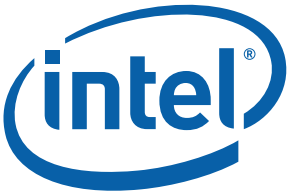

Intel® Ethernet Converged Network Adapter X710/XL710

iSCSI Quick Connect Guide (Red Hat* Enterprise Linux*)

Networking Division (ND)

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Revision History

Revision	Date	Comments
1.0	February 2013	Initial Release (Intel Public).
2.0	December 2015	Refresh with Intel X710 Adapter and RHEL 7.0.

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1.0 Introduction/Intended Audience

This document is a supplement to the Red Hat Enterprise Linux 7 Storage Administrators Guide. It is an introduction to iSCSI storage connectivity from a Linux server administrator's perspective and shows the basic connection from the Linux operating system to an iSCSI storage target. This document shows the connection from a host perspective and the requirements provided by and to the storage and network administrators and is part of a series of iSCSI Quick Connect guides for multiple operating systems. Note that switch and storage configuration are outside the scope of this paper.

Information presented in this document is for experienced system administrators who are familiar with server, network, data center, and SAN storage concepts and technologies.

2.0 iSCSI Basics

iSCSI has been in development since the early 2000s and Intel has been offering iSCSI solutions for over a decade. iSCSI is a proven and powerful Storage Area Networking (SAN) protocol, providing data availability, performance, and ease of use. Being a routable storage protocol, iSCSI imposes no inherent distance limitations and is scalable across LAN and Wide Area Network (WAN) infrastructures.

The iSCSI Qualified Name (IQN) is typically shown as the literal IQN string plus date, reverse domain, and optional text such as storage target name as shown in the example that follows. The IQN or iSCSI name is used when assigning the Logical Unit Number (LUN) on the external storage. In some applications, there is the ability to customize the IQN. Basic iSCSI configuration includes setup of the storage array by creating the LUN and initiator group then assigning the server's iSCSI IQN to that initiator group.

```
        Naming     String defined by
 Type  Date    Auth      "example.com" naming authority
+--++-----+ +------+ +------------------------+
```

iqn.1998-01.com.microsoft:myservername-123abc0

3.0 Administrative Ownership

Basic iSCSI connectivity touches three technology disciplines: server, network, and storage. The server administrator provides the IQN to the storage administrator and sets up the host with an IP address provided by the network administrator. Besides IP assignment, the network administrator ensures the network is setup end-to-end. The storage administrator creates the LUN and host entity then assigns each to a storage group to create the LUN masking and provides the target IQN to the server administrator. A single host in a host record implies LUN masking.

Table 1. Administrative Ownership Table

Server Administrator	1. Assign the IP address provided by the network administrator. 2. Identify the host IQN. 3. Provide the space requirements, IQN, and IP address to the storage administrator. 4. Set the discovery IP address for the host's basic storage connection. 5. Set up the host for any security policies. 6. Format and assign the drive identifier on the host.
Network Administrator	1. Assign the host IP address to the server administrator. 2. Register the IP address into the DNS. 3. Ensure end-to-end IP connectivity between the host and storage array.
Storage Administrator	1. Create a host record. a. Assign an IP address to the host record. b. Assign an IQN to the host record. 2. Create a LUN/target. 3. Create a storage group. a. Assign a host record to the storage group. b. Assign the LUN to the storage group.

4.0 Network Setup

The network administrator owns IP address assignment, network switch port configuration, and end-to-end connectivity between the storage array and the server. Because iSCSI data traffic is routable with network speeds now ranging up to 40 Gb/s, the network administrator must understand the data flow and architecture of the data center to best place servers for optimal performance. Coordination of the technical resources is imperative for a successful implementation.

5.0 Obtaining the IQN and IP Address in Linux

This section describes how to obtain an IQN using the Red Hat Linux operating system.

1. At the Command Line Interface (CLI) prompt enter `cat/etc/iscsi/initiatorname.iscsi` as shown:

```
[root@localhost]# cat /etc/iscsi/initiatorname.iscsi
InitiatorName=iqn.1994-05.com.redhat:1cfe5eddf5f
[root@localhost]#
```

2. Enter `ifconfig` at the prompt to obtain the IP address as shown:

```
[root@localhost]# ifconfig enp2s0f0
enp2s0f0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.100.213  netmask 255.255.255.0  broadcast 192.168.100.255
        ether 00:00:00:00:03:14  txqueuelen 1000  (Ethernet)
        RX packets 615  bytes 64410 (62.9 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 24  bytes 3079 (3.0 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
[root@localhost]#
```

3. The server administrator provides both the IQN and the IP address to the storage administrator. The storage administrator then uses the IQN and IP address to assign a LUN to the host.

