3GPP TSG SA WG3 Security — S3#22 **S3-020085**

25 - 28 February 2002

Bristol, UK

TSG-SA WG 1 meeting #15 **S1-020636**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item: 10.4**

Title: LS on 3GPP System – WLAN interworking
Source: SA1
To: SA, SA2, SA5
Cc: SA3
Response to:

Contact Person:
Name: **Frederic Paint**
Tel. Number: +47 95810881
E-mail Address: frederic.paint@telenor.com

Attachments:
- TR 22.934, version 0.1.0
- Draft updated Work Item description for 3GPP System – WLAN Interworking

1 Introduction

SA1 is conducting a feasibility study on interworking between 3GPP system and WLAN system according to work item description approved in TSG SA #13 in Beijing. This LS reports the current status of this work and asks guidance from TSG SA about entering into specification phase for WLAN interworking.

2 Status of SA1 Work

The Technical Report 22.934 titled “Feasibility study on 3GPP system to Wireless Local Area Network (WLAN) interworking”, gives the current results of the study. The latest version of the TR is attached.

In the TR 6 interworking scenarios are identified. Each higher numbered scenario introducing additional service requirements over those of the lower numbered scenarios. The identified scenarios are:
- Scenario 1: Common billing and Customer care
- Scenario 2: 3GPP system based Access Control and Charging
- Scenario 3: Access to 3GPP system PS based services
- Scenario 4: Service Continuity
- Scenario 5: Seamless services
- Scenario 6: Access to 3GPP CS Services

Scenario 1 is considered to depict an interworking case which is not based on 3GPP specifications., Scenario 2 has been identified as the basic interworking case on which further scenarios can be built. The scenario 2 enables an interworking service “IP connectivity via WLAN system for 3GPP subscribers” which would very well complement the services currently provided by the 3GPP system. This scenario 2 also does not pose too many requirements on the 3GPP system and thus this scenario of interworking may be rapidly specified while requirements for the other scenarios are being further developed. The service requirements for scenario 2 have been identified and are in the attached version of the TR.

3 Actions

In addition to the identified service requirements, many important functional requirements related mostly to reuse of existing 3GPP system functionalities have emerged during SA1 discussions. While SA1 sees this type of requirement as very important for definition of feasible interworking concepts, it is recognised that they usually require architectural knowledge of 3GPP system and thus they seem to be more in the scope of working group SA2.

SA1 discussed the possibilities to move forward with the 3GPP System – WLAN interworking topic in 3GPP and following approach was suggested.

- SA1 sees that it is important to start architecture definition work in SA2 for WLAN interworking. SA1 recommends that this work begin with scenario 2 type of interworking, in order that it may be specified in Release 6 timeframe.

- TSG SA is asked to approve the updated 3GPP System - WLAN Interworking work item (originally approved in TSG SA #13) so that it includes also creation of stage 1 specifications for scenario 2 type of WLAN interworking for 3GPP release 6.
    - Creation of Stage 1 specification for scenario 2 is possible by copying relevant parts (chapter 6.3) of the 3GPP System-WLAN Interworking TR to the existing SA1 Technical Specification 22.101.
    - Updated work item description attached.

- TSG SA1 continues to work on the feasibility study concentrating on higher level scenarios (above 2) according to the original work item description. From this work, the requirements for the other scenarios will be developed and these may require additional specifications.

- TSG SA5 is asked to study if realisation of scenario 1 type of WLAN interworking could be facilitated by taking the interworking concept into account in SA5 specifications regarding billing systems

SA1 seeks guidance from TSG SA on the approach proposed above.

Date of Next SA1 Meetings:

Title	Date	Location	Country
SA1 Adhocs	8 – 12 Apr 02	Sophia Antipolis	France
SA1#16	13 – 17 May 02	Victoria	Canada
SA1 Adhocs	8 – 12 Jul 02		Italy
SA1#17	12 – 16 Aug 02	Durango, CO	North America
SA1 Adhocs	14 - 18 Oct 02		
SA1#18	11-15 Nov 02		

TSG-SA WG 1 (Services) meeting #15 **S1-020638**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item: 10.4**

Title: ~~TR 22.934 v1.0.0~~Updated WLAN Interworking WID

Source: rapporteur

Work Item Description

Title

3GPP system - WLAN-~~UMTS~~ Interworking

1 3GPP Work Area

	Radio Access
X	Core Network
X	Services

2 Linked work items

Linked Building Blocks to be defined.

