

ITT Exelis and Dynatem Develop VPX Board with High Connectivity Bandwidth for Airborne Payload-Processing

ITT Exelis wanted to update a wide-area airborne surveillance system and turned to Dynatem to develop a new extremely rugged processor with advanced data connectivity options. The result was VPQ, which includes a 24-port, 10 Gigabit Ethernet switch for flexible data flow and tremendous connectivity bandwidth.



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CHALLENGE

ITT Exelis is a global aerospace, defense and information solutions company headquartered in McLean, Virginia. With more than 20,000 employees, ITT has a 50-year history of innovation and technology expertise, partnering with customers worldwide to deliver affordable, mission-critical products and services for managing global threats.

Several years ago, ITT set out to update an airborne payload-processing platform. The program is a wide-area airborne surveillance (WAAS) system that supports multiple cameras and gives ground operators access to imagery from up to 12 different angles at the same time.

“We were basically developing a flying supercomputer-ruggedized for avionics applications and built to handle the extremely high data inputs of persistent applications,” said Richard Lourette, Chief Scientist, ITT.

The project led to a five-year period of research and development, with one of the most complex tasks being to develop an embedded computer to fulfill the project requirements. ITT needed an extremely rugged processor, advanced data connectivity options, and a very high bandwidth, so Lourette set out to develop a solution.

SOLUTION

ITT has worked with Dynatem, now a member of Eurotech Group on previous generations of the product and Lourette knew they would be willing to work with him to develop a new product.

“We wanted to create one board as a building block I could use throughout the entire system,” said Lourette. “As I became aware of Dynatem’s capabilities, the scope of the project grew and I discovered they would be an excellent partner in developing a board for this project.”

Demands were high for the new system and the project was underway at the same time that the draft standard for VPX was being developed. Together, Dynatem and ITT started the design for the VPX board, tracked changes as the standard developed, and spun the final board to meet the ratified standard.

Despite the challenges of designing the board in parallel with standard, Lourette knew VPX was the way to go for this demanding sensor applications for several reasons.



Figure 1: The VPQ (CPU-111-10), includes a 24-port, 10 Gigabit Ethernet switch for flexible data flow

VPX is ideal for high performance architectures. The VPX platform also lends itself well to utilizing general-purpose computing on graphics processing units (GPGPU) technology. ITT Exelis and Dynatem repurposed NVIDIA and ATI graphics controllers for a very-performance number-crunching. In addition, VPX is capable of handling a cluster of CPUs, so Lourette created a computing cluster that can process massive amounts of sensor data.

“I worked directly with Dynatem, like a member of the design team,” said Lourette. “It was a true partnership, with weekly meetings, design reviews, and I even worked on site with the engineers at Dynatem to bring up the board.”

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RESULTS

The board ITT and Dynatem created, the VPQ (CPU-111-10), includes a 24-port, 10 Gigabit Ethernet switch for flexible data flow. "This board is very unique, offering tremendous connectivity bandwidth," said Lourette. The single board computer is based on a quad-core Intel® Xeon® processor and a PCI Express switch provides connectivity to two fully capable PMC/XMC sites with extensive user I/O.

integrated into a single chassis without the use of an additional switch board.

As a research and development project for ITT, the VPQ is currently being flown in their own aircraft and powering their sensors. "The whole purpose of the program was to develop an ITT platform so when we develop payloads, we can supply a processor to power our sensors," said Lourette. "We built something specific for our needs to get our sensors, coupled with software for our needs to get our sensor, coupled with software for a payload program to market faster."

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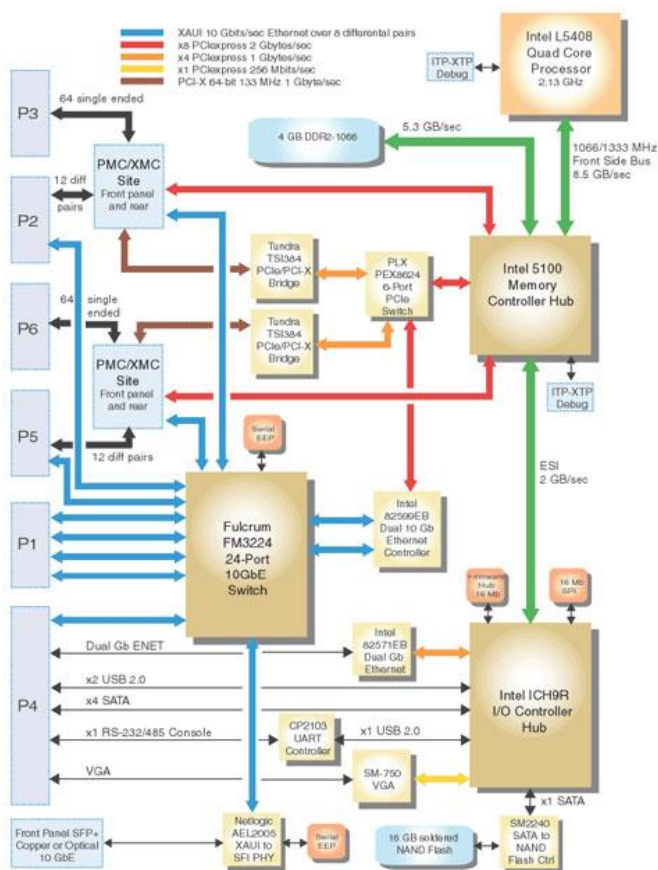


Figure 2: The Dynatem VPQ is a high-performance single board computer (SBC) based on the 6U VPX (VITA 46) form factor.

Since the VPQ provides an on board 10GB Ethernet switch, it also allows for up to eight VPQ single board computers to be