TSG-RAN Working Group 3 meeting #2
Utsikten 15th - 19th March 1999

TSGW3#2 (99)162

Agenda Item: 7.7

Source : NORTEL

Title : Iub & Iur interface Protocol Structure : independence of Radio Network and Transport Network protocols

Document for: UMTS S3.30 v 0.0.2 section 6
UMTS S3.20 v 0.0.2 section 6

ABSTRACT

This contribution is relative to section 6 of S3.30 : Iub Interface Protocol Structure. A new model, which provides independence between Radio Network and Transport Network protocols is proposed to represent the Iub Interface Protocol. This contribution applies also to the Iur Interface Protocol of S3.20 section 6 : Iur Interface Protocol Structure by replacing NBAP by RNSAP.

BACKGROUND

In "S3.30, section 4.3 : Iub Interface Specification Objectives", it is stated that the specification shall facilitate : "Separation of Iub interface Radio Network functionality and Transport Network functionality to facilitate the introduction of future technology".
However, in section 6, the Interface Protocol Structure model mixes Radio Network and Transport Network functions. It also refers to a specific ATM/AAL2 implementation of the Transport Network User Plane:

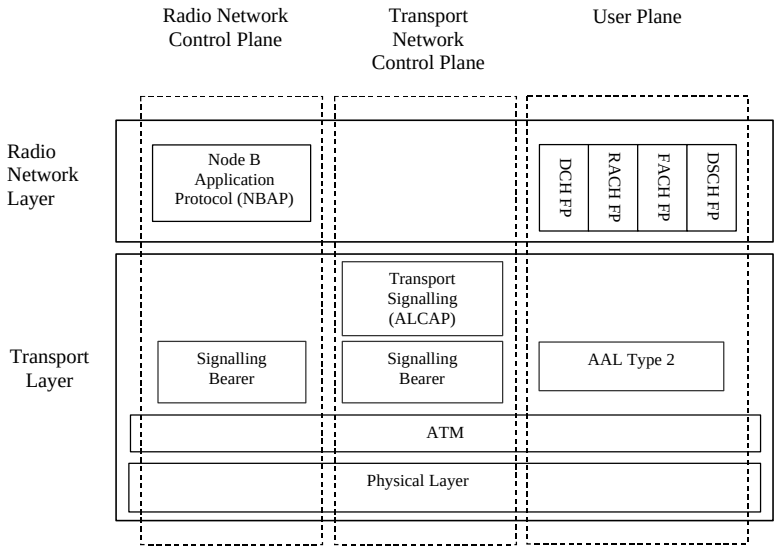

Figure 1: Iub Interface Protocol Structure.

DISCUSSION

The proposed Iub Interface Protocol Structure clarifies the functional split between the Network User Plane and Network Control Plane :

I - PROPOSED PROTOCOL STRUCTURE FOR Iub

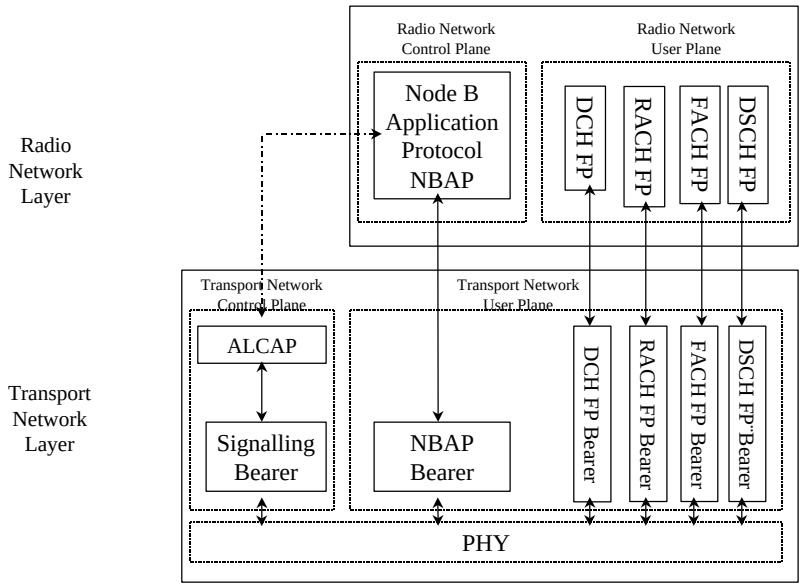

Figure 2 : Iub Interface Protocol Structure

The Transport Network Control Plane is split in Control Plane and User Plane. The Control Plane is used to establish the Transport Bearer in the Transport Network between Node B and RNC. The User Plane carries user information (payload) eg NBAP signalling, DCH, RACH, FACH, DSCH Frame Protocol.

