Technical Specification Group Services and System Aspects
Meeting #26, 13-16 December, 2004, Athens

TSGS#26(04)0870

Source: **NTT DoCoMo Inc., Fujitsu**

Title: **Proposed method for progressing work on 3GPP system evolution**

Document for: **Discussion and decision**

Agenda Item: **4, 5, 7.1.3, 7.2.2, 8.2.1**

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Attachments: **SP-040720 ëLS on evolution of network architectureí**

RP-040461 ëProposed Study Item on Evolved UTRA and UTRANí

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1. Introduction

Based on approval of a new work item for an All-IP Network (AIPN) Feasibility Study at TSG SA#24 work has been progressing within SA1 and version 1.0.0 of TR 22.978 is to be presented for information at TSG SA#26. Also, in recent SA2 meetings there have been discussions regarding evolution of the 3GPP network architecture and a Liaison Statement from SA2 is to be presented for discussion at TSG SA#26 (SP-040720).

In addition to these activities the RAN Evolution Workshop was held on 2nd - 3rd November of this year and based on the discussions at the workshop a new study item on evolved UTRA and UTRAN is to be presented by a number of companies to TSG RAN#26.

This document considers the various activities taking place within 3GPP related to the evolution of the 3GPP system and proposes a working method for progressing this work in an efficient and effective manner.

2. Discussion

When considering evolution of the 3GPP system it is important to recognise the different aspects of the 3GPP system as well as the expertise and responsibilities of the various working groups within 3GPP.

2.1 Coordination of related Work Items

Within SA1 work has been progressing on the All-IP Network Feasibility Study. However, as the scope of the work item for this work is limited to SA1 only, the content and direction of this work has not yet been considered within other working groups. The work within SA1 has a very large scope and for this reason other working groups should be strongly encouraged to review TR 22.978 1.0.0 presented to TSG SA#26 for information and provide feedback to SA1 as appropriate. Separate to the AIPN work within SA1 several other work items have been discussed within SA2 that would appear to be related to an IP-based architecture for the 3GPP system.

A non-exhaustive list of work items and proposed work items that appear to be related to an IP-based network architecture for the 3GPP system is provided below. It should be noted that this list contains work items that have been proposed but not yet agreed by SA Working Groups.

- 3GPP system WLAN interworking (SP-030712; Work Item Leadership: SA1 (secondary SA2))
- All-IP (AIPN) Network Feasibility Study (SP-040303; Work Item Leadership: SA1)
- Enhancement of E2E QoS (SP-040534; Work Item Leadership: SA2)
- Support of SMS and MMS over generic 3GPP IP access (SP-040688; Work Item Leadership: SA2)
- WI on MBMS Enhancements (discussed at SA2#42 within S2-0403346 but yet to be agreed within SA2)

- WID for Enhancement of I-WLAN Scenario 3 (discussed at SA2#43 in S2-043749 but yet to be agreed within SA2)
- WID for Support of mobility between heterogeneous access networks (discussed at SA2#43 within S2-043750 but yet to be agreed within SA2)

In order to realise an efficient system design for the future 3GPP system action should be taken to ensure that the activities do not diverge undesirably. As it is believed that SA2 has overall responsibility for the system architecture of the 3GPP system and traditionally takes the role of coordinating work within 3GPP, it is recommended that SA2 clarify the relationship between these work items and coordinate related activities as appropriate. An example of how this activity is provided in the figure below.

The work in SA1 on the All-IP Network Feasibility Study in TR 22.978 is considering a wide scope of service related aspects of evolution of the 3GPP system to an All-IP Network and has so far successfully completed a significant amount of work on this subject. It would seem logical that SA2 also perform a similar activity to study architectural aspects which would act as an umbrella for all the work related to IP-based network architecture evolution.

It is noted that based on discussions at the last SA2 meeting it was provisionally agreed to hold a joint meeting between SA1 and SA2 to enable SA1 to present the result of the AIPN Feasibility Study in TR 22.978 and exchange opinions on IP-based network evolution of the 3GPP system. This would appear to be an appropriate time to take a decision on the coordination of work items as described above and clarify how work on network architecture evolution should progress within SA2.

