3GPP TSG-RAN Meeting #23

Phoenix (AZ), USA, 10th – 12th March 2004

TDoc RP-040127

|	
Source:	**3, Vodafone, NEC, Siemens**
Title:	**Rel-5 IP/ATM-Interworking: Interworking Option 3**
Agenda item:	**7.4.1** ("Report from WG3 including report on actions required from RAN#22")
Document for:	**Information, Discussion and Approval**

1 Introduction

One of the major achievements in Rel-5 was the introduction of IP-Networks as a suited Transport Network Layer (TNL) for UMTS Radio Access Networks. In order to enable hassle-free coexistence of ATM- and IP-TNLs, three options for IP/ATM-interworking have been included into Rel-5 specifications right from their first appearance. However, "Interworking Option 3" was not fully finalised as relevant specifications were under preparation in related SDO.

Meanwhile, approval of Q.2631.1 by ITU-T [1] allows to finalise also "Interworking Option 3" in 3GPP's Rel-5 specifications. This contribution is providing 3's, Vodafone's, NEC's and Siemens' view on:

- The reasons, why "Interworking Option 3" is beneficial for Operators and Manufacturers
- The fact that CRs in RP-04 are suited to finalise "Interworking Option 3" in Rel-5
- A possible way forward for IETF-Draft on PWE3

2 Comparison of "Interworking Option 1, 2, 3"

To allow quick comparison, the following figures visualise all three IP/ATM-Interworking Options as listed today in 3GPP standards [3]. As an example, Iub was chosen for these figures:
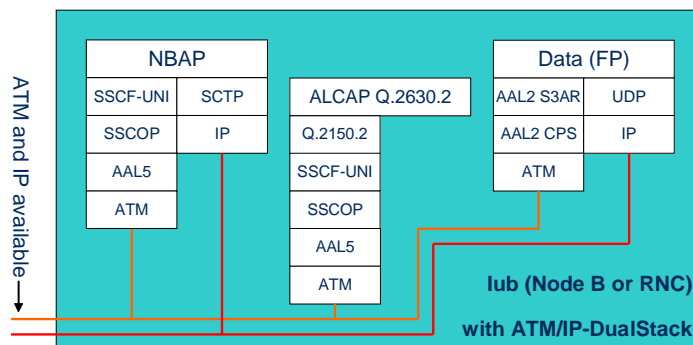
Interworking Option 1: ATM/IP Dual Stack supported in the IP UTRAN node
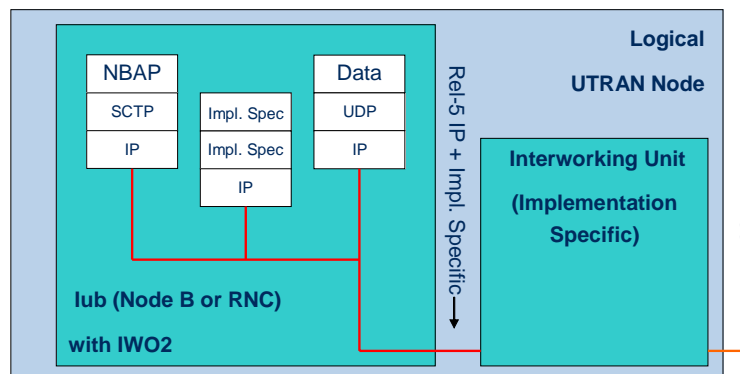
Interworking Option 2: Use of an interworking function (IWF) as logical part of the IP UTRAN node
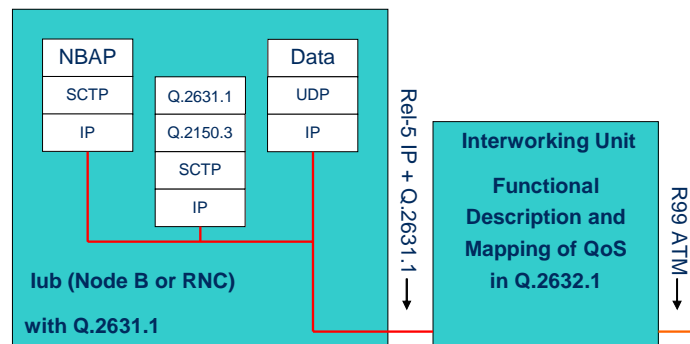
Interworking Option 3: Use of an interworking unit (IWU) as a separate logical unit

From the figures, it becomes clear that "Interworking Option 1" is the most versatile case as it directly connects to both types of TNL and the choice is finally a matter of configuration. On the other hand, figure 1 also provides an overview on all the protocols which have to be implemented in this case and thus on the related cost of such node. Whilst support of both TNLs is very sensible for an RNC, the increased effort is not really favourable in the NodeB case.

In "Interworking Option 2", the protocols for support of ATM have been moved to an interworking unit, i.e. there is just the requirement that ATM is provided at some physical location. By this fact, the IP Interface becomes a part of the logical UTRAN Node and thus is implementation specific. Whilst this option seems attractive at first glance for manufacturers, operators may need to accomplish different solutions for ATM/IP-Interworking in their network, each which manufacturer specific requirements on TNL (the required QoS for the IP-Link may depend on the implementation) and on configuration (Address and QoS Mapping). Thus, this solution provides no support for an open, multi-vendor IP interface.

