Intel® Ethernet Controllers FW LLDP Usage Control

Application Note

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Contents

Revision History

Revision	Date	Comments
1.1	February 07, 2024	Updated Software-Based DCBX Support.
1.0	August 15, 2023	Initial public release.

1.0 Introduction

This document provides an overview of the FW LLDP Agent for Intel® Ethernet Controllers E810 and X710 for server applications.

1.1 Terminology

Table 1. Acronyms and Definitions

Term	Definition
DCB	Data Center Bridging
DCBX	Data Center Bridging Capability Exchange
EVB	Edge Virtual Bridging
ETS	Enhanced Transmission Selection
FW	Firmware
HII	Hardware-Independent Imaging
LLDP	Link Layer Discovery Protocol
LLDPPDU	LLDP Data Unit
MIB	Management Information Bases
PFC	Priority-Based Flow Control
QoS	Quality of Service
SW	Software
UEFI	Unified Extensible Firmware Interface

1.2 Reference

Table 2. Reference Documents and Resources

Title	Location
Intel® Ethernet Controller E810 Datasheet	RDC #613875
Intel® Ethernet Controller X710-TM4/AT2 Datasheet	RDC #596333
Intel® Ethernet Controller X710/XXV710/XL710 Datasheet	RDC #332464
IEEE 802.1Qaz — Enhanced Transmission Selection (ETS)	IEEE Standards Association
IEEE 802.1Qbb — Priority based Flow Control (PFC)	
IEEE 802.1Qbg — Edge Virtual Bridging (EVB)	

2.0 FW LLDP Agent

The FW LLDP Agent can be configured by either the UEFI Driver in HII or by the Base Driver in the OS. The FW LLDP Agent can also be affected by features such as QoS and DCB, in different OS environments. The usage control methods (enable/disable) for different OS environments are described in FW LLDP Agent Control Behavior in OSs.

Intel® Ethernet products support firmware-based DCBX on X710 and E810 firmware. The default status is determined in the firmware NVM configuration.

Intel® Ethernet Product	FW LLDP Agent Default State
E810	Disabled
X710/XL710/XXV710	Enabled

In firmware-based mode, the FW LLDP Agent should be Enabled. The FW LLDP Agent intercepts all LLDP traffic and handles DCBX negotiation transparently for the user. In firmware-based mode, the adapter operates in *willing* DCBX mode, receiving DCB settings from the link partner (typically a switch). The local user can only query the negotiated DCB configuration.

2.1 Software-Based DCBX Support

The capabilities of a software-based DCBX can differ from those of an OS-based driver. In software-based mode, the FW LLDP Agent should be Disabled. The LLDP traffic is forwarded to the network stack and user space, where the software agent handles it. In software-based mode, the adapter can operate in either *willing* or *non-willing* DCBX mode, and the DCB configuration can be queried and set locally.

Software-Based DCBX on Current Intel OOT Base Driver	Windows	Linux	VMware
E810	Supported	Supported	Supported
X710	Unsupported	Supported	Unsupported

NOTE

Software-based mode requires the FW-based LLDP Agent to be disabled and the kernel CONFIG_DCB to be enabled. In VMware, the software DCB agent is enabled by default.

3.0 FW LLDP Agent Control Behavior in OSs

Table 3 shows a summary of the FW LLDP Agent control behavior. Details of the FW LLDP Agent control behavior for each OS operation are in Windows OS, Linux OS, and VMware ESXi OS.

Table 3. FW LLDP Agent Control Behavior

	Windows	Linux	VMware
E810	The FW LLDP Agent setting is based on the configuration of the icea driver, and is independent of the UEFI/HII.	The UEFI/HII and driver have the same LLDP setting and can overwrite the LLDP setting.	The FW LLDP Agent setting for E810 products is based on the configuration of the icen/ESXi. The FW LLDP Agent setting in the UEFI/HII is overwritten by the configuration of the icen/ESXi when booting into ESXi. OS reboot is required when changing the driver configuration.
X710	The FW LLDP Agent setting is based on the configuration in the UEFI/HII. The only way to change the behavior of the FW LLDP Agent in Windows is by using the setting from the UEFI/HII.	The FW LLDP Agent setting is based on the configuration in the UEFI/HII. When the FW LLDP Agent is enabled in the UEFI/HII, it can be disabled and re-enabled in runtime by the i40e driver.	The FW LLDP Agent is enabled only when both the UEFI/HII and the i40en/ESXi configurations are enabled. OS reboot is required when changing the driver configuration.

3.1 Windows OS

In Windows, the X710 series and the E810 series have different designs for FW LLDP Agent control. Details for FW LLDP Agent control for the X710 and E810 are described in X710 and E810.

3.1.1 E810

For E810, the FW LLDP Agent setting is independent from the BIOS/HII and the Windows OS.

The FW LLDP Agent setting is enabled by default in the latest Windows OOT Driver. The mapping property name is NDIS QoS. The NDIS QoS property is used to control the FW LLDP Agent usage.

To determine or change the FW LLDP setting:

1. Go to the NDIS QoS property in the Driver Properties:

   Driver Properties ➢ Advanced ➢ NDIS QoS

2. Ensure that the NDIS QOS Property Value is set to Enabled. See Figure 1.
3. Click **OK**.

Figure 1 shows the NDIS QoS property in the Driver Properties.

