ORACLE

Host ID Acquisition and Derivation

Document Number and Revision: 923-3521 Rev 08

Overview

This document describes how to get a new Host ID prefix from SPARC International and how to derive a Host ID on both SPARC and x86 architectures..

Audience

This document is for Oracle engineers, suppliers, and external manufacturers (EMs).

Contents

Introduction

A Host ID is a 4-byte identifier assigned to a computer, domain, or other piece of hardware and is used to control software licensing. While a Host ID is generally assumed to be a unique value, uniqueness is not guaranteed by the method employed to create it on x86 products. A different method is employed on SPARC products, which attempts to create a truly unique value across all SPARC products from all vendors worldwide. These differing methods of derivation are explained in the following sections.

Certain FRUs like network interface cards (NIC) having a media access control (MAC) address used to identify a Solaris domain also have a Host ID programmed into a programmable read-only memory (PROM) residing on the FRU. The derivation of the Host ID on these FRUs follows the method described for SPARC products.

1. Deriving Host IDs on SPARC Products

On Oracle hardware products powered by SPARC processors, the Host ID is composed of a 1-byte prefix followed by the lower three bytes of the MAC address. The Host ID prefix itself is determined by the organizationally unique identifier (OUI) of the MAC address, establishing a one-to-one relationship between the two. In other words, the Host ID is created by substituting a 1-byte prefix (two hexadecimal characters) for the first three bytes (six hexadecimal characters) of a given MAC address.

For example, if a server's MAC address is 00-14-4F-11-11-11, the Host ID is 84-11-11-11. In this example, 84 is the prefix corresponding to the OUI 00-14-4F. For an explanation of OUIs and their use in MAC addresses, see WWOPS Technology: Media Access Control (MAC) Address Assignment and Labeling, 923-3391.

On many products, Host IDs and the MAC addresses are programmed into the same PROM and the programming of both occurs in the same step in the manufacturing process. The Host ID can be programmed during the in-circuit test (ICT) or other tests performed during manufacturing.

1.1. Existing Host ID Prefixes

Because Host IDs are derived from MAC addresses, each OUI must be associated with a single Host ID prefix in order to maintain the uniqueness of the resulting Host IDs. Therefore, whenever Oracle requests a new OUI from the Institute of Electrical and Electronics Engineers (IEEE) for use on SPARC products, it must also obtain a new Host ID prefix used strictly in conjunction with the new OUI.

An organization like Oracle can produce 16,777,216 unique Host IDs under a single prefix. This enables Oracle to produce a unique Host ID for every MAC address. In practice,

however, an Oracle hardware product that is eligible for multiple domains and issued multiple MAC addresses can be configured to use only a fraction of the possible Host IDs.

The Host ID prefixes issued by SPARC International to Oracle and their corresponding OUIs are listed in *Table 1-1, Host ID Prefixes and Corresponding OUIs*, below.

Table 1-1 Host ID Prefixes and Corresponding OUIs

Host ID Prefix *(hexadecimal)*	***MAC Address OUI*** *(hexadecimal)*
80	08-00-20
81	unknown
82	00-00-7D, also shown as 00-00-BE
83	00-03-BA
84	00-14-4F
85	00-21-28
86	00-10-E0
87	A8-69-8C

1.2. Acquiring a New Host ID Prefix

Organizations can request small blocks from which they can generate Host IDs, but a full block is necessary because Oracle secures only full OUI blocks from IEEE. For organizations that are members of SPARC International, like Oracle, no charges are imposed for acquiring a Host ID prefix.

Request for a new prefix must be made to SPARC International, Inc.:

```
Address: 1671 Dell Avenue, Suite 204, Campbell, CA  95008
Phone: +1 408-250-9337
FAX: +1 408-317-0346
E-mail: sparcinfo@sparc.org
Web: http://www.sparc.org
```

The SCO Engineering Services Organization (ESO) is responsible for acquiring a new Host ID prefix whenever Oracle acquires a new OUI.

