# Marvell Solutions

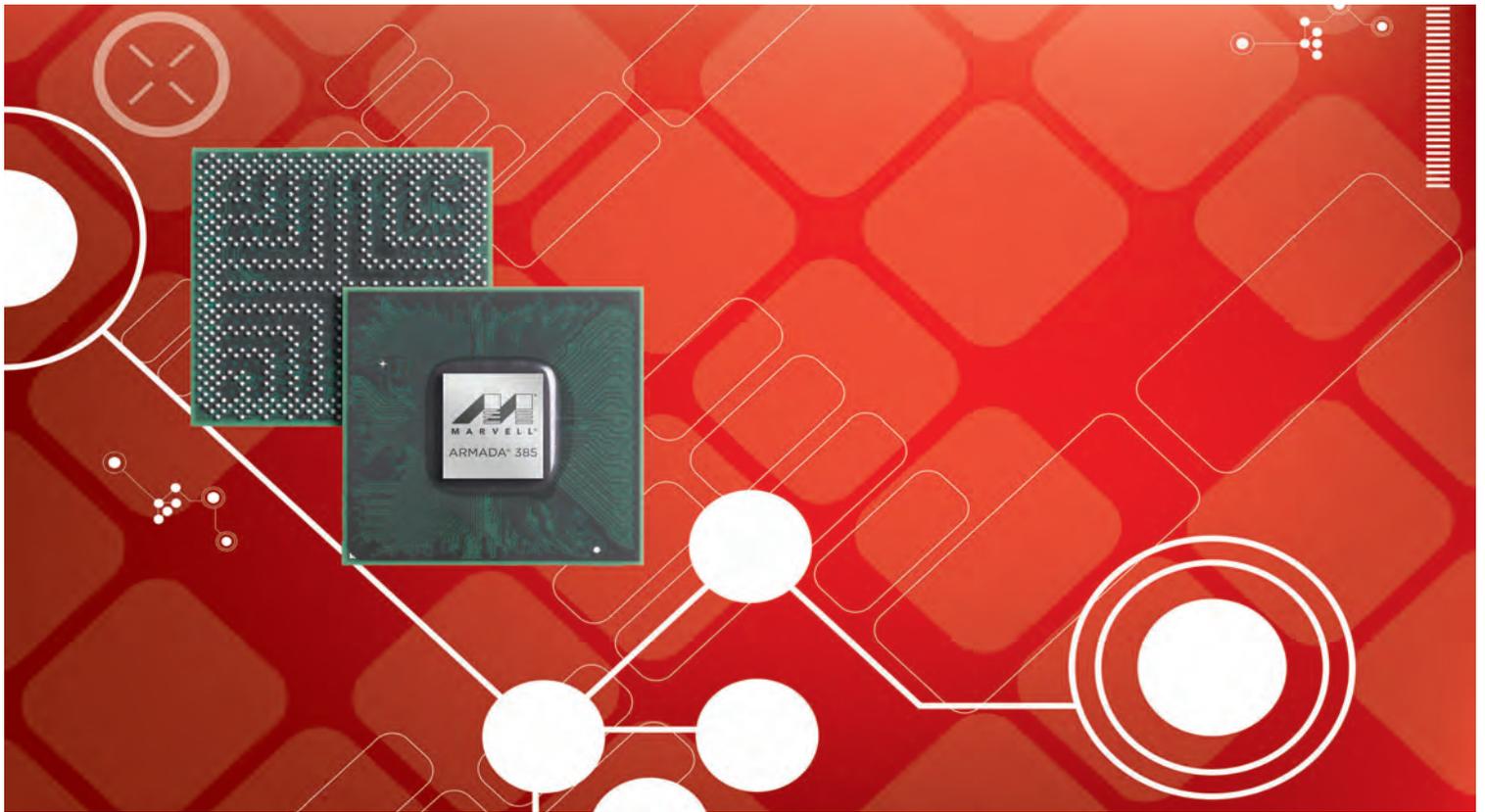# Solutions Guides

## featuring

## ARMADA® Embedded SOCs
## and
## Prestera® Switches

# Application Examples

## ARMADA® Embedded SOCs

# Two/Four-Bay NAS Server
ARMADA 385/388 SOLUTION BRIEF

## OVERVIEW

ARMADA® 380 Family is a complete system-on-chip (SoC) solution based on the ARM® Cortex™ A9 high-performance dual core CPU technology. The ARMADA 380 Family brings a new level of performance, integration, and efficiency, while enabling a simple, affordable system design. With its advanced architecture and integrated peripherals, the ARMADA 380 Family is ideally suited for a wide range of applications such as network attached storage (NAS), enterprise access point, surveillance video recorders (DVR/NVR/Hybrid) and high-performance networking products such as control planes and line cards. ARMADA 380 family consists of three pin-compatible devices: 1) Single-core Cortex A9-based ARMADA 380 2) Dual-core Cortex A9-based ARMADA 385 3) Dual-core Cortex A9-based ARMADA 388 with four native SATA ports.
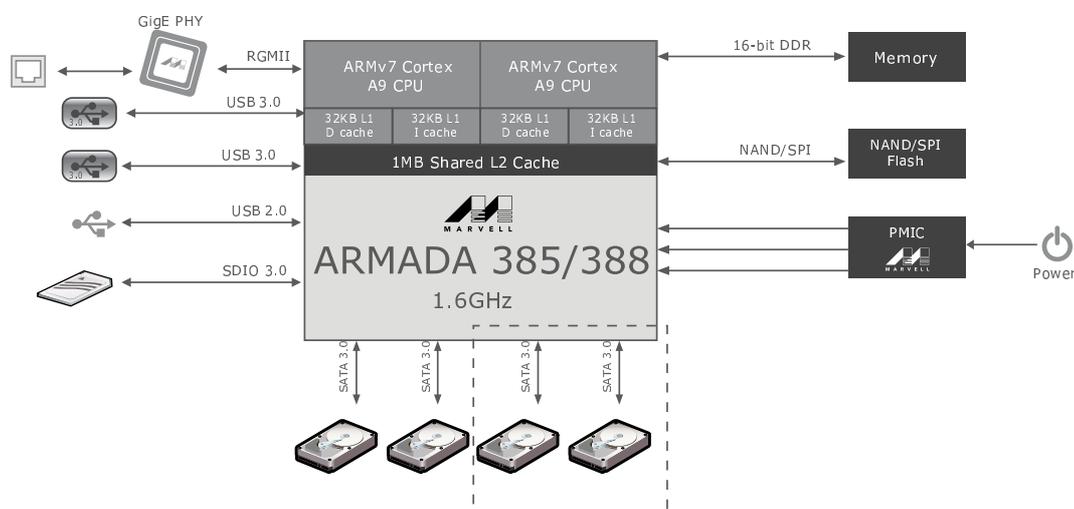
## SYSTEM DIAGRAM



Fig 1. Marvell Two/Four-Bay NAS Server Solution

## KEY FEATURES

- Single or dual core ARM v7-Cortex-A9 CPU with NEON SIMD and Floating Point Unit (FPU)
- Symmetric/Asymmetric multiprocessing (SMP/AMP) operational modes
- Up to 1.6GHz with 1MB L2 Cache, 32KB L1 Cache, 28nm
- 372-pin 17 x 17mm TFBGA, 0.8mm pitch
- High-speed, low latency, tightly coupled DDR3/3L/4 + ECC DRAM memory controller with advanced transaction re-ordering and prefetch engine
- Six multiplexed high-speed SERDES interfaces
- Four Gen2 x1 PCIe or one Gen2 x4, two GbE, Armada 385 two SATA or Armada 388 four SATA, one USB 2.0, two USB 3.0, one SDIO
- Advanced power management controller
- Available in iTemp

## BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
|---|---|---|
| 88F6820-A0-BRT2C160 | SOC - Dual Core 1.6GHz | 1 |
| 88PG8227-A1-NFE1C000 | Power Management | 1 |
| 88PG877-A3-NFB1C000 | Power Management | 1 |
| 88PH8101-A2-UBB1C000 | Power Management | 3 |
| 88PH845-B1-NFB1C000 | Power Management | 2 |
| 88E1512-A0-NNP2C000 | Single Port GigE PHY | 1 |

## DEVELOPMENT TOOLS

Marvell Development Boards Part Numbers: DB-88F6820-GP-A0, DB-88F6820-AP-A0, DB-88F6820-BP-A0

Recommended JTAG Debugger: Lauterbach or Marvell Blackstone 3 (DB-ZBLK3CBL)

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# Marvell Network Video Recorder
## ARMADA XP SOLUTION BRIEF

