**TSG RAN Meeting #20** **RP-030323**
**Hämeenlinna, Finland, 3 - 6 June, 2003**

**Title** **CR (Rel-5 only) to TR 25.933 on Corrections to ATM-IP interworking**
**Source** **TSG RAN WG3**
**Agenda Item** **7.3.5**

| RAN3 Tdoc | Spec | curr. Vers. | new Vers. | REL | CR | Rev | Cat | Title | Work item |
|---|---|---|---|---|---|---|---|---|---|
| R3-030915 | 25.933 | 5.2.0 | 5.3.0 | REL-5 | 003 | 2 | F | Corrections to ATM-IP interworking | ETRAN-IPtrans |

**3GPP TSG-RAN WG3 Meeting #36** ***R3-030915***
**Paris, France, 19-23 May 2003**

*CR-Form-v7*

# CHANGE REQUEST

⌘ **25.933** **CR** **003** ⌘**rev** **2** ⌘ Current version: **5.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

***Proposed change affects:*** UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☒

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Corrections to ATM-IP interworking |
| ***Source:*** | ⌘ | RAN WG3 |
| ***Work item code:*** | ⌘ | ETRAN-IPtrans |
| ***Date:*** | ⌘ | 31/03/2003 |
| ***Category:*** | ⌘ | **F** |
| ***Release:*** | ⌘ | Rel-5 |

*Use one of the following categories:*
***F*** *(correction)*
***A*** *(corresponds to a correction in an earlier release)*
***B*** *(addition of feature),*
***C*** *(functional modification of feature)*
***D*** *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

*Use one of the following releases:*
*2* *(GSM Phase 2)*
*R96* *(Release 1996)*
*R97* *(Release 1997)*
*R98* *(Release 1998)*
*R99* *(Release 1999)*
*Rel-4* *(Release 4)*
*Rel-5* *(Release 5)*
*Rel-6* *(Release 6)*

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | At the time the IP-ALCAP option was decided, there was no other solution for the ATM-IP interworking in the case the RNC/CN-node supporting IP transport option cannot be connected to the ATM backbone.<br>Since then, the IETF has introduced the Pseudo Wire Emulation Edge to Edge (PWE3) solution that simplifies the ATM-IP interworking in that case. It consists in tunneling ATM cells between an ATM RNC/CN-node with PWE3 and the ATM backbone where is connected the ATM-only CN-node/RNC. |
| ***Summary of change:*** | ⌘ | Rev1:<br>The changes aimed at agreement area section 7.9 are removed.<br><br>Rev0:<br>Scenario 1 (ATM RNC/CN-node with PWE3) is enhanced with the possibility to add PWE3 protocol stack below ATM layer.<br><br>Impact Analysis<br>Impact assessment towards the previous version of the specification (same release): this CR has isolated impact on the previous version of the specification (same release) because only one function is impacted.<br>This CR has an impact under the protocol point of view.<br>The impact can be considered as isolated as it affects only one function, namely IP-ATM interworking. |
| ***Consequences if not approved:*** | ⌘ | If this CR is not approved, the study area will remain uncorrect since the external IWU scenario with IP-ALCAP will be described as the only technically possible. |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 2, 3.3, 6.12.1.2 |

| | | Y | N | | | |
|---|---|---|---|---|---|---|
| ***Other specs affected:*** | ⌘ | | X | Other core specifications | ⌘ | |
| | | | X | Test specifications | | |
| | | | X | O&M Specifications | | |
| ***Other comments:*** | ⌘ | | | | | |

**How to create CRs using this form:**

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

# 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.*


[1] IP-Transport in UTRAN Work Task Description, as agreed at TSG RAN#6

[2] 3GPP TS 25.401: "UTRAN Overall Description".

[3] 3GPP TS 25.410: "UTRAN Iu Interface: General Aspects and Principles".

[4] 3GPP TS 25.412: "UTRAN Iu interface signalling transport".

[5] 3GPP TS 25.420: "UTRAN Iur Interface: General Aspects and Principles".

[6] 3GPP TS 25.422: "UTRAN Iur interface signalling transport".

[7] 3GPP TS 25.430: "UTRAN Iub Interface: General Aspects and Principles".

[8] 3GPP TS 25.427: "UTRAN Iur and Iub interface user plane protocols for DCH data streams".

[9] IETF RFC 1812: "Requirements for IP Version 4 Routers", June 1995.

[10] R. Pazhyannur, I. Ali, Craig Fox, "PPP Multiplexed Frame Option", RFC3153, August 2001..

