

DSS NETWORKS, INC.

The Gigabit Experts™

GigMAC PMC/PMC-X and PCI/PCI-X Cards
GigPMCX-Switch Cards
GigPCI-Express Switch Cards
GigCPCI-3U Card Family

Release Notes

OEM Developer Kit and Drivers

Document Version 2.0, P/N 131800

November 2007

Release Notes

These release notes apply to version 2.0 of DSS Networks Gigabit Ethernet Card-Family OEM Developers Kit (ODK) as of November 2007.

Included in this release (current or prior)

- ❑ Support for CPCI-3U Models C5164, C5262-LC, C5262-SC, C5262-RJ, C5263-SFP, C5468-SW
- ❑ Support for Linux 2.6 kernels (up to kernel version 2.6.22)
- ❑ Support for Linux 2.4 kernels (up to kernel version 2.4.32)
- ❑ Support for all Intel based cards (5262-SC, 5261-RJ, 5261-LC, 5262-RJ, 5262-LC, 5263-SFP, 5164, 6162-PCI-X, 6267-SFP, 5468 GigPMC-Switch, 6468 GigPCI-Express Switch, 5664 GigAMC Express 4-port)
- ❑ Support for extended management functions in Model 5468 8-port GigPMC hybrid switch and Model 6468 GigPCI-E hybrid switch.
- ❑ Support for National based cards (Models 5161, 6161, 6167, 7160)
- ❑ Support for Fiber 1000 Base SX/LX (Model 7160, 6167, 5261-LC, 5262-LC, 6267-SFP, 5263-SFP)
- ❑ Support for SFP CWDM transceivers (Models 6267-SFP, 5263-SFP, 5664 quad port GbE AMC)
- ❑ Linux Operating system support: 2.4.18, 2.4.20, 2.4.26, 2.4.30, Linux 2.6.10, 2.6.16, 2.6.22
- ❑ SNMP/RMON statistics
- ❑ MAC Register Dumps
- ❑ CPU usage utility
- ❑ Support for new Intel pcPentium4 BSP (Tornado 2.2.1/vxWorks 5.5.1, Workbench (all releases) with vxWorks 6.x)
- ❑ Driver support for Intel P3/P4/Xeon processor speeds up to 3.2 GHZ, dual-processors (all)
- ❑ Driver support for PowerPC processors (PowerPC 750, 7410, 7440, IBM PowerPC 750, all)
- ❑ Support for vxWorks driver (source code, PowerPC, MIPS and Intel processors) on Tornado 2.2.1/vxWorks 5.5.1 and Workbench (all releases) with vxWorks 6.x
- ❑ Support for Linux Driver (source code, Intel and PowerPC platforms)
- ❑ Support for Windows XP and Windows 2000 Driver (driver executable), National-based models only
- ❑ Driver utility (dmUtil) for Linux allows viewing of driver statistics, status, controller registers and trace information from the Linux command line.
- ❑ Blaster and blastee TCP test utilities for vxWorks, Linux and Windows

- ❑ High-performance benchmark results (frame rate and throughput)
- ❑ Support for Intel FW21154BE bridge (optional device configuration)
- ❑ Support for Broadcom BCM5421S PHY transceiver
- ❑ Support for VxWorks Advanced Feature Set (Link Redundancy, Link Fail-Over, Fail-back) (optional product enhancement)

SEE ALSO

Please also see the following documents on our website at www.dssnetworks.com and also included in the OEM developers kit CD:

Datasheets – please see product datasheets and other updated product information on OEM developer CD and on website. Document title “DP83820.PDF” contains the complete specification and register descriptions for the DP83820 PCI media access controller on our boards. This is the primary system interface over the PCI bus.

Release Notes -- where updated information is provided on new features, compatibility, performance benchmarks, platform information and corrected problems.

Users Manual – DSS Document part no 131900. Contains installation and usage for VxWorks, Linux and Windows based systems.

VxWorks Users Manual and Integration Guide, DSS Document part no 131901. Provides technical information on integrating and testing our controllers and drivers into a VxWorks BSP and onto a system board (SBC) from multiple vendors.

GIGFAQ.HTML – Also on website and included on OEM developer CD contains many answers to commonly asked questions regarding Gigabit Ethernet and our products including performance and system recommendations.