## OVERVIEW

The Marvell® ARMADA® XP (Extreme Performance) series of multicore processors is the industry's first quad-core ARM® processor designed for enterprise-class cloud computing applications. The Marvell ARMADA XP employs a very low power architecture and incorporates up to four Marvell designed ARM V7 MP compliant 1.6GHz CPU cores to deliver the best performance per watt for next generation "Green" system designs. The ARMADA XP series supports SMP (Symmetrical Multi-processing)/AMP (Asymmetrical Multi-processing) modes with hardware cache coherency and 64-bit DDR2/DDR3 memory interface at 800MHz clock rate (1600MHz data rate) to enable very high-performance system design. These devices incorporate up to 2MB L2 cache, Quad x4 PCI Express™ interfaces, multiple USB ports, Gigabit Ethernet ports, SATA, security engine and advanced power management techniques — setting new technology benchmarks for high-performance, low power and integration. With its broad offering of three pin-compatible chips, the ARMADA XP is ideally suited for applications ranging from high-performance networking, wireless infrastructure and web servers to high volume products like network attached storage (NAS), home servers, laser printers and other embedded applications.
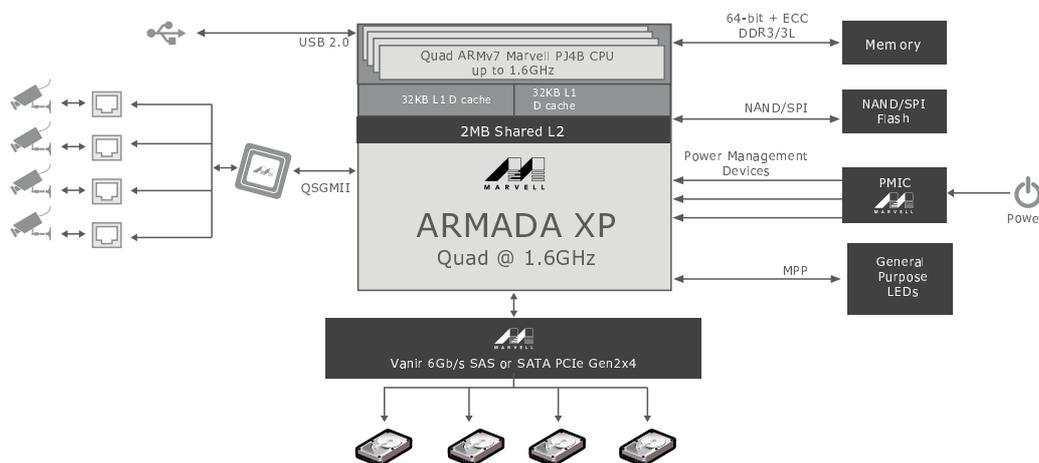
## SYSTEM DIAGRAM



Fig 1. Marvell Complete Network Video Recorder Solution

## KEY FEATURES OF MV78640

- ARM v7-compliant Core Processor (CPU) that includes Marvell micro-architecture enhancements and a double-precision IEEE-compliant Floating Point Unit (FPU) per core
- Quad or Dual Core, up to 1.6GHz with 2MB L2 Cache, 32KB L1 Cache, 40nm
- Up to 1.6GHz with 1MB L2 cache, 32KB L1 cache, 40nm
- 732-pin, 23x23mm FCBGA, 0.65mm pitch
- High-speed, low-latency, tightly-coupled DDR3/3L + ECC DRAM memory controller
- Two security engines
- Up to sixteen high-speed SERDES lanes with multi-functionality (PCIe, SATA, SGMII, QSGMII)
- PCIe Gen2 x4 and Gen2 x1, four GigE, two SATA 2.0, two USB 2.0, one SDIO
- Advanced power management controller

## BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
|---|---|---|
| MV78460-B0-BJR2C160 | SOC - Quad Core 1.6GHz | 1 |
| 88PH8101-A2-UBB1C000 | Power Management | 2 |
| 88PH845-B1-NFB1C000 | Power Management | 2 |
| 88PG847BB1-NAM1C000 | Power Management | 3 |
| 88E1545M-A1-LKJ2C000 | Quad Port GigE PHY | 1 |
| 88SE9445 | PCIe to 4-Port SATA/SAS | 1 |

## DEVELOPMENT TOOLS

Marvell Development Board Part Number: DB-MV784MP-GP

Recommended JTAG Debugger: Lauterbach or Marvell Blackstone 3 (DB-ZBLK3CBL)

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# Wireless Gateway/Cellular Data Modem
## ARMADA 385 SOLUTION BRIEF

## OVERVIEW

ARMADA® 380 Family is a complete system-on-chip (SoC) solution based on the ARM® Cortex™ A9 high-performance dual core CPU technology. The ARMADA 380 Family brings a new level of performance, integration, and efficiency, while enabling a simple, affordable system design. With its advanced architecture and integrated peripherals, the ARMADA 380 Family is ideally suited for a wide range of applications such as network attached storage (NAS), enterprise access point, surveillance video recorders (DVR/NVR/Hybrid) and high-performance networking products such as control planes and line cards. ARMADA 380 family consists of three pin-compatible devices: 1) Single-core Cortex A9-based ARMADA 380 2) Dual-core Cortex A9-based ARMADA 385 3) Dual-core Cortex A9-based ARMADA 388 with four native SATA ports.
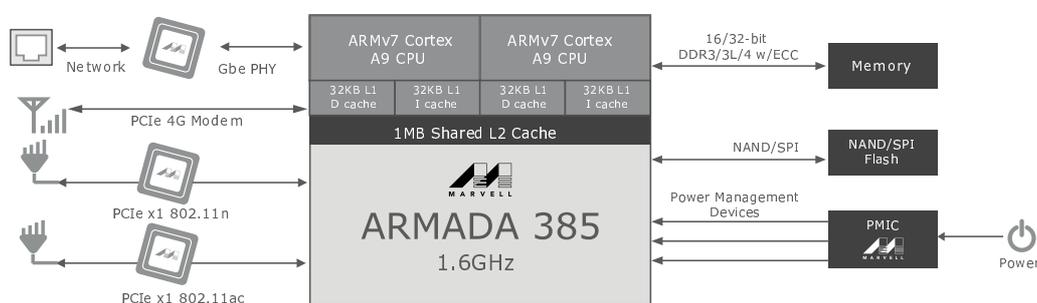
## SYSTEM DIAGRAM



Fig 1. Marvell Complete ARMADA Wireless Gateway/Cellular Data Modem Solution

## KEY FEATURES OF ARMADA 385

- Single or dual core ARM v7 Cortex™ A9 Core Processor (CPU) with NEON SIMD Floating Point Unit (FPU)
- Symmetric/Asymmetric multiprocessing (SMP/AMP) operational modes
- Up to 1.6GHz with 1MB L2 cache, 32KB L1 cache, 28nm
- 372-pin, 17x17mm TFBGA, 0.8mm pitch
- High-speed, low-latency, tightly-coupled DDR3/3L/4 + ECC DRAM memory controller with advanced transaction re-ordering and prefetch engine
- Acceleration engines for storage and security
- Six multiplexed high-speed SERDES interfaces
- Four Gen2 x1 PCIe or one Gen2 x4, two GigE, two SATA 3.0, two USB 3.0, one USB 2.0, one SDIO
- Advanced power management controller
- Available in iTemp

## BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
|---|---|---|
| 88F6820-A0-BRT2C160 | SOC - Dual Core 1.6GHz | 1 |
| 88PG8227-A1-NFE1C000 | Power Management | 1 |
| 88PG877-A3-NFB1C000 | Power Management | 1 |
| 88PH8101-A2-UBB1C000 | Power Management | 3 |
| 88PH845-B1-NFB1C000 | Power Management | 2 |
| 88E1512-A0-NNP2C000 | Single-port GigE PHY | 1 |
| 88W8897 | Wi-Fi 2x2 802.11ac | 1 |

## DEVELOPMENT TOOLS

Marvell Development Boards Part Numbers: DB-88F6820-GP-A0, DB-88F6820-AP-A0, DB-88F6820-BP-A0

Recommended JTAG Debugger: Lauterbach or Marvell Blackstone 3 (DB-ZBLK3CBL)

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# Marvell 24 Port Gigabit Ethernet Switch
## ARMADA 385 SOLUTION BRIEF