3 Justification

There is an increasing demand for wireless 'local area' access in very different scenarios. Wireless access to Internet is provided to public users by the use of currently existing WLAN technology such as IEEE 802.11b. In companies wireless access is provided to portable computer users by use of the same technology. For residential use wireless access is also increasing. 3rd generation technologies and systems will provide bearers for similar packet switched services, with greater mobility and wider area coverage albeit with reduced data rate.

WLAN technology can complement ~~UMTS~~ 3GPP based networks in deployment environments with high user density and demand for higher data rates. However, in order to provide flexible use of both technologies in these environments and to provide mobility of services between the two technologies it is sensible that some degree of interworking exists between the two technologies/systems.

4 Objective

The purpose of the work is twofold

- Continue the feasibility study
- Proceed with specification work

The purpose of the feasibility study is to study a generic interworking functionality between ~~UMTS~~ 3GPP system and WLAN systems (e.g. IEEE 802.11 family, HIPERLAN/2, …). In specific it aims at:

- Study the service requirements for Interworking scenarios~~interworking~~.
- Study the different possible architectures for interworking.

The feasibility study has identified several Interworking scenarios. Scenario 2 provides an IP connectivity via WLAN system for 3GPP subscribers. In that scenario access control and charging are 3GPP system based.

The specification work will aim at specifying the service and operational requirements for Interworking scenarios, beginning with scenario 2.

5 Service aspects

Service aspects should assess service requirements and the support of UMTS services over the WLAN radio access.

6 MMI aspects

MMI aspects should define a minimum set of functions to support the choice of access system by the user and/or terminal for when both access systems are available.

7 Charging Aspects

Both charging requirements and charging architecture should be studied. In particular it should considered whether WLAN charging should be integrated with the UMTS charging architecture or not.

8 Security Aspects

Security requirements should be studied given the prerequisite that a) the security level of the UMTS platform itself is not impacted, b) the security level provided to users in the WLAN mode is comparable to the one of UMTS.

9 Impacts

Affects:	USIM	ME	AN	CN	Others
Yes					
No					
Don't know	X	X	X	X	X

10 Expected Output and Time scale (to be updated at each plenary)

New specifications						
Spec No.	Title	Prime rsp. WG	2ndary rsp. WG(s)	Presented for information at plenary#	Approved at plenary#	Comments
TR 22.934 ~~xxx~~	Feasibility study on 3GPP system to Wireless Local Area Network (WLAN) interworking~~Feasibility study on WLAN-UMTS interworking~~	SA1	SA2	SA#15	SA#16	TR
Affected existing specifications						
22.101		Service principles				SA1
22.115		Charging and Billing				SA1

11 Work item rapporteurs

Fredric Paint, Telenor

12 Work item leadership

SA1 (secondary SA2)

13 Supporting Companies

Telenor, Ericsson, Telia, Nokia, Sonera, Voicestream, Nortel, Alcatel, Toshiba, Cisco, Vodafone.

~~Telenor, Ericsson, Telia, Microsoft, KPN, Siemens, Samsung Electronics Research Institute, Motorola, Swisscom~~

14 Classification of the WI (if known)

~~The work item is a feasibility study~~

The work item is a feature

TSG-SA WG 1 (Services) meeting #15 **S1-020637**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item: 10.4**

Title: **TR 22.934 v1.0.0**

Source: **rapporteur**

The feasibility study on 3GPP system – WLAN Interworking has identified and described 6 scenarios for Interworking. These scenarios range from common billing and 3GPP system based access control to seamless services. Each scenario realises an additional step into integrating WLAN in the cellular service offering. The 3GPP system based access control, scenario 2, has received significant effort and its related service requirements have een included in the TR. The common billing scenario, scenario 1, has also received interest, but S1 has not identified any standardisation work needed within 3GPP for supporting this scenario. Some initial requirements on the seamless services scenario, scenario 5, were also identified.

