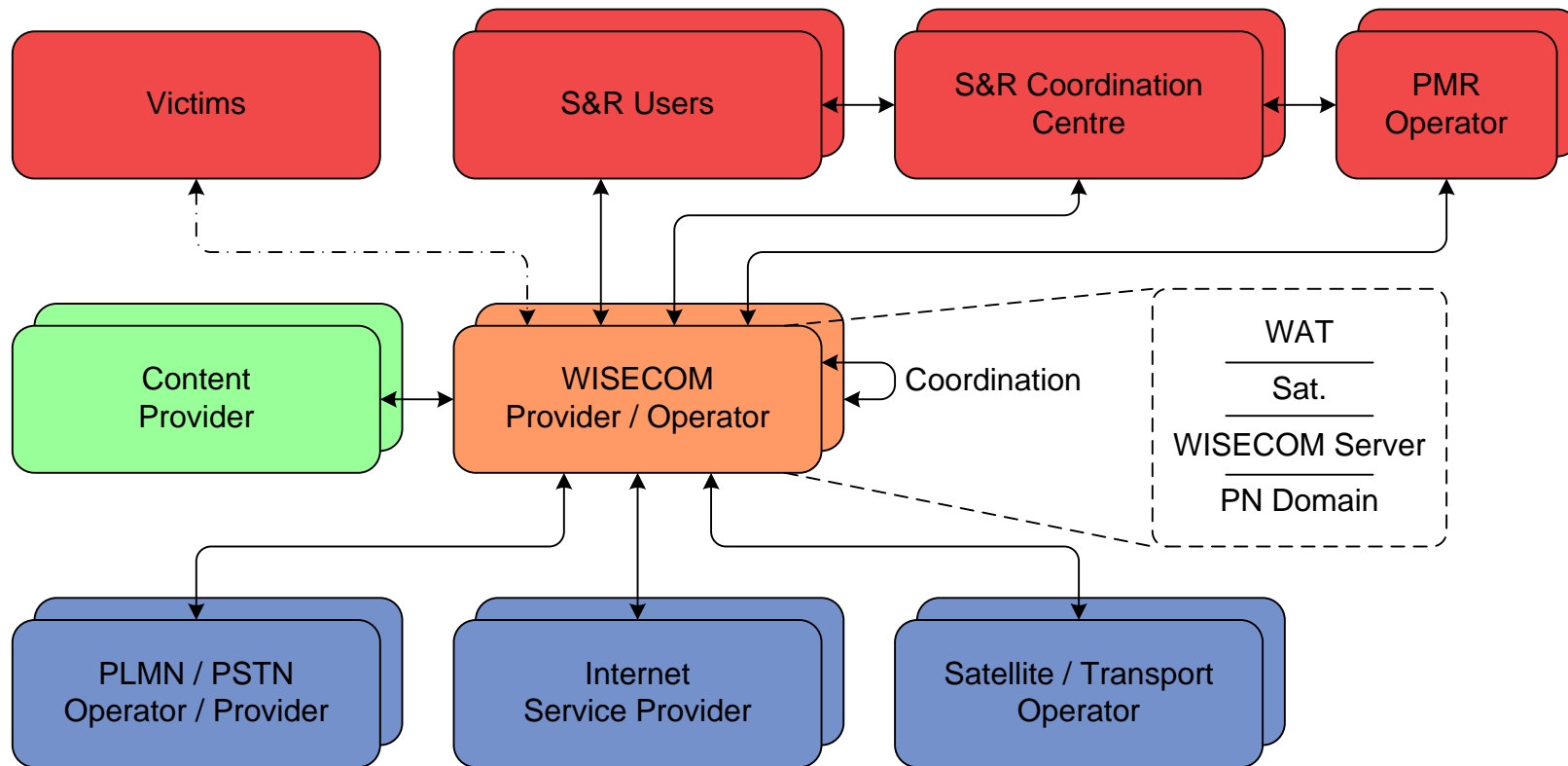


Figure 2.3.1 Schematic Representation of the Role Model and of the Relationship between the Different Players involved in the WISECOM System.



When one looks at the various levels of size (geographical extent) of disasters (local, national, regional, large-area, [AD-1]) and of the organisational structures in performing disaster relief operations (local, single or multi-rescue-organisations, national extent, international extent), apparently the WISECOM communication system should be generic in a sense that it could be used in all cases.

A multi-national or global approach can only be met by properly adapted structures in cooperation and command, and some level of hierarchy can be expected, but in any cases a distributed-cooperative approach will be required. Consequently a respective WISECOM system would certainly mirror such structures to some degree. However, looking at the current reality, global harmonization and setting up such structures seem to have just started with still quite visionary goals. In many cases, national structures dominate the scenario, and also many of the smaller to medium disasters are typically of regional or national extent.

For further studies in the framework of this project it is therefore certainly a pragmatic approach to assume typically national command/coordination centres that would typically have a national WISECOM operator/service provider as counterpart. In addition, to ensure a harmonized development of a WISECOM infrastructure over both national borders and over time, also some technical coordination between such national operators/providers will be required. To have the multi-national component reflected in a simplified way in the WISECOM communication system studies, one could imagine one regional (e.g. European) WISECOM “master centre”/operator/provider which serves all the national command centres and rescue organisations, potentially with slightly tailored content and communications services, rather than setting up a complicated distributed or hierarchical system infrastructure from the beginning. At the same time, it would provide the single infrastructure for the communication between central cooperation/command centre and all national counterparts; in this latter case, as long as only sites in the disaster-safe segment are involved, corresponding parts of the infrastructure would certainly not involve satellite transport links.

3 User and Service Requirements

3.1 User Requirements

In this section, the requirement identifier begins always with US_Us which stands for User and Service _ User requirements. The level of applicability of the requirements for each disaster phase has been represented thanks to the acronyms NA, L, M, and H which stand for Not Applicable, Low, Medium and High respectively.

3.1.1 Target User Profiles

At the early phase after a disaster happened, three major groups of users can be identified. First of all the rescue forces are penetrating into the disaster area. Second, the alarm centre or dispatch centre needs communication with the rescue forces to provide logistical support and third, the victims that may have a communication device and can then use it to call for help or to be localized by the rescue teams.

The rescue teams typically consist of the medical team (Emergency Medical Service, EMS), the fireman and police. Sometimes extra help is necessary, like technical help or experts like in chemical disasters. These rescue forces are mobile and usually have just one type of communication devices, like radio or TETRA. Any extra communication device needs to be easy to handle, light and robust. As energy is usually lacking, batteries are widely used, but have to be replaced in time.

The alarm centre or dispatch centre is outside of the disaster area and has all the resources necessary. As dispatchers in a disaster situation will be affected by stress, the design of the communication solution has to be simple and easy to be used. The system has to provide the dispatchers with sufficient data transfer capability to process a lot of activities within a short time frame.

Finally the victims may still have the opportunity to use communication hardware, like mobiles to ask for help. A fast installation of the communication infrastructure will allow communicating and tracing the victims in an early stage after the disaster. In addition, the psychological effect will be enormous.

To localize the victims, LBS would provide an easy to install application. Two scenarios can be covered in WISECOM:

- Case 1: localization of subscriber telephones for helping to find victims
- Case 2: logistics support for search and rescue team operations

In both cases, we can consider that the user comprises a team of professionals trying to find and rescue victims of a disaster, which means that in case 1, the subscribers being searched for are not considered end-users of LBS. The difference in the two cases is that the first case requires network-based positioning techniques and the telephones being positioned are standard GSM or UMTS handsets. In the second case, the positioning is terminal-based and the telephones are specialized, containing GPS or A-GPS positioning technology as well as special purpose software as required. ([AD-1], section 6.4.1). While WISECOM must support case 2 in all disaster scenarios, both cases may coexist.



In case 1, the critical user requirements are based on the positioning accuracy achieved versus the number and placement of deployed WISECOM base stations. In case there are very few base stations (1 or 2) the achievable network-based positioning accuracy is not sufficient for most practical use and therefore the usage reverts to supporting case 2 only.

The target users of LBS, as mentioned, are a team and not just one individual. Two major roles can be identified:

- controller / management / info gathering and decision centre
 - o central point for gather information, giving orders, making decisions, managing the operations of all field worker
- field worker / fireman /
 - o moves around in the area of operation
 - o provides assistance to victims / puts out fires where possible
 - o provides information on observed situation

While it is conceivable that a certain amount of the central management function can be automated, in principle there are always at least two parties involved, one at each side of the link. In practice, there would be one or more controllers managing the movements of several to many field workers.

The WISECOM system concept shall allow several different S&R teams operating in the same area. Since data relevant to the disaster area may be relevant for all S&R teams, it shall be collected in a central database that is accessible by all teams involved.

3.1.2 Transportability and Mobility Requirements

Req_Id	US_Us_01								
Concise expression of the requirement									
A end-user shall be able to carry alone and over long distances the WISECOM Access Terminal (WAT). The WAT shall therefore be light and reduced in dimensions / volume (fit into a hiking backpack ~60l).									
Requirement justification and detailed description									
After a disaster terrestrial infrastructures may be destroyed or damaged so that classical vehicles cannot reach the disaster place. Other adapted means of transportation (helicopters, army vehicles, etc...) may not be immediately available. Therefore it is required that a single person is able to carry the WISECOM Access Terminal (WAT) even over long distances (10 km).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	NA	NA	M	L	NA	H	M	L

Req_Id	US_Us_02								
Concise expression of the requirement									
The WISECOM Access Terminal (WAT) carried by the rescue team shall resist transport hazards in rough environments.									
Therefore all equipments brought on the scene of the disaster to restore local telecommunication services (the WAT) shall:									
<ul style="list-style-type: none"> • Resist shocks, • Resist extreme temperatures, • Resist dust, smoke and chemicals, • Resist high humidity conditions and water, • Be tolerant to radiation exposure. 									
Requirement justification and detailed description									
Post-disaster environments are likely hostile to human beings and their equipments.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

Req_Id	US_Us_03								
Concise expression of the requirement									
<p>The WISECOM Access Terminal shall be designed to facilitate its transportation in post-disaster phases by the end-user.</p> <p>The WAT shall therefore display the following characteristics:</p> <ul style="list-style-type: none"> • Non-slipping surfaces, • Handles, • Ability to float. 									
Requirement justification and detailed description									
<p>The end-user of the WISECOM Access Terminal (WAT) may be carried by stressed people in a hostile environment. With this respect the shape of the WAT has to be designed so that the end-user can handle it easily.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	NA	NA	M	L	NA	H	M	L

3.1.3 Installation Requirements

The requirements defined for transportability (please refer to section 3.1.2) shall also be applicable during the installation and operation phases.

Req_Id	US_Us_04								
Concise expression of the requirement									
<p>It shall be possible to easily and swiftly deploy the WISECOM Access Terminal (WAT) everywhere on the scene of the disaster.</p> <p>This means that the installation of the lightest version of WAT on the disaster scene shall mobilize as few as possible members of the rescue team, during the shortest possible time.</p> <ul style="list-style-type: none"> • The installation shall last less than 10 minutes, • No user manual, intuitive installation, short language independent instructions written on the case of the WAT, • Neither screw driver nor other tools needed for the installation, • Handled, hand screw and button should be large enough and easy to access • The number of physically separated pieces constituting the WISECOM Access Terminal (e.g. wireless access point, WISECOM Client, satellite terminal and battery) shall be reduced and connection between these pieces shall be easy. 									
Requirement justification and detailed description									
<p>In case of disaster, especially in the early disaster phase, the need for telecommunication services is urgent, and rescue teams carrying the WAT are required to quickly rescue casualties.</p> <p>In addition, the environment in a post-disaster situation (especially in the early disaster</p>									

phase) might still be dangerous. In order to preserve the safety of the members of the rescue teams, the WAT should be deployable everywhere (e.g. no need to climb on a tree or on the top of a building to make the WAT work or to provide the required coverage area or access to the transport domain).