ALCAP is the protocol used to establish Transport Bearers in the Transport Network, ie a physical resource and the requested end to end service. In the case of an ATM based Transport Network which is the current working assumption, the physical resource is an ATM virtual channel (VP/VC) and if a further stage of AAL2 multiplexing is used, the physical resource is an AAL2 connection, defined by the VP/VC and the AAL2 CID. The end to end service is based on the adaptation layer. For data transmission it can be AAL5 if the virtual channel is an ATM VP/VC or SSSAR/SSTED/SSADT if the underlying virtual channel is an AAL2 connection. For a compressed voice application, either AAL5 or SSSAR/SSTED or even a null adaptation layer can be used (ie AAL0 over ATM VP/VC or AAL2 without SSAR/SSTED/SSADT).

NBAP uses the ALCAP protocol to obtain a transport bearer to carry either NBAP signalling or User Plane Frame Protocol streams and negociate the end to end service and multiplexing between Node B and RNC.

The Protocol Structure Mapping on existing Transport Network as ATM, IP, GSM PCM is shown in the following paragraphs :

- **ATM**

In an ATM environment, Virtual Path are manually configured and Virtual Channels are setup using SAAL. The ALCAP protocol based on Qaal2 will be used :

- to create/destroy ATM VC using the reserved signalling link associated with each VP (identified by VC = 5) based on existing SAAL-UNI protocol.
- to create/destroy AAL2 connection associated to a specific VP/VC
- to define the adaptation layer above the virtual channel

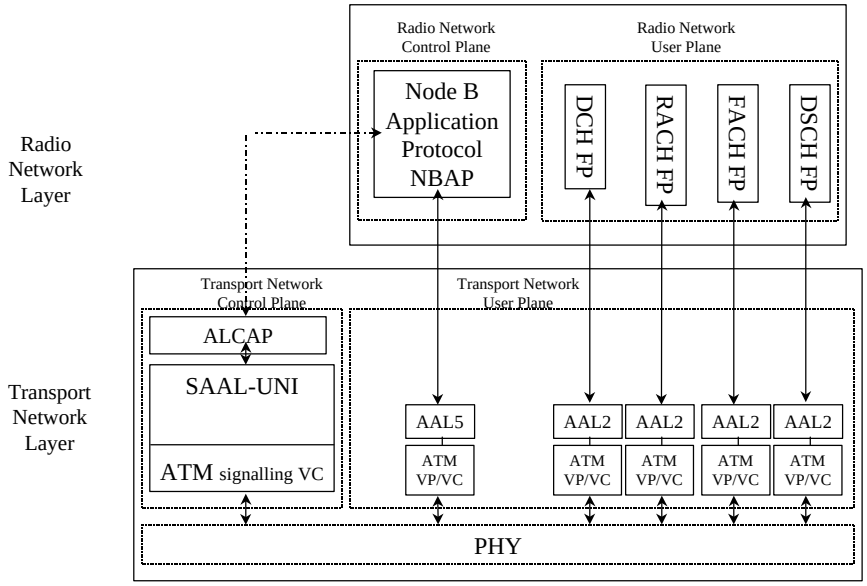

Figure 3 : Mapping of Iub Interface Protocol Structure on an ATM Transport Network

- **IP**

In an IP based network, using typically frame relay over n*64Kbit/s in a WAN environment, channels are allocated on a semi-permanent basis (n*64kbit/s) the data link layer is based on an HDLC protocol and user plane data are transmitted connection less using datagrams. The (IP) transport layer provides either connection oriented (TCP) or connection less service (UDP).
In that case, the Network Control Plane is not used.

