



Summary of the TCP/IP over ATM Fundamentals

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Interaction Goals

- **Issues involved in running IP over ATM**
- **Inefficiencies in TCP/IP over ATM**
- **Current practices**
- **Recommended Readings**

Running the TCP/IP over the ATM: Facts and Issues

- The IP layer in the Internet acts as a Connectionless Network Layer whereas the ATM layer provides a Connection-oriented Network Layer functionality.
- Therefore, when IP layer is made to function atop the ATM layer, then even before a transaction really takes place, an ATM Network Layer connection is established between the Source and the Destination Hosts.

Running the TCP/IP over the ATM ...

- Thereafter, the IP layer takes over and sends independent IP Layer Packets (called IP Packets) over the established path. Naturally, although the ATM requires just a brief Virtual Circuit Number, the IP layer atop it generates IP packets that contain full Source as well as full Destination Address. This arrangement clearly leads to unsolicited overhead. Furthermore, the routing exercise done by the IP as well as the ATM Layer proves a sort of duplication, which adds to this overhead.



Running the TCP/IP over the ATM ...

- The TCP Layer sitting on the top of the IP layer does not know about the ATM layer and therefore assumes that its underlying IP Layer might deliver the packets (at the destination) out of order and instructs its mechanism to ensure that the packets arriving at the host are reordered correctly.

Running the TCP/IP over the ATM ...

- Since this involves duplication of much of the functionality in various layers, undue overheads in terms of connection-establishment / termination, packet-generation / routing / extraction and redundant use of the packet reordering mechanism etc., this arrangement (i.e. TCP / IP over the ATM) is considered inherently inefficient.



Running the TCP/IP over the ATM ...

- If still TCP/IP over ATM is used in certain cases, it is primarily because there exists a huge software base that talks the TCP / IP way and there are a lot of people who are used to it! This must not be misconstrued to mean that acceptable combination of IP over ATM cannot exist.

Recommended Readings:

- S. Keshav: An Engineering Approach to Computer Networking, AWL, 1997.
- A. S. Tanenbaum: Computer Networks, Fourth Edition, PHI, 2006.
- C. Huitema: IPv6, Second Edition, Prentice-Hall PTR, 1998.
- U. D. Black: Computer Networks, Second Edition, PHI, 1993.
- D. Bertsekas and R. Gallager: Computer Networks, Second Edition, PHI, 1992.
- G. R. McClain (Ed.): Handbook of Networking and Connectivity, AP Professional (Academic Press), 1994.

Recommended Readings ...

- RFC 1009 (Requirements for Internet Gateways)
- RFC 1254 (Gateway Congestion Control)
- RFC 1360 (Official Protocol Standards of the Internet Architecture Board)
- RFC 1124 (Policy Issues in Interconnecting Networks)
- RFC 1125 (Policy Requirements for Inter-Administrative Domain Routing)
- RFC 781 (IP Timestamp)
- RFC 791 (IP)
- RFC 815 (IP Datagram Reassembly)
- RFC 1042 (IP over IEEE 802.3)
- RFC 1011 (Official IP)

Recommended Readings ...

- RFC 1883 (IPv6 Specification)
- RFC 1825 (IP Security Architecture)
- RFC 1826 (IP Authentication Header)
- RFC 1827 (IP Encapsulation Security Payload)
- RFC 1828 (IP Authentication using MD5)
- RFC 1175 (FYI : A very useful reference-list on Internetworking related information)
- RFC 1208 (Glossary of Networking Terms)
- Smoot Carl-Mitchell & John S. Quarterman: Practical Internetworking with TCP / IP and UNIX, Addison-Wesley, Reading, 1993. (This book does not really discuss the IPv6. This however, helps the reader to take a look at the pre-IPv6 days and realize the wisdom of evolution of the IP.)

Recommended Readings

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- Larry Hughes: Introduction to Data Communication: A Practical Approach, Narosa Publishers, 1997.
- Prakash C. Gupta: Data Communications, PHI, 1996.
- A. Shah: FDDI: A High Speed Network, PTR Prentice Hall, 1994.
- M. R. Tolhurst (Ed.): Open System Interconnection, Macmillan, 1988.
- William Stallings: Data and Computer Communications, Fifth Edition, PHI, 1998.

Recommended Readings ...

- D. Comer: Internetworking with TCP / IP , Vol..-1, PHI, 1995.
- D. Comer & D. L. Stevens: Internetworking with TCP /IP, Vol.. 2-3, PHI, 1994, 1993.
- W. Buchanan: Advanced Data Communication and Networks, Chapman & Hall, London, 1997.
- Uyles D. Black: TCP / IP & Related Protocols, Second Edition, McGraw-Hill, N. Y., 1995.
- RFC 1519 (CIDR)
- RFC 1997 (BGP community attribute)
- Bassam Hallabi: Internet Routing Architectures, Cisco Press, New Riders Publishing, 1997.
- RFC 904 (Exterior Gateway Protocol)