WE INNOVATE. WE DELIVER.
YOU SUCCEED.

High Performance Embedded Computing
Introduction

Parallelism has been at the heart of supercomputing since the term was first used in the 1960s. Today, supercomputing has, in many instances, become high performance computing - but instead of vast rooms full of mainframe computers all working together on the same problem, high performance computing sees the deployment of numbers of server-class machines, each featuring multiple high performance processors configured in parallel.

And now, high performance computing has come to the world of embedded systems – and, especially, to the systems being developed and deployed by the world’s armed forces. To address the most demanding and sophisticated applications, such as ISR and electronic warfare, high performance embedded computing – HPEC – uses the power, not just of multiple single board computers working together, but also of multi-core and many-core processors.

Unique Challenges

But HPEC in the military arena presents a unique set of challenges in two key areas as a result of how and where these solutions will be deployed. The first of these is the need to ensure 100% reliability – in what are often, literally, life-and-death situations - in the face of extremes of shock, vibration, temperature and contaminants. The second is that, increasingly, these solutions are being deployed in environments that are small, and that need to minimize weight, power and heat.

Both are fields in which Abaco Systems is an acknowledged leader. No other company has Abaco’s pedigree in the development of systems that are truly capable of withstanding the rigors of deployment in the harshest environments. And no other company is able to better Abaco’s expertise in developing HPEC solutions that are small, lightweight, consume minimal power and dissipate minimal heat.

Abaco is well-known for its ability to develop and deliver leading-edge single board computers, multiprocessors, high speed switches, etc. – and to provide complete, rugged, ready-to-run subsystems – and a broad range of supporting services.

Meeting new realities

It’s not just about hardware. In an era of acquisition reform, without the luxury of extended, government-funded development cycles, the onus on development exists with the supplier. To meet these new realities, Abaco provides a complete integrated software development tool suite - AXIS - that reduces development time and cost and accelerates time to market.

There’s more to Abaco’s HPEC offering than just hardware and software, however. Abaco also has an unmatched understanding of, and commitment to, long term support – recognition of the multi-year (multi-decade, even) lifecycle of the typical military program.

Abaco Systems has been a long time champion of COTS – commercial off-the-shelf – solutions, because of what they bring to customers in terms of faster access to new technologies, high technology readiness levels (TRL), ease of interoperability through the use of open standards, reduced program risk and lower lifetime cost of ownership. Today, Abaco readily works with customers to create custom variants of those solutions - variants that combine the advantages of COTS with the benefits of custom development.

Abaco is in the business of developing innovative solutions all the time, every time – for the long term. In an unpredictable world, only a company of Abaco’s size, stature, resources and experience can work with customers to anticipate needs – and minimize the impact of the unforeseen. At the heart of everything Abaco does is the deep understanding of what is most important to customers: bringing value-added, differentiated, high performance, reliable and cost-effective solutions to market in the fastest time, at the lowest cost and with the minimum of risk – thereby creating value for the customer.

Abaco Systems established the Boston HPEC Innovation Center specifically to support customer demand for high TRL COTS solutions that can shorten time-to-market, minimize cost and help to eliminate program risk, allowing prime contractors, system integrators and OEMs to focus on value-added and create competitive advantage. The Center takes advantage of Abaco’s COTS Rugged Systems (CRS) capability to support the rapid deployment of systems to the field.

The HPEC Innovation Center also provides a focus for the future development of a range of powerful, flexible products and solutions for military/aerospace embedded computing.

Abaco’s HPEC Innovation Center

Abaco Systems established the Boston HPEC Innovation Center specifically to support customer demand for high TRL COTS solutions that can shorten time-to-market, minimize cost and help to eliminate program risk, allowing prime contractors, system integrators and OEMs to focus on value-added and create competitive advantage. The Center takes advantage of Abaco’s COTS Rugged Systems (CRS) capability to support the rapid deployment of systems to the field.

The HPEC Innovation Center also provides a focus for the future development of a range of powerful, flexible products and solutions for military/aerospace embedded computing.

Abaco Systems established the Boston HPEC Innovation Center specifically to support customer demand for high TRL COTS solutions that can shorten time-to-market, minimize cost and help to eliminate program risk, allowing prime contractors, system integrators and OEMs to focus on value-added and create competitive advantage. The Center takes advantage of Abaco’s COTS Rugged Systems (CRS) capability to support the rapid deployment of systems to the field.

