



RFM2g

Network and Shared Memory Driver

Features

- Shared memory support for GE Fanuc 2 Gb/s RFM family of products for PCI/PMC/PCIE and VME
- RFM2g supports a wide range of processors including PowerPC®, SPARC®, and x86
- Highly configurable to be interoperable with legacy Reflective Memory systems
- Supports data transfer rates of 170 MB/s over fiber-optic in a ring topology
- Supports Big Endian and Little Endian conversions
- PIO and DMA can be mixed
- Provides an Application Programming Interface (API) Library to simplify usage and provide a standard interface across operating systems
- Provides diagnostic and performance utilities
- 32-bit and 64-bit support on Linux® OS and Windows®
- Operating system support for Solaris™, VxWorks®, Windows 2003, Windows XP, Windows Vista, and Linux , and Windows NT (VME-5565 only)

Reflective Memory (RFM) networks are real-time Local Area Networks in which each computer always has a local, up-to-date copy of the network's shared memory set. These networks are designed to provide the highly deterministic, tightly timed performance necessary for a variety of distributed simulation and industrial control applications. They cater to applications where determinism, implementation simplicity, integration of a number of dissimilar hardware platforms running different operating systems, and a lack of software overhead are key factors.

Using RFM systems, designers are able to eliminate most communication latency and realize drastic improvements in resource utilization over traditional LAN technologies. The benefit of a low-software, high-speed, hardware driven network like RFM is extremely low data latency, both overall and between individual network nodes.

RFM node interface cards can be installed in a variety of computer backplanes and buses including VME, PMC, PCI and PCI Express. We support a wide variety of operating systems such as Linux, VxWorks, Microsoft® Windows XP/ Vista/2003 and Solaris®. You also have the choice of multi-mode for short fiber runs or single-mode for spanning long distances between nodes for the fiber optic cable interconnect.

Using an RFM Network Requires Only a Few Simple Steps:

1. Plug RFM node card into any available backplane slot or bus via VME, PCI, PCIE or PMC, or connect it to any single board computer or carrier (VME, CompactPCI etc.) with a PMC site and connect cabling.
2. Install the RFM2g driver.
3. Write to memory (RFM's global memory appears to the computer as standard RAM).
4. Read memory (from Reflective Memory boards on the network).

The steps above show the simplicity and power of RFM. But the functionality does not stop there. For additional functionality:

- Use the API library to easily use DMA to transfer large blocks of data to or from shared memory while maintaining high throughput.
- Optionally, send network interrupts to other nodes to notify them of changes to the shared memory content.

RFM2g

The RFM2g network and shared memory driver, included with the purchase of RFM node cards, provides an application program with two convenient methods for exchanging data among hosts connected to the same RFM network:

- Programmed I/O (Peek and Poke): An application program can treat the memory on the RFM device as ordinary memory in which the program can use ordinary load and store accesses.
- Direct Memory Access (DMA): On systems where the performance penalty for individual bus accesses is unacceptably



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high, the driver utilizes the DMA available on the RFM node card. For shorter transfers, such as accessing sparse data structures, the driver switches to PIO to efficiently transfer data in small-size blocks.

The RFM2g driver provides all of the necessary files, scripts and programs for you to install, test and use any of the supported RFM interface cards in your system. The RFM2g driver provides:

- **Application Programming Interface (API) Library:** Application programs may use the services provided by the RFM2g Application Program Interface (API) library to access the features of the RFM2 devices in a portable way. Using the API library makes it easy to use a different model of RFM interface, or to re-host your application program on a different supported host platform.
- **Command Line Interpreter:** The `rfm2g_util` program is a command line interpreter that enables a user to exercise various RFM2g API commands by entering commands at the keyboard. The ANSI-C source code is included along with the binary executable.
- **Example Programs:** The RFM2g driver contains the `rfm2g_sender.c`, `rfm2g_receiver.c` and `rfm2g_map.c` sample programs that provide examples on how to use the driver and API with your application.

User Interrupts

Node cards in the RFM 5565/5565PIORC/5565RC family provide four network interrupts with four corresponding FIFOs. Any processor can generate an interrupt on any other node on the network. In addition, any processor can generate an interrupt on all nodes on the network with a single register write.

Data stored in a FIFO is user-definable and typically is treated as an interrupt vector. As part of an interrupt service routine, the local processor reads this information out of the FIFO and acts accordingly.

Operating System (OS) Support

Node Card	Form Factor	OS Support
PCI-5565PIORC	PCI	VxWorks, Linux†, Windows† XP, Window† Vista, Windows† 2003, Solaris
PCIE-5565RC	PCI Express	VxWorks, Linux†, Windows† XP, Window† Vista, Windows† 2003, Solaris
PMC-5565PIORC	PMC	VxWorks, Linux†, Windows† XP, Window† Vista, Windows† 2003, Solaris
VME-5565	VME	Window† 2003, Windows† XP, Windows† NT, VxWorks, Linux†

† 32-bit and 64-bit support

Ordering Information

RFM2g drivers are available for downloading from the RFM node card product pages:

<http://www.gefanuc.com/products/family/reflective-memory-nodes>

About GE Fanuc Intelligent Platforms

GE Fanuc Intelligent Platforms, a joint venture between General Electric Company (NYSE: GE) and FANUC LTD of Japan, is an experienced high-performance technology company and a global provider of hard-ware, software, services, and expertise in automation and embedded computing. We offer a unique foundation of agile, advanced and ultra-reliable technology that provides customers a sustainable advantage in the industries they serve, including energy, water, consumer packaged goods, government and defense, and telecommunications. GE Fanuc Intelligent Platforms is a worldwide company headquartered in Charlottesville, VA and is part of GE Enterprise Solutions. For more information, visit www.gefanuc.com.

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Additional Resources

For more information, please visit the GE Fanuc Intelligent Platforms web site at:

www.gefanuc.com

