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Lee Paggeot
Command and Control Performance Lead
46th Test Squadron
Eglin Air Force Base

Challenge

War games. Disaster response. National security. Each of these things falls under the purview of the elite technical developmental test team that is the 46th Test Squadron. Operating from Eglin Air Force Base, Florida, as part of the 46th Test Wing, the 46th Test Squadron exists at the place where military tactics meet execution—where massive amounts of money and labor are at stake and failure to test a system properly is not an option.

Among the over three-hundred projects the squadron must oversee at any given time are initiatives such as hurricane response software, the outfitting of military aircraft with critical VoIP and datalink communications systems, and full-on war simulations. In short, it is up to the 46th Test Squadron to make certain the fabric binding our nation’s Command and Control for defense systems is ready when it matters most.

If it sounds like a movie, it isn’t. If it sounds like the ultimate challenge, it is.

Shock, Awe, and Observer

In the run-up to the second Gulf War, the 46th Test Squadron’s Command and Control Performance Team Lead Lee Paggeot and the 46th Test Squadron held the enormous task of ensuring military command and control center networks could handle the grand opening salvos the world would come to know as “Shock and Awe.”



For this critical initial stage of the war to succeed, a network comprising multiple topologies and interfaces spread between far-flung bases and command sites—and some space-based systems—would need to operate perfectly. It would also need to support an immense data load, with huge volumes of intelligence and air tasking orders flowing to and from the command centers—signals that would determine what was attacked and when.

A network this important requires exhaustive testing and maintenance. A systems failure due to insufficient testing would be disastrous.

“If systems go down and the enemy fires a missile at you, you’re blind. You pay the price,” says Paggeot. “If special operations groups get attacked, there is no response coming to help them. You’ve taken the strategic-level command system down.”

Paggeot and his team use the Network Instruments® Observer® analyzer to make certain that never happens. In a military network environment, applications can communicate over transmission control protocol (TCP) to airborne, mobile, and naval ground-base systems and dedicated facilities throughout the world. It is vital that command understands thoroughly each system’s application in a TCP environment.

Observer also plays a key role in analyzing conversations between multiple systems.

“Let’s say the Army system is talking to the Air Force and for some reason the message is not getting through,” says Paggeot. “With Observer, I can reassemble the conversation back to SMTP and resolve that problem very quickly.”

Field Tests and Airborne Communications

When the Air Force scrambles a group of F-16 fighter jets, the mission cannot happen without proper communications capabilities. As airborne assets migrate to TCP-based network communications, pilots will rely largely on voice-over-IP (VoIP) networks for communications with ground forces.

To better understand how installed VoIP systems would function under different conditions, the 46th Test Squadron flew airborne assets through various ranges and altitudes and tested multiple configurations.

“The power with Observer is that you can drill down and look at your Mean Opinion Score (MOS), your R-factor,” says Paggeot. “You can also see port-to-port conversations.”

The team used Observer to look at which ports computers were using in their conversations and to replay the traffic. Using WAN analysis, they were able to determine how the VoIP system would respond based on different scenarios and flight paths.

“We used the same techniques for the application layer, to look at the DNS, the databases, and the VoIP system, and characterize what we saw,” explains Paggeot. “We instrumented the different assets with Observer so we could get the data and captures we needed.”

Blazing New Trails

The Joint Expeditionary Force Experiment (JEFX) ’06 tested new concepts and processes aimed at bolstering offensive and defensive capabilities, including the use of airborne IP networking. The 46th Test Squadron was on hand to make sure the hundreds of participants and myriad weapons, vehicles, and other devices stayed connected.



“[Observer is] actually helping people succeed, faster.”

Sergeant Stacia Zachary
46th Test Squadron
Eglin Air Force Base

“We had hundreds of systems—tons and tons of servers in a massive configuration,” says Paggeot. “In looking for network problems, if Observer shows me a 200 millisecond response time, I ask myself, ‘Is that because of the network or because of the application?’ I’m able to drill down quickly and sort it out.”

Based on this network testing, the crew compiled a users’ manual of sorts, including a detailed list of technical deficiencies. In some cases, the corrected problems improved response times drastically, from about one hour to about one minute.

In national defense situations, time is the enemy. Troops and command forces require real-time data to make sound decisions quickly, which means systems must be able to communicate with one another properly with acceptable response times.

“Systems provide updates to other systems, perhaps that a missile was fired,” says Paggeot. “With Observer, we would watch under ICMP messages to see whether a router could deliver a message.”

Observer: Air Force’s Top Gun

Operations like JEFX draw heavily on financial and time resources. As such, it is in the government’s interest for things to work correctly the first time. The 46th Test Squadron remembers the days when network problems were far more difficult—and costly—to sort out.

“Sometimes we’d lose the event, and we would have spent thousands of dollars, a hundred thousand dollars,” says Paggeot. “We wouldn’t know until the last day that it was a multicast broadcast storm. Now, if that happens at any of our events, we know in minutes.”

Several years ago, the Air Force held a command-and-control test with a different analyzer. Alongside them, the Navy had purchased Observer to perform application analysis, deep drill-down, and real-time captures, all of which caught the Air Force’s eye.

“We all looked at it and liked it. It is a powerful tool,” says Paggeot. “The application features, the ease of use, the help features—the 46th Test Squadron bought all of it. All of our flights have it.”

Sergeant Stacia Zachary from the 96th Air Base Wing says the test squadron makes heavy use of application analysis, port-to-port conversational mapping, and web trending, which they use to gauge current bandwidth usage and project the impact of increased loads on network health.

It seems that at Eglin Air Force Base, Observer’s popularity is growing.

“People now come to us and say, ‘Hey, can you check on my system now before I go and waste a hundred billion dollars?’” says Zachary. “The 46th is saving people lots of money and lots of wasted effort that they weren’t able to before. They are actually helping people succeed, faster.”

About Eglin Air Force Base

The 46th Test Wing is the Air Force’s test and evaluation center for air delivery weapons, navigation and guidance systems, command and control, computers, communications and intelligence systems and Air Force special operation command systems. The Eglin Gulf Range provides approximately 130,000 square miles of water and air space. Their world-class technical facilities and natural resources, coupled with the creative thinking of its staff, produce affordable, technical solutions to contemporary technical problems.



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