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Rubrique /assignments/ethernet-numbers

ETHER TYPES

(last updated 13 March 2006)

Many of the networks of all classes are Ethernets (10Mb) or Experimental Ethernets (3Mb). These systems use a message "type" field in much the same way the ARPANET uses the "link" field.

If you need an Ether Type, contact:

IEEE Registration Authority
IEEE Standards Department
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Piscataway, NJ 08854
Phone +1 732 562 3813
Fax: +1 732 562 1571
Email: <ieee-registration-authority@ieee.org>
<http://standards.ieee.org/regauth/index.html>

The following list of EtherTypes is contributed unverified information from various sources. Another list of EtherTypes is maintained by Michael A. Patton and is accessible at:

<[URL:http://www.cavebear.com/CaveBear/Ethernet/](http://www.cavebear.com/CaveBear/Ethernet/)>
<[URL:ftp://ftp.cavebear.com/pub/Ethernet-codes](ftp://ftp.cavebear.com/pub/Ethernet-codes)>

Assignments:

Ethernet		Exp. Ethernet		Description	References
-----	-----	-----	-----	-----	-----
decimal	Hex	decimal	octal		
0000	0000-05DC	-	-	IEEE802.3 Length Field	[XEROX]
0257	0101-01FF	-	-	Experimental	[XEROX]
0512	0200	512	1000	XEROX PUP (see 0A00)	[8,XEROX]
0513	0201	-	-	PUP Addr Trans (see 0A01)	[XEROX]
	0400			Nixdorf	[XEROX]
1536	0600	1536	3000	XEROX NS IDP	[133,XEROX]
	0660			DLOG	[XEROX]
	0661			DLOG	[XEROX]
2048	0800	513	1001	Internet IP (IPv4)	[IANA]
2049	0801	-	-	X.75 Internet	[XEROX]
2050	0802	-	-	NBS Internet	[XEROX]
2051	0803	-	-	ECMA Internet	[XEROX]