The HPEC Innovation Center also provides a focus for the future development of a range of powerful, flexible products and solutions for military/aerospace embedded computing.

Abaco Systems established the Boston HPEC Innovation Center specifically to support customer demand for high TRL COTS solutions that can shorten time-to-market, minimize cost and help to eliminate program risk, allowing prime contractors, system integrators and OEMs to focus on value-added and create competitive advantage. The Center takes advantage of Abaco’s COTS Rugged Systems (CRS) capability to support the rapid deployment of systems to the field.

The HPEC Innovation Center also provides a focus for the future development of a range of powerful, flexible products and solutions for military/aerospace embedded computing.

Abaco Systems established the Boston HPEC Innovation Center specifically to support customer demand for high TRL COTS solutions that can shorten time-to-market, minimize cost and help to eliminate program risk, allowing prime contractors, system integrators and OEMs to focus on value-added and create competitive advantage. The Center takes advantage of Abaco’s COTS Rugged Systems (CRS) capability to support the rapid deployment of systems to the field.

The HPEC Innovation Center also provides a focus for the future development of a range of powerful, flexible products and solutions for military/aerospace embedded computing.
Software

Overarching Abaco’s comprehensive high performance embedded computing offering is AXIS, an integrated, sophisticated yet easy to use software development tool suite that has led to software development time being halved, and to software testing beginning 30% sooner than would have been achieved with a ‘hand-crafted’ solution.

Abaco’s AXIS Software Development Tool Suite - Enabling Rapid Software Development

- Initialize the system – quickly configure all nodes in the system
- Check system configuration - automate system configuration validation
- Map application to system – place tasks for best performance
- Perform high performance communications between tasks
- Run the application – download and run on multiple nodes with two clicks
- Determine bottlenecks – locate and resolve bottlenecks in data flow and task performance
- Measure real-time performance – profile runtime data across entire system
- Maximize algorithm performance – identify opportunities for improvement
- Rescale the application – move the application to larger or smaller systems
- Rapidly create graphical user interfaces for the application

AXIS reduces the time taken to develop, test, debug and optimize complex software applications based on heterogeneous, multiprocessor CPU and GPU platform architectures. Because of the high level of hardware abstraction it provides, it requires little or no developer knowledge of the underlying platform, freeing developers to focus on the application. As such, it reduces program risk; it increases productivity; it reduces costs; and it reduces time-to-market, creating competitive advantage.

Easy, fast, cost-effective
AXIS is also highly portable, allowing the easy, fast and cost-effective migration of a software solution to multiple hardware platforms as well as simplifying technology insertion during the lifetime of a program.

AXIS provides support for Abaco’s latest multi-core and many-core hardware platforms including single board computers featuring the latest Intel® Core™ and Xeon® processors as well as those featuring the latest NXP PowerPC™ processors with Altive™, and those featuring GPGPU (general purpose processing on graphics processing units) technology. This provides customers with a highly integrated hardware and software platform that uniquely enables them to take maximum advantage of the enormous benefits of the latest processing technologies.

Tuning to meet performance requirements
The AXIS Pro software suite includes an integrated graphical user interface. AXIS View provides tools for application development and system visualization. The developer exploits an iterative application development cycle, allowing the user to benchmark routines and tune the application to meet performance requirements.

In addition, AXIS Flow provides a high performance inter-processor communication library for high throughput, low latency data movement across multiple fabrics (PCI Express®, Gigabit Ethernet, 10Gigabit Ethernet, 40 Gigabit Ethernet and RoCE) scaling from one to many CPU cores and nodes across a single board, multiple boards and multiple system chassis. If open standards are required, then AXIS MPI offers an embedded computing-focused MPI library that will facilitate efficient scaling from one to many CPU cores and nodes across a single board, multiple boards and multiple system chassis. If open standards are required, then AXIS MPI offers an embedded computing-focused MPI library that will operate across heterogeneous systems.

AXIS DataView provides the unique ability to rapidly create graphical interfaces for embedded application without needing to write any GUI code. This can reduce the amount of code and effort for developing GUIs by two orders of magnitude. DataView is focused on SWaP, it is therefore lightweight and doesn’t require a runtime engine like MATLAB® or LABVIEW™. It is much simpler to learn and use than a full GUI widget toolkit such as Qt® or GTK+.