3GPP TR 22.934 V1.0.0 (2002-02)

Technical Report

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Feasibility study on 3GPP system to Wireless Local Area Network (WLAN) interworking;
(Release 6)

Keywords
<keyword[, keyword]>

3GPP

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Foreword 5

1 Scope 6
1.1 Scope of 3GPP - WLAN Interworking 6

2 References 6

3 Definitions, symbols and abbreviations 7
3.1 Definitions 7
3.2 Symbols 7
3.3 Abbreviations 7

4 Background 7
4.1 WLAN Technologies 7
4.2 Deployment and Usage Scenarios 8
4.3 Environments 8

5 Main Concepts 8
5.1 Interworking Scenarios 9

6 Service Requirements 12
6.1 General Requirements 12
6.2 Interworking Scenario 1 12
6.3 Interworking Scenario 2 12
6.3.1 Service aspects 12
6.3.2 Access Control 13
6.3.3 Security 13
6.3.4 Roaming aspects 13
6.3.5 Terminal Aspects 13
6.3.6 Naming and Addressing 14
6.3.7 Charging and Billing 14
6.3.7.1 Online charging support 14
6.3.7.2 Offline charging support 14
6.6 Seamless Services 14

Annex <X>: Change history 15

Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

This document covers the feasibility of interworking between 3GPP systems and Wireless Local Area Networks (WLAN).

This document:

- Identifies and describes the scenarios for Interworking
- Identifies the service requirements
- Provides guidelines for standardisation of Interworking between UMTS and WLAN

The feasibility study considers a number of different scenarios of 3GPP-WLAN interworking ranging from common billing to seamless services between the WLAN and 3GPP systems. The interworking feasibility is considered for a number of environments where both 3GPP and WLAN systems may be deployed.

In addition, the feasibility study outlines some of the different WLAN technologies that may be interworked with 3GPP systems.

1.1 Scope of 3GPP - WLAN Interworking

In the context of 3GPP interworking WLAN system can be considered an access system. WLAN system provides access to services located in WLAN networks or networks behind the WLAN network.

In the context of 3GPP – WLAN interworking, 3GPP system functionalities can reside behind WLAN access system or parallel to the WLAN access system.

In case of 3GPP system functionalities located behind WLAN access system the interworking between 3GPP system and WLAN system may include

- enabling usage of 3GPP system functionalities between mobile terminal and 3GPP system via the WLAN access (e.g. providing SIP calls)
- utilising 3GPP system functionalities to complement the functionalities available at WLAN access system (e.g. providing charging means)

In a case when WLAN access system is seen as a parallel access system to 3GPP system, the interworking between 3GPP system and WLAN system may include

- creation of mechanisms for selecting and switching between the WLAN and 3GPP systems

Enabling any of these interworking cases may result into modifications or additions in 3GPP systems, in WLAN systems or both.

It is out of scope for 3GPP to develop new system functionalities for WLAN systems that are not interworking with any 3GPP system functionality.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[<seq>] <doctype> <#>[([up to and including]{yyyy[-mm]|V<a[.b[.c]]>}[onwards])]: "<Title>".

[1] 3GPP TR 41.001: "GSM Release specifications".

[2] 3GPP TR 21 912 (V3.1.0): "Example 2, using fixed text".

3 Definitions, symbols and abbreviations

3.1 Definitions

WLAN coverage: an area where wireless local area network access services are provided for interworking by an entity in accordance with WLAN standards.

3.2 Symbols

To be defined

3.3 Abbreviations

To be defined

4 Background

4.1 WLAN Technologies

WLAN is not a single radio technology, several different technologies fall into the category called WLAN. Existing industry standard is IEEE 802.11b operating at 2,4 GHz ISM band. New entrant for this same band is Bluetooth and technologies such as IEEE 802.11a and ETSI BRAN Hiperlan2 are being developed for the 5GHz band.

Despite the different radio technologies, all these WLAN systems are commonly used for transportation of IP datagrams. The specific WLAN technology used in each wireless IP network is not very visible for the layers above IP.

Service interworking between 3GPP system and WLAN network should reuse the defacto way of using WLAN networks, i.e. tranportation of IP datagrams. 3GPP interworking should not thus be built directly on top of any specific WLAN technology but on top of harmonising layer(s) (e.g. IP).