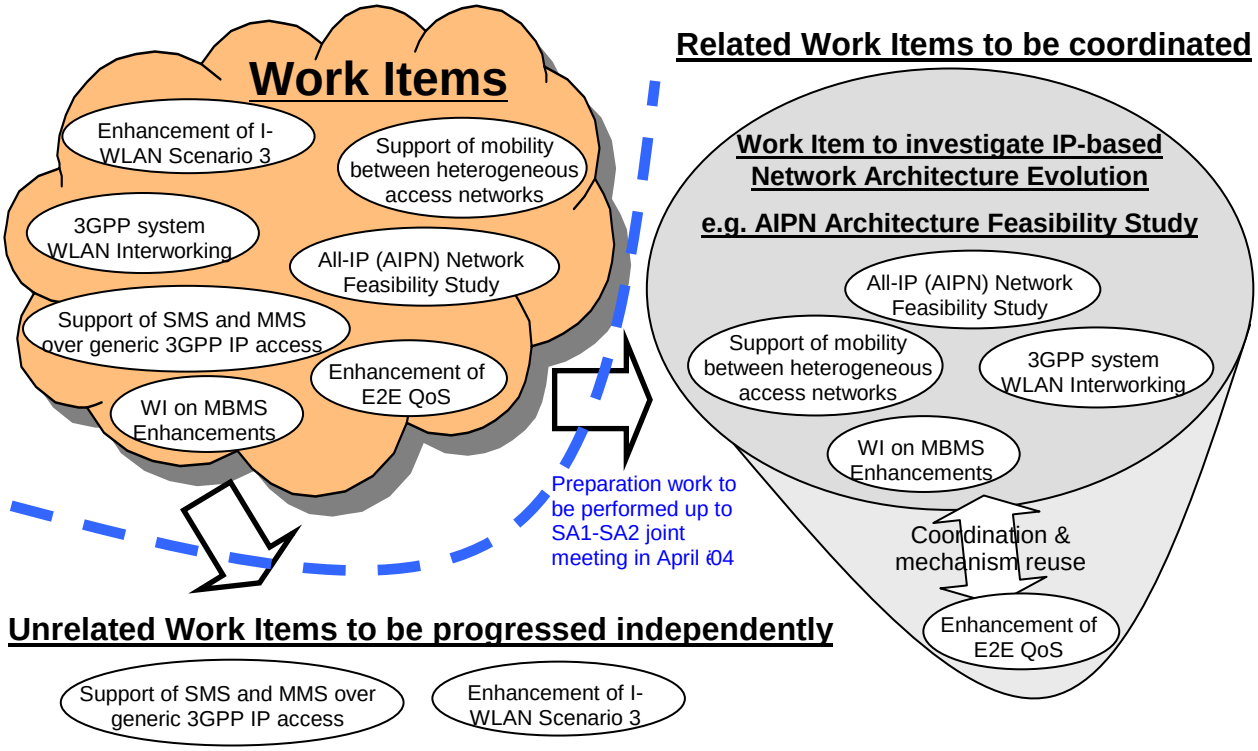

Figure 1: Example of relationship clarification and coordination of work items

2.2 Progression of work on evolution of UTRA and UTRAN

The work on evolution of UTRA and UTRAN is thought to be a major piece of work and the start of this activity will be the presentation of the "Proposed Study Item on Evolved UTRA and UTRAN" (RP-040461) at TSG RAN#26. After approval of a new Study Item it is expected that work on evolution of UTRA and UTRAN will progress within TSG RAN and TSG RAN Working Groups. However, as this work may impact other aspects of the system, e.g. the overall system architecture, the relevant working groups should endeavour to maintain awareness of the progress made.

