NAS 7825, Next Generation Multi-functional Networked Storage Solution

Key Benefits

Unique Trident architecture including dual-core ARM 11 MP each core running at 750 MHz, application specific hardware engines for networking, storage, and security, and highly structured firmware for the highest performance at the lowest system cost

Enable innovation and rapid market footprint expansion into new generation of "NAS related" products such as routers, gateways, PVR/DVR, and set-top boxes

Highly optimized for media applications such as streaming multiple HD videos, music, and photos, content management, and many more

Security engine for encryption with hashing functionality for enhanced security

Booting from HDD without Flash for the lower BOM cost (support of Flash is optional)

Two integrated SATA3G/s ports with RAID0, RAID1, and JBOD support in hardware

Rich set of interfaces: 2xUSB2.0, UART, JTAG, 2xPCIe, and 2xRGMII

Supported file system: SMB, XFS, EXT3, and NTFS (Read)

Support of many third party application partners for media serving, remote access, back-up, and media content management

The Evolution of the Consumer Market

The digital lifestyle is going through major changes. More and more people are self-creating, purchasing, and downloading digital contant (video, photo, and music) than any time before. This explosion of digital content demands a fresh approach to consumer content storage, security, and management.

We are now witnessing the third wave of the consumer digital revolution. The first wave was the introduction of the internet into the home. The second wave was the mainstream adoption of handheld mobile devices such as smart phones and MP3 players. The third wave is the demand of consumers to access their content from anywhere, anytime, and from any device securely and reliably. This requires fresh thinking into consumer content storage.

This emerging environment presents new challenges/opportunities to system designers, as these new consumer devices must now evolve from a one-dimensional model of a single user/application to a sophisticated, multi-client model running simultaneous applications.

Long gone are the times that the conventional "cranking up" of the processor clock could effectively meet the new requirements and cost structure of the consumer storage market. There are two orthogonal requirements: on one hand, these new SoCs should provide high performance in a multi-application and user environment. At the same time, meet the cost sensitive requirements of the consumer market. This requires a new architectural approach.

PLX NAS 7825 brings a new architectural approach to consumer NAS system on a chip (SoC)

For years the conventional approach to SoC design has been the bigger hammer approach. To improve the performance, increase the clock speed of the processor. This approach has not been unique to the consumer NAS market but more of a general semiconductor industry approach.

The PLX 7825 changes the game by a holistic view of the overall system architecture. It uses the PLX Trident architectural approach:

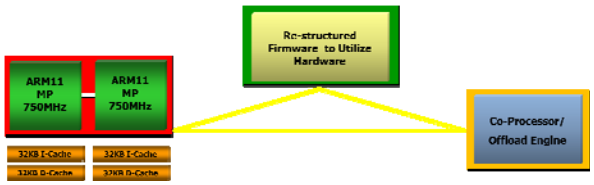


Figure 1: Trident Architectural Approach

1. Processor still is a key part of the overall architecture. However, the new applications, particularly the media applications, have unique and stringent requirements such as low jitter and high QoS. The common single core processors simply cannot meet these requirements effectively regardless of how fast the processor clock is running. On the other hand, the dual core architecture has significant advantages in:
   - Simultaneously running multiple applications
   - Performance intensive applications
   - Multi-threading kernels such as Linux
   - Flexibility in processor resource allocation. For example, each core could be dedicated to specific application or load-sharing and balancing
   - Independent I & D cache reduces cache pollution improved power/performance ratio particularly in media application processing

2. Application specific hardware offload engine. The PLX NAS 7825 has taken this approach to the next level. By analyzing the performance funnel, and indentifying the key areas and applications with intensive processing requirement, the product has implemented hardware engines to relieve the processor and the internal bus from intensive processing and system traffic. Hence this improves the overall system performance with better processor utilization (i.e., higher throughput per CPU clock) reduces internal traffic within the SoC, and better cost structure due to less processor demand. PLX NAS 7825 utilizes hardware offload engines in networking, security, and storage (i.e., RAID & SATA) areas.

3. What integrates all the sub-systems together as a cohesive system is restructured firmware. The key design criterion is to fully utilize and bond all the system hardware via highly optimized firmware. Simply said, optimized firmware to utilize hardware modules. This is the most challenging part of the overall system architecture. The PLX NAS 7825 has taken this approach to the next level by providing the industry's highest optimized firmware for consumer storage.