After a new Host ID is obtained, *Table 1-1, Host ID Prefixes and Corresponding OUIs*, must be updated.

1.3. Restrictions on Host ID Prefixes

On SPARC products, the functionality of the open boot PROM (OBP) requires that the highest order bit of the Host ID (hostid) must be one. In other words, the first two characters of the Host ID, in hexadecimal format, must fall into the range of 80 through FF inclusive. This is required to enable the OBP to distinguish modern SPARC platforms from older platforms that do not have the highest order bit set high and that use platform-specific values for the first byte of the Host ID. For more information, contact one of the OBP development groups within Oracle.

1.4. Implementing a New Host ID Prefix

Once Oracle acquires a new Host ID prefix, it must be communicated broadly to all teams that support products using SPARC processors. The new prefix and its corresponding OUI must be added to all look-up or reference tables that are used to generate a Host ID. These tables exist in the following locations:

- FRUID or service electronically erasable programmable read-only memory (SEEPROM) programming specifications reporting to assemblies that hold Host IDs
- ICT and other test code
- CIS printing applications or configuration files

Ensure that the required changes are implemented in applicable specifications, procedures, codes, and manufacturing and test processes.

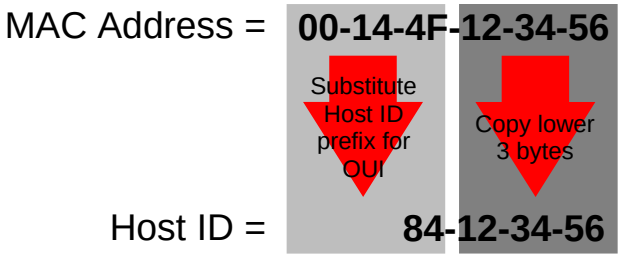
1.5. Deriving the Host ID from the MAC Address

On SPARC-based products, the Host ID is always derived from the MAC address. The upper byte of the Host ID is a prefix that corresponds to only one MAC address OUI, as established by *Table 1-1, Host ID Prefixes and Corresponding OUIs*, on page 3. The lower three bytes, or the serial portion, are the same as the lower three bytes of the MAC address. The method of derivation is illustrated in *Figure 1-1, Deriving a Host ID on SPARC Products*, below. For the majority of Oracle hardware products, MAC addresses are managed and issued by Data2 Corporation and can be issued in two ways:

- On a MAC address label
- In a data file

For more information on MAC addresses, refer to WWOPS Technology: Media Access Control (MAC) Address Assignment and Labeling, 923-3391-xx.

Figure 1-1 Deriving a Host ID on SPARC Products

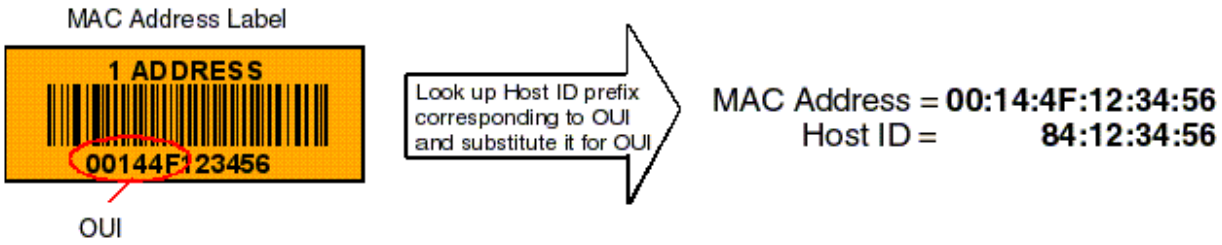


For manufacturing processes that create a Host ID from a MAC address label, use the following steps to derive the Host ID:

1. Scan the bar code to read the MAC address.
2. Find the Host ID prefix that corresponds to the OUI in a look-up table that matches *Table 1-1*, *Host ID Prefixes and Corresponding OUIs*, on page 3. An error is returned if the OUI is not found.
3. Record the Host ID prefix separately, or record the full Host ID by linking it to the lower three bytes of the MAC address.

