

# Beyond Wi-Fi:

## What's next in wireless communications?



*Satellite communication services are evolving rapidly. The KVH Tracphone domes on this cruiser provide near-global voice, fax and high-speed internet service.*

Consumers want to be able to access the same information and communications functions they do at home or the office no matter where they are. Many want to mix pleasure and business on their boats and are willing to invest in technology to make it possible.

Ideally, the “must-have” features of a wireless communication system on a well-equipped vessel include reliable high-speed internet with ease of installation and long-range communications, low power consumption, connectivity on demand and reliable performance. For all but a few boaters, price sensitivity is still an issue. Selecting the right system involves understanding all of the options available, then making a decision based on tradeoffs involving price and coverage, and matching the equipment size to the vessel.

Let's begin by looking at communication

BY LYNN TANDLER

options for where many boats spend most of their days—at the marina. Wi-

Fi, or wireless fidelity, is becoming more popular all the time. It is a technology that first emerged in 1999 but moved into the mainstream only in the last two years. Wi-Fi networks use radio technologies called IEEE 802.11b (or the newer, faster 802.11g) to transmit data from an internet connection point to the host computer. (The formal designations—IEEE 802.1b and 802.11g—were coined by engineering groups like the Institute for Electrical and Electronics Engineers that specify how the various tech-

### Preview

Wi-Fi, WiMAX, 802.11, hot spots, 2G, 3G, 802.16, LEO, GEO. What does it all mean? Where are we headed? Our goal is to make sense of these terms and others by discussing the trends in marine wireless technology. In the process we'll look at the wireless communication options at the dock, near shore and offshore.

nologies operate.) One of the earliest companies to promote and sell Wi-Fi technologies to the home consumer was Apple Computer using a Wi-Fi transmitter called Airport. Apple made connecting wirelessly to the internet from almost anywhere in your home simple and convenient.

Since then, businesses and consumers have widely adopted this technology, and it has grown tremendously. Wi-Fi is now available not only at home but in public areas via “hotspots.” There are many service providers offering high-speed internet service to marinas. Some providers offer to set up the hotspot at the marina and recoup the investment by revenue sharing with the marina. Some marina operators elect to install the system themselves and sell their own access. The marina operator's payment system requires the user to have direct contact with



*New VHF radios, like this ICOM M422, now must incorporate Digital Selective Calling, an emergency function.*



the marina office to either rent equipment or pay for service. Access is sold by the minute, hour or season.

Competition has made Wi-Fi access an expected amenity in harbors, and the trend is for continued growth in marinas. Industry sources report that the number of hotspots is growing rapidly and will soon total more than 200,000 worldwide, up from 43,850 in 2003. Boaters will see more value-added services combined with hotspots at marinas, and there will likely be more consolidation as well. For boaters this trend means that a subscription bought at one marina can be used at others also. As coastal cruisers increase their reliance on Wi-Fi, external high-gain antennas and booster kits will provide additional reach.

Another trend is increased Wi-Fi security. Not all of the wireless standards currently available provide protection against eavesdropping. This will grow in importance as hotspots become more readily available.

### Close-in conversations

Another option for communication at the dock is Family Radio Service (FRS)/General Mobile Radio Service (GMRS). FRS is a very low-power, short-range VHF citizens band service in the 460 MHz band. This method of communicating is intended for hand-held, short-range local communication. FRS/GMRS radios are more secure than VHF radios and can be used on land as well as on the water, but FRS radios have a range of less than one mile. Many FRS radios are also capable of operating as GMRS radios at power levels of up to 5 watts with detachable antennas, resulting in a range of up to 10 miles. This can be very useful for voice communication between the vessel and parties ashore in remote areas

without cellular coverage. Operation of GMRS radios requires an FCC license, easily obtained for \$80.

For communicating near shore, the two most popular options are cellular and VHF radio. Marine VHF radio is still a popular way of summoning help and communicating with other boaters. You can contact the US Coast Guard up to 50 miles offshore and talk to other boaters across 15-20 miles of open sea. A trend expected to continue with VHF radios is the addition of digital data transmitted alongside voice. The newest radios are required by law to provide an operation mode called Digital Selective Calling. DSC is part of the Global Maritime Distress and Safety System. DSC radios send and receive digitally encoded distress calls on Channel 70. By pressing a button on DSC-equipped VHF radios, a distress call is sent in digital form in less than a second. The call includes the boater's unique identification number, called MMSI for Maritime Mobile Service Identity.

