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2015

2015 Global Stratecast Operations Management of Emerging Internet of Things (IoT) Technology Innovation Award

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50 Years of Growth, Innovation & Leadership

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Background and Company Performance

Introduction

Our world has many more connections than those represented by the people now with mobile voice and data access. In fact, the total number of connections today is estimated at approximately 10 billion, growing to more than 80 billion by 2020. What is making the connected world or Internet of Things (IoT) grow to such proportions? Simply put, it is the use of technology and mobile device functionality to help nearly every major industry improve its goods and services in a manner that can provide a better experience for its customers. This applies to healthcare, telematics (automobiles and fleet management), retail services, financial services, education, publishing, insurance, supply chain, smart utilities, electronics, government services and public transportation, to name a few.

The IoT world holds an almost limitless set of possibilities for both the supplier ecosystems that create them and the customers that use them. Some now believe that 99 percent of the "things" that can be connected are not yet connected, which further boosts the business opportunity for those addressing the IoT marketplace. Perhaps the greatest challenge with the evolving IoT market lies with the ability of network operators and services providers to manage the operations and monetization (O&M) functions needed to keep billions of IoT devices connected and performing the tasks for which they are designed.

Industry Challenges

The Internet of Things increases the scale of devices in the network by several orders of magnitude. Along with this scale come three challenges that providers of machine-to-machine (M2M) solutions or small device-centric connectivity services must solve right from the start:

- Collecting and making coherent sense of the data generated by millions and perhaps tens of millions of sensors and devices in order to make equally coherent decisions about network and service performance
- Maintaining control and configuration of these edge devices and the IoT infrastructure supporting them
- Ensuring the interconnection and security of the devices and services.

These challenges must be met at the same time that network operators and service providers are transitioning to an era of network functions virtualization (NFV). Through this network transformation process, these organizations must still protect top-line revenue, minimize operation expenses, detect faults in virtual and physical infrastructure

and management systems, and grow revenue through the introduction of new services. Many organizations view the IoT as a growth opportunity.

Wind River

Wind River was founded in 1981 as a provider of operating systems and embedded tools. It has a broad customer base that includes companies from the communications, aerospace and defense, automotive, industrial, and medical industries. The company was acquired by Intel in 2009 and is headquartered in Alameda, California. The company has a presence in more than 20 countries and employs more than 1,800 people. Though a software company, Wind River does not fit the traditional Operations & Monetization model. It is more representative of emerging architectures for supporting Software-defined Networks (SDN), NFV and the interconnected nature of the IoT.

The Wind River Helix portfolio of products enabling IoT advancements includes five main product lines:

- **Operating Environments** – Operating environments provide the software foundation to build secure and intelligent devices for IoT – from the edge, to the core infrastructure, and up into the cloud. Wind River's operating environments include VxWorks and Wind River Linux.

- **Gateways** – The Wind River Intelligent Device Platform is a customizable middleware development environment that simplifies the development, integration, and deployment of gateways for the Internet of Things.

- **Network Infrastructure** – Network Infrastructure products provide high-performance, carrier grade software for building networking equipment that supports the stringent requirements of the telecom industry, including NFV and future IoT applications. Drawing from decades of telecom experience, Wind River possesses a portfolio of proven networking and communications technologies. Core to this portfolio is Wind River Titanium Server, which is the industry's first fully integrated NFV infrastructure software platform.

- **Cloud** – Wind River Helix Device Cloud, the company's edge management system, collects and manages data from devices and machines to raise operational visibility and intelligence. It is a cloud-based platform that helps sensors, devices, and machines connect securely to network infrastructures.

- **Simulation** – Wind River Simics allows companies to simulate virtually any system, from the smallest to the most complex. It improves efficiency and collaboration across all teams regardless of location by providing the access, automation and collaboration tools required for agile development practices, and can accelerate every phase of the development lifecycle.

Wind River Helix Device Cloud is recognized by Stratecast as the company's contribution to the advancement of next generation support systems for the Internet of Things.

Technology Attributes and Future Business Value of Wind River

The Stratecast Global Technology Innovation Award for Operations Management of Emerging IoT Technologies, is judged based on ten criteria detailed later in this document; 5 criteria relate to technology and 5 criteria relate to business value. Wind River was compared against two other innovative IoT operations management solution suppliers. They are referred to as Competitor 2 and Competitor 3 in the remainder of this document. The following details a selection of these comparisons from the ten criteria.

Industry Impact

Significant change and challenges lie ahead for the players that will participate in supporting the Internet of Things. The performance and management challenges in particular for the network edge and the vastly increasing number of devices the network supports will be significant.

The management systems designed for current networks will not suffice in terms of scale nor complexity. Wind River has stepped up to support a new kind of interconnectedness where millions of new devices will not just connect to the network, but share data with other devices and machines, sometimes in an intelligent fashion. Without a new level of support for the worldwide management and performance monitoring of these devices and the multi-vendor network-edge technologies connecting them, the IoT will not flourish as expected.

Product Impact

The Wind River Helix Device Cloud is a cloud-based platform that helps sensors, devices, and machines connect securely to the network infrastructure. The system also manages these machines and network devices and provides correlation and analysis of the data they generate. The major differences between Wind River and its competitors is the combination of a cloud-based platform for device management, embedded analytics agents deployed through equipment supplier partners and a pre-integrated technology stack that connects to the Intel IoT Gateway, and is an integral part of Intel IoT Platform.