2052	0804	-	-	Chaosnet	[XEROX]
2053	0805	-	-	X.25 Level 3	[XEROX]
2054	0806	-	-	ARP	[IANA]
2055	0807	-	-	XNS Compatability	[XEROX]
2056	0808	-	-	Frame Relay ARP	[RFC1701]
2076	081C	-	-	Symbolics Private	[DCP1]
2184	0888-088A	-	-	Xyplex	[XEROX]
2304	0900	-	-	Ungermann-Bass net debugr	[XEROX]
2560	0A00	-	-	Xerox IEEE802.3 PUP	[XEROX]
2561	0A01	-	-	PUP Addr Trans	[XEROX]
2989	0BAD	-	-	Banyan VINES	[XEROX]
2990	0BAE	-	-	VINES Loopback	[RFC1701]
2991	0BAF	-	-	VINES Echo	[RFC1701]
4096	1000	-	-	Berkeley Trailer nego	[XEROX]
4097	1001-100F	-	-	Berkeley Trailer encap/IP	[XEROX]
5632	1600	-	-	Valid Systems	[XEROX]
16962	4242	-	-	PCS Basic Block Protocol	[XEROX]
21000	5208	-	-	BBN Simnet	[XEROX]
24576	6000	-	-	DEC Unassigned (Exp.)	[XEROX]
24577	6001	-	-	DEC MOP Dump/Load	[XEROX]
24578	6002	-	-	DEC MOP Remote Console	[XEROX]
24579	6003	-	-	DEC DECNET Phase IV Route	[XEROX]
24580	6004	-	-	DEC LAT	[XEROX]
24581	6005	-	-	DEC Diagnostic Protocol	[XEROX]
24582	6006	-	-	DEC Customer Protocol	[XEROX]
24583	6007	-	-	DEC LAVC, SCA	[XEROX]
24584	6008-6009	-	-	DEC Unassigned	[XEROX]
24586	6010-6014	-	-	3Com Corporation	[XEROX]
25944	6558	-	-	Trans Ether Bridging	[RFC1701]
25945	6559	-	-	Raw Frame Relay	[RFC1701]
28672	7000	-	-	Ungermann-Bass download	[XEROX]
28674	7002	-	-	Ungermann-Bass dia/loop	[XEROX]
28704	7020-7029	-	-	LRT	[XEROX]
28720	7030	-	-	Proteon	[XEROX]
28724	7034	-	-	Cabletron	[XEROX]
32771	8003	-	-	Cronus VLN	[131,DT15]
32772	8004	-	-	Cronus Direct	[131,DT15]
32773	8005	-	-	HP Probe	[XEROX]
32774	8006	-	-	Nestar	[XEROX]
32776	8008	-	-	AT&T	[XEROX]
32784	8010	-	-	Excelan	[XEROX]
32787	8013	-	-	SGI diagnostics	[AXC]
32788	8014	-	-	SGI network games	[AXC]
32789	8015	-	-	SGI reserved	[AXC]
32790	8016	-	-	SGI bounce server	[AXC]
32793	8019	-	-	Apollo Domain	[XEROX]
32815	802E	-	-	Tymshare	[XEROX]
32816	802F	-	-	Tigan, Inc.	[XEROX]
32821	8035	-	-	Reverse ARP	[48,JXM]
32822	8036	-	-	Aeonic Systems	[XEROX]
32824	8038	-	-	DEC LANBridge	[XEROX]
32825	8039-803C	-	-	DEC Unassigned	[XEROX]
32829	803D	-	-	DEC Ethernet Encryption	[XEROX]
32830	803E	-	-	DEC Unassigned	[XEROX]
32831	803F	-	-	DEC LAN Traffic Monitor	[XEROX]
32832	8040-8042	-	-	DEC Unassigned	[XEROX]
32836	8044	-	-	Planning Research Corp.	[XEROX]

