

GE
Intelligent Platforms

PACSystems High Availability Solutions



imagination at work

Minimizing the high cost of downtime

To keep your essential systems running, PACSystems High Availability ensures continuous, efficient operations with superior performance and flexibility.

Operations in industries such as water, power and energy, emergency power, tunnels and continuous processing cannot afford unplanned downtime, as the economic impact can have serious implications, including lost productivity, profitability and performance. According to Electric Power Research Institute, companies in some industries can lose as much as \$6.45 million per hour of downtime.

GE Intelligent Platforms understands your critical business needs, and our PACSystems® RX3i High Availability and PACSystems RX7i High Availability solutions

can keep your essential systems running efficiently and reliably. The solutions consist of two physically independent controllers connected to various I/O on our proven industrial network that provides automatic switchover for continuous operations.

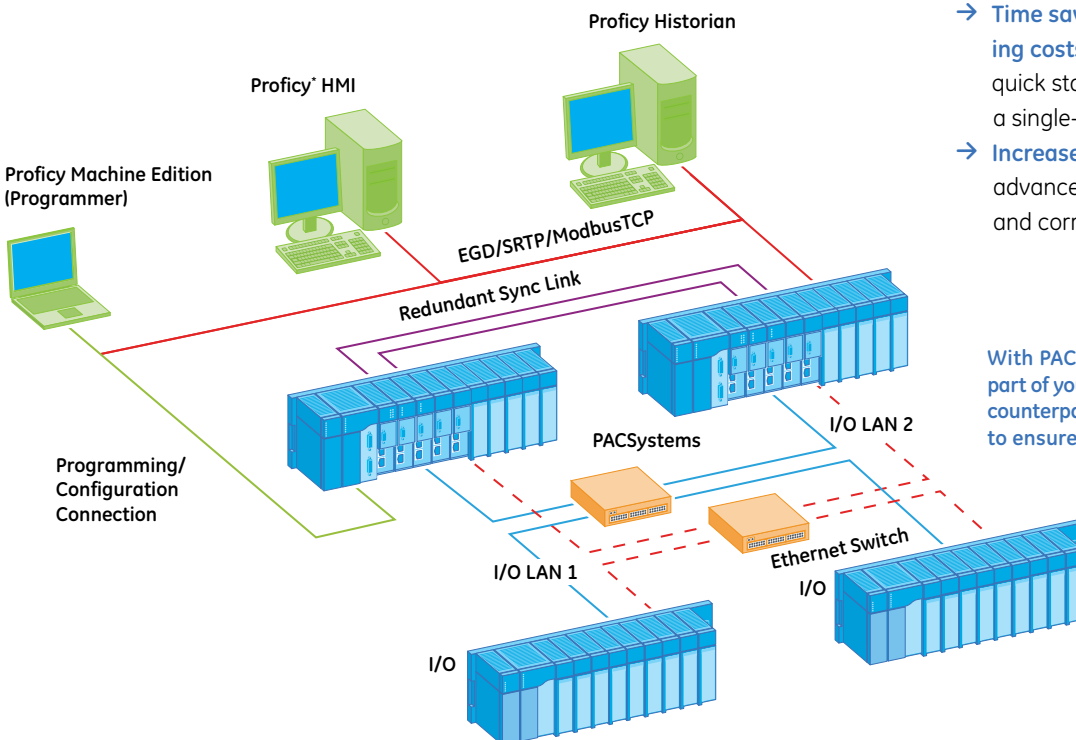
Built on a scalable, synchronized, hot-standby redundancy control platform, our PACSystems High Availability solutions ensure uninterrupted control of your applications and processes with total transparency. They leverage domain expertise and industry-leading technologies to meet your needs for enhanced speed

and performance, increased memory, built-in hardware redundancy and ease of use.