## OVERVIEW

ARMADA® 380 Family is a complete system-on-chip (SoC) solution based on the ARM® Cortex™ A9 high-performance dual core CPU technology. The ARMADA 380 Family brings a new level of performance, integration, and efficiency, while enabling a simple affordable system design. With its advanced architecture and integrated peripherals, the ARMADA 380 Family is ideally suited for a wide range of applications such as network attached storage (NAS), enterprise access point, surveillance video recorders (DVR/NVR/Hybrid) and high-performance networking products such as control planes and line cards. ARMADA 380 family consists of three pin-compatible devices: 1) Single-core Cortex A9-based ARMADA 380 2) Dual-core Cortex A9-based ARMADA 385 3) Dual-core Cortex A9-based ARMADA 388 with four native SATA ports.
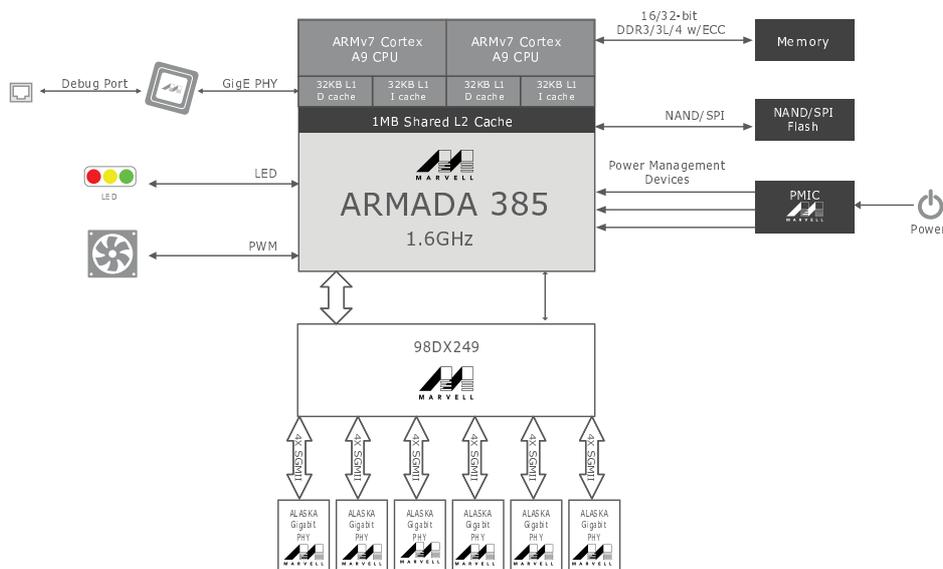
## SYSTEM DIAGRAM



Fig 1. Marvell Complete ARMADA 24 Port Gigabit Ethernet Switch Solution

## KEY FEATURES OF 88F6820

- Single or dual core ARM v7 Cortex™ A9 Core Processor (CPU) with NEON SIMD Floating Point Unit (FPU)
- Symmetric/Asymmetric multiprocessing (SMP/AMP) operational modes
- Up to 1.6GHz with 1MB L2 cache, 32KB L1 cache, 28nm
- 372-pin, 17x17mm TFBGA, 0.8mm pitch
- High-speed, low-latency, tightly-coupled DDR3/3L/4 + ECC DRAM memory controller with advanced transaction re-ordering and prefetch engine
- Acceleration engines for storage and security
- Six multiplexed high-speed SERDES interfaces
- Four Gen2 x1 PCIe or one Gen2 x4, two GigE, two SATA 3.0, one USB 3.0, one USB 2.0, one SDIO
- Advanced power management controller
- Available in iTemp

## BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
| --- | --- | --- |
| 88F6820-A0-BRT2C160 | SOC - Dual Core 1.6 GHz | 1 |
| 88PG8227-A1-NFE1C000 | Power Management | 1 |
| 88PG877-A3-NFB1C000 | Power Management | 1 |
| 88PH8101-A2-UBB1C000 | Power Management | 3 |
| 88PH845-B1-NFB1C000 | Power Management | 2 |
| 88E1512-A0-NNP2C000 | Single Port GigE PHY | 1 |
| 98DX249-A0-BEY1C000 | Prestera DX Switch | 1 |
| Quad Port Alaska PHY | Quad Port PHY | 6 |

## DEVELOPMENT TOOLS

Marvell Development Boards Part Numbers: DB-88F6820-GP-A0, DB-88F6820-AP-A0, DB-88F6820-BP-A0

Recommended JTAG Debugger: Lauterbach or Marvell Blackstone 3 (DB-ZBLK3CBL)

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# Industrial Computer Solution
## ARMADA 375 SOLUTION BRIEF

## OVERVIEW

The Marvell® ARMADA® 375 is a complete system-on-chip (SoC) solution based on the ARM® Cortex™ A9 high-performance, dual core CPU technology. The ARMADA 375 is ideally suited for a wide range of applications, including networked attached storage (NAS) devices, media servers, networking applications and video surveillance applications. With its innovative architecture and high integration, the ARMADA 375 brings a new level of performance, and power efficiency to enable high-performance systems at a very affordable cost.

## SYSTEM DIAGRAM



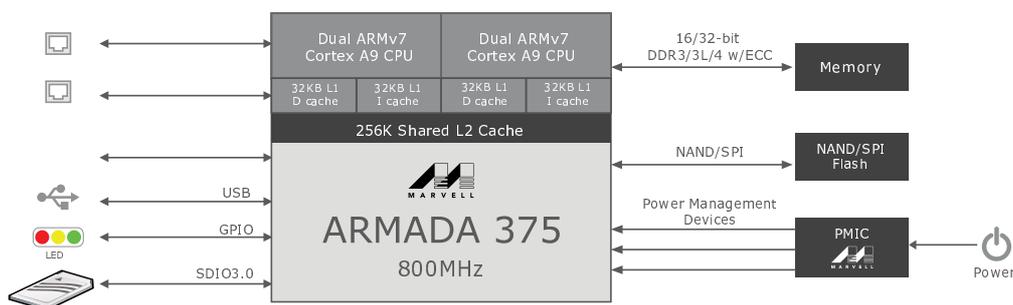Fig 1. Marvell Complete ARMADA Industrial Computer Solution

## KEY FEATURES OF 88F6720

- ARM v7 Cortex™ A9 dual core Core Processor (CPU) with NEON SIMD Floating Point Unit (FPU)
- 800MHz with 256KB L2 cache, 32KB + 32KB I/D L1 cache, 40nm
- 511-pin, 19x19mm TFBGA, 0.65mm pitch
- High-speed, low-latency, tightly-coupled DDR3/3L DRAM with advanced transaction re-ordering and prefetch engine
- Acceleration engines for storage and security
- Four multiplexed high-speed SERDES interfaces, plus one dedicated SGMII SERDES
- 2 Gigabit Ethernet ports (RGMII/SGMII/Embedded PHY)
- Two Gen2 x1 PCIe, two GbE with integrated PHY, two SATA 2.0, one USB 3.0, one USB 2.0, one SDIO, two SPI, 2-channel TDM, two UART, 67 GPIO pins
- Advanced power management controller
- Available in iTemp

## BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
|---|---|---|
| 88F6720-A0-BRP2C080 | SOC - Dual Core 800MHz | 1 |
| 88PH845-B1-NFB1C000 | Power Management | 2 |
| 88PH101-A2-UBB1C000 | Power Management | 2 |
| 88PG839-A1-NAE2C000 | Power Management | 1 |

## DEVELOPMENT TOOLS

Marvell Development Board Part Number: DB-88F6720-A0

Recommended JTAG Debugger: Lauterbach or Marvell Blackstone 3 (DB-ZBLK3CBL)

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# Gateway Solution
## ARMADA 370 SOLUTION BRIEF

## OVERVIEW

The Marvell® ARMADA® 370 is a highly integrated and high-performance ARM V7-based system-on-chip (SoC) suited for a variety of home and enterprise applications. With its on-chip floating point engine, 256K L2 cache, and multiple I/O peripherals, the ARMADA 370 provides new levels of performance, integration, and efficiency, while enabling a simple system design. The ARMADA 370 is suited for a wide range of applications, including network attached storage (NAS) devices, media servers, and wireless access points, as well as networking applications.
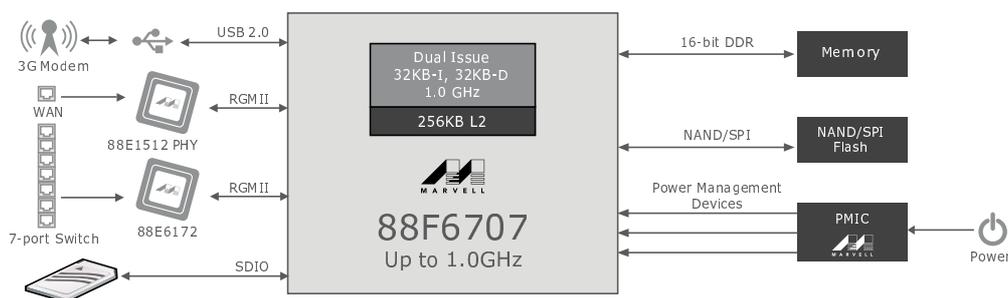
## SYSTEM DIAGRAM