AXIS EventView provides a simple, focused event analyzer that allows detailed performance analysis of complex multi-threaded applications. It provides a much higher granularity of performance detail than traditional profiling tools, and is much simpler to use and interpret than operating system-focused event analyzers such as LTProf. It can also be used across multiple operating systems. It was used to great effect in a recent Air Force-sponsored Next Generation Radar study, where its focused analysis facilitated significant optimizations of both SAR and GMTI algorithms running on a HPEC system.

AXIS Lib provides DSP and math function libraries to support very high performance signal- and data processing routines with a standard VSIPL interface for portability across multiple processor platforms as well as a simpler C API for optimum performance.

The AXIS ImageFlex 2.0 toolkit provides an easy-to-use API framework for developing real-time image processing, visualization and autonomy applications utilizing the power of modern GPU architectures. It provides an abstraction layer on top of OpenGL® to allow developers with no OpenGL experience to rapidly create high performance graphics applications. System integrators can deploy ImageFlex across Abaco’s 3U & 6U OpenVPX HPEC solution sets that include the latest generation of Intel® Core™ i7 and Xeon-D® multicore CPU/GPU combinations, as well as NVIDIA® and AMD GPUs.

AXIS MPI, AXIS Flow and AXIS Lib facilitate development of efficient portable and scalable multi-threaded code that can be distributed across multiple processing cores and CPU domains

AXIS EventView enables in-depth performance analysis of these distributed threads, allowing focused application tuning

AXIS DataView provides an innovative tool for rapidly building a graphical interface for embedded applications, helping developers visualize their data and interactive controls

AXIS ImageFlex 2.0 facilitates rapid development of high performance image processing, visualization and autonomy applications that take advantage of the huge processing power of GPUs.
Few, if any, embedded computing companies can offer the range of HPEC solutions that are available from Abaco Systems. In line with Abaco’s strategy of enabling customers to enjoy – and maximize – the benefits that accrue from COTS solutions, all of Abaco’s HPEC offerings are built around technologies that are industry standards and that represent ‘best in class’.

Demanding military applications
Processors come from Intel, with its industry-leading Core dual- and quad-core technology and 4- to 16-core Xeon-D, and from NXP with its highly respected Power Architecture™ processors. From NVIDIA® comes its CUDA® architecture and many-core GPU (graphic processing unit) processors – not just for graphics applications, but also for general purpose use in the most demanding military applications that can benefit from a high degree of parallelism, such as radar. With more than double the processing and I/O resources of previous FPGA technology, Xilinx® UltraScale™ and UltraScale+™ devices are ideal for high performance digital signal processing.

Software support also comes in the form of Xilinx, Abaco’s advanced integrated software development tool suite which has been shown to substantially shorten the development, debug and optimization cycle.

The OFED software stack from the Open Fabric Alliance is also fully supported, providing drivers and open standards interfaces along with RoMA-enabled communications protocols such as Open MPI, uDAPL and sockets direct. This allows developers to leverage the extensive landscape of commercial HPC software.

Abaco participates in industry initatives that are generating new open architecture standards for specific application areas such as FACE (Future Airborne Capability Environment - open avionics environment for military airborne platforms), SOSA (Sensor Open Systems Architecture for interfacing sensor suites), OMS (Open Mission Systems standards for integrating subsystems and services into airborne platforms), and more.

Extensive HPEC offering
Abaco’s extensive HPEC offering includes single board computers such as the SBC627, based on the high performance Intel Core i7 processor. It features fully integrated graphics and memory controller together with dual or quad core processing up to 2.7 GHz, and offers outstanding performance per watt. Coupled with the Intel (GM87) chipset, this provides an unmatched level of I/O bandwidth for both onboard and off-board functions.

Abaco’s DSP2828A is the latest in a long line of multiprocessors designed for the most demanding ISR applications. Like the SBC627, it is based on Intel Core processor technology – but features a dual quad core architecture delivering, in effect, eight CPU cores on a single board and making it ideal for demanding DSP, radar, sonar and sensor processing across a wide range of platforms including manned, unmanned airborne, ground and naval vehicles. Multiple DSP2828As can be interconnected via 10/40 Gigabit Ethernet fabric switches to create powerful HPEC clusters.