With PACSystems High Availability, operations globally are delivering results for a sustainable competitive advantage:

- **Minimized downtime** through robust, dual redundancy capabilities
- **Increased productivity** due to fast, powerful synchronization and the ability to maintain individual system components without interruption
- **Maximum protection** of your investments with flexible, scalable, open architectures
- **Time savings and reduced engineering costs** with easy configuration and quick startup and maintenance with a single-point connection
- **Increased data integrity** through advanced memory error checking and correction (ECC)

With PACSystems High Availability, if any part of your control system fails, the backup counterpart automatically assumes control to ensure continuous operations.



High speed, power and performance

Built with leading-edge technologies, PACSystems High Availability enables you to easily transfer large amounts of data quickly and with seamless switchover control.

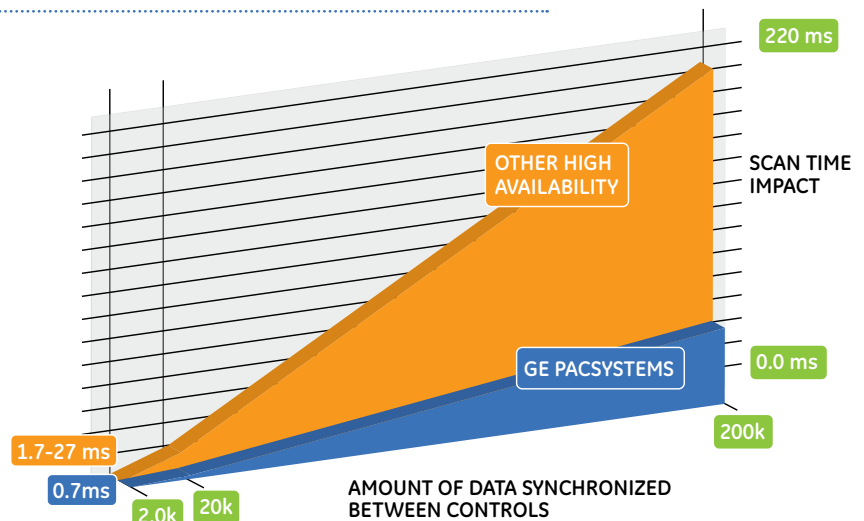
Unlike other solutions, PACSystems High Availability offers true dual redundancy data synchronization with dual modules. The controllers have dedicated, redundant links to one another and operate synchronously with virtually no overhead added to the control application—transferring all of your application’s variables, status and I/O data on every scan with speed and transparency.

Fast, full system synchronization

At the heart of PACSystems High Availability is GE’s unique, patented Redundancy Memory Xchange (RMX) module, based on reflective memory technology. It synchronizes your systems at the beginning and end of each logic scan execution to keep all variable data the same—providing rapid and bumpless switchover.

More memory, faster transfer rates and greater efficiency

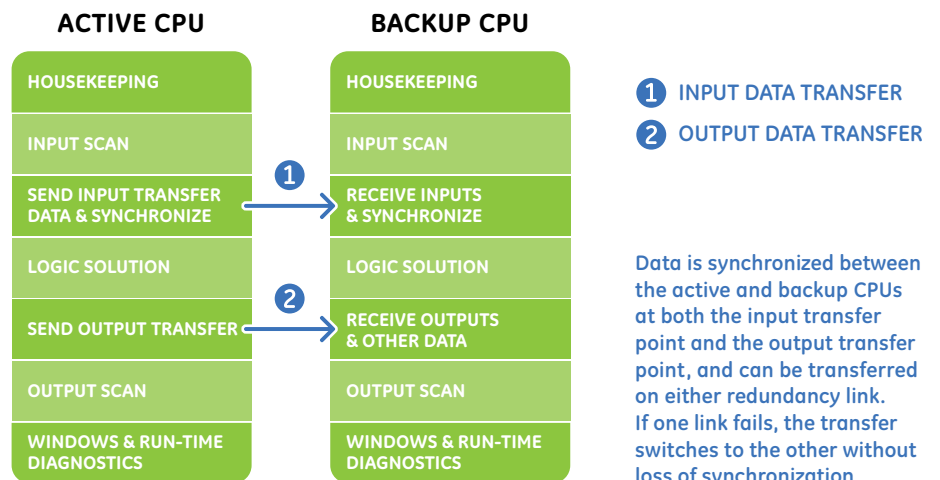
PACSystems’ high-speed memory sharing enables multiple devices to transfer up to 2 Mbytes of data over a fiber optic deterministic network at speeds of up to 20 times faster than Ethernet. The use of fiber optic connections allows you to easily operate in high-noise areas and cover large distances (300 meters between controllers) in real time; a manual toggle switch enables you to easily change control between primary and secondary units.