[11] IETF RFC 1661 (STD 51): "The Point-to-Point Protocol (PPP)", W. Simpson, Ed., July 1994.

[12] IETF RFC 1662 (STD 51): "PPP in HDLC-like Framing", W. Simpson, Ed., July 1994.

[13] IETF RFC 2508: "Compressing IP/UDP/RTP Headers for Low-Speed Serial Links", S. Casner, V. Jacobson, February 1999.

[14] IETF RFC 2509: "IP Header Compression over PPP", M. Engan, S. Casner, C. Bromann, February 1999.

[15] IETF RFC 2364: "PPP Over AAL5", G. Gross, M. Kaycee, A. Lin, J. Stephens, July 1998.

[16] IETF RFC 2661: "Layer Two Tunneling Protocol "L2TP"", W. Townsley, A. Valencia, A. Rubens, G. Pall, G. Zorn, B. Palter, August 1999.

[17] Bruce Thompson, Tmima Koren, Dan Wing, "Tunneling multiplexed Compressed RTP (TCRTP)", <draft-ietf-avt-tcrtp.06.txt>, February 27, 2002.

[18] Andrew J. Valencia, "L2TP Header Compression (L2TPHC), <draft-ietf-l2tpext-l2tphc-04.txt>, October 2001.

[19] Tmima Koren, Stephen Casner, Patrick Ruddy, Bruce Thompson, Alex Tweedly, Dan Wing, John Geevarghese, ", “Compressing IP/UDP/RTP headers on links with high delay, packet loss and reordering”, <draft-ietf-avt-crtp-enhance-04.txt>, February 24, 2002.

[20] IETF RFC 1990: "The PPP Multilink Protocol (MP)".

[21] IETF RFC 2686: "The Multi-Class Extension to Multi-Link PPP".

[22] "A Lightweight IP Encapsulation Scheme", draft-chuah-avt-lipe-02.txt, M. Chuah, E. J. Hernandez-Valencia, December 2000.

NOTE 1: Expired. There is no new version.

[23] IETF RFC 3031: "Multi-Protocol Label Switching Architecture" , January 2001.

[24] IETF RFC 2719: "Framework Architecture for Signaling Transport", October 1999.

[25] IETF RFC 2960: "Stream Control Transmission Protocol", October 2000.

[26] J. Loughney,G. Sidebottom, Guy Mousseau, S.Lorusso, SS7 SCCP-User Adaptation Layer (SUA), <draft-ietf-sigtran-sua-12.txt>, 11 February 2002.

[27] IETF RFC 2460: "Internet Protocol, Version 6 (Ipv6) Specification", December 1998.

[28] IETF RFC 2462: "Ipv6 Stateless Address Autoconfiguration", December 1998.

[29] "An overview of the introduction of IPV6 in the Internet", ", IETF draft-ietf-ngtrans-introduction-to-ipv6-transition-08, February 2002.

[30] IETF RFC 2893, "Transition Mechanisms for Ipv6 Hosts and Routers", August 2000.

[31] IETF RFC 3270, "MPLS Support of Differentiated Services", May 2002.

[32] "Tunneling Multiplexed Compressed RTP in MPLS", draft-theimer-tcrtp-mpls-00.txt, IETF work in progress, June 2000.

NOTE 2: Expired. There is no new version.

[33] "Frame Relay Fragmentation Implementation Agreement, FRF.12" http://www.frforum.com/5000/Approved/FRF.12/frf12.doc.

[34] "Simple Header Compression", draft-swallow-mpls-simple-hdr-compress-00.txt, March 2000, work in progress

NOTE 3: Expired. There is no new version.

[35] IETF RFC 2687: "PPP in a Real-time Oriented HDLC-like Framing".

[36] "COPS Usage for MPLS/Traffic Engineering", draft-franr-mpls-cops-00.txt, July 2000, work in progress.

NOTE 4: Expired. There is no new version.

[37] "Constraint-Based LSP Setup using LDP", draft-ietf-mpls-cr-ldp-05.txt, February 2001, work in progress.

NOTE 13:Expired . There is no new version.

[38] "RSVP-TE: Extensions to RSVP for LSP Tunnels", draft-ietf-mpls-rsvp-lsp-tunnel-08.txt, February 2001, work in progress

NOTE 5: Expired . There is no new version.

[39] "MPLS/IP Header Compression", draft-ietf-mpls-hdr-comp-00.txt, July 2000, work in progress.

NOTE 6: Expired. There is no new version.

