

## INTEL® E-BUSINESS CASE STUDY

# Prescription of Gigabit Solution Helps Deliver High-Quality Patient Care

*Intel® Gigabit solution enables hospital and clinics to share images and diagnose patient conditions in real-time*

### CASE HIGHLIGHTS

*Profiled Organization: Provider of medical image management solutions*

*Challenge: Expand Picture Archiving and Communications System (PACS) across the enterprise to enable hospital staff and affiliated clinics to share patient exams.*

*Solution: Provide Gigabit performance between backbone, servers and workstations using Intel® PRO/1000 Network Adapters.*

*Benefits: Optimized patient care, improved physician, staff and administrative productivity.*

Imagine a scenario in which you need an emergency x-ray. Your physician is unable to determine just how serious your condition may be and needs a radiologist to look at the image. However, the radiologist is working across town at the hospital affiliated with your physician's clinic. Does this mean that you'll have to wait a number of days before you can get a diagnosis? Not with a Picture Archive & Communications System (PACS) that spans the enterprise. The PACS solution from A.L.I. Technologies Inc. allows digital images to be instantly accessed and viewed at various locations on a LAN or virtual private network (VPN). And, with help from the performance and reliability that Intel® PRO/1000 Network Adapters and Intel® architecture-based server boards provide, this solution is a reality.

A.L.I. Technologies Inc. is a provider of digital imaging network systems for medicine. Its mission is to provide medical image management solutions that automate workflow and eliminate the use of film in hospitals and clinics. This allows for improved productivity, reduced operating costs, and ultimately improved patient care through the delivery of more timely and accurate diagnostic information.

### **CHALLENGE:** Harness the Performance of Gigabit in the Existing Infrastructure

ALI's customer's, University of Wisconsin Hospital and Clinics (UW), primary goal is to improve the quality of patient care. This goal requires the capability to provide accurate, efficient and immediate diagnosis. New imaging device technology helps to meet part of the goal's equation: to capture more detailed images with faster scanning devices. Now UW had to complete the other side of the equation: the ability to access and view these very large "exams" (sets of images) throughout the entire enterprise. "New imaging technology has, in some ways, forced our hand to upgrade our network in order to take full advantage of these more detailed

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Network Connections

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images,” states Dr. Gary Wendt, vice chair of Informatics and assistant professor of radiology at University of Wisconsin. “These images provide us with much more information and allow us to more accurately diagnose the patient’s condition.”

Expanding the PACS solution allows other specialists, technologists, administrators, and referring physicians in remote locations, such as outpatient clinics, to have universal access to exams. This expansion also allows “on-call” specialists or physicians to access images at their home or private office via a VPN, which UW has considered rolling out in the future.

In addition, the expansion provides real-time collaboration among physicians and eminently enhances productivity and patient coordination. The network extension of PACS also greatly reduces the possibility of losing images. Lost images not only cost money, but also hinder diagnosis and the quality of care.

**“If a physician can’t access, view and get back to the patient or attending physician in 5 minutes, it means lost productivity. Lost productivity is a major factor, not only for our bottom line, but for the patient’s care.”**

### **PROCESS:** Quick and Highly Reliable Network

Implementation of PACS across the enterprise requires higher network performance. Images created from UW’s more than 35 medical imaging devices – approximately 14 Terabytes per year – are stored on high-speed RAIDs and Network Attached Storage (NAS). The servers are connected to 33 workstations located in the main site’s radiology department, a test lab, and off-campus clinics. The average exam that is accessed from the servers is 500 megabytes and can be as large as 2 Gigabytes. “It’s the largest exams that are our concern,” says Dr. Wendt. “If a physician can’t access, view and get back to the patient or attending physician in 5 minutes, it means lost productivity. Lost productivity is a major factor, not only for our bottom line, but for the patient’s care.”

Network reliability is a critical factor. If the system is down, physicians and staff cannot access the image archives and cannot make diagnoses. “Our customers are crucially dependent on the system,” states Len Grenier, chief technology officer and senior vice president of engineering at ALI. “Therefore, reliability is a key factor in selecting network equipment.”

Cost is also a concern. High-quality patient care has to be affordable. To keep costs down, both ALI and UW look to industry-standard hardware and software.

