2014 Global PXI-based Instruments for Electronic Test Equipment
New Product Innovation Award
Background and Company Performance

Industry Challenges

Over time, the cost of test across industries has become a significant challenge. Frost & Sullivan recognizes that it is a significant burden in the military and commercial world alike albeit for different reasons. In the aerospace and defense industry, for example, the focus on costs has increased in the face of reduced defense budgets. With the department of defense (DoD) spending inordinate amounts on rewriting and recertifying Test Program Sets (TPS) for automated test equipment (ATE) due to the sheer number of ATEs and the use of traditional electronic test equipment in these systems, there is a dire need for solutions. Cost pressure is also important in the wireless communications industry due to the growing importance of consumer applications inducing price pressure throughout the value chain. Moreover, technology evolution, which is particularly rapid in the wireless space, also challenges end users of test equipment requiring constant upgrades/changes in test systems. These trends call for new test strategies involving more versatile and easy-to-upgrade instrumentation.

RADX Technologies' New Product Attributes and Customer Impact

Match to Needs

Electronic test and measurement equipment is no exception to the drive toward a smarter world. Coined “Smart is the New Green” by Frost & Sullivan, smart products and services are proliferating and having a great impact on the electronic test and measurement industry by increasing the complexity and changing the nature of the Devices Under Test (DUT). This, in turn, drives the need for greater performance and adaptability in instrumentation i.e. smart instrumentation. Using PXI hardware from National Instruments such as the NI 1085 chassis, RADX Technologies’ LibertyGT Software Defined Synthetic Instrumentation (SDSI) offering provides faster measurement speed than traditional instrumentation in a smaller footprint, resulting in a lower cost of test. While modular instrumentation based on the PXI open standard imparts such benefits to users, the modular synthetic instrumentation offering of RADX enhances these benefits by only requiring software modules to add measurement functions (if the hardware is capable of supporting the test the customer is looking to perform) and providing a wide range of functions in a single instrument. Frost & Sullivan’s analysis shows that the range of functionalities available from RADX Technologies (up to 32 instruments currently) translates into a significantly lower cost of ownership as the number of instruments it replaces increase. The company’s Measurement Science Firmware and Software (MSFS) offering encompasses spectrum analysis, Digital Storage Oscilloscope (DSO), signal generation, stimuli measurements, etc. and is available in two software packages, the MSFS base bundle and the Advanced Measurement Science Software and Firmware Bundle (AMSB). In addition to providing a wide range of functions, RADX Technologies’ LibertyGT
SDSI also supports third-party functions and the company is willing to develop custom modules for customers.

With the LibertyGT SDSI, RADX Technologies has responded to the market demand for smarter, more cost-effective instrumentation and demonstrated a sound understanding of the impact of the smart mega trend on the electronic test and measurement industry. While other companies have also taken steps to provide solutions to customers using PXI hardware, RADX Technologies differentiates itself by providing control of the modules to customers, which is essential to add/modify functionality over time. Customers can reconfigure the instrument as the panel rotates down. In addition to hardware reconfigurability, the software architecture addresses the need for concurrent measurement capability, transforming the synthetic instrument into a small test system. RADX Technologies is looking to make further inroads on that front by incorporating a test management capability in its offering.

**Customer Ownership Experience**

In the aerospace and defense industry, the lifecycle of automatic test equipment (ATE) can reach 20-25 years. With the lifecycle of traditional electronic test instruments much shorter than that of ATE, the replacement of instruments with new ones often leads to the rewriting and recertification of TPSs as the new generation of instruments differs from the previous one. In RADX Technologies’ LibertyGT SDSI, the hardware, software, and TPS are isolated from each other, enabling hardware and software changes without affecting the TPS. This greatly reduces the need to rewrite and recertify TPSs in military ATE applications, which reduces the cost of ownership significantly. Analysis performed by the company showed that the average cost to rewrite and recertify TPS for the replacement of a discrete instrument reduces from $150,000 to $45,000 per TPS with modular synthetic instrumentation. Frost & Sullivan notes that considering that there are numerous TPSs per instrument, and that each instrument is changed several times during the lifetime of an ATE, the savings are tremendous. Also, another study conducted at the Tobyanna Army Depot demonstrated gains in productivity in the order of 41% more Units under Test (UUT) repaired per month and 48% less UUT repair costs.

