

GE  
Intelligent Platforms



# sonar solutions



imagination at work

# In Sonar, There Is No Substitute For Experience.

We have been delivering state-of-the-art military computing solutions for over 40 years, so it's not surprising that the industry's best prime contractors choose GE Intelligent Platforms products in many of their highest profile programs.

If you are developing a sonar application, you can turn to us with complete assurance that we know sonar. Our reputation for design excellence has made us the preferred choice for naval fleets across the globe. Our solutions are deployed on over 400 vessels—including the US Navy's Virginia class submarine—and deployed in such major programs as SQQ-89 and the ARCI modernization effort.

In addition to our invaluable experience in sonar, our field-proven hardware offerings reach all the way from front-end data acquisition, to back-end signal processing. Our software toolset, known as AXIS (Advanced Multiprocessor Integrated Software), enables rapid, efficient devel-

opment, debugging and deployment of sophisticated, high performance signal processing applications. It is this expertise, hardware, software and support that set GE Intelligent Platforms apart.

#### Major programs that have selected GE Intelligent Platforms sonar solutions.

- ADCAP (Raytheon Company)
- SQQ-89 (Lockheed Martin)
- ALFS/LAMPS (Raytheon USA)
- LFAS (DRA USA)
- NSSN-SIM/STIM (DSR USA)
- P3 Upgrade (Boeing USA)



#### daqNet

daqNet is an integrated, high-speed acoustic 1U server for network-centric environments, including sonar. It offers 192 analog or 240 digital channels in an integrated data acquisition and control node solution.

# GE Intelligent Platforms is your Premiere Choice.

As a leader in COTS embedded computing for military and defense applications, our product line includes a full range of VMEbus, VPX and CompactPCI platforms available in any of five ruggedization levels.

Our product line is outstanding in its breadth, from single board computers using both PowerPC® and Intel® processors, to powerful multiprocessor DSP boards featuring both FPGA and general purpose processing technologies. We offer sophisticated communications switches and a broad array of data acquisition, sensor processing and digital recording and playback solutions.

GE Intelligent Platforms can truly offer 'sensor to shooter' capabilities because we have the expertise to integrate our own product line with third party products in order to create complete functional sub-

systems. We are able to provide technical assistance with subsystem integration, and support you at every stage of the development process.

Of equal importance, GE Intelligent Platforms is a leader in the long term support of the multi-year deployments that are typical of military programs. Configuration control and Program Lifecycle Maintenance ensure that you are protected to the maximum extent possible from the technology changes that can occur during the extended lifetime of a program.



# Front-End Data Acquisition.

For sonar applications, the two main considerations are the signal-to-noise ratio and the phase matching of the analog-to-digital conversion process.

Maximizing the signal-to-noise ratio is increasingly important to sonar designers because of new threats with low signature responses such as the latest diesel generators. Once a signal is successfully received, it is impossible to locate the source without accurate phase information.

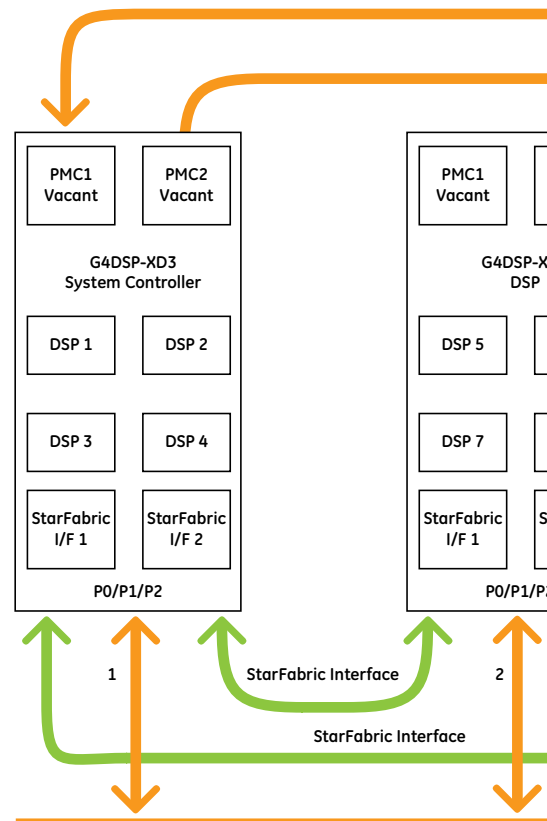
The skill in designing for signal-to-noise ratio is twofold: to minimize the noise and to maximize the signal itself. Minimizing noise will typically mean ensuring that the ADC silicon is separated from the digital components on the board. It should have its own filtered power supply, and other components should be placed on the board so that interference is minimized. Fully differential circuits should be used wherever possible.