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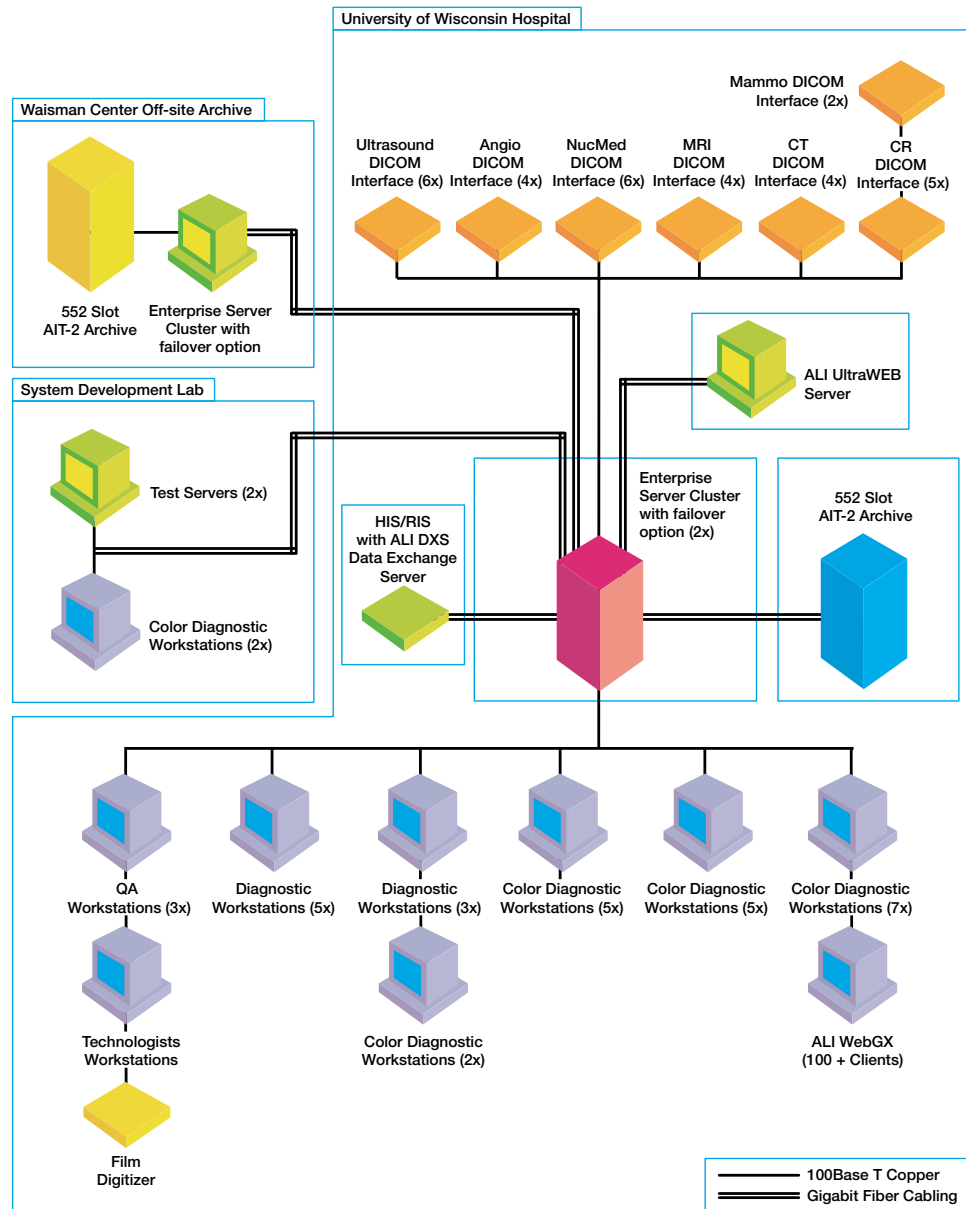
### **SOLUTION:** Gigabit Server Adapters: The Intelligent Way to Connect

To transfer multi-Gigabyte exams throughout the network called for a Gigabit Ethernet solution. Gigabit Ethernet was applied both to the network backbone and data center. The solution included several Gigabit servers with integrated RAID, Network Attached Storage (NAS) and a Gigabit switch to tie them all together. The Gigabit switch is connected to UW’s network backbone, which connects the medical imaging devices and workstations via 10/100 Cat-5 cabling. Fiber cabling creates the network backbone.

