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Options bring choice and affordability to broadband at sea
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Recent technological advances have put broadband-at-sea within reach of even the smallest vessels.

Crew e-mail and Internet access are creature comforts that give vessel operators a new weapon in the fight to recruit and retain qualified workers, and the technology also offers side benefits to businesses. As connection speeds increase and prices drop, the technology is nearing the point where it could pay for itself. But with more choice than ever before, shipowners and operators need to determine their needs to find the best means of connecting their fleets with the world.

Until a few years ago, vessels traveling more than five miles offshore had one option for Internet access — Inmarsat, the satellite telephony provider. Service was pay as you go, and expensive. The latest iterations of Inmarsat's FleetBroadband systems start around just \$5,000, and pay plans have changed to always-on, pay-per-byte billing, but data still costs around \$13.50 per megabyte.

Now Inmarsat finds itself competing with other technologies, like VSAT, or very small aperture terminal, which uses a stabilized pedestal antenna to communicate with satellites. Early VSAT antennas were bulky and expensive — as much as \$65,000. But in 2007, manufacturer KVH Industries launched a new generation nearly half the price and a quarter the size, and continues — along with competitors SeaTel and Intellian — to dramatically decrease the size, weight and cost of antennas.

Unlike Inmarsat, which owns its own satellite network, VSAT relies on satellites operated by others. While Inmarsat service is generally based on usage charges (the more you use, the more you pay), VSAT providers usually charge a flat monthly fee for nearly unlimited Internet access, which can range from \$1,000 to more than \$5,000 per month, and in many cases includes the hardware. "With a fixed cost, shipowners can budget for it," said David Quarders with Ship Equip, a maritime broadband provider. "You can be surfing the Internet all day long and it doesn't cost any more. The crew can use it any time they want."

Quarders said a typical unlimited monthly rate in the Americas might be \$3,400, with free hardware in exchange for a three-year airtime contract. "They just pay for the installation," he said. "On a 200-foot vessel, they might pay around \$15,000 to have it installed."

KVH's new mini-VSAT broadband service uses even smaller antennas, just 24-inches in diameter and 60 pounds, so installation costs are less. The company is using a different business model by offering soup-to-nuts service, said Chris Watson, director of marketing. KVH provides the hardware and the airtime all in one package.

"Installation can be just a few thousand dollars," Watson said. "Because of its size, this system can be put on a 60-foot motor yacht or a 1,000-foot containership. It doesn't matter. We have leasing programs from \$2,000 to \$7,000 a month."

Standard VSAT can provide up to 1.5 Mbps inbound to the boat and around 700 kbps outbound. KVH's mini-



Andy Raczkowski goes online aboard the American Seafoods vessel Northern Eagle. This photo, taken by the vessel's factory manager Terje Gjerde, was e-mailed via Northern Eagle's VSAT broadband connection.

VSAT offers up to 2 Mbps inbound, 512 kbps out. (Note that all speeds are claimed, and should be considered best-possible speeds.)

VSAT satellites cover most well traveled areas of the globe, but there are regions where service is unavailable — including the poles. Inmarsat has better coverage, but also does not cover the poles. Enter Iridium Satellite, which this summer is rolling out its OpenPort broadband system worldwide.

Iridium's constellation of 66 active satellites offers gap-free, pole-to-pole coverage over the entire planet using a different technology than VSAT.

VSAT uses a stabilized pedestal antenna to track satellites which orbit more than 20,000 miles above Earth. But Iridium's satellites fly in lower Earth orbits, requiring a smaller, fixed antenna. Satellites hand calls off to one other as they pass out of sight — much like cellular phone technology. The system was originally designed by Motorola to act like a mobile phone network in space.

The fixed OpenPort broadband antenna is about the size of the radar dome on a small boat, so initial hardware costs are relatively minimal. An OpenPort link provides three separate phone lines and a data channel configurable from 9.8 to 128 Kbps. But users are charged a per-megabyte fee, or a monthly fee with data limits, and the scalable Internet connection isn't as fast as VSAT or Inmarsat.

Iridium and Inmarsat are betting most vessels don't need the high-speed bandwidth. For simple e-mail and crew calling, some might consider the monthly cost of an unlimited VSAT link an unneeded expense.

"In the current economic climate, shipowners are looking for ways to trim operating costs for ships at sea," said Don Thoma, Iridium's executive vice president of marketing. "Iridium OpenPort offers a very cost-effective alternative to other broadband satellite systems in terms of hardware, installation and monthly usage costs."

One option is for vessel operators to pass the burden of cost along to end users — in this case the crew, who might purchase calling cards, an increasingly popular business model. According to the May 2008 Maritime VSAT report from London-based satellite consultants COMSYS, passenger cruise lines have turned at-sea Internet connections into revenue streams by charging passengers and crew for access. And later this year, KVH rolls out its Crew Calling product, which adds a third Voice Over IP line dedicated to crew phone access to the mini-VSAT. The system offers three methods of charging crew for phone usage, which can help vessel operators recoup costs.