In "Interworking Option 3", the UTRAN Node has to support a connection control protocol to communicate with a standardised IP/ATM-interworking unit. Since 2002, ITU-T has developed two corresponding recommendations: Recommendation Q.2632.1 [2] describes the functionality for QoS-aware ATM/IP-Interworking while Q.2631.1 [1] specifies the corresponding connection control protocol. As Q.2631.1 was designed for efficient implementation, additional effort in UTRAN Node is suited for widespread usage.

3   Benefits of "Interworking Option 3"

From comparison in section 1, the following benefits of "Interworking Option 3" can be summarised:
- Lean stacks in the IP-NodeB (compared to Dual-Stack)
- Standardised Connection Control Protocol [1] (compared to Interworking Option 2)
- Recommendation available for Interworking Functionality [2]
- Recommendation available for QoS handling (Annex of [2])
- Transparent requirements for the IP interface supporting connection control protocol
- The interworking unit can be deployed at any suited location in the network
- Multi-Vendor suitability (e.g. different sizes of Interworking Unit in portfolios)
- Simple way to provide connectivity to ATM when delivering first IP Nodes

4   Finalisation of "Interworking Option 3" by Approval of CRs in RP-040054

At the current stage, specification of "Interworking Option 3" is not fully finalised in 3GPP Specifications. The main issue is to replace the current placeholder ("TBD") in the reference to the connection control protocol by a reference to an existing protocol. This task is performed by the CRs in RP-040054. Moreover, this set of CRs aligns the figures for the different interfaces and provides descriptive text for application of the connection protocol and the supporting stack. The set has been available since 2003 and has undergone revision by RAN WG3, resulting in the fact that RAN3 has endorsed them to be technically correct.

5   An Additional Option: IETF-Draft on PWE3

At IETF, there is currently an effort to create PWE3 (Pseudo-Wire Emulation End to End) for tunnelling of ATM cells through an IP Network. According to our understanding, planning in IETF is to provide a general Layer 1

emulation for any kind of ATM traffic, i.e. possibly for UTRAN-ATM-Traffic in general. However, discussions in RAN WG3 revealed that some companies prefer to restrict its application in UTRAN only for Nodes supporting Rel-5 IP, too. The resulting protocol stack is depicted in figure below.
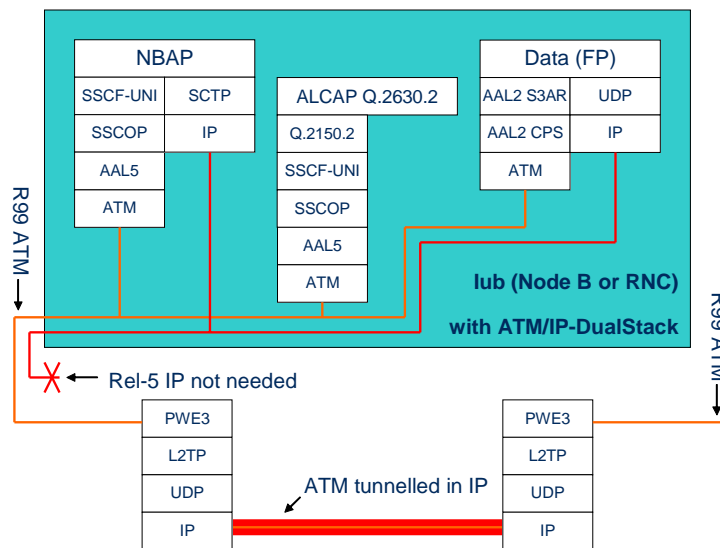
PWE3: Application in conjunction with UTRAN Node supporting ATM and IP

As one can see, the resulting depth of the protocol stacks is quite impressive, even if parts of the stacks might reside in PWE3-capable IP-Routers. Thus, from an economic point of view it cannot be suggested to make frequent use of this option.

However, if operating scenarios exist where such tunnelling of ATM is preferred, there is no need to limit the application of PWE3 as long as the resulting link quality is sufficient for the UTRAN-ATM-Traffic. Thus, there are several options how to proceed with PWE3:

- PWE3-1:   Include PWE3 into 3GPP specification as a general option for Layer 1
- PWE3-2:   Include PWE3 into 3GPP specification only for IP/ATM-Dual Stack
- PWE3-3:   No reference in 3GPP specifications to PWE3

Please note that choosing PWE3-3 does not mean to exclude its application, as the final IETF RFC should anyhow not restrict the applicability of PWE3 for any type of ATM traffic.

6   Proposal

In order to provide reliable and standardised interworking between Rel-5 IP nodes and R99/Rel-4/Rel-5 ATM nodes, we propose to:

- Agree on the benefits of ATM/IP-Interworking Option 3
- Finalise Interworking Option 3 by approving the CRs in RP-040054.
- Decide on how to proceed with inclusion of PWE3 into 3GPP standards

7   References

[1]   ITU-T Recommendation Q.2631.1 (10/2003): "IP Connection Control Signalling Protocol - Capability Set 1"
[2]   ITU-T Recommendation Q.2632.1 (10/2003): "Interworking between AAL type 2 Signalling Protocol Capability Set 2 and IP Connection Control Signalling Protocol Capability Set 1"
[3]   3GPP TS 25.401: "UTRAN Overall Description"