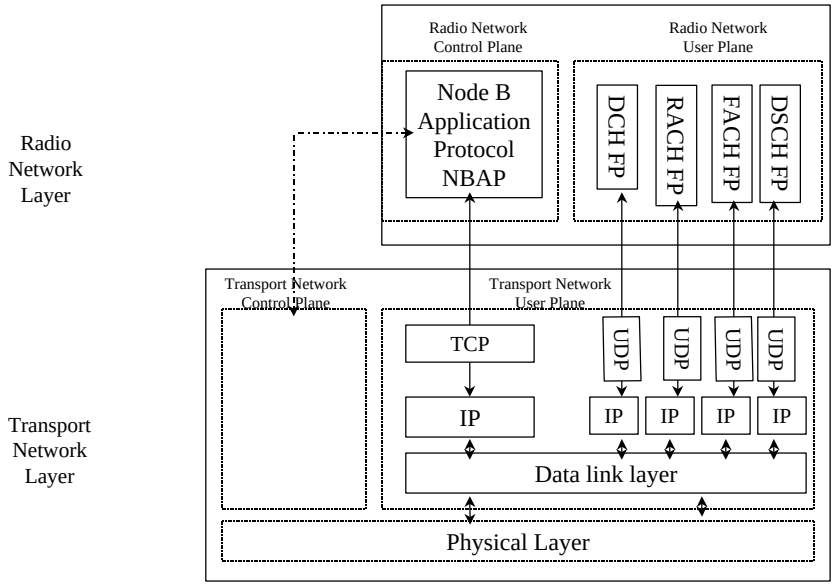

Figure 4 : Mapping of Iub Interface Protocol Structure on an IP based Transport Network

▪ GSM PCM

In a GSM PCM environment as used over the Abis interface, data bearers are 16Kbit/s channels (1/4 of a PCM Time Slot). There are used to transport compressed voice frames (not radio frames) and inband signalling.
The NBAP protocol uses one complete 64Kbit/s PCM time slot and LAPB frames over HDLC. The Network Transport Control Plane is empty since PCM links are established on a semi permanent basis.

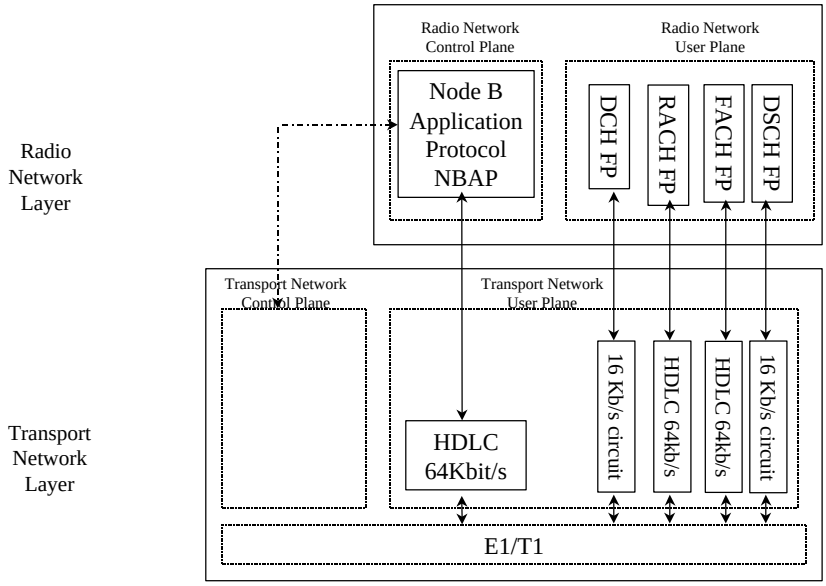

Figure 5 : Mapping of Iub Interface Protocol Structure on a GSM Transport Network

II - PROPOSED PROTOCOL STRUCTURE FOR Iur

The proposed Interface Protocol Structure for Iub clarifies the functional split between the Network User Plane and Network Control Plane. The same principle should be applied to the Iur interface and the corresponding Iur Interface Protocol Structure is:

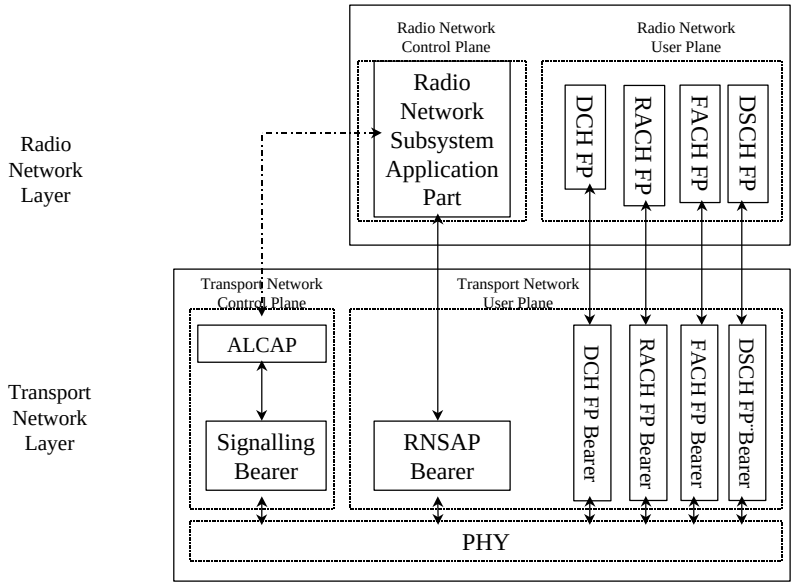

Figure 6 : Iur Interface Protocol Structure

The proposed protocol structure for Iur is totally aligned with the Iub proposition with RNSAP replacing the NBAP protocol.