32838	8046	-	-	AT&T	[XEROX]
32839	8047	-	-	AT&T	[XEROX]
32841	8049	-	-	ExperData	[XEROX]
32859	805B	-	-	Stanford V Kernel exp.	[XEROX]
32860	805C	-	-	Stanford V Kernel prod.	[XEROX]
32861	805D	-	-	Evans & Sutherland	[XEROX]
32864	8060	-	-	Little Machines	[XEROX]
32866	8062	-	-	Counterpoint Computers	[XEROX]
32869	8065	-	-	Univ. of Mass. @ Amherst	[XEROX]
32870	8066	-	-	Univ. of Mass. @ Amherst	[XEROX]
32871	8067	-	-	Veeco Integrated Auto.	[XEROX]
32872	8068	-	-	General Dynamics	[XEROX]
32873	8069	-	-	AT&T	[XEROX]
32874	806A	-	-	Autophon	[XEROX]
32876	806C	-	-	ComDesign	[XEROX]
32877	806D	-	-	Computgraphic Corp.	[XEROX]
32878	806E-8077	-	-	Landmark Graphics Corp.	[XEROX]
32890	807A	-	-	Matra	[XEROX]
32891	807B	-	-	Dansk Data Elektronik	[XEROX]
32892	807C	-	-	Merit Internodal	[HWB]
32893	807D-807F	-	-	Vitalink Communications	[XEROX]
32896	8080	-	-	Vitalink TransLAN III	[XEROX]
32897	8081-8083	-	-	Counterpoint Computers	[XEROX]
32923	809B	-	-	Appletalk	[XEROX]
32924	809C-809E	-	-	Datability	[XEROX]
32927	809F	-	-	Spider Systems Ltd.	[XEROX]
32931	80A3	-	-	Nixdorf Computers	[XEROX]
32932	80A4-80B3	-	-	Siemens Gammasonics Inc.	[XEROX]
32960	80C0-80C3	-	-	DCA Data Exchange Cluster	[XEROX]
32964	80C4	-	-	Banyan Systems	[XEROX]
32965	80C5	-	-	Banyan Systems	[XEROX]
32966	80C6	-	-	Pacer Software	[XEROX]
32967	80C7	-	-	Applitek Corporation	[XEROX]
32968	80C8-80CC	-	-	Intergraph Corporation	[XEROX]
32973	80CD-80CE	-	-	Harris Corporation	[XEROX]
32975	80CF-80D2	-	-	Taylor Instrument	[XEROX]
32979	80D3-80D4	-	-	Rosemount Corporation	[XEROX]
32981	80D5	-	-	IBM SNA Service on Ether	[XEROX]
32989	80DD	-	-	Varian Associates	[XEROX]
32990	80DE-80DF	-	-	Integrated Solutions TRFS	[XEROX]
32992	80E0-80E3	-	-	Allen-Bradley	[XEROX]
32996	80E4-80F0	-	-	Datability	[XEROX]
33010	80F2	-	-	Retix	[XEROX]
33011	80F3	-	-	AppleTalk AARP (Kinetics)	[XEROX]
33012	80F4-80F5	-	-	Kinetics	[XEROX]
33015	80F7	-	-	Apollo Computer	[XEROX]
33023	80FF-8103	-	-	Wellfleet Communications	[XEROX]
33031	8107-8109	-	-	Symbolics Private	[XEROX]
33072	8130	-	-	Hayes Microcomputers	[XEROX]
33073	8131	-	-	VG Laboratory Systems	[XEROX]
33074	8132-8136	-	-	Bridge Communications	[XEROX]
33079	8137-8138	-	-	Novell, Inc.	[XEROX]
33081	8139-813D	-	-	KTI	[XEROX]
	8148			Logicraft	[XEROX]
	8149			Network Computing Devices	[XEROX]
	814A			Alpha Micro	[XEROX]
33100	814C	-	-	SNMP	[JKR1]

814D			BIIN	[XEROX]
814E			BIIN	[XEROX]
814F			Technically Elite Concept	[XEROX]
8150			Rational Corp	[XEROX]
8151-8153			Qualcomm	[XEROX]
815C-815E			Computer Protocol Pty Ltd	[XEROX]
8164-8166			Charles River Data System	[XEROX]
817D			XTP	[XEROX]
817E			SGI/Time Warner prop.	[XEROX]
8180			HIPPI-FP encapsulation	[XEROX]
8181			STP, HIPPI-ST	[XEROX]
8182			Reserved for HIPPI-6400	[XEROX]
8183			Reserved for HIPPI-6400	[XEROX]
8184-818C			Silicon Graphics prop.	[XEROX]
818D			Motorola Computer	[XEROX]
819A-81A3			Qualcomm	[XEROX]
81A4			ARAI Bunkichi	[XEROX]
81A5-81AE			RAD Network Devices	[XEROX]
81B7-81B9			Xyplex	[XEROX]
81CC-81D5			Apricot Computers	[XEROX]
81D6-81DD			Artisoft	[XEROX]
81E6-81EF			Polygon	[XEROX]
81F0-81F2			Comsat Labs	[XEROX]
81F3-81F5			SAIC	[XEROX]
81F6-81F8			VG Analytical	[XEROX]
8203-8205			Quantum Software	[XEROX]
8221-8222			Ascom Banking Systems	[XEROX]
823E-8240			Advanced Encryption System	[XEROX]
827F-8282			Athena Programming	[XEROX]
8263-826A			Charles River Data System	[XEROX]
829A-829B			Inst Ind Info Tech	[XEROX]
829C-82AB			Taurus Controls	[XEROX]
82AC-8693			Walker Richer & Quinn	[XEROX]
8694-869D			Idea Courier	[XEROX]
869E-86A1			Computer Network Tech	[XEROX]
86A3-86AC			Gateway Communications	[XEROX]
86DB			SECTRA	[XEROX]
86DE			Delta Controls	[XEROX]
86DD			IPv6	[IANA]
34543	86DF	-	-	ATOMIC [Postel]
	86E0-86EF			Landis & Gyr Powers [XEROX]
	8700-8710			Motorola [XEROX]
34667	876B	-	-	TCP/IP Compression [RFC1144]
34668	876C	-	-	IP Autonomous Systems [RFC1701]
34669	876D	-	-	Secure Data [RFC1701]
	880B			PPP [IANA]
	8847			MPLS Unicast [Rosen]
	8848			MPLS Multicast [Rosen]
	8A96-8A97			Invisible Software [XEROX]
36864	9000	-	-	Loopback [XEROX]
36865	9001	-	-	3Com(Bridge) XNS Sys Mgmt [XEROX]
36866	9002	-	-	3Com(Bridge) TCP-IP Sys [XEROX]
36867	9003	-	-	3Com(Bridge) loop detect [XEROX]
65280	FF00	-	-	BBN VITAL-LanBridge cache [XEROX]
	FF00-FF0F			ISC Bunker Ramo [XEROX]
65535	FFFF	-	-	Reserved [RFC1701]

