Guidelines for Fibre Channel Use of the Organizationally Unique Identifier (OUI)

Overview

Fibre Channel standards support several identifier formats that incorporate IEEE OUI values. These are summarized in table 1.

Table 1 — Fibre Channel identifiers using OUI

NAA Type	NAA Code	Size of identifier	Reference
NAA IEEE 48-bit	1h	8 bytes	table 4
NAA IEEE Extended	2h	8 bytes	table 5
NAA IEEE Registered	5h	8 bytes	table 6
NAA IEEE Registered Extended	6h	16 bytes	table 7
NAA EUI-64 Mapped	Ch, Dh, Eh, Fh	8 bytes	table 8

OUI-Based IEEE Formats Used by Fibre Channel

The Universal LAN Address (ULA or EUI-48) format, shown in table 2, is defined in Use of the IEEE assigned Organizationally Unique Identifier with ANSI/IEEE Std 802 Local and Metropolitan Area Networks. This format is used by the FC-FS-2 NAA IEEE 48-bit and NAA IEEE Extended Name_Identifier formats.

Table 2 — ULA (i.e., EUI-48) format

Byte/Bit	7	6	5	4	3	2	1	0
0	(MSB)							
1	IEEE OUI							
2								(LSB)
3	(MSB)							
4	VENDOR-SPECIFIC EXTENSION IDENTIFIER							
5								(LSB)

Bit 1 of byte 0, which serves as the universally/locally administered address bit, is set to zero.

Bit 0 of byte 0, which serves as the individual/group address bit, is set to zero.

The EUI-64 format, shown in table 3, is defined in Guidelines for 64-bit Global Identifier (EUI-64). This format is used by the FC-FS-2 NAA EUI-64 mapped Name_Identifier formats.

Table 3 — EUI-64 format

Byte/Bit	7	6	5	4	3	2	1	0
0	(MSB)							
1	IEEE OUI							
2								(LSB)
3	(MSB)							
	VENDOR-SPECIFIC EXTENSION IDENTIFIER							
7								(LSB)

Bit 1 of byte 0, which serves as the universally/locally administered address bit, is set to zero.

Bit 0 of byte 0, which serves as the individual/group address bit, is set to zero.

Name_Identifier Formats

Name_Identifiers are defined in FC-FS-2 and are used to identify Fibre Channel entities (e.g., Nx_Ports, Nodes, Fx_Ports, E_Ports, B_Ports, Switches, and Fabrics). Name_Identifiers are used in several protocols specified in Fibre Channel standards. Name_Identifiers are **Network Address Authority (**NAA) format identifiers that may include IEEE OUIs. FC-FS-2 uses the term Company_ID as a synonym for OUI.

The NAA IEEE 48-bit address format is shown in table 4.

Table 4 — NAA IEEE 48-bit address format

Byte/Bit	7	6	5	4	3	2	1	0
0	NAA (1h)				0h			
1	00h							
2								
	ULA (see table 2)							
7								

Bit 1 of byte 2, which serves as the universally/locally administered address bit, is always set to zero.

Bit 0 of byte 2, which serves as the individual/group address bit, is always set to zero.

The NAA IEEE Extended format is shown in table 5.

Table 5 — NAA IEEE Extended format

Byte/Bit	7	6	5	4	3	2	1	0
0	NAA (2h)				(MSB)			
1	VENDOR-SPECIFIC IDENTIFIER							(LSB)
2								
	ULA (see table 2)							
7								

Bit 1 of byte 2, which serves as the universally/locally administered address bit, is always set to zero.

Bit 0 of byte 2, which serves as the individual/group address bit, is always set to zero.

The NAA IEEE Registered format is shown in table 6.

Table 6 — NAA IEEE Registered format

Byte/Bit	7	6	5	4	3	2	1	0
0	NAA (5h)				(MSB)			
1	IEEE OUI							
2								
3				(LSB)	(MSB)			
4	VENDOR-SPECIFIC IDENTIFIER							
7								(LSB)

Bit 5 of byte 1, which serves as the universally/locally administered address bit, is always set to zero.

Bit 4 of byte 1, which serves as the individual/group address bit, is always set to zero.

The NAA IEEE Registered Extended format is shown in table 7.

Table 7 — NAA IEEE Registered Extended format

Byte/Bit	7	6	5	4	3	2	1	0
0	NAA (6h)				(MSB)			
1	IEEE OUI							
2								
3				(LSB)	(MSB)			
4	VENDOR-SPECIFIC IDENTIFIER							
7								(LSB)
8	(MSB)							
	VENDOR-SPECIFIC IDENTIFIER EXTENSION							
15								(LSB)

Bit 5 of byte 1, which serves as the universally/locally administered address bit, is always set to zero.

Bit 4 of byte 1, which serves as the individual/group address bit, is always set to zero.

The NAA EUI-64 Mapped format is shown in table 8.

