

# iSCSI Boot Functionality: Diskless Booting Enables SANlike Benefits at Lower Costs

Broadcom Corporation and Fujitsu Siemens Computers GmhH Dated: June 2007



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# 1 Broadcom® iSCSI Boot Functionality

### 1.1.1 Background and Overall Benefits:

One of the recent storage technologies to rise within the datacenter is iSCSI boot functionality. iSCSI boot is a process whereby the operating system is initialized from a remote storage disk array across a storage area network (SAN) rather than from the locally attached hard disk drive. The functionality reduces the datacenter's total cost of ownership by contributing to lower power consumption, better solution performance, localized patch management and real estate cost savings. Enabling SAN-like benefits at attractive costs, this diskless booting option is now available through the omnipresent and ubiquitous low cost Ethernet fabric via Broadcom's leading-edge converged network interface controller (C-NIC) technology first introduced in 2004.

A key benefit of iSCSI boot is that it localizes hard disk drive errors and contains them. With iSCSI boot functionality, the operating system is booted from the SAN and the local hard disk drives will then be recommended for SWAP files and crash dumps. This provides, tremendous benefits to blade servers and virtualization computing server environments relating to RAID management and consolidated external storage.

As disk storage space for mobile and thin clients has increased via remote access to these dedicated storage spaces, iSCSI boot functionality provides an avenue and a giant step beyond conventional boot options such as PXE, BOOTP and RPL, enabling better security, storage and patch management being a standards-based solution.

### 1.1.2 Implementation:

In implementing iSCSI boot functionality, it is typically loaded on the initiator (and represents the diskless client). The physical hard drive is removed from the client system and resides on an iSCSI target.

# 2 Broadcom's iSCSI Boot Functionality

### 2.1.1 Introduction

In May 2004, Broadcom introduced the world's first C-NICs as part of the company's NetXtreme® family of controllers and the first to simultaneously perform accelerated data networking, high performance clustering, storage networking and remote system management, all on a single Ethernet fabric from a single-chip solution. By integrating TCP acceleration, remote direct memory access (RDMA), iSCSI block storage and remote



system pass-through functions, Broadcom® NetXtreme controllers can run four disparate network functions over a single, converged Ethernet fabric.

#### Comparison



With the convergence of high-speed networking, storage, clustering and remote management on a standard Ethernet network, end users can significantly reduce cost by leveraging the existing IT infrastructure. A standard server equipped with current Ethernet controllers cannot efficiently run network, storage and cluster traffic simultaneously over Ethernet, as it takes a significant portion of the CPU's processing power to operate the network at the full line rate. NetXtreme controllers bring the necessary performance to run these network functions over a single, converged fabric on today's server platforms.

In review of C-NIC technology, TCP acceleration shifts the Ethernet protocol processing overhead from the host CPU to the network controller, freeing up the CPU and memory resources, thus allowing increased network throughput. iSCSI functionality enables low-cost networked storage capabilities over an existing Gigabit Ethernet infrastructure (i.e. network cabling, switches, and routers). RDMA technology enables high performance server clustering and eliminates the burden of excessive memory copies when communicating between servers. The embedded in-band management pass-through technology allows for remote control of a server over a single network connection.



Broadcom's C-NIC technology eliminates the high up-front acquisition costs of adding storage networking to a server and delivers the same benefits of any SAN including better manageability, higher availability and lower cost of ownership. It removes the high acquisition costs usually associated with deploying a SAN or purchasing a separate server for storage networking applications.

iSCSI boot functionality is one of the major building blocks for enabling IT with a standard Ethernet-based infrastructure for data, storage and networking traffic. By combining these networking and storage functions in a single C-NIC device, Broadcom demonstrates that iSCSI functionality can now be cost-effectively and broadly adopted as part of a standard server's data networking system. Servers equipped with NetXtreme controllers are now able to connect to SANs via iSCSI boot capabilities under Windows® and Linux® operating systems

Fujitsu Siemens Computers and its technology partner Broadcom collaborated to provide an iSCSI boot solution that is easy-to-use and customer-friendly, and enhances an IT department's' iSCSI boot process experience. As a result, Broadcom's iSCSI boot functionality will be seamlessly integrated in the Fujitsu Siemens Computers Server Management Suite for easy and secure operation.

Another feature of Broadcom's iSCSI boot functionality is the multiple boot agent (MBA) which is an industry standard optional read-only memory (OPROM) that allows the end-user to select the method for booting the system using the network controller. The MBA supports multiple boot methods (currently PXE, bootp, RPL, and iSCSI) and is responsible for loading the correct software to accomplish the requested boot, hooking into the system BIOS boot chain (BBS, Int18h, Int19h, etc.), and starting the boot process.

The Broadcom NetXtreme family of high-speed controllers supports network access through the industry standard universal network driver interface (UNDI). The UNDI driver is typically used when booting a system via PXE but can also be used to support general network access. Broadcom's iSCSI boot functionality takes advantage of the existing UNDI driver as part of the boot process.

Various editions of Windows 2003 Servers support iSCSI boot and the 2008 Server edition will include Broadcom iSCSI boot support as part of its debut. The iSCSI boot was designed from the ground-up to support Microsoft iSCSI boot specifications. Native iSCSI initiators are supported by Linux versions which will be released in future Linux driver releases. To ensure interoperability, Broadcom's solution within Fujitsu Siemens Computers Systems has been validated against current major target shipping solutions of NetApp, EMC<sup>2</sup>, FibreCAT NX40 and WinTarget.



- Supported PRIMERGY servers
  - RX100 S4 / RX200 S3 / RX300 S3 / TX150 S5 / TX300 S3
  - **D** BX620 S3 / BX630
  - RX220 / RX330 S1
  - □ BX600 LAN I/O card based on Broadcom 5708
  - □ BX620 S4 (3x 5715 chips)

### 2.1.2 Features and Benefits

Broadcom has worked closely with Fujitsu Siemens Computers to understand IT customer needs. As a result of customer input, additional capabilities have been incorporated to make the iSCSI boot function and the setup graphical user interface (GUI) cleaner and easier to use.

- a. Two iSCSI targets have been provided in Broadcom's iSCSI boot solution.
  - i. One can be configured as a primary and fail-over target
  - ii. If login to the first target fails, then login to the second target
- b. CHAP
  - i. One-way and mutual authentication
- c. iSCSI Initiator and Target information
  - i. Statically configure network and iSCSI parameters
  - ii. Obtain network parameters via DHCP (dynamic host configuration protocol) and configure iSCSI parameters statically
  - iii. Obtain network and iSCSI parameters via DHCP
- d. iSCSI target redirection is supported.
- e. Banner message timeout has been provided to allow IT administrators to specify how much time to wait for user to enter the configuration menus and helps in customizing the speed of boot process for the respective settings.
- f. Link speed configuration allows user to force a speed.
- g. VLAN has been provided to extend the greater security and configuration options for IT administrator.
- h. Link up time delay has been provided to accommodate some targets that may need extra time to initiate on-line if powered on at the same time as the server/client system.

### 2.1.3 iSCSI setup configuration

The iSCSI setup configuration utility has also been made available to end customers and can replace or used in conjunction with iSCSI setup screens. Broadcom and Fujitsu Siemens Computers, working with



our customers, found it to be useful for silent installations or remote configurations. Features include call level interface (CLI) based operations, recording iSCSI parameters to a file and configuring iSCSI parameters from a file

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