The standard for transmission of IP datagrams over Ethernets and Experimental Ethernets is specified in [RFC894] and [RFC895] respectively.

NOTE: Ethernet 48-bit address blocks are assigned by the IEEE.

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ETHERNET VENDOR ADDRESS COMPONENTS or ORGANIZATIONALLY UNIQUE IDENTIFIERS

Ethernet hardware addresses are 48 bits, expressed as 12 hexadecimal digits (0-9, plus A-F, capitalized). These 12 hex digits consist of the first/left 6 digits (which should match the vendor of the Ethernet interface within the station) and the last/right 6 digits which specify the interface serial number for that interface vendor.

These high-order 3 octets (6 hex digits) are also known as the Organizationally Unique Identifier or OUI.

Ethernet addresses might be written unhyphenated (e.g., 123456789ABC), or with one hyphen (e.g., 123456-789ABC), but should be written hyphenated by octets (e.g., 12-34-56-78-9A-BC).

These addresses are physical station addresses, not multicast nor broadcast, so the second hex digit (reading from the left) will be even, not odd.

At present, it is not clear how the IEEE assigns Ethernet block addresses. Whether in blocks of 2^{24} or 2^{25} , and whether multicasts are assigned with that block or separately. A portion of the vendor block address is reportedly assigned serially, with the other portion intentionally assigned randomly. If there is a global algorithm for which addresses are designated to be physical (in a chipset) versus logical (assigned in software), or globally-assigned versus locally-assigned addresses, some of the known addresses do not follow the scheme (e.g., AA0003; 02xxxx).

Another list of Ethernet vendor address components is maintained by Michael A. Patton and is accessible at:

<URL:<http://www.cavebear.com/CaveBear/Ethernet/vendor.html>>
<URL:<ftp://ftp.cavebear.com/pub/Ethernet-codes>>
<URL:<gopher://ftp.cavebear.com/00/pub/Ethernet-codes>>