Although the lifecycle of test systems in the commercial world is not as long as that of ATE in military applications, there is also increasing demand in this space for multi-purpose instrumentation able to smoothly evolve over time due to the constant introduction of new standards/technologies generating new test requirements. While modular instrumentation based on PXI addresses this challenge by removing the subsystem redundancy of traditional instrumentation, modular synthetic instrumentation further enhances this benefit by only requiring software modules to add measurement functions (if the hardware is capable of supporting the test the customer is looking to perform).

Providing more functionality in a smaller form factor (over 30 instruments are currently synthesized in the platform), and able to accommodate new test requirements faster than
alternatives, the modular synthetic instrumentation of RADX Technologies meets the key demands of end users of electronic instrumentation. Although adoption has been restrained in the past by the initial acquisition cost of synthetic instruments, RADX Technologies has put in significant efforts on this front and believes it has now brought down the price of these instruments low enough to drive adoption in the market.

**Design**

With the LibertyGT SDSI, RADX Technologies has responded to the market demand for smarter, more cost-effective instrumentation. Frost & Sullivan's competitive analysis reveals that while other companies have also taken steps to provide solutions to customers using PXI hardware, RADX Technologies differentiates itself by providing control of the modules to customers. This is enabled by the innovative design of the instrument that features two screws on the top left and right corners of the product that customers can release to rotate the front panel down, unveiling the modules behind it.

In addition, the front panel of the instrument features a large 1080P high definition (HD) touchscreen display that provides a user experience in par with that of popular consumer mobile devices. RADX Technologies sought JKI’s expertise in the development of innovative user interfaces (UI) with LabVIEW to develop a sharp UI for its instrument that features intuitive workflows and elegant screen animations. The company has strived to make it as obvious to use as possible for the users so that they do not have to look up documentation to complete their test and measurement tasks. Furthermore, the company uses videos to provide assistance to end users. The videos are extremely helpful to the users who can actually see a RADX Technologies technician or customer making the measurements they are looking to make.

Apart from answering the demand for hardware reconfigurability and ease of use, the software architecture of RADX Technologies’ LibertyGT SDSI addresses concurrent operation, which enhances throughput for customers. The company has also strived to make its LibertyGT solution especially suited for the production test environment by providing the test frame, front-to-back cooling, the modular power supply, and so on. The breadth of instrument personalities offered and the expected addition of a management system using NI TestStand essentially turn RADX Technologies’ instruments into small test systems.

**Quality**

Founded by industry veterans with experience in the commercialization of aerospace technologies, RADX Technologies is a pioneer in the synthetic instrumentation market that focuses on high-performance applications valuing precision and accuracy. With development centers in the U.S. (California) and Europe (Serbia), the company focused on developing a superior offering from the very beginning. RADX Technologies secured an exclusive license with BAE Systems for key technologies used in its LibertyGT SDSI
offering. Such technologies are further protected by four fundamental patents that relate to components used in synthetic instrumentation and the use of such instrumentation for testing electronic equipment.

**Positioning**

Frost & Sullivan expects the global PXI-based instrumentation market for electronic test applications to grow from $563.3 million in 2013 to over $1.75 billion in 2020. RADX Technologies is an emerging participant in this growing market differentiating itself from the competition by offering solutions to customers (as opposed to a set of components requiring end users to write software) and keeping its solutions open (turnkey solutions currently offered in the market do not provide the opportunity to the customers to tailor the solution to their needs).

From an application perspective, with a background in the mil-aero industry, such applications were a top priority for the company. RADX Technologies has been heavily involved in software-defined radio (SDR) including cognitive radio (CR) applications for the government. However, its LibertyGT offering has commercial applications in wireless infrastructure, wireless communication devices, commercial radios, commercial avionics, etc. In addition to providing a wide range of instrument personalities, RADX Technologies allow customers to add their own measurement science to the instrument, which opens up opportunities.