For applications that demand an even higher degree of parallelism, Abaco has introduced the IPN252 platform with a 64-core NVIDIA Maxwell™ GPU. In the case of the IPN252, the GM107 is augmented by an Intel Core i7 processor operating at 2.1 GHz to create a heterogeneous and computationally dense processing platform for demanding applications that are constrained in terms of size, weight and power (SWaP).

The IPN252 is capable of delivering up to 1.4 TeraFLOPS (trillion floating point operations per second) of throughput from a single 6U chassis slot. It complements other Abaco platforms to allow the creation of complete systems capable of responding to the most exacting embedded computing challenges.

For I/O and DSP processing, Abaco offers the VP880 which has the latest embedded processor from Xilinx, the Zynq™ UltraScale+, as well as an extremely large Virtex™ or Kintex™ UltraScale FGPA. Each device is connected to a VITA 57.5 FMC+ interface for advanced I/O and high performance embedded signal processing.

3U VPX HPEC systems can be crafted from a similar set of technologies. The SBC259 offers a quad-core Xeon E3 processor and a PCIe™ Data Plane, while the SBC347D has a Xeon-D CPU with 4-, 8-, 12- or 16 cores, and connectivity via PCIe, 10GbE and 1GbE. The GRA113 graphics processor has the same GM107 GPU as the IPN252.

Switches, subsystems and more
Other key members of Abaco’s HPEC solution include the SWE540A fully managed 6U VPX 4x/10GbE Data Plane Ethernet switch. The NE.Tensity™ SWE540A is a fully managed (Layer 2/3) 6U VPX Ethernet switch designed to meet the most demanding requirements for network switching in tactical applications. With its configuration options of up to 20 data plane ports and OpenVX™ switch management software, the SWE540A is available in both air-cooled and conduction-cooled versions, providing multiple OpenVX configurations supporting a mix ofdataplane and control plane ports. In addition, there is an available option to support four 10GbE and two 1000BaseT ports. ISO protection on the management processor memory offers higher reliability in harsh environments.

The SWE540A delivers full wire-speed switching that can be fully managed and easily deployed. Proven, high performance architecture and a multilayer switching fabric provide a rich feature set, broad functionality, scalability, and product longevity.

The GRA113 brings 10GbE switching to 3U VPX systems, with 12 or 24 ports and two 10GbE uplinks. It too runs the OpenVx switch management software. 3U systems using PCIe can leverage the PXE411 multi-fabric switch, which can be configured with up to six 4x PCIe ports and up to eight 1GbE ports.

Abaco’s peer-to-peer PCIe software makes it easy to configure and use the PCIe fabric as a data plane between multiple CPUs.

The most recent addition to Abaco’s HPEC range is the rapidly-growing family of Mission Ready Systems. Designed for customers who need to eliminate the expense, time and risk of custom sourcing and development, these preconfigured, tested, ready-to-run systems can be deployed in the field as soon as the application is ready, or used as a starting point for multiple application-specific configurations.

Abaco’s comprehensive HPEC product and system offering is backed by an extensive infrastructure of customer support programs designed to ensure that high performance, reliable systems are deployed in the minimum time, at the minimum cost and with minimum risk.

Solutions: The Abaco Advantage
- HPEC CoE helps with architecture definition, application development and performance optimization
- Able to deliver short lead time software development platforms with a path to fully ruggedized deployable systems
- Provide fully software integrated and tested ‘application ready’ solutions
- Provide ‘getting started’ support and training

Solutions:
- Network Switch Units
- Target Tracking
- Embedded Training
- Integrated Display Processing
- SBCs, DSPs, Graphics, I/O Cards
- Situational Awareness
- Remote Interface Units
- Launch Control Units
- Fire Control Computers
- H ull/Turret Computers

Embedded Rugged Systems
- Mission Control
- Flight Control
- Sensor Processing
- Vehicle Management

Abaco’s comprehensive HPEC product and system offering is backed by an extensive infrastructure of customer support programs designed to ensure that high performance, reliable systems are deployed in the minimum time, at the minimum cost and with minimum risk.

