

Boot from iSCSI SAN

Tim Chung

Version 1.1 (MAR, 2009)

QSAN Technology, Inc.
<http://www.qsan.com.tw>
White Paper# **QWP200907-P150C**

Introduction

What is Boot from SAN (Storage Area Network)?

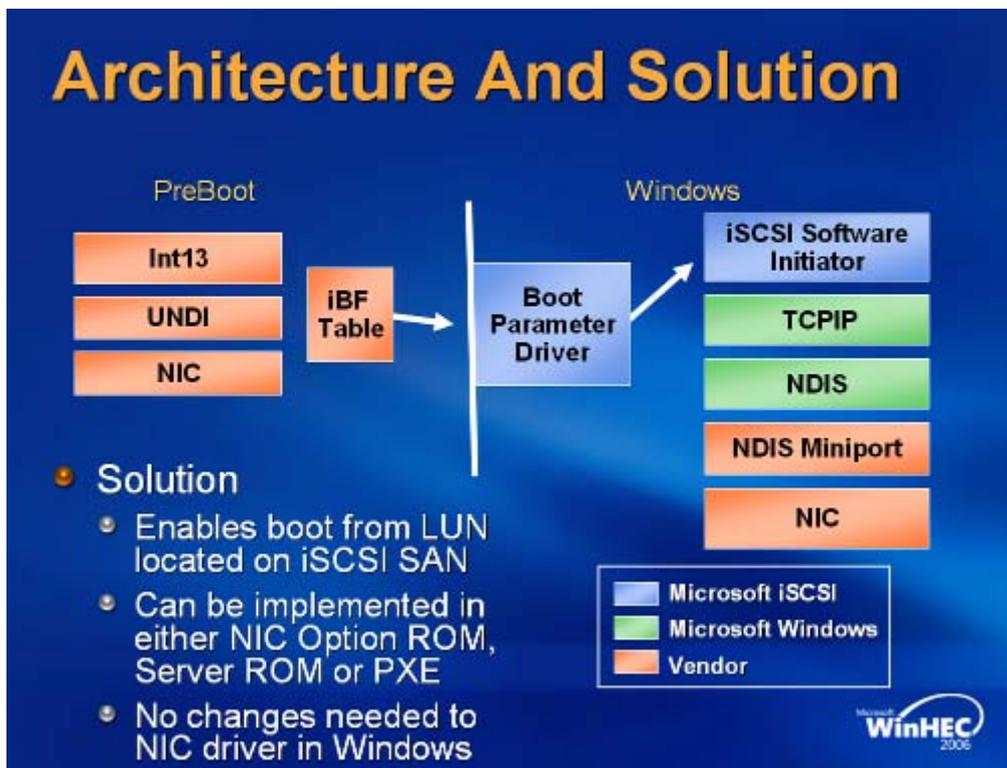
Traditionally, computers boot their operating system from a local disk. Boot from SAN technology enables computers to boot from a RAID unit which located on the SAN. No matter what it's a fibre channel SAN or IP SAN. Booting from SAN enables the deployment of diskless computers; it also can enable organizations to minimize the equipment costs, maximize consolidation of the IT resources, and realize the considerable management benefits of centralizing the boot process.

In this document, it describes how to boot from iSCSI SAN. At the beginning of this technology, it needs a bootable iSCSI HBA to implement. Although iSCSI HBA is expensive, users would refuse to use.

Today, there is a cheaper way to implement this technology. It integrates the **iSCSI remote boot** feature on NIC (Intel or Broadcom) and **bootable iSCSI initiator** on Windows Server 2003 or 2008. Using an Intel network adapter with iSCSI remote boot feature can replace the expensive iSCSI HBA and using the software of bootable iSCSI initiator can make booting from iSCSI more affordable. In the following description, Intel NIC and **Microsoft iSCSI initiator BOOT VERSION 2.08** will be demonstrated and using both of them will achieve the goal.

PXE boot

The term PXE stands for **Pre-boot eXecution Environment** which is an extension of Intel **RPL (Remote Program Load)**. It allows a workstation to boot from a server on a network instead of booting from its local hard drive.