Maximizing signal quality will typically require signal conditioning—ideally, on the data acquisition board itself. Signal conditioning can include functions such as signal amplification, attenuation, filtering and electrical isolation.

Detecting a signal may be important, but it is of little use unless the location can be determined. Careful phase matching across all channels on a circuit card, and

all channels across multiple synchronized circuit cards, has been our design goal since day one. Not only for the start of acquisition, but also ensuring that phase information is maintained during continuous operation. Our products offer three levels of redundant synchronization designed solely to maintain this important information.

Example of a complete front/back end solution.



# Back-End Data Processing.

Once the data have been acquired, the next hurdle is equally daunting: designing and debugging the complex back end processing system across multiple processing nodes.

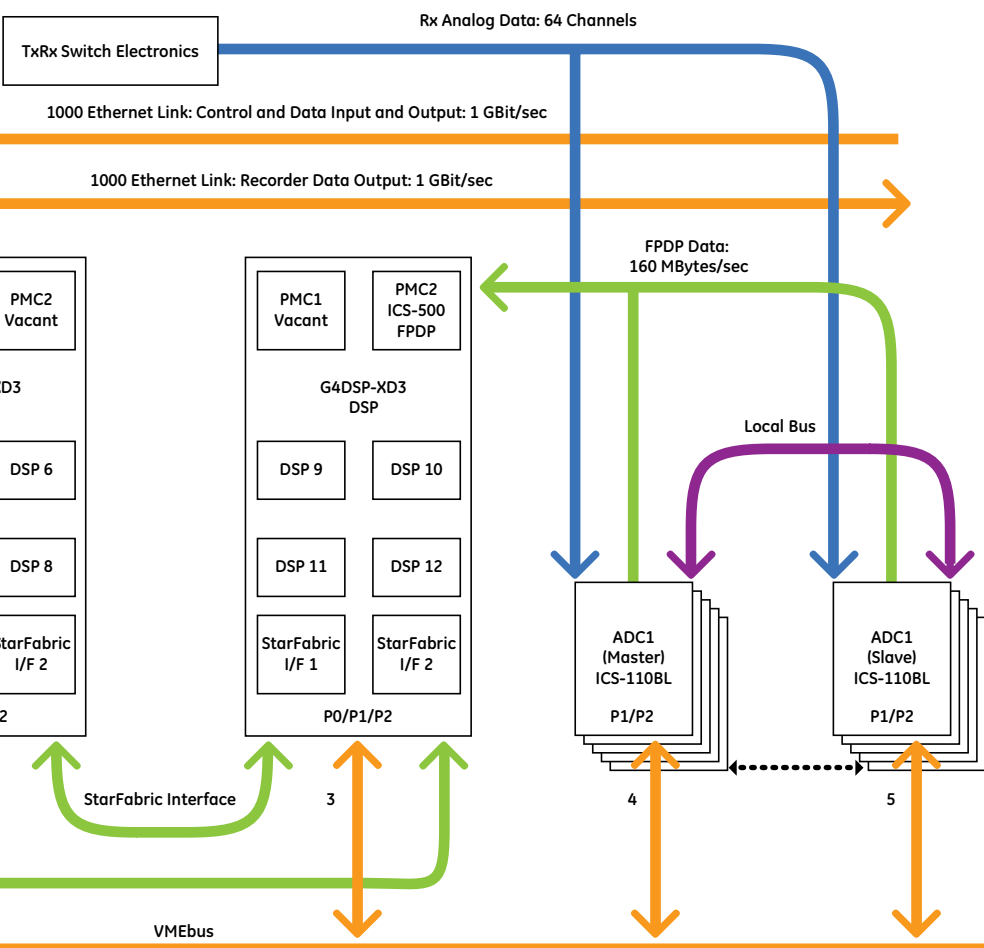
GE Intelligent Platforms offers a leading combination of hardware and software designed not only to deliver state-of-the-art performance as rapidly as possible, but to support the deployment of that performance. Our AXIS application development toolset is specifically designed to

simplify the development of complex signal processing applications requiring multiprocessor PowerPC® systems.

