ADCOMM System Improves River Safety and Security
—Dave Magnenat, PMP

Nearly $9 billion dollars of goods and commerce move up and down the Columbia and Snake Rivers every year and keeping all of those barges, tugs, towboats, tankers, and other vessels safe is the major focus of RiverGuard. ADCOMM and partner iXP recently completed the design and business plan for RiverGuard, and the project is set to move into the implementation phase.

The RiverGuard project will build Automatic Identification System (AIS) receiver sites along the Columbia and Snake Rivers and carry the collected vessel position information back to central control rooms in the Portland area. AIS provides ship tracking information in a way similar to an airplane's transponder, sending out radio signals with position, speed, heading, and other information on a regular basis. The AIS transponders receive the information as well as send, so a vessel on the river can identify what other vessels are in the area. This aids navigation, timing of lock openings, and other vital river activities.

You can see AIS in action on various web sites. One popular site is www.marinetraffic.com. Because sites like these are run by hobbyists, though, the reliability of consistent coverage is not high. Traffic reports are usually delayed by as much as an hour, too.

Many vessels operating on the Columbia and Snake Rivers carry AIS transceivers; federal law requires them on vessels over a certain size. Because they operate on radio waves, however, the range of the signal is limited and can be blocked by terrain. Also, there is no central location where all of the ships on the river system can be tracked in real time and historical information saved.

That's where RiverGuard comes in. By placing receivers on shore and transporting the vessel information to a central data system, the Coast Guard, Merchants Exchange, shipping companies, ports, County emergency managers, law enforcement, and other authorized users can see what is happening on the river system in real time. This information can speed emergency response, help in planning and monitoring emerging incidents, increase company efficiency, and provide a level of maritime security the river system does not have today.

ADCOMM has completed the initial system design for RiverGuard, working with the Columbia River Towboat Association and Merchants Exchange of Portland using Port Security Grant funds from FEMA. Working closely with a coalition of interested parties including the Coast Guard, the U.S. Army Corps of Engineers, major river shipping companies, the Pacific Northwest Waterways Association, Clean River Coalition, Pilot's Associations, and others, ADCOMM crafted a plan to install 19 AIS stations over the entire river system length from Portland to Lewiston, Idaho. The AIS stations will be connected via digital connectivity and the data collected and processed by a data processing center and made available to participants in RiverGuard.

From an initial potential site list of nearly 50 locations, ADCOMM's first task was to identify which sites best filled RiverGuard's need. We narrowed the list based on radio propagation first, then hit the road by tire and hiking boot to check out the remaining possible sites. Since many of the sites were known to us by virtue of having worked in the area before, for some of us the site verification was a matter of visiting with people we knew. For other sites, though, we drove as far as the road went, then hiked farther in to meet the land owner. In a couple of instances we were advised the best way to reach the site was by boat, then horseback. While that sounded like fun, we recognized that such limited access would make building and supplying the site in the future very costly, so we had to pass on those locations.

Designing the sites took ADCOMM in new directions as well. We designed a low impact, solar powered site for two locations, for example. Built on a slightly elevated platform that does not require the deep holes and concrete pours needed by traditional sites, these low impact sites generate their own power through solar panels, have built-in mounts for antenna support structures, and require minimal anchoring. They are a bit more expensive to build but will address the environmental and land use concerns that some of the radio sites have.

Along with the technical design, ADCOMM and partner iXP produced business and operations plans for the organization that would operate RiverGuard. Under the plan, RiverGuard is envisioned to become a non-profit organization sustained by subscription. The need for a regular source of income for the system is clear; there's a lot of ground to cover and the equipment is working in some harsh conditions, so regular maintenance is an absolute requirement. By creating a non-profit group, RiverGuard can serve the greater good of everyone who uses the river. Exact details of membership are not settled yet; however, we anticipate there will be subscription plans at various price levels so that a broad range of organizations can participate. (Final decisions will be up to RiverGuard, of course.)

The next step for RiverGuard is to secure implementation funding from existing grant funds, a process that is in full swing. After funding is in place implementation is likely to be quick, with AIS stations being installed and operating along the river system in 12 months and system completion by the first part of 2014.