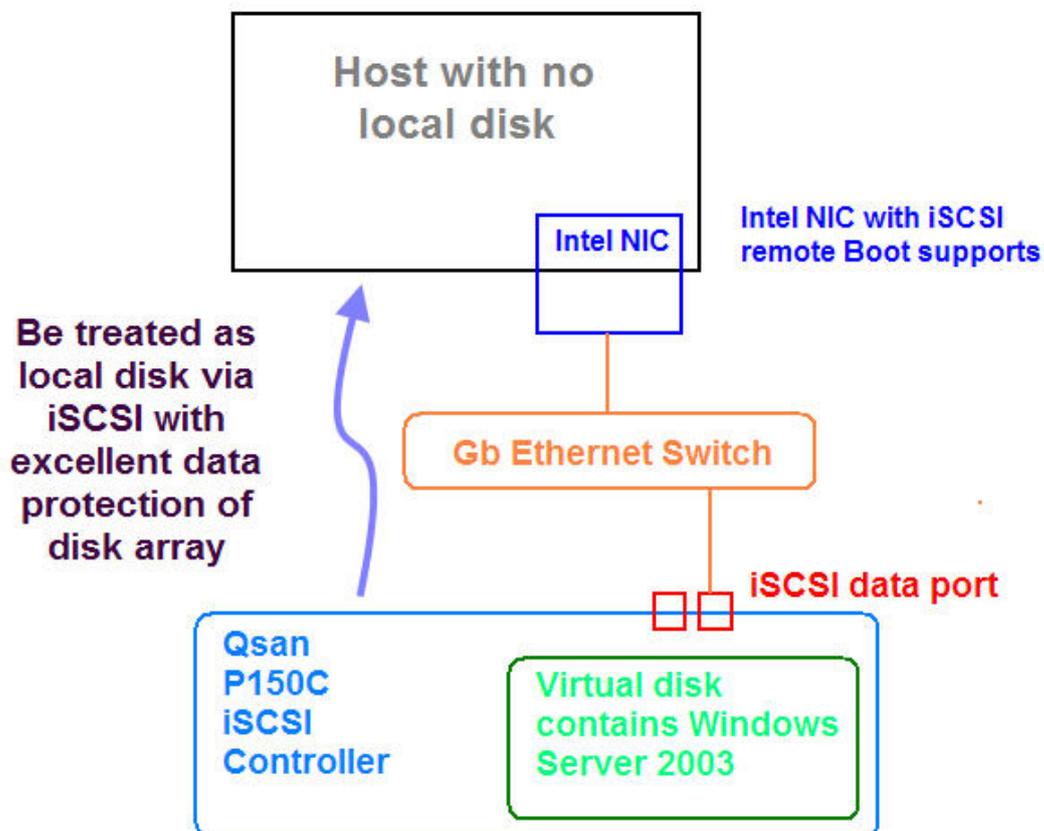
iSCSI remote boot scenario

Use the network adapter with iSCSI remote boot feature to establish an iSCSI session to the target disk which includes the Windows image. Once the OS (operating system) has bootstrapped enough to load the iSCSI software initiator, there is a hand-off. The iSCSI software initiator establishes its own session to the target and continues loading the rest of the Windows operating system. Currently, Windows Server 2003 and Windows Server 2008 support this technology.

Environment

- Host OS:** Windows Server 2003 R2
- iSCSI initiator:** Microsoft iSCSI initiator BOOT VERSION 2.08
- NIC:** Intel Pro/1000 PT dual port
- iSCSI target:** QSAN P150C
- RAM:** 1GB DDR2-533
- Firmware:** 1.1.4 (20081212_1700)
- iSCSI data port:** 192.168.11.150/24

Diagram



Installation

Part 1: Flash Intel NIC boot ROM for iSCSI remote boot

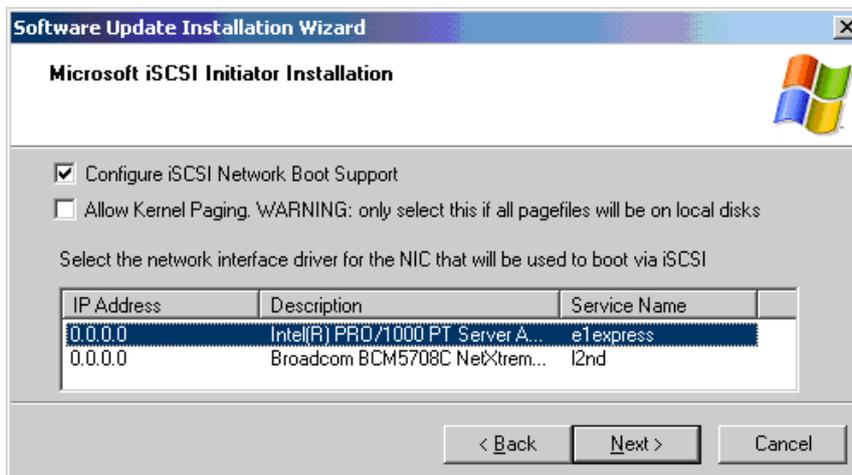
1. Please refer the URL in Reference. Download **Intel iSCSI Remote Boot Setup Utility** (ISBoot.exe) and install it. The `\iSCSIUt\NDOS\iscsiutl.exe` is a DOS utility for updating the adapters' FLASH ROM.
2. Copy the **iscsiutl.exe** to a bootable floppy disk. Install Intel NIC and boot the host with the floppy disk.
3. After booting from the floppy disk, run the following command to flash the ROM on Intel NIC.

```
A:\>iscsiutl -all -up
A:\>iscsiutl -all -flashenable
A:\>iscsiutl -nic=1 -bootpriority=primary           // Set boot priority of
                                                    // port 1 to primary
                                                    // you want to boot first.
A:\>iscsiutl -nic=2 -bootpriority=disabled         // Disable unused port.
```