Fig 1. Marvell Complete ARMADA Gateway Solution

## KEY FEATURES OF 88F6707

- ARM v7-compliant Marvell Core Processor (CPU) that includes Marvell micro-architecture enhancements and a double precision IEEE-compliant Floating Point Unit (FPU)
- Up to 1.0GHz with 256KB L2 cache, 32KB + 32KB I/D L1 cache, 40nm
- 286-pin, 19x19mm HSBGA, 1mm pitch
- Low-latency and high-bandwidth 16 bit DDR3/3L-1333 memory controller
- Two DMA/XOR engines with two independent channels per each engine
- Four integrated multi-speed SERDES lanes
- Two Gen2 x1 PCIe, two GbE, two SATA 2.0, two USB 2.0, one SDIO, two SPI, 2-channel TDM, two UART, two I²C, RTC, internal thermal sensor
- Available in iTemp

## BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
|---|---|---|
| 88F6707-A1-BMI0C000 | SOC - Single Core 1.0GHz | 1 |
| 88PG8227-A1-NFE1C000 | Power Management | 1 |
| 88PG839-A1-NAE2C000 | Power Management | 1 |
| 88PH845-B1-NFB1C000 | Power Management | 3 |
| 88PG847BB1-NAM1C000 | Power Management | 1 |
| 88E1512-A0-NNP2C000 | Single Port GigE PHY | 1 |
| 88E6172-A1-TFJ2C000 | 7 port Gigabit Ethernet Switch | 1 |

## DEVELOPMENT TOOLS

Marvell Reference Design Part Number: RD-88FA370-A1

Marvell Development Board Part Number: DB-88F6710-DDR3-A1

Recommended JTAG Debugger: Lauterbach or Marvell Blackstone 3 (DB-ZBLK3CBL)

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# Enterprise Storage
## ARMADA XP SOLUTION BRIEF

## OVERVIEW

The Marvell® ARMADA® XP (Extreme Performance) series of multicore processors is the industry's first quad-core ARM® processor designed for enterprise-class cloud computing applications. The Marvell ARMADA XP employs a very low power architecture and incorporates up to four Marvell designed ARM V7 MP compliant 1.6GHz CPU cores to deliver the best performance per watt for next generation "Green" system designs. The ARMADA XP series supports SMP (Symmetrical Multi-processing)/AMP (Asymmetrical Multi-processing) modes with hardware cache coherency and 64-bit DDR2/DDR3 memory interface at 800MHz clock rate (1600MHz data rate) to enable very high-performance system design. These devices incorporate up to 2MB L2 cache, Quad x4 PCI Express™ interfaces, multiple USB ports, Gigabit Ethernet ports, SATA, security engine and advanced power management techniques — setting new technology benchmarks for high-performance, low power and integration. With its broad offering of three pin-compatible chips, the ARMADA XP is ideally suited for applications ranging from high-performance networking, wireless infrastructure and web servers to high volume products like network attached storage (NAS), home servers, laser printers and other embedded applications.

## SYSTEM DIAGRAM



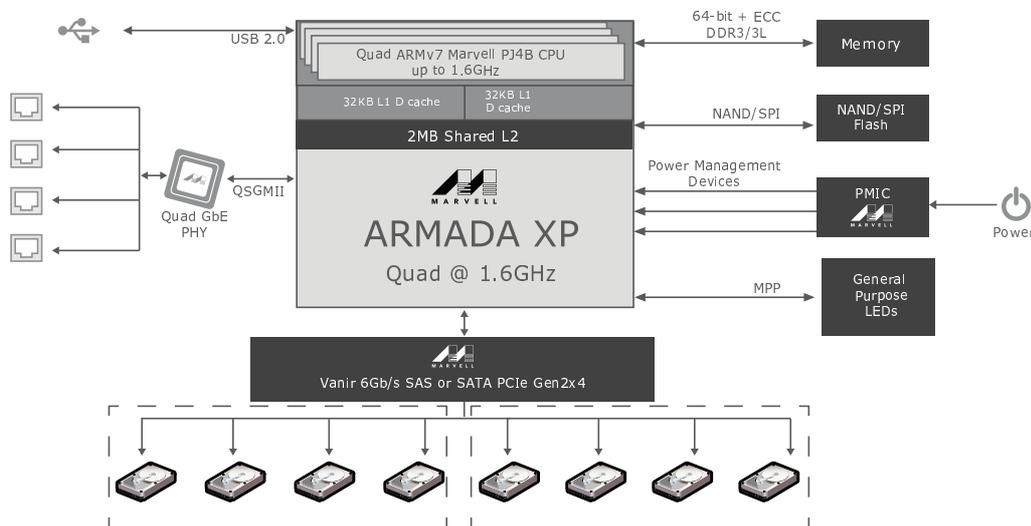Fig 1. Marvell Complete Enterprise Storage Solution

## KEY FEATURES OF MV78640

- ARM v7-compliant Core Processor (CPU) that includes Marvell micro-architecture enhancements and a double-precision IEEE-compliant Floating Point Unit (FPU) per core
- Quad or Dual Core, up to 1.6GHz with 2MB L2 Cache, 32KB L1 Cache, 40nm
- Up to 1.6GHz with1MB L2 cache, 32KB L1 cache, 40nm
- 732-pin, 23x23mm FCBGA, 0.65mm pitch
- High-speed, low-latency, tightly-coupled DDR3/3L + ECC DRAM memory controller
- Two security engines
- Up to sixteen high-speed SERDES lanes with multi functionality (PCIe, SATA, SGMII, QSGMII)
- PCIe Gen2 x4 and Gen2 x1,  four GigE, two SATA 2.0, two USB 2.0, one SDIO
- Advanced power management controller

## BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
|---|---|---|
| MV78460-B0-BJR2C160 | SOC - Quad Core 1.6GHz | 1 |
| 88PH8101-A2-UBB1C000 | Power Management | 2 |
| 88PH845-B1-NFB1C000 | Power Management | 2 |
| 88PG847BB1-NAM1C000 | Power Management | 3 |
| 88E1545M-A1-LKJ2C000 | Quad Port GigE PHY | 1 |
| 88SE9485C3-BJA2C000 | PCIe to 8-Port SATA/SAS | 1 |

## DEVELOPMENT TOOLS

Marvell Development Board Part Number: DB-MV784MP-GP

Recommended JTAG Debugger: Lauterbach or Marvell Blackstone 3 (DB-ZBLK3CBL)

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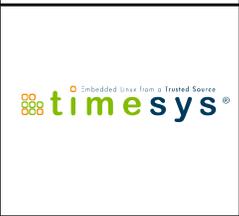
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# SoC Ecosystem

