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IP over ATM Working Group's Recommendations for the ATM Forum's Multiprotocol BOF Version 1

Status of this Memo

This memo provides information for the Internet community. This memo does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

1. Abstract

This document represents an initial list of requirements submitted to the ATM Forum's Multiprotocol BOF for the operation of IP over ATM networks as determined by the IETF IP over ATM Working Group and other working groups. This RFC is issued for the benefit of community members. The information contained in this document is accurate as of the date of publication, but is subject to change. Subsequent RFCs will reflect such changes.

The content of this memo was submitted by the IETF Liaison to the ATM Forum as contribution number 94-0954 in the ATM Forum's documentation process on 14 September 1994.

2. Notice

This contribution has been prepared to assist the ATM Forum. This document is offered to the Forum as a basis for discussion between the ATM Forum Multiprotocol BOF and the IETF. The statements are subject to change in form and content after further study and discussion. Specifically, the IETF reserves reserves the right to add to, amend or modify the statements contained herein.

3. Introduction

The following is the charter statement from the Internet Engineering Task Force's (IETF) IP over ATM Working Group (IPATM WG). It is being reproduced here for the benefit of those in the ATM Forum who may not be familiar with it:

"The IP over ATM Working Group will focus on the issues involved in running internetworking protocols over Asynchronous Transfer Mode (ATM) networks. The final goal for the Working Group is to produce

standards for the TCP/IP protocol suite and recommendations which could be used by other internetworking protocol standards (e.g., ISO CLNP and IEEE 802.2 Bridging).

The Working Group will initially develop experimental protocols for encapsulation, multicasting, addressing, address resolution, call set up, and network management to allow the operation of internetwork protocols over an ATM network. The Working Group may later submit these protocols for IETF standardization.

The Working Group will not develop physical layer standards for ATM. These are well covered in other standards groups and do not need to be addressed in this Group.

The Working Group will develop models of ATM internetworking architectures. This will be used to guide the development of specific IP over ATM protocols.

The Working Group will also develop and maintain a list of technical unknowns that relate to internetworking over ATM. These will be used to direct future work of the Working Group or be submitted to other standards or research groups as appropriate.

The Working Group will coordinate its work with other relevant standards bodies (e.g., ANSI T1S1.5) to insure that it does not duplicate their work and that its work meshes well with other activities in this area. The Working Group will select among ATM protocol options (e.g., selection of an adaptation layer) and make recommendations to the ATM standards bodies regarding the requirements for internetworking over ATM where the current ATM standards do not meet the needs of internetworking."

Historically, a large number of IETF IPATM WG participants are employees of companies who are principal members of the ATM Forum. Requirements between the two organizations have been communicated informally by these participants. With the establishment of the ATM Forum’s Multiprotocol BOF activities, it has become prudent now to document IETF requirements in a more formal fashion.

At the July 1994 meeting of the IETF in Toronto, Canada, a request was presented to the IP over ATM Working Group by the ATM Forum Liaison, Drew Perkins, for the working group to prepare a list of requirements as input to the ATM Forum’s Multiprotocol BOF activities. This document is a response to that request.

4. List of Requirements for Consideration

4.1 Standardization & Logistics

- Formal communications between the IETF and the ATM Forum should be made via IETF <> ATM Forum Liaison(s), specific written communications (such as this document), and/or presentations made at official IETF or ATM Forum meetings.

- IETF standards define how the TCP/IP protocol suite is defined, deployed, and carried over specific network technologies, including ATM networks [1][2][8].

- Any formal communications that affect the IETF standards or processes must be made publicly available as the IETF is a public international standards body. Ideally, such communications should be written as Internet Drafts [1], the IETF's equivalent to incoming contributions.

- We invite and encourage ATM Forum members to participate in the IETF standards process. See [1], [2], and [8] for information on how to participate.

4.2 IPv4 Encapsulation

- RFC 1483 [3] and RFC 1577 [4] define how IP is encapsulated and carried over ATM networks. The IPATM WG requests that any ATM Forum Multiprotocol work support these standards as specified, and that any future changes to them be made via the IETF standards process.

4.3 Routing

- RFC 1577 defines the default Logical IP Subnet (LIS) model.

- The IETF Routing over Large Clouds Working Group is developing the Next Hop Resolution Protocol, which allows the incremental optimization of routing (and subnets) by routing datagrams over preferential ATM paths [9].

- The IETF IP over ATM Working Group will be working on the next generation IP over ATM standards after RFC 1577 moves from draft to proposed status. Requirements to the ATM Forum will be forthcoming.

