DataSoft Corporation
Product R&D and Engineering Design Services
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Capabilities in
Embedded & Communications Systems
Design, Development & Integration
DataSoft Expertise

- **Wireless Hardware**
  - Software Defined Radio Development HW (30 MHz – 4 GHz)
  - Custom RF Design, PCB, Digital Design, Mechanical, Rapid Prototyping
  - WiFi & Bluetooth accessories for tactical radios; SOM for IoT Gateways & sensors

- **Real-time Embedded Software**
  - BSP, Boot Loaders, File Systems; Kernel development, Device Drivers
  - Peripherals: UART, WiFi, BT, USB; ARM, DSP, Vybrid, microprocessors

- **IP Networking Software:**
  - IPv4/IPv6 networking; Layer-2 bridging, routing; QoS, Bandwidth mgt; policy; traffic prioritization; congestion avoidance; MANET management software

- **Application Software:**
  - C, C++, Java, GUI, Netbeans, Eclipse, GWT, Linux, Android

- **Waveform Porting Tools:**
  - Probes, API Verification, Nimbus SDK

- **Test & Verification:**
  - ATE design, environmental test, test fixtures
Differentiators

- Intellectual Property: SDRs, IoT module, IP-networking software libraries, low power embedded computing device
- Exporter of radio products and software to France, UK, Poland, Brazil, and India
- Rapid prototyping capability in RF and mechanical systems
- CSfC solution (under NSA evaluation) for Secret & below wireless communications. 14 Phase II SBIRs that have led to exports, COTS products, and licensing agreements.
- Track record of winning & performing on government and IRAD projects for primes
- Silver-level Samsung Partner for developing secure Apps on Knox 2.4
Products and Projects

Microburst SDR

Thunder Development & Test Platform

Test Automation

Network Status Visualizer App

Software Probe Toolbox for SDRs

Embedded PC board stack

MUOS & ATIP (NMT)

Network Security
Business Model

<table>
<thead>
<tr>
<th>DataSoft Capability</th>
<th>Business Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW &amp; SW Products</td>
<td>Direct Sales, OEM, Licensing, Overseas VAR</td>
</tr>
<tr>
<td>Custom Design Services</td>
<td>T&amp;M, FFP, royalty</td>
</tr>
<tr>
<td>Govt. design &amp; development RFPs</td>
<td>Cost-plus; T&amp;M, FFP</td>
</tr>
</tbody>
</table>

Export/ITAR Experience:

- Registered with Dept. of State as a Manufacturer & Exporter
- Exported ITAR-controlled HW & SW to France, UK, Brazil, Poland, India, Canada
- Partners in UK, India, Poland
- Interests from Argentina, South Africa, Australia, Singapore, Israel
- Investing in export compliance training, monitoring ITAR reform for Category XI items
Tactical Radio Connectivity

- Bluetooth v2.1+EDR, BLE v4.0
- uC and uP with memory
- Protocol conversion software
- Secure IP encryption
Connectivity for multiple tactical radios

<table>
<thead>
<tr>
<th>Radio model</th>
<th>SideBridge (v1)</th>
<th>SideBridge (v2)</th>
<th>SideBridge (v2)</th>
<th>SideBridge LCD</th>
<th>SideLink</th>
<th>SideMate</th>
<th>SideBridge RAP</th>
<th>SideBridge DAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio brand</td>
<td>AN/PRC-154/A</td>
<td>PRC-154(A)</td>
<td>PRC-152(A)</td>
<td>PRC-154(A)</td>
<td>MBITR2</td>
<td>MBITR2 w/SIAM</td>
<td>AN/PRC-117G</td>
<td>N/A</td>
</tr>
<tr>
<td>SideBridge platform</td>
<td>OMAP</td>
<td>Vybrd</td>
<td>Vybrd</td>
<td>Vybrd</td>
<td>OMAP</td>
<td>OMAP</td>
<td>Vybrd</td>
<td>??</td>
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<tr>
<td>Bluetooth</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>WiFi capable</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>GPS</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>External USB</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes (x2)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>External Serial</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>External Power</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Type 1 encryption</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Other</td>
<td>MMP in development</td>
<td>Uses Adapter Plate</td>
<td>Wide/Narrow Band I/O</td>
<td>MBITR2/SIAM I/O</td>
<td>Connect serial devices</td>
<td>Prototype</td>
<td>Planned Development</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td>Complete</td>
<td>Complete</td>
<td>Complete</td>
<td>Prototype</td>
<td>Complete</td>
<td>Complete</td>
<td>Prototype</td>
<td>Planned Development</td>
</tr>
</tbody>
</table>