README.LINUX – Included on OEM developer CD contains latest driver installation and usage instructions for Linux Operating System.

netPerformance.txt -- Included on OEM developer CD contains useful information on tuning WindRiver’s VxWorks-based Network Protocol Stack.

New to this release

- ❑ Add support for CPCI-3U Models C5164, C5262-LC, C5262-SC, C5262-RJ, C5263-SFP and C5468-SW
- ❑ Add support and app notes for supporting the STP/RSTP protocol
- ❑ Add support and app notes for redundant dual ring topologies using Model 5468/6468 cards.
- ❑ Test on Dell PowerEdge 1950 Dual Core Intel® Xeon® 5110, 4MB Cache, 1.60GHz, 1066MHz FSB
- ❑ Add Linux 2.6 driver support (up to Linux 2.6.22)
- ❑ Additional platform tested (Dell PowerEdge 1950 Dual Core Intel® Xeon® 5110, 4MB Cache, 1.60GHz, 1066MHz FSB)

Additional Notes from previous releases

- ❑ Additional platforms tested (Concurrent CPCI Intel M-Class, Intel 2.8 dual Xeon/E7525 chipset (SuperMicro X6DAE-G2)
- ❑ Add extended feature support for Model 5468 switch management via driver API
- ❑ Add support for Model 6468 and 5263-SFP
- ❑ Add support for Model 6267 2-port fiber PCI-X (Intel, pluggable SFP)
- ❑ Add support for Model 5468 GigPMC 8-port hybrid switch
- ❑ Integrate latest support and bug fixes (see notes below).
- ❑ Support for new Model 5262-SC Intel based PMC.
- ❑ Support for Wind River Workbench (all releases) with vxWorks 6.x
- ❑ Support for new Intel based cards (models 6267, 5261, 5262, 5164)
- ❑ Support for Tornado 2.2/VxWorks 5.5
- ❑ Additional integration and testing on Motorola MVME5500 and Thales VMPC7
- ❑ Support for Intel pcPentium4 BSP (Tornado 2.2)
- ❑ Support for Model 6162-PCI-X (dual copper)
- ❑ Support for Model 6161 (copper) and model 6167 (fiber)
- ❑ Support for Broadcom BCM5421s transceiver
- ❑ Added support for “frame generator” task (vxWorks, Linux)
- ❑ Support for Intel pcPentium4 BSP
- ❑ Add additional configuration parameters for Linux driver.
- ❑ New high-frame-rate application benchmarks and support (short frames, high-frame rate for both Linux and vxWorks)
- ❑ Add support for Broadcom BCM521S transceiver (copper and fiber)

- ❑ New optimizations and performance benchmarks for VxWorks and Linux
- ❑ Suppress additional warnings in driver code
- ❑ New platforms tested (2 GHZ Xeon, Linux and vxWorks)
- ❑ Add support for Intel FW21154BE bridge and Model 5162 dual-port card
- ❑ Windows Driver Source code available under separate source license.
- ❑ Support for Fiber model 7160 on Linux platforms is now included
- ❑ Driver has been verified on Linux PowerPC architectures
- ❑ Support for GigMAC PMC Model 5161
- ❑ Add additional diagnostic features including interrupt test, cpu usage and buffer descriptor display
- ❑ Support for VxWorks Advanced Feature Set (optional product)
- ❑ Additional Extended Statistics
- ❑ Source code merged with VxWorks, Linux and Windows bases creating common hardware-specific driver lower half used on all platforms.

OEM Developer Kit CD Contents

Please find the following reference material on the OEM Developer's Kit CD:

- ❑ Driver source code for vxWorks, Linux 2.4, Linux 2.6, PowerPC, Intel platforms
- ❑ Users Manual(s)
- ❑ VxWorks Users Manual and Integration Guide (Intel and National)
- ❑ Datasheets for chipset controllers (Intel, National, etc.)
- ❑ Application notes library
- ❑ Windows device driver executables
- ❑ TCP/UDP/IP performance test programs (vxWorks, Linux, Windows versions included)
- ❑ TCP, UDP and raw driver performance tests
- ❑ Driver Utilities (Linux)
- ❑ High-performance frame generator (wire and bus-speed capable)
- ❑ Transmit and receive callbacks (hooks) for MAC to driver-level real-time application code
- ❑ Internal and external loopback capabilities
- ❑ Built-in performance instrumentation statistics
- ❑ Built-in BIT, POST and additional diagnostics
- ❑ SNMP/RMON statistics
- ❑ MAC Register Dumps
- ❑ CPU usage utility