Figure 1-2, *Deriving a Host ID from a MAC Address Label*, above, shows an example of deriving a Host ID from a MAC Address Label.

Figure 1-2 Deriving a Host ID from a MAC Address Label



2. Deriving Host IDs on x86 Products Running Solaris

The Host ID on x86 products is a randomly generated 4-byte value created during the installation of Solaris so that it is not determinable until the unit is installed at a customer site or until Solaris is fully installed as it can occur in Oracle's integration processes. The installation of a stub Solaris image during manufacturing does not result in the creation of a Host ID.

Once created, the Host ID is stored in the /kernal/misc/sysinit file, which is not overwritten when Solaris is upgraded on a particular machine. However, reinstalling Solaris overwrites this file and changes the Host ID. To prevent this, the file must be copied to a safe location on another machine and written back after installation.

NOTE 1: If the Jumpstart/PXE installation method is used for installation, all systems installed from the Jumpstart server must have the Host ID of the Jumpstart server.

Given that 4,294,967,295 permutations of a Host ID are possible from a 4-byte value, the chances of duplication are considered small enough not to represent a concern for software vendors who desire a truly unique value. The ability to easily change the Host ID on many platforms presents a larger problem to software piracy and unlicensed use.

NOTE 2: No attempt is made to prevent the random generation of Host IDs that have high-order bytes of 0x80, 0x81, 0x82, 0x83, 0x84, 0x85, and 0x86 and that can duplicate those issued on SPARC products.

The Host ID can be queried with the gethostid UNIX command and changed with a utility named sethostid, which is available for download internally at: http://monaco.sfbay/detail.jsf?cr=6306078.

Appendix A Derivation of Host ID on Legacy Products

The Host ID was derived in various ways on Oracle's early products. Derivation on Sun-1 and Sun-2 series products is still unknown. Each model of Sun-3 and early Sun-4 series products was assigned a 1-byte Machine ID, and it was used as the high-order byte of the Host ID. The assigned values of these Machine IDs are listed in *Table A-1, Machine Types on Sun-3 Products*, below, and in *Table A-2, Machine Types on Early Sun-4 Products*, on page 7. For more information on the derivation of the Host ID on Sun-3 and early Sun-4 series products, see *Appendix A*, Appendix *A Derivation of Host ID on* Legacy Products, above.

Sun-3 Series Products

Prior to the introduction of the SPARCstation10, the Host ID was derived from a label on the identification programmable read only memory (IDPROM) or the non-volatile random access memory (NVRAM). The number printed on the label was a decimal value, and the last four digits of it, when converted to hexadecimal, formed the lower three bytes of the Host ID. The first byte of the Host ID was called the 'Machine Type' or 'Machine ID' (id_machine). The values used are shown in *Table A-1, Machine Types on Sun-3 Products*, below.

Table A-1 Machine Types on Sun-3 Products

System Model Number	***Machine Type or Machine ID*** *(hexadecimal)*	***Label Value*** *(decimal)*
3/75, 3/140, 3/150, 3/160, 3/180	11	3xxxx
3/50	12	4xxxx
3/260, 3/280	13	5xxxx
3/110	14	6xxxx
3/60	17	0xxxx
3E	18	9xxxx
Sun 386i	31	xxxx
3/460, 3/470, 3/480	41	xxxx
3/80	42	xxxx

Early Sun-4 Series Products

The early Sun-4 products were also assigned a Machine Type used as the first two hexadecimal characters of the Host ID. The values used are shown in *Table A-2*, *Machine Types on Early Sun-4 Products*, below.