- **ATM MAPPING FOR Iur :**

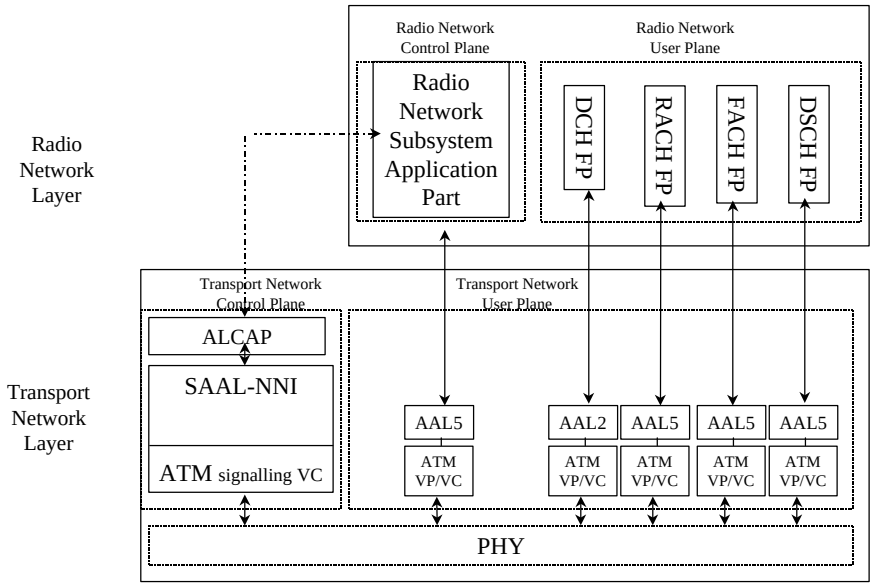

Figure 7 : Mapping of Iur Interface Protocol Structure on an ATM Transport Network

This mapping is similar to the one of Iub, RNSAP replaces NBAP and SAAL-NNI replaces SAAL-UNI. RACH FP, FACH FP and DSCH FP are mapped onto AAL5 bearers (instead of AAL2 bearers in the case of Iub).

PROPOSAL

This contribution has introduced a new model for the Iub Interface Protocol with a clear split between Radio Network and Transport Network functions. The Transport Network plane was split into Control and User Plane. Mapping of this protocol structure on existing transport network technology has been shown.
The same model has been applied also to the Iur Interface Protocol Structure.
It is suggested to accept the following propositions :

Proposition 1 (Iub): replace the existing figure 1 of section 6 by the figure 2 of this contribution and replace the second bullet of the text which describes the transport layer functionality by :
[The Iub interface protocol architecture consists of two functional layers :
1 – Radio Network Layer, defines procedures related to the operation of Node B. The radio network layer consists of a radio network control plane and a radio network user plane.]
*"2 – Transport **Network** layer, defines procedures for establishing physical and logical connections between Node and the RNC. **The transport network layer consist of transport network control plane and transport network user plane**"*

Proposition 2 (Iub): add the text and figure 3 relative to ATM mapping of the protocol structure in a subsection section 6 : Iub Protocol structure called "ATM protocol structure"

Proposition 3 (Iub): add the text and figure 4 and 5 relative to IP and GSM Abis mapping of the protocol structure in an informative annex of S3.30.

Proposition 4 (Iur) : make the corresponding modifications in S3.20 section 6 : "Iur Interface Protocol Structure" to be compliant with S3.30.
a) replace the existing figure 1 of section 6 by figure 6 of this contribution and add a text which describes the transport layer functionality :
"The Iur interface protocol architecture consists of two functional layers :
1 – Radio Network Layer, defines procedures related to the operation between RNS. The radio network layer consists of a radio network control plane and a radio network user plane.
2 – Transport Network layer, defines procedures for establishing physical and logical connections between Node and the RNC. The transport network layer consist of transport network control plane and transport network user plane"
"
b) add the text and figure 7 relative to ATM mapping of the protocol structure in a subsection section 6 : Iur Protocol structure called "ATM protocol structure"
c) make a reference to the informative annex of S3.30 containing the mapping of the protocol structure in case of IP and GSM Abis

REFERENCES

[1] S3.20 v0.0.2, Description of Iur Interface
[2] S3.30 v0.0.2, Description of Iub Interface