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## NPS Hastily-Formed Networks Research Group Responds to Haiti Earthquake

NPS > About NPS > News

Article By: Barbara Honegger



The Navy unveiled its new slogan, "A Global Force for Good," at the end of last year, and was immediately given the chance to prove it. The powerfully-devastating earthquake that hit the poor island nation of Haiti on Jan. 12 led to a swift Humanitarian Assistance and Disaster Relief (HA/DR) response by all of the services. And one of the players at the civil-military boundary in that effort – serving as a bridge between on-the-ground medical personnel, the USNS Comfort hospital ship, and the international non-governmental organization (NGO) community – was the Naval Postgraduate School's rapid response wireless communications team.

The eight-member NPS Hastily Formed Networks (HFN) team, led by its director and Information Sciences Research Associate retired Navy Lt. Brian Steckler, left Monterey for the island nation Jan. 18 after a hurried three days pulling together the orders, funding and equipment for the mission.

"When you think of what's most needed in an emergency like this, water, food, shelter and medical supplies are what usually come to mind," said Steckler, who volunteered to return to a major disaster zone for the third time in five years after responding to both the Southeast Asia tsunami and Hurricane Katrina. "But emergency communications should be at the top of the list, because without them, you can't coordinate the others and can't operate; and the communications situation in Port-au-Prince was really dire. For three days after the earthquake hit, even the president of the country couldn't talk to President Obama because he didn't have a working satellite phone."

Responding immediately to this informational challenge, NPS' HFN Team Haiti flew \$250,000 worth of emergency communications equipment from their labs to reconnect the people of Haiti to each other and the world.

"This is the biggest disaster in modern times in terms of lives lost, now estimated at well over 500,000," Steckler said, "and the urgent needs of persons and property affected has been the catalyst to bring all these communications challenges to a head. NPS' HFN operations have become a model of how to do real-time communications for MediVacs and other trauma support by quickly enabling the use of the Internet."

"Our mission was to support the U.S. government and military by bringing satellite-enabled rapid wireless communications to the most critical areas and functions, working with Joint Task Force-Haiti, which is in charge of the military side of the relief effort," noted Steckler, who was named a Red Cross hero for his emergency communications efforts in the wake of Hurricane Katrina. "Knowing our track record in the tsunami and Katrina, the Department of Defense immediately reached out to us and asked us to participate and contribute in our small way."

The Hastily-Formed Networks Research Group is a Cebrowski Institute field-experimental research organization created in response to the 2004 tsunami. It is specially structured to respond to humanitarian disasters. "We're entirely self-contained," Steckler noted. "We go in with everything we'd need if deployed on the ground – portable light-weight tents, sleeping bags, MREs (meals ready to eat), water purification and filtration equipment, alternate power, cooking equipment, various communications devices – you name it."

The team arrived in Haiti with eighteen 70- to 100-pound 'fly-away kits' in hard cases used both for this self sufficiency and to set up Internet access capabilities to enable voice/chat (Skype), video, e-mail and data communications, including telemedicine via satellite. The equipment included four Broadband Global Area Network satellite units (BGANs) that can connect to the Internet via the International Maritime Satellite Network in five minutes and generate 100-meter wireless "clouds"; four foldable 9-foot-by-9-foot solar panel tarps that generate 800 watts of power when there's sun, and a wind turbine when there isn't, to run the equipment if needed; GPS devices, visualization systems to provide situational awareness in a command center-like configuration and four satellite phones, "which are like gold," Steckler said.

"With the WiFi 'clouds' we can create temporary Internet 'cafes' in hospitals or field clinics, boat or helicopter landing zones, and key relief sites like the ones we set up in parking lots in the wake of Katrina," he noted. "These 'clouds' can then be connected using WiMAX terrestrial long-haul wireless point-to-point networks that extend up to 30 miles, bringing links from one site to another in point-to-point mode or with multiple hops.

"The first five days I was on board the USNS Comfort – a converted oil tanker that's the sixth largest hospital in the world. It looked like D-Day," Steckler recalled. "There were two dozen international ships off shore, a large number of critically injured Haitians pouring out the deck from helicopters landing every six minutes with more circling two or three deep nearby, and hundreds of doctors, nurses and medical personnel working 20-hour days to save lives and ease the suffering. The ship had only two phone lines for MediVacs with the communications infrastructure down at hospitals and other shore facilities, so we set up a BGAN on the bridge deck to demonstrate how mobile/portable, airline-luggage-checkable communications equipment can support things such as MediVac communications from/to the helicopter and boat landings, and for coordinating medical supplies or personnel transits from ship to shore."