We also offer the specialized types of hardware required for these demanding applications. For example, the G4DSP-XD3

features four PowerPC MPC7448 compute nodes, operating at 1 GHz and is based around the AccelerX loosely-coupled PCI-X architecture to allow ultra fast node-to-node communications. Multiboard scalability is greatly enhanced by the use of two StarFabric ports. GE's StarSwitch can then be used to interconnect limitless G4DSP-XD3s within the VME environment.

For applications requiring the raw processing capability and the flexibility of FPGA technology, we offer the V4DSP with dual Xilinx® Virtex® -4 FX FPGA processors, together with a PowerPC MPC7448 general purpose processing node. The V4DSP offers a choice of mezzanine support-a 64-bit/66 MHz PMC site, or an XMC site. For scalability, V4DSP provides two Star Fabric ports which can be used to scale large multiboard systems. Also provided are two MultiGigabit Transceiver (MGT) lanes for alternative high-speed serial I/O up to 2.5 GHz.



# Hardware, Software specifically designed

## Multiprocessing



DSP230 (VPX)



G4DSP-XD3 (VME)



IMP1A (cPCI)

## Network Switching



VME-2128 (VME)



PCIE-5565RC (PCIe)

## Graphics



Magic1 (VPX)

## Data Acquisition



daqNet (1U)



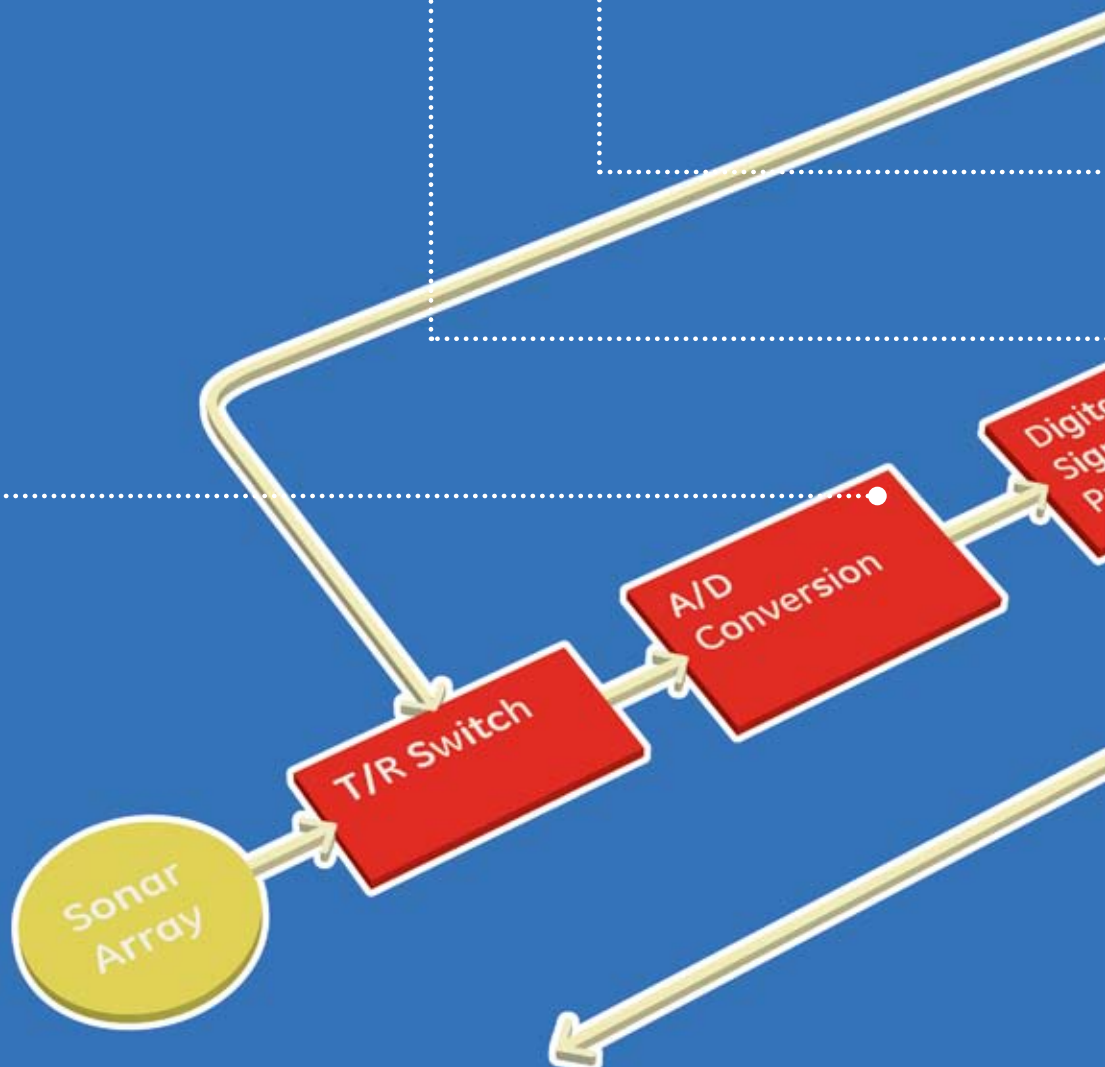
ICS-1620 and ICS-1640 (PCI Express)



