Use of the IEEE assigned Organizationally Unique Identifier with ANSI/IEEE Std 802-2001 Local and Metropolitan Area Networks

General

If you have an 3-octet IEEE assigned Organizationally Unique Identifier (OUI), that OUI can be used to generate Universal LAN MAC addresses and Protocol Identifiers per ANSI/IEEE Std 802*, for use in Local and Metropolitan Area Network applications.

Each OUI assignment reserves a block of each derivative identifier (i.e., Universal LAN MAC Addresses or Protocol Identifiers).

ANSI/IEEE Std 802 specifies binary and hexadecimal representations for OUIs, LAN MAC Addresses and Protocol Identifiers; the hexadecimal representations are the same as that used for assigning OUIs.

Universal Addresses

A Universal Address is a sequence of six octets. The first three take the values of the three octets of the OUI in order. The last three octets are administered by the assignee. The binary representation of an address is formed by taking each octet in order and expressing it as a sequence of eight bits, least significant bit (lsb) to most significant bit (msb), left to right.

For example, the OUI AC - DE - 48 could be used to generate the address:

AC-DE-48-00-00-80

which has the binary representation:

```
first octet      second octet     third octet
of OUI           of OUI           of OUI

0011 0101        0111 1011        0001 0010        0000 0000        0000 0000        0000 0001
 |       |        |       |        |       |        |       |        |       |        |       |
lsb     msb      lsb     msb      lsb     msb      lsb     msb      lsb     msb      lsb     msb
 C       A        E       D        8       4        0       0        0       0        0       8
```

The first (leftmost) bit in the binary representation is the I/G Address Bit. If set to 0 as above, it indicates an individual address. It may be set to 1 in an address allocated by the assignee to indicate that that address is a group address.

For example, the OUI above could be used to generate the Group Address:

```
                    AD-DE-48-00-00-80
1011 0101   0111 1011   0001 0010   0000 0000   0000 0000   0000 0001
|
I/G Address Bit
 D    A    E    D    8    4    0    0    0    0    0    8
```

The order of bit transmission of a MAC address field is that of the binary representation with the leftmost bit as the first bit transmitted.

```
     1011 0101   0111 1011   0001 0010   0000 0000   0000 0000   0000 0001
     | |                                                                  |
     | next bit transmitted                                               |
first bit transmitted                                        last bit transmitted
```

Protocol Identifiers

ANSI/IEEE Std 802 provides for the use of Protocol Identifiers in conjunction with the SNAP/SAP reserved LLC address. A Protocol Identifier is defined as a sequence of five octets. The first three octets take the values of the three octets of the OUI in order; the following two octets are administered by the OUI assignee. The hexadecimal representation of the Protocol Identifier consists of the hexadecimal values of the five octets in order, separated by hyphens, in the order transmitted by the network application, left to right.

For example, the OUI AC - DE - 48 could be used to generate the Protocol Identifier:

```
          AC-DE-48-00--80
            |            |
   first octet          last octet
  transmitted          transmitted
```

Bit Transmission Ordering and Different MACs

The bit transmission of data octets for IEEE 802.3 (ISO 8802-3) and IEEE 802.4 (ISO 8802-4) LAN media occurs least significant bit first. Consequently, the bit transmission order of the OUI component of a Protocol Identifier carried in the data field of a MAC frame is the same as that of the OUI components of the frame's MAC address fields.

The bit transmission of data octets for IEEE 802.5 (ISO/IEC 8802-5) and IEEE 802.6 (ISO/IEC DIS 8802-6) LAN and MAN media occurs most significant bit first, although the bit transmission order of the MAC Address fields is as described above. This leads to a difference in the encoding of the OUI in these two parts of the frame, the bit positions within each octet appearing reversed as between the address and data fields. For further explanation and examples see ANSI/IEEE 802.

Address Administration

The OUI referenced in your IEEE Registration Authority Assignment letter has been described in previous correspondence as an integral part of a 48-Bit LAN globally assigned address block.

An OUI assignment allows the assignee to generate approximately 16 million addresses, by varying the last three octets. IEEE intends not to assign another OUI to any part of your company until you have consumed, in product, the preponderance (more than 90%) of this block of potential addresses. It is incumbent upon your company administration to ensure that large portions of the address block are not left unused in manufacturing facilities.

The method that an assignee uses to ensure that no two of its devices carry the same address will, of course, depend on the assignment or manufacturing process, the nature of the organization, and the organization's philosophy. However, the users of networks worldwide expect to have unique addresses. The ultimate responsibility for assuring that user expectations and requirements are met, therefore, lies with the organization offering such devices.

Use with FDDI LANs

ANSI/IEEE Std 802 LAN MAC Addresses and Protocol Identifiers are also used in ISO 9314-2: 1989; Information processing system -- Fibre Distributed Data Interface. Part 2: FDDI Token Ring Media Access Control (MAC). Since FDDI LANs may be connected to IEEE 802 LANs, each value assigned to Individual Addresses and additional Protocol Identifiers should be unique.

The bit transmission ordering conventions of the FDDI MAC follow those of IEEE 802.5. (FDDI information as transmitted on the physical media is encoded, or in some cases scrambled. However, the transmitted MAC addresses and data can be visualized as described above, since all coding and scrambling is performed within the Physical layer and is transparent to the MAC and LLC sublayers).

** ANSI/IEEE STD 802-2001 Local and Metropolitan Area Networks Tutorial Rev. Nov02*