Solutions: The Abaco Advantage
- HPEC CoE helps with architecture definition, application development and performance optimization
- Able to deliver short lead time software development platforms with a path to fully ruggedized deployable systems
- Provide fully software integrated and tested ‘application ready’ solutions
- Provide ‘getting started’ support and training

Solutions:
- Network Switch Units
- Target Tracking
- Embedded Training
- Integrated Display Processing
- SBCs, DSPs, Graphics, I/O Cards
- Situational Awareness
- Remote Interface Units
- Launch Control Units
- Fire Control Computers
- Hull/Turret Computers

Embedded Rugged Systems
- Mission Control
- Flight Control
- Sensor Processing
- Vehicle Management

Abaco’s comprehensive HPEC product and system offering is backed by an extensive infrastructure of customer support programs designed to ensure that high performance, reliable systems are deployed in the minimum time, at the minimum cost and with minimum risk.

Solutions: The Abaco Advantage
- HPEC CoE helps with architecture definition, application development and performance optimization
- Able to deliver short lead time software development platforms with a path to fully ruggedized deployable systems
- Provide fully software integrated and tested ‘application ready’ solutions
- Provide ‘getting started’ support and training

Solutions:
- Network Switch Units
- Target Tracking
- Embedded Training
- Integrated Display Processing
- SBCs, DSPs, Graphics, I/O Cards
- Situational Awareness
- Remote Interface Units
- Launch Control Units
- Fire Control Computers
- Hull/Turret Computers

Embedded Rugged Systems
- Mission Control
- Flight Control
- Sensor Processing
- Vehicle Management

Abaco’s comprehensive HPEC product and system offering is backed by an extensive infrastructure of customer support programs designed to ensure that high performance, reliable systems are deployed in the minimum time, at the minimum cost and with minimum risk.

Solutions: The Abaco Advantage
- HPEC CoE helps with architecture definition, application development and performance optimization
- Able to deliver short lead time software development platforms with a path to fully ruggedized deployable systems
- Provide fully software integrated and tested ‘application ready’ solutions
- Provide ‘getting started’ support and training

Solutions:
- Network Switch Units
- Target Tracking
- Embedded Training
- Integrated Display Processing
- SBCs, DSPs, Graphics, I/O Cards
- Situational Awareness
- Remote Interface Units
- Launch Control Units
- Fire Control Computers
- Hull/Turret Computers

Embedded Rugged Systems
- Mission Control
- Flight Control
- Sensor Processing
- Vehicle Management

Abaco’s comprehensive HPEC product and system offering is backed by an extensive infrastructure of customer support programs designed to ensure that high performance, reliable systems are deployed in the minimum time, at the minimum cost and with minimum risk.

Solutions: The Abaco Advantage
- HPEC CoE helps with architecture definition, application development and performance optimization
- Able to deliver short lead time software development platforms with a path to fully ruggedized deployable systems
- Provide fully software integrated and tested ‘application ready’ solutions
- Provide ‘getting started’ support and training
COTS: faster access to technology, lower cost of ownership

The advantages of COTS are many. COTS solutions allow military organizations to leverage the latest in commercial technologies faster than would otherwise be the case. COTS solutions are significantly more cost-effective, because they obviate the need for extensive up-front investment in development — and they take advantage of technologies that are produced on a commercial scale. A COTS solution can typically be deployed more quickly, shortening time-to-market.

Total cost of ownership of a COTS solution is lower because the vendor takes responsibility for long-term support — and COTS solutions are designed to ease technology insertion, maximizing performance over the lifetime of a program. Because COTS solutions are derived from commercially-proven technologies, they typically feature a high Technology Readiness Level (TRL) and minimize program risk.

GPGPU solves complex problems faster

GPGPU — general purpose computing on a graphics processing unit — technology is an excellent example of how military organizations can leverage technologies originally designed for commercial and consumer applications. PC-based game playing has long-driven advances in GPU technology as gamers strive for ever-greater realism — and that same search for enhanced realism has seen GPU technology widely deployed in military display applications such as embedded training.

But, the inherent high degree of parallelism that brings ultimate graphics performance can also be used to deliver other types of processing — types of processing widely required in military applications such as radar, where the requirement is to process multiple streams of data simultaneously. Customers using NVIDIA CUDA GPU architecture — such as the 640-core GM107 — for applications such as SAR simulation, pattern recognition, object detection and cryptology are reporting performance increases of between 10x and 500x. Using a GPU to augment the capability of a traditional CPU can therefore bring real-size, weight and power (SWaP) advantages to high-end processing systems.

Dual NVIDIA CUDA

GM107 GPUs are featured in the Abaco’s IPN252 multiprocessor, combining the power of a GM107 with the performance of an Intel i7 processor for maximum application integration and flexibility.