Free or paid, at-sea access seems to be a growing necessity for vessel operators who want to retain crew.

"It makes a huge difference on pretty much any size vessel," said Ship Equip's Quarters. "Whether it's a tugboat, a yacht or a ship, it's difficult to maintain a quality crew if the owners don't give them the same things they have on the beach."

Bob Landsfield is chief executive of SkyMira, which tailors a wide range of at-sea communications solutions to individual customers. Landsfield said SkyMira sees an opportunity in the growing market to provide not only the hardware and airtime, but tools to manage access and data. He said the industry is full of horror stories, like the one about a captain scanning multipage customs documents and e-mailing them, unwittingly generating a huge bill. Unlimited access would solve that problem, he said, but not all vessels need it. "Let's say you're a research vessel that sends out terabytes of information," Landsfield said. "Then VSAT is a perfect fit for you." But Inmarsat's FleetBroadband is a more-than-adequate solution for many vessels, he said. "Even though (VSAT) is a flat fee, it's quite a bit more money. If a customer's data profile makes sense for it, then it's worth it. We ask them, what is the information they want to pass back and forth?"

There are other benefits to Internet-at-sea technology, said Intellian's John Minetola, like saving money. "Ships don't have to stay in port as long, because now they can e-mail in — it turns the ship into an office," he said. "They can e-mail in payroll and have it ready to go when they reach port, or e-mail in U.S. Coast Guard requirements."



MV Marianne Schulte, a 689-foot container vessel owned by the German-based shipowner and management firm Bernhard Schulte Group, was the first container vessel to trial FleetBroadband. Capt. Abraham Mohan said he uses the technology to keep in touch with the shore office in Shanghai. "We had no problem using FleetBroadband for key operational tasks," he said, adding that crew morale is "very good as a result."

Northern Eagle's VSAT antenna. VSAT service typically involves a flat monthly fee for unlimited Internet access.

Quarders tells a story about a ship whose owners installed VSAT under pressure from the crew to provide Internet access and crew calling. Within a month, the ship had a mechanical problem at sea — the engineer found the part he needed and ordered it online. It was waiting when the ship arrived in port. "All of a sudden, on the shore side the management is starting to rethink why they want this," he said, "and they put VSAT on the rest of the fleet."

As the technology improves, the market grows. Smaller antennas can fit on smaller vessels, and decreasing costs open up new possibilities, Minetola said — even pleasure boats.

"Used to be a 500-foot vessel was the lower end, but now it's as small as a 55- or 60-foot yacht where a guy might be cruising and want to stay in touch with the stock market," he said. "There are huge uses for it. Anything you can do from home and the office, you can do from sea."

Ships' business aside, that may ultimately be the systems' selling point, regardless of which technology is used to provide it. U.S. Coast Guard Petty Officer 1st Class Bobby Troupe didn't know what method his 418-foot cutter Bertholf used to access the Internet, but he knew that access had made a significant improvement in his happiness.

"I was out at sea when my grandmother passed away," he said. "I knew she was in bad health, but I didn't know she'd passed away until (my wife) sent me an e-mail. Who's to say what's going on back home? If someone had an accident or anything like that, I want to know, and you can't use your cell phone out at sea."

Stephanie Troupe said she sees the benefits every time her husband leaves home. "The first cutter he was on didn't have anything," she said. "I couldn't get in touch with him by cell phone, e-mail, anything. Life at sea is so much different than life at home — he might not get free time until two or three in the morning. You can't call home at that time, but you can send an e-mail. I feel better when I'm able to hear from him."

Barry Fitzpatrick is captain of the 341-foot Alaska-based Northern Hawk, which provides VSAT e-mail and phone access to its 130-member crew. Seniority has its privileges, he said — upper-level crew have access to several terminals with Web access and individual e-mail addresses, while lower-level crew share a terminal and an outgoing e-mail address. Incoming e-mails are sent to the bridge, where the mate prints them and distributes them.

"I remember back in the old days, we had a fax machine," Fitzpatrick said. "My wife and I were doing a real estate deal, and I ended up spending about \$4,000 in faxes." Now, he said, he's in constant contact with his wife, who sends digital photos of his children. He also uses e-mail to communicate with one of his children's classmates as part of a school project. "Immediate e-mail access makes a big difference to the crew," he said. "Everyone keeps in touch with home better."

According to the COMSYS report, to date VSAT has penetrated less than 10 percent of the market, with more than 5,000 vessels using the technology. Most of the people interviewed for this article agreed that the industry is in its infancy. If broadband-at-sea follows land-based trends, in a few years, access will be a given. The industry is poised to explode in the next few years as the technology and prices improve.

"We're all trying to find ways to trim costs and increase data speeds," said Quarders. "So all of a sudden you're paying less, and your communications have increased tenfold. Why wouldn't shipowners want that?" •