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| Logo | Description | Contact / Technologies |
|---|---|---|
| WIND™ | Windriver has been pioneering computing inside embedded devices since 1981, and its technology is found in nearly 2 billion products. The company has enabled products in Marvell's PXA and ARMADA application processor families for many years with market leading RTOS, VxWorks and commercially supported Wind River Linux in a range of storage and networking applications. | http://www.windriver.com<br>Contact: Andreea Durbaca<br>andreea.durbaca@windriver.com<br>Windriver Linux & VxWorks |
| sartura | Sartura is able to cover software development services from the bootloader and operating system support all the way to the application level. Sartura is an active contributor in the open source community for OpenWrt and U-boot projects. These include platforms based on Marvell ARMADA and Kirkwood SoC. | http://www.sartura.hr<br>Contact: Luka Perkov<br>luka.perkov@sartura.hr<br>U-Boot, Linux Kernel, Buildroot, OpenWrt, Management protocol stack implementations |
| timesys® | Timesys provides embedded Linux solutions that include tools to customize embedded Linux distributions, an embedded software repository, easy-to-use development tools, and support for various build systems including Yocto Project, professional services and customized training to embedded developers targeting Linux as their go-to-market platform. Timesys is enabling Yocto and LinuxLink on ARMADA family. | http://www.timesys.com<br>Contact: Brian Gildon<br>brian.gildon@timesys.com<br>U-Boot, Linux Kernel, Yocto, LinuxLink, TimeStorm Eclipse-based IDE |
| StreamUnlimited Connectivity for Things | StreamUnlimited provides design, development and integration services to its customers. The company has a long history and wide range of experience with Marvell ARMADA processors and Wi-Fi and BT chipsets. | www.streamunlimited.com<br>Contact: Claudia Tacke<br>Role: Technical Sales<br>Email: claudia.tacke@streamunlimited.com   Home networking, Audio Streaming, Wireless, Linux, ThreadX, FreeRTOS |
| denx | DENX Software Engineering provides software engineering services for embedded and real-time systems. The company develops, tailors, and installs base software for embedded systems and provides solutions such as graphical user interfaces, performance optimization, security concepts or tools for automatic software updates. DENX is enabling U-Boot, Linux Kernel, and Yocto for Marvell ARMADA SoC devices. | http://www.denx.de<br>Contact: Wolfgang Denk<br>wd@denx.de<br>U-Boot, Linux Kernel, Yocto, ELDK, Xenomai RTOS Emulation |
| free electrons Embedded Linux Experts | Free Electrons is an engineering company specializing in embedded Linux as well as free and open Source software for embedded systems. The company has been upstreaming Linux kernel support for Marvell ARMADA 370, XP, 375, 38x, and 39x. Free Electrons has also been working with Marvell to upstream Linux kernel support for Marvell Berlin processors. | http://free-electrons.com<br>Contact: Thomas Petazzoni<br>info@free-electrons.com<br>U-Boot, Linux Kernel, Buildroot, OpenWrt, Yocto, Android, Asterisk |
| SEMIHALF EMBEDDED SYSTEMS | Semihalf specializes in embedded systems design and development, with expertise in both software and hardware. Semihalf supports open source and their developers contribute to the FreeBSD, Linux and U-Boot project for Marvell ARMADA devices. The company's solutions and technologies can be found in a wide range of products, from simple commodities to heavy duty carrier-class network devices, industrial robotics and protecting national security. | http://www.semihalf.com<br>Contact: Rafal Jaworowski<br>raj@semihalf.com, Marcin Wojtas<br>mw@semihalf.com<br>U-Boot, Linux Kernel, FreeBSD, NetBSD, Network Fast Path, DPDK, ODP, XDB, Lauterbach |

Visit Marvell's Embedded Processor webpage for the latest ecosystem partners

http://www.marvell.com/embedded-processors/partners.jsp

# Marvell Software Partners

| | | |
|---|---|---|
| media5 corporation | Media5's SIP SDK support fixed/mobile voice and video applications and are designed for total portability and are standards IETF, IMS, RCS, PC2.0 and VoLTE standards based. M5T's SIP SDK is deployed in millions of broadband connected devices including smartphones, set-top boxes, and a wide variety of telecommunications equipment and applications. Media5 has developed VOIP stack for Marvell ARMADA processors. | http://www.media5corp.com<br>Contact: Stefano Genoni<br>sgenoni@media5corp.com<br>SDK, VOIP Client, VOIP Gateway for SOHO and SMB, SBC, Linux |
| REDVUE | Redvue Systems provides enterprise storage subsystems for SMB's utilizing Marvell ARMADA 385 SoC. Redvue has experience developing virtualizing software on the Marvell Linux platform to solve the typical server setup and maintenance problem that small businesses encounter. | http://www.redvue.com<br>Contact: Johnny Tseng<br>johnny.tseng@redvue.com<br>SMART Office Data,<br>SMART Office Mail, Linux |
| VOLANSYS<br>VOLANSYS TECHNOLOGIES<br>ADVANCED TECHNOLOGY SOLUTIONS & SERVICES | Volansys provides high-quality solutions and services from initial concept stage to prototyping. The company has expertise with the ARMADA 385 that includes custom product designs and application software. With a generic ARMADA 385 Linux Kernel image to measure the SOC's performance and all of its interfaces, Volansys is ready to provide any required support on ARMADA 385. | http://www.volansys.com<br>Contact: Bhavin Shah<br>bhavin.shah@volansys.com<br>U-Boot & Linux |
| comm-IT | Comm-IT is a software and systems development house that provides advanced IT communications services and solutions. The company's organizational flexibility enables it to provide instant responses to its customers' challenges and requirements, equipping them with the latest technology can offer. Comm-IT has experience with developing Vx-Works software on Marvell ARMADA SoC family. | http://www.Comm-IT.com<br>Contact: Udi Rasiuk<br>udi@Comm-IT.com<br>VxWorks and Linux |

# Marvell Hardware Partners

| | |
|---|---|
| SolidRun | Established in 2010, SolidRun is a global leading developer and manufacture of powerful energy efficient System on Modules (SOMs) and mini computers. SolidRun's innovative compact embedded Solutions are based on ARM processor architecture and include comprehensive software packages, drivers and support for major operating systems. SolidRun is a proud member of the OSS community and strong promoter of the principles behind open source software. SolidRun has developed complete reference platform based on Marvell ARMADA 385 processor.      http://www.solid-run.com |
| GLOBALSCALE<br>TECHNOLOGIES, INC. | Globalscale Technologies provides complete Original Design Manufacturing (ODM) and Superior Supply Chain Management throughout all stages of product development. Globalscale offers the PrimaBox Development Kit built upon Marvell's ARMADA 385 SoC chipset. The PrimaBox delivers a complete hardware and software solution for NAS, Wi-Fi AP, IOT, and DVR applications.      http://globalscaletechnologies.com |
| PACTRON<br>moving from mind to market | Pactron provides a comprehensive one stop solution for all board level needs. Among its collaborations with Marvell are the Birchwood Development kit, a low power development/evaluation platform and JADE, a fully featured platform for embedded applications. Pactron has development boards for the ARMADA XP (uSOM) and the ARMADA 385 Riverwood development board. The system enables users to design and develop innovative embedded products based on the Marvell's ARMADA XP and ARMADA 385 processors.      http://www.pactroninc.com |
| IONICS<br>EMS, INC. | Ionics, Inc. developed its Nimbus, Cumulus and Stratus range of Plug Computers in collaboration with Marvell. These Plug Computers are full-featured, fist-sized computers, powered by Marvell Kirkwood processors, designed for managing and securing digital assets in a cloud computing environment.      http://www.ionics-ems.com |
| COGENT<br>"Always Complete" | Cogent Computer Systems, Inc., has been designing, manufacturing and delivering advanced embedded since 1992. We originally produced SBC's for software developers but as more and more functionality was integrated onto the CPU it became economically feasible to design and produce boards which could be used for both OEM use and software development. Cogent Computer has developed an ARMADA XP uSOM reference design platform.      http://www.cogcomp.com |

# Marvell ARMADA SDK

- U-Boot
- Linux Kernel 3.2 & 3.10
- Buildroot

- Upstream
  Mainline Linux
  OpenWrt

- Documentation
Hardware Spec, Functional Spec, Design Guideline
Software Porting Guide, Schematics, User Guide
Schematics/Layout Checklist, BOM, Power Calculator
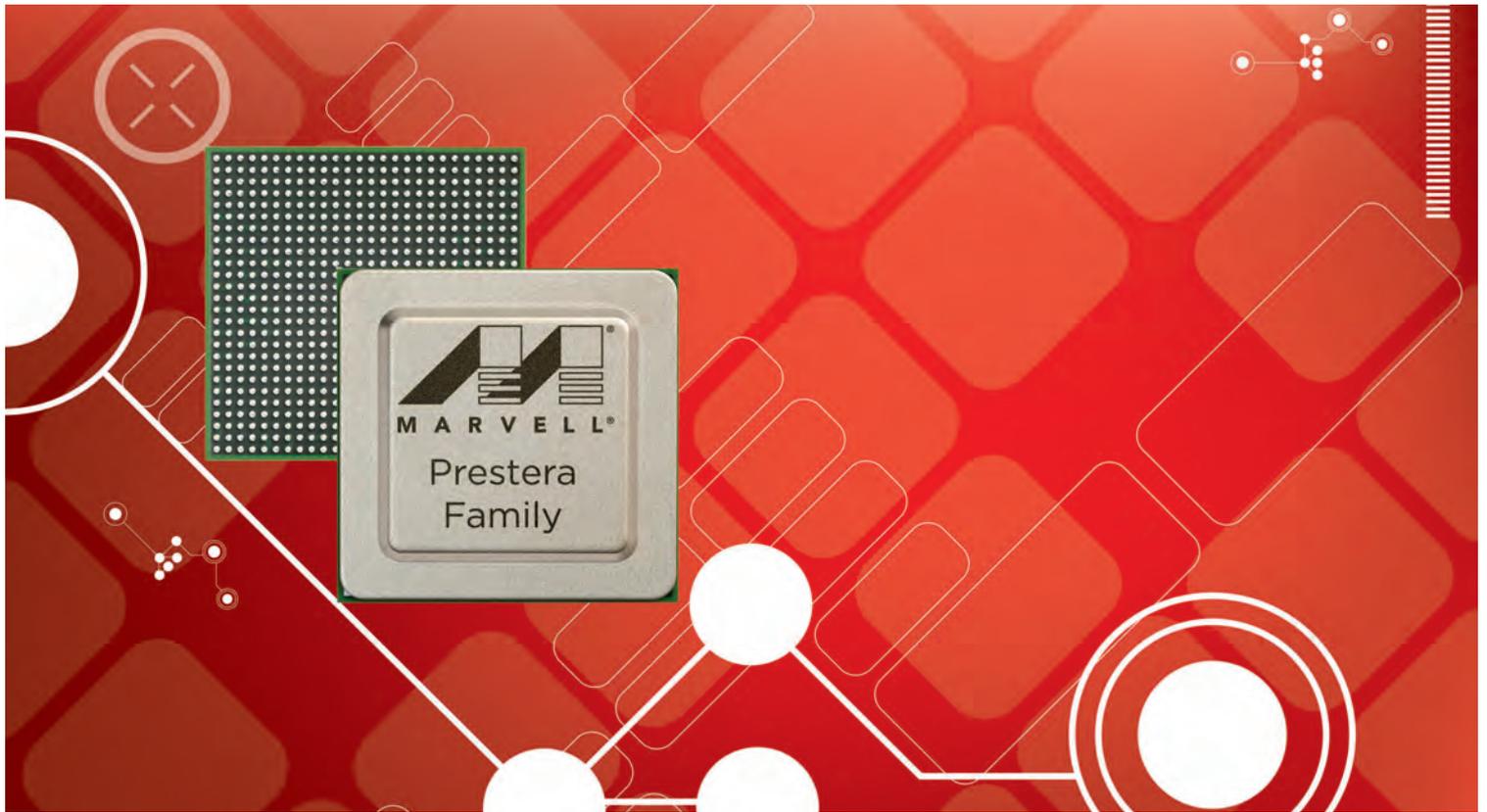
# Application Examples