[40] R3-010181: "Comparison CIP/MPLS".

[41] "MPLS/IP Header Compression over PPP", draft-ietf-mpls-hdr-comp-over-ppp-00.txt, July 2000, work in progress.

NOTE 7: Expired. There is no new version.

[42] IETF RFC 768: "User Datagram Protocol".

[43] 3GPP TS 21.133: "3G security; Security threats and requirements".

[44] IETF RFC 2401: "Security Architecture for the Internet Protocol", November 1998.

[45] IETF RFC 2408: "Internet Security Association and Key Management Protocol (ISAKMP)", November 1998.

[46] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".

[47] draft-larzon-udplite-04.txt, "The UDP Lite protocol".

NOTE 8: Expired. There is no new version.

[48] 3GPP TR 23.910: "Circuit switched data bearer services".

[49] IETF RFC 791 (9/1981): "Internet Protocol".

[50] 3GPP TR 29.903: "Feasibility study on SS7 signalling transportation in the core network with SCCP-User Adaptation (SUA)".

[51] IETF RFC 2507: "IP Header Compression", M. Degermark, B. Nordgren, S. Pink , February 1999.

[52] ITU-T Recommendation Q.2630.1: "AAL Type 2 Signalling Protocol (Capability Set 1)".

[53] ITU-T Recommendation Q.2150.3: "Signalling Transport Converter on SCTP".

[54] IETF RFC 2205: "Resource ReSerVation Protocol (RSVP); Version 1 Functional Specification".

[55] IETF RFC 2210: "The use of RSVP with IETF Integrated Services".

[56] IETF RFC 2996: "Format of the RSVP DCLASS Object".

[57] IETF RFC 2543: "SIP: Session Initiation Protocol".

[58] IETF RFC 2327: "SDP: Session Description Protocol".

[59] IETF RFC 1889: "RTP: A Transport Protocol for Real-Time Applications".

[60] 3GPP TS 25.411: "UTRAN Iu interface Layer 1".

[61] ISO/IEC 8348: "Information technology – Open Systems Interconnection – Network service definition".

[62] ISO/IEC 8348/Amd.1: "Information technology – Open Systems Interconnection – Network service definition Amendment 1: Addition of the Internet protocol address format identifier",

[65] IETF RFC 2874: "DNS Extensions to Support IPv6 Address Aggregation and Renumbering", July 2000.

[67] ITU-T SG11: TD GEN/11-49r1 “Draft Signalling Requirements for AAL Type 2 to IP Interworking (TRQ.AAL2IP.iw)” February 2002

[68] ITU-T SG11: TD GEN/11-54r3 “Report of Q.6/11, Joint Qs.6 & 9/11 and Q.9/11 discussions” March 2002

[69] 3GPP TSG RAN WG3: R3-021366 “A2IP Signalling Protocol (Q.IPALCAP Spec draft)” May 2002

[70] draft-ietf-pwe3-framework-01.txt: "Framework for Pseudo Wire Emulation Edge-to-Edge (PWE3)"

[71] draft-ietf-pwe3-atm-encap-01.txt: "Encapsulation Methods for Transport of ATM Cells/Frame Over IP and MPLS Networks"

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

## 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

| | |
|---|---|
| AAL2 | ATM Adaptation Layer type 2 |
| ACK | Acknowledgement |
| ALCAP | Access Link Control Application Protocol |
| ATM | Asynchronous Transfer Mode |
| CDN | Compressing/Decompressing Node |
| CRC | Cyclic Redundancy Check |
| CRNC | Controlling Radio Network Controller |
| DRNC | Drift Radio Network Controller |
| FEC | Forwarding Equivalence Class |
| FP | Frame Protocol |
| FR | Full Rate |
| GPRS | General Packet Radio Service |
| GSM | Global System for Mobile communications |
| GTP | GPRS Tunneling Protocol |
| HDLC | High Level Data Link Control |
| ICMP | Internet Control Message Protocol |
| IP | Internet Protocol |
| Ipv4 | Internet Protocol Version 4 |
| Ipv6 | Internet Protocol Version 6 |
| L2TP | Layer Two Tunneling Protocol |
| LAN | Local Area Network |
| LCP | Link Control Protocol |
| LDP | Label Distribution Protocol |
| LEN | LENgth |
| LSB | Least Significant Bit |
| LSP | Label-Switched Path |
| LSRs | Label Switched Routers |
| LXT | Length ExTension |
| MPLS | Multi-Protocol Label Switching |
| MSB | Most Significant Bit |
| MTU | Maximum Transmission Unit |
| NAPT-PT | Network Address/Port Translators-Protocol Translators |
| NBAP | Node B Application Part |
| NCP | Network Control Protocol |
| NSP | Network Service Part |
| O&M | Operations & Maintenance |
| PDCP | Packet Data Convergence Protocol |
| PDU | Protocol Data Unit |
| PFF | Protocol Field Flag |
| PPP | Point-to-Point Protocol |
| PPPmux | PPP Multiplexing |
| PVC | Permanent Virtual Circuit |
| PWE3 | Pseudo Wire Emulation Edge to Edge |
| QoS | Quality of Service |