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

Req_Id	US_Us_05								
Concise expression of the requirement									
The WISECOM Access Terminal (WAT) shall be re-transportable and re-deployable after initial installation.									
Requirement justification and detailed description									
In post-disaster situations, it is advantageous if the WAT is readily re-deployable, i.e. it can be moved to a new location swiftly and without causing any problems to ongoing operations. Reasons for this are the fact that a given WAT location might become dangerous or that the coverage area of the WAT need to be shifted.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

3.1.4 High-Layer Service Provision / Usage Requirements

Req_Id	US_Us_06								
Concise expression of the requirement									
The WISECOM system shall provide various classical telecommunication services to end-users on the scene of the disaster. These required telecommunication services are:									
<ul style="list-style-type: none"> • Voice (live and recorded, memo), with a good speech quality, • High definition pictures (enabling zoom, image processing by given tools), • Text messages and multimedia messages (SMS, MMS, etc.), • Video (live and recorded) with a restricted quality, • Tele-medicine applications (real time application with very high priority), • Other kinds of information (bar code for the counting of injuries, pollution measurement, topographic information, etc...). 									
Requirement justification and detailed description									
In case of disaster, different telecommunication services are of paramount importance to find and rescue casualties and to co-ordinate and manage the rescue work of the rescue teams.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_07								
Concise expression of the requirement									
<p>The WISECOM system shall provide different Location-Based Services (LBS) to end-users on the scene of the disaster in order to improve the management of the post-disaster crisis. These location-based services shall at least be:</p> <ul style="list-style-type: none"> • Localisation of end-users (casualties, rescue team members, etc...) (GSM signals, etc...), • Localisation of the different WAT deployed on the disaster scene (point on a map), • Sending of targeted location-based practical information or emergency messages (danger in specific areas, closest hospital or relief facilities), • Transfer of geographical and regularly updated information (pictures, maps of affected area including buildings, infrastructure, environmental information) to the end-users, • Handle of disaster-related location-based information, including on-line locations of victims, rescue teams. 									
Requirement justification and detailed description									
<p>In case of emergency situation in a post-disaster area, location-based services are of paramount importance for the rescue of the victims and the safety of both victims and rescue teams.</p> <p>The LBS system is a useful tool to be employed by professional rescue teams and possibly other related parties. The WISECOM system has therefore to support LBS services required by such teams. LBS core service is digital on-line mapping of (possible) victims, rescue teams and other geographically referred relevant features. LBS service is important value-added feature of WISECOM system; this gives relative advantage to many other legacy rescue communication solutions.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H

Req_Id	US_Us_08								
Concise expression of the requirement									
<p>The WISECOM system shall support a very wide range of connection topologies. The associated connection topologies shall be:</p> <ul style="list-style-type: none"> • Unicast of information to a very specific end-user, • Multicast of location-based information to specific or geographically dependent users groups (location of the closest medical unit, information about potential post-disaster dangers for the safety of the rescue team and of the victims, etc...). • Broadcast of information to all reachable end-users (global warning messages, e.g. "don't drink the water, leave this area", practical information, numbers to dial to reach a given emergency service, etc...) <p>In addition, uni-directional or bi-directional connections for all presented connection topologies shall be supported.</p>									

Requirement justification and detailed description									
In case of disaster, specific telecommunication services with a wide range of possible connection topology may be required.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_09								
Concise expression of the requirement									
The WISECOM system shall enable the provision of telecommunication and location-based services to any set of end-users involved in an emergency situation: <ul style="list-style-type: none"> • End-users managed by the same WISECOM Access Terminal (WAT), • End-users managed by different WATs but by the same WISECOM server, • End-users managed by one or several WAT and end-users reached via the WISECOM server (in the public, private or home network domains), • End-users attached to different WISECOM servers managed by different WISECOM operators, • Any combination of the previously mentioned types of connections. 									
Requirement justification and detailed description									
In case of emergency, it is required that any end-user is able to reach any possible group of any other end-users of the WISECOM system or of several public or private networks.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_10								
Concise expression of the requirement									
The end-user shall access the telecommunication services provided by the WISECOM system on the disaster site thanks to the most common wireless technologies, including GSM, GPRS, UMTS, WiFi, WiMAX, TETRA.									
Requirement justification and detailed description									
In case of disasters, victims and members of rescue teams may use heterogeneous user-terminals supporting different wireless technologies. In order to support the provision of telecommunication services to the widest possible range of end-users, it is desirable that the WISECOM system supports most of the current wireless technologies.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	US_Us_11								
Concise expression of the requirement	<p>The WISECOM system shall enable the inter-networking of the different supported wireless telecommunication technologies.</p> <p>The WISECOM system shall enable any end-user using any type of user-terminal (GSM, UMTS, WiFi, WiMAX, TETRA, etc...) to reach any possible other end-user using any type of user-terminal (GSM, UMTS, TETRA, WiFi, WiMAX, etc...) and to seamlessly interoperate with it.</p>								
Requirement justification and detailed description	<p>In case of emergency, it is necessary that end-users are able to communicate one with the others irrespectively of their user-terminals and their associated wireless telecommunication technology.</p>								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_12								
Concise expression of the requirement	<p>The WISECOM system shall enable the inter-operability between different application types.</p>								
Requirement justification and detailed description	<p>In case of emergency, considering the plurality of types of end-users, of user-terminals and possibly of applications run by the end-users on these user-terminals, the WISECOM system has to enable the inter-operation between any type of applications (e.g. VoIP with classical GSM voice services, etc...). This may need the use of media gateways to convert protocols and data formats.</p>								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_13								
Concise expression of the requirement	<p>The WISECOM system shall provide several levels of priorities and restrictions to the telecommunication and location-based services provided by the WISECOM system to the end-users according to their type. At least, the following types of priorities shall be supported:</p> <ul style="list-style-type: none"> • Unlimited and high priority use of the telecommunication and location-based services provided by the WISECOM system for some special members of rescue or professional teams, • Limited access to the telecommunication services provided by the WISECOM system to some other members of the rescue teams, • Restricted access for some other types of end-users: victims, other involved people, 								



etc... (this type of end-users might only be able to call specific emergency numbers and to receive SMS with practical information, etc...).

Requirement justification and detailed description

In case of emergency, considering specific restrictions of the available bandwidth (especially in the transport domain or even in the local access domain), it is necessary to preferentially attribute transmission resources to the given groups of end-users susceptible to run applications having a critical impact on the management of the disaster relief and rescue operations.

This supposes to manage call priorities with identified high priority numbers, users and organizations, to manage application priorities thanks to several Quality of Service (QoS) classes.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

Req_Id US_Us_14

Concise expression of the requirement

The WISECOM system shall provide the service required by the end-user as soon as possible, with the best quality and the better possible use of the transport domain resources. This means especially the following:

- Call set-up shall be performed as soon as possible,
- Quality of Services and efficient resource allocation mechanisms shall be supported by the WISECOM system,
- Integrity of the transmitted data shall conform with the Quality of Service,
- Cache and proxy shall be present in the WISECOM Client for an optimized access and distribution of the information.

Requirement justification and detailed description

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Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

Req_Id US_Us_15

Concise expression of the requirement

The WISECOM system shall provide a service to the end-users enabling them to easily find the number to dial on their user-terminal to reach the desired end-user(s) or to benefit from the necessary telecommunication services, whatever their user-terminal type is.

Requirement justification and detailed description

In case of emergency, it might be that the end-users, especially victims, don't know the emergency numbers to dial or which services to access to in order to transmit their distress messages or any other information. This is very critical since for instance emergency numbers may vary from one country to another, and foreigners (tourists) may



not be aware of the local emergency numbers. A solution to this problem relies upon the periodic broadcast of messages with emergency numbers in the disaster area.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_16								
Concise expression of the requirement	The WISECOM Access Terminal (WAT) shall be able to locate itself.								
Requirement justification and detailed description	<p>In practice, this means that:</p> <ul style="list-style-type: none"> • Each WAT has to be equipped with a GPS receiver, • Each member of the rescue team will be equipped with a user-terminal that supports accurate positioning – GPS, A-GPS, Galileo. <p>For positioning support to A-GPS, additional functionality may be required in the WAT. Each such remote terminal has to be capable of transmitting its location information, along with supplementary information such as audio, video, textual comments, to the central control function.</p>								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_17								
Concise expression of the requirement	The WISECOM system shall enable the members of the rescue teams to query and/or fill a centralized database containing information about the victims and casualties.								
Requirement justification and detailed description	<p>In the early disaster phase, it might be that members of a rescue team have to face a large amount of casualties which cannot be all instantaneously carried to the closest relief camp or field hospital. With this respect, members of rescue teams might only provide first aid and let the casualty on the disaster scene.</p> <p>Therefore, a database application centralizing information about the victims (name, blood group, type of injury, location, undergone treatment (so far), attributed identification number (identity bracelet with name tag), etc...) has to be supported. This application is closely related to the LBS services.</p> <p>Such an application is therefore of the utmost importance for the efficient management of casualty.</p>								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H



Req_Id	US_Us_18								
Concise expression of the requirement									
<p>A Digital Map of the disaster areas shall be available for LBS services with the appropriate accuracy.</p> <p>The Global LBS server located in the Disaster-Safe segment shall include detailed Digital Map data for all geographical areas for which the particular WISECOM system is providing services.</p> <p>Data relevant to the particular area served by a single WAT shall be downloadable to the LBS local server in the WAT over the satellite link.</p>									
Requirement justification and detailed description									
<p>The Geographical Information System (GIS) [RD-10] is a generic component of WISECOM LBS system, included in both user-terminals of rescue workers and the LBS Server. It is a necessary element of the LBS subsystem.</p> <p>The detailed Digital Maps provided by the Global LBS server should not in principle be constrained by political boundaries, even if the particular WISECOM system is owned, operated and intended to provide coverage to one or more specific countries.</p> <p>In addition, since WATs will generally be stored and maintained by S&R teams responsible for particular areas, the LBS local servers should in principle be preloaded with detailed map data for the entire region being covered.</p> <p>It is necessary that digital map data are available using open standards (based on OGC) to enable open application access.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_19								
Concise expression of the requirement									
<p>Geographical Information System (GIS) digital map content coverage shall be at least nation-wide.</p>									
Requirement justification and detailed description									
<p>Digital map data is mandatory content for GIS system, which is part of LBS system. Otherwise there is no reference information to display locations of rescue teams and other on-line mapped objects. Digital map content includes digital background maps (vector data, aerial and satellite images, could be also scanned paper maps) with different accuracy levels.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H

Req_Id	US_Us_20								
Concise expression of the requirement									
<p>Geographical Information System (GIS) digital map content accuracy and maps shall be</p>									



as detailed as possible, at least:

- 1:10000 scale for rural areas,
- 1:2000 scale for urban areas.

Requirement justification and detailed description

Maps in specified scales is required for detailed navigation of rescue teams and other objects.

Urban maps with 1:2000 scale have to include all buildings, streets, other visible infrastructures (power e.g. lines on air), nature features (rivers, parks) and placenames (street names, city district names, points of interests etc).

Rural maps with 1: 10000 scale have to include major building groups, all roads (including minor and un-paved roads and tracks), major power lines, nature features (rivers, lakes, forests etc), points of interests and placenames (down to village names). Better scale may be also useful for rescue cases, but it could be available for very few special areas only.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	M	M	M	H	H	H	H	H	H

Req_Id	US_Us_21
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Concise expression of the requirement

Additional aerial images of target areas (orthophotos) with 1m resolution or better shall be available for LBS/GIS system. Satellite images shall also be available.

Requirement justification and detailed description

Satellite and aerial images give usually more up-to-date situation information than digital maps which are updated no more than once a year. Aerial images may include also details which are not visible on digitized maps (vector maps), such as type of nature object (forest), shape of buildings etc.

Images are only GIS map data source if detailed digital maps are not available, as it may be the case for some regions/countries. There are providers for below 1m resolution satellite images for any point on the earth.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	L	L	M	M	M	M	M	M

Req_Id	US_Us_22
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Concise expression of the requirement

It shall be possible to update map and image data with operative (on-line) practical information about the disaster: dangerous area, location of relief camps, of field hospitals, etc.

Requirement justification and detailed description

The update of the map and image data is based on information entered by the S&R Team Manager / Control Center and / or information received from field operatives in the form of

geomessages (information messages with a geographical location tag attached).

This data has to be made available for rescue teams using open standards (OCG and others).

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_23								
Concise expression of the requirement									
Maps and images shall always be up-to-date and during an emergency situation may be regularly updated on the fly, where possible.									
Requirement justification and detailed description									
<p>Since digital map data and aerial images may take up terabytes of space, the system architecture will take this into account and ensure that as little data as possible are transferred over the satellite link.</p> <ul style="list-style-type: none"> • Digital maps (static, background info). Update interval: 6 months, • Aerial photos / satellite images (usually static, background info). Update interval: 3 months, • Environmental information – on-line info about e.g. pollution, forecasts. Update interval: 10 minutes, • Meteorological information – on-line weather info and forecasts. Update interval: 30 minutes, • Geological information – on-line seismic activity information and forecasts. Update interval: 5 minutes, • Other important on-line geographical information. <p>Keeping map content up-to date requires different measures:</p> <ul style="list-style-type: none"> • Legal agreements with content providers, • Technical on-line connection to load frequently updated data. 									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H

3.1.5 Operability and Interface Requirements

The requirements defined for transportability (please refer to section 3.1.2) shall also be applicable during the installation and operation phases.