The most demanding C4ISR and Electronic Warfare applications require high performance embedded computing which sees the deployment of multiple processors of either homogeneous or heterogeneous types, either on a single silicon device, on a single board — or on multiple boards.

Serial switched fabrics for high system throughput

This presents two key challenges. The first is in the intercommunication between the processors — but here too, Abaco provides solutions. Abaco was among the first embedded computing companies to commit wholeheartedly to the interconnect technology that has rapidly become the standard for demanding military applications. VPX — and, subsequently, OpenVPX — grew out of the pervasive and hugely successful VME standard, and is an open standard which utilizes the familiar 6U and 6U card sizes of VME. It offers true rugged capabilities, including conduction cooling and resistance to shock and vibration. At the same time, it offers higher power budgets, more signal density and a far faster serial backplane.

Abaco has also chosen to standardize on 40 Gigabit Ethernet for intercommunication between single board computers, digital signal processors, graphics cards and other products that make up the system. 40 Gigabit Ethernet is an ideal choice as it offers high performance, Ethernet is ubiquitous, and it is supported by a substantial ecosystem of products, technologies and expertise. With the addition of our OpenVPX switch management software, customers are able to take advantage of new network capabilities such as data center bridging which helps with traffic prioritization, flow and bandwidth utilization for data-intensive applications such as high performance embedded computing.

Intel-based computers are dominant in the high-performance computing clusters that are often called ‘server farms’ — installations which deliver massive computing power by coupling together multiple servers or blades. With the growing requirement in the military/aerospace market to gather, process and disseminate huge volumes of data, those server farms are increasingly being replicated in defense applications. For customers looking to create similar profiles, there are sound commercial as well as technical reasons why 40Gigabit Ethernet is becoming the standard for internode communications.

Software rises to the development challenge

The second challenge is in managing the multi-faceted complexity of developing demanding, mission-critical applications on software platforms that can themselves be complex to master — and to do so in minimum time and at minimum cost. Here, Abaco offers the AXIS advanced integrated software development suite. AXIS is a set of software modules that can be used to accelerate the design, development, testing and deployment of complex DSP and multiprocess-ing platforms for real-time applications such as radar, sonar, communications and image processing.

AXIS allows tough questions — about system sizing, data movement, algorithm performance, configuration, application mapping and so on — to be answered quickly and easily, speeding the cycle of design, development, test, optimization and validation and reducing time to market.

Abaco’s high performance embedded computing solutions combine the best in COTS technologies with open standards and advanced tools to make the development and deployment of demanding ISR applications easier, faster and more cost-effective.
Applications

Radar
Developers of today’s radar systems demand that their processing systems be founded upon the principles of Modular Open System Architecture. Designs must be scalable, open architecture and capable of sustainment for the long term with technology insertion plans.

In response, Abaco has adopted OpenVPX as the primary form factor, using widely-adopted processors from Intel and NVIDIA, connecting processing clusters with standard interconnects such as Ethernet and RoCE (RDMA over Converged Ethernet), and providing support for Linux, Open Fabrics Enterprise Distribution, MPI, DDS and so on.

SIGINT
By using the rapid prototyping capabilities of AXIS View along with quick implementation of radar algorithms with AXISLib and AXIS Flow, a scalable signal processing system can readily be modeled to determine how many processors are needed. Abaco can produce such standard or custom radar backend processors scalable to dozens of TeraFLOPS. The AXIS tools can then be used to create a high performance deployable algorithm. Such systems can extend from sensor input via standard interfaces such as serial FPDP and 10/40GbE, through processing on clusters of Intel processors with optional NVIDIA GPGPU or FPGA co-processing, to output to a backend system via standard Gigabit Ethernet.

Electronic Warfare
Electronic Warfare systems are typically defined by their need for low-latency processing. Many systems employ Abaco Systems’ state-of-the-art line of advanced RF and DSP FPGA-based products to address the front-end requirements for modern EW systems.

For many Electronic Warfare systems, GPUs are now considered a viable technology with GPU Direct. GPU Direct allows sensor data to be transferred directly into GPU memory, bypassing the multiple copies and host processor involvement that were previously required. Testing has shown a reduction in latency of better than 25x, opening up the use of GPUs in applications that were previously not candidates. Development time and cost are also reduced.