Cebrowski Institute Research Associate Ramsey Meyer was among the first team members on the ground coming off the COMFORT and became one of the "go-to guys" ashore to arrange critical-patient MediVacs out to the ship. "We used BGANs, a satellite unit called a SWE-DISH, and laptops to establish reliable wireless communications with the Comfort's triage team," he said.

Meyer was joined by retired Navy Supply Corps commander and Cebrowski Institute Research Associate Dave Nystrom; Electrical Engineering student Marine Corp Capt. Brandon Newell, and civilian Research Assistants Rosa Akbari and Foard Copeland. The group set up operations at Joint Task Force-Haiti headquarters, in a tent in the lot next to the U.S. Embassy about the size of the NPS academic quad.

"The first medical facility we went to was the field hospital at Terminal Vereaux, set up by the U.S. Department of Health and Human Services, where we set up a communications bridge to the Comfort," Meyer said. "Though our original mission was communications, we were instantly thrust into the role of life savers, and every time we did a MediVac we were also doing our comms mission."

"The conditions at the Haitian Community Hospital (HCH), like many others, were horrendous," Steckler recalled. "Several dozen patients, including children and elderly women, lined the halls and covered the ground outside, some on stretchers made out of wooden doors, with squirrel-size rats running around at night. We bought and delivered 30 rat traps to try to improve the situation. Eight out of ten days, due to shaky local ISP infrastructure, the hospital used our satellite phones and BGAN satellite Internet connection devices, and we coordinated live chat and voice over IP on laptops, which turned out to be key medical tools. By the time we left Haiti, wireless chat was up and running at hospitals, with plans in hand to set



chat up in the tent cities and schoolhouses, with a sharp focus to connect health, education and shelter sites to the Internet, and then with by-sector live chat."

The general medical situation in the city was also horrendous, the team recalled. There was only one CAT scanner in all of Haiti, which wasn't working because the building it was in was damaged. And the blood stored throughout the city had gone bad due to lack of electricity. Steckler and his team made calls until they found some refrigerators, and had them delivered to the hospital so that desperately-needed blood donations could once again be preserved until use.

"We were at HCH doing communications assessments for only a couple of hours when the head nurse rushed in and said they had an urgent patient, but that all three cell phone calls that afternoon to the Comfort to attempt to arrange a MediVac had been dropped due to lousy satellite phone service," Steckler continued. "We used our direct line to the ship's command center and got them to agree to send a helicopter, waiving the usual requirement for passengers in Navy helicopters to be certified for night flights since this was an after-dark event. We loaded the patient, who'd been rescued from the rubble with his stomach in his chest and a hand respirator keeping him alive, into our car in the dark and got him to the chopper with a doctor and emergency medical technician on board. In all, we used our vehicle as an ambulance four times to get patients to helicopters or port landings where they could be taken out to the hospital ship by boat or to other facilities better equipped for a particular patient."

After returning to NPS, the team was elated to learn they'd been successful in saving the leg of one of the four patients they'd helped get out to the Comfort, a young Haitian boy named Roovins Monchil who'd had a life-threatening femur fracture and infection.

"It was fantastic news," Steckler said. "We heard from the NGOs we'd worked with that his leg had healed and that he's up and walking with a walker, and rapidly improving. This kid would probably have lost his left and possibly his life without the evacuation we were able to help arrange using our emergency communications."

"Most people don't get the chance to save a life in their entire career, and in the short time we were in Haiti, we helped arrange MediVacs that saved four lives. There just isn't any better feeling than that."

"The MediVacs were definitely the most rewarding part of the mission for me," Meyer agreed.

The last two weeks of the first month's deployment the remaining HFN Team Haiti personnel worked at the Joint Task Force-Haiti level, focusing on communications-oriented liaison with Haitian, U.S. and international nongovernmental organizations (NGOs), hundreds of which rushed to the country's aid in the wake of the 7.0 earthquake.

