   A Method for the Transmission of IPv6 Packets over Ethernet Networks

Status of this Memo

Introduction

   This memo specifies the frame format for transmission of IPv6 [IPV6]
   packets and the method of forming IPv6 link-local addresses on
   Ethernet networks. It also specifies the content of the
   Source/Target Link-layer Address option used the the Router
   Solicitation, Router Advertisement, Neighbor Solicitation, and
   Neighbor Advertisement messages described in [DISC], when those
   messages are transmitted on an Ethernet.

Maximum Transmission Unit

   The default MTU size for IPv6 packets on an Ethernet is 1500 octets.
   This size may be reduced by a Router Advertisement [DISC] containing
   an MTU option which specifies a smaller MTU, or by manual
   configuration of each node. If a Router Advertisement is received
   with an MTU option specifying an MTU larger than 1500, or larger than
   a manually configured value less than 1500, that MTU option must be
   ignored.

Frame Format

   IPv6 packets are transmitted in standard Ethernet frames. The
   ethernet header contains the Destination and Source ethernet
   addresses and the ethernet type code, which must contain the value
   86DD hexadecimal. The data field contains the IPv6 header followed
   immediately by the payload, and possibly padding octets to meet the
   minimum frame size for Ethernet.

```
    +-------+-------+-------+-------+-------+-------+          ^
    |           Destination Ethernet address    |          |
    +-------+-------+-------+-------+-------+-------+        ethernet
    |            Source Ethernet address         |         header
    +-------+-------+-------+-------+-------+-------+          |
    | 86     DD    |                                          v
    +-------+-------+-------+-------+-------+------+------+
    |             IPv6 header and payload ...             /
    +-------+-------+-------+-------+-------+------+------+
```
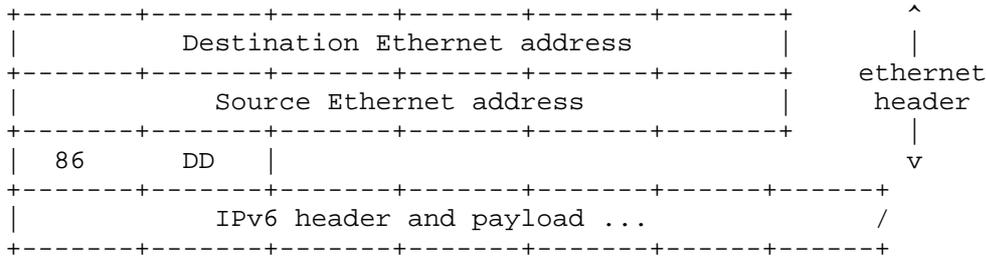
Stateless Autoconfiguration and Link-Local Addresses

   The address token [CONF] for an Ethernet interface is the interface's
   built-in 48-bit IEEE 802 address, in canonical bit order and with the
   octets in the same order in which they would appear in the header of
   an ethernet frame. (The individual/group bit is in the first octet
   and the OUI is in the first three octets.) A different MAC address
   set manually or by software should not be used as the address token.

   An IPv6 address prefix used for stateless autoconfiguration of an
   ethernet interface must be 80 bits in length.

   The IPv6 Link-local address [AARCH] for an Ethernet interface is
   formed by appending the interface's IEEE 802 address to the 80-bit
   prefix FE80::.

```
    +-------+-------+-------+-------+-------+-------+------+------+
    | FE      80      00      00      00      00      00     00  |
    +-------+-------+-------+-------+-------+-------+------+------+
    | 00      00    |            Ethernet Address                |
    +-------+-------+-------+-------+-------+-------+------+------+
```
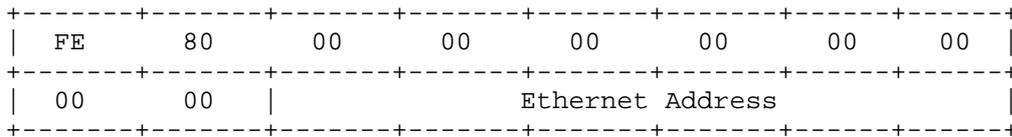
Address Mapping -- Unicast

   The procedure for mapping IPv6 addresses into Ethernet link-layer
   addresses is described in [DISC]. The Source/Target Link-layer
   Address option has the following form when the link layer is
   Ethernet.

```
    +-------+-------+-------+-------+-------+-------+-------+-------+
    | Type  |Length |              Ethernet Address               |
    +-------+-------+-------+-------+-------+-------+-------+-------+
```
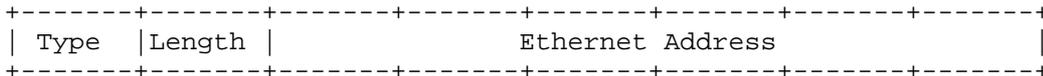
Option fields:

Type   1 for Source Link-layer address.
             2 for Target Link-layer address.

Length   1 (in units of 8 octets).

Ethernet Address
             The 48 bit Ethernet IEEE 802 address, in canonical bit
             order. This is the address the interface currently responds
             to, and may be different from the built-in address used as
             the address token.

Address Mapping -- Multicast

   An IPv6 packet with a multicast destination address DST is
   transmitted to the Ethernet multicast address whose first two octets
   are the value 3333 hexadecimal and whose last four octets are the
   last four octets of DST, ordered from more to least significant.

```
            +-------+-------+-------+-------+-------+-------+
            |   33  |   33  | DST13 | DST14 | DST15 | DST16 |
            +-------+-------+-------+-------+-------+-------+
```

Security Considerations

   Security issues are not discussed in this memo.

References

   [AARCH] Hinden, R., and S. Deering, "IP Version 6 Addressing
           Architecture", RFC 1884, December 1995.

   [CONF] Thomson, S., and T. Narten, "IPv6 Stateless Address
          Autoconfiguration", RFC 1971, August 1996.

   [DISC] Narten, T., Nordmark, E., and W. Simpson, "Neighbor Discovery
          for IP Version 6 (IPv6)", RFC 1970, August 1996.

   [IPV6] Deering, S., and R. Hinden, "Internet Protocol, Version 6
          (IPv6) Specification", RFC 1883, December 1995.

Author's Address

    Matt Crawford
    Fermilab MS 368
    PO Box 500
    Batavia, IL 60510
    USA

    Phone: +1 708 840-3461
    EMail: crawdad@fnal.gov