Where nanosecond latency timeframes are required, Abaco has a range of FPGA boards using the latest devices available.

Targeting pods require increasing processing power to keep up with increased sensor resolution and added sensors. Typically, the system size is restricted by the existing pod profile and power.

Abaco’s range of OpenVPX products, spread across 3U and 6U form factors, allow for highly scalable solutions from the smallest to the largest pods. AXIS software tools allow seamless scalability of the application to match the hardware. Gigabit and 10/40Gigabit Ethernet offer standard connections between subsystems and to sensor suites.

EO/IR Visualization
Increasing focal plane arrange size, faster frame rates and more sensors being fused mean that more capability is being demanded in the same or lower size, weight and power. GPUs are particularly well suited to processing the large volumes of pixel data present on today’s ISR platforms. Abaco’s AXIS ImageFlex software enables developers to harness the GPU’s power without introducing the complexity of software layers such as OpenGL or DirectX.

Given the shock and vibration levels that many ISR platforms are subjected to, Abaco’s policy of using chip-down designs fits well. The use of high speed fabrics with RDMA in addition to Abaco’s AXIS Flow software allows the sensor data to be efficiently spread to the processing nodes.
**Product Examples**

**DSP282A**
6U OpenVPX Dual Intel 5th Generation Intel Core i7 Deployed Server Platform

**Features:**
- Two Intel Core i7-5700EQ CPUs
- 16 GB DDR3L 1600 with ECC per CPU
- 16 MB BIOS Flash per PCH, 16 GB SATA NAND Flash, 812 Kbytes NVRAM
- 10/40 GbE or PCIe gen 3 and OFED RDMA (data plane)
- -665.6 GFLOPS per card slot

**SBC627**
6U OpenVPX 6th Generation Intel Core i7-based Single Board Computer

**Features:**
- Deployed Server Platform
- 6U OpenVPX Dual Intel 5th Generation
- 512 Kbytes NVRAM
- ECC per CPU
- COP: 2x Gigabit Ethernet
- (control plane)
- OFED RDMA (data plane)
- 2x 10 GbE (data plane)
- 12 PCIe lanes, Gen 3 capable (expansion plane)

**IPN252**
6U OpenVPX VITA 46 / VITA 48 REDI GPP/GPU Multiprocessor

**Features:**
- NVidia 640-core “Maxwell” GM107 GPU
- 3rd Generation Intel Core i7 CPU
- 2x 10 GbE (data plane)
- 16 PCIe Gen 3 (expansion plane)
- 4x Gigabit Ethernet (control plane)
- Both front and rear I/O ports
- PMC/XMC expansion sites
- Five levels of ruggedization (convection and conduction cooling variants)
- AXIS and Deployed Test Software

**SBC367D**
3U VPX Intel Xeon D-based Rugged Single Board Computer

**Features:**
- 3U VPX Ultracore FPGA Signal Processing Ethernet Switch
- Zynq Ultrascale Onboard Processor
- Conduction Cooled or Air Cooled
- Dual FMC+ Interfaces: (VITA 57.1 / VITA 57.4)
- 2x Gigabit Ethernet
- 36GB Onboard DDR3 SDRAM

**VP868**
6U OpenVPX Dual Ultrascaler FPGA Signal Processing Ethernet Switch

**Features:**
- Zynq Ultrascale Onboard Processor
- Conduction Cooled or Air Cooled
- Dual FMC+ Interfaces: (VITA 57.1 / VITA 57.4)
- 2x Gigabit Ethernet
- 36GB Onboard DDR3 SDRAM

**NETernity SAE540A**
Fully Managed 6U VPX 40/100GbE Data Plane Ethernet Switch

**Features:**
- Zynq Ultrascale Onboard Processor
- Conduction Cooled or Air Cooled
- Dual FMC+ Interfaces: (VITA 57.1 / VITA 57.4)
- 2x Gigabit Ethernet
- 36GB Onboard DDR3 SDRAM

**VP880**
3U VPX Ultracore FPGA, Zynq Ultrascale+ and FMC+

**Features:**
- Dual FPGA architecture - Kintex or Virtex Ultrascale - zync Ultrascale+ MPSoC
- 3GB DDR4 mapped to FPGAs
- 20GB DDR4 mapped to zynq
- VITA 57.1 YFPC FMC+
- VITA 66.4 optical interface via FiberLynx BLAST site
- VP881 expanded backplane I/O option available
- Operating system support (Linux, Windows, VxWorks)
- Full featured Board Support Package (BSP)