Superior to competitor solutions, PACSystems’ RMX redundancy link operates in parallel to the main logic controller and has minimal effect on scan time—even with large amounts of data—maximizing your productivity.

TYPICAL BASE SWEEP TIME IMPACT (REFERENCE DATA TRANSFER LIST IMPACT) †	3.66 msec: 1K Discrete I/O, 125 Analog I/O and 1K Registers
	3.87 msec: 2K Discrete I/O, 250 Analog I/O and 2K Registers
	4.30 msec: 4K Discrete I/O, 500 Analog I/O and 4K Registers
	5.16 msec: 8K Discrete I/O, 1K Analog I/O and 8K Registers

† Symbolic variable and reference data can be exchanged between controllers. Up to 2 Mbytes of data are available for transfer.



Maximizing your return on investment

PACSystems High Availability is designed to operate as a completely integrated system that's user-friendly, customizable and cost-effective for mission-critical redundancy.

High availability typical applications

Processing plants where continuous uptime is essential to profitability

- Water treatment
- Semiconductor
- Metal processing
- Mining

Transportation applications where bottlenecks must be avoided

- Transport systems
- Ventilation systems

Remote locations where time and cost to repair is extended

- Offshore applications
- Remote pumping stations
- Ships
- Windmills
- Pipelines

Operations where work stoppage means lost production

- Cranes
- Turbine auxiliary
- Material handling

Essential building operations

- HVAC systems

Mission-critical power switching

- Data warehouses
- Hospitals
- Credit card processing centers
- Power distribution

Easy to configure, monitor and maintain

PACSystems High Availability operates as a single system to the overall operations, eliminating the complex preparations usually needed to synchronize data between other applications and external systems. Configuration, installation, monitoring and maintenance are made easy with our user-friendly software solution, Proficy Machine Edition, which enables you to:

- Leverage advanced object oriented programming, resulting in significant time and cost savings
- Easily set up a hardware configuration with the correct parameter settings for your redundancy scheme using its Redundancy Wizard
- Debug and monitor your system online using simple, intuitive tools
- Add, delete or modify transfer list entries without interruption with run mode store support of the redundancy transfer list

Floating IP

To further optimize your control, you can leverage a built-in redundant IP that floats between the primary and secondary Ethernet controllers, so a switchover of the processor is transparent at the HMI/SCADA level—simplifying development efforts and eliminating the need for duplicate databases.

Flexible, scalable and open

PACSystems High Availability integrates flexibly with other systems and devices to give you freedom of choice and maximum return on your investments. The solution is also scalable so you can choose the redundancy architecture that best meets your needs today, and easily modify your system as your business needs evolve into the future. Its inherent flexibility enables interoperability with various I/O such as Genius*, DeviceNet and Profibus.

For even higher availability needs, we also offer PACSystems Quad Redundancy. Two pairs of redundant controllers synchronize themselves over redundant fiber optic busses, and together they actively manage the overall system availability to ensure the highest level of redundancy at all times.



Remote I/O

The PACSystems ENIU remote I/O supports redundant Ethernet LANs and a wide variety of network modules. You can expand to additional LANs and pick up other signals from field devices using popular field buses. All modules, including discrete and analog I/O and intelligent cards, support hot swap.