Defining interworking based on a harmonising layer(s) (e.g. IP) allows easier phased introduction of more advanced interworking levels as well as parallel provisioning of different interworking levels by the same WLAN access network.

However, if some standard mechanisms for realising specific system functions within a WLAN access system exist, they should be considered to be reused for 3GPP system interworking to ensure compatibility with generic WLAN systems. As an example, IEEE 802.11 is currently specifying IEEE 802.1x standard based access authentication and a new air interface encryption mechanisms optimised for that specific WLAN technology.

4.2 Deployment and Usage Scenarios

TBD

4.3 Environments

There are number of different possible operating environments where interworking of the 3GPP and the WLAN systems may be desired. The 3GPP operates universally in Public, Corporate, or Residential environments. WLANs may also be deployed in any of these environments and it would be advantageous if the standards for Interworking between 3GPP systems and WLANs could accommodate all of the environments. Such capability would further enhance the ease of use for the mobile system user and extend the combined coverage areas.

The different environments may involve different administrative domains and wide diversity of WLAN technical capabilities. As an example, the security capabilities and policies may differ between public, corporate and residential WLANs. These differences may lead to different interworking methods between 3GPP and WLANs in these environments. Hence, it is to be recognised that interworking may not be possible in all cases for both technical and non-technical considerations.

The environments and some of their characteristics may be summarised as follows:

The "Public" environment includes all areas where there is unrestricted public presence, including outdoor areas, streets, transportation centres, retail stores, hotels, restaurants and public spaces and lobbies in major civic buildings. Here, for example, the WLAN operator is expecting general access and will likely have a system policies and equipment suitable for 3GPP interworking.

The "Corporate" environment includes offices and factories where the users are restricted to employees of the business. Restricted visitor access may also be accommodated in this environment. The Corporate WLAN operator is providing service primarily for internal uses, and access to other networks may be screened (i.e. with a "firewall"). There may be several WLANs deployed within the corporation, not all of which are to be interworked with 3GPP. Thus, interworking between Corporate WLAN and 3GPP may involve some different policies and techniques than for other environments.

The "Residential" environment includes individual homes and apartments where the users are restricted to the residents and their guests. Here, the WLAN owner and user are most likely the same. However, in a multi-tenant building, there may be a single WLAN (i.e. owned by the landlord) serving many users. The interworking of residential WLAN with 3GPP may involve some different policies that for other environments.

5 Main Concepts

This chapter describes an approach for a flexible, general, scalable and future proof 3GPP System and WLAN interworking. The approach is flexible and scalable in the sense that it can be implemented in steps from a quite simple interworking to fully seamless inter system operation. The approach is general in that there are no limitations on the WLAN system that can be inteworked. The approach is also future proof in that it ensures interworking with both current and future WLAN and 3GPP releases. The following section (5.1) defines a number of different scenarios for interworking that provide an indicative roadmap for development.

Interworking between 3GPP Systems and WLAN should be possible with a minimum of coordination of the different standards. The goal is to avoid changes to WLAN standards and to minimise changes in existing 3GPP specifications.

Also, the goal is to allow interworking with Release 99, Release 4 and Release 5, however it is acknowledged that the actual fulfilment of this goal will vary from scenario to scenario.

5.1 Interworking Scenarios

In this chapter six interworking scenarios are described. Each scenario realises an additional step in integrating WLAN in the 3GPP service offering and naturally includes the previous level of integration of the previous scenario.

The 3GPP System – WLAN interworking scenarios may be considered with the aid of the simplified reference diagram in figure 1. This reference diagram illustrates the elements of the 3GPP and WLAN systems being interworked. These may be interconnected in a variety of ways to develop the progressive scenarios outlined in this section.