- ATM signaling should give an indication of connection over LAN or WAN and include feedback of time vs byte charging.

4.4 Security

- ATM signaling should support a user information element that is used to convey security and authentication information between IP members and applications. The IETF IPATM WG would like to define the IP specific content of this IE.

4.5 Broadcast and Multicast

- The IPATM WG is currently discussing models of how best to map IP multicast facilities onto ATM facilities. While this work is preliminary, the IETF does support the ATM Forum's currently planned multicasting enhancements, such as leaf-initiated joins and support of multiple multicast congestion management policies. A further list of requirements will be presented at a later time.

4.6 Signaling and Addressing

- The IPATM WG is currently producing a specification for using UNI 3.0 and 3.1 signaling to support RFCs 1483 and 1577. This specification will be published as an informational reference for UNI 3.0 signaling, and as a proposed standard for UNI 3.1 signaling following UNI 3.1's ratification and official publication.

- IPv6 packets will include a Flow ID field intended to support service classes in some way. Until the semantics of this field are fully defined it is hard to say much, but presumably a soft mapping between this and the VC to be used is desirable. A further list of requirements will be presented at a later time.

- IPv6 addresses will be 16 bytes and there will likely be a defined embedding of them inside 20-byte NSAP format. There will also likely be a mapping of US-GOSIP-like NSAPs into IPv6 addresses (deleting the unuseful bytes), but that is still controversial in the IPv6 discussions. A further list of requirements will be presented at a later time.

4.7 Quality of Service, Performance, and Traffic Management

- ATM should support extremely bursty applications with significant elasticity in their bandwidth demands.

- ATM should support elastic applications as defined in RFC-1633 [7] very efficiently. That means enable high bottleneck utilization while keeping delay reasonably bounded (i.e., doubling delay wouldn't be terrible for elastic apps). This should not be at the expense of delay sensitive classes of service.

- ATM should provide a a class of service which strives to cooperate with existing TCP congestion avoidance, thereby explicitly providing support not only for directly ATM-attached and -aware endstations, but also for endstations on LANs (or using LAN Emulation) that are using current TCP implementations and interconnected via ATM-attached bridges and routers.

- Predictive QoS should be supported in addition to guaranteed QoS to support applications which are somewhat tolerant of delay variation and low levels of loss.

- IP uses both point-to-point and point-to-multipoint (future) connections. To satisfy IP's needs an ABR-like service would need to be applicable to both types of connections [6].

- No specification of minimum or maximum bandwidths by the ATM end-systems [6].

- As simple as possible [6].

- Full line-rate transmission over otherwise-idle links [6].

- When end-to-end delay through the network is less than 1 second, the cell loss for AAL5 frames over an ABR-like service should be on the order of 3 in 10**8 cells for 1500 byte frames, or 3 in 10**9 cells for 18 Kbyte frames [6].

5. Security Considerations

Security issues raised in this memo will be addressed by the IETF IP over ATM Working Group and presented in subsequent updates to this memo.

6. Acknowledgement

The basis of this memo is a summary of comments made on the email discussion list of the IP over ATM Working Group. The contribution was reviewed by Drew Perkins and Andy Malis as a sanity check before submission to the ATM Forum.

7. References

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[2] Internet Architecture Board, and Internet Engineering Steering Group, "The Internet Standards Process -- Revision 2", RFC 1602, IAB, IESG, March 1994.

[3] Heinanen, J., "Multiprotocol Encapsulation over ATM Adaptation Layer 5", RFC 1483, Telecom Finland, July 1993.

[4] Laubach, M., "Classical IP and ARP over ATM", RFC 1577, Hewlett-Packard Laboratories, January 1994.

[5] Deering, S., "Host Extensions for IP Multicasting", STD 5, RFC 1112, Stanford University, August 1989.

[6] McCloghrie, K., "Lan-Emulation's Needs for Traffic Management", ATM-Forum/94-0533, ATM Forum, June 1994.

[7] Braden, R., Clark, D., and S. Shenker, "Integrated Services in the Internet Architecture: an Overview", RFC 1633, USC/Information Sciences Institute, MIT, Xerox PARC, June 1994.

[8] Postel, J., Editor, "Internet Official Protocol Standards", STD 1, RFC 1720, USC/Information Sciences Institute, July 1994.

[9] Malis, A., "Routing Over Large Clouds Liaison to the ATM Forum Multiprotocol BOF", ATM-Forum/94-0766, ATM Forum, September 1994.

8. IETF <> ATM Forum Liaison

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