As a new and small company, RADX Technologies is flexible and sells its technology at different levels of integration. It is open to partnerships with larger companies to help them address requirements these companies are not able to fulfill.

**Conclusion**

Founded in 2011, RADX Technologies entered the test and measurement market with the introduction of the LibertyGT SDSI product line in 2013. Frost & Sullivan's independent research clearly shows that RADX Technologies’ LibertyGT offering addresses key demands from end users by featuring an innovative design that facilitates hardware configurability, and synthesizing a significant range of instruments while enabling concurrent operation. Based on the results of our research, Frost & Sullivan is proud to present the 2014 Global New Product Innovation Award in PXI-Based Instrumentation Market for Electronic Test Applications to RADX Technologies.
New Product Innovation

Ultimately, growth in any organization depends upon continually introducing new products to the market, and successfully commercializing those products. For these dual goals to occur, a company must be best-in-class in three key areas: understanding demand, nurturing the brand, differentiating from the competition.

Key Benchmarking Criteria

For the New Product Innovation Award, Frost & Sullivan evaluated two key factors - New Product Attributes and Customer Impact—according to the criteria identified below.

New Product Attributes

Criterion 1: Match to Needs
Criterion 2: Reliability
Criterion 3: Quality
Criterion 4: Positioning
Criterion 5: Design

Customer Impact

Criterion 1: Price/Performance Value
Criterion 2: Customer Purchase Experience
Criterion 3: Customer Ownership Experience
Criterion 4: Customer Service Experience
Criterion 5: Brand Equity

Best Practice Award Analysis for RADX Technologies

Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows our research and consulting teams to objectively analyze performance, according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation; ratings guidelines are illustrated below.

RATINGS GUIDELINES
The Decision Support Scorecard is organized by New Product Attributes and Customer Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criteria are provided beneath the scorecard). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, Frost & Sullivan has chosen to refer to the other key players in as Company 2 and Company 3.

### DECISION SUPPORT SCORECARD FOR NEW PRODUCT INNOVATION AWARD

<table>
<thead>
<tr>
<th>Measurement of 1–10 (1 = poor; 10 = excellent)</th>
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<td>New Product Innovation</td>
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<td>RADX Technologies</td>
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<td>Competitor 2</td>
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<td>Competitor 3</td>
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### New Product Attributes

**Criterion 1: Match to Needs**
Requirement: Customer needs directly influence and inspire the product’s design and positioning

**Criterion 2: Reliability**
Requirement: The product consistently meets or exceeds customer expectations for consistent performance during its entire life cycle

**Criterion 3: Quality**
Requirement: Product offers best-in-class quality, with a full complement of features and functionality

**Criterion 4: Positioning**
Requirement: The product serves a unique, unmet need that competitors cannot easily replicate

**Criterion 5: Design**
Requirement: The product features an innovative design, enhancing both visual appeal and ease of use

### Customer Impact

**Criterion 1: Price/Performance Value**
Requirement: Products or services offer the best value for the price, compared to similar offerings in the market

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Criterion 2: Customer Purchase Experience
Requirement: Customers feel like they are buying the most optimal solution that addresses both their unique needs and their unique constraints

Criterion 3: Customer Ownership Experience
Requirement: Customers are proud to own the company’s product or service, and have a positive experience throughout the life of the product or service

Criterion 4: Customer Service Experience
Requirement: Customer service is accessible, fast, stress-free, and of high quality

Criterion 5: Brand Equity
Requirement: Customers have a positive view of the brand and exhibit high brand loyalty

Decision Support Matrix
Once all companies have been evaluated according to the Decision Support Scorecard, analysts position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.

DECISION SUPPORT MATRIX FOR NEW PRODUCT INNOVATION AWARD
The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan’s 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often, companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry players and for identifying those performing at best-in-class levels.

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