Both controller and field worker sides of the system shall be designed to take ease of operation into account, especially regarding use in stressful and time-critical situations. This leads to the following set of requirements:

Req_Id	US_Us_24								
Concise expression of the requirement	The WISECOM Access Terminal (WAT) shall be self-configurable and shall be operational in less than 10 minutes with as few as possible interaction from the end-user (one button power on).								
Requirement justification and detailed description	<p>In post-disaster situations, rescue workers will be available for the management of the casualties as soon as possible, and will therefore not spend time to configure the WAT.</p> <p>This requirement concerns especially the lightest version of WATS and covers:</p> <ul style="list-style-type: none"> • Automatic satellite tracking system for the antenna of the satellite terminal or omni-directional satellite antenna, • Automatic configuration of all supported devices (local access domain, ...). <p>In addition, the WAT will have to provide as soon as possible telecommunication services to the end-user.</p>								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H

Req_Id	US_Us_25								
Concise expression of the requirement	The WISECOM Access Terminal (WAT) shall provide man-machine interfaces adapted to the post-disaster situation.								
Requirement justification and detailed description	<p>This requirement implies:</p> <ul style="list-style-type: none"> • Keyboard with backlight for night or smoke use, • Touchscreen (some elements / configuration directly accessible via the screen), • Touchpad / Trackpoint if necessary (no mouse which could be uneasy to use), • Possibility to easily configure the brightness of the display and the volume of the loudspeakers. 								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_26								
Concise expression of the requirement	The WISECOM Access Terminal (WAT) shall be multi-language and enable a fast and easy language selection. The LBS S&R application shall also be multi-language.								
Requirement justification and detailed description	This requirement implies:								



- Multi-language interfaces for international rescue teams,
- The flag of the countries may be used for an easier selection of the desired language.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	L	L	M	M	M	H	H	H

Req_Id	US_Us_27								
Concise expression of the requirement									
The WISECOM Access Terminal (WAT) shall be easy to use and shall not require special trained teams. LBS software shall be easy to use, without special training requirements.									
Requirement justification and detailed description									
This requirement implies:									
<ul style="list-style-type: none"> • User-friendly interface, • The untrained end-user should be able to intuitively and quickly discover, understand and use the services and functionalities provided by the WISECOM system. 									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_28								
Concise expression of the requirement									
The WISECOM Access Terminal (WAT) shall clearly indicate information about the power supply.									
Requirement justification and detailed description									
This requirement implies:									
<ul style="list-style-type: none"> • Display of the remaining autonomy (remaining conversation time, remaining stand-by time), • Display of the available types of power supply (battery, solar panel, etc...). 									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_29								
Concise expression of the requirement									
User-terminals of rescue teams shall include GPS and have AGPS software.									
Requirement justification and detailed description									
Rescue teams are referred here as (end) users, they have terminal to access LBS service of WISECOM. GPS (in future extended with other systems like Galileo, GLONASS or similar) is needed to find precise on-line geographical coordinates of the rescue teams.									



Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_30								
Concise expression of the requirement	<p>User-terminals of rescue teams shall provide a graphical colour screen that is large enough (minimum 2.5" in diagonal, at least PDA format) for viewing of maps in the WISECOM LBS application.</p> <p>Pointing Stick User Interface is also strongly suggested for easy and efficient map browsing.</p>								
Requirement justification and detailed description	<p>This is required for following LBS features:</p> <ul style="list-style-type: none"> • Rescue team can see own current (and historical) location on digital map context, • Can see locations (distance, bearing etc) of other rescue teams, and WAT client (central site), • Can add on-line relevant information to the map (locations of damaged buildings, victims etc) to share this with central coordination team and other rescue teams, • Can browse other local map-based information (digital map data, on-line info of environment etc). 								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_31								
Concise expression of the requirement	<p>User-terminals of rescue teams shall be capable of connecting on-line to the LBS local server for the reception or update of LBS data.</p>								
Requirement justification and detailed description	<p>User-terminals need to have on-line connectivity to be able to browse and use on-line geographical information and information shared by other rescue teams: their location, their mapped/pinpointed findings.</p>								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	US_Us_32								
Concise expression of the requirement	<p>User-terminals of rescue teams shall support voice functions: hands free headset option, built-in microphone and loudspeaker.</p>								

Requirement justification and detailed description

This is useful for voice communication functionality of rescue teams:

- Calls to/from the central coordinating unit,
- Calls to/from other rescue teams,
- Multi-party calls with central coordinating unit and other rescue teams,
- Calls to/from other telephone numbers.

Note: this requirement may be covered by legacy terminals (e.g. TETRA), it is not a LBS requirement.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id US_Us_33

Concise expression of the requirement

User-terminals of rescue teams shall have software to access and update LBS service data in WISECOM LBS Server.

Requirement justification and detailed description

User-terminals have to be extensible, as standard mobile devices (e.g. TETRA terminals) do not have any LBS specific software. LBS client software (digital on-line map client) has to be installed on user-terminals of rescue teams. It is suggested to use open software platforms for this software. Software itself is not part of WISECOM solution, as LBS system defines open interfaces to publish needed on-line data.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id US_Us_34

Concise expression of the requirement

LBS solution shall enable to locate GSM phones in disaster region, and send messages (warning, information etc) to the local phones. Accuracy shall be as good as technically possible.

Requirement justification and detailed description

Sending warning messages enables to notify local people quickly about possible relapses of disaster. Localization enables also to find unfound victims (lost persons), at least finding out whether persons can or cannot be in the disaster region.

Location of mobiles should be available in WISECOM LBS server database, and visible via multiple interfaces.



Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.1.6 Power Supply Requirements

Req_Id	US_Us_35								
Concise expression of the requirement	All the different available power supply solutions shall guarantee a sufficient autonomy to the WISECOM Access Terminal for continuous provision of emergency services during at least the early disaster phase.								
Requirement justification and detailed description	According to the type of disaster, the rescue team carrying a WAT might be completely isolated during the early disaster phase. During this phase, the WAT is required to provide telecommunication services to the rescue team and to the victims in its coverage area, and need therefore to be supplied with the appropriate power.								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

Req_Id	US_Us_36								
Concise expression of the requirement	The WISECOM Access Terminal (WAT) shall have its own set of independent and redundant power supply solutions (battery, solar panel, fuel cell, etc...).								
Requirement justification and detailed description	In a post-disaster situation, power supply infrastructures may be destroyed. For this reason, the WAT needs to have its own power supply, enabling it to run during a time adapted to the emergency situation (depending upon the considered disaster phase).								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

Req_Id	US_Us_37								
Concise expression of the requirement	The WISECOM Access Terminal (WAT) shall be designed to consume as little as possible power.								
Requirement justification and detailed description	For the mission of the WISECOM system, the critical power consumption is related to the antenna necessary to support the wireless local access and the wireless connection to the transport domain. In addition, the use of wide colour screens and of specific types of processor may increase the power consumption. In order to limit the power consumption of the WAT which has to run as long as possible with the power delivered by a set of batteries, power consumption should be reduced by selecting the adapted equipments.								



Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

Req_Id	US_Us_38								
Concise expression of the requirement									
Among the set of solutions supplying power to the WISECOM Access Terminal, at least one shall enable to recharge the time limited power supply solutions.									
Requirement justification and detailed description									
<p>In case of post-disaster situation, it is hard to accurately foresee how long a WAT has to operate without external power supply or replacement of its battery. In addition, the power consumption of the WAT depends upon the amount of telecommunication services it supports and the amount of traffic it handles. As battery might run out of power, one or several of the following power supply solutions enabling to recharge the time limited power supply solutions should be supported:</p> <ul style="list-style-type: none"> • Solar panel, • Mini windmill, • Manual possibility to recharge the WAT, for instance by turning of a handle or a pedal. 									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	NA	NA	M	L	NA	H	M	L

Req_Id	US_Us_39								
Concise expression of the requirement									
The end-user shall be able to recharge the WISECOM Access Terminal from the restored/intact local power. With this respect, it shall be possible to plug the WAT to any standardized but international power supply system, with different intensity, voltage, frequencies and plug format.									
Requirement justification and detailed description									
<p>In case of disaster, there is a small probability that the power infrastructure has not been completely destroyed or that the power supply is restored after a given time in the vicinities of a WAT offering telecommunication services to rescue teams and victims. In this case, it has to be possible to supply the WAT with power from the working power infrastructure, in order to free it from problems related with limited power batteries.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	M	H	NA	L	M	H	L	M	H

Req_Id	US_Us_40								
Concise expression of the requirement									
The WISECOM Access Terminal shall enable the recharge of the user-terminals if necessary.									

Requirement justification and detailed description									
Members of rescue teams may extensively use their personal user-terminals in case of emergency. Even during the early disaster phase, the user-terminals might run out of power. It is therefore necessary that the members of the rescue teams are able to recharge their user-terminals to the nearest WAT.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	H	M

3.1.7 Safety Requirements

Req_Id	US_Us_41								
Concise expression of the requirement									
<p>The WISECOM Access Terminal shall be designed to preserve the safety of the end-users during transportation, installation and operation in emergency situation.</p> <p>The WAT shall therefore be designed in order to avoid:</p> <ul style="list-style-type: none"> • Short circuits, • Fire, explosion, emission of toxic gases, • Acute or sharp shapes, • Injuries due to breakable materials (e.g. glass), • Harmful radiations of all wireless telecommunication devices. 									
Requirement justification and detailed description									
In post-disaster situation, the environment might be dangerous, both for human beings and telecommunication devices. For this reason, the use of the WAT on the disaster scene should not generate new hazards.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.1.8 Reliability Requirements

Req_Id	US_Us_42								
Concise expression of the requirement									
Breakdowns of the WISECOM Access Terminal or any of its components related to any mechanical, electrical or electronic problem shall very infrequently occur. The Mean Time Between Failure (MTBF) of the WISECOM system shall therefore be as long as possible.									
Requirement justification and detailed description									
In post-disaster situation, victims and members of the rescue teams rely on the WAT. It is therefore necessary that the WAT has a very low probability of failure.									



Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.1.9 Maintenance and Repairing Requirements

Req_Id	US_Us_43								
Concise expression of the requirement	The WISECOM Access Terminal shall provide comprehensible breakdown diagnose, shall be easy to dismantle and shall be easy to repair thanks to a modular architecture enabling a fast and efficient replacement of a limited number of faulty pieces.								
Requirement justification and detailed description	<p>In case of break-down, the WAT has to be repaired (or replaced) as soon as possible in order to restore local telecommunication services which are of the utmost importance for the management of post-disaster situations.</p> <p>Neither special screw drivers nor other tools should be necessary to dismantle the system.</p>								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.1.10 Cost Requirements

Req_Id	US_Us_44								
Concise expression of the requirement	The WISECOM Access Terminal shall be as cheap as possible and the WISECOM system shall be overall as inexpensive as possible.								
Requirement justification and detailed description	<p>The members of the rescue teams have generally a limited availability to pay, which has to be taken into account when sizing the WISECOM system and WAT. The same guideline applies to the operation.</p> <p>In addition, in emergency situation, the WISECOM Access Terminal may be damaged, destroyed, stolen and therefore replaced.</p> <p>In an operational system, the LBS system costs are determined by the service cost of GPS-based positioning, possible additional service costs, the cost of (A)-GPS handsets, a couple of servers for collecting and maintaining the mobile positioning information, licence costs for the application software, as well as the cost of possible additional software in the WAT for A-GPS support.</p>								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.1.11 Other General Requirements



Req_Id	US_Us_45								
Concise expression of the requirement									
<p>The WISECOM Access Terminal shall be modular and use standard interfaces (physical and logical) to connect the different add-on modules.</p> <p>The different types of modules that shall be easily connected to the WAT are:</p> <ul style="list-style-type: none"> • Different power supply solutions (fuel cell, solar panel, battery, etc...), • Different satellite terminals and antenna types, • Different local access technologies. <p>The modularity of the WISECOM Access Terminal shall enable the use of future satellite or local access technologies.</p>									
Requirement justification and detailed description									
<p>The WAT is designed for the provision of telecommunication services for the management of post-disaster situations. In the future, new local access technologies or new satellite systems will become available, and some of them will be eligible for use in the WISECOM system. In addition, the WAT might be upgraded during the different consecutive disaster phases, by bringing new local access domain and transport domain technologies: (e.g. in the early disaster phase, only a BGAN satellite system with GSM BTS might be used, and upgraded with WiFi, WiMAX and DVB-RCS systems in the response phase).</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



3.2 Service Provision Requirements

In this section, the requirement identifier begins always with US_Se which stands for User and Service _ Service Provision requirements. The level of applicability of the requirements for each disaster phase has been represented thanks to the acronyms NA, L, M, and H which stand for Not Applicable, Low, Medium and High respectively.

