Technical Specification Group Services and System Aspects
Meeting #13, Beijing, China, 24-27 September 2001

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Source: **Telenor, Telia, Ericsson**

Title: **WI Proposal : 'WLAN-UMTS Interworking'**

Agenda item: **8.8 Review of Release 5 status, content and Scheduling**

Document for: **Approval**

Work Item Description

Title

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 supplement UMTS 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.

Some organisational entities within the different regions of 3GPP have already started looking into this area of work. E.g. the ETSI Project BRAN is in an ongoing process to standardise HIPERLAN/2-UMTS interworking architectures. This may contribute significantly to a more generic approach of tying UMTS to Wireless LAN technologies performed in 3GPP.

Interworking could be achieved in different ways. However, using WLAN as an IP access network complementary to current UMTS PS domain and utilising the UMTS subscriber databases has several advantages. It minimises the impact on UMTS systems and reduces the need for standardisation work within 3GPP. In addition the architectural solution with its IETF defined interface towards UMTS networks has the advantage of being generically suitable for all WLAN technologies. This is in line with the ongoing work in ETSI Project BRAN.

Starting the process of standardisation in time is of strategic interest to the mobile operators, in order to enable attractive commercial models.

In the annex 'A possible scheme for standardisation of UMTS/WLAN interworking' a possible way of providing the necessary standards is envisaged.

4 Objective

The purpose of this work item is to standardise the interworking functionality between UMTS and WLAN systems (e.g. IEEE802.11 family, HIPERLAN/2) to complement the current UMTS PS domain. In specific it aims at:

- Defining the Interworking Requirements put upon UMTS
- Specifying the Interworking Functionality
- Including the needed enhancements in the UMTS specifications

In order to avoid impact on ongoing features and to minimise the addition of workload in 3GPP, a phased approach is required. The initial phase will specify the interworking functionality needed for the interworking and functionality needed to enable subscribers to roam between UMTS and WLAN, including security aspects and charging principles. This might fit into Release 5. Later phases will deal with intersystem session continuity and service mobility. These latter aspects will be studied during Release 5 time frame but standardisation will be done during a later release.

5 Service aspects

Service aspects should assess service requirements and the support of UMTS services over the WLAN radio access. Standards are to be defined during the later phase.

6 MMI aspects

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

7 Charging Aspects

Charging requirements should be specified. The charging architecture should be studied out of these requirements. 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 specified in such a way that a) the security level of the UMTS platform itself is not impacted, b) the security level offered users in the WLAN mode is comparable to the one of UMTS.

9 Impacts

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

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
23.xxx	WLAN-UMTS Interworking	SA2				Technical specification defining the UMTS-WLAN interworking requirements and Architecture. Specifying the functional enhancements needed in UMTS.

Affected existing specifications				
Spec No.	CR	Subject	Approved at plenary#	Comments
		USIM Specification		
23.221		Architectural Requirements		Include UMTS –WLAN architectural requirements
22.101				Include UMTS –WLAN service requirements
22.060				Include UMTS –WLAN service requirements
22.228				Include UMTS –WLAN service requirements
21.111		USIM and IC card requirements		
21.133		Security Threats and Requirements		
31.102		Characteristic of the USIM application		

11 Work item rapporteurs

Fredric Paint, Telenor

12 Work item leadership

SA2

13 Supporting Companies

Telenor, Ericsson, Telia

14 Classification of the WI (if known)

For further study

Annex : A possible scheme for standardisation of UMTS/WLAN interworking

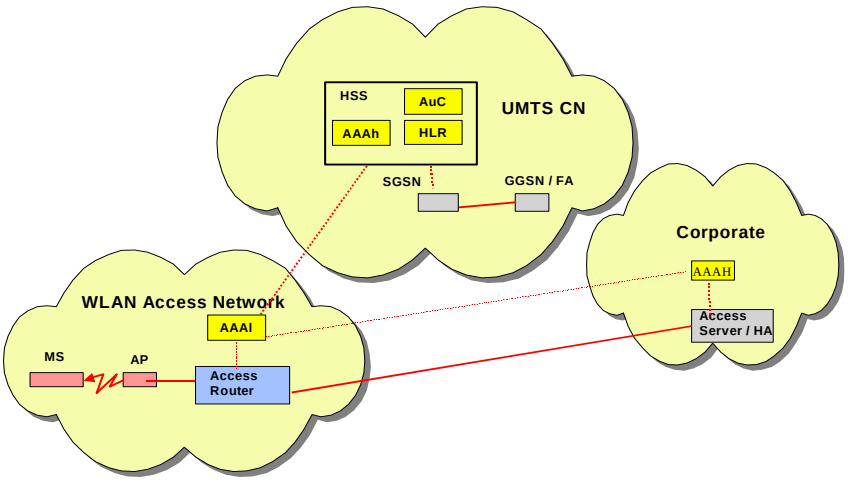
Introduction

The standardisation of an interworking arrangement between UMTS and WLAN will have to involve several standards bodies. The purpose of this paper is to initiate a discussion about the general approach with respect to such a standardisation process and to communicate some initial thoughts on the subject.

The paper outlines a possible architecture and - based on that - it proposes a split of work between the involved standards bodies. The amount of standardisation effort is commented as well as the timing aspects.

The objective of the proposal is to find a strategy that allows early standardisation of a limited, basic functionality that would allow operators to get started quickly, while at the same time ensuring forward compatibility with future standards releases.