Figure 1. NDIS QoS Property in the Driver Properties

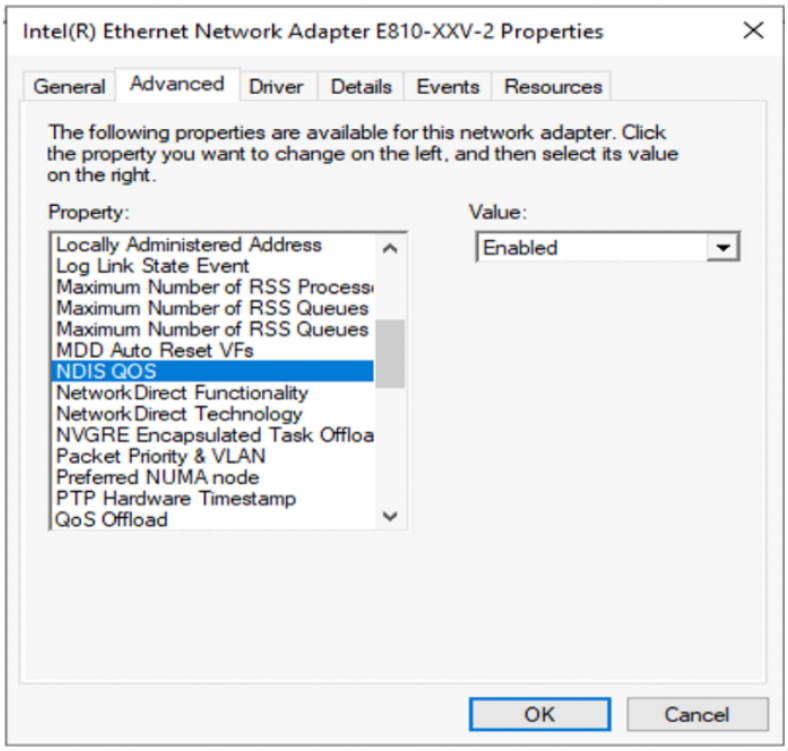

Table 4. Relationship of the NDIS QoS and FW LLDP Settings in HII

NDIS QoS	HII LLDP Agent Status	Windows Driver at Start	Windows Driver at Stop
Enabled	Disabled	Start FW-LLDP Agent The driver sends the following informational message to the system event log: <device_name>: FW-LLDP was temporarily enabled to allow QoS to be enabled.	Stop FW-LLDP Agent The driver sends the following informational message to the system event log: <device_name>: FW-LLDP was set back to be disabled.
Enabled	Enabled	No Action	No Action
Disabled	Disabled	No Action	No Action
Disabled	Enabled	Stop FW-LLDP Agent	Start FW-LLDP Agent

3.1.2 X710

For X710, the FW LLDP Agent setting is based on the configuration in the UEFI/HII. Currently, in Windows, there is no other method to change the behavior of the FWQ LLDP Agent, except in the UEFI/HII.

3.2 Linux OS

Details for the FW LLDP Agent control for the X710 and E810 in Linux are described in X710 and E810.

3.2.1 E810

The FW LLDP Agent configuration for the UEFI driver and the *ice* driver is synchronous on E810 products. When you modify the configuration on either side, the configuration on the opposite side also changes.

1. The **Get** command for *ice* is:

```
ethtool --show-priv-flags <ethX> | grep lldp
```

2. For example:

```
fw-lldp-agent : off
```

3. The **Set** command for *ice* is:

```
ethtool --set-priv-flags <ethX> fw-lldp-agent on|off
```

3.2.2 X710

The FW LLDP Agent setting for X710 products is based on the configuration in the UEFI/HII.

When the FW LLDP Agent is enabled in the UEFI/HII, it can be disabled and re-enabled in runtime by the i40e driver in the OS. However, it does not change the configuration in the UEFI/HII, and the status of the FW LLDP Agent is restored back to the configuration in the UEFI/HII after reboot.

When the FW LLDP Agent is disabled in the UEFI/HII, it cannot be enabled by the i40e Driver in the OS.

1. The **Get** command for i40e is:

```
ethtool --show-priv-flags <ethX> | grep lldp
```

2. For example:

```
disable-fw-lldp : off
```

3. The **Set** command for i40e is:

```
ethtool --set-priv-flags <ethX> disable-fw-lldp on|off
```

3.3 VMware ESXi OS

Details for the FW LLDP Agent control for the X710 and E810 in VMware ESXi are described in X710 and E810.

3.3.1 E810

The FW LLDP Agent setting for E810 products is based on the configuration in the icen/ESXi.

The setting for the UEFI/HII is overwritten by the configuration of the icen/ESXi when booting into ESXi.

The main difference between i40en and icen is that icen supports SW DCB. The characteristics of ESXi require most users to use SW DCB, and SW DCB requires FW LLDP to be disabled. When the FW LLDP configuration is modified in the UEFI/HII, using the icen/ESXi configuration as the main FW LLDP setting helps to avoid SW DCB usage failures.

To enable FW LLDP for E810:

1. In ESXi, use this command to check the status of the FW LLDP Agent:

```
dme-sg | grep icen.*LLDP
```

2. Use this command to change the icen configuration:

```
esxcli system module parameters set -m icen -p LLDP=<value> (0 = disable, 1 =
enable)
```

   For example, this command disables Ports 1 and 2:

```
esxcli system module parameters set -m icen -p LLDP=0,0
```

3. Reboot.

3.3.2 X710

To enable FW LLDP for X710:

1. In ESXi, use this command to check the status of the FW LLDP Agent:

```
dmesg | grep i40en.*LLDP
```

2. Use this command to change the i40en configuration:

```
esxcli system module parameters set -m i40en -p LLDP=<value> (0 = disable, 1
= enable)
```

   For example, this command disables Ports 1 and 2:

```
esxcli system module parameters set -m i40en -p LLDP=0,0
```

3. Reboot.

   The FW LLDP Agent is enabled only when it is enabled in both the UEFI/HII and the i40en/ESXi configurations.