3.2.1 Detailed Telecommunication Services and Applications Requirements

Req_Id	Us_Se_01								
Concise expression of the requirement									
<p>The WISECOM system shall support voice applications by guaranteeing a constant bit rate to the end-user. The quality of the voice service shall be good (Mean Opinion Score (MOS) [RD-7] = 3.5) at least. The maximum transmission delay shall be less than 400 ms [RD-5].</p> <p>The WISECOM system shall support point to multi-point audio conferencing applications with the characteristics of a voice call.</p> <p>The WISECOM system shall establish voice connection in less than 30 seconds.</p>									
Requirement justification and detailed description									
<p>In case of emergency, voice calls are the most natural and straightforward services to be provided to the end-users. It is therefore necessary that the provided quality of the speech is good enough in order to improve the efficiency of the communication between end-users.</p> <p>The constant bit rate allocated to voice application should not be less than 13 kbit/s in both directions (this corresponds to the full rate GSM voice codec [RD-4]).</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_02								
Concise expression of the requirement									
<p>The WISECOM system shall support video applications. For this kind of application, the variable bit rate allocated to video application shall not be less than 256 kbit/s (mean rate) in both directions [RD-8]. The maximum transmission delay shall be less than 400 ms (one-way). The used video codec (e.g. H.323 [RD-8]) shall support good image quality for specific applications (tele-medicine).</p> <p>The WISECOM system shall support point to multi-point video conferencing applications with the characteristics of a video application.</p> <p>For high priority application, the WISECOM system shall establish video connection in less than 30 seconds.</p>									

Requirement justification and detailed description									
In case of emergency, video applications with good video quality have to be supported for tele-medicine applications for instance.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_03								
Concise expression of the requirement									
<p>The WISECOM system shall support all the current IP applications with an effective offered transmission quality (bit rate, delay, delay jitter, loss ratio, etc...) fitting the required QoS of the application.</p> <ul style="list-style-type: none"> • Streaming application (at least audio), • File transfer application, • Email application, • Web browsing application, • Telnet and Secure Shell application, • Voice over IP application, • Video application. 									
Requirement justification and detailed description									
All the current IP applications presented here may be usefull for the management of a post-disaster situation.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_04								
Concise expression of the requirement									
<p>The WISECOM system shall enable the up-load (from end-user to server) and down-load (from server to end-user) of files whose sizes may exceed 10 Mbytes. The typical transmission delay for this kind of file should be less than 5 minutes and 2 minutes respectively for a 10 Mbytes file.</p>									
Requirement justification and detailed description									
<p>This is necessary in case of management of a post-disaster situation for the transmission of picture of the post-disaster-scene for instance.</p> <p>The ratio down-loaded file volume/up-loaded file volume is expected to be high (in the order of 10 to 100) because in case of the management of a post-disaster situation, end-users require more information than they transmit.</p> <p>Caches and proxy will have to be supported in the WISECOM Client to accelerate the down-load of these files and improve the satellite system resource utilisation by avoiding</p>									



multiple transmission of the same content over the transport domain.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_05								
Concise expression of the requirement									
The WISECOM system shall support interactive applications for the browsing of specific disaster related web pages, browsing of database information, etc... The data transmission delay for browsing information shall be less than 4 seconds [RD-5]. The WISECOM system shall guarantee on the average 32 kbps in the return link and 128 kbps in the forward link for each web browsing application, and shall preserve the integrity of the data.									
Requirement justification and detailed description									
Web browsing or database browsing applications are of the utmost importance in the management of post-disaster situations (e.g. databases of victims with name, types of injuries, treatment, etc...).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_06								
Concise expression of the requirement									
The WISECOM system shall enable call filtering in order to block services not required in case of post-disaster emergency situations.									
Requirement justification and detailed description									
In case of post-disaster emergency situations, it is not important that people calls other members of their family, even send pictures, etc.... Such telecommunication services should be prohibited during the post-disaster phase in the WISECOM system. It can also be required that in case of emergency, victims are only allowed to call a given set of numbers (911).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_07								
Concise expression of the requirement									
The WISECOM system shall prioritize the attribution of resources to different applications according to the profile of the users running the considered applications.									
At least three priority levels shall be supported:									
<ul style="list-style-type: none"> High priority (for unlimited access user type), 									



- Medium priority (for limited access user type),
- Low priority (for restricted access user type).

Requirement justification and detailed description

In case of management of post-disaster situations, the access to given telecommunications applications provided by the WISECOM system and to the corresponding telecommunication resources has to be prioritized according to the type of end-user benefiting from it. It is recommended that the highest priority is given to specific rescue forces involved in the overall management of the crisis, followed by normal rescue teams and then by victims desiring to join special emergency services.

An end-user may be identified by a given login and password, by its IP address, MAC address, etc...

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id Us_Se_08

Concise expression of the requirement

The WISECOM system shall support at least 4 classes of Quality of Service (based on [RD-9]):

- Very high priority (Tele-medicine, specific emergency applications): all required bandwidth and network resources shall be allocated to this kind of application, in order to provide them with a low losses and low delay path,
- Conversational (VoIP, phone call): very low delay and delay jitter requirements, can bear losses,
- Interactive (Web browsing): loose delay and delay jitter requirements, sensitive to losses,
- Background (file transfer, email): no delay requirements, very sensitive to losses.

Requirement justification and detailed description

The use of different QoS classes enables to improve the efficiency of the use of the telecommunication resources, especially the satellite resources in the transport domain. The 4 defined QoS classes have different performance requirements in terms of losses and delays.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



3.2.2 Location-Based Services Requirements

Req_Id	Us_Se_09								
Concise expression of the requirement									
Specific LBS Search & Rescue application shall be installed on LBS Server.									
Requirement justification and detailed description									
For the support of LBS services, its is necessary that the LBS/GIS S&R application for WISECOM is installed on the LBS server. This application is typically a fleet management type of mapping application and shows in real time the on-line locations (of victims, rescue workers etc) together with static map data (maps and important thematical information).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H

Req_Id	Us_Se_10								
Concise expression of the requirement									
The LBS Search & Rescue Application shall have the following features:									
<ul style="list-style-type: none"> • The central LBS application shall be remotely available using a web browser, • The LBS Application shall have secured access (encryption, users shall be securely authenticated and authorized), • The LBS application shall enable viewing rescue worker real-time locations on a map, • The LBS shall enable viewing historical locations of rescue workers on a map, • The LBS shall allow realtime updating of map data based on geomessaging feedback from field operatives or information from other sources. 									
Requirement justification and detailed description									
-									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H

Req_Id	Us_Se_11								
Concise expression of the requirement									
GSM and 3G positioning shall be supported in LBS.									
<ul style="list-style-type: none"> • The LBS shall be capable of showing other real-time locations, e.g. locations of possible victims (using GSM and 3G mobile positioning), • The LBS shall enable location of mobiles, when the phone number is known (and if the legacy GSM and 3G networks are working), 									



- The LBS shall enable location of GSM and 3G phones in the temporary emergency network cell(s), using best possible accuracy.

Requirement justification and detailed description

-

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

Req_Id Us_Se_12

Concise expression of the requirement

LBS shall be integrated with cellular systems (GSM/3G).

Requirement justification and detailed description

- The LBS enables getting a list of local network mobile phones (phone number, owner name and address if known) around the disaster area,
- The LBS enables getting a list of visiting (roaming) mobile numbers in the disaster area,
- The LBS enables sending notifications (alerts) to mobile phones in the disaster area.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

3.2.3 Telecommunication Solution Requirements

Req_Id Us_Se_13

Concise expression of the requirement

The WISECOM system shall be designed to transparently offer telecommunication services to current off-the-self (COTS) user-terminals, and to LBS enhanced terminals.

Requirement justification and detailed description

From the user-terminal point of view, no specific functionalities (software or hardware) are required to access the services provided by the WISECOM system. This has the advantage that the rescue workers and victims can benefit from the services provided by the WISECOM system using their own terminals and well know software and applications. In case of emergency, this is justified since end-users undergoing unusual level of stress need to easily and quickly access telecommunication services.

From the end-user perspective, the WISECOM system has to provide a wireless network with the same characteristic as the ones the end-users usually use. The end-user should not perceive any difference in the service provided by the WISECOM system when compared to services used in the normal life or during training sessions.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	Us_Se_14								
Concise expression of the requirement									
The WISECOM system shall reuse as much as possible current off-the-self (COTS), wide-spread technologies in the local access domain and in the transport domain.									
Requirement justification and detailed description									
This requirement is necessary to provide access to current off-the-self, wide-spread user-terminals technologies.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_15								
Concise expression of the requirement									
The WISECOM system shall enable multiple combinations of local access domain and transport domain technologies, in order to extend the possible range of connectivity and offered services.									
Requirement justification and detailed description									
For instance, the following combinations of local access domain and transport domain technologies may be possible:									
<ul style="list-style-type: none"> • GSM over BGAN, • UMTS over BGAN, • WiFi over DVB-RCS, • WiMAX over DVB-RCS, • TETRA over DVB-RCS, • WiMAX + WiFi + GSM over DVB-RCS. 									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.2.4 Roaming and Mobility Requirements

In this section, mobility of the end-user on the disaster scene is taken into account.

It is useful to distinguish the different types of roaming which may occur when the WISECOM system is installed on a disaster scene and their associated requirements.

Req_Id	Us_Se_16								
Concise expression of the requirement									
The WISECOM system shall enable seamless intra WISECOM Access Terminal (WAT) roaming.									
Requirement justification and detailed description									
A WAT may manage several antennas defining several distinct and potentially overlapping coverage areas (cells) for the supported wireless technologies in the local access domain. When end-users roam from one cell to another, seamless handover is needed in order to provide continuous telecommunication services.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_17								
Concise expression of the requirement									
The WISECOM system shall enable seamless inter WISECOM Access Terminal (WAT) roaming, for WAT managed either by the same WISECOM server or by different WISECOM servers.									
Requirement justification and detailed description									
In post-disaster situations, a end-user may roam from the wireless network managed by one WAT on the ground to the wireless network managed by another WAT. In this case inter WAT seamless handover is required. It must also be possible that a end-user seamlessly runs an application while roaming from a WAT managed by a given WISECOM operator to a WAT managed by another WISECOM operator. In this case, preliminary agreements between operators should have been reached to enable the handover procedure between different WISECOM operators.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_18								
Concise expression of the requirement									
The WISECOM system shall enable seamless roaming between the wireless network managed by a WAT and the fixed, intact wireless network.									

Requirement justification and detailed description									
In case of disasters with reduced geographical extent (e.g. for small disasters in a city or in case of an explosion), the end-user might roam from a region where wireless connectivity is provided by a WAT to a region where the telecommunication infrastructure has been preserved. In this case, seamless handover has also to be performed, where possible.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_19								
Concise expression of the requirement									
The position of the end-user shall be updated at least at pre-defined time intervals. Geographical information (maps, pictures, etc...) related with the position of the end-user shall be updated when the end-user significantly (with respect to the geographical expanse of the disaster, or the range of the map) moves.									
Requirement justification and detailed description									
The position of the end-user is stored on the LBS local server and this can be replicated on the LBS global server. The position has always to be up-to-date with a given uncertainty corresponding to the update interval of the user position. Information related to the current position of the end-user (map, practical information) has also to be updated.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.2.5 Security Requirements

Req_Id	Us_Se_20								
Concise expression of the requirement									
The WISECOM system shall support firewall and anti-virus.									
Requirement justification and detailed description									
In case of disaster, the reliability of the telecommunication services and the integrity of the data transmitted via the WISECOM system are of the utmost importance. They have to be protected in particular against any deliberate or fortuitous virus, worm, and Trojan.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_21								
Concise expression of the requirement									
The WISECOM system shall enable the encryption of the totality or of part of the data in end-to-end transmission.									



Requirement justification and detailed description									
Data transmitted over the WISECOM system are very likely sensitive and confidential. For this reason, encryption mechanisms may be requested at different levels (air interface in the local access domain and in the transport domain, in the public domain, etc...).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_22								
Concise expression of the requirement									
The WISECOM Access Terminal shall rely upon an authentication mechanism using login and password before providing given services.									
Requirement justification and detailed description									
When set up, the WAT will have instantaneously to provide some given pre-defined services using the supported wireless technologies (call to emergency services, transfer of messages with practical information, etc...). For the support of other services (internet connection, tele-medicine applications, video-conferencing, etc...) the WAT users will have to authenticate himself using a login and a password.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_23								
Concise expression of the requirement									
It shall be possible to remotely shut down, connect or disconnect, check, control or restrict the functionalities of a WAT from the disaster safe segment, using a standard protocol (SNMP).									
Requirement justification and detailed description									
In a post-disaster situation, rescue teams members and especially WISECOM Access Terminal responsible may let the WAT unattended for long time. This may waste some system capacity which may be useful for some other users. In addition, the functionalities of the WAT might be abusively used by un-authorized users.									
For these reasons, it is necessary to leave the possibility to remotely control the WAT.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



3.2.6 Reliability Requirements

Req_Id	Us_Se_24								
Concise expression of the requirement									
Telecommunication services shall always be available when required, after the successful installation and deployment phase of the WAT. The number of telecommunication services running in a given WISECOM system shall only be limited by the selected transport domain or local access domain capacity.									
Requirement justification and detailed description									
-									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_25								
Concise expression of the requirement									
High priority services provided by the WISECOM system shall never be interrupted during the operation phase.									
Requirement justification and detailed description									
High priority services are for instance telemedicine applications, or applications for the overall management of the post-disaster crisis. The WISECOM system has to undertake all necessary actions to keep these high layer services running.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_26								
Concise expression of the requirement									
The WISECOM system shall support the mechanisms necessary to enforce that the QoS level negotiated between the end-user and the WISECOM system corresponds to the QoS level effectively provided by the WISECOM system to the end-user. Especially, reliability of the transmission (data integrity) shall be guaranteed for the application requiring it and running over the WISECOM system.									
Requirement justification and detailed description									
In post-disaster situations, integrity of the transferred data is of the utmost importance for given applications (casualties database, telemedicine, etc...).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.2.7 Cost Requirements

Req_Id	Us_Se_27								
Concise expression of the requirement									
<p>The end-users of the WISECOM system shall not be constrained by the costs of the telecommunication services and any subscription fee and shall use the required telecommunication services needed for the management of the post-disaster crisis independently of their costs.</p> <p>It shall be possible to charge costs of telecommunication services used by WISECOM end-users and related to the use of specific local access, transport, or home network domains technologies, to the different categories of end-users.</p>									
Requirement justification and detailed description									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_28								
Concise expression of the requirement									
<p>The cost of the telecommunication services provided by the WISECOM system shall be reduced and controlled.</p> <p>Telecommunication services between end-users managed by the same WISECOM Access Terminal shall be free of charge.</p>									
Requirement justification and detailed description									
<p>The urgent need of telecommunication services in case of emergency cannot be a pretext for different service providers (e.g. transport domain service provider) to charge them at high price to the WISECOM operator.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_29								
Concise expression of the requirement									
<p>The WISECOM system shall be designed and optimised in order to reduce as much as possible the costs associated with the telecommunication services provided by underlying operators.</p>									
Requirement justification and detailed description									
<p>This requirement means especially that the amount of data transferred over the transport domain shall be all the more limited than the cost of transfer over the transport domain is high.</p> <p>This implies the use of proxy in the WISECOM Client in order to locally store often accessed contents. This implies the selection of proper transport domain technologies, adapted to the characteristics of the data back-hauled between the WISECOM Access</p>									



Terminal and the WISECOM server (e.g. selection of a packet mode satellite system with per volume fee for the transmission of variable bit rate non real time traffic).