Basic Architecture



The figure above shows a possible architecture for UMTS/WLAN interworking. This architecture is based on the Loose Interworking approach as defined by ETSI BRAN. Loose Interworking builds on the principle that user data is routed directly from the WLAN access network to an IP based network, i.e. there is no user plane connection through the UMTS core network. The functionality of UMTS is reached by having the control plane of the WLAN radio access network to access the UMTS core network from appropriate nodes, in the picture provisionally called Access Router.

This architecture proposes the introduction of a new domain in the UMTS architecture, a WLAN domain in addition to the already existing CS/PS domains and the IP Multi Media Subsystem (IMS). There will be several opportunities to reuse existing techniques, both in respect of

standardisation and implementation.

Timing aspects

Earlier discussions with members of 3GPP have shown that it is seen as a top priority to stabilise 3GPP Release 5 without bringing in too many new elements beyond the well accepted IMS objective.

On the other hand - as shown below in this document - only limited work is actually required in 3GPP to reach the first UMTS-WLAN integration goals.

It is therefore proposed to adopt a phased approach with respect to standardisation of UMTS-WLAN interworking.

A first **Initial Phase** should be limited to a very small set of standardisation items, covering only the functionality needed for identification and authenticate of WLAN users and the ability to detect and link the users WLAN identity to his UMTS identity. This will allow operators to get started on the market place, possibly using proprietary solutions for some other less urgent functions.

The **Extension Phase** should cover remaining aspects of mobility and more sophisticated service support functionality (QoS, location services, etc….).

Work split between Standards Bodies

General

Standardisation of a UMTS-WLAN interworking should be handled as a shared task between different standards bodies. 3GPP should take the lead to identify and approve the overall architecture. For the details of the WLAN Access Network architecture 3GPP may wish to leave that to other standards bodies directly involved in the concerned WLAN standard, such as ETSI BRAN for the HiperLan/2 standard and IEEE for the 802.11 standards family. It is important though that the interface standard between the UMTS CN HSS and the Access Router in the WLAN Access Network remains the same for all WLAN standards.

Actions in 3GPP

First set of standards: The architecture described in section 2 minimises the need for standardisation efforts in 3GPP. For the basic functionality described above for the Initial Phase, rather little actual work has to be done in 3GPP.

Essentially, the following five actions are needed:

- Assessment of service requirements.
- Obtaining general acceptance of the approach to base the UMTS-WLAN interworking solution on a separate WLAN domain and a WLAN authentication application in the UICC, as outlined above. This need to be reflected in the UMTS reference architecture specifications. A solution based on an authentication algorithm and authentication key implemented in software should also be included.
- Definition of the new interface between the UMTS CN HSS and the Local AAA server in the WLAN Access Network. On this point it is assumed that Diameter will be used, in which case most of the actual work will be done in IETF. See below.
- An expansion of the USIM standard - where the WLAN Application is added – is necessary. This item includes an element of technical standardisation work, however it may be made quite limited if existing standards are properly reused.
- An expansion of the USIM/UE interface to support the WLAN challenge response mechanism. It is assumed that most of this may be achieved through reuse of existing mechanisms.

Future 3GPP standards releases will require additional work allowing to fully exploit the benefits of the UMTS-WLAN combined services.

- Mobility functions have to be analysed.
- Support UMTS based services e.g. IMS and location based services. In that regard new API's between the UMTS service network and the CN may be desired.
- Charging aspects have to be explored.

Actions in IETF

To support the interworking solution extensions/enhancements to the AAA protocol are required. Assuming that EAP and AKA will be used to provide authentication in the WLAN network, the following functionality in IETF standards and drafts need to be supported:

1. EAP AKA Authentication [draft-arkko-pppext-eap-aka-00.txt, IETF work in progress, May 2001]. That is an Extensible Authentication Protocol (EAP) mechanism for authentication and session key distribution using the UMTS AKA authentication mechanism.
2. PPP Extensible Authentication Protocol (EAP) (RFC2284).
3. DIAMETER Support for EAP [draft-ietf-aaa-diameter-nasreq-06.txt, June 2001]. The draft proposes messages and AVP's sufficient to carry EAP authentication to a home authentication server (ref S3-010330).
4. Work is needed to make sure that the functionality for the WLAN architecture is supported in these documents. Also, work is needed in the IETF to drive the two Internet drafts mentioned in 1 and 3 above, forward into RFC status.

Actions in ETSI BRAN

BRAN should strive for a solution that enables interworking between UMTS and both HiperLAN2 and IEEE 802.11 using the same interworking system.

The initial standardisation will focus on the architecture of the WLAN Access network. The question of how much to be standardised needs to be studied, as well as the split of functionality between the MT, the AP, the Access Router and the interworking network. It is essential that all aspects that will impact on the interworking architecture will be identified, even though all problems need not be resolved with the first standards release. It is expected that a stable WLAN reference architecture will prevail towards the end of year 2001.

A first version of the standard should concentrate on identification and security functions. It is anticipated that the HiperLAN2 network should use Diameter to communicate with the authentication servers. This should thus be stated in the BRAN standard. An extension to Diameter is needed for the purpose.

Further, it is important that mobility functions are investigated at an early date to ensure that later standardised mobility solutions are not obstructed. In the same way the support for accounting shall be investigated. Especially, the accounting extension of Diameter should be investigated.

Later standards releases will focus on

- Mobility support
- Improved quality of service tools over the air interface: This may require standardisation, both at the radio link control layer and for the mapping of QoS parameters from higher layers to the RLC layer.
- Accounting: Definition of raw data that a HiperLAN2 network will provide to higher layer accounting functions.

Actions in IEEE

IEEE 802.11x are access standards for WLAN.
Possible extensions are to be defined.