| | |
|---|---|
| RAB | Radio Access Bearer |
| RANAP | Radio Access Network Application Part |
| RFC | Request For Comments |
| RNL | Radio Network Layer |
| RNSAP | Radio Network Subsystem Application Part |
| RSVP | Resource ReserVation Protocol |
| SAPC | Service Application PLMN Code |
| SCCP | Signalling Connection Control Part |
| SEP | Signalling End Point |
| SIIT | Stateless IP/ICMP Translation algorithm |
| SP | Signalling Points |
| SRNC | Serving Radio Network Controller |
| SS7 | Signalling System No. 7 |
| SSSAR | Service Specific Segmentation and Re-assembly sublayer |
| STP | Signalling Transfer Point |
| SUGR | Served User Generated Reference parameter |
| TLV | Type-Length-Value |
| TNL | Transport Network Layer |
| ToS | Type of Service |
| TTI | Transmission Timing Interval |
| UDP | User Datagram Protocol |
| UMTS | Universal Mobile Telecommunications System |
| UTRAN | Universal Terrestrial Radio Access Network |
| VPN | Virtual Private Network |

*Next change*

### 6.10.2.1 Dual Stack operation within Rel.5 RNCs

Within the dual stack option a Rel.5 RNC must provide both stacks. Generally, it is assumed that only RNCs should provide both types of interfaces, so that Node Bs are either IP or ATM nodes. Nevertheless, for interworking case 3, where an IP based Node B is connected with a Release 99 / Release 4 RNC, also an interworking on Iub would be necessary. Within a pure IP or ATM environment the RNC must only provide one type of interface.

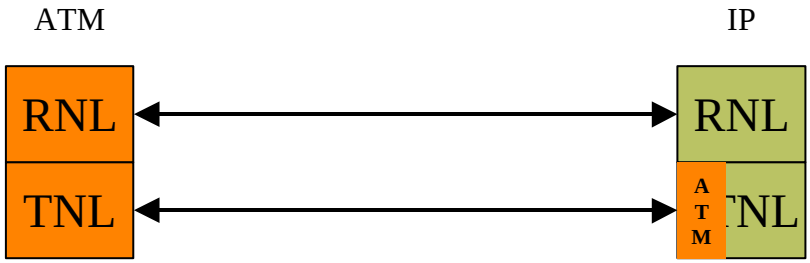


**Figure 6-31: Dual Stack operation within Rel.5 RNCs**

A Rel.5 IP node that needs to communicate with a pure ATM node (R99 or later) requires the complete ATM/AAL2 protocol stack. Beneficial of such an dual stack solution is, that it does not require a TNL control protocol on IP side.

On Iub this solution would be quit sufficient, but on Iur there may be certain cases where a simple IWF or dual stack operation are not sufficient and an interworking unit (IWU) will be needed. (If interworking case 3 and 4 should be supported, also on Iub an IWU would be needed.)

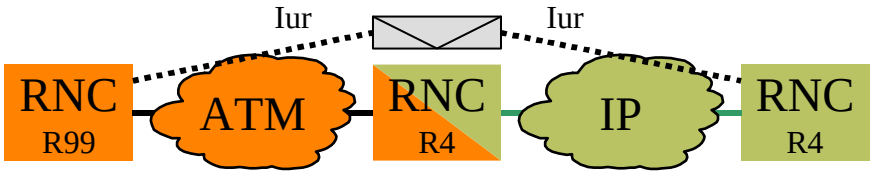


**Figure 6-32: Full Meshed Iur**

In the network, that is shown in figure 6-32, are some RNCs pure IP based, some RNCs are pure ATM based and some RNCs are dual stacked. Assuming a network configuration where a pure IP based RNS borders on a pure ATM based RNS, the Iur interface between both RNSs must be supported.

