

iPORT™ Hydra™ PC Communications Software

Real-time data streaming between GigE-connected PCs for processing-heavy vision applications

Today, the real-time processing requirements of applications like semiconductor wafer inspection, flat panel display inspection, and postal sorting are typically met using DSP cards, framegrabbers, or custom boards.

This specialized hardware is expensive, complex, and difficult to evolve or scale when processing loads change, new tasks are introduced, or different system architectures are required.

Pleora's innovative iPORT Hydra software eliminates the need for most of this specialized gear, while making systems easier to build and use, by allowing real-time processing tasks to run on standard, GigE-connected PCs.

Hydra streams data between PCs at full GigE rates with the low, predictable latency (or delay) and high reliability needed for high-performance image transfer. Cost-effective real-time processing systems can thus be constructed from straightforward GigE networks of powerful Pentium 4-class computers.

Hydra runs on off-the-shelf Intel NICs (network interface cards/chips), interfaces to standard GigE switches, and uses ordinary Cat-5 copper or fiber cabling. When streaming data, it consumes trivial levels of the host computer's CPU, leaving ample CPU capacity available for simultaneous applications processing.



With Hydra, real-time processing systems can finally benefit from the aggressive price/performance curves of commercial processors, and the well-known scalability, flexibility, and ease of use of GigE networks.

Processing algorithms can run on well-understood PC platforms instead of being tailored to specialized board architectures. Processing power can be boosted and new tasks supported by simply adding a new PC to the system or upgrading an existing one. Overall, systems are easier to program, scale, maintain, and support.

Hydra supports a flexible range of single- or multi-stage processing architectures (see p. 3), allowing integrators to meet nearly all real-time system demands.

Hydra integrates seamlessly with other products in Pleora's iPORT Vision Connectivity Solution, including the growing family of iPORT IP Engines. Hydra is shipped with two pieces of supporting software: the iPORT High-Performance IP Device Driver, and the iPORT Software Development Kit.

iPORT Hydra PC Communications Software

Data Acquisition/Transmission Features	
Integrated data receiver and transmitter	◆ Sends and receives any type of data over GigE connections, including image data, locally generated processing results, and data received via a network link
Wirespeed operation	◆ Nearly full utilization of the GigE link (120 MB/s)
Low CPU utilization	◆ PC resources available for processing without the need for specialized hardware, such as DSPs, framegrabbers, and TCP/IP offload engines
Concurrent acquisition and transmission (providing PCI bus has sufficient bandwidth)	◆ Minimizes data transfer latencies to ensure real-time operation
Compatible with iPORT IP Engines	◆ Allows users to build end-to-end, networked high-performance data capture and processing solutions

Network Interface Attributes	
GigE-based	◆ Dominant commercial LAN standard; low-cost, easy-to-implement equipment
Runs on Intel PRO/1000 family of GigE NICs, including PCI-Express versions	◆ Compatible with Ethernet networks operating at 10/100/1000 Mb/s ◆ Long reach: 100 m with Cat-5 LAN copper cabling, further with standard switches and/or fiber
Supports 802.3, Ethernet v2.0, ARP, IP, ICMP, UDP, and PING	◆ Works with standard, off-the-shelf GigE switches and networks
iPORT Multimedia Streaming Protocol	◆ Guarantees efficient delivery of all packets ◆ Delivers comprehensive data transfer diagnostics ◆ Sends/receives all data types
Multicast capability	◆ Enables advanced distributed processing and control architectures
RJ-45 connector or fiber interface	◆ Inexpensive Cat-5 LAN cabling, shielded or unshielded ◆ Supports electrically isolated connections and, for long-haul transport, Intel-based fiber adapters