3. Conclusions and recommendations

Based on this contribution it is recommended that SA2 be tasked to clarify the relationship between work items that appear to be related to IP-based network architecture evolution and take action to ensure activities are coordinated as appropriate. It is already provisionally planned to hold a joint meeting between SA1 and SA2 in April of next year to discuss the AIPN Feasibility Study and exchange opinions on IP-based network

evolution of the 3GPP system. It appears that this would be an appropriate point at which to take a decision on the coordination of work items and clarify how work on network architecture evolution is to progress within SA2.

Furthermore, whilst it is expected that work on evolution of UTRA and UTRAN will initially progress within the TSG RAN and TSG RAN Working Groups. Relevant groups should endeavour to be aware of the progress made.

An example of a method that could be utilised to progress work on evolution of the 3GPP system is provided in the figure below.

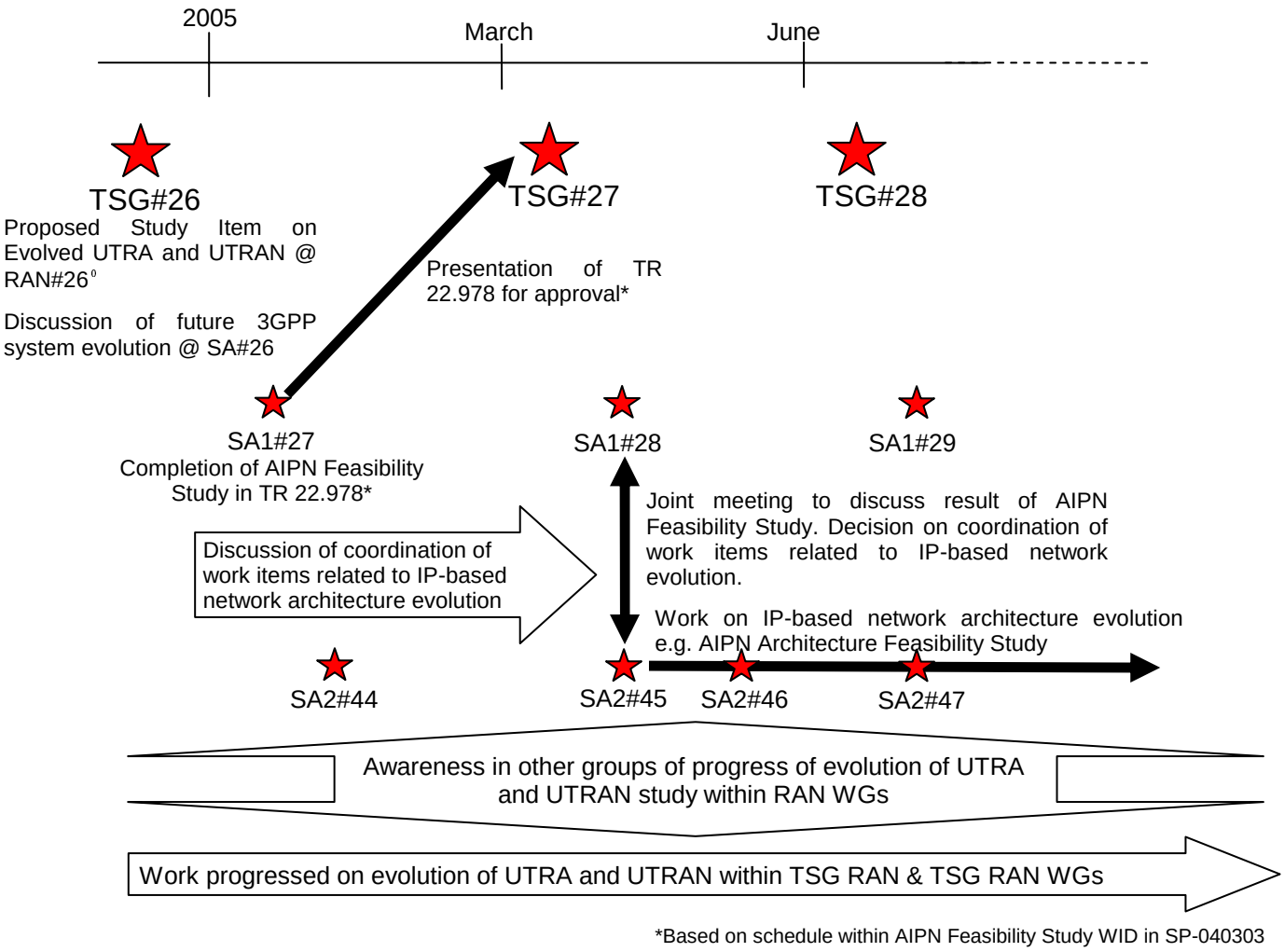

Figure 2: Example of method for progressing work on evolution of the 3GPP system

Technical Specification Group Services and System Aspects Meeting #26, Athens, Greece **TSGS#26(04)0720**

3GPP TSG-SA WG2 Meeting #43 **Tdoc S2-043891**
Seoul, South Korea, 15 - 19 November 2004 **rev of S2-043725**

Title: LS on evolution of network architecture

Response to: -
Release: Release 7
Work Item: -

Source: SA2
To: RAN, SA
Cc: CN

Contact Person:
Name: **Juan Noguera**
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Attachments: S2-043650

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1. Overall Description:

During the SA2 #43 meeting, Tdoc S2-043650 (attached) brought to the attention of SA2 the different network evolution activities that are taking part in different groups in 3GPP. In particular, it identifies the work on All-IP Network (AIPN) done in SA1 and the UTRAN evolution proposals shown in the recent RAN Evolution Workshop held in Toronto (some of which had architectural implications well beyond UTRAN).

Also, during both the SA 2 #42 and #43 meetings, SA 2 have held extensive discussion on a WID relating to WLAN scenario 4/5 work. Currently there is no agreement within SA 2 as to whether or not this work should focus only on WLAN-3GPP interworking, or, whether it can focus on interworking to any other generic RAT. SA 2 would appreciate guidance from SA on this matter.