**NETernity SAE440**
Fully Managed 3U OpenVPX Ethernet Switch

**Features:**
- Fully managed 3U VPX 40/100GbE Ethernet Switch
- Conduction Cooled or Air Cooled
- Dual FMC+ Interfaces: (VITA 57.1 / VITA 57.4)
- 2x Gigabit Ethernet
- 36GB Onboard DDR3 SDRAM

**NETernity GBX411**
Fully Managed 3U OpenVPX Ethernet Switch

**Features:**
- Fully managed 3U OpenVPX 40/100GbE Ethernet Switch
- Conduction Cooled or Air Cooled
- Dual FMC+ Interfaces: (VITA 57.1 / VITA 57.4)
- 2x Gigabit Ethernet
- 36GB Onboard DDR3 SDRAM

**NETernity SAE540A**
Fully Managed 6U VPX 40/100GbE Data Plane Ethernet Switch

**Features:**
- Zynq Ultrascale Onboard Processor
- Conduction Cooled or Air Cooled
- Dual FMC+ Interfaces: (VITA 57.1 / VITA 57.4)
- 2x Gigabit Ethernet
- 36GB Onboard DDR3 SDRAM

**VP880**
3U VPX Ultracore FPGA, Zynq Ultrascale+ and FMC+

**Features:**
- Dual FPGA architecture - Kintex or Virtex Ultrascale - zync Ultrascale+ MPSoC
- 3GB DDR4 mapped to FPGAs
- 20GB DDR4 mapped to zynq
- VITA 57.1 YFPC FMC+
- VITA 66.4 optical interface via FiberLynx BLAST site
- VP881 expanded backplane I/O option available
- Operating system support (Linux, Windows, VxWorks)
- Full featured Board Support Package (BSP)
Abaco has long been a pioneer in the provision of the infrastructure necessary to support a program throughout its multiyear deployment, ensuring minimum long term cost of ownership and maximum return on investment.

This commitment starts at the point a new product is designed, with a key design goal being maximum compatibility or upgradability over an extended period. The list of critical components will include only those for which vendors have committed to a long-term production run. It is typically the case that new generations of Abaco products are pin-compatible with their predecessors, enabling straightforward, cost-effective technology insertion throughout successive product generations.

Several flexible, responsive options are available to customers to suit the specific needs of a program.

Solutions
For example, once a product has been deployed, Abaco’s Health Check program can alert the customer to potential obsolescence issues and provide possible solutions such as a last-time buy of the components, an appropriate replacement component, a redesign of the original product for form, fit, or functionality compatibility, technology insertion earlier than planned or a lifetime purchase of the components.

When components are purchased in bulk, Abaco also can provide secure, climate-controlled storage for as long as required by the customer. Long-term product lifecycles demand that critical engineering knowledge is available regardless of personnel changes or corporate restructures. Similarly, testing, diagnostic and repair capabilities are maintained. The PLM program ensures that such knowledge, protocols and capabilities are available throughout the lifecycle of any program.

Every customer program is assigned an Abaco program manager – a highly qualified, experienced, knowledgeable individual charged with ensuring the success of the program. The program manager’s responsibilities include:

- Fully understanding the detailed program requirements
- Acting as the voice of the customer to every part of the Abaco organization
- Identifying potential risks and mitigating or eliminating them
- Coordinating the necessary Abaco resources to ensure program success
- The planning and execution of each phase of the program, from development to deployment – and beyond
- Managing the program schedule, ensuring the achievement of agreed milestones

Support: The Abaco Advantage

- Unrivaled expertise in support of multi-decade program deployments
- Tailored to specific customer needs
- Makes significant contribution to lower lifetime cost-of-ownership
- Range of support strategies help reduce risk
Global coverage

WE INNOVATE. WE DELIVER. YOU SUCCEED.

Americas: 866-OK-ABACO or +1-866-652-2226    Asia & Oceania: +81-3-5544-3973
Europe, Africa, & Middle East: +44 (0) 1327-359444
Locate an Abaco Systems Sales Representative visit: abaco.com/products/sales

©2018 Abaco Systems. All Rights Reserved. All brands, names or trademarks are property of their respective owners. Specifications are subject to change without notice.