Camp Lejeune

Building a Base for Growth and Maximum Efficiency

In September 1941, a Marine Division set up camp in the middle of a sandy pine forest along the Atlantic. Today what began as a small tent city has grown into a 246-square mile, 153,439-acre, premier military training facility—Camp Lejeune, North Carolina.

Industry:
Government

Number of Users:
25,000 active nodes

Challenge:
Deploying a Base-Wide Communications Infrastructure

Solution:
Ensuring Scalable, Utility-Like Networking with the X-Pedition™ switch router and Matrix™ E7

Benefits:

- High capacity to handle demanding and diverse network traffic—like VLANS
- Pinpoint control, simplified manageability and full-function wire-speed routing—even under the busiest conditions
- Scalability to accommodate constant change—with no fork lift
- Wire-speed performance and functionality to meet end-user requirements
- True investment protection thanks to compatible modules and technology that migrate seamlessly

Home to an active duty, dependent, retiree and civilian employee population of more than 130,000 people, Camp Lejeune is the largest Marine Corps base on the east coast, one of three major Marine Corps bases in the world. Camp Lejeune is also the largest amphibious training base in the country with over 14 miles of beach to support sea-to-land operations. With 54 live-fire ranges, 89 maneuver areas, 33 gun positions, 25 tactical landing zones and a state-of-the-art urban terrain training facility, Camp Lejeune now hosts bilateral and NATO-sponsored exercises for military forces from around the world.

Camp Lejeune is a self-contained city with its own post office, fire department, police force, utilities, hospital, schools, shops, airport, marina and more. In fact, the base generates $2 billion in commerce each year from payroll and various contracts that together support the structure required to train and equip the country's marines. Thanks to its unmatched supporting infrastructure, a tradition of excellence in doing day-to-day business has evolved. From environmental programs that include a state-of-the-art landfill and water treatment system to quality of life programs for Marine Corps families, Camp Lejeune stands out as a superior military base.

The Challenge:
Deploying a Base-Wide Communications Infrastructure

In order to maintain its excellent reputation and provide the level of service that makes it a superior facility, Camp Lejeune requires an information network that can support its many diverse divisions and departments. An additional challenge: Unlike other networks that generally sustain "typical" business or government organizations, the Camp Lejeune network is deployed community wide. "Our enterprise not only supports core marine operations; it also meets the connectivity needs of the entire base community—from municipal offices to medical facilities, from the fire department to base utilities," says Frank Toth, computer technician in Camp Lejeune's Information Systems Management Group, who is responsible for switching and configuration technology, as well as for managing and maintaining the infrastructure.

To say that the network touches everyone at Camp Lejeune is no exaggeration. According to Toth, the 911 system (for police, fire and medical emergencies) runs over the network, as do base utilities, which control services like heating and air conditioning, and wastewater treatment. Even the base marina and airport are connected to the network. "The Graphic Information System runs across the network," Toth explains. "You can look at the entire base infrastructure and see telephone lines, sewer lines, heating and air conditioning, or roads, for example. The GIS provides directions and critical structural information so crews know where to respond in an emergency or even to undertake routine maintenance."

A History of Partnership

Toth was an early adopter of networking and Enterasys technology, beginning with his work at the Camp Johnson Financial Management School which boasted the first network aboard Camp Lejeune. That network connected three classroom

buildings, each with its own server, to a server in the administration building. At that time, Toth used switched Token Ring to the classrooms with Ethernet connectivity in the main building.

In 1995, Toth was part of an effort to deploy an enterprise network throughout Camp Lejeune. "We invited most of the big players in networking at that time to bid," Toth said. "Our biggest requirement was single mode fiber across the entire campus. In addition, the network had to be scalable and, of course, we wanted good support." Toth adds that Enterasys was the only respondent who could support Camp Lejeune's requirements without using third-party vendors.

"Other vendors said, 'Here's what we have available and this is how you should do things.' Enterasys said, 'Here's what you want to do and here's what we have to support your enterprise.' That level of understanding was important, and since then we've been strictly an Enterasys network."

The Solution:
Ensuring Scalable, Utility-Like Networking with the X-Pedition switch router and Matrix E7

Today, the base relies on a 75-mile OC-12 ATM backbone that connects 318 buildings and can support 25,000 active nodes on its non-classified network alone. Important applications that run over this network include distance learning applications, e-mail, logistics, back-office operations, and more. ATLAS, a major military application, controls every function of supplies and logistics, including inventory and the transition of supplies across different departments or units. Used on the base and in the field, access to ATLAS is critical for maintaining efficient supply management.

"It shouldn't be surprising that communications applications, like e-mail, use the most bandwidth and provide what users consider to be one of our most critical functions," Toth says. "And, as more and more units rely on the Internet, HTTP traffic becomes important as well."

The Camp Lejeune infrastructure incorporates ten major network centers, each its own routed domain. From each network center, connectivity extends through one or more enterprise switches, currently the SmartSwitch 9000, depending on the size of the environment. From the SmartSwitch 9000, the network branches out to individual buildings via single mode fiber. Depending on the requirements of a single building, there may be anywhere from 24 to 400 people relying on multiple Enterasys switches—the Matrix E6 or Matrix E7, or the Vertical Horizon™ 2000. Some buildings have a combination based on the population of a particular wiring closet within a building, and some buildings have multiple connections back to the main center depending on requirements of the tenants—who they are and what they do.