Additional key features:

- Redundant power supply support at the remote drop
- Optional 20K of local logic for emergency shutdowns and other local control
- Two built-in serial ports for device interfaces
- Interoperability with Genius, Profibus, DeviceNet, Motion, HART and Ethernet
- Fully compatible with PACSystems Sequence of Event recording

PACSystems High Availability Solutions Overview

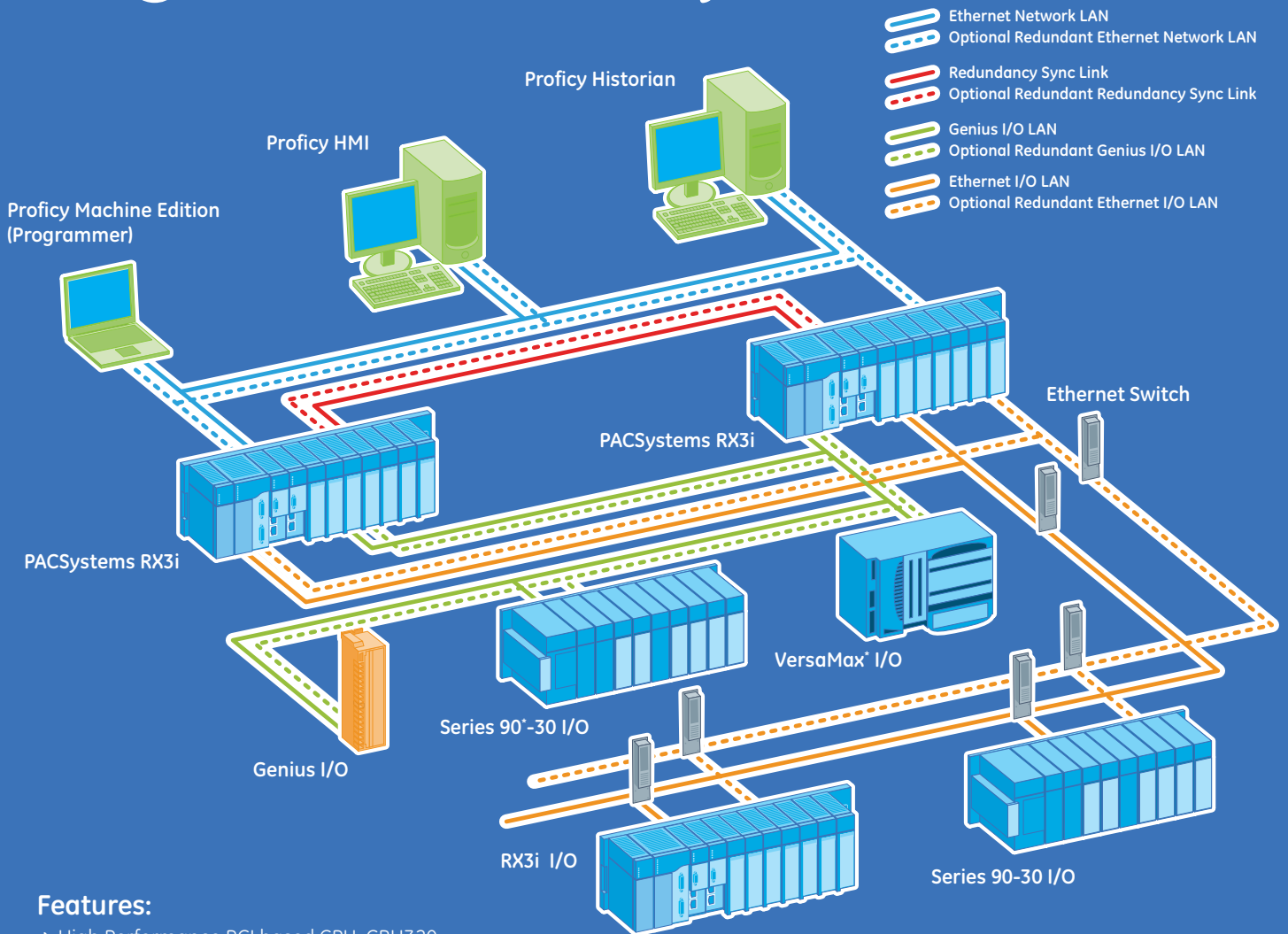
With both options, PACSystems RX3i High Availability and PACSystems RX7i High Availability, you can choose the solution that best meets your redundancy needs. PACSystems RX7i High Availability may be an ideal choice for applications that require a VME open platform and faster processing requirements such as those needed for steel and paper mills.