Thinking About ...

For ADCOMM, the RiverGuard project was a great opportunity to expand into new areas, come up with some cool ideas, and help increase the safety and security of the Columbia and Snake Rivers, two very important elements of our regional economy and way of life.

Marine Vessel Tracking with AIS

—Mike Norin

Have you ever wondered where all those ships, tugboats, ferries, and other large vessels in Puget Sound, or virtually any other major waterway in the world, are coming from? Or perhaps more importantly, where they're headed, and what's their current course and speed? To a casual observer, this might be just a curiosity. To the Coast Guard, shipboard captains, shipping and towboat companies, emergency responders, and even environmental agencies and insurance companies, having an accurate live picture and historical record of local, regional, and even global marine traffic is much more than a curiosity. It is a matter of significant economic impact, environmental protection, and public safety. Today, *Automatic Identification System* (AIS) is the primary technology that enables users and observers of all types to know such vessel movement details.

The heart of the AIS system is the transponders that are installed aboard marine vessels. In conjunction with an external or built-in GPS receiver, an AIS transponder transmits the vessel's current location, course, and speed, along with a unique vessel identifier, at regular intervals on one of two dedicated VHF radio channels (Marine Channels 87B and 88B). Nearby vessels also equipped with an AIS transponder are able to directly receive, decode, and display transmissions from other AIS-equipped vessels within VHF (simplex) range. The display is generally a 2-D map of the area around the ship and can show the position, course, and speed of all other AIS-equipped vessels within range. No shore-based infrastructure is needed for a ship to see the traffic around itself. However, a ship is limited to seeing *only* the traffic in its immediate vicinity. Although AIS is not used for navigation, it can be a valuable tool in collision avoidance.

There are two classes of AIS transponder: *Class A* and *Class B*. Generally, Class A transponders are more sophisticated and have greater capability than Class B devices. Class A units have an integrated display, transmit power of 12 watts, and typically have a transmit rate of every few seconds, along with the ability to interface with various other ship systems. Class B units have a transmit power of 2 watts, a typical transmit rate of every 30 seconds, and are required to have an integrated GPS receiver. They are not, however, required to have an integrated display. Class B units are instead typically connected to an external display system. In general, all ships with a gross tonnage of 300 or more tons and all passenger ships, regardless of size, are required to be fitted with AIS. It should be noted that AIS is not a replacement for radar. Rather, AIS is generally a more affordable technology that supplements radar for collision avoidance but, unlike radar, is dependent on GPS.

The addition of shore-based AIS receivers has greatly enhanced the ability to provide wide-area AIS coverage and marine traffic visibility. Since the AIS transmission format specification is publicly available, anyone with the desire can install a fixed receiver and be able to monitor AIS traffic. Indeed, many people have done so and even provide their collected data to public aggregators, such as the web site MarineTraffic.com. There is extensive, worldwide public data available for free at this site. In addition to course and speed, detailed vessel information is often available, such as historical tracks, vessel specifications and photographs, and recent port information. It should be kept in mind, however, that along with the AIS data itself, most of these additional details and photographs are "crowd-sourced"—that is, they are typically provided by public Internet users. As such, while the data is often accurate, there is no guarantee of its accuracy, timeliness, or availability. Android and iPhone apps are also available to access MarineTraffic.com.

Since some entities, such as the Coast Guard, private enterprises, and public safety agencies, have a greater reliance on AIS data, non-public AIS receiver networks have also been built. Such systems can provide a higher level of availability, guarantee near real-time data, and provide extensive historical data. Having access to reliable real-time data can significantly improve operational efficiencies for towboat and shipping companies since they can know where all their marine assets are at any given time. The Coast Guard and other public safety agencies can respond to vessel emergencies, environmental disasters (such as oil spills), and other incidents more efficiently when they have a clear picture of where their assets are located, in addition to having accurate location information for any AIS-equipped vessels involved. Having an accurate historical record of AIS data is also critical in re-