4. As an optional step, Intel recommends that programmers verify that the software device driver and NVM image are the most current as shown:

```
[root@localhost]# ethtool -i enp2s0f0
driver: i40e
version: 1.3.47
firmware-version: 4.53 0x80001dc0 0.0.0
bus-info: 0000:02:00.0
supports-statistics: yes
supports-test: yes
supports-eeprom-access: yes
supports-register-dump: yes
supports-priv-flags: yes
[root@localhost]#
```

6.0 Red Hat Linux 7.0 Operating System Setup

This section describes the server steps that must be done once the storage administrator has created the storage target. The storage administrator provides the target IP address and IQN once the target has been created. Note that all commands comply with the open-iscsi.org syntax.

1. Return to the CLI and enter command set `service iscsi restart` to ensure the iSCSI service is running as shown:

```
[root@localhost]# service iscsi start
Redirecting to /bin/systemctl start  iscsi.service
[root@localhost]#
```

2. Enter command set `iscsiadm --mode discoverydb --type sendtargets --portal 192.168.25.250 -discover` to discover record targets on the given port 192.168.25.250 as shown:

```
[root@localhost]# iscsiadm --mode discoverydb --type sendtargets --portal
192.168.100.226 --discover
192.168.100.226:3260,1 iqn.1991-05.com.microsoft:fmsnet16-iscsi-qc-target
[root@localhost]#
```

3. Use the IQN provided by the storage administrator to enter command set `iscsiadm --mode node --targetname iqn.1992-04.com.emc:cx.apm00101001768.a8 --portal 192.168.25.250 --login` to login to the portal as shown

Note: A login to the incorrect portal results in a failure.

```
[root@localhost]# iscsiadm --mode node --targetname iqn.1991-
05.com.microsoft:fmsnet16-iscsi-qc-target --portal 192.168.100.226 -login
[root@localhost]#
```

4. Verify the attached iSCSI LUNs and other related information for the iSCSI session by running command `iscsiadm -m session -P 3` as shown. Note that there are four session types: 0 (default), 1, 2, and 3. Also, session type 3 shows any attached SCSI devices plus the information from each of the other session types.

```
[root@localhost]# iscsiadm -m session -P 3 (Output truncated)
iSCSI Transport Class version 2.0-870
version 6.2.0.873-21
Target: iqn.1991-05.com.microsoft:fmsnet16-iscsi-qc-target (non-flash)
    Current Portal: 192.168.100.226:3260,1
    Persistent Portal: 192.168.100.226:3260,1
        **********
        Interface:
        **********
        Iface Name: default
        Iface Transport: tcp
        Iface Initiatorname: iqn.1994-05.com.redhat:1cfe5eddf5f
        Iface IPaddress: 192.168.100.213
        SID: 1
```

```
        iSCSI Connection State: LOGGED IN
        iSCSI Session State: LOGGED_IN
        Internal iscsid Session State: NO CHANGE
        ************************
        Attached SCSI devices:
        ************************
        scsi6 Channel 00 Id 0 Lun: 0
           Attached scsi disk sdcState: running
    Current Portal: 10.19.253.226:3260,1
    Persistent Portal: 10.19.253.226:3260,1
  [root@localhost]#
```

5. Use the `fdisk` command to create a primary partition on the attached SCSI device found in the previous step using command set `fdisk /dev/sdc` as shown:

```
[root@localhost]# fdisk /dev/sdc

Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them. Be careful before
using the write command.

Command (m for help): x

Expert command (m for help): b
Partitioning number (1-4): 1
New beginning of data (1-8388607, default 63)
Using default value 63

Expert command (m for help): p

Disk /dev/sdc: 133 heads, 62 sectors, 1017 cylinders
Nr AF  Hd Sec  Cyl  Hd Sec  Cyl     Start      Size ID
 1 00   0   1    0 254  63 1023      63        8388607 ee
 2 00   0   0    0   0   0    0       0        0 00
 3 00   0   0    0   0   0    0       0        0 00
 4 00   0   0    0   0   0    0       0        0 00

Expert command (m for help): w
The partition table has been altered

Calling ioct() to re-read partition table
Syncing disks
[root@localhost]#
```

6. Make and mount the file system like any other new system drive.

7.0 Summary

The Intel® Ethernet Converged Network Adapter X710/XL710 10 GbE and 40 GbE solutions fully support a wide range of storage capabilities. Customers get the ease of Ethernet support along with Linux iSCSI storage support in a single adapter.

For more configuration information about iSCSI on Intel® Server Adapters refer to the Intel® Ethernet Unified Networking for iSCSI or the Intel® XL710/X710 product briefs.

For more Linux iSCSI command sets go to http://www.open-iscsi.org/docs/README or refer to the Red Hat Enterprise Linux 7 Storage Administration Guide.

For more configuration information about Intel® Server Adapters go to http://www.intel.com/support/network/sb/cs-009715.htm.