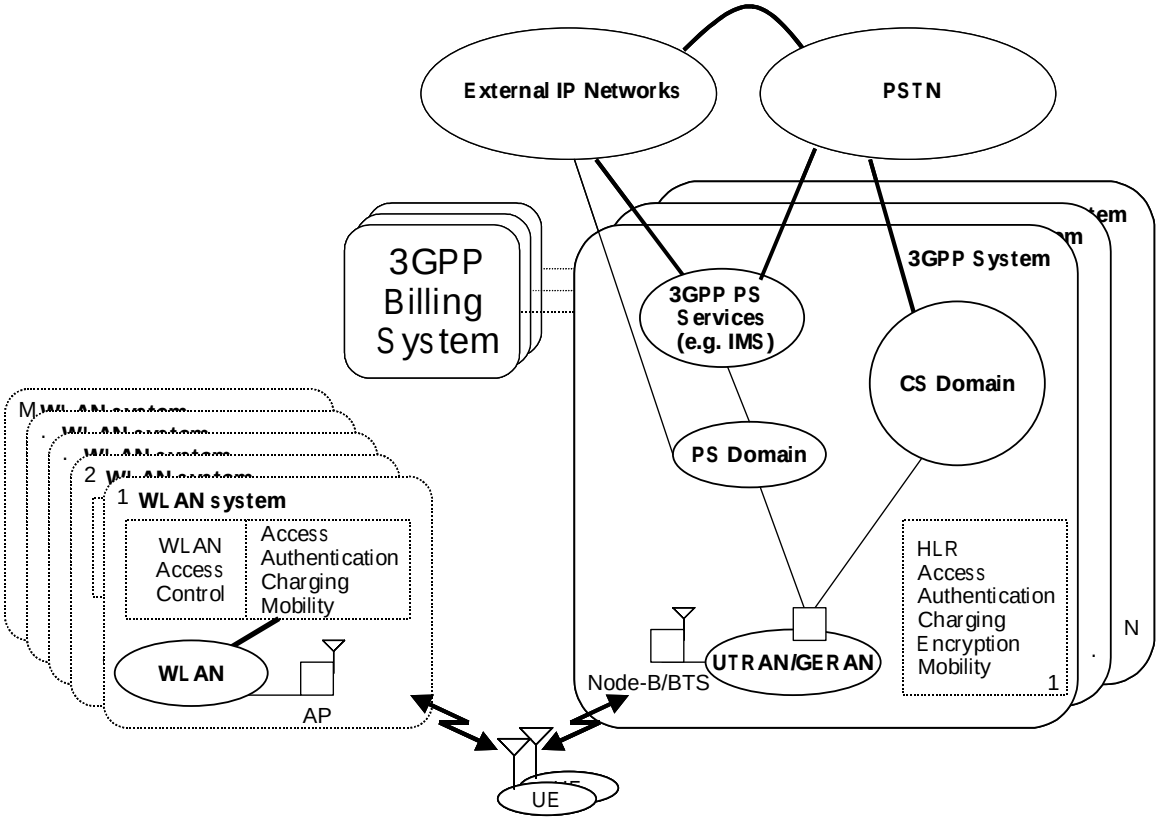

Figure 1: 3GPP System – WLAN interworking simplified reference model

Scenario 1 - Common Billing and Customer Care

This is the simplest scheme of interworking. The connection between WLAN and 3GPP is that there is a single customer relationship. The customer receives one bill from the mobile operator for the usage of both 3GPP and WLAN access services. Integrated Customer Care allows for simplified service offering from both operator and subscriber's perspective. The security level of the two systems may be independent.

This scenario does not pose any new requirements on 3GPP specifications.

Scenario 2 - 3GPP system based Access Control and Charging

This is the scenario where authentication, authorization and accounting are provided by the 3GPP system. The security level of these functions applied to WLAN is in line with that of the 3GPP system. This ensures that the user does not see significant difference in the way he is granted access. This may also provide means for operator to charge access in a consistent manner over the two platforms.

Reusing the 3GPP system access control principles allows for additional benefits seen from a user and 3GPP system operator standpoint. First of all the 3GPP system operator may easily convert the subscribers within his existing 3GPP system customer base to becoming WLAN-3GPP system subscribers with a minimum effort both for the subscriber and the operator. In addition the maintenance of the subscriber may also be simplified.

No requirements are put upon the set of services to be offered in the WLAN part beyond those inherently offered by being addressable in an IP network..

Editor's Note: later separation of this scenario into scenarios providing separate authentication, authorization and accounting functionality might be considered where each functionality is fulfilled by 3GPP or non-3GPP system.

Scenario 3: Access to 3GPP system PS based services

The goal of this scenario is to allow the operator to grant access to 3GPP system PS based services through the WLAN access. These services may include e.g. IMS based services, location based services, instant messaging, presence based services, MBMS and any service that is built upon the combination of several of these service components.