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.2.8 Requirements related to Regulatory Issues

Req_Id	Us_Se_30								
Concise expression of the requirement									
The end-user shall be able to use its user-terminal(s) irrespectively of its location without taking into account regulatory issues, whatever the wireless technology.									
Requirement justification and detailed description									
When the rescue teams arrive on the disaster scene, they have to be able to use immediately any wireless user-terminal without caring about regulatory issues.									
The WISECOM operator will therefore have to negotiate a long time before the disaster the use of the wireless frequencies for the local access domain and the transport domain in case of emergency with the authorities of the considered countries.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_31								
Concise expression of the requirement									
The WISECOM Access Terminal shall be designed in order to limit the interference with other existing and functioning wireless telecommunication systems and shall not prevent them from correctly running.									
Requirement justification and detailed description									
In case of post-disaster situations, the mobile or terrestrial telecommunication networks may only be partially destroyed. The running telecommunication networks may be extensively used by the rescue teams to perform the relief work, and therefore the use of one or several WATs in the vicinities must neither interfere nor prevent them from correctly working.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Se_32								
Concise expression of the requirement									
The WISECOM system shall use a potentially location (geopolitically) dependent frequency attribution scenario so that it can seamlessly provide the required telecommunication services to the end-users, all over the world.									

Requirement justification and detailed description									
This means that the WISECOM system has to be able to use different frequencies in different countries according to the local regulations.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.3 System Operator Requirements

A global Emergency communications Operator (WISECOM Operator) would provide services to rescue teams and other users in disaster areas. Dedicated services would be provided to specific rescue teams via adapting the WISECOM Client, and via this there would also be adaptability to changing requirements.

It is considered of crucial importance to coordinate the development of an operator role over time with organizations such as the UN, the International Red Cross and Télécommunications Sans Frontières, etc...

In this section, the requirement identifier begins always with US_Op which stands for User and Service _ Operator requirements. The level of applicability of the requirements for each disaster phase has been represented thanks to the acronyms NA, L, M, and H which stand for Not Applicable, Low, Medium and High respectively.

3.3.1 Service Provision Area

Req_Id	Us_Op_01								
Concise expression of the requirement									
The WISECOM system shall provide global emergency telecommunication services to the end-users everywhere on the earth and at anytime.									
Requirement justification and detailed description									
Disasters can occur everywhere on the world and at anytime. It is therefore necessary to deploy the WAT everywhere and at any time.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Op_02								
Concise expression of the requirement									
The different technologies supported by the WISECOM Access Terminal (WAT) shall procure sufficient local coverage areas according to the specificities of the covered area.									
Requirement justification and detailed description									
Disasters can occur anywhere at anytime and in all type of areas. For best coordination on-site between different teams and organizations, open technologies like GSM and WiFi are considered crucial, and operators are required to support seamless roaming between the different types of equipment on-site.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.3.2 Deployment and Exploitation

Req_Id	Us_Op_03								
Concise expression of the requirement									
The WISECOM system shall be supervised by local or remote centre. The protocol SNMP shall be supported by all equipments.									
Requirement justification and detailed description									
The SNMP is the Simple Network Management Protocol. It is used by network management systems for monitoring network-attached devices for conditions that warrant administrative attention.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Op_04								
Concise expression of the requirement									
The WISECOM system shall provide a management and supervision tool for the management of remote gateways, and for the overall infrastructure network.									
Requirement justification and detailed description									
A management and supervision tool permits to have a global overview of the deployed system. This management control should be done at local and global levels. The anomalies about the network are detected by the supervision controller (at the global centre).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

3.3.3 Requirements related to the Role Model



Req_Id	Us_Op_05								
Concise expression of the requirement									
The WISECOM operator shall ensure the readiness of the disaster-safe segment of the WISECOM system at all times with highest reliability.									
Requirement justification and detailed description									
<p>Readiness and reliability of the disaster-safe segment at all times is THE crucial service from the WISECOM operator. This broad requirement includes:</p> <ul style="list-style-type: none"> • Maintenance and care of the satellite gateway, • Maintenance and care of the WISECOM server and LBS server, • Provisioning and maintenance of WISECOM Access Terminals, • Ensuring that access to required terrestrial networks is operational, • Ensuring appropriate license or other agreements with satellite operators and terrestrial network operators, as required. This includes the guaranteed availability of priority bandwidth at the moment it is required (24/7 readily available capacity), • Ensuring that authorities / WISECOM users have web or other access to the appropriate servers and services. 									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	Us_Op_06								
Concise expression of the requirement									
The overall responsibility for ensuring availability of up-to-date and relevant content (e.g., static and dynamic GIS data) should remain with the WISECOM Service Provider.									
Requirement justification and detailed description									
The contractual relationships and service level agreements have to be simple for the end-users (rescue organisations). Therefore the WISECOM operator should also act as instance that ensures a generally high service level through appropriate contractual and technical arrangements with all relevant content providers.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	M	M	M	H	H	H	H	H	H



4 End-to-End WISECOM system Requirements

Technical requirements expressed in section 4 are complementary to the ones presented in section 3. They are related to the global WISECOM end-to-end system architecture and, as much as possible, repetition of requirements has been avoided between these two sections. Instead, additional technical details are provided in section 4, which enables to make the link with the WP2.2 ([RD-2]) aiming at addressing in further details the design of the WISECOM end-to-end architecture, presented at high layer in section 2 of this document.

4.1 Overall End-to-End WISECOM system Requirements

4.1.1 Functional and Operational Requirements

Req_Id	TS_OV_01								
Concise expression of the requirement									
The WISECOM system shall enable to provide a continuous worldwide coverage except the polar areas.									
Requirement justification and detailed description									
Requirements on emergency services mainly concern users located on continental and maritime areas which are not in polar areas (see examples of disasters are listed in [AD-1]). Efficient and cost-effective solutions have thus to be found in priority to address these places, which also correspond to GEO satellite coverage capabilities.									
Polar areas are currently covered with LEO solutions like Iridium, with a limited set of services (voice and narrow band data transfer). LEO solutions providing high speed communications are too expensive to be available in the coming years.									
This technical requirement is linked to the user and service requirement US_Op_01.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_OV_02								
Concise expression of the requirement									
<p>The WISECOM system shall implement appropriate measures for high availability such as:</p> <ul style="list-style-type: none"> • Power and network redundancy, • Automatic failover, • Data replication. 									
Requirement justification and detailed description									
The WISECOM system has to implement a level of robustness ensuring a quasi-continuous service availability, whatever the situation.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_03								
Concise expression of the requirement									
At similar costs and levels of service quality, the WISECOM system shall give preference to the use of standardised solutions.									
Requirement justification and detailed description									
The WISECOM system does not intend to invent new standards but instead aims at improving the use of existing solutions for the specific purpose of emergency services, and to provide guidelines for next generations of equipment (both ground and space components). Standardised solutions will be preferred in order to implement a global open architecture.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_04								
Concise expression of the requirement									
The WISECOM system shall provide the technical means to generate the bill to end-users.									



Requirement justification and detailed description
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Accounting has to be done for some categories of end-users (e.g. specific rescue teams) which will have to pay to access the WISECOM system. This billing function will have to take into account profile of users (capacity, performance, etc) and different network utilisation metrics (transferred data rate, priority, reserved bandwidth, connection time) for the support of different billing policies (per volume or per time billing).

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_OV_05								
Concise expression of the requirement									
<p>The WISECOM system shall at least support the following technologies for local access and transport domains:</p> <ul style="list-style-type: none"> • GSM access in 900, 1800 and 1900 MHz bands, • UMTS access in the S-band, • PMR access, including TETRA, • WiFi access, including 802.11a, b, g, n, etc. in 2.4 and 5.4 GHz frequency bands, • WiMAX access, • BGAN backhauling, • DVB-RCS backhauling, • WiMAX backhauling. <p>These solutions shall be interoperable for end-users.</p>									
Requirement justification and detailed description									
<p>This technical requirement comes in answer to several user and service requirements in sections 3.2.3 and 3.3.1.</p> <p>Typical local coverage areas for the supported technologies are:</p> <ul style="list-style-type: none"> • GSM: 500 to 1000m in dense urban areas, 2 to 3km in suburban areas [RD-11], • UMTS: 1 to 1.5km for VoD applications [RD-12], • TETRA: for TMO mode, up to 58km for the release 1 and up to 83km for the release 2 [RD-13], • WiFi: home router with stock antenna might have a range of 45m indoors and 90m outdoors [RD-14], • WiMAX: at 10Mbps, about 10km outdoor decreasing to 2km in urban environments [RD-15]. <p>The coverage area of the different supported local access technologies will depend on the characteristics of the covered area, for instance rural, sub-urban or urban area.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	M	H	H	M	H	H	M	H	H

Req_Id	TS_OV_06								
Concise expression of the requirement									
The LBS system shall be fault-tolerant.									
Requirement justification and detailed description									
Since the LBS system is mission critical for the S&R operations, it must be tolerant to faults.									



Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_07								
Concise expression of the requirement									
The WISECOM system shall be tolerant to unstable and slow communication links, it shall be capable of working at least partly off-line.									
Requirement justification and detailed description									
In a post-disaster situations, it might be that the communication over the transport domain might be temporarily interrupted (heavy rain, unstable ground, obstacles, etc...). The WAT have therefore to be able to work off-line by supporting local communications and by transmitting to the end-users locally saved copies of useful information (maps, pictures, etc...).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	M	L	H	M	L

4.1.2 Security and Network Requirements

4.1.2.1 Authentication

Req_Id	TS_OV_08								
Concise expression of the requirement									
The WISECOM system shall support different types of users who simultaneously access the services.									
The WISECOM system shall support secure user authentication.									
The authentication mechanisms shall allow the management of users' profiles defining, at least, for each user (or class of users) rights of access (to data and applications).									
Requirement justification and detailed description									
After a disaster, different categories and profiles of users will have to use the WISECOM system to access data and services (members of rescue teams, NGO, medical aid, militaries, victims, etc...). They all need to use the WISECOM system, independently of the team they belong to.									
Different levels of privilege have to be allocated to users depending on their conditions of subscription, as well as on their role during operations of disaster management.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_OV_09								
Concise expression of the requirement									
<p>Authorization shall be ensured through the use of established standards and protocols:</p> <ul style="list-style-type: none"> • SSL/TLS, • RADIUS, • X.509 certificates, • 802.1x, • LDAP. 									
Requirement justification and detailed description									
<p>In order to protect the network and the data through secure accesses, only authorised users are allowed to gain access to the WISECOM system.</p> <p>The above mentioned standards and protocols are common mechanisms widely adopted to manage authentication and users profiles. Using them will insure a high level of interoperability of WISECOM with external systems.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	M	H	H	M	H	H	M	H	H

Req_Id	TS_OV_10								
Concise expression of the requirement									
<p>The authentication mechanism shall be implemented both at local (WAT) and system levels (WISECOM Server).</p>									
Requirement justification and detailed description									
<p>In case the Transport Domain of a given WAT is out of order, end-users have however to be given the capability to gain access to the WAT services (for example to be able to communicate with other end-users already connected to this given WAT). These users won't be able to reach Public or Home networks (due to the defecting Transport Domain), yet they would still be able to communicate at field level.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_11								
Concise expression of the requirement									
The WISECOM system shall provide mechanisms for authentication of satellite terminals.									
Requirement justification and detailed description									
Different satellite terminals will be deployed on the disaster site segment. It is important to authenticate the satellite terminals deployed in the WISECOM system, to avoid that external and unauthorised people deploy a satellite terminal and use the WISECOM system.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

4.1.2.2 Security and Confidentiality

Req_Id	TS_OV_12								
Concise expression of the requirement									
The WISECOM system shall support VPN mechanism.									
Requirement justification and detailed description									
VPN technology is required to support the management of different communities over the WISECOM system with end-to-end authentication, integrity and confidentiality.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_13								
Concise expression of the requirement									
The VPN mechanism shall support full encryption of IP frames (IP source, IP destination and data fields) using an encryption level at least equivalent to AES with a 256-bit key, and a normalized security solution (Ipsec, PPTP, L2TP, ...).									
Requirement justification and detailed description									
The level of security is important that is the reason why the VPN mechanism has to support encryption. AES 256-bit key level is justified by the fact that sensitive information will be exchanged through WISECOM.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_14								
Concise expression of the requirement									
The WISECOM system shall support the following services for security reasons: SSH, HTTPS, SFTP; SCP.									