"The story of NPS' communications response to the Haiti earthquake goes beyond the Navy and U.S. military, to our interface with the non-U.S. community and NGOs," Steckler said. "We were directly involved in several NGO and U.N. activities, where we, along with many others, made a real difference in both aid to the Haitians and in simply working together better at the civil-military boundary than ever before. The response to this disaster has been unprecedented in that regard."

The NGO background of HFN Team member and Cebrowski Institute Research Assistant Rosa Akbari was a key to bridging this civil-military gap. Akbari, who is taking classes in the National Security Affairs Department's Stabilization and Reconstruction track, operated the BGAN units at the Embassy compound and on board the Comfort and, with Research Assistant Foard Copeland, served as a bridge to communicate better with the United Nations and NGOs of all types, while still addressing the needs of military units supporting the relief efforts.

"My HA/DR experience in Haiti was invaluable," Akbari said, "because it was an opportunity to bring all of this knowledge and experience to life. By interfacing among UN agencies, NGOs and DoD officials, I was able to exist as a chameleon, weaving through an unfolding HA/DR social network. While I've always been comfortable in different social groups, I never thought DoD or the military in general would be one of those groups, and little did I know the value of that connection. I also came away with an immense appreciation for the NGO volunteers willing to work without fluid institutional support and resources like those provided by DoD. Because of research opportunities at NPS, young civilians like myself are now able to physically bridge this interagency civil-military gap."



"I was really impressed by what happened at the NGO tent at the U.N. compound, where volunteers for these local and international organizations just show up, announce their presence like they were on a conference call, and share what they know about where the greatest needs are and the resources they can provide to meet them," said Meyer. "These are incredibly selfless people that we worked with from all over the world, many of whom used vacation leave from their jobs to get there and help in any way they could."

Capt. Bobby Gruber, a Marine Corps communications officer and NPS student who had been in charge of equipment and training for an Operation Iraqi Freedom communications platoon, was the next to last HFN team member to arrive in Haiti. He worked on setting up emergency communications at three locations: the Haitian Community Hospital, a medical field facility, and a small island at the main Haiti port/pier area from which U.S. Coast Guard reservists conducted port security.

"The NPS HFN effort was a bridge between the military and the NGOs," said Gruber. "There's a big difference between the military's combat mentality of security and force protection and what's needed to be out interacting with the people and working with NGOs. To be that bridge, we had to shed both our combat mentality and uniforms, and wore civilian clothes. We worked with people and NGOs from all over the world and a lot of them were shocked when they found out we were from the military. It felt really good to break down those stereotypes."

Marine Corps Capt. Brian Sullivan, an NPS Electrical Engineering student doing his thesis on using software to optimize solar cell performance, was the last team member to arrive on the island.

"One of the things that made it really rewarding was a big project we did for the Coast Guard Reservists on the island doing port security, to set up Internet access using the BGANs," Sullivan said. "They were struggling and were very thankful that we got it up and running for their day-to-day operations and e-mail."

"A real morale booster was when the Coast Guard set up a big screen with benches outdoors on the island they lived and worked on and learned they'd be able to watch the Super Bowl live," Sullivan added. "Their comms officer was ecstatic that he could tell his guys they'd be able to see the game. In just two hours, we connected a laptop to Brian's daughter's Tivo back in California using 'Sling Box' technology to feed the game in live. They were so excited, we were absolute heroes. At half time, they called us all up to the front for a standing ovation for the whole NPS HFN Team Haiti."

One team member, Capt. Newell, was able to apply his thesis research to the Haiti mission even before leaving NPS.

"While we were still here [at NPS], I ran the renewable energy optimization software tool called HOMER I'm using for my thesis research for the area around Port-au-Prince," said Newell, whose thesis research is on evaluating the software as a Marine Corps pre-deployment planning tool. "It lets you know in advance how all your energy resources will mesh together, so you can prioritize the best power generation equipment to take on a mission – solar, wind turbines, fuel cells, and a mix of generator types and sizes." Newell was a member of the Marine Corp's Energy Assessment Team in Afghanistan, attended the Commandant's Energy Summit last August and will be reporting to the new Marine Corps Expeditionary Energy Office when he graduates from NPS.

"It's been really exciting," Newell said. "Just while I've been at NPS, there's been a major shift by the Commandant himself to create an office and position doing just what I've always wanted to do. It's been quite a ride."