00000C Cisco
00000E Fujitsu
00000F NeXT

000010 Sytek
00001D Cabletron
000020 DIAB (Data Intdustrier AB)
000022 Visual Technology
00002A TRW
000032 GPT Limited (reassigned from GEC Computers Ltd)
00005A S & Koch
00005E IANA
000065 Network General
00006B MIPS
000077 Interphase Corporation
00007A Ardent
000080 Cray Communications A/S
000089 Cayman Systems Gatorbox
000093 Proteon
00009F Ameristar Technology
0000A2 Wellfleet
0000A3 Network Application Technology
0000A6 Network General (internal assignment, not for products)
0000A7 NCD X-terminals
0000A9 Network Systems
0000AA Xerox Xerox machines
0000B3 CIMLinc
0000B7 Dove Fastnet
0000BC Allen-Bradley
0000C0 Western Digital
0000C5 Farallon phone net card
0000C6 HP Intelligent Networks Operation (formerly Eon Systems)
0000C8 Altos
0000C9 Emulex Terminal Servers
0000D0 Develcon
0000D7 Dartmouth College (NED Router)
0000D8 3Com? Novell? PS/2
0000DD Gould
0000DE Unigraph
0000E2 Acer Counterpoint
0000EF Alantec
0000FD High Level Hardware (Orion, UK)
000102 BBN BBN internal usage (not registered)
0010D1 BlazeNet
001700 Kabel
0020AF 3COM ???
0020C9 Victron
002094 Cubix
008064 Wyse Technology / Link Technologies
00802B IMAC ???
00802D Xylogics, Inc. Annex terminal servers
00808C Frontier Software Development
0080C2 IEEE 802.1 Committee
0080D3 Shiva
00A03E ATM Forum
00AA00 Intel
00DD00 Ungermann-Bass
00DD01 Ungermann-Bass
020701 Racal InterLan
020406 BBN BBN internal usage (not registered)
026086 Satelcom MegaPac (UK)

02608C	3Com	IBM PC; Imagen; Valid; Cisco
02CF1F	CMC	Masscomp; Silicon Graphics; Prime EXL
080002	3Com (Formerly Bridge)	
080003	ACC (Advanced Computer Communications)	
080005	Symbolics	Symbolics LISP machines
080008	BBN	
080009	Hewlett-Packard	
08000A	Nestar Systems	
08000B	Unisys	
080011	Tektronix, Inc.	
080014	Excelan	BBN Butterfly, Masscomp, Silicon Graphics
080017	NSC	
08001A	Data General	
08001B	Data General	
08001E	Apollo	
080020	Sun	Sun machines
080022	NBI	
080025	CDC	
080026	Norsk Data (Nord)	
080027	PCS Computer Systems GmbH	
080028	TI	Explorer
08002B	DEC	
08002E	Metaphor	
08002F	Prime Computer	Prime 50-Series LHC300
080036	Intergraph	CAE stations
080037	Fuji-Xerox	
080038	Bull	
080039	Spider Systems	
080041	DCA Digital Comm. Assoc.	
080045	????	(maybe Xylogics, but they claim not to know this number)
080046	Sony	
080047	Sequent	
080049	Univation	
08004C	Encore	
08004E	BICC	
080056	Stanford University	
080058	???	DECsystem-20
08005A	IBM	
080067	Comdesign	
080068	Ridge	
080069	Silicon Graphics	
08006E	Concurrent	Masscomp
080075	DDE (Danish Data Elektronik A/S)	
08007C	Vitalink	TransLAN III
080080	XIOS	
080086	Imagen/QMS	
080087	Xyplex	terminal servers
080089	Kinetics	AppleTalk-Ethernet interface
08008B	Pyramid	
08008D	XyVision	XyVision machines
080090	Retix Inc	Bridges
484453	HDS ???	
800010	AT&T	
AA0000	DEC	obsolete
AA0001	DEC	obsolete
AA0002	DEC	obsolete
AA0003	DEC	Global physical address for some DEC machines

AA0004 DEC Local logical address for systems running
DECNET

The CFxxxx Series

RFC 2153 describes a method of using a "pseudo OUI" for certain purposes when there is no appropriate regular OUI assigned. These are listed here.

CF0001 Data Comm for Business [McCain]

ETHERNET MULTICAST ADDRESSES

An Ethernet multicast address consists of the multicast bit, the 23-bit vendor component, and the 24-bit group identifier assigned by the vendor. For example, DEC is assigned the vendor component 08-00-2B, so multicast addresses assigned by DEC have the first 24-bits 09-00-2B (since the multicast bit is the low-order bit of the first byte, which is "the first bit on the wire").

