A World Wide Name, WWN, is sometimes referred to as a:

- World Wide Number
- World Wide ID (WWID)
- IEEE address

Every Fibre Channel Node and every Fibre Channel Port has a globally unique world wide name[1]. A Fibre Channel Node has a World Wide Node Name, abbreviated *WWNN*. A Fibre Channel Port has a World Wide Port Name, abbreviated *WWPN*.

A WWNN is assigned during the manufacturing process, and is effectively 'burnt' into the hardware. WWPNs can be generated in software (meaning firmware, microcode or kernel drivers), and are seeded from the WWNN.

Taking the example of a Fibre Channel switch, the switch chassis has a WWNN, and each port on the switch has a WWPN, seeded from the WWNN of the switch chassis. Generally, a RAID array chassis has a WWNN, and each port on the RAID controllers ('directors', if you like) within the chassis has a unique WWPN, seeded from the WWNN of the RAID array chassis. A dual-ported fibre channel disk drive has a WWNN, and each port on the drive has a unique WWPN.

In situations involving WWN fabric Zoning or RAID array LUN masking you would generally specify to the granularity of the WWPN (so, either WWPN, or the combination of WWNN:WWPN).

Global uniqueness of WWNs is administered and managed cooperatively by the IEEE and the hardware vendor.

WWNs are either 64 bits (16 hex chars) or 128 bits (32 hex chars) in length. Physical objects (eg. HBA ports) have WWNs and logical objects (eg. a RAID array LUN, or a logical fabric) can also have WWNs. Very often, logical objects have a 128 bit WWN.

WWNs can be written in several notations (however, the notation expected by a particular vendor CLI will be very specific). For example:

- 50060485c5edaa5d
- 50:06:04:85:c5:ed:aa:5d
- 50:6:4:85:c5:ed:aa:5d[2]
- 50-06-04-85-c5-ed-aa-5d

In order to determine the notation required and expected by a switch CLI (for the purposes of zoning, for example) then you can query the nameserver of the switch, in order to display

1 Examples include HBAs, HBA ports, RAID arrays, RAID array ports, disk drives, disk drive ports, switches, switch ports... etc.

2 Leading nibble of the byte dropped if the nibble is zero

WWNs in the particular notation required by the switch.[3]

To query WWNs, visit the IEEE Website at:

http://standards.ieee.org/regauth/oui/index.shtml

In order to successfully query which vendor the WWN (either a WWNN, or a WWPN) belongs to, you need to extract the Company Identifier from the WWN and then key this Company Identifier into the search engine at the IEEE website. The Company Identifier is referred to as the *Organizationally Unique Identifier – OUI.* The trick is that the OUI is located at different positions within the WWN string, depending on the type (or format) of the WWN.

There are four common formats for WWNs. There is format 1, format 2, format 5, format 6. The format number indicates the digit (a nibble) that the WWN starts with. This first digit is also know as the *Network Address Authority, NAA.*

Network Address Authority 1

NAA 1 is *IEEE 802.2 standard.*

NAA	Field1	Field2	Field3
4 bits = 0001	12 bits zero filled	24 bit OUI	24 bit vendor sequence or serial number

For example:

- 10:00:<24-bit_OUI>:<24-bit_vendor_sequence_or_serial number>

- 10:00:**00:00:C9**[4]:3d:a5:46
- **You would key '0000c9' into the IEEE search engine**

Network Address Authority 2

NAA 2 is *IEEE 802.2 extended.*

NAA	Field1	Field2	Field3
4 bits = 0010	12 bit vendor code	24 bit OUI	24 bit vendor sequence or serial number

3 Commands vary across switch vendors. Some examples, *nsshow, fabricshow, topologyshow*
4 An Emulex OUI

For example:

- 2<12-bit_vendor_code>:<24-bit_OUI>:<24-bit_vendor_sequence_or_serial number>
- The 12-bit vendor code (field1) can be used to identify Fibre Channel ports on a Fibre Channel node, or to extend the vendor unique serial number.
- Some examples:
- 20:00:**00:20:37**[5]:13:12:1a - a Seagate disk WWNN
- 21:00:**00:20:37**:13:12:1a - a Seagate disk WWPN for port A[6]
- 22:00:**00:20:37**:13:12:1a - a Seagate disk WWPN for port B
- **You would key '002037' into the IEEE search engine**
- NAA 2 provides greater flexibility than NAA 1.

Network Address Authority 5[7]

NAA 5 is *IEEE registered name.*

NAA	Field2	Field3
4 bits = 0101	24 bit OUI	36 bit vendor sequence or serial number

For example:

- 5<24-bit_OUI>:<36-bit_vendor_sequence_or_serial number>
- 5**0:06:04:8**[8]5:c5:ed:aa**:**4c
- the 24-bit OUI does not start on a byte boundary
- **You would key '006048' into the IEEE search engine**

Network Address Authority 6

NAA 6 is *IEEE registered extended* (128 bits in length – 32 hexadecimal characters)

5 A Seagate OUI
6 Seagate Fibre Channel drives are dual-ported for redundancy
7 Do not assume that NAA 5 always means SCSI target. Some SCSI initiators are NAA 5.
8 An EMC OUI (used for *Symmetrix*)

NAA	Field2	Field3	Field4
4 bits = 0110	24 bit OUI	36 bit vendor sequence or serial number	64 bit vendor specific extension

For example:

- 6**0:02:0f:2**[9]0:00:00:ca:93:3f:2e:b2:d4:00:01:8a:54[1011]

A Brocade Fibre Channel Switch Example

A CLI *'switchshow'* reports the switch WWNN as: 10:00:00:60:69:90:72:bc

- we immediately know that this is NAA 1
- we can identify the OUI (bold): 10:00:**00:60:69**:90:72:bc
- we can confirm with the IEEE registration website that 00:60:69 is the 24-bit OUI for Brocade

Now we can query the WWNs of each switch port:[12]

'portshow 0' - reports: 2**0:00**:00:60:69:90:72:bc
'portshow 1' - reports: 2**0:01**:00:60:69:90:72:bc
'portshow 2' - reports: 2**0:02**:00:60:69:90:72:bc
.
'portshow 10' - reports: 2**0:0a**:00:60:69:90:72:bc
.
'portshow 31' - reports: 2**0:1f**:00:60:69:90:72:bc

In this example, the 12-bit vendor code is used to reference the physical switch port.

Sun Solaris Device Path example

/dev/dsk/c7t60020F200000CA933D3D19CA000886A5d0s0

This represents the logical device path to a SCSI-3 block device. The device is actually a SCSI LUN mapped from a RAID array. The device path is based on the traditional /dev/dsk/c#t#d#s# addressing scheme. However, the *t* number represents the SCSI target, and is actually an NAA 6 128-bit WWN. Since the device path contains a WWN, there is no need to configure persistent binding.

9 A Sun Microsystems OUI
10 128 bits = 32 hex characters
11 It is often the case that logical objects have a 128bit WWN, whilst physical objects have a 64bit WWN.
12 Note that these are format 2, which allows vendor setting of the three nibbles immediately following the NAA nibble 2. These 3 nibbles represent the 12-bit vendor code.