- ❑ Interrupt test utility
- ❑ Fully quick and easy integration verification (with frame generator, external or internal loopback, extended statistics, interrupt latency test, CPU usage indicator)
- ❑ Gigabit Ethernet FAQ sheet
- ❑ NetPerformance.txt protocol stack tuning guide for vxWorks

Driver Performance Benchmark Information (Linux and VxWorks)

The VxWorks and Linux drivers have been tested at the following performance levels:

- 980 Mbytes/sec (7.84Gbps) sustained system throughput (over 4-ports using PCI-X and PCI-Express based models) -- 1500-byte Ethernet frames (wire-speed on 4 ports full duplex).
- Over 1.8 million 60 to 100 byte frames per second sustained on 2 GHZ Intel Xeon (vxWorks and Linux) over 4 ports
- Single and Dual-processor configurations tested with Linux 2.4/2.6 on Intel dual Pentium3 and dual Xeon (2.2 GHZ and 2.8 GHZ based systems)
- 245 Mbytes/sec (1.96 Gbps) sustained raw driver throughput over 64-bit, 133/100 PCI-X (single port)
- 220 Mbytes/sec (1.76 Gbps) sustained raw driver throughput over 64/66 PCI (single port)
- 224 MB/sec (1.792Gb) sustained TCP/IP in 2-port bidirectional test between 2 GHZ Intel Zeon and Dual 1-GHZ Pentium3 (single port)
- 118 megabytes/sec (944 Mb) sustained TCP/IP throughput tested on 2 GHZ Intel processor running Linux kernel 2.4.26 (single port)
- 118 Megabytes/sec (944 Mb) sustained raw throughput in 32/33 PCI (vxWorks, single port)
- 96 Megabytes/sec sustained tested with VxWorks protocol stack using UDP/IP on a 450 MHZ PowerPC 750 (single port)
- Over 536,000 60-byte frames per second on 450 MHZ PowerPC 750

Note: Please additional information on Gigabit Ethernet FAQs and benchmarks, please visit our website at the following quick links:

<http://www.dssnetworks.com/v3/FAQs.asp>

http://www.dssnetworks.com/v3/Screenshots_main.asp

Linux Driver Information

The Linux driver supports and contains the following features:

- Standard Linux Network Driver model
- Interfaces with any upper layer protocol using standard Linux MUX/Network Driver Interface
- Interfaces with the Linux TCP/UDP/IP protocol stack
- Linux version support to 2.4.32 and 2.6.22
- Modular, dynamically loadable design
- High-performance, low latency transfers (< 2us)
- Driver has zero-copy DMA operation
- System configuration and management features
- Performance and health monitoring statistics
- Built-in BIT, POST and additional diagnostics
- MAC register statistics
- MAC SNMP/RMON statistics
- Interrupt test provides a system-level maximum benchmark in millions of interrupts per second
- Built-in wire-speed frame generator – can be used as same or for verification of card/driver/system integration health and performance)
- Build in internal and external loopbacks (internal as applicable)
- Built-in real-time trace capability
- Linux driver support for all card models
- Failover and fail-back (optional extended feature set)

VxWorks Driver Information

The vxWorks driver supports and contains the following features:

- Standard vxWorks END (Enhanced Network Driver)
- Interface with any upper layer protocol using standard vxWorks END driver interface
- Interfaces with Wind River's vxWorks TCP/UDP/IP protocol stack
- Wind River Workbench / vxWorks 6.x support
- Tornado 2.2.1/VxWorks 5.5.1 and Tornado 2.0.2/vxWorks 5.4 support
- Modular, dynamically loadable design
- High-performance, low latency transfers (< 2us)
- Zero-copy DMA operation
- System Configuration and Management Functions
- Performance and health monitoring statistics
- Built-in BIT, POST and additional diagnostics
- MAC register statistics
- MAC SNMP/RMON statistics
- Interrupt test provides a system-level maximum benchmark in millions of interrupts per second
- CPU usage monitor
- Built-in wire-speed frame generator – can be used as same or for verification of card/driver/system integration health and performance)
- Build in internal and external loopbacks (internal as applicable)
- Built-in real-time trace capability
- VxWorks driver support for all card models
- Failover and fail-back (optional extended feature set)