Another list of Ethernet multicast addresses is maintained by Michael A. Patton and is accessible at:

<URL:http://www.cavebear.com/CaveBear/ether-codes.html>
<URL:ftp://ftp.cavebear.com/pub/Ethernet-codes>
<URL:gopher://ftp.cavebear.com/00/pub/Ethernet-codes>

Ethernet Address	Type Field	Usage
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Multicast Addresses:

01-00-5E-00-00-00-01-00-5E-7F-FF-FF	0800	Internet Multicast [RFC1112]
01-00-5E-80-00-00-01-00-5E-FF-FF-FF	????	Internet reserved by IANA
01-80-C2-00-00-00-09-00-02-04-00-01?	-802- 8080?	Spanning tree (for bridges) Vitalink printer
09-00-02-04-00-02?	8080?	Vitalink management
09-00-09-00-00-01	8005	HP Probe
09-00-09-00-00-01	-802-	HP Probe
09-00-09-00-00-04	8005?	HP DTC
09-00-1E-00-00-00	8019?	Apollo DOMAIN
09-00-2B-00-00-00	6009?	DEC MUMPS?
09-00-2B-00-00-01	8039?	DEC DSM/DTP?
09-00-2B-00-00-02	803B?	DEC VAXELN?
09-00-2B-00-00-03	8038	DEC Lanbridge Traffic Monitor (LTM)
09-00-2B-00-00-04	????	DEC MAP End System Hello
09-00-2B-00-00-05	????	DEC MAP Intermediate System Hello
09-00-2B-00-00-06	803D?	DEC CSMA/CD Encryption?
09-00-2B-00-00-07	8040?	DEC NetBios Emulator?
09-00-2B-00-00-0F	6004	DEC Local Area Transport (LAT)
09-00-2B-00-00-1x	????	DEC Experimental
09-00-2B-01-00-00	8038	DEC LanBridge Copy packets (All bridges)
09-00-2B-01-00-01	8038	DEC LanBridge Hello packets (All local bridges)

		1 packet per second, sent by the designated LanBridge
09-00-2B-02-00-00	????	DEC DNA Lev. 2 Routing Layer routers?
09-00-2B-02-01-00	803C?	DEC DNA Naming Service Advertisement?
09-00-2B-02-01-01	803C?	DEC DNA Naming Service Solicitation?
09-00-2B-02-01-02	803E?	DEC DNA Time Service?
09-00-2B-03-xx-xx	????	DEC default filtering by bridges?
09-00-2B-04-00-00	8041?	DEC Local Area Sys. Transport (LAST)?
09-00-2B-23-00-00	803A?	DEC Argonaut Console?
09-00-4E-00-00-02?	8137?	Novell IPX
09-00-56-00-00-00-	????	Stanford reserved
09-00-56-FE-FF-FF		
09-00-56-FF-00-00-	805C	Stanford V Kernel, version 6.0
09-00-56-FF-FF-FF		
09-00-77-00-00-01	????	Retix spanning tree bridges
09-00-7C-02-00-05	8080?	Vitalink diagnostics
09-00-7C-05-00-01	8080?	Vitalink gateway?
0D-1E-15-BA-DD-06	????	HP
AB-00-00-01-00-00	6001	DEC Maintenance Operation Protocol (MOP) Dump/Load Assistance
AB-00-00-02-00-00	6002	DEC Maintenance Operation Protocol (MOP) Remote Console 1 System ID packet every 8-10 minutes, by every: DEC LanBridge DEC DEUNA interface DEC DELUA interface DEC DEQNA interface (in a certain mode)
AB-00-00-03-00-00	6003	DECNET Phase IV end node Hello packets 1 packet every 15 seconds, sent by each DECNET host
AB-00-00-04-00-00	6003	DECNET Phase IV Router Hello packets 1 packet every 15 seconds, sent by the DECNET router
AB-00-00-05-00-00	????	Reserved DEC through
AB-00-03-FF-FF-FF		
AB-00-03-00-00-00	6004	DEC Local Area Transport (LAT) - old
AB-00-04-00-xx-xx	????	Reserved DEC customer private use
AB-00-04-01-xx-yy	6007	DEC Local Area VAX Cluster groups Sys. Communication Architecture (SCA)
CF-00-00-00-00-00	9000	Ethernet Configuration Test protocol (Loopback)
Broadcast Address:		
FF-FF-FF-FF-FF-FF	0600	XNS packets, Hello or gateway search? 6 packets every 15 seconds, per XNS station
FF-FF-FF-FF-FF-FF	0800	IP (e.g. RWHOD via UDP) as needed
FF-FF-FF-FF-FF-FF	0804	CHAOS
FF-FF-FF-FF-FF-FF	0806	ARP (for IP and CHAOS) as needed
FF-FF-FF-FF-FF-FF	0BAD	Banyan
FF-FF-FF-FF-FF-FF	1600	VALID packets, Hello or gateway search? 1 packets every 30 seconds, per VALID station