"The big take away from Haiti is that the military and NGO communities are very different animals with very different strengths and weaknesses and the concept of hastily-formed networks, at the intersection between them, can bridge the gaps to optimize how they can best work together for humanitarian assistance and disaster response," Newell said. "I believe the HFN concept should be built into the military, similar to the United Nations UNDAC's on-call communications and prepositioning of equipment. If we pre-positioned dedicated HA/DR equipment, the concept of HFN could be built into the military to more rapidly and agilely respond to humanitarian needs."

"If the military is serious about moving toward greater support of HA/DR, we need to get serious about prepositioning at key locations around the world," Gruber agreed.

"The NPS Hastily-Formed Networks' experience and contributions are making a compelling case to Navy leadership that we need a new paradigm when committing Sailors and Marines to HA/DR missions," added Nystrom, the Cebrowski Research Associate who works at the Office of Naval Research and provided key logistical support for the team. "We're good at deploying for military operations, but that model falls short for HA/DR missions. Not only do policy changes need to be addressed, particularly with respect to network security, but the suite of technology needed to be effective in the HA/DR early response phase is something we need to take more fully into consideration as a Department of Navy program of record."

technology needed to be effective in the HFN early response phase to something as basic as water and more fully the consideration as a Department of Navy program of research. Communications, water generation, resources distribution, energy, medical and food must all be part of a complete response package, and we need to practice doing this with the international NGO community.”

In addition to the current Naval Postgraduate School faculty and students on the Haiti mission, a number of NPS alumni could be found in key positions around the country, including the Chief Communications Officer for the entire Joint Task Force-Haiti; the commander of Destroyer Squadron 40 embarked for the Haiti mission on board the Comfort; and the Joint Forces Maritime Component Command (JFMCC) Information Manager, and many others.

“These great NPS alumni coordinated our every move all along the way to get us to Haiti, supported us, and kept us quite busy when we were there,” Steckler said.

“The supply officer on board the Comfort happened to be a former classmate of mine, who provided whatever we needed in terms of logistics,” said Nystrom. “My background as a Navy Supply Corps officer helped us plug into the available logistics support and supply chain coming into Haiti.”

The NPS Hastily Formed Networks team is already looking forward to applying the lessons learned from Haiti and to collaborating with other military departments, U.S. government agencies, the United Nations, and international NGOs on future HA/DR missions.

Not surprisingly, Steckler is already on it. In mid March he met in Washington with a broad spectrum of U.S. government agencies which have learned of HFN’s research and expressed interest in future collaboration. “We’re trying to get a group workshop to bring them all together to talk about HFNs and the HA/DR mission set,” he said.

“HFN is operationally-oriented research, where researchers explore the civil-military boundaries,” said Deputy Director of the Cebrowski Institute and Information Sciences Research Associate Sue Higgins. “The Navy and DoD missions are changing to include more humanitarian assistance and disaster response involving civil-military interactions like Operation Unified Response in Haiti. The NPS HFN research effort helps explore the gaps in this interface and makes recommendations to Navy and DoD leadership about how best to fill them.

“NPS research can also deepen understanding of how social and technical networks can enhance HA/DR efforts. Additionally, we are learning that when research bridges operational areas, it can be messy and challenging. The rules and procedures aren’t yet written, offering many learning opportunities about the importance of quickly gaining clarity in requests, offers, roles and missions to enable effective coordination in fast-paced, overwhelming situations. We are grateful to the broad Navy/Joint team who were willing to work with our NPS HFN team during Operation Unified Response,” she added.

Although the Navy and Marine Corps effectively completed their missions in early March – the Comfort has discharged its last patient and the Seabees, Navy/Army divers and Army engineers have completed their round-the-clock repairs to finally reopen the port allowing relief supplies by ship – the real work in Haiti has only just begun.

“We have to let the world know that we can’t put this country, the poorest in the Western hemisphere, on the back page any longer,” Steckler stressed. “There are still around a million people without shelter, thousands of amputees who need wound care and prosthetics, and whole new health and related crises just around the corner as the monsoon rainy season has already started with rain swamping the tent cities and indigenous displaced persons camps followed by the hurricane season, making shelter paramount to avoid perhaps double the number of deaths they’ve already seen.”

“Pray for the people of Haiti,” said Newell, “and give generously to the charity or NGO relief organization of your choice that’s still responding to the crisis, because they’re going to be needed for a long time.”



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