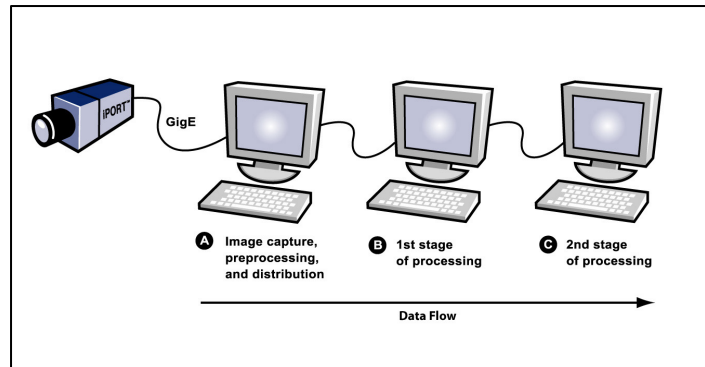
iPORT High-Performance IP Device Driver	
DMA transfer with minimal CPU usage	◆ CPU available for PC-based processing tasks
Full Windows IP stack bypass	◆ CPU-efficient stack processing – typically less than 2% at max transfer rates
Jumbo frame support to 16 KB	◆ Highest transfer efficiency on networks supporting jumbo frames

iPORT Software Development Kit (SDK)	
Comprehensive C++ libraries	◆ Simplifies development and maintenance of high-performance applications
Visual Basic library	◆ Fast prototyping and application development
Windows 2000, XP	◆ Flexible choice of application platform
OCX Control (display) COM+ Components (libraries) Buffer Interface	◆ Fast time-to-market with custom applications using buffer interface or OCX controls ◆ Compatible with third-party vision packages, such as National Instruments' Labview, Media Cybernetics' Image Pro, MVTec's Halcon, IO Industries' Video Savant, Matrox' MIL, Euresys' eVision, Norpix' StreamPix, and others. ◆ Natively compatible with any third-party image processing package that can accept a memory buffer
Multiple classes	◆ Comprehensive toolsets for communications, imaging, data reception and transmittal, device and data control and display, and configuration management
Sample application source code and executables	◆ Provides working applications for device configuration, data acquisition, data transmittal and triggering, and display and diagnostics ◆ Enables instant data access and fast application development

iPORT Hydra: Sample Processing Architectures

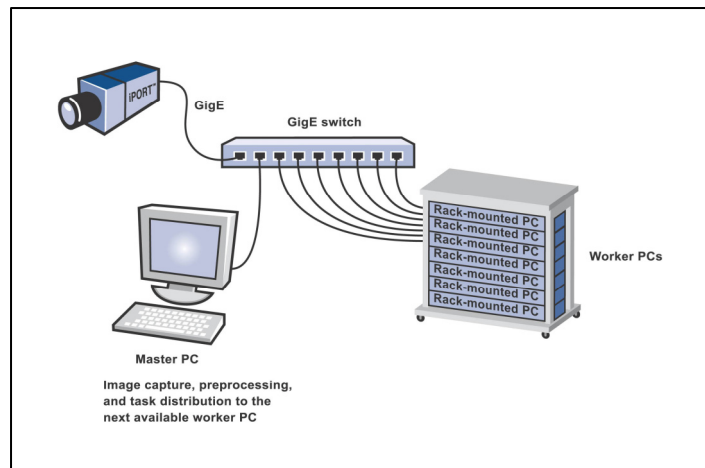
Pipelined Architecture

This architecture is useful for easily segmented, compute-intensive processing tasks. Each PC performs one processing stage, and data is distributed serially down the chain. The final PC in the pipeline requires only the iPORT High-Performance IP Device Driver to perform its real-time receive function. Hydra software is not necessary, since the PC is the end of the line, and does not send data in real time.