Even though this scenario allows access to all services, it is an implementation question whether only a subset of the services is actually provided.

However, service continuity between the 3GPP system part and the WLAN part is not required.

Editor's Note : It is FFS which access network is to be used for getting access to requested services.

Scenario 4: Service Continuity

The goal of this scenario is to allow that the services supported in Scenario 3 to survive the process of change of access network technology between WLAN and a 3GPP system. However some services may not survive.

The solution for providing service continuity between WLAN and a 3GPP system could also be used for providing service continuity between two WLAN subnets.

The criteria and decision mechanism for change of access network is FFS.

Change in service quality may be a consequence of mobility between access technologies, due to varying capabilities and characteristics of access technologies.

Scenario 5: Seamless services

The goal of this scenario is to provide seamless service continuity between the access technologies, for the services supported in Scenario 3.

By seamless service continuity is meant minimizing aspects such as data loss and break time during the switch between access technologies.

Scenario 6: Access to 3GPP CS Services

The goal of this scenario is to allow the operator to grant access to 3GPP system CS based services through Circuit Switched WLAN access.

Seamless mobility for CS services will be provided.

Below is given a table that defines the service and operational capabilities of each scenario.

Scenarios: Service and operational Capabilities:	Scenario 1: Common Billing and Customer Care	Scenario 2: 3GPP system based Access Control and Charging	Scenario 3: Access to 3GPP system PS based services	Scenario 4: Service continuity	Scenario 5: Seamless services	Scenario 6: Access to 3GPP system CS based Services
Common billing	X	X	X	X	X	X
Common customer care	X	X	X	X	X	X
3GPP system based Access Control		X	X	X	X	X
3GPP system based Access Charging		X	X	X	X	X
Access to 3GPP system PS based services from WLAN			X	X	X	X
Service Continuity				X	X	X
Seamless Service Continuity					X	X
Access to 3GPP system CS based Services with seamless mobility						X

Service and operational Capabilities:

Common billing: The user will receive the bill for the services consumption on either platform in a coordinated way. However, it does not include any requirement to harmonize the tariff structure or level of services on the two platforms.

This capability does not require any additional 3GPP work.

Common customer care: The user will not have to bother about which platform that might have caused his need to consult the customer care.

This capability does not require any additional 3GPP work.

3GPP system based Access Control: The user faces control procedures (authentication and authorization) similar for WLAN as within the 3GPP domain.

3GPP system based Access Charging: This capability enables that the 3GPP charging mechanism can be reused for WLAN access.

Access to 3GPP system PS based services from WLAN: The user is offered access to the same PS based services over WLAN as he may access via the 3GPP system.

Service continuity: services will survive the process of change of access network technology between WLAN and a 3GPP system.

Seamless service continuity: to provide seamless service continuity between the access technologies by minimizing aspects such as data loss and break time during the switch between access technologies.

Access to 3GPP system CS based Services with seamless mobility: to allow the operator to grant access to 3GPP system CS based services through the WLAN access.

6 Service Requirements

This chapter provides the service and operational requirements for each of the scenarios identified and which high-level description is provided in chapter 5.

6.1 General Requirements

Interworking between WLAN and 3GPP systems could be realised in different ways. WLAN could be made to be an integral part of 3GPP system or the two systems could be kept as separate but interworking systems. At network side in case of separate systems there could be one-to-one, one-to-many, many-to-one or many-to-many relationship between the WLAN access network and 3GPP network.

Following guidelines for deployment of WLAN – 3GPP Interworking are recommended.

- Functional split between WLAN access network and a 3GPP system should be clearly specified
- Interworking between WLAN and 3GPP system should pose as little 3GPP specific requirements to WLAN systems as feasible
- Interworking means between WLAN access network and 3GPP system should be able to support many-to-many relationship between the two systems;
    - i.e. specifications should allow that one WLAN access network can interwork with several 3GPP systems and one 3GPP system can interwork with several WLAN access networks

6.2 Interworking Scenario 1

There are no requirements affecting 3GPP specifications for Scenario 1.

6.3 Interworking Scenario 2

6.3.1 Service aspects

WLAN-3GPP system interworking service is defined as a wireless IP connectivity service where the wireless access technology is of type WLAN.