Requirement justification and detailed description									
To protect data exchanges through secure services and guarantee that transmitted data are not tampered with.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_15								
Concise expression of the requirement									
The WISECOM system shall implement filtering strategies to ensure that only authorised WISECOM services and applications are used on the network.									
Requirement justification and detailed description									
Potential utilisation of unauthorised services and applications over the WISECOM network must be prevented. For example an authorised user (declared on the user database) may try to run an unexpected application, thus degrading the global performance of the system. Such behaviour must be avoided by appropriate filtering strategies.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_16								
Concise expression of the requirement									
The filtering strategies shall insure that the WISECOM security domain remains safe and unviolated. The WISECOM security domain has three different interface to the external world, namely with the End-User domain; Public networks domain and Home networks domain. Each of these interfaces shall be protected by a firewall mechanism.									
Requirement justification and detailed description									
A firewall mechanism is mandatory to enforce security between the WISECOM security domain and the external world.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_OV_17								
Concise expression of the requirement									
The WISECOM local area domain shall provide secure wireless transfers and authentication, using WPA, WEP, and TKIP.									
Requirement justification and detailed description									
The data transmissions using wireless solutions are easy to capture by unconcerned people. To secure the traffic, it is important to secure the wireless transmissions.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	H	H	L	H	H	L	H	H

Req_Id	TS_OV_18								
Concise expression of the requirement									
The WISECOM system shall be capable of protecting the network elements from configuration changes by unauthorised entities.									
Requirement justification and detailed description									
The WISECOM system is configured to propose a secure network and communication tools. This network is managed by authorised people and defined to offer the best quality of services to authorized end-users.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



4.1.2.3 Quality of Service (QoS)

Req_Id	TS_OV_19								
Concise expression of the requirement									
The WISECOM system shall be able to prioritise data traffic in particular emergency traffic.									
Requirement justification and detailed description									
Data transmission are very important and numerous in a post-disaster or emergency situation. But some rescue teams have to transmit data with higher priority because a life is in danger for example, or because the application is critical (telemedicine).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_20								
Concise expression of the requirement									
The WISECOM system shall allow the prioritization of data flows generated by different types of users according to at least 3 levels of priority, with each higher levels number meaning a higher access to resources in the transport and local access domain. A minimum bandwidth shall be reserved in both domains for each level of priority in order to avoid the starvation of the traffic generated by a given type of user.									
Requirement justification and detailed description									
At least 3 levels of priority are required by users (please refer to section 3.2.1).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_21								
Concise expression of the requirement									
The WISECOM system shall provide a QoS mechanism allowing the specific processing (priority of the attribution of transmission resources over the transport domain, dropping, queuing) of data flows according to their characteristics. 4 classes of QoS shall at least be supported.									
Requirement justification and detailed description									
QoS support is required to share the bandwidth and to manage scheduling priorities between the different classes of applications (please refer to section 3.2.1).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_22								
Concise expression of the requirement									
The WISECOM QoS policy shall guarantee that within a given level of priority and within a given QoS class, the various concurrent data flows will be fairly served.									
Requirement justification and detailed description									
It is important that simultaneous data flows belonging to the same priority class and to the same QoS class are treated equally which means that all user flows belonging to a specific priority class are equally important in term of processing. This is to insure that no data flows will be kept out of network resources.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_23								
Concise expression of the requirement									
In case of a temporary lack of transmission resources (especially over the transport domain or over the local access domain), the WISECOM system shall be able to delay data streams generated by non high priority or non-real time applications until enough resources are available again, by using enough cache to minimize losses.									
Requirement justification and detailed description									
This is a standard method to improve the efficiency of the use of the transmission resources over the local access domain and the transport domain. This implies the management of buffers in the user-terminals, the WATs and the WISECOM Server / Operator Domain.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_24								
Concise expression of the requirement									
The prioritization and QoS mechanisms shall be managed in the WISECOM client and server domains. It shall be independent of the Transport Domain.									
Requirement justification and detailed description									
No assumption should be made on the features provided by equipments from the Transport Domain (satellite terminals for example). Some of these equipments may provide some kind of QoS management but the WISECOM system must not rely on it in order to be interoperable with any satellite terminal or satellite gateway.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_OV_25								
Concise expression of the requirement									
<p>The prioritization mechanism shall allow to assign priorities according to the type of end-user running the application.</p> <p>The QoS mechanism shall allow to select a queuing, dropping and scheduling policy adapted to the type of application run by the end-user.</p>									
Requirement justification and detailed description									
<p>How critical a data flow is depends on the nature of the corresponding application and on the user running the application. For instance voice could be assigned a higher priority than video and data, because voice transmission remains the essential mode to convey orders on the disaster field. In addition it may be that a picture transmitted by a given member of a rescue team (displaying potential dangers) has more priority than a conversation call of a victim.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_26								
Concise expression of the requirement									
<p>The dispatching of data flows according to levels of QoS shall be done using IP data available at the 3rd and 4th layer of IP. In particular it shall be possible to discriminate data flow by (at least) IP addresses (sender and recipient), IP ports numbers (UDP & TCP) and Diffserv / TOS.</p>									
Requirement justification and detailed description									
<p>The 3rd and 4th layers as defined by OSI are the most convenient and efficient levels to manage priorities.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_27								
Concise expression of the requirement									
<p>The WISECOM system shall enable the reservation of minimum end-to-end communication resources (bandwidth over a satellite system in the transport domain, etc..) to specific groups of end-users.</p>									
Requirement justification and detailed description									
<p>In case of post-disaster situation, it might be that specific groups of users (high priority users) need reserved resources all over the WISECOM system (and especially over the local access domain and the transport domain) to run given applications (e.g. video conferencing, file transfer, etc..).</p>									



Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_28								
Concise expression of the requirement									
The QoS policy shall allow to optimize the used bandwidth in such a manner that the prioritization mechanism provides an optimal management of traffic congestions.									
Requirement justification and detailed description									
It is necessary that the applied QoS policy avoids as much as possible the loss of data because it is expected that vital/critical information will be transmitted over the WISECOM system.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_29								
Concise expression of the requirement									
The QoS policy shall be interoperable and compliant with the QoS policy of the various networks that will be interconnected to the WISECOM system (Internet, PSTN, PLMN, private networks, etc.)									
Requirement justification and detailed description									
This concern will drive the design of the QoS mechanism so that end-to-end QoS can be achieved. Policies implemented on the WISECOM system have to be sufficiently standard to avoid as much as possible conflicts with already existing QoS policies enforced within Home networks.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_30								
Concise expression of the requirement									
The WISECOM system shall support a Connection Admission Control mechanism in order to avoid overloading the transport and the local access domain.									
Requirement justification and detailed description									
The WISECOM system needs to monitor all the active applications in the system, and decide whether or not a new application can be accepted according to its traffic profile, its priority and the remaining amount of available resources (especially in the transport and local access domains). In case of a new high priority application, one or several previously running low priority applications might be dropped to free enough transmission resources for the new high priority application.									



Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H

Req_Id	TS_OV_31								
Concise expression of the requirement									
The WISECOM system shall support a congestion control mechanism.									
Requirement justification and detailed description									
A congestion control mechanism has to monitor the transmission delays of traffic belonging to given applications and the usage of the transmission resources over the transport domain in the WISECOM system. In case of congestion, relevant actions (dropping of given applications or calls, according to their priorities) have to be undertaken.									
The use of a congestion control mechanism improves the efficiency of the use of the transmission resources and improves the performance of the active applications.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H

Req_Id	TS_OV_32								
Concise expression of the requirement									
The WISECOM system shall support the data streaming filtering and classifying, queuing, dropping and scheduling strategies necessary for the support of several levels of priority, of different classes of Quality of Service and for the efficient use of the transport domain resources.									
Requirement justification and detailed description									
In case of emergency, the support of different levels of priority and Quality of Service is necessary. With this respect, adapted data stream classification, dropping, queuing and scheduling have to be supported in both the WISECOM client and server. This enables for instance to attribute transmission resources over the transport domain with a higher priority to real-time application, and therefore to delay non real-time traffic, and to optimize the use of transmission resources over the transport domain.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	M	L	H	H	M	H	H	H



4.1.2.4 Network Management

Req_Id	TS_OV_33								
Concise expression of the requirement									
The WISECOM system shall provide a network management mechanism.									
Requirement justification and detailed description									
Monitoring and management are two essential features for any networks maintenance and operation.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_34								
Concise expression of the requirement									
The network management shall be implemented both at local level (WAT) and at WISECOM server level.									
Requirement justification and detailed description									
In case the Transport Domain of a given WAT is out of order, this WAT is however required to be able to manage and monitor the associated WAT local network (for example to declare a new user/terminal into the network).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_35								
Concise expression of the requirement									
At WAT level, the network management shall be capable of providing information as specified in 4.2.2.2.									
Requirement justification and detailed description									
Please refer to section 4.2.2.2.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_36								
Concise expression of the requirement									
At WISECOM Server level the network management shall be capable of providing at least the following monitoring functionalities:									
<ul style="list-style-type: none"> List of end-users declared on the WISECOM network (grouped by communities), 									



- List of end-users active on the network (currently connected),
- List of user-terminals declared on the network (grouped by WAT),
- List of user-terminals active on the network (grouped by WAT),
- List of WATs declared on the network,
- List of WATs active on the network,
- Amount of instantaneous traffic used on each interface available on each WAT (WiFi, GSM, satellite, etc.) expressed in kbits/s and in percentage,
- Monitoring of the global Transport Domain network facilities and equipments,
- Monitoring of the connection state to all the Disaster Safe networks,
- Graphical synthetic view of the global network (supervision tool),
- Alert mechanism to signal any network malfunction with visual and messaging notification.

Requirement justification and detailed description

Network operators need to have this minimum information in order to correctly supervise the WISECOM system.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id TS_OV_37

Concise expression of the requirement

At WISECOM server level the network management shall be capable of managing and providing at least the following management functionalities:

- Management of end-users (declaration, modification, suppression),
- Management of user-terminals (declaration, modification, suppression),
- Management of WATs (declaration, modification, suppression),
- Management of the global QoS policy,
- Management of security policy,
- Management of applications & services,
- Management of addressing plan.

Requirement justification and detailed description									
Network operators need to have (at least) these management features in order to correctly manage the WISECOM system.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

4.1.2.5 Performance

Req_Id	TS_OV_38								
Concise expression of the requirement									
The WISECOM system shall have the same overall network performance as the ones of the used satellite systems. The WISECOM system shall not apply specific coding, modulation or protocols to secure the traffic over what is already in the system.									
Requirement justification and detailed description									
WISECOM system is not intended to develop or to modify the characteristics of the components that are integrated in it, in order to maintain interoperability with any technology.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_39								
Concise expression of the requirement									
The WISECOM system shall guarantee a network round trip time of less than 600ms between the user-terminal and the WISECOM server.									
Requirement justification and detailed description									
A long delay perturbs the communication (real-time traffic) and is not acceptable.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_40								
Concise expression of the requirement									
The WISECOM system shall implement PEP mechanisms.									
Requirement justification and detailed description									
PEP technology is widely used in order to accelerate and limit congestion of the IP traffic over satellite links.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_41								
Concise expression of the requirement									
The statistical availability of the global WISECOM system shall be above 99.5% (TBC).									
Requirement justification and detailed description									
This rate of availability is a minimum for a system used for crisis and emergency management.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_42								
Concise expression of the requirement									
The critical equipment of the WISECOM system located in the disaster safe segment shall be integrated in hot or cold redundancy.									
Requirement justification and detailed description									
In case of post-disaster situation, it is required that the collective equipments (such as servers, satellite gateways, etc...) involved in the WISECOM system have a very high availability.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_43								
Concise expression of the requirement									
The negotiated SLAs for access to the Public networks (Internet, PSTN, PLMN) shall be compliant with the performance for the overall WISECOM system.									
Requirement justification and detailed description									
It is important to keep in mind this aspect when these SLAs will be negotiated.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_44								
Concise expression of the requirement									
The WISECOM system shall implement various strategies in order to optimize the traffic and in particular reduce the required satellite bandwidth. Techniques like caching, proxying and efficient multicasting shall be implemented.									
Requirement justification and detailed description									
Operational and Performance EXpenditures (OPEX) both dictates that such optimization strategies be implemented.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