A dual stacked RNC with an IWF in the middle would be able to communicate on both networks but would not be able to combine both parts of the network. In that case either an interworking unit is needed or a ~~configuration as shown in figure 6-32 is not possible and every RNC needs to support both interface types (IP and ATM).~~ solution to transport ATM-traffic through the IP-backbone. Such a solution, based on Pseudo-Wire Emulation Edge to Edge (PWE3) [70] [71], is provided in the next paragraph.

#### 6.10.2.1.1 Interworking with Pseudo-Wire Emulation

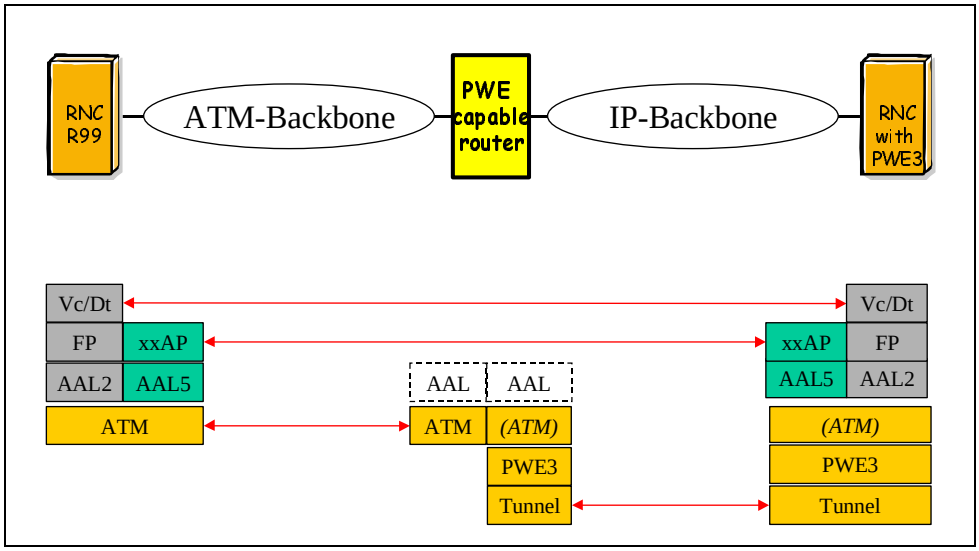


**Figure 6-33. Interworking with Pseudo-Wire Emulation**

A PWE-capable router, equipped with interfaces to both the ATM and the IP network, connects the ATM and the IP-backbone. Through the IP-backbone between the RNC-with PWE3 and the PWE-router, a tunnel is established for interconnection with RNC-R99.

RNC-with PWE3 communicates with RNC-R99 via its AAL2/AAL5 protocol stackon top of PWE3 layer over the PWE3 tunnel through the IP-backbone. The PWE3 tunnel terminates in the PWE-router, from where plain ATM-traffic is forwarded to RNC-R99 over the ATM-backbone. All planes (Control plane, Transport Network control plane and user plane) shall be carried over PWE3.

The two options of PWE3 tunneling protocol [71] over IP networks can be done either directly over IP layer or over L2TP [38].

The following figure shows the protocol stack for PWE3 protocol at the RNC/CN-node, in the case the RNC/CN-node supporting PWE cannot be connected to the ATM backbone.

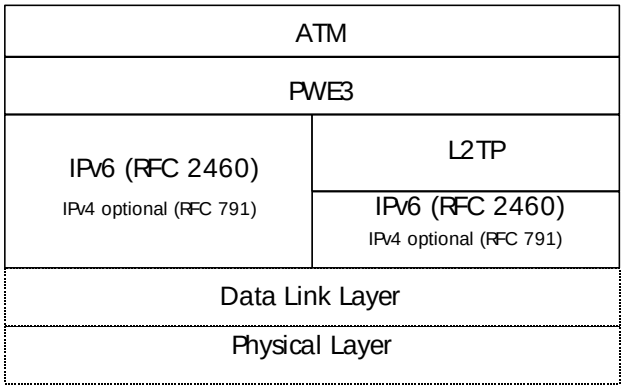


**Figure 6-34. Bearer for Control plane (RANAP), Transport Network control plane (ALCAP) and user plane with PWE3 tunneling protocol.**

The method(s) to be used for encapsulation of ATM cells, namely, One-to-one mode and N-to-one mode, is(are) FFS. The transport service to be used, namely the ATM VCC Cell Transport Service or the ATM VPC Cell Transport Service, is FFS.

The use of the ATM AAL5 CPCS-SDU and AAL5 PDU frame modes is not required.