In addition to DSC, VHF radios are now available with many more features. Options include larger display screens, GPS interface, barometer/temperature sensors, fish indicators, and the ability to view DSC text, to name a few. Manufacturers add more functions all the time.

Many advances have been made with cellular. Probably the most significant is the addition of repeater/amplifier systems. External antennas can increase cell phone range up to 50 miles, reduce dropped calls, increase signal strength and improve reception.

Also significant are advances in data capabilities of newer cellular devices, known as 3G technology (short for 3rd generation). 3G

*Wireless hotspots are popping up everywhere. More and more boaters expect marinas they visit to offer the service, along with fuel and ice.*

provides high-speed or broadband mobile internet access, reaching speeds of more than 2 mbps. As you might guess, 3G technology is replacing 2G. 3G wireless technology represents a shift from voice-centric services to multimedia-oriented like video, voice, data and fax services. The benefits include roaming capability, broader bandwidth and higher speed communication.

A new option is in the works for communications between near shore and offshore. Called WiMAX, it's a standards-based wireless technology that provides high-throughput broadband connections over longer distances than Wi-Fi. According to leading chip maker Intel, WiMAX can be used for a number of applications including fixed broadband connections for homes and office to replace fiber optic links in cellular and Wi-Fi hotspot networks. While WiMAX systems reportedly will be able to transmit signals as far as 30 miles, the average WiMAX base-station installation will likely cover 3-5 miles. The technology associated with WiMAX is formally known as IEEE 802.16.

### Offshore operation

For communications on the high seas, the choices narrow to either traditional marine single sideband (SSB) or satellite systems. SSB remains a popular means of communicating for bluewater boaters cruising the Pacific, Mediterranean or Caribbean. It has a range of up to several thousand miles and offers free calls between yachts and shore stations. All of the newer receivers come with built-in interfaces for models to enable email and some basic internet services at low cost. The limitations with SSB are the complexity of installation, the limited service options, the hefty power draw during transmission (as much as 30 amps), and the difficulty of using the equipment long range.

The biggest advances in offshore communications involve satellite technology. In the past several years, the choices of global satellite systems for vessels under 100 feet long have

increased significantly. More satellite options, the lower cost of satellite systems, and new data rates have changed the way many boaters maintain contact with customers, associates, family and friends.

Recreational boaters have a wider range of applications, including systems using low earth orbit satellites (LEO) and geosynchronous (GEO) satellites. Deciding which system is right for a particular application depends on considerations such as the need for a real time vs. store-and-forward system packet data service; voice or data or a combination of both; fax; email, internet web access; video conferencing; broadcast quality audio; networking LAN/WAN capable; handheld or laptop. Of course, cost is also a factor. Boaters must decide how much they are willing to pay for their wish list of services and applications.

For handheld satellite phones, more flexible pricing plans and better data compression services have reduced the cost and improved the reliability of email and data services. PC connections are getting easier and more reliable with more plug and play systems. At the Miami Boat Show in February, new GEO



*Advances in satellite communications technology, coupled with lower operational costs, are changing the way owners and professional crews keep in touch with family, friends and shoreside services. This electronics suite is aboard the 80 foot sailboat Too Elusive.*

satellite systems were introduced boasting much smaller antennas, higher data speeds, and "always on" connectivity. More service providers are moving to pricing based on the amount of data transmitted (as opposed to time spent online) to improve the value delivered per dollar of service cost. For LEO data systems, there has been a convergence of GPS tracking systems with electronic navigation software to offer end-to-end fleet tracking applications in addition to email, weather downloads and monitoring. It is now possible for one system to provide tracking, monitoring and messaging services for an entire fleet of vessels at low cost.

"This is an exciting time to be involved in marine communications," said John Tandler, CEO of SkyMate Inc. "Demand for wireless services continues to grow, while hardware vendors and service providers are finding new ways to deliver more reliable, cost-effective service to this important market." **ME**

### **About the author**

Lynn Tandler is chief operating officer at SkyMate Inc., which provides low-cost, global satellite communication services to recreational and commercial boaters. She is in charge of marketing the company's products to the marine industry.