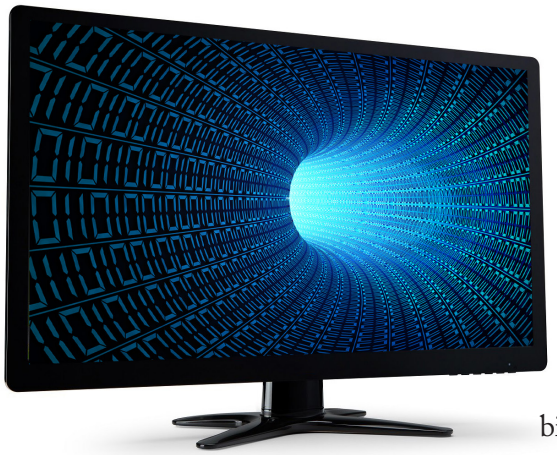
QUICK BYTES

AgileDelta's Efficient Extensible Interchange (EXI) format changes the landscape of data transfer



If there is one overriding characteristic of the age of information, it's the movement of data. Given the ubiquity of personal computers, smartphones, and the internet of things, the amount of data being generated and the speed at which it travels is increasing at a breakneck pace.

How data is generated and moves has even impacted the nature of military roles, missions, and methods. In particular, the U.S. Department of Defense (DoD) has shifted toward an approach called network-centric operations for better communication and situational awareness. Network-centric operations improve the efficiency and effectiveness of combat units by sharing common data between command centers, aircraft, ships, and mobile land forces over a global network.

AgileDelta, Inc., a Bellevue, Washington-based software company, has come to be key player in the implementation of the DoD's new approach. Networking technologies in the field can be hindered by the limited bandwidth, processing power, and the battery life of mobile devices. AgileDelta's Efficient Extensible Interchange (EXI) products allow network-centric military operations to run quickly and smoothly by optimizing bandwidth utilization, processor performance, and power consumption.

"EXI has broad applicability and is far more efficient than what people were using at the time. With one of our EXI plug-ins, you can transfer data a hundred times faster or put a hundred times more data into the pipeline," said John Schneider, founder and Chief Executive Officer of AgileDelta. "The DoD had critical information that was too large to send to the tactical users who needed it most. With the help of our products, now they were able to do so."

During the company's early days, AgileDelta received much needed help from the DoD's Small Business Innovation Research (SBIR) program. Two years after starting the company with co-founder Rich Rollman in 2001, Schneider received an SBIR Phase I contract from the Air Force with a proposal that described "expanding the Battlespace Infosphere to mobile platforms" with commercial off-the-shelf software. Before that, the two men had been working 80 hours a week on what basically amounted to two jobs—only half of their time was spent building their internal products while the other half was spent consulting for outside clients to fund these efforts. Their Air Force Phase II

in 2004 was so successful, it was followed by a second Phase II award in 2007 from the Navy on the same topic, enabling even broader utilization.

"The SBIR funding was a nice shot in the arm because we could spend more of our time focused on internal objectives for AgileDelta," said Schneider. "It was a great way to accelerate what we were doing and get our product to market in a timely fashion."

Today, EXI is a mandated standard for any new or improved DoD system that produces, uses, or exchanges information, according to the DoD Information Technology Standards Registry (DISR). But the product's success goes far beyond defense applications. In 2006, industry's venerable World Wide Web Consortium (W3C) identified it as best of breed and adopted it as the global web standard for efficient XML data exchange. Since then, AgileDelta's EXI has been adopted as the standard data format for everything from connected automobiles and smart electrical grids, to digital radios used by first responders and smart home products.

"We really had an excellent team working on EXI and together we were able to accomplish some things that no one was able to do before," he said. "It's the most efficient way to exchange data that we know of. There's nothing quite like it."

The previous W3C data standard, XML, short for Extensible Markup Language, was developed in the 1990s as a way to store, transport, and share data in plain text format. It allows users to describe data and their meaning—for example, GPS coordinates, temperature, or an operations plan—in a way that can be understood by any system. As a non-proprietary, software and hardware independent method of information management, XML caught on for several widespread applications such as web publishing, web searching, and business-to-business transactions.

The DoD adopted XML for major defense programs, such as the Global Command and Control System (GCCS) and Net-Enabled Command Capability (NECC). In addition, the language is used for defense message standards like the United States Message Text Format (USMTF) program and NATO Allied Data Publication 3 (ADatP-3).

However, a major challenge with XML arises when wireless users and mobile devices come into play. Because the language was not designed with efficiency in mind, message sizes are often very large relative to their content. XML messages can take prohibitively long to send and receive, which also drains the battery of mobile devices. Users who already face strict constraints on storage, memory, bandwidth, and processing power needed something more streamlined than traditional XML.