## Prestera® Switches

# Top of Rack Switch
## Prestera CX SOLUTION BRIEF

## OVERVIEW

Marvell® Prestera® switching ICs solutions enable performance and cost-optimized solutions for a broad range of platforms in the intelligent switching, service provider, security and performance at the access/edge, embedded, and campus environments. By delivering a stream of technical innovations through a diverse set of leading edge, fast-growing product lines, Marvell technology is powering the next-generations of network environments.

The Marvell Prestera family of devices supports FE, 1 GbE, 10 GbE, and 40 GbE line rate switching, providing complete flexibility while enabling applications such as server virtualization, cloud computing, and Software as a Service.  With advanced virtualization, highly flexible L2/L3/L4 forwarding, flexible classification and police engine, the Prestera family is ideal for all major packet processing environments.
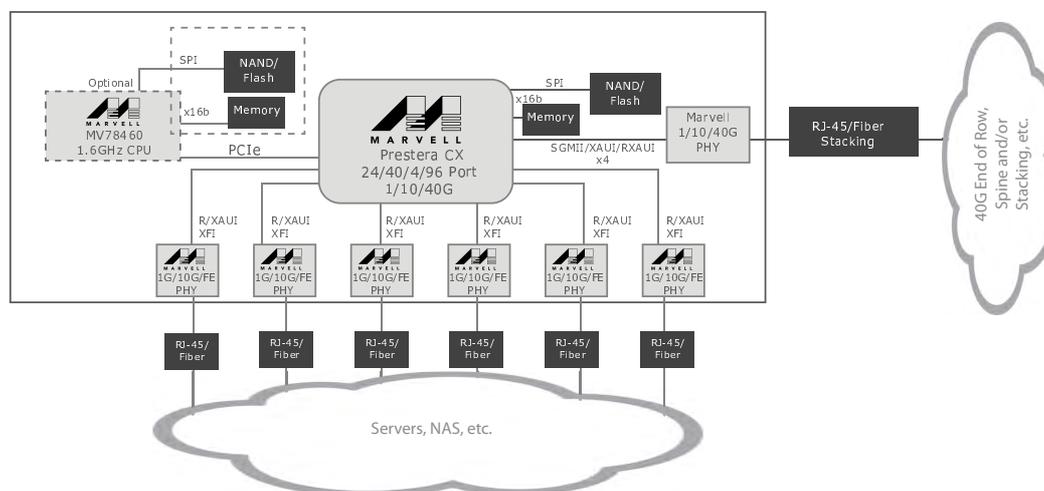
## SYSTEM DIAGRAM



Fig 1. Marvell Complete Top of Rack Switch Solution

## Data Center

- Servers, NAS Interconnect to ToR
- Two-tier Design with Spine and Leaf (ToR)
- Spine design utilizes 40G ports at 16 or 32 ports

- Higher port count 40G systems are built with a two-stage design up to 32 ports of 40G
- A typical server rack is 7 feet tall with 42 slots for housing servers and ToR switches. Typical configuration is 40 servers + 2 ToR switches for redundancy.

## Product Options

- Bobcat2, Hooper, Lion2
- 1G, 2.5G, 10G, 40G Fiber and/or Cu
- 1G, 2.5G, 8G, 10G, 12.5G, 20G, 40G Uplinks/Stacking Ports
- 8/16/24/40/48/96 10G Port Count Offerings plus 40G Uplinks/Stacking

- PHYs (Optional)
  - Single, Dual, Quad, Octal 1G Copper PHYs
  - Dual, Quad 10G/40G Optical PHYs
- CPU (Optional)
  - Armada® XP (ARM v7 Dual and Quad Core, up to 1.6GHz)
  - Armada 385 (ARM v7 Cortex A9 Dual Core, up to 1.6GHz)

# BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
|---|---|---|
| **48 Ports 10G Fiber with LRM or 16 Ports 40G Fiber** | | |
| 98CX8129A1-BPL2C000 | 48 Port 10 or 16 ports 40G Switch (Hooper) | 1 |
| MV78460-B0-BJR2C160 | Quad Core up to 1.6GHz CPU | 1 |
| 88X2242-B0-BKP2C000 | 4x10G LRM or 1x40G LRM | 12 or 16 |
| 88PH8101-A2-UBB1C000 | Power Management for CPU | 2 |
| 88PH845-B1-NFB1C000 | Power Management for CPU | 2 |
| 88PG847BB1-NAM1C000 | Power Management for CPU | 3 |
| **96 Ports 10G LRM or 32 Ports 40G (Fiber)** | | |
| 98CX8297B1-BLS2C000 | 48 Ports 10/16 Ports 40G Switch (Lion2) | 1 |
| MV78460-B0-BJR2C160 | Quad Core up to 1.6GHz CPU | 1 |
| 88X2242-B0PA0-BKP2C000 | 4x10G LRM or 1x40G PHY | 24 or 32 |
| 88PH8101-A2-UBB1C000 | Power Management for CPU | 2 |
| 88PH845-B1-NFB1C000 | Power Management for CPU | 2 |
| 88PG847BB1-NAM1C000 | Power Management for CPU | 3 |
| **24Ports 10G (Fiber)** | | |
| 98DX4251B0-BRR2C000 | 24 Ports 10G Switch (Bobcat2) | 1 |
| Native SFP+ | No PHY, No LRM | |
| **48 Ports 1G Cu + 4 Ports 10G Cu + 2 Ports 40G** | | |
| 98DX4221B0-BRR2C000 | 1G/10G/40G Switch (Bobcat2) | 1 |
| 88E1680-A2-LKJ2C000 | 8 Port Cu PHY | 6 |
| 88X3240-A0-BSN2C000 | 4 Port 10G Cu PHY | 1 |
| 88X2242-B0PA0-BKP2 | 1 Port 40G LRM PHY (Fiber) | 2 |
| 88PG827BB0-NAM1C000 | Power Management | 2 |
| 88PG817BB0-NAM1C000 | Power Management | 3 |

# DEVELOPMENT TOOLS

Marvell Development Boards Part Numbers:

- RD-CX2H-14XLG8XG - Hooper-based RD, 14 QSFP, 8 SFP+

- DB-CX2-32QSFP - Lion2-based DB, 32 QSFP

- DB-88SX2242MP-2 - 88X2242P-based DB, 4 SFP+ Line 4 SFP+ and Host 2 QSFP

- RD-DXBC2-48G12XG2XLG-A0 - Bobcat2-based 48 GbE, 12 10G SFP, 2 QSFP

- DB-88X3240P-4 - Four port 88x3240P DB

- Software: CPSS, U-boot, CLI, OpenSDK

**THE MARVELL ADVANTAGE:** Marvell chipsets come with complete reference designs which include board layout designs, software, manufacturing diagnostic tools, documentation, and other items to assist customers with product evaluation and production. Marvell's worldwide field application engineers collaborate closely with end customers to develop and deliver new leading-edge products for quick time to market. Marvell utilizes world-leading semiconductor foundry and packaging services to reliably deliver high-volume and low-cost total solutions.