4.1.2.6 Protocols

Req_Id	TS_OV_45								
Concise expression of the requirement									
The WISECOM system shall provide end-to-end communication using the TCP/IP protocol suite (including both TCP and UDP).									
Requirement justification and detailed description									
It is necessary to support the TCP/IP protocol suite in the WISECOM system, since TCP/IP is the most common protocol suite.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_46								
Concise expression of the requirement									
The WISECOM system shall support the IPv4 release of the IP Protocol.									
Requirement justification and detailed description									
As IPv4 is the present standard most widely used in the IP community, the system has to be able to support this technology.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_OV_47								
Concise expression of the requirement									
The WISECOM system shall support IP routing (both static and dynamic).									
Requirement justification and detailed description									
End-to-end data communication over IP requires the implementation of routing techniques. Both static and dynamic IP routing techniques have to be allowed to achieve this in the end-to-end WISECOM system.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_48								
Concise expression of the requirement									
The WISECOM system shall support IP multicast technology (in particular end-to-end IP multicast routing shall be supported using at least IGMP and PIM/DVMRP).									
Requirement justification and detailed description									
As point to multi-point communications will often be established during WISECOM operations (for audio, video and data), it is important that this IP technology is supported by the system, since it will significantly reduce the network bandwidth usage, which is crucial in term of performance and also in terms of OPEX.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OV_49								
Concise expression of the requirement									
The WISECOM system shall support the IP streaming and its associated protocols: RTSP and RTCP.									
Requirement justification and detailed description									
IP streaming is important to see real time movies such as live video or audio from the disaster segment.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_OV_50								
Concise expression of the requirement									
The WISECOM system shall support at least the following protocols and services over IP: HTTP, DNS, IMAP, POP, SMTP, FTP, SNMP.									
Requirement justification and detailed description									
All these services are most widely used in the Internet community. For ease of implementation and interoperability, all these services have to be supported by the WISECOM system.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



4.2 On-Disaster Site Segment Requirements

4.2.1 User-terminal Domain Requirements

Req_Id	TS_OD_01								
Concise expression of the requirement									
<p>The WISECOM system shall support, in principle, any user-terminal equipped with any operating systems capable of wireless connectivity and TCP/IP internetworking, with no additional software installed. List of possible user-terminals than can be plugged to the WISECOM system shall include (but not limited to):</p> <ul style="list-style-type: none"> • 2G/3G terminals, • WiFi terminals, • WiMax terminals, • PMR terminals including TETRA, • LBS-enhanced terminals. <p>Different sources of vendors and manufacturers constructed according to the required standards shall be possible for the procurement of end-user-terminals.</p>									
Requirement justification and detailed description									
<p>On a disaster-site, the victims or some rescue teams need to communicate. They always have their personal user-terminals such as GSM, laptop, and they will use them to communicate. The WISECOM system has to provide a way to communicate to this people through their personal user-terminals, so with no additional software.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OD_02								
Concise expression of the requirement									
<p>The only software requirement on PC-like user-terminals shall be a Web client capable of handling HTTP protocol (IE, Mozilla, Opera ...).</p>									
Requirement justification and detailed description									
<p>The most widely adopted protocol worldwide for access to data is the HTTP protocol of the Internet. Adoption of such protocol will insure long-term interoperability of the system.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

4.2.2 WISECOM Access Terminal Requirements

Req_Id	TS_OD_03								
Concise expression of the requirement									
<p>The WISECOM system shall support 2 classes of WISECOM Access Terminals (WAT) for the on-Disaster Site Segment:</p> <ul style="list-style-type: none"> • Portable Class (which can be carried by individuals), • Transportable Class. 									
Requirement justification and detailed description									
<p>After a disaster terrestrial infrastructures may be destroyed or not available. The WISECOM Access Terminals used by the end-users are different for each case of disaster (small, medium, large) and each period after the disaster. Two classes of WISECOM Access Terminals have been defined which enable to cover mobility and bi-way communications needs under emergency situation.</p> <p>An example of portable WAT (in terms of size, weight, etc) can be based on a BGAN terminal or a compact version of DVB-RCS terminals.</p> <p>The transportable class of WATs (in terms of size, weight, etc) includes collective units which may be mounted on vehicles (e.g. Tracks [RD-17]) or are container-like (e.g. Emergesat [RD-16]).</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	M	H	H	M	H	H	M

Req_Id	TS_OD_04								
Concise expression of the requirement									
<p>Each WISECOM Access Terminal (WAT) shall be outfitted with a GPS receiver, allowing accurate self-positioning of the WAT, wherever it is installed.</p>									
Requirement justification and detailed description									
<p>This enables fast and accurate placement of WAT on top of digital maps in the WISECOM system LBS service. Also it enables easier relative coordination (finding distance and bearing) of rescue team and WAT terminal locations.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	L	L	M	M	L	H	M	L

Req_Id	TS_OD_05								
Concise expression of the requirement									
<p>The WAT shall have enough memory to store data (e.g. in case of LBS, map data for the affected area) for off-line use. It shall also be possible to pre-load data (e.g. maps) on a WAT in order to avoid the down-load over the transport domain of unnecessary</p>									



information.

Requirement justification and detailed description

This requirement implies the use of cache and proxies, reducing the amount of information carried over the transport domain and enabling the WAT to continue providing services even when the transport domain becomes unavailable.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id TS_DS_01

Concise expression of the requirement

The WISECOM Access Terminal shall implement all the media gateways functionalities necessary for the conversion and the convergence of the various types of traffic and protocols it shall handle and potentially carry over the transport domain.

Requirement justification and detailed description

A user and service requirement defined in section 3 is that the WISECOM system shall enable the interoperation of any application run on any user-terminal type with any other application run by any other user-terminal type.

Considering the wide set of different application types and technologies that may be supported by the WISECOM system, conversion of protocols (signalling) and data formats (GSM codec, VoIP codec, etc...) traditionally performed in entities called media gateways shall be supported in the WAT if not supported by any other operator.

For instance, for a GSM voice application initiated in the on-disaster site segment, the voice CODEC and signalling information may be converted into a format suiting better the transmission characteristics over the transport domain.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



4.2.2.1 Transportability and Deployment Requirements:

Req_Id	TS_OD_06								
Concise expression of the requirement					Ref: US-Us-1				
<p>The Portable Class of WISECOM Access Terminals shall comply with the following constraints:</p> <ul style="list-style-type: none"> • Weight not exceeding 20 Kg, • Autonomy of at least 5 hours in normal use, and 30 hours in standby mode, • Reduced in dimensions and volume (max 60l), • Resistant to extreme temperatures. Min = -20°C / +50°C, • Resistant to high humidity conditions: 25 to 80%. 									
Requirement justification and detailed description									
<p>Post-disaster areas may be hostile for equipment. Therefore the portable WAT brought on-disaster site have to comply with special operational requirements especially for the early disaster and response phases as defined in [AD-1].</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	M	H	H	M	H	H	M

Req_Id	TS_OD_07								
Concise expression of the requirement									
<p>The Transportable Class of WISECOM Access Terminals shall comply with the following constraints:</p> <ul style="list-style-type: none"> • Weight: No special maximum weight. If the system can not be carried by one person, the system shall be easily transportable, • Autonomy of at least 24 hours using internal batteries. For long-term usage it shall include a power generation system, • As small as possible, with antenna size not exceeding 2.4 meters, • Resistant to extreme temperatures. Min = -20°C / +50°C, • Resistant to high humidity conditions: 25 to 80%. 									
Requirement justification and detailed description									
<p>Post-disaster areas may be hostile for equipment. Therefore the transportable WAT brought on-disaster site have to comply with special operational requirements especially for the early disaster and response phases as defined in WP1.1.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	M	H	NA	M	H	H	L	H	H



Req_Id	TS_OD_08								
Concise expression of the requirement									
It shall be possible to use the different WISECOM Access Terminals deployed over the disaster area as a basis for the restoration of the permanent telecommunication infrastructure after a disaster.									
Requirement justification and detailed description									
In the recovery phase, the WAT may be integrated in the restored telecommunication infrastructure and therefore may make its restoration easier, quicker and more efficient thanks to the reuse of functionalities of the WISECOM Access Terminal.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OD_09								
Concise expression of the requirement									
<p>The Portable Class of WISECOM Access Terminals shall comply with the following deployment constraints:</p> <ul style="list-style-type: none"> • Deployment time not exceeding 10 minutes, • The plugs shall be as intuitive as possible, • Capability for end-users to use the WISECOM Access Terminal without any user manual, • Automatic / simple antenna satellite pointing, and self-configuration of WISECOM Access Terminals. 									
Requirement justification and detailed description									
<p>After a disaster the existing telecommunications infrastructures are very damaged or inexistent. But the rescue teams and the victims need to communicate quickly, to ask for help, to explain where they are.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	M	H	H	M	H	H	M

Req_Id	TS_OD_10								
Concise expression of the requirement									
<p>The Transportable Class of WISECOM Access Terminals shall comply with the following deployment constraints:</p> <ul style="list-style-type: none"> • Deployment time not exceeding 1 hour, • Automatic satellite antenna pointing, • Number of persons required to deploy transportable WISECOM Access Terminals not exceeding 2, • The manual deployment shall be included in the WAT and shall include as much as possible pictures and diagrams to help in the understanding of the procedure. It shall also include at the end a validation procedure to insure that the system is fully operational. 									
Requirement justification and detailed description									
<p>After a disaster the existing telecommunications infrastructures are very damaged or inexistent. But the rescue teams and the victims need to communicate quickly, to ask for help, to explain where they are.</p>									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	M	H	NA	M	H	H	L	H	H



4.2.2.2 Authentication & Authorisation Requirements:

Req_Id	TS_OD_11								
Concise expression of the requirement									
The WISECOM Access Terminal shall authenticate final users with respect to a user database located at the WISECOM server or replicated at WAT level.									
Requirement justification and detailed description									
Please refer to the overall end-to-end system authentication requirements as expressed in section 4.1.2.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	H	H	L	H	H	L	H	H

Req_Id	TS_OD_12								
Concise expression of the requirement									
WISECOM Access Terminals shall have an interface for enabling connection with GSM, 2G/3G, WiFi, WiMAX, PMR terminals.									
Requirement justification and detailed description									
These interfaces are necessary to connect the WAT with all the categories of user-terminals listed in section 4.2.1.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	H	H	L	H	H	L	H	H

Req_Id	TS_OD_13								
Concise expression of the requirement									
WISECOM Access Terminals shall have an IP interface, providing wireless transmission of IP packets.									
Requirement justification and detailed description									
-									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	H	H	L	H	H	L	H	H



Req_Id	TS_OD_14								
Concise expression of the requirement									
WISECOM Access Terminals shall implement QoS functions.									
Requirement justification and detailed description									
Please refer to the overall end-to-end system QoS requirements as expressed in section 4.1.2.3.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	H	H	L	H	H	L	H	H

Req_Id	TS_OD_15								
Concise expression of the requirement									
WISECOM Access Terminals shall provide IP routing capabilities (both static and dynamic routing).									
Requirement justification and detailed description									
Please refer to the overall end-to-end system protocol requirements as expressed in section 4.1.2.6.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	H	H	L	H	H	L	H	H

Req_Id	TS_OD_16								
Concise expression of the requirement									
WISECOM Access Terminals shall implement TCP acceleration mechanism.									
Requirement justification and detailed description									
Please refer to the overall end-to-end system protocol requirements as expressed in section 4.1.2.6.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	H	H	L	H	H	L	H	H

Req_Id	TS_OD_17								
Concise expression of the requirement									
WISECOM Access Terminals shall implement network management capable of providing (at least) the following information :									
<ul style="list-style-type: none"> • List of end-users declared on the WAT, • List of end-users active on the WAT, • List of user-terminals declared on the WAT, • List of user-terminals active on the WAT, 									



- Amount of instantaneous traffic used on each interface available on the WAT (WiFi, GSM, satellite, etc.) expressed in kbits/s and in percentage,
- For satellite access amount of instantaneous upstream and downstream traffic expressed in kbits/s.

Requirement justification and detailed description

The local administrator of the WAT shall be capable to perform basic network management at his level (directly from the field). The above mentioned information will provide him with a simple and non-technical view of the current status of his WAT

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	H	H	L	H	H	L	H	H

Req_Id | TS_OD_18

Concise expression of the requirement

The WISECOM Access Terminal shall support a set of standardized interfaces including:

- USB,
- Serial,
- Ethernet,
- Firewire with RJ45 and 100Mbps full-duplex transmission.

Requirement justification and detailed description

These standardized interfaces should be used for operation and maintenance, up-load of software, databases, maps, etc...