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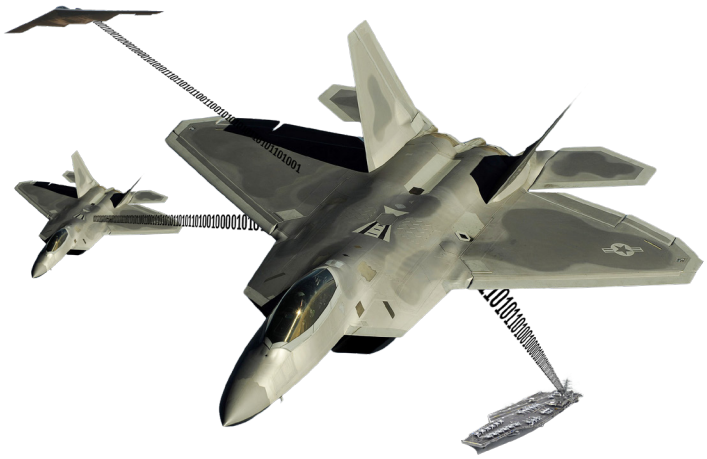
Schneider, who was working as principal systems engineer for a federally funded research and development center, decided to tackle the problem. But instead of creating proprietary technology for the DoD alone, he envisioned creating broad-based industry standards and commercial products that the DoD—and anyone else—could buy off the shelf for a low price. In 2001, he started AgileDelta in his basement with some colleagues from Microsoft, Oracle, and Amazon who had experience building extremely successful, widely used open industry standards (including XML) and commercial software.

"It was quite a challenge to take the very inefficient open standards of the day and optimize them for use in the most demanding defense applications," said Schneider. "But the SBIR funding helped to accelerate our development so we could remain competitive with other groups who were working on the same issue."

John Schneider

The team released the first version of EXI in early 2004. In the years that followed, the initial release expanded to include an entire EXI product line. The technology effortlessly integrates with a user's existing software platform with a simple plugin, dramatically reducing



AgileDelta's EXI technology has been widely adopted by the Department of Defense, with applications including use in a stealth data-link for fighter aircraft.

the size of data and simultaneously accelerating data processing using fewer computational resources.

How does it work? EXI uses several innovative new techniques to shrink data size and send data more efficiently. For instance, a core concept from Information Theory states that the more one knows about the information that is likely to get sent, the smaller one can encode the data. While traditional compression algorithms analyze the data to gather information about what is likely to get sent, AgileDelta's products also analyze available metadata to gain a far more precise and complete understanding and are therefore able to encode the data far more efficiently. They also use machine learning algorithms to analyze the data and look for deep structural patterns to further improve this understanding. And they use this knowledge to cleverly multiplex data streams in ways that further increase encoding efficiency. The technology has been awarded six patents.

In 2006, the DoD put AgileDelta's products through large-scale testing. The U.S. Air Force and Navy performed their own tests with real aircraft, satellites, vehicles, and SOF units to see how such remote systems would operate together and share data. The Navy's Joint Rapid Architecture Experiment (JRAE) and the Air Force's Joint Expeditionary Force Experiment (JEFX) independently assessed the utility of EXI for military applications, measuring XML data transfer speeds over 100 times faster using less than 1 percent of the bandwidth. Both experiments recommended immediate fielding and broad adoption of EXI.

Outside of the DoD, the technology has been adopted by many industries. AgileDelta's software is currently deployed in over 6 million vehicles in the connected automotive space, including those made by Volkswagen, Audi, and Porsche. The Telecommunications Industry Association (TIA) uses EXI as the standard data format for digital radios used by first responders and other emergency users. The Zigbee Alliance uses it as the standard for all Smart Energy 2.0 devices. Even the Gaming Standards Association has adopted the technology for data transfer in gaming systems, such as those found in casinos.

"The involvement of the DoD helped us get it tested and vetted on real-world systems—like military aircraft, ships and army vehicles—that we wouldn't have normally had access to. But it also got us to the position where we could easily bring the technology to broader commercial industries," said Schneider. "The SBIR program gave us the time and freedom to transform our initial vision into a successful commercial product and transform the way industry exchanges data."

AgileDelta, Inc. • Bellevue, WA

Modernization Priority: Fully Networked Command, Control, and Communication

SBIR contract: FA8750-04-C-0095 • Agency: Air Force • Topic: AF03-094, Extending the Infosphere to Mobile Platforms Using Optimized COTS Technologies

SBIR contract: N00039-07-C-0137 • Agency: Navy • Topic: AF03-094, Extending the Infosphere to Mobile Platforms Using Optimized COTS Technologies