                  Default IP MTU for use over ATM AAL5

Status of this Memo

   This document specifies an Internet standards track protocol for the
   Internet community, and requests discussion and suggestions for
   improvements.  Please refer to the current edition of the "Internet
   Official Protocol Standards" (STD 1) for the standardization state
   and status of this protocol.  Distribution of this memo is unlimited.

Default Value for IP MTU over ATM AAL5

   Protocols in wide use throughout the Internet, such as the Network
   File System (NFS), currently use large frame sizes (e.g. 8 KB).
   Empirical evidence with various applications over the Transmission
   Control Protocol (TCP) indicates that larger Maximum Transmission
   Unit (MTU) sizes for the Internet Protocol (IP) tend to give better
   performance.  Fragmentation of IP datagrams is known to be highly
   undesirable. [KM87] It is desirable to reduce fragmentation in the
   network and thereby enhance performance by having the IP Maximum
   Transmission Unit (MTU) for AAL5 be reasonably large.  NFS defaults
   to an 8192 byte frame size.  Allowing for RPC/XDR, UDP, IP, and LLC
   headers, NFS would prefer a default MTU of at least 8300 octets.
   Routers can sometimes perform better with larger packet sizes because
   most of the performance costs in routers relate to "packets handled"
   rather than "bytes transferred".  So there are a number of good
   reasons to have a reasonably large default MTU value for IP over ATM
   AAL5.

   RFC 1209 specifies the IP MTU over SMDS to be 9180 octets, which is
   larger than 8300 octets but still in the same range. [RFC-1209] There
   is no good reason for the default MTU of IP over ATM AAL5 to be
   different from IP over SMDS, given that they will be the same
   magnitude.  Having the two be the same size will be helpful in
   interoperability and will also help reduce incidence of IP
   fragmentation.

   Therefore, the default IP MTU for use with ATM AAL5 shall be 9180
   octets.  All implementations compliant and conformant with this
   specification shall support at least the default IP MTU value for use
   over ATM AAL5.

Permanent Virtual Circuits

   Implementations which only support Permanent Virtual Circuits (PVCs)
   will (by definition) not implement any ATM signalling protocol.  Such
   implementations shall use the default IP MTU value of 9180 octets
   unless both parties have agreed in advance to use some other IP MTU
   value via some mechanism not specified here.

Switched Virtual Circuits

   Implementations that support Switched Virtual Circuits (SVCs) MUST
   attempt to negotiate the AAL CPCS-SDU size using the ATM signalling
   protocol.  The industry standard ATM signalling protocol uses two
   different parts of the Information Element named "AAL Parameters" to
   exchange information on the MTU over the ATM circuit being setup
   [ATMF93a].  The Forward Maximum CPCS-SDU Size field contains the
   value over the path from the calling party to the called party.  The
   Backwards Maximum CPCS-SDU Size Identifier field contains the value
   over the path from the called party to the calling party.  The ATM
   Forum specifies the valid values of this identifier as 1 to 65535
   inclusive.  Note that the ATM Forum's User-to-Network-Interface (UNI)
   signalling permits the MTU in one direction to be different from the
   MTU in the opposite direction, so the Forward Maximum CPCS-SDU Size
   Identifier might have a different value from the Backwards Maximum
   CPCS-SDU Size Identifier on the same connection.

   If the calling party wishes to use the default MTU it shall still
   include the "AAL Parameters" information element with the default
   values for the Maximum CPCS-SDU Size as part of the SETUP message of
   the ATM signalling protocol [ATMF93b].  If the calling party desires
   to use a different value than the default, it shall include the "AAL
   Parameters" information element with the desired value for the
   Maximum CPCS-SDU Size as part of the SETUP message of the ATM
   Signalling Protocol.  The called party will respond using the same
   information elements and identifiers in its CONNECT message response
   [ATMF93c].

   If the called party receives a SETUP message containing the "Maximum
   CPCS-SDU Size" in the AAL Parameters information element, it shall
   handle the Forward and Backward Maximum CPCS-SDU Size Identifier as
   follows:

    a) If it is able to accept the ATM MTU values proposed by the
       SETUP message, it shall include an AAL Parameters information
       element in its response.  The Forward and Backwards Maximum
       CPCS-SDU Size fields shall be present and their values shall be
       equal to the corresponding values in the SETUP message.

      b) If it wishes a smaller ATM MTU size than that proposed, then
         it shall set the values of the Maximum CPCS-SDU Size in the AAL
         Parameters information elements equal to the desired value in the
         CONNECT message responding to the original SETUP message.

      c) If the calling endpoint receives a CONNECT message that does
         not contain the AAL Parameters Information Element, but the
         corresponding SETUP message did contain the AAL Parameters
         Information Telement (including the forward and backward CPCS-SDU
         Size fields), it shall clear the call with cause "AAL Parameters
         cannot be supported".

      d) If either endpoint receives a STATUS message with cause
         "Information Element Non-existent or Not Implemented" or cause
         ""Access Information Discarded", and with a diagnostic field
         indicating the AAL Parameters Information Element identifier, it
         shall clear the call with cause "AAL Parameters cannot be
         supported."

      e) If either endpoint receives CPCS-SDUs in excess of the
         negotiated MTU size, it may use IP fragmentation or may clear the
         call with cause "AAL Parameters cannot be supported".  In this
         case, an error has occurred either due to a fault in an end
         system or in the ATM network.  The error should be noted by ATM
         network management for human examination and intervention.

   If the called endpoint incorrectly includes the Forward and Backward
   Maximum CPCS-SDU Size fields in the CONNECT messages (e.g.  because
   the original SETUP message did not include these fields) or it sets
   these fields to an invalid value, then the calling party shall clear
   the call with cause "Invalid Information Element Contents".

Path MTU Discovery Required

   The Path MTU Discovery mechanism is an Internet Standard [RFC-1191]
   and is an important mechanism for reducing IP fragmentation in the
   Internet.  This mechanism is particularly important because new
   subnet ATM uses a default MTU sizes significantly different from
   older subnet technologies such as Ethernet and FDDI.

   In order to ensure good performance throughout the Internet and also
   to permit IP to take full advantage of the potentially larger IP
   datagram sizes supported by ATM, all routers implementations that
   comply or conform with this specification must also implement the IP
   Path MTU Discovery mechanism as defined in RFC-1191 and clarified by
   RFC-1435.  Host implementations should implement the IP Path MTU
   Discovery mechanism as defined in RFC-1191.

Applicability Statement

   The Multiprotocol Encapsulation over ATM AAL5 defined in RFC-1483 is
   not specific to any model of IP and ATM interaction. [RFC-1483]
   Similarly, this specification is general enough to apply to all
   models for use of IP over ATM AAL5.  Use of this specification is
   recommended for all implementatons of IP over ATM AAL5 in order to
   increase interoperability and performance.  This specification does
   not conflict with the Classical IP over ATM specification and may be
   used as a conforming extension to that specification.  [RFC-1577]
   Applicability of this draft is not limited to the Classical IP over
   ATM model.

Security Considerations

   Security issues are not discussed in this memo.

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Acknowledgements

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Author's Address

   Randall J. Atkinson
   Information Technology Division
   Naval Research Laboratory
   Washington, DC 20375-5320
   USA

   EMail: atkinson@itd.nrl.navy.mil