	PACSystems RX3i High Availability	PACSystems RX7i High Availability
TYPICAL SWITCH OVER TIME	Immediate, 1 sweep	
DATA SYNCHRONIZED	Twice per scan, beginning and end of scan	
SYNCHRONIZATION METHOD	Reflective Memory Technology	
CPU MAXIMUM AMOUNT OF DATA IN TRANSFER LIST	Up to 2 Mbytes	
SYNCHRONIZED LINK TRANSFER RATE	43 Mbyte/s (4 byte packets) to 174 Mbyte/s (64 byte packets)	
SYNC LINK SPEED	2.12 Gbits/s	
CPU SCAN SYNCHRONIZATION	Automatic Each Scan	
REDUNDANT NETWORK	Yes and Redundant IP	
MAXIMUM DISTANCE BETWEEN REDUNDANCY CONTROLLERS	300 meters	
REDUNDANT I/O LAN SUPPORTED	Yes	
REDUNDANT SYNC LAN	Up to two synchronization links supported	
CPU TYPE	CRU320	CRE020/CRE030/CRE040
REMOTE I/O SUPPORTED	RX3i ENIU, Genius LAN Series 90-30 ENIU	RX3i ENIU, Genius LAN, Series 90-30 ENIU
REDUNDANT I/O SUPPORT	Yes, with application code	
SIL SAFETY RATING	No†	

† For applications in harsh environments or hazardous areas, and where you need SIL2 and SIL3 functional safety, GE offers targeted process control and safety solutions with industry-specific robust redundancy capabilities. For more information, visit www.ge-ip.com/safety

To learn more about PACSystems High Availability, visit www.ge-ip.com/highavailability