SA2 strongly encourages other working groups to continue the work in this area. However, SA2 believes that there is a need to coordinate the architectural evolution of CN and RAN(s) in order to ensure that they follow a complementary path. As the leading working group on overall UMTS architecture, SA2 would like to inform RAN and SA that we plan to take this coordination role as well as overall responsibility for network evolution. SA2 expects close coordination with RAN and SA groups working on UTRAN or CN evolution and would like to be kept informed on the progress of this work in RAN and other SA groups.

Note: the terms of reference for 3GPP SA 2 can be found at http://www.3gpp.org/TB/SA/SA2/ToR.htm

2. Actions:

For RAN and SA: to kindly take the above information into account when discussing the outcome of the RAN evolution workshop.

For SA: to give SA 2 guidance on how to progress with the WLAN scenario 4/5 work.

3. Dates of Next TSG-SA WG2 Meetings:

TSG-SA WG2 Meeting #44	26 Jan - 02 Feb 2005	EU
TSG-SA WG2 Meeting #45	04 - 08 April 2005	CN

3GPP TSG-SA WG2 #43 **Tdoc 3GPP S2-043650**
Seoul, Korea
15-19 November 2004

Source: **Vodafone**
Title: **Future SA 2 work related to ì RAN evolutionî ; AIPN; and WLAN scenario 4/5**
Agenda item: **12.1**

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1 RAN Evolution Workshop

3GPP TSG RAN held a workshop on ìRAN evolutionî in Toronto 2-3/11/04.

Although the focus of many of the workshop presenters was on the radio technology, several of the presentations showed anticipated developments in the system architecture behind the radio interface (see REV-WS022, 23, 24, 25, 26, 27, 31, 37, 40, 41 at ftp://ftp.3gpp.org/workshop/2004_11_RAN_Future_Evo/Docs/).

The summary of the meeting is in tdoc REV-WS044 and it identifies the

ìNeed for input from SA on different subjects e.g.:

- Potential New functional splits between Radio Access Network and Core Network
- Evaluation of the ratio between Peak and Average throughput for service delivery to determine optimisation of the backhaul
- Determine the throughput per userî

It is believed that various companies are preparing proposals for Study Items/Work Items that will be presented to TSG RAN for approval.