The service is subject to a 3GPP system subscription.

WLAN-3G interworking service should support Ipv4 and Ipv6 based connectivity.

Quality of Service is out of scope in this scenario 2 (see 5.1).

6.3.2 Access Control

Access control for a 3GPP system subscribe accessing the WLAN -3GPP system interworking service shall be provided by the 3GPP system.

Successfull 3GPP system based access control is a prerequisite for usage of the WLAN – 3GPP interworking service.

It shall be possible to reuse existing UICC cards, containing the SIM/USIM, for the access control.

Editor's note: Additional methods of access control could be defined in the future.

3GPP compatible access control for users accessing WLAN may:

- reuse existing 3GPP permanent subscriber database (e.g. HLR)

To be WLAN compatible one major characteristic is assumed:

- Reuse of the standard WLAN radio interface mechanisms for authentication interworking with 3GPP compatible access control

6.3.3 Security

The level of security of the 3GPP system shall not be compromised by deployment of the 3GPP –WLAN interworking system

Access control for users accessing WLAN shall have the same level of security as 3GPP system authentication procedure.

Editor's note: Contributions are welcome about user data confidentiality

6.3.4 Roaming aspects

3GPP –WLAN interworking system should provide the ability for a 3GPP subscribers to access the WLAN service while roaming between networks. This implies the pre-existence of a roaming mechanism and a service agreement between the different network operators involved.

UE shall be able to select visited network when accessing the WLAN service. The selection within the UE can be automated or done by the user.

6.3.5 Terminal Aspects

3GPP system based access control requires existence of similar level of security for the access control related functions within user equipment that exists also in 3GPP user equipment.

One identified option to realise this requirement is to have a UICC card containing SIM or USIM application in the UE.

Deployed WLAN devices (according WLAN standards, e.g. 802.11, HiperLan 2 etc), that meet interworking requirements, e.g. security, shall be supported without upgrading the functionality.

User involvement in enabling scenario 2 interworking functionality in terminals shall be minimized (e.g. installation of SW)

6.3.6 Naming and Addressing

Usage of NAI format ensures that 3GPP based access control will be compatible with standard WLAN equipment and with IETF AAA protocols such as Diameter. This approach also enables smooth simultaneous usage of 3GPP based and non 3GPP based access control solutions over the same WLAN access network.

The user identification for 3GPP based access control shall be based on Network Access Identifier (NAI) format (*user@realm*) /RFC 2486/.

6.3.7 Charging and Billing

Charging and billing in the 3GPP system shall not be compromised by the interworking with the WLAN. Other aspects regarding charging and billing shall be accomodated as for interworking between 3GPP systems.

6.3.7.1 Online charging support

3GPP –WLAN interworking system shall have the possibility to provide online charging.

As the charging information affects the service rendered, a mechanism shall be available to allow the 3GPP system to indicate to the WLAN system that the service rendered should be terminated, interrupted or modified (for example for pre-paid users).

6.3.7.2 Offline charging support

Offline charging shall utilise the existing 3GPP system Charging Gateway, i.e. WLAN charging shall be based on charging records delivered to 3GPP Charging Gateway.

6.6 Scenario 5

Although the specifications shall permit a technical implementation of handover between a 3GPP System and a WLAN, there may be a temporary change of QoS on bearer services at the time of handover. To assure Seamless Service, means shall be defined which make it possible to limit any temporary change during handover so it meets the performance specified by 3GPP System service requirements for packet switched data handover. During handover from a 3GPP System to a WLAN or from a WLAN to a 3GPP system, change of service shall be no greater than that which may occur during intra 3GPP System handover.

It shall be possible to provide a technical implementation that provides seamless service continuity for at least one 3GPP System radio access mode for cases that:

- the UE stays within limits for the service (i.e. pedestrian rate of motion) in both the WLAN and 3GPP System;
- the UE remains during the time of handover within coverage of both systems.

After the handover the user shall remain connected to the selected external network (e.g. internet, intranet) independently of the radio interface being used.

Any non-temporary change in the QoS shall be seen at the service access points as a network initiated renegotiation of QoS. If the newly negotiated QoS is not acceptable, the UE/user may terminate the connection/context.

Annex <X>:
Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New