FF-FF-FF-FF-FF-FF	8035	Reverse ARP
FF-FF-FF-FF-FF-FF	807C	Merit Internodal (INP)
FF-FF-FF-FF-FF-FF	809B	EtherTalk

IANA ETHERNET ADDRESS BLOCK - UNICAST USE

The IANA owns an Ethernet address block which may be used for unicast address assignments or other special purposes.

The IANA may assign unicast global IEEE 802 MAC address from its assigned OUI (00-00-5E) for use in IETF standard track protocols. The intended usage is for dynamic mapping between IP addresses and IEEE 802 MAC addresses. These IEEE 802 MAC addresses are not to be permanently assigned to any hardware interface, nor is this a substitute for a network equipment supplier getting its own OUI.

The address block in IEEE binary is: 0000 0000 0000 0000 0111 1010

In the normal Internet dotted decimal notation this is 0.0.94 since the bytes are transmitted higher order first and bits within bytes are transmitted lower order first.

IEEE CSMA/CD and Token Bus bit transmission order: 00 00 5E

IEEE Token Ring bit transmission order: 00 00 7A

Appearance on the wire (bits transmitted from left to right):

```

0                               23                               47
|                               |                               |
0000 0000 0000 0000 0111 1010 xxxx xxxx xxxx xxxx xxxx xxxx
|
Multicast Bit

```

Appearance in memory (bits transmitted right-to-left within octets, octets transmitted left-to-right):

```

0                               23                               47
|                               |                               |
0000 0000 0000 0000 0101 1110 xxxx xxxx xxxx xxxx xxxx xxxx
|
Multicast Bit

```

The latter representation corresponds to the Internet standard bit-order, and is the format that most programmers have to deal with. Using this representation, the range of Internet Unicast addresses is:

00-00-5E-00-00-00 to 00-00-5E-FF-FF-FF in hex, or

0.0.94.0.0.0 to 0.0.94.255.255.255 in dotted decimal

The low order 24 bits of these unicast addresses are assigned as follows:

Dotted Decimal	Description	Reference
000.000.000-000.000.255	Reserved	[IANA]
000.001.000-000.001.255	Virtual Router Redundancy (VRRP)	[RFC3768]

IANA ETHERNET ADDRESS BLOCK - MULTICAST USE

The IANA owns an Ethernet address block which may be used for multicast address assignments or other special purposes.

The address block in IEEE binary is: 0000 0000 0000 0000 0111 1010

In the normal Internet dotted decimal notation this is 0.0.94 since the bytes are transmitted higher order first and bits within bytes are transmitted lower order first.

