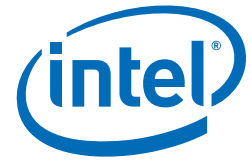


# Technical Brief

Intel® Ethernet Server Adapter X520 Family  
Network Connectivity



## Open Fibre Channel over Ethernet (FCoE) for Linux\*-based Intel® Ethernet Server Adapter X520 Family Adapters

Processor and platform advancements, together with changes in operating systems and applications, have spurred data centers to quickly adopt 10 Gigabit Ethernet (10 GbE) as the de-facto standard for interconnects. By removing the inherent I/O constraints associated with the Memory Controller Hub (MCH) in the latest generation chipsets (5600 series and later), applications that were not technically feasible a few years ago are now becoming mainstream.

One such application is Fiber Channel over Ethernet (FCoE). FCoE is a standards-based solution that includes standards from both FCIA (T11-FC-BB-5) and IEEE Data Center Bridging, DCB ([www.ieee802.org/1/pages/dcbridges.html](http://www.ieee802.org/1/pages/dcbridges.html)), and falls under IEEE802.1Q – Virtual Bridged Local Area Networks. It comprises the following three standards:

- a) 802.1Qbb (Priority Flow Control). This standard enables multiple traffic types such as Ethernet, FCoE, and IPC to share a common Ethernet link. This granularity enables the data center administrator to manage these traffic types independently over a shared Ethernet link.
- b) 802.1Qaz (Bandwidth Management). This standard enables management of the QoS from a network level rather than point-to-point. Administrators can now establish guaranteed bandwidth levels for given traffic types within the DCB cloud.
- c) 802.1Qau (Congestion Management). This standard enables end-to-end congestion management. Pause frames are no longer limited to point-to-point delivery; they can now be sent to the source of the congestion within the DCB cloud.
- d) DCBX (also part of IEEE 802.1Qaz). This standard defines how nodes communicate their enhanced Ethernet capabilities to their link partners with the DCB cloud.

There are three major components within a FCoE-capable network. The end node is a host that contains a 10 GbE adapter that supports the FCoE protocol. The end node is typically connected to a Fibre Channel Forwarding-enabled switch (such as a Cisco\* Nexus\* 5000 or Brocade\* 8000). The Fibre Channel Forwarder (FCF) then connects to traditional SAN and LAN infrastructures

by an Inter-Switch Link (ISL) to the SAN (E-Port), and by trunk ports to the LAN (Spanning-Tree). Recently, multi-hop support has been added to enable an end node to connect with a DCB-capable switch that then connects to a FCF. DCB switches lack the mapping capabilities of the FCF switches but are typically available at lower cost. This will extend the reach of FCoE.

### Industry Support

Intel, a long-time leader in the Data Center Ethernet market has worked with other industry leaders to develop, test, and ratify these standards. The Open FCoE solution with Intel's X520 family of adapters (listed below) has been certified with EMC and Netapp.

- Intel® Ethernet Server Adapter X520-DA2
- Intel® Ethernet Server Adapter X520-SR1
- Intel® Ethernet Server Adapter X520-SR2

### Intel/EMC Support Page

<http://www.intel.com/support/network/adapter/pro100/sb/CS-032048.htm>

### Intel/Netapp Support Page

<http://www.intel.com/support/network/adapter/x520server/sb/CS-031565.htm>

### Feature Introduction

With the Red Hat 6 (RHEL 6) and Novell SLES 11 sp1 releases, Open FCoE ([www.open-fcoe.org](http://www.open-fcoe.org)) is now available through major Linux\* distributions. Intel's X520 family of adapters are fully supported by the Open FCoE stack – the solution developed by the community and embraced by Intel. The X520 family also fully supports the DCB and DCBX ([www.open-ldp.org](http://www.open-ldp.org)) daemons included in the RHEL 6 distribution.

Features supported include:

- Transmit and Receive (Tx – Rx) FC CRC Processing
- Receive Direct Data Placement (DDP)
- Receive Exchange-Id Packet Filtering

## Product Walk-Through

Included in the RHEL 6 and SLES 11 sp1 distribution are user-level command line tools (lldpad, dcbtool and fcoeadm) that make it easy for IT administrators to deploy FCoE. The lldpad utility is used to initiate and configure the Link Layer Discovery Protocol (LLDP). LLDP enables the IEEE Data Center Bridging extensions (DCBx) so that FCoE VLAN discovery, parameter negotiations, and session initiation can be accomplished. The DCB settings on the physical interfaces to be used for FCoE are configured with the dcbtool utility. After configuring the VLAN interface used for FCoE and starting the FCoE service, the fcoeadm tool can be used to create, remove, and inquire about the actual FCoE interface. Please make note of the FC-ID when the FCoE interface is created.

```
root# fcoeadm -i
```

**Description:** 82599EB 10-Gigabit Network Connection

**Revision:** 01

**Manufacturer:** Intel Corporation

**Serial Number:** 001B21606274

**Driver:** ixgbe 2.0.62-k2

**Number of Ports:** 2

**Symbolic Name:** fcoe v0.1 over eth3.100-fcoe

**OS Device Name:** host3

**Node Name:** 0x1000001B21606277

**Port Name:** 0x2000001B21606277

**FabricName:** 0x2064000DECA33A01

**Speed:** 10 Gbit

**Supported Speed:** 10 Gbit

**MaxFrameSize:** 2112

**FC-ID (Port ID):** 0x4A0064

**State:** Online

Additional features include:

- Multi-Fabric Enabled Ports
- Queue Depth Management
- Link Down Timeout Settings
- Manual DCB Settings Option
- FCoE Boot Options
- Statistics

## Example Installation/Configuration Display

Process of installing FCoE on RHEL 6, post install.

1. Add package fcoe-util.x86\_64, This package is included in the RHEL6 GA DVD.
2. Configure FCoE ( Example: eth4).

```
#cd /etc/fcoe/  
#cp cfg-ethx cfg-eth4
```
3. Start lldpad

```
#service lldpad start
```
4. Configure DCB

```
#dcbtool sc eth4 dcb on  
#dcbtool sc eth4 app:fcoe e:1
```
5. Start FCoE

```
#service fcoe start
```
6. Assign an IP address to eth4
7. Check FCoE status

```
fcoeadm -i
```
8. Setup lldpad and fcoe to start when booting

```
# chkconfig lldpad on  
# chkconfig fcoe on
```

## Operating Systems

Red Hat Enterprise Level 6 \*:

\* x86, x86\_64 (or IA32, EM64E)

\*\* 64 bit only

Novell SUSE SLES 11 sp 1

\* x86, x86\_64 (or IA32, EM64E)

\*\* 64 bit only

## Summary

Intel's best-of-breed 10GbE solutions are now available with FCoE capabilities. Customers get world class Ethernet support together with Open FCoE support in main stream Linux distributions in a single adapter.

## Customer Support

Intel® Customer Support Services offers a broad selection of programs including phone support and warranty service. For more information, contact us at [support.intel.com/support/go/network/adapter/home.htm](http://support.intel.com/support/go/network/adapter/home.htm). Service and availability may vary by country.

## For Product Information

To speak to a customer service representative regarding Intel products, please call 1-800-538-3373 (U.S. and Canada) or visit [support.intel.com/support/go/network/contact.htm](http://support.intel.com/support/go/network/contact.htm) for the telephone number in your area. For additional product information on Intel Networking Connectivity products, visit [www.intel.com/go/ethernet](http://www.intel.com/go/ethernet)

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