PACSystems RX3i High Availability



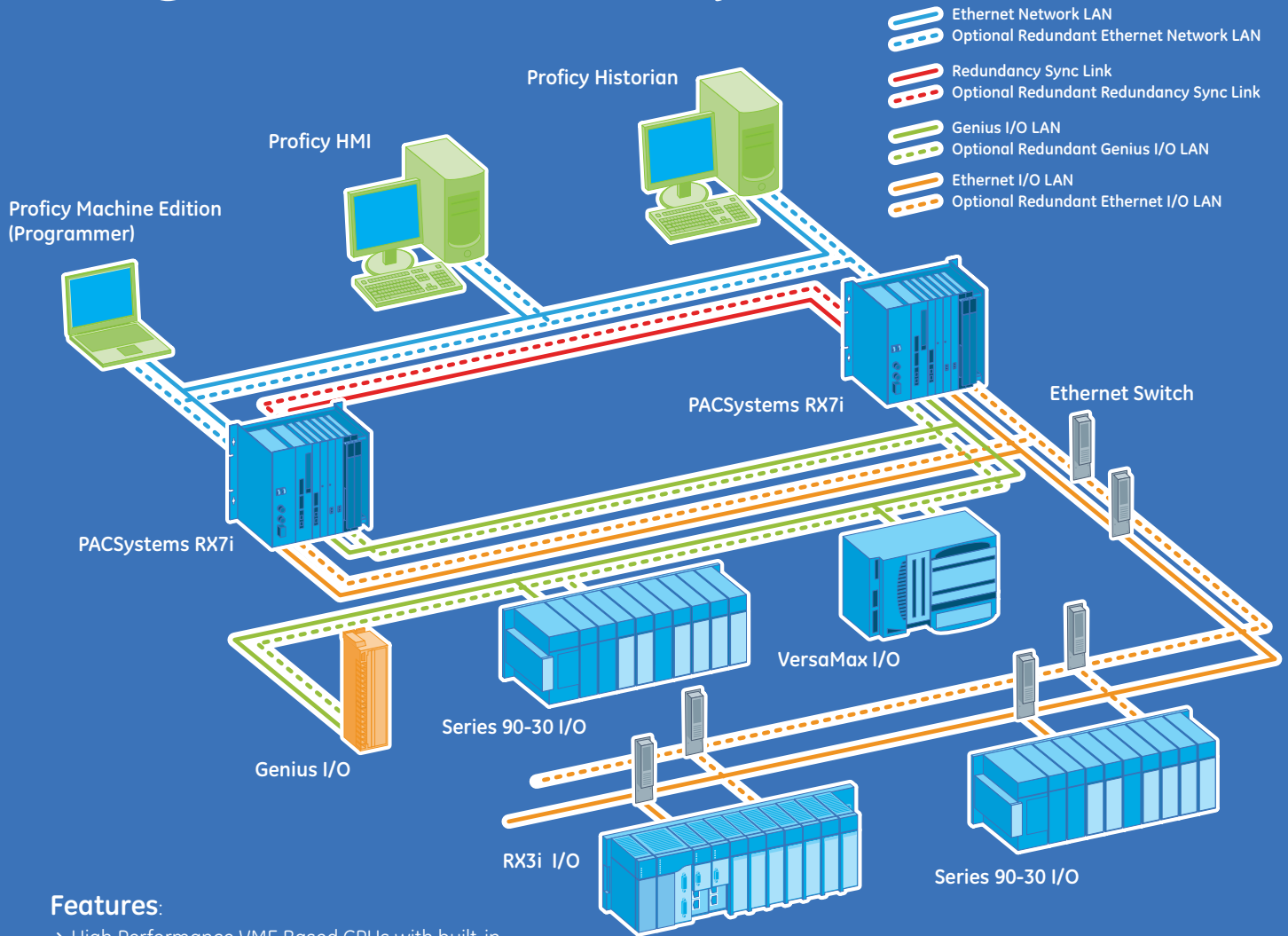
Features:

- High Performance PCI based CPU; CRU320 – 1GHz processor with 64Mbytes of user memory
- 2.12Gbit/sec Fiber High Speed Data Synchronization Link
- Redundant I/O LAN Option
- Dual Ethernet Network LAN Option
- Floating IP for HMI Network LAN
- Support for RX3i ENIU I/O, Genius I/O, VersaMax I/O and Series 90-30 ENIU
- High Speed Ethernet I/O LAN: 10/100Mbits Ethernet
- Supports up to 8 Ethernet modules per controller
- Hot Swap Remote I/O
- Remote Fieldbus and communication connections supported with RX3i ENIU (Genius, Profibus, DeviceNET, Ethernet, Serial and HART)
- Redundant Power Supply Support



PACSystems RX3i

PACSystems RX7i High Availability



Features:

- High Performance VME Based CPUs with built-in Ethernet and up to 64 Mbytes of user memory
- 2.12Gbit/sec Fiber High Speed Data Synchronization Link
- Redundant I/O LAN Option
- Dual Ethernet Network LAN Option
- Floating IP for HMI Network LAN
- Support for RX3i ENIU I/O, Genius I/O, VersaMax I/O and Series 90-30 ENIU
- High Speed Ethernet I/O LAN: 10/100Mbits Ethernet
- Supports up to 8 Ethernet modules per controller
- Hot Swap Remote I/O
- Remote Fieldbus and communication connections supported with RX3i ENIU (Genius, Profibus, DeviceNET, Ethernet, Serial and HART)



PACSystems RX7i