Table A-2 Machine Types on Early Sun-4 Products

System Model Number	***Machine Type or Machine ID*** *(hexadecimal)*
4/260, 4/280	21
4/110, 4/150	22
4/330, 4/360	23
4/470, 4/490	24
4/60	51
4/40	52
4/65	53
4/20	54
4/75	55
4/25	56
4/50	57
4E	61
SS600MP	71
S10, S10SX, S20	72
4/10, 4/15, 4/30, S4, S5	80

SPARCclassic and Newer SPARC Products

Beginning with the release of the SPARCclassic and SPARCstation LX products in 1992, a unique Machine Type was no longer assigned and all Host IDs started with hexadecimal value 80. The label placed on the IDPROM or NVRAM contained only the hexadecimal characters representing the lower three bytes of both the Ethernet address and Host ID, and this value was stored electronically as variable id_serial. Because of its former use, the upper byte of the Host ID is sometimes still referred to as the 'Machine Type' or 'Machine ID'. As currently used, the first byte is called the 'Host ID prefix'.

Since February, 2001, MAC address labels show all 12 hexadecimal characters of a MAC address. Therefore, any labels created under OUI 00-03-BA, 00-14-4F, 00-21-28, or 00-10-E0 display the full MAC address.

System Configuration Cards (SCCs)

Host IDs were derived and programmed into SCCs as follows:

1. The MAC addresses were provided in a data file from Data2 Corporation.
2. The Host ID prefix corresponding to the OUI was found in a look-up table that matched *Table 1-1, Host ID Prefixes and Corresponding OUIs*, on page 3. An error message was returned if the OUI was not found.
3. The Host ID prefix was either programmed separately, or it was prepended to the lower three bytes of the MAC address and programmed in full.

Reference Documents and Records

Document Title	Number	ESO Controlled [1]		Quality Record [2]	
		Yes	No	Yes	No
WWOPS Technology: Media Access Control (MAC) Address Assignment and Labeling	923-3391-xx	x			x
SPARC International web site: http://www.sparc.org	N/A		x		x

Document History and Approvals

Dash	Rev	Date	Description of Change	Originator
01	A	08 Aug 2005	Initial release.	n/a
02	A	03 Nov 2006	Added a note below Table 1-1. Updated Figures 4-1 and 4-2.	n/a
03	A	04 Dec 2006	Changed title. Added Section 2. Changed the structure of the document.	n/a
04	A	29 May 2007	Modified Sections 1.1 and 1.2.	n/a
05	A	02 Apr 2008	Add bottom row to Table 1-1.	n/a
06	A	25 Jul 2011	Updated document throughout, including: • Added new Host ID prefix, 0x86, to Table 1-1. • Moved information pertaining to the derivation of Host IDs on SCCs to Appendix A. • Changed 'Sun' to 'Oracle' where appropriate. • Changed 'x86/x64' to 'x86' throughout. • Updated SPARC International contact information. • Changed colons to dashes in the representations of hexadecimal values.	n/a

[1] All references to documents controlled by Engineering Services were current when this document was released. All hard copies of this document are to be used for reference only.

[2] For quality record information, refer to WWOPS Quality: Control of Quality Records, 923-1764-xx.

			• Removed former Notes 1 and 2. • Moved Section 1.2.2 to Appendix A. • Removed references to blog.	
07	A	26 Sep 2012	Corrected attachment in Agile and updated to current template. **No content changes made.**	n/a
			Fusion History	
Rev		***Date***	***Description of Change***	***Originator***
08		9 Jul 2021	Added row to Table 1-1. Updated document references. Modified Section 1.4.	n/a

Related Information

REASON FOR CHANGE:

Added row to Table 1-1

- When Document Template is complete, email source file to eso_business_docs_us_grp@oracle.com
- All hard copies of this document are uncontrolled and are to be used for reference only.
- For questions or comments about this document, please send an email to: Ask_Document_Question@beehiveonline.oracle.com