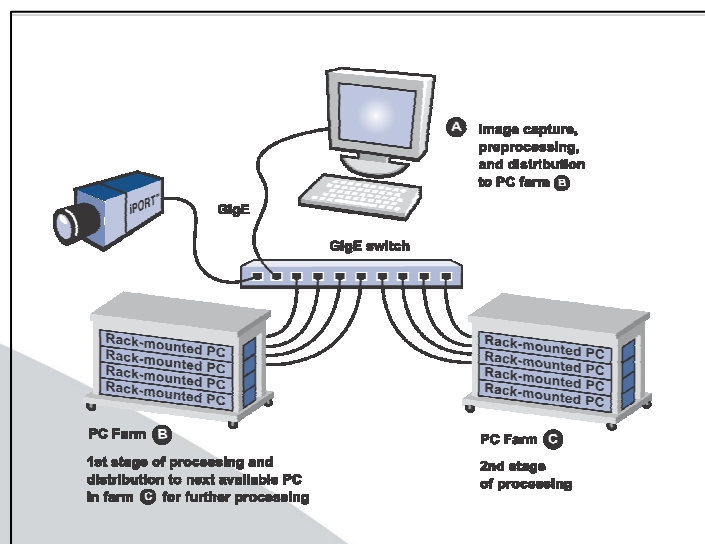
Switched Architecture

This architecture is useful for processing large amounts of image data in two stages. The master PC accepts image data, does some preprocessing, segments the data into predefined tasks, and distributes each task via a GigE switch to the next available worker PC in the rack. Each worker PC executes its assigned task and returns data (such as a decision signal or analysis summary) to the master PC. This information can then be distributed to a database and/or used to perform an action as required.

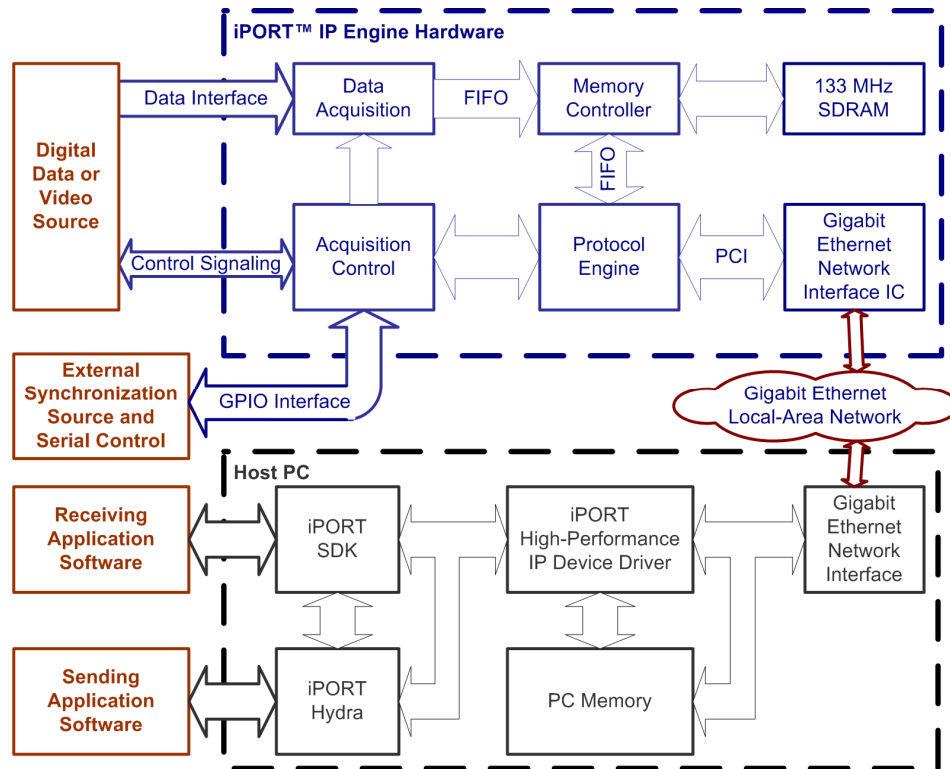


Switched/Pipelined Architecture

This architecture is useful when multiple analyses are required, and each analysis type is computationally intensive. A master PC accepts the image data, does some preprocessing, segments the data into tasks, and distributes the individual tasks via a switch to worker PCs in PC farm B. If farm B workers do not complete the analysis in a fixed amount of time, they pipeline the data to the first available worker PC in farm C, where a second type of analysis is performed.



Pleora's iPORT Connectivity Solution



End-to-end iPORT architecture with IP Engine, High-Performance IP Device Driver, and Hydra

iPORT Hydra Platform Requirements:

PC Configuration

- Intel Pentium 4 or AMD Athlon-based with 512 MB SDRAM and PCI-X or PCI-Express NIC from Intel's PRO/1000 series

Operating System

- Windows 2000 or Windows XP

Order Codes:

iPORT Hydra, single GigE linkPT1000HYD-BASE
 iPORT Hydra, dual GigE linkPT1000HYD-DUAL

iPORT Hydra software is shipped with the iPORT High-Performance IP Device Driver, the iPORT Software Development Kit, sample application source code, and user documentation. The entire package is delivered on CD or available by download.

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