- All dongles have CPU and memory to host applications
- Bluetooth and WiFi can be turned off
- All dongles run Linux OS
- WiFi, Bluetooth, GPS
Android Apps

- BlueLink, SRW Contacts, PLI Cam
- Android kernel, VPN, multicast
- Various devices – Nexus, Atrix, Galaxy, Note, Zoom, Tab, etc.
Industrial Design / Rapid Prototyping

- SideBridge designs for multiple radio models
- Custom 3D Printing with ABS
- Quick-turn metal shops
- Solidworks
SDR Development Systems

Thunder-H
Range: 400 – 4000 MHz
RF BW: 40 KHz – 40 MHz
Use: Development of waveforms

Thunder-L
Range: 30 – 1600 MHz
RF BW: 40 KHz – 40 MHz
Use: Development of waveforms

Microburst
Range: 30 – 3800 MHz
RF BW: 1.5 MHz – 28 MHz
Use: Development of waveforms to deploy on Microburst SDR

DataSoft SDR platforms are fully programmable development platforms with TI GPP/DSP/Xilinx FPGAs, complete software environments with example applications for advanced waveform and IP development covering all communications bands

Features
- Affordable, wide-band, high performance baseband and RF development and test platforms with low phase noise, excellent spurious performance, fast hopping transceivers with multiple external interfaces
- All feature a 3-board system: Baseband, RF Transceiver, and FEM with Xilinx Spartan-6 FPGAs and TI DM3730 OMAP GPP/DSP
- GiGE interface for high speed connectivity from MATLAB/GNU Radio/Host directly to the WF FPGA.
- Nimbus SDK for waveform development/porting
- Probe Toolbox -- real-time multi-processor debugging tool that includes Data probe, Resource probe, Latency probe, Traffic probe, SCA Adapter probe
- Models:
  - Thunder-Low: 30 MHz – 1600 MHz
  - Thunder-High: 400 MHz – 4000 MHz
  - Microburst: 30 MHz – 3800 MHz

Applications
- SDR Development Platform
- Waveform & Algorithm Development
- Test automation
- Cognitive Radio, TV White Spaces, LTE
- Academic R&D & Rapid Prototyping
Probes for Waveform Development, Debug or Porting

Real-time debugging tool with ability to prove and excite waveform elements for waveform porting, integration or validation

Features

• Data Probe
  • Inject or capture GPP/DSP stream data
  • Synchronize and trigger multiple probe points
  • Capture block data
  • Interface to MATLAB/Simulink
• Resource Probe
  • Memory and CPU utilization graphs
  • CPU resource detail
  • Memory peeks and pokes
• Latency Probe
  • Capture and display timestamp information with a synchronized time base across the GPP/SDP
• Traffic Probe
  • Capture and display network traffic
• SCA Adapter Probe
  • Integrated with PrismTech’s Spectra Core Framework to show traffic, latency, and data in an SCA environment
• Applications
  • Validate waveform and platform data by applying probes at varying points in the GPP and DSP
  • Gather data in heterogeneous multiprocessor environment

Using the Probe Toolbox, the waveform developer can study critical waveform and platform traffic on multiple processors and the interaction between the processors

*Probe Toolbox software is part of the Nimbus Software Development Kit provided with all DataSoft SDR platforms*
Testing facilities

