

Canonical and Non-Canonical Address Formats

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Introduction

The ODI specification for NetWare requires that all addresses passed through the LSL must indicate whether the address is in canonical, non-canonical, or unspecified format. This provides the means for drivers to conform to the IEEE 802.1d MAC Layer Bridging specification which states that all addresses at the Data-Link layer and above must be in canonical format. The RFC 1231 for IEEE 802.5 Token-Ring Management Information Base (for SNMP) document also requires canonical addressing.

Addresses affected by this requirement include: the node address in the *MLIDNodeAddress* field of the configuration table, the address in the *ImmediateAddress* field of the ECB, and functional addresses.

The MSM and TSM support tools supplied by Novell handle most of the details involving the address format.

Address Format

Addresses that are sent on the wire with the least significant bit of each byte first are in *canonical* (LSB) form. Those sent with the most significant bit of each byte first are in *non-canonical* (MSB) form.

An example of an address in canonical and non-canonical format is shown here:

Canonical:	08 00 00 A5 64 6B
Non-canonical:	10 00 00 A5 26 D6

Node Addresses

Bits 15 and 14 of the *MLIDModeFlags* field in the configuration table indicate the address format the driver is using. The MSM and TSM control both of these bits. How they are set depends on which TSM the driver uses and what parameters are entered on the driver's load command line (described later in this section).

Bit 15 denotes whether or not the address format is specified. If the format is unspecified (i.e. an old style driver), the *MLIDNodeAddress* in the configuration table is assumed to be in the physical layer's native format. When the format is specified, bit 14 indicates if the *MLIDNodeAddress* field contains the canonical or non-canonical form of the node address. In this case, the HSM should use *MSMPhysNodeAddress* to obtain the actual physical layer format of the node address, since the TSM may have bit swapped the node address bytes in the configuration table.

Note: Drivers written for OS versions later than 3.11 should always have specified address formats.

The bit 15 and 14 combinations are:

15,14	Description
00	<i>MLIDNodeAddress</i> format is unspecified. The node address is assumed to be in the physical layer's native format -- <i>MSMPhysNodeAddress</i> is not used. Drivers written for OS versions later 3.11 can not have unspecified address formats.
01	This is an illegal value and must not occur.
10	<i>MLIDNodeAddress</i> is configured canonical -- the HSM must use <i>MSMPhysNodeAddress</i> to obtain the physical layer format of the node address.
11	<i>MLIDNodeAddress</i> is configured non-canonical -- the HSM must use <i>MSMPhysNodeAddress</i> to obtain the physical layer format of the node address.

Specifying the Node Address Format

Drivers may indicate which address format is passed through the LSL by specifying the MSB or LSB keyword following the frame type designation on the load command line. LSB forces canonical addresses to be passed between the MLID and the upper layers. The MSB designation forces non-canonical addresses to be passed (this is the default for Token-Ring media). Ethernet media may not use the MSB designator.

Non-Canonical Media

For media types with a non-canonical physical layer format, the default mode is MSB. When the MSB keyword is specified on the command line following the frame type (or when the format is left unspecified), the node address in both the configuration table and *MSMPhysNodeAddress* is non-canonical. The TSM sets both bits 15 and 14 of the *MLIDModeFlags*.

A driver for a non-canonical media type may indicate that it passes addresses at the data-link layer and above in canonical format. It does this by specifying the LSB keyword on the command line following the frame type designation. In this case, the MSM places the non-canonical node address in *MSMPhysNodeAddress* and the canonical node address in the configuration table. The TSM sets bit 15 and clears bit 14 of the *MLIDModeFlags*.

Canonical Media

For media types with a canonical physical layer format, the MSM and TSM always set bit 15 and clear bit 14 of the mode flags. This indicates that the *MLIDNodeAddress* in the configuration table is specified in canonical form and that *MSMPhysNodeAddress* is used. Both locations contain the canonical address format.

Although the MSB keyword (indicating a non-canonical address format) may be added to the command line, the TSM ignores it for canonical media types. However, a node address override can be entered in a non-canonical form with an "M" suffix as described next, even when the media is canonical. The TSM simply bit-swaps the address.

Overriding the Node Address

You can override the hardware node address using the NODE keyword on the load command line. The address may be entered in either canonical or non-canonical form by appending an "L" (for canonical) or "M" (for non-canonical) to the specified address. For example:

```
Canonical:      NODE=080000A5646BL
Non-canonical:  NODE=100000A526D6M
```

If neither "L" nor "M" is specified, the address is considered to be in the native format of the media.

Note: No matter what form of the node address is specified on the command line, the format of the node address actually placed in the configuration table is indicated by bit 14 in the *MLIDModeFlags* byte.

Media Headers

All addresses passed between the HSM and the support modules (TSM and MSM) are in the physical layer format of the media. That is, media using non-canonical format will have a non-canonical address in the TCB.

Raw Sends

It is the protocol stack's responsibility to deliver raw send packets in the correct format for the physical layer. Drivers that support raw sends should assume all raw send packets to be in the correct format for the physical layer.

Functional Addresses

Functional addresses passed to the HSM will be adjusted by the TSM to provide the correct format for the physical layer.

Other Address Format Issues

MAC headers reflect the physical layer format of the media that originated or last transferred the packet. Source routing addresses are always non-canonical.