Many of the architectures that were presented depicted the new radio interface as a totally new RAT. The interconnection of this new RAT with the existing 3GPP system might be via Iu or via Gn or ìat Giî.

Although no detailed architecture descriptions were proposed, several speakers hypothesised about new architectural features. Examples include: connecting the Iu interface to the base station site; or placing the SGSN functionality into the base station site. However important issues were frequently omitted (eg charging, legal interception, encryption of the user plane from the Base station site), and, many of these are interesting to SA Working Groups including SA 2.

2 All IP Network (AIPN)

Within SA 1 there is a large piece of work progressing on the ì requirements for an All IP Networkî. One of its conclusions MIGHT (or might not) be that specifications for ì network controlled mobility between heterogeneous RATsî should be developed.

This work could well link to the RAN evolution work ñ alternatively it could diverge from it.

3 WLAN scenario 4/5

This work is under active discussion within SA 1 and SA 2. In SA 1, the discussions on WLAN seem to be treated in a separate drafting group to those on AIPN. Again, this work could converge or diverge from the AIPN and/or RAN evolution work.

4 Scope of SA 2

SA 2 is believed to have overall responsibility for the system architecture of the 3GPP system. Hence it seems sensible that SA 2 prepare some proposals as to how these different work areas within 3GPP can be converged, rather than permitting (or even encouraging) their divergence.

5 Proposals

a) that SA 2 draft a work item for SA to consider when discussing the RAN evolution report.

b) that SA 2 consider the ìRAN evolutionî aspects while discussing/revising the scenario 4/5 WID.

TSG-RAN Meeting #26 RP-040461
Athens, Greece, 8-10, December, 2004

Agenda Item: 8.12

Source: **NTT DoCoMo, Alcatel, Cingular Wireless, CMCC, Ericsson, Fujitsu, Huawei, LG Electronics, Lucent Technologies, Mitsubishi Electric, Motorola, NEC, Nokia, Nortel Networks, Orange, Panasonic, Philips, Qualcomm Europe, Samsung, Sharp, Siemens, Telecom Italia, Telefonica, TeliaSonera, T-Mobile, Vodafone**

Title: **Proposed Study Item on Evolved UTRA and UTRAN**
Document for: **Discussion and approval**

In the RAN Future Evolution Workshop, many of the presentations pointed out the need of 3G long-term evolution to meet the future demand and to maintain its competitive position for coming decades. Several interesting new technology components such as OFDM with a flexible and broader RF bandwidth were presented as potential candidates for the evolution. It was pointed out such a technology enhancement should be applied to UTRAN architecture as well as the UTRA radio interface.
It is proposed that 3GPP should initiate the feasibility study of the long-term evolution accounting for the above situation. In this paper, a Study Item Description is presented for this study.

Concerning the time plan, we propose to complete the feasibility study by June 2006 and envisage all relevant core specifications by June 2007.

Study Item Description

Title: Evolved UTRA and UTRAN

1 3GPP Work Area

X	Radio Access
	Core Network
	Services

2 Linked work items

All-IP Network (AIPN) Feasibility Study

3 Justification

With enhancements such as HSDPA and Enhanced Uplink, the 3GPP radio-access technology will be highly competitive for several years. However, to ensure competitiveness in an even longer time frame, i.e. for the next 10 years and beyond, a long-term evolution of the 3GPP radio-access technology needs to be considered. Important parts of such a long-term evolution include reduced latency, higher user data rates, improved system capacity and coverage, and reduced cost for the operator. In order to achieve this, an evolution of the radio interface as well as the radio network architecture should be considered.

Considering a desire for even higher data rates and also taking into account future additional 3G spectrum allocations the long-term 3GPP evolution should include an evolution towards support for wider transmission bandwidth than 5 MHz. At the same time, support for transmission bandwidths of 5MHz and less than 5MHz should be investigated in order to allow for more flexibility in whichever frequency bands the system may be deployed in.