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id | TS_OD_19

Concise expression of the requirement

The WAT shall have an IP interface capable of providing energy to the WiFi base station

Requirement justification and detailed description

A reduced number of cables is preferable. Providing energy to the WiFi base station through the IP cable avoids having an independent power supply for this equipment.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

4.2.3 WISECOM Client Domain Requirements

Req_Id	TS_OD_20								
Concise expression of the requirement									
The WISECOM Client shall be able to manage a LBS local server.									
Requirement justification and detailed description									
-									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OD_21								
Concise expression of the requirement									
It shall be possible to manage local prioritization between users directly from the WISECOM Client domain.									
Requirement justification and detailed description									
No assumption can be made on the features provided by equipment from the Transport Domain (satellite terminals for example). Some of these equipments may provide some kind of local QoS management but the WISECOM system won't rely on it in order to be interoperable with any satellite terminal or satellite gateway.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_OD_22								
Concise expression of the requirement									
The satellite system of the transportable WAT on the disaster area shall use a dish with a diameter up to 2.4 meters.									
Requirement justification and detailed description									
The satellite dish of the transportable system shall offer a compromise between performance and transportability (by plane, by trucks, ...).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	L	L	M	M	M	H	H	H

4.3 Transport Domain Requirements

This section deals with requirements related to the characteristics of the transport domain with emphasis on the satellite segment. It is defined as the part of the system comprising the transmission of a signal towards a satellite, the satellite itself, and the transmission of the signal from the satellite to earth.

The transport domain is the key domain in WISECOM. It connects the remote areas requiring Emergency communications with the Global Information Infrastructure in general and the WISECOM network in particular. As expressed in section 3, the main requirement for this segment is that it should be reliable, present and give the right priorities for the emergency use. It should also be cost-effective enough for organizations with low budgets to find it attractive to use.

The transport domain may consist of different satellite systems, and may also include other technologies such as WiMAX. In WISECOM our main focus is the satellite transport, and the main satellite systems are Inmarsat BGAN and Ku-band VSAT systems like DVB-RCS. Adding to this, systems may operate at other frequencies of course, and a future WISECOM system may include other technologies as well.

4.3.1 Satellites Requirements

Req_Id	TS_Tr_01								
Concise expression of the requirement									
The WISECOM system shall be able to operate nominally with existing in-orbit satellites, both for the Portable and Transportable versions of WISECOM Access Terminals.									
Requirement justification and detailed description									
Emergency services as defined in the present document have to be made as soon as possible, without having to wait for a new generation of satellites.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

4.3.2 Frequency Bands for Satellite Transmission Requirements

Req_Id	TS_Tr_02								
Concise expression of the requirement									
The following frequency bands shall be usable by the <i>WISECOM</i> system for satellite transmission:									
<ul style="list-style-type: none"> • L-band, • S-band, • C-band, • Ku-band, • Ka-band. 									



Requirement justification and detailed description									
Users should be able to benefit from any eligible authorised frequency band to provide bi-way communications under fixed and mobility conditions wherever they are located. The corresponding regulatory constraints are presented in WP 2.3 ([AD-2]).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

4.3.3 Protocols / Air Interface Requirements.

Req_Id	TS_Tr_03								
Concise expression of the requirement									
Preference for the air interface schemes of WISECOM Access Terminals shall be given to standardised solutions, including: <ul style="list-style-type: none"> • DVB-S, • DVB-S2, • DVB-RCS, • DVB-RCS mobile, • BGAN. 									
Requirement justification and detailed description									
Priority is given to standardised solutions for the same level of QoS and costs.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

4.4 Disaster-Safe Segment Requirements

4.4.1 WISECOM Server / Operation Domain Requirements

The WISECOM Server / Operation Domain is made of two main blocks of functions, the WISECOM Network Operation Centre (WNOC) and the WISECOM server, whose main functions are as specified here below.

Req_Id	TS_DS_02								
Concise expression of the requirement	The WISECOM system shall be able to support several WISECOM servers.								
Requirement justification and detailed description	The system has to be based on an open architecture offering the possibility to accept different WISECOM operators, each one having the possibility to manage its own WISECOM server.								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_03								
Concise expression of the requirement	Each WISECOM server shall be managed by one single WISECOM operator.								
Requirement justification and detailed description	-								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_04								
Concise expression of the requirement	It shall be possible to connect several servers managed by different WISECOM operators who would like to collaboratively inter-operate and extend the range of services provided to the end-users.								
Requirement justification and detailed description	-								
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_DS_05								
Concise expression of the requirement									
<p>The WISECOM server(s) shall act as the main interface between the different groups of network elements composing the Public and Home Network Domains on the one hand, and the ones belonging to the Transport Domain in the Disaster-Safe segment on the other hand.</p> <p>The WISECOM server(s) shall work as intelligent router(s) with IP interfaces on both sides.</p>									
Requirement justification and detailed description									
The WISECOM system is made of a mix of telecommunication solutions which have to be used in a coherent way with respect to user needs under emergency situation.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_06								
Concise expression of the requirement									
The WISECOM server shall always be located remotely from the disaster area, in a safe place.									
Requirement justification and detailed description									
Requirement justified by the need to ensure the service whatever the situation, which necessitates to place all elements of the disaster-safe domain in geographical area(s) rarely subject to natural or man-made disasters.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_07								
Concise expression of the requirement									
WISECOM server(s) shall be able to manage several thousands of WISECOM clients.									
Requirement justification and detailed description									
Quality of telecommunication services delivered on field, in particular for large and medium size disasters, should not be degraded by the simultaneous use of a high number of WATs by rescue teams. This requirement is particularly critical for Large Size disasters.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	L	L	L	M	M	M	H	H	H

Req_Id	TS_DS_08								
Concise expression of the requirement									
The WISECOM server shall be able to use different wireless back-hauling									



telecommunication systems for the backhauling of data.

Requirement justification and detailed description

Depending on the emergency phase and on the situation on the field, the most appropriate telecommunication solutions have to be found for the benefit of end-users; this will be the role of the WISECOM server.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id | TS_DS_09

Concise expression of the requirement

The WISECOM Server shall be able to provide the following services:

- Location_Based Services (LBS),
- VoIP SIP,
- Capability for Telemedicine services,
- Mail exchange services,
- Multicast routing,
- FTP facility,
- Access to Internet, to PSTN/PLMN, each with high reliability and high bandwidth,
- Authentication, Authorisation and Administrations (AAA) of users.

Requirement justification and detailed description

-

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id | TS_DS_10

Concise expression of the requirement

The WISECOM server shall have the maximum availability and therefore shall implement the necessary level of redundancy and fail over mechanisms.

Requirement justification and detailed description

Justification for this requirement comes from the need to ensure the maximum availability under any circumstance of emergency situation.

Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_DS_11								
Concise expression of the requirement									
Each WISECOM server interface, i.e. for each satellite gateway, each Public network and each Home network, shall implement a security mechanism.									
Requirement justification and detailed description									
This requirement is necessary to ensure the integrity of the WISECOM server.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_12								
Concise expression of the requirement									
The WISECOM server shall be implemented using multiple servers and appliances interconnected via a high speed LAN.									
Requirement justification and detailed description									
Robustness and availability requires that applications and services are spread over several appliances. It is then necessary to interconnect these servers with high speed LAN to insure high performance.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_13								
Concise expression of the requirement									
The WISECOM server shall be equipped with a router capable of managing 2 Internet gateways.									
Requirement justification and detailed description									
Attachment to 2 different Internet service providers will insure high availability of the Internet access (in case one of the ISP fails it should be possible to transparently switch to the other ISP).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_14								
Concise expression of the requirement									
The WISECOM server shall be equipped with a PABX equipment with at least 2 interfaces:									
<ul style="list-style-type: none"> • One IP interface, • One ISDN interface. 									

Requirement justification and detailed description									
Requirement necessary to manage the connection with the ISDN/PSTN.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_15								
Concise expression of the requirement									
The WISECOM server shall implement all the media gateways functionalities necessary for the conversion and the convergence of the various types of traffic and protocols it shall handle and potentially carry over the transport domain.									
Requirement justification and detailed description									
A user and service requirement defined in section 3 is that the WISECOM system shall enable the interoperation of any application run on any user-terminal type with any other application run by any other user-terminal type.									
Considering the wide set of different application types and technologies that may be supported by the WISECOM system, conversion of protocols (signalling) and data formats (GSM codec, VoIP codec, etc...) traditionally performed in entities called media gateways shall be supported in the WISECOM server if not supported by any other operator.									
For instance, for a voice over IP application initiated in the on-disaster site segment trying to reach an end-user on the PSTN network, the conversion SIP/VoIP codec to SS7/PCM is required. If this conversion is not provided by the PSTN service provider, it has to be supported by the WISECOM server.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

4.4.2 Public Networks Domain Requirements

Req_Id	TS_DS_16								
Concise expression of the requirement									
The connection between the Public Networks Domain and the WISECOM server shall be redundant, which imply that:									
<ul style="list-style-type: none"> • WISECOM shall negotiate at least two different connections to the Internet through at least two different ISPs, • The ISPs retained by WISECOM shall themselves have multiple attachments to Internet using Border Gateway Protocol (BGP). 									

Requirement justification and detailed description									
This requirement is necessary to ensure the continuity of service in case of failure of one of the links available and to optimise availability to the Internet.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_17								
Concise expression of the requirement									
The ISP providing Internet access to the WISECOM server shall provide a domain name and a set of fixed public IP addresses.									
Requirement justification and detailed description									
This requirement is necessary to implement the Internet access service in the WISECOM server.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_18								
Concise expression of the requirement									
The ISP shall allow mail transfer (both incoming and outgoing) between WISECOM server and the Internet.									
Requirement justification and detailed description									
Necessary to implement the mail exchange service in the WISECOM server.									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H

Req_Id	TS_DS_19								
Concise expression of the requirement									
The Service Level Agreement (SLA) negotiated with the ISP shall include the provision of a minimum guaranteed bandwidth between WISECOM server and the Internet.									
Requirement justification and detailed description									
A simple best effort policy is not enough because since WISECOM deals with emergency a permanent and reliable access to the Internet is mandatory									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	H	H	H	H	H	H	H	H	H



Req_Id	TS_DS_20								
Concise expression of the requirement									
The Service Level Agreement (SLA) negotiated with the ISDN/PSTN operators shall include some value-added services such as (but not limited to) number presentation, etc.									
Requirement justification and detailed description									
Any added-value service which may ease operations on disaster sites should be considered. Some of them are not however strictly necessary; this is the reason why the priority on this Requirement has been considered as Medium (M).									
Scenario	SD1	SD2	SD3	MD1	MD2	MD3	LD1	LD2	LD3
Appl. Sys.	M	M	M	M	M	M	M	M	M



Conclusion

The purpose of this document was to define a comprehensive set of user and system requirements for the WISECOM telecommunication solution in emergency situations, aiming at the careful and realistic design of the architecture of the WISECOM system.

Prior to the definition of the requirements, it has been necessary to define the WISECOM system and to identify its main actors at high level. Therefore, a high-level functional architecture of the target WISECOM system has been presented, and its main components have been identified and classified into several segments and domains. In addition, a terminology has been defined for the WISECOM system, used to consistently express the user and system requirements presented afterwards in the document. Especially, the WAT has been defined as the unit brought on the disaster area by the rescue team and restoring local wireless communication thanks to different local wireless technologies (GSM, UMTS, WiFi, etc...) and to one or several backhauling technologies (BGAN, DVB-RCS, etc...). Finally, the different operators involved in the provision of the end-to-end emergency services in the WISECOM system have been identified and the interaction among them have been analysed in a so called role model.

The rest of this document aimed at expressing all the user and system requirements necessary for the accurate definition of the architecture of the WISECOM system. It is again worth emphasizing that these requirements have been defined for a target wireless telecommunication system used for the management of post-disaster crisis, and that therefore many of them won't apply to the demonstrator, supposed to feature only the most realistic, appropriate and currently technically achievable characteristics of the WISECOM system.

In summary, it has been stated in this document that an ideal WISECOM Access Terminal (WAT) shall be as light, reduced in size, robust, and resistant as possible due to its use in rough environments. The WAT shall restore possibly several wireless networks at a time considering the most common wireless technologies (GSM, UMTS, WiFi, WiMAX, TETRA). It shall support a wide range of classical telecommunication services (Voice, Video, messaging, file transfer, web or database browsing, etc...), and shall provide these services in such a way that the end-users shall not notice the difference with services usually provided by other operators. In addition to these classical telecommunication services, the need for the support of Location-based Services (LBS) such as localization of victims, tracking of the position of the members of the rescue teams, provision of location dependent geographical information (map, picture, etc...) and multicasting of location dependent messages has been identified as necessary in case of the management of post-disaster crisis. It is in addition crucial that such a system and especially the WAT is easily operable and modular in order to be extensible to further technologies.

From a technical point of view, the WISECOM system shall support the most common applications, standards, security and network management mechanisms. It shall also intelligently select the best possible local access domain and transport domain technologies according to the required and offered services and their costs. In addition, it shall enable a high-level of interoperability among the wide range of applications and technologies that might be required and used in the management of a post-disaster crisis. This means especially that some protocol and data format conversion functionalities are necessary both in the WAT and in the WISECOM



server. The WISECOM system shall also optimize the use of limited and costly resources over the transport domain by using the appropriate cache and proxy mechanisms, and shall of course support classical mechanisms such as data stream filtering and classifying, queuing, dropping, scheduling, performance monitoring and the support of several levels of priority and of quality of service.

Finally, a close co-ordination and organisation of the services provided by the different operators involved in the provision of the end-to-end WISECOM services is necessary. Among these operators, one can distinguish classical network (transport domain but also PLMN / PSTN operators, ISP, etc...) or service (LBS) operators, and regulatory bodies or governmental organisations.