# Completing the Solution with Software

— by John Phillips, Pleora Technologies

Software is an important part of an end-to-end vision system that delivers tactical and safety advantages to combat troops. Choosing the right combination of hardware and software allows manufacturers to speed time-to-market, lower costs, and deliver differentiated performance, increasing the value of their systems.


## Design flexibility

By upgrading vision systems with GigE Vision® interfaces, imaging data is received using the Ethernet ports that already exist in most computing platforms. Freed of the need for a PC with a peripheral card slot, designers can choose computing platforms with smaller form factors — such as embedded processors, single-board computers, laptops, and tablets — for control and analysis, and employ a variety of operating systems.

This delivers two significant advantages. First, with a wider range of computing platforms to choose from, designers can more easily balance application requirements and cost concerns. Second, with a traditional PCI frame grabber designers are "locked in" to that vendor for support, relying on them to write drivers for specific operating systems and processing architectures. In comparison, nearly every modern hardware platform and operating system includes native support for Ethernet.

In addition, GigE Vision software development kits (SDKs) are widely available that allow developers to produce video applications for a range of operating system and processor architectures. With the right SDK, developers can easily develop functionality that can be modified to work on new operating systems, or receive video over a different interface types, reducing design time and costs.

## Enhanced, streamlined performance

One of the key performance advantages of Ethernet-based distributed network architectures is the ability to locate intelligent nodes at sites around the platform where data collection and control occurs. The Internet Group Management Protocol (IGMP), implemented almost universally as part of an Ethernet device or switch, allows network elements to be part of one or more ad-hoc video distribution groups, where a single server can multicast its data to several clients. This lets vehicle occupants decide "on the fly" which video streams they need to see, without changing cabling or reconfiguring software.

At the transport layer, the server sends only one copy of the data to a network switch. The switch replicates the data for distribution to display panels and processing platforms as required. This ensures video distribution doesn't impact server performance. Leveraging Ethernet's inherent multicast capabilities, display and processing functions can be offloaded from a single device to multiple devices to help ensure reliability. This also helps GigE Vision cameras to multicast high-quality, uncompressed video to multiple display screens and processing nodes simultaneously with the lowest possible latency. In some applications, a video compression processing node may then send video to a storage device or a remote command center via a wireless connection.

## Simplifying design with standards

Standards compliance is a key consideration when designing or upgrading military vision systems, with global defense organizations publishing extensive engineering and technical requirements to ensure interoperability in multi-vendor systems.

**GenICam**™ is a global standard that defines a generic interface for the computer control of digital cameras and other imaging products that transmit video. GenICam has been incorporated in many video interface standards, including GigE Vision, and is supported by most leading vendors of high-performance cameras.

GenICam provides a generic programming interface for all types of cameras, no matter what interface technology is used or what features are implemented. An extended mark-up language (XML) file standardizes the name, type, and meaning of camera features or their use, and stores this information in a self-description file that is retrieved by the SDK when the camera is first connected to a system. GenICam also ensures "human readable" features can be reliably converted into device implementation-specific commands, by mandating that the naming of features adheres to the Standard Features Naming Convention (SFNC). For example, "gain" not "brightness" is used consistently regardless of manufacturer.

Many of the benefits delivered by Ethernet for military vision systems, including design flexibility, lower costs, and increased performance, require a thorough understanding of the hardware and software components of the end-to-end solution. Choosing commercial off-the-shelf (COTS), standards-compliant video interfaces to avoid vendor lock-in and ease design, while architecting systems based on Ethernet's multicast capabilities, manufacturers can quickly and cost-effectively implement or upgrade high-performance vetronics systems. ✸

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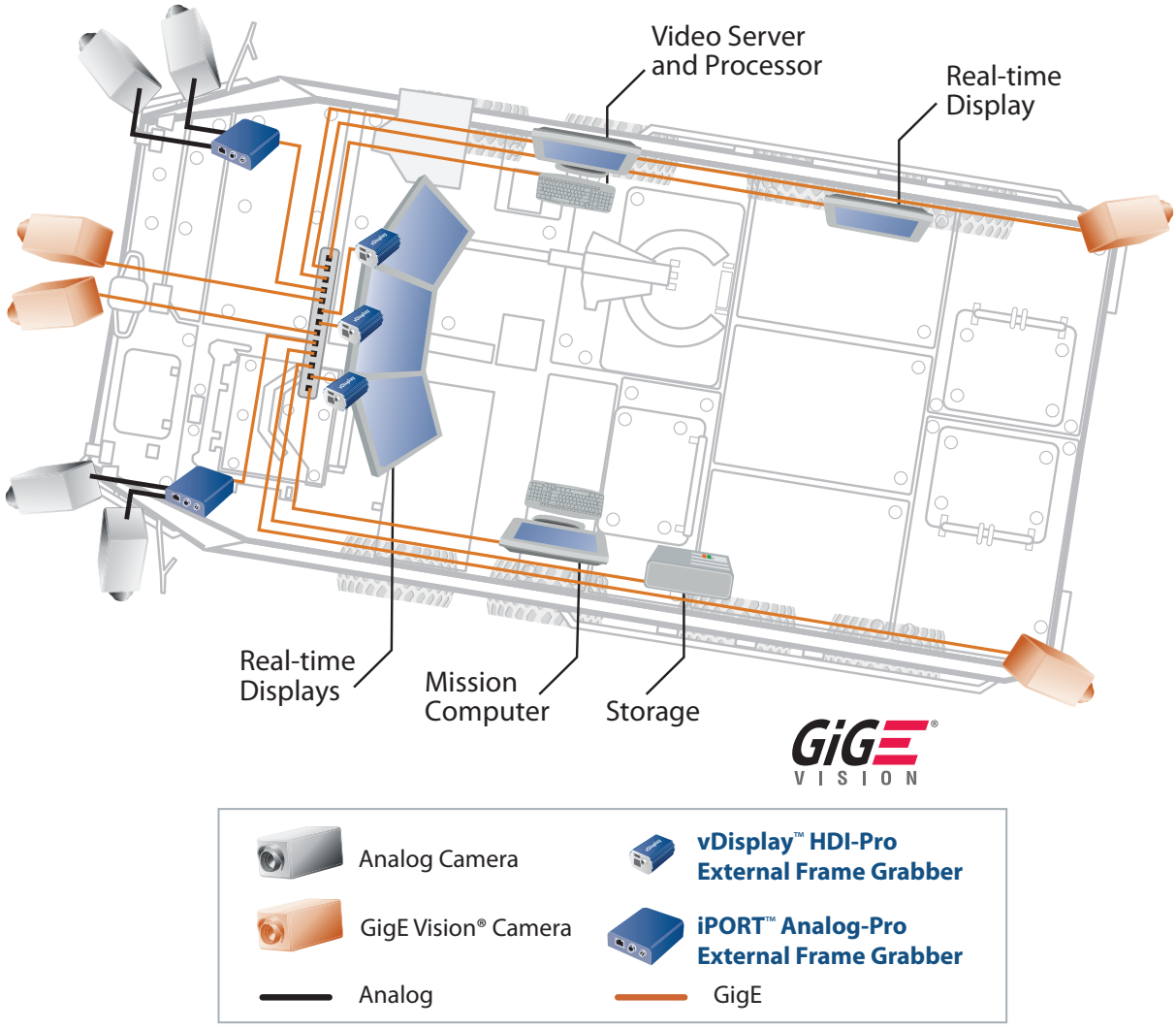




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