ALI’s solution for UW is an Intel® architecture-based end-to-end PACS. “One of the main reasons we bought our system from ALI was because they provide Intel end-to-end solutions,” says Wendt. “This met our COTS (commercial-off-the-shelf) requirements to keep the solution cost effective and to be able to work with existing and future hardware and software.”

“We looked at other server adapters that had attractive prices, but the performance and reliability just weren’t there.”

“We’ve used Intel adapters in our solutions since the 1980s, so we know they are reliable and high-performing.”



ALI’s solution included Compaq\* Proliant\* 8000 servers based on Intel® Pentium® III Xeon™ processors 700 MHz and Compaq Proliant ML370 servers with Pentium® III processors 1266 MHz. ALI and UW chose Intel® PRO/1000 XF Server Adapters to be integrated in all the servers.

An Intel® PRO/1000 Server Adapter-based solution met all the requirements for performance and reliability. “We looked at other server adapters that had attractive prices, but the performance and reliability just weren’t there,” states Grenier. “We’ve used Intel adapters in our solutions since the 1980s, so we know they are reliable and quick.”

Intel® PRO/1000 XF Server Adapters are designed specifically to alleviate network bottlenecks when extra bandwidth is needed. To ensure optimal performance, Intel PRO/1000 XF Server Adapters deliver industry-leading throughput. “We tested and verified that Intel Gigabit NICs offered the best performance in our own labs before proposing a solution to our customer.”

**“We’ve been very pleased with Intel long-term, satisfying relationship with the company.”**

**“Without this PACS solution, UW could potentially lose millions a year, but making money is not our primary goal. Patient care is. And without the PACS solution, quality of our care would certainly suffer.”**

In regard to reliability, Intel® PRO Server Adapters support technologies that ensure maximum server uptime. Adapter Fault Tolerance (AFT) and PCI HotPlug\* keep servers up and running, even if the switch or hub port fails, a cable breaks, or a NIC malfunctions. AFT, which was developed by Intel, monitors the server connection to the network and automatically switches traffic to a redundant link in the event of a failure. It provides a simple, effective and fail-safe method for increasing the availability of server connections, by creating an emergency backup link between the server and the network. If there is any problem with a cable, NIC, switch port or hub port along the primary link, the secondary link kicks in within. The recovery is transparent to applications and users. PCI HotPlug, developed by Compaq, is now an industry standard that enables a failed network adapter to be replaced without taking the server offline.

Relationships also weighed in heavily for ALI’s decision criteria. “We’ve been very pleased with Intel and have had a long-term, satisfying relationship with the company,” said Grenier. “We were the very first vendor to show a multi-node, Ultrasound PACS solution based on Intel® architecture in 1989.”

### **BENEFIT: Patients Profit from Better Care**

It’s difficult to quantify the payback in terms of patient care. “I could say that without this PACS solution, UW could potentially lose millions a year,” explained Dr. Wendt. “But making money is not our primary goal. Patient care is. And without the PACS solution, quality of our care would certainly suffer.”

### **FUTURE: Gigabit to the Desktop**

UW’s next logical step is to scale the existing workstations to Gigabit to allow for faster viewing of patient files. “A doctor’s time should be spent helping patients get well, not waiting for a file to download. Gigabit to the desktop is the logical progression to deliver the best patient care and maximize doctor efficiency,” explained Dr. Wendt. UW is already using Gigabit fiber adapters in some high demand-workstations and for those greater distances away from the switch.

Widespread deployment is now possible with the advent of Gigabit throughput on standard Category-5 copper cabling, which UW has installed extensively throughout its facilities. Deployment steps simply include replacing 10/100 desktop adapters with Intel® PRO/1000 T Desktop Adapters and replacing the 10/100 segment switch with a Layer 2 Gigabit switch. With this solution, ALI is able to offer its customer a 10-fold increase in bandwidth over UW’s existing infrastructure – Category-5 copper cabling.

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