IEEE CSMA/CD and Token Bus bit transmission order: 00 00 5E

IEEE Token Ring bit transmission order: 00 00 7A

Appearance on the wire (bits transmitted from left to right):

```

0                               23                               47
|                               |                               |
1000 0000 0000 0000 0111 1010 xxxx xxx0 xxxx xxxx xxxx xxxx
|                               |
Multicast Bit                    0 = Internet Multicast
                                   1 = Assigned by IANA for
                                   other uses

```

Appearance in memory (bits transmitted right-to-left within octets, octets transmitted left-to-right):

```

0                               23                               47
|                               |                               |
0000 0001 0000 0000 0101 1110 0xxx xxxx xxxx xxxx xxxx xxxx
|                               |
Multicast Bit                    0 = Internet Multicast
                                   1 = Assigned by IANA for other uses

```

The latter representation corresponds to the Internet standard bit-order, and is the format that most programmers have to deal with. Using this representation, the range of Internet Multicast addresses is:

01-00-5E-00-00-00 to 01-00-5E-7F-FF-FF in hex, or

1.0.94.0.0.0 to 1.0.94.127.255.255 in dotted decimal

Modified EUI-64 Addresses in the IANA Ethernet Address Block - per [RFC4214]

Modified EUI-64 addresses ([RFC3513], section 2.5.1 and Appendix A) in the IANA Ethernet Address Block are formed by concatenating the

24-bit IANA OUI (00-00-5E) with a 40-bit extension identifier and inverting the "u" bit, i.e., the "u" bit is set to one (1) to indicate universal scope and it is set to zero (0) to indicate local scope.

Modified EUI-64 addresses have the following appearance in memory (bits transmitted right-to-left within octets, octets transmitted left-to-right):

```

0          23          63
|          OUI          |          extension identifier          |
000000ug00000000 01011110xxxxxxx xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxx

```

When the first two octets of the extension identifier encode the hexadecimal value 0xFFFE, the remainder of the extension identifier encodes a 24-bit vendor-supplied id as follows:

```

0          23          39          63
|          OUI          |          0xFFFE          |          vendor-supplied id          |
000000ug00000000 0101111011111111 11111110xxxxxxx xxxxxxxxxxxxxxxxxxx

```

When the first octet of the extension identifier encodes the hexadecimal value 0xFE, the remainder of the extension identifier encodes a 32-bit IPv4 address as follows:

```

0          23          31          63
|          OUI          |          0xFE          |          IPv4 address          |
000000ug00000000 0101111011111110 xxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxx

```

SNAP PROTOCOL IDS IN THE IANA ETHERNET ADDRESS BLOCK

The Sub-Network Access Protocol (SNAP) header contains 40 bits: 24 bits containing an IEEE-assigned Organizationally Unique Identifier (OUI), and 16 bits containing a Protocol Identifier (PID). The OUIs are the same as those used in the Ethernet Vendor Address Components list above. The IANA's OUI, 00-00-5E, may be used in SNAP headers with the appropriate PID to identify the protocols listed below.

Note that the IANA restricts this list to protocols that are ONLY identified in this manner; if a protocol has an EtherType, then SNAP headers identifying that protocol must contain an OUI of 00-00-00, with the EtherType in the PID field.

The SNAP PID assignments using the IANA's OUI are:

Protocol ID	Description	References
-----	-----	-----
decimal	Hex	
0001	0001	MARS Data Messages (short form) [RFC2022]
0002	0002	reserved for future NHRP use [RFC2332]
0003	0003	MARS/NHRP Control Messages [RFC2022, 2332]
0004	0004	MARS Data Messages (long form) [RFC2022]
0005	0005	SCSP - Server Cache Sync Protocol [RFC2334]

0006	0006	VRID - Virtual Router MAC Address	[Knight]
0007	0007	L2TP	[RFC3070]
0008	0008	Virtual Private Network ID	[Malis-ID]
0009	0009	MSDP-GRE-Protocol Type	[msdp-ID]

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