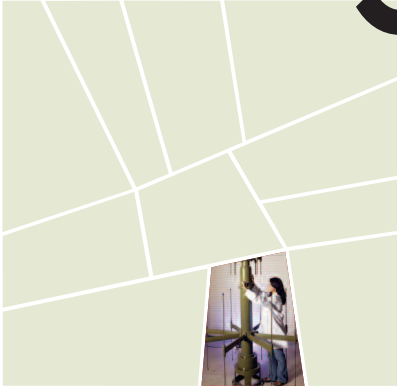


# Signal Exploitation and Geolocation



- DF & radiolocation systems •
- automated & remote-controlled DF networks • wideband intercept • automatic signal recognition • electromagnetic modeling & propagation analysis • system production • satellite-based tracking systems • technical spectrum surveillance • special-purpose tagging & tracking devices • life-cycle support • repair & refurbishment • field engineering support • communications intelligence systems • signal analysis



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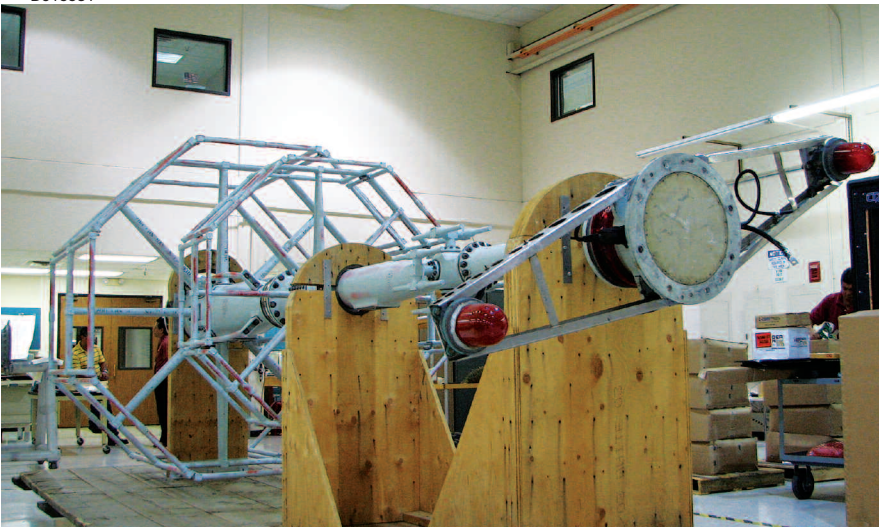
**C**ommunications intelligence, direction finding, signal intercept and other electronic warfare systems are becoming increasingly complex in today's crowded communications spectrum. Southwest Research Institute is assisting U.S. and friendly foreign governments by developing these systems, as well as others for surveillance, tagging and tracking. Recent work in data exfiltration has included commercial clients as well. Our scientists and engineers work directly with clients to provide **optimized hardware and software solutions** for specific operational problems. SwRI systems range from one-of-a-kind, commercial-level designs to large-scale, fully documented, deployment-ready production units.

*We developed high-frequency wideband systems that use our Frontier architecture to provide automatic signal processing at extremely high new-energy alarm rates.*

Our communications intelligence and **geolocation systems** for land, sea and air use a variety of custom-designed software based on our Frontier design architecture. The **Frontier series of communication intelligence systems** offers signal handling capacities an order of magnitude greater than those available from other suppliers. By harnessing the processing power of hundreds of computers, our COMINT systems sift through the radio spectrum looking for radio signal energies, isolating and analyzing the signals, and determining their geographic location, signal type and transmission content.

*As part of our sustainment and life-cycle support services, we are overhauling and upgrading antennas that have served in the Canadian Navy for up to 20 years.*

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The Frontier architecture supports a U.S. Navy shipboard system that provides critical intelligence information to **forward-deployed naval assets**. Based on initial success, additional systems will be installed on Navy ships in the future.

Our Signal Intercept from Low Orbit equipment suite uses **low-Earth-orbit satellite tracking and global positioning system technology** to determine latitude, longitude and altitude from any host platform. Using a two-way communications link, SILO® beacons communicate line-of-sight with command and control equipment used for world-wide tracking and mobile operations.

Our **sustainment and life-cycle support services** ensure continued operation of SwRI systems years after delivery. For example, we are overhauling direction finding antenna systems that have been in use for 20 years by the Canadian Navy. Staff members are replacing cables and connectors, stripping paint and coatings, applying new paint and stenciling, upgrading electronic assemblies and testing the overall components. Additional systems are expected for overhaul. All of this work is performed under **ISO 9001:2000 standards**, and we are implementing additional processes to Level 3 of the Software Engineering Institute's CMMI-SE/SW.

With internal funding, we are developing expertise in the design and implementation of **application-specific integrated circuits**, which will allow us to assess and design customized, reprogrammable and non-reprogrammable integrated circuits to execute novel processes. These ASICs can significantly improve the performance, environmental tolerance, size, weight, power consumption and cost of embedded electronic systems.

SwRI provides a wide range of analysis, simulation and evaluation capabilities in the areas of electromagnetics, DF system performance, RF signal propagation, communications links and radar cross section to

*SwRI developed a tactical shipboard capability for the U.S. Navy to supply critical mission intelligence information. The capability uses SwRI's Frontier series of communication intelligence systems.*



SwRI is developing radio direction finding antennas in the VHF/UHF frequency range for both shipboard and land-mobile applications. Current research is focused on expanding the frequency range to include SHF. Staff members are designing the antennas for ease of assembly and disassembly for vehicular transport.

**optimize systems** before they are even built.

SwRI is also developing technology to address **data fusion**, in which different sources of information — radio frequency signals, imagery and other sources — are combined to create a rich data bank from which intelligence can be determined.

To build on client services, we are increasing laboratory and office space by more than 50,000 square feet. New technical efforts

will be directed at **expanding capabilities** in communications, communications intelligence, signals intelligence networks, data exfiltration and tracking, as well as extending the frequency ranges of our equipment. ❖

Visit [sigint.swri.org](http://sigint.swri.org) for more information or contact Vice President Dr. William G. Guion at (210) 522-2902 or [william.guion@swri.org](mailto:william.guion@swri.org).

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