4 Objective

The objective of this study item is to develop a framework for the evolution of the 3GPP radio-access technology towards a high-data-rate, low-latency and packet-optimized radio-access technology. Thus the study should focus on supporting services provided from the PS-domain. In order to achieve this, studies should be carried out in at least the following areas:

- Related to the radio-interface physical layer (downlink and uplink):
  - e.g. means to support flexible transmission bandwidth up to 20 MHz, introduction of new transmission schemes and advanced multi-antenna technologies
- Related to the radio interface layer 2 and 3:
  - e.g. signaling optimization
- Related to the UTRAN architecture:
  - identify the most optimum UTRAN network architecture and functional split between RAN network nodes, not precluding considerations on the functional

split between UTRAN and CN (SA2 experts should be invited to the latter topic)
- RF-related issues

The targets for the evolution of the radio-interface and radio-access network architecture should be:
- Significantly increased peak data rate e.g. 100 Mbps (downlink) and 50 Mbps (uplink)
- Increase ì cell edge bitrateî whilst maintaining same site locations as deployed today
- Significantly improved spectrum efficiency (e.g. 2-4 x Rel6)
- Possibility for a Radio-access network latency (user-plane UE ñ RNC (or corresponding node above Node B) - UE) below 10 ms
- Significantly reduced C-plane latency (e.g. including the possibility to exchange user-plane data starting from camped-state with a transition time of less than 100 ms (excluding downlink paging delay))
- Scaleable bandwidth
  - 5, 10, 20 and possibly 15 MHz
  - [1.25,] 2.5 MHz: to allow flexibility in narrow spectral allocations where the system may be deployed
- Support for inter-working with existing 3G systems and non-3GPP specified systems
- Further enhanced MBMS
- Reduced CAPEX and OPEX including backhaul
- Cost effective migration from Rel-6 UTRA radio interface and architecture
- Reasonable system and terminal complexity, cost, and power consumption.
- Support of further enhanced IMS and core network
- Backwards compatibility is highly desirable, but the trade off versus performance and/or capability enhancements should be carefully considered.
- Efficient support of the various types of services, especially from the PS domain (e.g. Voice over IP, Presence)
- System should be optimized for low mobile speed but also support high mobile speed
- Operation in paired and unpaired spectrum should not be precluded
- Possibility for simplified co-existence between operators in adjacent bands as well as cross-border co-existence

5 Service Aspects

The result will enhance the capabilities of UTRA and UTRAN, enabling more advanced services. No direct study of particular services will be done.

6 MMI-Aspects

None

7 Charging Aspects

None

8 Security Aspects

The study will have to consider security aspects during the course of the work. However, security algorithms will not be studied.

9 Impacts

Affects:	USIM	ME	AN	CN	Others
Yes		X	X		
No	X				X
Don't know				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 endorsement at plenary#	Approved at plenary#	Comments
25.xxx				RAN#31	RAN#32	Technical Report
						Technical Report
						Technical Report

Affected existing specifications				
Spec No.	CR	Subject	Approved at plenary#	Comments

11 Study item raporteurs

Takehiro Nakamura (NTT DoCoMo)
(vice rapporteur) Don Zelmar (Cingular)

12 Work item leadership

WG1, WG2, WG3 and WG4

13 Supporting Companies

Alcatel, Cingular, CMCC, Ericsson, Fujitsu, LG Electronics, Huawei, Lucent Technologies, Mitsubishi Electric, Motorola, NEC, Nokia, Nortel Networks, NTT DoCoMo, Orange, Panasonic, Philips, Qualcomm Europe, Samsung, Sharp, Siemens, Telecom Italia, Telefonica, TeliaSonera, T-Mobile, Vodafone

14 Classification of the WI (if known)

	Feature (go to 14a)
	Building Block (go to 14b)
	Work Task (go to 14c)

14a The WI is a Feature: List of building blocks under this feature

(list of Work Items identified as building blocks)

14b The WI is a Building Block: parent Feature

(one Work Item identified as a feature)

14c The WI is a Work Task: parent Building Block

(one Work Item identified as a building block)