**ABOUT MARVELL:** Marvell (NASDAQ: MRVL) is a global leader in providing complete silicon solutions and Kinoma® software enabling the "Smart Life and Smart Lifestyle." From mobile communications to storage, Internet of Things (IoT), cloud infrastructure, digital entertainment and in-home content delivery, Marvell's diverse product portfolio aligns complete platform designs with industry-leading performance, security, reliability and efficiency. At the core of the world's most powerful consumer, network and enterprise systems, Marvell empowers partners and their customers to always stand at the forefront of innovation, performance and mass appeal. By providing people around the world with mobility and ease of access to services adding value to their social, private and work lives, Marvell is committed to enhancing the human experience.

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# Carrier Switch
## Prestera DX SOLUTION BRIEF

## OVERVIEW

Marvell® Prestera® switching ICs solutions enable performance and cost-optimized solutions for a broad range of platforms in the intelligent switching, service provider, security and performance at the access/edge, embedded, and campus environments. By delivering a stream of technical innovations through a diverse set of leading edge, fast-growing product lines, Marvell technology is powering the next-generations of network environments.

The Marvell Prestera family of devices supports FE, 1 GbE, 10 GbE, and 40 GbE line rate switching, providing complete flexibility while enabling applications such as server virtualization, cloud computing, and Software as a Service.  With advanced virtualization, highly flexible L2/L3/L4 forwarding, flexible classification and police engine, the Prestera family is

## SYSTEM DIAGRAM

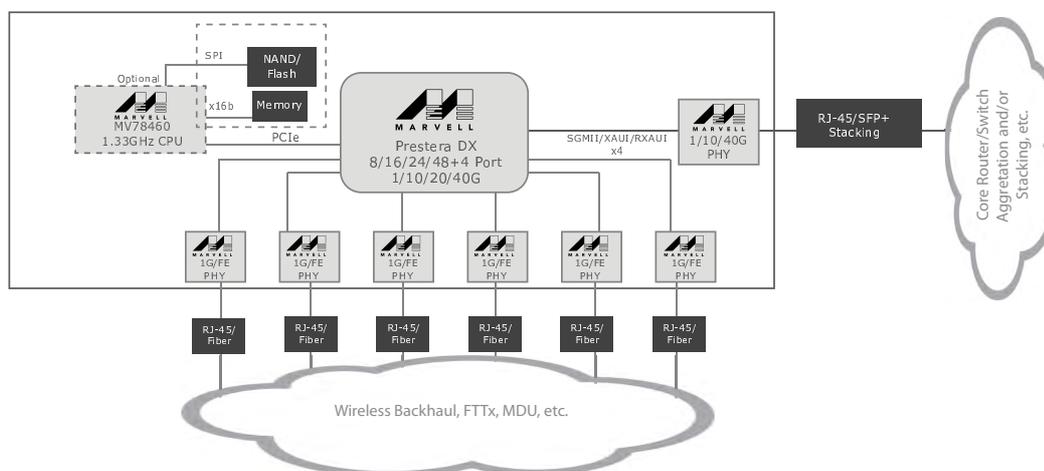

Fig 1. Marvell Complete Carrier Switch Solution

## Carrier Application

- CPE Aggregation, Blade interconnect
- Access to Aggregation
- 1G - 40G Fiber/Cu with Uplinks non-blocking
- Integrated processor
- IEEE 1588 1-step PTP

- Redundancy, Failover
- MPLS
- Smart/L2+/L3*
- 5-level HQoS traffic management (Bobcat2 only)

## Product Options

- Prestera XCat2/3, Bobcat+, Bobcat2 (All Integrated Processor)
- 1G, 10G* Fiber and/or Cu
- 1G, 10G, 12.5G, 20G*, 40G* Uplinks/Stacking* Ports
- 8/16/24/48 Port Count Offerings plus Uplinks (Ethernet or OTN)
- Available in iTemp*

- PHYs (Optional)
  - Single, Dual, Quad, Octal 1G PHYs
  - Dual, Quad 10G/40G Optical PHYs
  - G.Now
- CPU (Optional)
  - Armada® XP (ARM v7 Dual and Quad Core, up to 1.6GHz)
  - Kirkwood (ARM v5TE-compliant Single core, up to 2.0GHz)
  - Armada 385 (ARM v7 Cortex A9 Dual Core, up to 1.6GHz)

*On select product offerings

## BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
|---|---|---|
| **24 Ports 1G LRM + 4 Ports 1G Fiber** | | |
| 98DX3135B0-BIH2C002 | 24+4 Port Switch (Poncat2) | 1 |
| 88E1543-A1-LKJ2C000 | 4 Port 1G LRM Fiber | 8 |
| 88PH8101-A2-UBB1C000 | Power Management | 5 |
| 88PH845-B1-NFB1C000 | Power Management | 1 |
| **24 Ports 1G Fiber + 4 Ports 10G LRM** | | |
| 98DX4122C0-BIH2C000 | 24+4 Port Switch (Bobcat+) | 1 |
| 88E1548-A1-LKJ2C000 | 4 Port 1G LRM PHY (Fiber) | 6 |
| 88X2242PA0-BKP2C000 | 4x10G LRM PHY with MACsec and 1-step PTP | 1 |
| 88PH8101-A2-UBB1C000 | Power Management | 5 |
| 88PH845-B1-NFB1C000 | Power Management | 1 |
| **24 Ports 1G LRM + 4 Ports 10G Fiber** | | |
| 98DX4251B0-BRR2C000 | 24+4 Port Switch (Poncat3) | 1 |
| 88E1548-A1-LKJ2C000 | 4 Port 1G LRM PHY (Fiber) | 6 |
| Native SFP+ (PHY-less) | SR/LR, DAC cable (No LRM) | |
| 88PH8101-A2-UBB1C000 | Power Management | 5 |
| 88PH845-B1-NFB1C000 | Power Management | 1 |
| **48 Ports 1G Cu + 4 Ports 10G LR (Fiber)** | | |
| 98DX4221B0-BRR2C000 | 1G/10GSwitch (Bobcat2) | 1 |
| 88E1680-A2-LKJ2C000 | 8x1G Cu PHY | 6 |
| Native SFP+ (PHY-less) | SR/LR, DAC cable (No LRM) | |
| 88X2242-B0PA0-BKP2 | 1 Port 40G LRM PHY (Fiber) | 2 |
| 88PG827BB0-NAM1C000 | Power Management | 2 |
| 88PG817BB0-NAM1C000 | Power Management | 3 |

## DEVELOPMENT TOOLS

Marvell Development Boards Part Numbers:

- DB-xCat2-24GE-4GP-A - Poncat2 Based DB, 24 GE, 4 SFP

- DB-XC3-24G4XG - Poncat3 Based DB, 24 GE, 4 SFP+

- RD-XC3-24G4XG - Poncat3 Based RD, 24 GE, 4 SFP+

- RD-DXBC2-48G12XG2XLG-A0 - Bobcat2 Based 48 GbE, 12 10G SFP, 2 QSFP

- DB-88SX2242MP-22 - 88X2242P Based DB, 4 SFP+ Line 4 SFP+ and Host 2 QSFP

- Software: CPSS, U-boot, CLI,  OpenSDK

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# Entry Level/Small-to-Medium Business Switch
## Prestera DX SOLUTION BRIEF

## OVERVIEW

Marvell® Prestera® switching ICs solutions enable performance and cost-optimized solutions for a broad range of platforms in the intelligent switching, service provider, security and performance at the access/edge, embedded, and campus environments. By delivering a stream of technical innovations through a diverse set of leading edge, fast-growing product lines, Marvell technology is powering the next-generations of network environments.