4. Done. Nowadays, Intel NIC supports iSCSi remote boot.

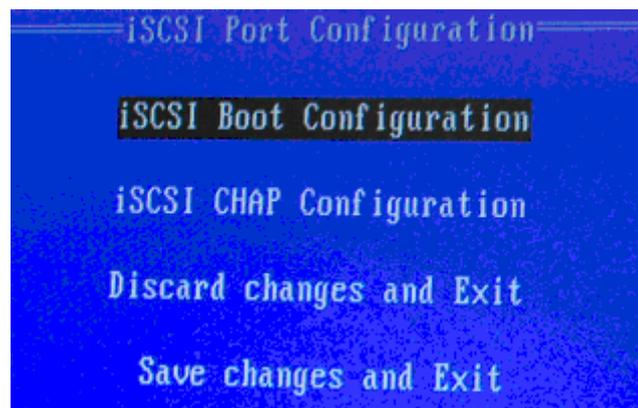
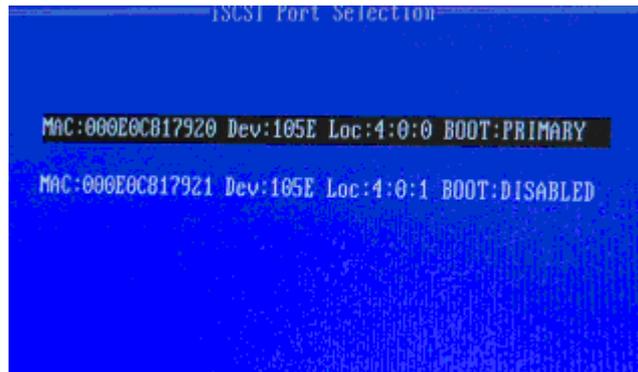
Part 2: Install Microsoft iSCSI initiator BOOT VERSION

1. If Windows Server 2003 is running SP1 or older, please install Microsoft Hotfix for Windows Server, KB902113 NDIS QFE. Windows 2003 SP2 already contains the QFE.
2. Please refer the URL in Reference. Download **Microsoft iSCSI initiator BOOT VERSION 2.08** and install it. During installation, please select the Intel iSCSI Remote Boot-capable Gigabit Network Adapter as the NIC.



Configuration

1. Power on host. When the message "Press <Ctrl-D> to run setup..." is displayed on the screen, press **Ctrl-D** key to get into the Intel iSCSI Remote Boot Port Selection setup menu.
2. Choose the port which will be configured. Set the necessary information on each configuration items including iSCSI initiator, target information and CHAP settings.



3. Save and reboot the system.
4. Create a volume in **QSAN P150C**, and then attach a LUN. The volume is created for boot from iSCSI target.
5. Clone the local disk image to iSCSI target. For example, using **dd** command in Linux is a simple method to copy Windows image into iSCSI target.
6. Shutdown the system and remove all local disks in it. Boot up the system again, and it would be successful to get a diskless system.