Platforms used for validation, testing and benchmarks

- ❑ Dell PowerEdge 1950 Dual Core Intel® Xeon® 5110, 4MB Cache, 1.60GHz, 1066MHz FSB
- ❑ SuperMicro X6DAE-G2 Intel based PC Computer, 2.8 GHZ Dual Xeon, Intel E7525 chipset, 1GB DDRII-400 (dual channel), PCI-Express, Linux 2.4.30, 2.6.22
- ❑ Concurrent AD PP5/001-00 Rev B (720-6138-00) (Intel M-class based CPCI), Linux 2.4.30/ Linux 2.6.22
- ❑ Intel SE7505VB2 PC, 2 GHZ Dual Xeon CPU, 512MB DDR SDRAM, 64/66 PCI, 133/100 PCI-X, Intel E7505 chipset, Linux kernel 2.4.30, 2.6.22, vxWorks 5.5
- ❑ SuperMicro P4DL6 PC, 2 GHZ Xeon CPU, 512MB DDR SDRAM, 64/66 PCI, 133/100 PCI-X, Serverworks LE chipset, Linux kernel 2.4.30, vxWorks 5.5
- ❑ Motorola MVME-5500, vxWorks 5.5
- ❑ Force Computers CPCI-680 (vxWorks 5.5)
- ❑ Thales Computers VMPC7 (Power Engine 7), vxWorks 5.5
- ❑ CompactPCI / PMC, PowerPC 750, 450MHZ, 256MB SDRAM, VxWorks 5.4
- ❑ PC, Pentium III CPU, 1.2 GHz Dual CPU, 256MB PC133 SDRAM, 64/66 PCI, Linux kernel 2.4.26, Windows XP
- ❑ PC, Pentium III CPU, 1 GHZ dual CPU, 128 MB SDRAM, 64/66 PCI, Linux 2.4.26, MontaVista Linux 2.0 (kernel version 2.4.17)
- ❑ All other platforms may require minor integration by mid to senior level software engineer with kernel/BSP/driver/PCI experience.

Test Procedures

Gigabit Ethernet card testing: BIT/POST, built-in diagnostics, internal and external loopbacks, frame generator, status, statistics and register dump monitoring, ICMP/Ping, Fast Ping, ARP, IP, TCP/IP, UDP/IP, FTP, Telnet, HTTP, Windows/SMB/NBT, Network Browsing, Network Printing

Modes tested: 10-Base-T, 100-Base-T, 1000-Base-T, 1000-Base-SX, 1000-Base-LX, Half and Full-Duplex, CWDM, Copper and Fiber Interfaces

Throughput test: Raw driver maximum throughput test loopback at 245 MB/sec sustained per port. Total system throughput up to 1GB/sec (980 Mbytes/sec). Over 850,000 frames per second using 60-byte short frames per port – 1.8 million frames per second over 4-ports.

TCP/IP throughput test: Blaster/blastee TCP sockets throughput tests (vxWorks and Linux), 114 MB/sec per-port sustained using TCP/IP, 118 MB/sec per-port sustained using UDP/IP.

UDP/IP throughput test: Blaster/blastee UDP sockets throughput tests (vxWorks and Linux), 118 MB/sec per-port sustained using UDP/IP.

Internal and external loopbacks: Maximum load / rate / bus testing to 980 Mbytes/sec and 1.8 million frames per second.

Interrupt test: Interrupt test run to 50+ million interrupts per second sustained (on Intel dual 2.8 GHZ Xeon based system).

Problems resolved (current and from previous releases)

- ❑ Minor changes for better LED control
- ❑ Linux driver does now correctly supports model 6167 PCI fiber controller
- ❑ Fix mac address increment issue on x86 platforms
- ❑ Heavy testing with MVME5500, minor mods to cache flush & invalidates
- ❑ Improvements to reduce register access during interrupts and data transfer
- ❑ Fix pci scan / card detection on high-end server boards (Linux)
- ❑ Auto-negotiation using 1000 Base SX fiber controllers has been fixed.
- ❑ Driver warnings when using -Wall have been quieted (corrected)
- ❑ Inline functions moved to top to allow for proper inlining (GNU requirement)
- ❑ Fix / enhance PCI configuration, don't enable i/o space explicitly

Known problems and/or limitations

- ❑ None as of this release.