The Marvell Prestera family of devices supports FE, 1 GbE, 10 GbE, and 40 GbE line rate switching, providing complete flexibility while enabling applications such as server virtualization, cloud computing, and Software as a Service.  With advanced virtualization, highly flexible L2/L3/L4 forwarding, flexible classification and police engine, the Prestera family is ideal for all major packet processing environments.
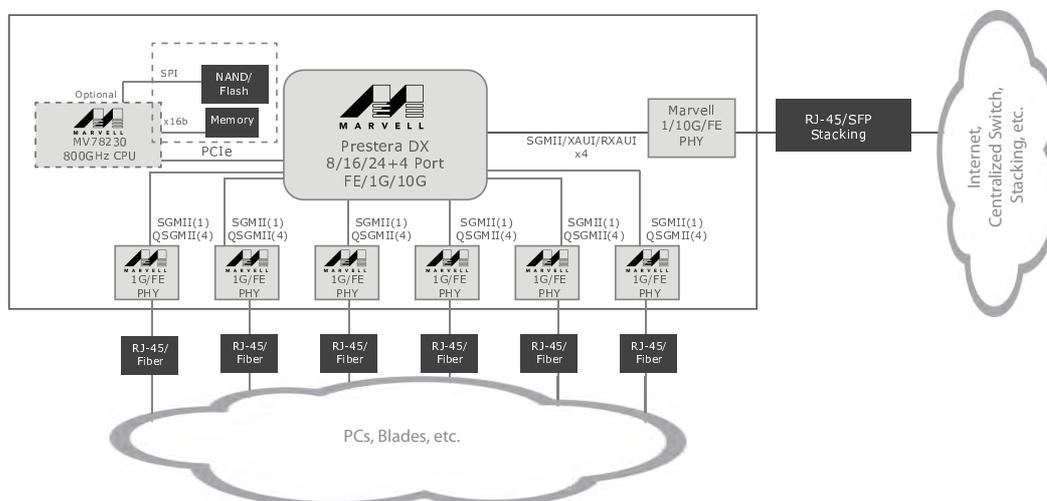
## SYSTEM DIAGRAM



Fig 1. Marvell Complete Entry Level/Small-to-Medium Business Switch Solution

## Metro Entry Level (MEL) Application

- End User, Low-end Server,  Blade Interconnect
- Aggregation to Core
- Microserver, Railway, Traffic Control

- Stacking*, Redundancy, Failover
- 1G – 10G* Fiber/Cu w/ Uplinks Non-blocking
- Smart/L2+

## Product Options

- Prestera Salsa2-No Integrated Processor,  XCat2/3-Integrated Processor
- 1G, 10G* Fiber and/or Cu
- 1G, 10G*, 12.5G* Uplinks/Stacking* Ports x 4
- Native SFP+ Support
- 8/16/24+4* Port Count Offerings

- Available in iTemp
- PHYs (Optional)
  - Single, Dual, Quad, Octal 1G PHYs
  - Dual, Quad 10G/40G Optical PHYs
- CPU (Optional)
  - Armada® XP (ARM v7 Dual and Quad Core, up to 1.6GHz)
  - Armada 385 (ARM v7 Cortex A9 Dual Core, up to 1.6GHz)

*On select product offerings

## BILL OF MATERIALS

| PART NUMBER | FUNCTION | QUANTITY |
|---|---|---|
| **24 Ports FE Cu + 4 Ports 1G Fiber** | | |
| 98DX1165B0-LGO2C002 | 24 Ports FE + 4 Ports 1G Switch (Poncat2) | 1 |
| 88E3083-B1-LKJ1C000 | 8 Port FE Cu PHY | 3 |
| 88E1543-A1-LKJ2C000 | 4 Port 1G Fiber PHY | 2 |
| 88PH8101-A2-UBB1C000 | Power Management | 5 |
| 88PH845-B1-NFB1C000 | Power Management | 1 |
| **24 Ports 1G Cu (Unmanaged)** | | |
| 98DX224-A1-LKJ2C000 | 24 Port Cu Switch (Salsa2) | 1 |
| 88E1680-A2-LKJ2C000 | 8 Port 1G Cu PHY | 3 |
| 88PG827BB0-NAM1C000 | Power Management | 2 |
| 88PG817BB0-NAM1C000 | Power Management | 3 |
| **16 Ports 1G Cu + 4 Ports 1G Fiber** | | |
| 98DX3034B0-BIH2C002 | 16 Ports 1G + 4 Ports 1G Switch (Alleycat2) | 1 |
| 88E1680-A2-LKJ2C000 | 8 Port 1G Cu PHY | 2 |
| 88E1543-A1-LKJ2C000 | 4 Port 1G Fiber PHY | 2 |
| 88PG827BB0-NAM1C000 | Power Management | 2 |
| 88PG817BB0-NAM1C000 | Power Management | 3 |
| 88PH8101-A2-UBB1C000 | Power Management | 5 |
| 88PH845-B1-NFB1C000 | Power Management | 1 |
| **24 Ports 1G Cu + 4 Ports 1G Cu** | | |
| 98DX3135B0-BIH2C002 | 24 Ports 1G + 4 Ports 1G Switch (Poncat2) | 1 |
| 88E1548-A1-BAM2C000 | 4 Port 1G Media Detect PHY | 6 |
| 88E1543-A1-LKJ2C000 | 4 Port 1G Cu PHY | 2 |
| 88PH8101-A2-UBB1C000 | Power Management | 5 |
| 88PG817BB0-NAM1C000 | Power Management | 1 |
| **24 Ports 1G Cu + 4 Ports 10G Cu/10G LRM** | | |
| 98DX3236A1-BTD2C000 | 24 Ports 1G + 4 Ports 10G Switch (Alleycat3) | 1 |
| 88E1680-A2-LKJ2C000 | 4 Port 10G Cu PHY | 1 |
| 88X2242MB0-BKP2C000 | 4 port 10G LRM PHY | 1 |
| 88X3240-A0-BSN2C000 | 4 Port 10G Cu PHY | 1 |
| 88PG827BB0-NAM1C000 | Power Management | 2 |
| 88PG817BB0-NAM1C000 | Power Management | 3 |
| **24 Ports 1G Fiber + 4 Ports 10G Fiber (non-LRM)** | | |
| 98DX3236A1-BTD2C000 | 24 Ports 1G + 4 Ports 10G Switch (Alleycat3) | 1 |
| Native SFP | No PHY, No LRM | |
| Native SFP+ | No PHY, No LRM | |

# DEVELOPMENT TOOLS

Marvell Development Boards Part Numbers:

- DB-xCat2-24GE-4GP-A - Poncat2 Based DB, 24 GE, 4 SFP

- DB-XC3-24G4XG - Poncat3 Based DB, 24 GE, 4 SFP+

- RD-XC3-24G4XG - Poncat3 Based RD, 24 GE, 4 SFP+

- Software: CPSS, U-boot, CLI, OpenSDK

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## Glossary of Commonly Used Terms

| TERM | DESCRIPTION |
|---|---|
| Blocking | Occurs when one or more switches are not able to transfer at full line rate capacity on every port because of restricted bandwidth. |
| Fiber to the "x" (FTTx) | Fiber optic cabling providing internet service to customers. FTTx systems typically convert fiber service to the legacy copper(twisted-pair) or coaxial cable. |
| HQoS | Multiple level queuing allows for bandwidth control and SLA (service level agreement) enforcement for a per port, per customer, per service and/or per priority basis concurrently. |
| KR | A simplified 10 Gbps interface using a single lane, specifically designed for long reach, backplane types of applications. |
| LRM | 10G standard for transmission of 10Gbps multi-mode fiber |
| MacSec | Point-to-point encryption/decryption of every packet's payload to ensure data confidentiality. |
| Managed Switch | Supplies additional control over LAN traffic with configurable advanced features and protocols. |
| Multi-Protocol Label Switching (MPLS) | Directs data from one network node to the next based on short path labels rather than long network addresses, avoiding complex lookups in a routing table. |
| Networked Attached Storage (NAS) | Used to attach to small and large storage arrays for databases, backups, etc. |
| Operations, Administration and Management (OAM) | As it relates to a switch, it is the set of protocols supported for installing, monitoring and troubleshooting the network. |
| QSFP+ (Quad SFP+) | Combines four 10Gbps SFP+ for a single interface supporting 4x10G or a single 40G throughput |
| Quad SGMII (QSGMII) | Combines 4 SGMII lines creating a lower signal line, 4xSGMII interface. |
| Small Form-factor Pluggable (SFP) | A pluggable, external facing Fiber interface that supports up to 1Gbps throughput |
| SFP + (Direct Attached) DAC | A passive cable desinged for 1G for inter-rack connectivity, usually <5 meters, also known as Twin-Ax |
| Serial Peripheral Interface (SPI) | A synchronous serial data link used for short distance embedded device interfaces |
| Stacking | Utilizes ports to interconnect 2 or more switching devices, may be blocking or non-blocking |
| Unmanaged switch | Typically a fixed configuration that allows communication between Ethernet devices. |
| XFI/SFI | 10Gbps interface, 10G serial interface capable of driving SFP+ directly |

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