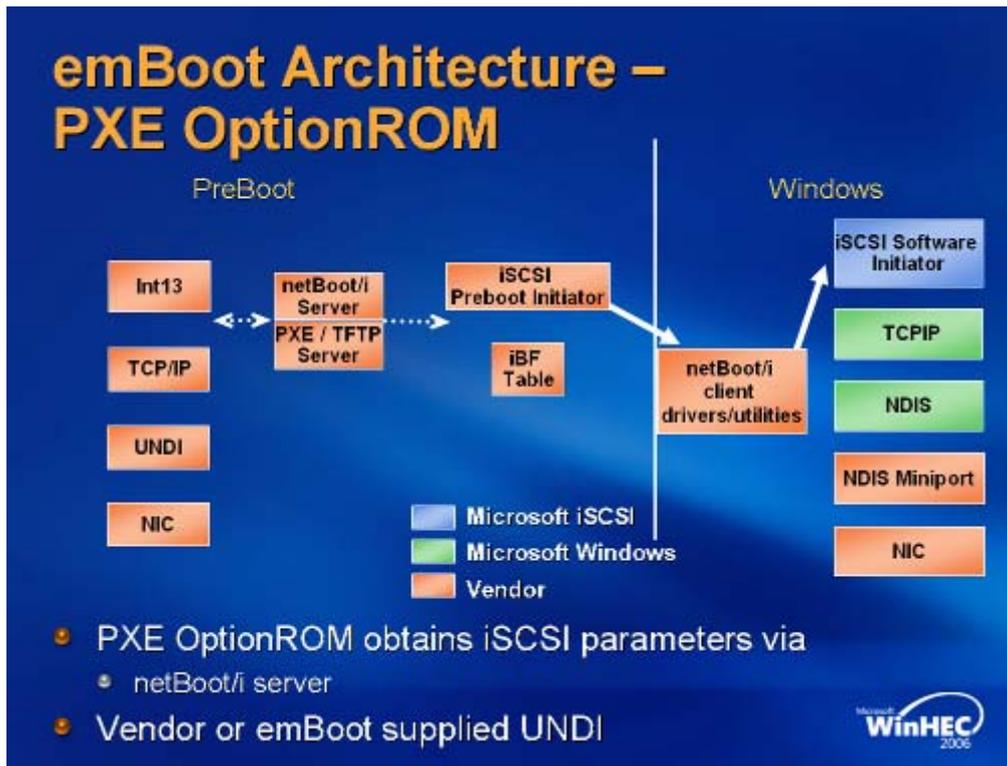
Other solution

Solution 1: netBoot/i

netBoot/i from Double-Take Software allows for the booting of servers from iSCSI storage with existing (PXE-enabled) Ethernet adapters. netBoot/i offers simplified

recoverability, fast deployment, powerful provisioning and is blade ready and virtual machine friendly.

netBoot/i allows for the booting up of multiple Windows and Linux operating systems, including Windows Server 2000/2003/2008, XP Pro, Vista Enterprise, 2000 Server, and 2000 Pro (32 and 64-bit); as well as Suse Linux Enterprise Server, OpenSUSE, and Red Hat Enterprise Linux. It leverages (and requires) the vendor's own iSCSI initiator. The netBoot/i Service runs on Windows Server 2000/2003/2008, 2000/XP Pro, Vista, and Linux (same as the clients).



Summary

Generally speaking, the diskless system is implemented on some mission-critical servers because the cost of creating a diskless system is expensive. Now there is a cheaper solution to implement boot from iSCSI SAN technology. If combining the iSCSI remote boot and **QSAN QShare** technology, it will be a very good solution to apply to Internet café, computer teaching class, laboratory...etc. With the help of iSCSI remote boot, each client does not have to install a local disk. Using **QSAN QShare**, each client can share the same OS image and users will never know. Since users can still read/write data just like they are using a local disk. No matter how users violate the data, reboot the system and users will get a brand new one. The most wonderful thing is that if the administrator wants to update any patch for OS, games, software...etc, the administrator has to do it one time. When users login next time, they will get an updated system. What a great solution!

Applies to

- All **QSAN P series** controllers FW (20081212_1700)

References

- Wikipedia – Preboot Execution Environment
http://en.wikipedia.org/wiki/Preboot_Execution_Environment
- Intel iSCSI Remote Boot
<http://www.intel.com/network/connectivity/products/iscsiboot.htm>
- Intel iSCSI Remote Boot FLASH ROM Utility
<http://www.intel.com/support/network/adapter/pro100/sb/CS-023748.htm>
- Download page of Microsoft iSCSI initiator.
<http://www.microsoft.com/downloads/details.aspx?FamilyID=12cb3c1a-15d6-4585-b385-befd1319f825&DisplayLang=en>
- Users Guide for Microsoft iSCSI initiator.
<http://download.microsoft.com/download/A/E/9/AE91DEA1-66D9-417C-ADE4-92D824B871AF/uGuide.doc>
- Microsoft Announces Availability of Windows Storage Server 2003 R2 with OEM Partners.
<http://www.microsoft.com/presspass/press/2006/apr06/04-04SNWPR.msp>
- netBoot/i – Double-Take software
<http://www.doubletake.com/english/products/netBoot-i/Pages/default.aspx>