

**Agenda Item:** 11  
**Source:** Nokia  
**Title:** I<sub>u</sub> transport: Support of Address Resolution in PVC scenario  
**Document for:** Decision

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## 1 Abstract

This contribution proposes a change to [1]. Based on the argumentation given below it is proposed that the requirement to apply Classical IP and ARP over ATM (CLIP) [2] in ATM PVC environment is removed from the given Technical Specification. Instead of CLIP only the IP datagram encapsulation with local address mapping (via O&M) should be required for associating the IP addresses and their corresponding VCs.

## 2 Discussion

Considering the application of IP over ATM on I<sub>u</sub> interface towards the IP domain the following has been stated in [1].

*"AAL5 shall be used according to I.363.5.*

*AAL5 virtual circuits are used to transport the IP packets across the I<sub>u</sub> interface toward the packet switched domain. Multiple VCs can be used over the interface. There is a one-to-one relationship between the VC and the IP address as required by Classical IP over ATM. An association must be made between a peer node's IP address and a VC. This association can be made using O&M or using ATM Inverse ARP according to Classical IP over ATM.*

*Classical IP over ATM protocols are used to carry the IP packets over the ATM transport network. Classical IP over ATM is specified in IETF RFC 2225. Multiprotocol Encapsulation over AAL5 is specified in IETF RFC 1483."*

The given statement and the related reference [2] leave some questions open regarding the implementation of I<sub>u</sub> interface transport layer. These open questions culminate especially in the requirements for RNC and for 3G-SGSN. It is emphasised that such unspecified issues may endanger the multivendor operability of the I<sub>u</sub> interface. In the following two of such questions are given.

1. *Shall 3G-SGSN, RNC or both of the network elements be able to function as an ARP server?*

This question have a direct impact to the requirements and implementation effort of 3G-SGSN and RNC, respectively.

2. *What is the mechanism to provide fault-tolerant and reliable ARP service for I<sub>u</sub> interface?*

The given reference [1] specifies only a single ARP server within a Logical IP Subnetwork. It is not considered sufficient for UMTS application. In [2] the need for more reliable address resolution service has been recognised.

In the contribution [3] that was used as the basis for the decision to apply CLIP and ARP over ATM there were no arguments given for the application of ARP for ATM PVCs. It was only stated that *"This association can be made using O&M or using ATM Inverse ARP according to Classical IP over ATM."* Considering the potential benefit of ARP in reducing the need for local configuration work (i.e., "using O&M") in the 3G-SGSN and RNC the following is emphasised. The application of PVCs always require local configuration in the corresponding network elements. Any additional work that needs to be done in order to associate a configured PVC to its

corresponding IP address is not any effort compared to the configuration of PVCs themselves. Moreover, the existence of ARP requires at least one additional PVC to be configured for each UMTS network element within the given LIS in order them to communicate with the ARP server.

The primary motivation behind the utilisation of ATM PVCs instead of any signalled connections is the simplicity of the approach, without sacrificing the general efficiency of ATM as the common layer 2 resource. Consequently all unnecessary complexity in implementation or in operation of the ATM PVC based  $I_u$  transport should be avoided. In this respect and based on the other arguments given above Nokia does not see it reasonable to require Address Resolution mechanisms (i.e., ARP/Inv.ARP) in PVC environment on  $I_u$  interface. It is seen sufficient only to use the IP datagram encapsulation into AAL5 PVCs as it has been already stated in [1]. If Switched Virtual Circuits (SVC) are used then the application of [2] is considered a feasible approach.

### 3 Proposal

It is proposed that the application of Classical IP and ARP over ATM [2] in PVC environment shall not be a requirement on the  $I_u$  interface towards the IP domain. Furthermore, only the encapsulation of IP datagram should be applied in the way it has been stated in the current version of [1]. The following modification should be done in chapter 6.1.4:

*AAL5 virtual circuits are used to transport the IP packets across the  $I_u$  interface towards the packet switched domain. Multiple VCs can be used over the interface. There is a one-to-one relationship between the VC and the IP address as required by Classical IP over ATM. An association must be made between a peer node's IP address and a VC. This association can be made using O&M or using ATM Inverse ARP according to Classical IP over ATM. If only semi-Permanent VCs are used then the existence of ARP/Inverse ARP is not required.*

### References

- [1] TS 25.414:  $I_u$  Interface Data Transport and Transport Network Signalling, version 2.0.0, 3GPP TSG RAN WG3.
- [2] Classical IP and ARP over ATM, IETF RFC 2225.
- [3] TSGW3#3(99)276: GTP-U protocol for  $I_u$  User Plane towards the IP domain. Source: Ericsson.