Class A AIS Transponder (photo courtesy of Clipper, wikipedia.org)
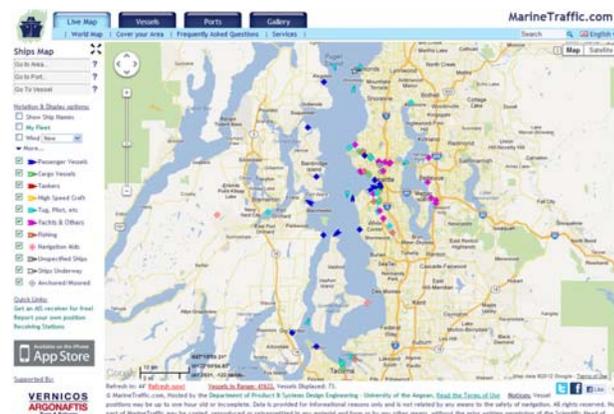
MarineTraffic.com Screenshot (courtesy of MarineTraffic.com)

constructing accidents and disasters. As such, even insurance companies have a vested interest in being able to access reliable historical AIS data.

Next time you see a ship or ferry navigating the waters of Puget Sound, the Columbia River, or even the Greek Isles, pull out your smartphone and check out all the information available about the vessel and its itinerary, right at your fingertips. If you work for a public safety or government agency, consider how this information may be of value to your agency, particularly if the agency is responsible for an area that includes or is impacted by marine incidents or related environmental disasters.

Narrowbanding Update

—Joe P. Blaschka, Jr., P.E.

Not getting your narrowbanding completed fast enough? Thinking about asking for a waiver of the compliance date? A waiver might be possible. The FCC, however, has been very clear that they will not be granting waivers "just because." They have a very clear mandate to enforce their regulations and cannot by law issue waivers that would essentially vacate their rules. The FCC has said specifically;

" Consequently, requests for waivers of the deadline will be subject to a high level of scrutiny under the waiver standard set forth in Section 1.925 of the Commission's rules, which requires the waiver petitioner to demonstrate either that "(i) the underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and that a grant of the waiver would be in the public interest; or (ii) in view of unique or unusual factual circumstances of the instant case, application of the rule(s) would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative."

The FCC's specific guidance in applying for a waiver request should include the following:

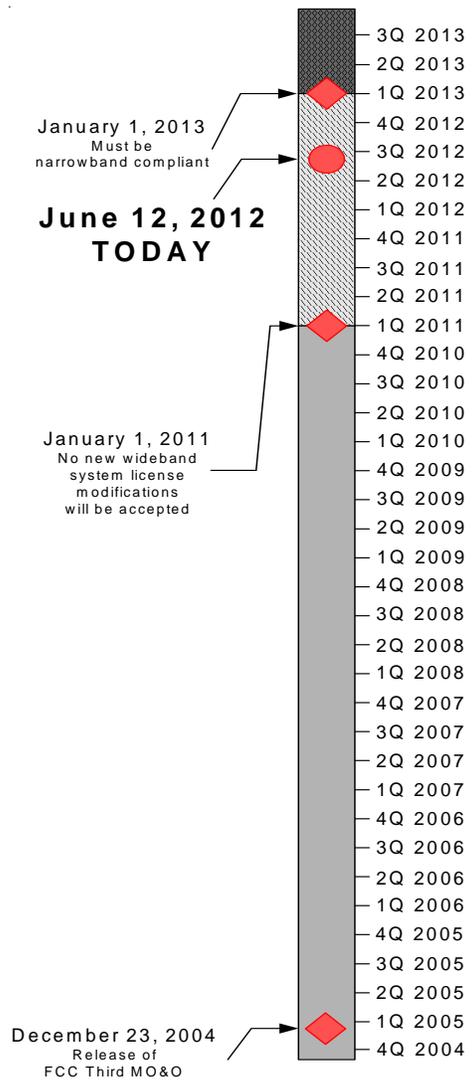*Steps already taken to plan for, initiate, and complete the transition to narrowband operations*

- *System size and complexity*
- *Whether system equipment is narrowband-capable or must be replaced or upgraded*
- *Whether the licensee plans additional system upgrades or improvements in addition to converting to narrowband operation*