"In a building with more than 24 users, we're installing the Matrix E7," Toth says. "We really appreciate the scalability of the E7 because accommodating constant change without a forklift is one of the requirements of our network. In fact, in some instances we're starting with a chassis and a single blade knowing that the E7 has the capacity we need to handle growing demands." The Enterasys Matrix E7 enhances the proven performance of Enterasys technology with the increased speed and functionality required in environments like that of Camp Lejeune. The Matrix E7 ensures scalability for new users and applications—and for emerging technology.

Toth also takes advantage of the E7's ability to seamlessly migrate connectivity. "The basic switch platform stays the same, yet by using a VHSIM or FEPIM or different module, I can change technology in a single building, from Gigabit Ethernet to ATM for instance. This is extremely cost effective and represents genuine protection of our investments," Toth adds. Because the Matrix E7 is completely compatible with all existing Matrix E6 modules, investment protection is assured. In addition, the Matrix E7 shares common feature sets with Enterasys existing technology—like standard-based 802.1q VLAN.

Utility-Like Networking

When Toth considers the Camp Lejeune network, he pictures utility-like functionality. "Due to the special considerations of a major military base such as Camp Lejeune, our network must be seen as a core base utility demanding high-performance with zero downtime. On a military base, people come and go quite frequently, but the service is always there. It shouldn't matter where a user goes on base or what his function is," Toth says. "A user should be able to plug in a PC or laptop, or access a wireless network with a hand-held computer, and have network services available to them 24 x 7. Ideally, the Camp Lejeune network is plug-and-play." Toth compares the network to a building's electric utility: The tenant may change but if

a light switch is flipped, the lights will go on. According to Toth, this type of functionality is critical in a network that is growing rapidly; his team adds several hundred nodes a week.

A Time of Transition

Today, the network at Camp Lejeune is continuing its evolution. Toth explains, "Right now we're moving away from software-based routers to a hardware-based router—the X-Pedition switch router—beginning in three of our ten network centers." Like his counterparts in enterprise networks of all sizes, Toth has discovered that conventional software-based routers—although rich in features—can't meet the level of performance his network requires.

Based on Gigabit Ethernet, the Enterasys X-Pedition switch router combines the features of software-based routers with the performance of the industry's leading switches. It offers the capacity Camp Lejeune needs to handle its demanding and diverse network traffic including virtual LANs, as well as pinpoint control, simplified manageability, and full-function, wire-speed IP/IPX routing. With the X-Pedition 8600 on the backbone, network throughput exceeds 31 million packets per second. Equally important, it provides seamless interoperability with previous generations of networking equipment, protecting customer investments.

According to Toth, these three network centers in transition meet the data requirements of between 65 to 70% of the total Camp Lejeune users—about 174 buildings and 14,000 people. "We'll always have the requirement to route," he says, "but the advent of the hardware-based X-Pedition switch router eliminates the latency inherent in software-based routing. Essentially, we're streamlining functionality and can eliminate software-based routers from our network. The fact that the X-Pedition supports 802.1q and our requirements for VLAN technology is very important."

Camp Lejeune is transitioning to 802.1q VLANs standard. "We're working to streamline the technology we support," Toth says. "Right now, in addition to primarily switched Ethernet with some traditional routing, we're also using ATM." Originally, Camp Lejeune looked to ATM for VLAN support and quality of services; features available now with 802.1q. "The availability of the 802.1q standard with the X-Pedition switch router changes a great deal for us," Toth explains. "Gigabit Ethernet compares to ATM very favorably. With inherent quality of service, OC-12-type bandwidth and application flow control—some of the primary reasons we chose ATM technology originally—our major requirements for ATM don't apply."

The Future:
Building on the Successes of the Past

Short-term objectives for the Camp Lejeune network are clear. "We need to fully implement the new Matrix E7 and deploy the X-Pedition switch router in all our network centers," Toth says. With the new technology fully deployed, Toth seeks to complete the base's migration to 802.1q and transition from ATM to Gigabit Ethernet.

In the long term, Toth would like to take advantage of 802.1q's application flow control and bandwidth provisioning—allowing him to apply security filters and QoS policies to specific application flows, assigning e-mail applications a different priority than database applications, for example. In this way, mission-critical applications can be guaranteed bandwidth throughout the network, ensuring predictable performance at all times. As Toth explains, "Traditionally, we have managed a piece of hardware or the amount of bandwidth. With the application flow control and bandwidth provisioning provided by Enterasys' X-Pedition switch routers, we can reverse that process to manage our systems and applications in a way that ensures that priority is given to what is most essential. We will look at establishing this priority within each building, and we'll eventually be able to take it to the port level, so we won't have to make those types of decisions when we're dealing with serious congestion."

The most important thing for Toth, however, is building on the success he's already achieved with Camp Lejeune's network, taking advantage of all the features and functionality Enterasys solutions have to offer. "We have a long, successful relationship with Enterasys Networks and its parent company, Cabletron Systems," Toth adds. "The technology is always there, and Enterasys' support for Camp Lejeune has been outstanding throughout our entire relationship—listening to our needs and providing solutions that will fulfill our demands."