- Complete electronic labs
- Network analyzer, signal analyzer/generator, oscilloscopes, temperature chamber, etc.
- LabView, customized test software, ATE
### MMP: MANET Management Protocol

**SBIR Phase II A12-047**  
Resources Management in Peer-to-Peer Mobile Ad Hoc Network Communications Environments

#### Goals
- **Efficient** use of wireless medium; enable better **scalability** in MANETs  
- **Disruption-tolerance**: don’t assume network is low-delay or high-reliability  
- **Adapt dynamically** to current local network conditions

#### Methods
- **Software Agents**: a decentralized approach that distributes tasks and intelligence across the entire network  
- **Clustering**: a self-forming and self-healing overlay network of MMP agents that facilitates efficient network-wide broadcast/gathering functions  
- **Adaptive Forwarding**: a store-and-forward mechanism combined with QoS-like throttling of monitoring traffic

#### 3 Protocols
- **Clustering Protocol**: forms the overlay network of agents in any IP-based network, e.g., SRW, WNW  
- **Inter-Agent Protocol**: Disruption tolerant forward of network mgt data  
- **Configuration Protocol**: Allow network manager to control agents, could be replaced by OTAM

#### So What?
- Complements OTAM, which is slated to be the “killer app” for SDRs  
- Can run inside radio, or, on dongles  
- Can be in-band, or, use WiFi or Bluetooth too  
- Applications not limited to network management.  
- Other network functions can also be more efficient.  
- Saving bandwidth translates directly into saving power.

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**SNMP Traps to Monitoring Station**  
**MMP Agents will run on external devices** directly interfaced with the radios.
Automated Test Expertise

- **Simulation based Testing**
  - OPNET-based test bed
  - Data Collection & Analysis tools
  - HW-in-the-Loop (HWIL) testing
  - SW-in-the-Loop (SWIL) testing

- **ATE Design & Development**
  - STE design & fabrication
  - PC-based control via GPIB bus
  - Virtual RF Environment
  - LabView and Teststand
  - Data logging & analysis
Waveform Porting/Analysis

- Waveform Development Environment
  - SCA-compliant SDR; Drivers, BSP, Loading tools
- SRW, WNW, MUOS experience
  - Porting and test support of MUOS WF to JTRS HMS platform
  - Updated and maintained CAI waveform requirements and design artifacts
  - Waveform Performance Characterization and Analysis
  - RSS API Extensions to support MUOS on JTRS HMS and AMF JTRS
- Waveform Probe Toolbox
  - Data Probe; Resource Probe; Latency Probe; Traffic Probe; SCA Adapter Probe
- Portability/Complexity Analysis Tool
- SCA API Compliance verification tool, approved & used by JTEL/JTNC
- System Engineering to support HAIPE 3.x and IPv6 for MUOS and WNW
ATIP supports Navy NMT

Advanced TDMA Interface Processor (ATIP)
- IP Layer-2 Ethernet bridging device
- Element of Navy Multiband Terminal (NMT)
- Supports ADNS and BMDS Networks
- Features:
  - Rack mounted COTS servers based on RT-Linux
  - Open, modular, scalable architecture
  - IPv4/IPv6 networking & QoS enhancements
  - Information Assurance & Security
  - Prioritization and Dynamic Bandwidth Allocation
  - Framing for multiple data streams
  - Adaptive Coding enhancements
  - Web based control & configuration system
  - CMMI 3 development process

Other experience
- Linux, VxWorks, GHS Integrity
- BSP, PSP, Boot loader, Radio control library
- Device Drivers – Ethernet, audio, USB, UART
- Radio Devices, Radio Control, RF Control,
- DSP modules device drivers and sample apps
NOVA Cyber Security System

- Honeypot-based anti-reconnaissance software for IP based networks
- Gives network admin time to pinpoint, isolate, and remove threats
- Combines lightweight virtualization, attacker classification, automated alerts for asset protection
- Pre-configured appliance with web-based interface
- Complements Intrusion Detection & Anti-Virus systems