- *Funding sources, including whether the licensee's budget requires government approval or a multi-year budget process*
- *Whether the licensee's narrowbanding schedule is affected by neighboring systems due to interoperability relationships or other interdependencies*
- *Plans to minimize the negative impact of extended wideband operations on co-channel and adjacent channel operations, including a description of the spectrum environment in the affected area*
- *If the licensee plans to migrate to a non-VHF/UHF band (e.g., 700 MHz or 800 MHz), whether it will relinquish VHF/UHF spectrum once it has migrated and the amount of spectrum to be relinquished. Licensees should also provide a proposed timetable for completion of narrowbanding that includes the following elements:*
  - *What steps in the process have been or will be taken prior to January 1, 2013*
  - *Anticipated dates of commencement and completion of:*
    - *Replacement or retuning of mobiles/portables*
    - *Infrastructure replacement or retuning*

When addressing the above factors, we recommend that licensees explain how (i) they have worked diligently and in good faith to narrowband their systems expeditiously; (ii) their specific circumstances warrant a temporary extension of the deadline; and (iii) the amount of time for which a waiver is requested is no more than is reasonably necessary to complete the narrowbanding process. Such showings can support various elements of the Section 1.925 waiver standard.

The key here is that these rules have been in place for a decade. Asking for a 2-3 year waiver so one can start the process of planning and implementing a new trunked radio system to replace an old conventional system probably will not be accepted. If on the other hand a 6-month extension to complete a project already started and contracted for might be accepted.

What will the FCC do if a licensee hasn't completed narrowbanding and does not have a waiver? No one knows for sure. However, just as some public safety users have found out when their license expired and someone else was licensed on their channel they lost the use of their radio channel. Also, one large state system lost tens of millions of dollars when the FCC refused to grant it the VHF frequencies it needed for the system that had already been partially installed.

January 1, 2013
Must be
narrowband compliant

**June 12, 2012
TODAY**

January 1, 2011
No new wideband
system license
modifications
will be accepted

December 23, 2004
Release of
FCC Third MO&O

3Q 2013
2Q 2013
1Q 2013
4Q 2012
3Q 2012
2Q 2012
1Q 2012
4Q 2011
3Q 2011
2Q 2011
1Q 2011
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3Q 2010
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1Q 2005
4Q 2004

THE LAST BYTE

Where have all the technicians gone? Gone to retirement homes, most everyone. (Apologies to Pete Seeger and the few younger technicians out there!) Seems as with many skilled trades, there are not many younger people in the pipeline to fill the jobs opening up due to retirement. Look around, if you know someone who seems to have the "knack" for electronics or even mechanical skills, encourage them to look at radio electronics, instead of computers, as a career option. If their parents are APCO members, the Dick Quantz scholarship fund can help with their education. The situation will only get worse if we do not encourage younger people to follow in our footsteps.

Who's The New Guy at ADCOMM?

What do disaster recovery on September 11th and Hurricane Katrina, testifying before state utility commissions, and implementing transfer trip system protection on 230kV transmission lines have in common with constructing Network Operations Centers and meeting FCC mandates for E9-1-1, Local Number Portability and Wireless Number Portability? Answer: Not much unless you are Scott Peabody, the latest engineer to be added to the ADCOMM team. Each of these projects is among the growing list of interesting jobs during his engineering tenure.

Scott earned his license as a Professional Engineer and his University of Washington MBA while working for 10 years at Puget Power. After working in the field on meters, transformers and relays, he was offered the opportunity to manage the telecommunications group with operations responsibilities for fiber optic networks, telephone and data switches, radio systems and SCADA. Deregulation of the power industry resulted in a move to engineering and operations roles in the cellular industry at AT&T Wireless, Nextel and Sprint.

His favorite pastime is definitely fishing, which began as an excuse to use his Grady-White boat more often. He's a member of the Puget Sound Anglers and the Coastal Conservation Association. Scott is a regular speaker at the Seattle Boat Show and frequently writes for The Reel News, *the largest Pacific Northwest fishing publication.*

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