Table 8 — NAA EUI-64 Mapped format

Byte/Bit	7	6	5	4	3	2	1	0
0	11b		IEEE OUI (bits 23 to 18)					
1	IEEE OUI (bits 15 to 8)							
2	IEEE OUI (bits 7 to 0)							
3	(MSB)							
	VENDOR-SPECIFIC IDENTIFIER							
7								(LSB)

Bits 7-4 of byte 0 are also interpreted as the NAA, which may take on value Ch, Dh, Eh, or Fh, depending on bits 23 and 22 of the IEEE OUI from EUI-64 (see table 3) that is being mapped.

The IEEE OUI is the IEEE OUI from the EUI-64 that is being mapped, with the following modifications:

a) bit 17 of the IEEE OUI from EUI-64 (see table 3) that is being mapped, which serves as the universally/locally administered address bit, is assumed to be set to zero and is omitted; and
b) bit 16 of the IEEE OUI from EUI-64 (see table 3) that is being mapped, which serves as the individual/group address bit, is assumed to be set to zero and is omitted.

VENDOR-SPECIFIC IDENTIFIER is the vendor specific identifier from EUI-64 (see table 3) that is being mapped.

Examples

Assume that a manufacturer's IEEE-assigned OUI value is ACDE48h.

The NAA IEEE 48-bit address identifier, assuming a vendor-specific extension identifier of 234567h, is 1000ACDE48234567h, whose byte and bit representations are as follows:

```
addr+0    addr+1    addr+2    addr+3    addr+4    addr+5    addr+6    addr+7
  10        00        AC        DE        48        23        45        67     bytes
00010000 00000000 10101100 11011110 01001000 00100011 01000101 01100111  bits

    Most significant byte                                Least significant byte
Most significant bit                                         Least significant bit
```

The NAA IEEE Extended identifier, assuming a vendor-specific extension identifier of 234567h and a vendor-specific identifier of 898h, is 2898ACDE48234567h, whose byte and bit representations are as follows:

```
addr+0    addr+1    addr+2    addr+3    addr+4    addr+5    addr+6    addr+7
  10        00        AC        DE        48        23        45        67     bytes
00010000 00000000 10101100 11011110 01001000 00100011 01000101 01100111  bits

    Most significant byte                                Least significant byte
Most significant bit                                         Least significant bit
```

The NAA IEEE Registered identifier, assuming a vendor-specific identifier of 234567898h, is 5ACDE48234567898h, whose byte and bit representations are as follows:

```
addr+0    addr+1    addr+2    addr+3    addr+4    addr+5    addr+6    addr+7
  5A        CD        E4        82        34        56        78        98     bytes
01011010 11001101 11100100 10000010 00110100 01010110 01111000 10011000 bits

    Most significant byte                                Least significant byte
Most significant bit                                         Least significant bit
```

The NAA IEEE Registered Extended identifier, assuming a vendor-specific identifier of 234567898h and a vendor-specific identifier extension of FEDCBA9876543210h, is 6ACDE48234567898FEDCBA9876543210h, whose byte and bit representations are as follows:

```
addr+0   addr+1   addr+2   addr+3   addr+4   addr+5   addr+6   addr+7
  6A       CD       E4       82       34       56       78       98     bytes
01101010 11001101 11100100 10000010 00110100 01010110 01111000 10011000 bits

    Most significant byte
Most significant bit
```

```
addr+8   addr+9   addr+A   addr+B   addr+C   addr+D   addr+E   addr+F
  FE       DC       BA       98       76       54       32       10     bytes
11111110 11011100 10111010 10011000 01110110 01010100 00110010 00010000 bits

                                                  Least significant byte
                                                       Least significant bit
```

The NAA EUI-64 Mapped identifier obtained from the EUI-64 value ACDE48234567ABCDh is EBDE48234567ABCDh, whose byte and bit representations are as follows:

```
addr+0   addr+1   addr+2   addr+3   addr+4   addr+5   addr+6   addr+7
  EB       DE       48       23       45       67       AB       CD     hex
11101011 11011110 01001000 00100011 01000101 01100111 10101011 11001101  bits

    Most significant byte                                 Least significant byte
Most significant bit                                           Least significant bit
```

References

Fibre Channel standards:

- ISO/IEC 14165-252, Fibre Channel Framing and Signaling-2 (FC-FS-2), ANSI INCITS 424-2006.

Fibre Channel standards are developed by the INCITS T11 committee. Questions about this tutorial may be directed to the T11.3 committee at t11_3@mail.t11.org.

Fibre Channel standards are published by ANSI and ISO/IEC. To obtain copies of these documents, contact Global Engineering at 15 Inverness Way, East Englewood, CO 80112-5704; phone: 800-854-7179; fax: 303-792-2192 or visit http://www.incits.org.

Other Documents:

Use of the IEEE assigned Organizationally Unique Identifier with ANSI/IEEE Std 802 Local and Metropolitan Area Networks by the IEEE Standards Association.

Guidelines for 64-bit Global Identifier (EUI-64) Registration Authority by the IEEE Standards Association.

INCITS 470-2011 FC-FS-3 Standard