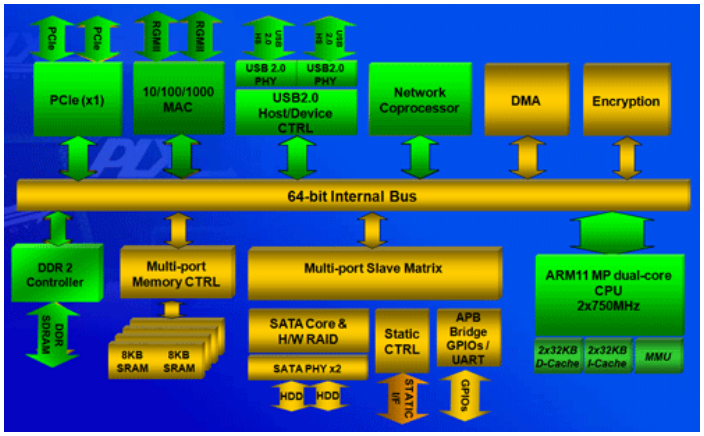


Figure 2: NAS 7825 architecture overview

Enabling innovation and expansion into new markets

The concept of networked storage is expanding into many other consumer devices such as routers/gateways, set-top boxes, and PVR/DVRs.

These new devices need to take additional roles over traditional NAS. For example, they need to provide routing, access point services, VoIP, NAT to name

just a few. This requires that this new generation of multi-functional SoCs provide the right performance, interfaces, and cost structure.

PLX NAS 7825 is the first SoC that has been designed from the bottom up to meet the challenges of these new markets.

Full feature-set

The PLX NAS 7825 has rich feature rich set. Here is a features summary:

- Highly integrated consumer NAS SoC for the lowest BOM cost
- Unique PLX Trident architecture including dual-core ARM 11 MP each core running at 750 MHz, application specific hardware engines for networking, storage, and security, and highly structured firmware
- Hardware security engine with AES-128/256 bit based encryption with hashing function support for fast and secure connection and enhanced security
- 8 channel DMA controller
- 64-bit wide internal bus
- 2 integrated SATA3G/s ports with hardware RAID 0 and RAID 1 engine
- SPI serial NOR flash and SLC and MLC NAND support
- Flexible boot modes:
    - Direct from HDD (no flash needed) for low BOM cost
    - NOR/HDD or NAND
- Integrated fan controller and PWM
- Full set of interfaces including: 2xRGMII, 2xUSB2.0 H/D, UART, JTAG, and 2xPCIe
- In order to provide the best class of applications, PLX has partnered with key leading application vendors. These applications are fully tested and integrated so each one could be independently offered based on the marketing and product requirements of each customer.

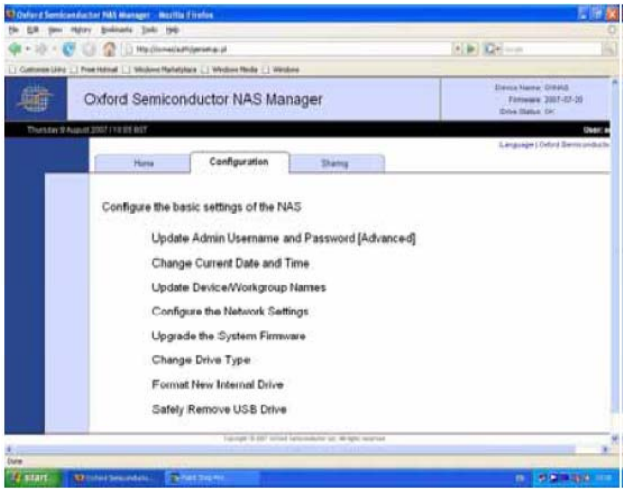
Complete Rapid Development Kits (RDK)

Hardware

- Development board for product demo and rapid product development
- Reference design schematics for reduced time-to-market

Software Development Kit (SDK)

- Advanced software development tools including source package and script for Linux kernel, bootloader, root file system, and web pages
- Compliers, drivers, and complete documentation
- Full source code to facilitate product differentiate and customization by enabling vendors to modified supplied modules or create new functional modules
- Complete turn-key solution for fast-time-to-market
- Rich third party application environment for media serving (uPnP and DLNA compatible), content management, back-up, remote management, and many more



Additional PLX advantages

- Superior storage expertise
- Custom support team for each customer for fast time-to-market
- Turn-key SDK with full feature set
- Schematic and Layout Design Reviews