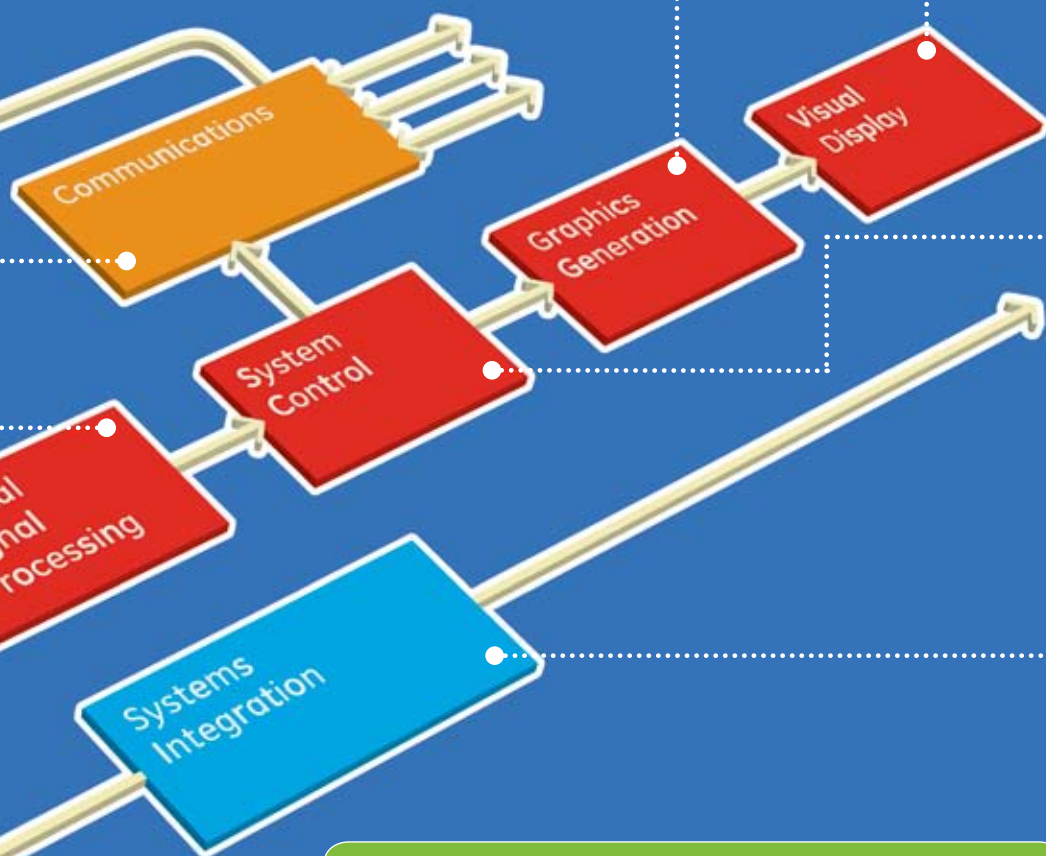
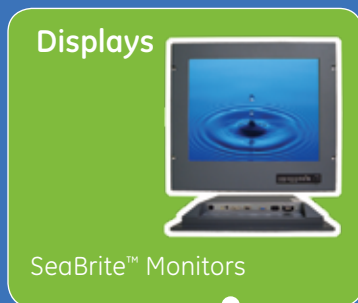
ICS-8145 (VME)



ICS-710 (cPCI)



# are and Services ned for Sonar.



**Application Development Tools**  
AXIS: Advanced Multiprocessor Integrated Software is designed to accelerate complex signal processing application development. The AXIS architecture consists of three integrated elements:  
→ Interprocessor Communications  
→ Multiprocessor Productivity Tools  
→ DSP Libraries  
For more information: [www.ge-ip.com/axisdemo](http://www.ge-ip.com/axisdemo)



### GE Intelligent Platforms Contact Information

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