Wind River Helix Device Cloud does not rely solely on the output from network and edge devices, because the agent can be integrated into Wind River's operating systems (VxWorks and Wind River Linux, which run on many network edge devices). Stratecast believes that no other operations management system has this advantage.

Scalability

Intel, which acquired Wind River in 2009 is the master of scalability. It is the preeminent microprocessor silicon manufacturer in the world and its technology has driven the

scalability and processing speed of computers and networks for decades. The embedded systems into which Wind River technology is now embedded in have helped move a silicon mindset and scalability into the entire network stack. Additionally, Wind River has helped Intel as well in its bid to expand beyond chips and silicon into the embedded software and networking worlds. Competitors for the most part do not take an embedded technology approach to edge and device management. They still rely on software and hardware probes in the network to gather data.

Visionary Innovation

Intel has recognized the future of IoT. It has invested heavily in the security and software infrastructure needed to support it, including the $7.68 billion acquisition of McAfee, now Intel Security, in 2011 and the $884 million acquisition of Wind River. Wind River has since delivered on expectations for supplying software-driven solutions for Intel. One of the leading goals for CSPs is to address the vertical nature of the enterprise space with common, next-generation systems and get away from the silo-based approach they take currently.

In addition to the inherent innovation to its overall IoT focus and embedded technology support, Wind River is helping to address the next-generation systems approach that CSPs need, to better address the enterprise market in its use of representational state transfer-conforming (RESTful) application programming interfaces (APIs). Such APIs that allow developers or enterprises themselves to create vertical-specific IoT solutions that are supported by the Wind River Helix Device Cloud platform. Other key innovations in the Helix Device Cloud platform not equaled by its competitors include:

- Remote, rules-based, and intelligent device management that allows for remote diagnostics across networks
- On-device security that supports white listing and data integrity monitoring
- Remote capture of sensor and system health data scaled for IoT

Customer Acquisition

IoT will have a profound impact on the industries that have the need and means to leverage it. Wind River is supporting IoT across industries. In the energy sector, for example, Texas-based Group NIRE, is deploying IoT technologies to achieve its goal of accelerating the development, commercialization, certification and adoption of alternative energy technologies. Group NIRE sees IoT as a path to the future of energy management and is working with Wind River to cut costs through predictive maintenance and reduced manual operations and by enabling centralized control and automation across large-scale energy systems.

Along with an Intel IoT Gateway, Group NIRE has implemented the Wind River Intelligent Device Platform XT and Device Cloud. The Intelligent Device Platform XT securely

aggregates, shares, and filters data for analysis. The overall solution will allow Group NIRE to combine weather forecasting data, real-time wind turbine data, and battery data from its various sites. This will provide engineers with actionable analyses of system performance so they can make power generation decisions in real time. The cloud-based Device Cloud is being used to remotely monitor and manage devices in the field.

Human Capital

It is difficult to oversell the value of the human capital of Wind River's parent company, Intel. It would be equally difficult to do the same for Wind River's primary competitors. However, because the category of this award concerns the small devices and edge equipment that comprise the bulk of the IoT infrastructure model, Stratecast gives a slight edge to Wind River based on its knowledge base in embedded systems and scalability.

Conclusion

Few doubt that the future of networking belongs to the interconnected world of the Internet of Things. Cars, homes, health monitoring, and sensors of all kinds will need, reliable, low-cost monitoring, analysis and management. The systems in place for current networks is simply not adequate. The IoT will also rely on software-defined networks driving virtual network functions and interconnected clouds. In addition, IoT business solutions will require the monitoring and management of thousands of new applications.

Wind River is helping to drive all aspects of this emerging infrastructure. Device Cloud will be one of the most immediate requirements for the IoT to become a reality. Wind River's strategy, products and partnerships all show real innovation in support of the future of businesses across market segments.

With its strong overall performance, Stratecast is proud to bestow to Wind River the 2015 Stratecast Global Technology Innovation Award for Operations Management of Emerging Internet of Things (IoT) Technologies in the Communications Market.

Significance of Technology Innovation

Ultimately, growth in any organization depends upon finding new ways to excite the market, and upon maintaining a long-term commitment to innovation. At its core, technology innovation or any other type of innovation can only be sustained with leadership in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.

Understanding Technology Innovation

Technology innovation begins with a spark of creativity that is systematically pursued, developed, and commercialized. That spark can result from a successful partnership, a productive in-house innovation group, or the mind of a singular individual. Regardless of the source, the success of any new technology is ultimately determined by its innovativeness and its impact on the business as a whole.

Key Benchmarking Criteria

For the Technology Innovation Award, Stratecast | Frost & Sullivan analysts independently evaluated two key factors—Technology Attributes and Future Business Value—according to the criteria identified below.

Technology Attributes

Criterion 1: Industry Impact

Criterion 2: Product Impact

Criterion 3: Scalability

Criterion 4: Visionary Innovation

Criterion 5: Application Diversity

Future Business Value

Criterion 1: Financial Performance

Criterion 2: Customer Acquisition

Criterion 3: Technology Licensing

Criterion 4: Brand Loyalty

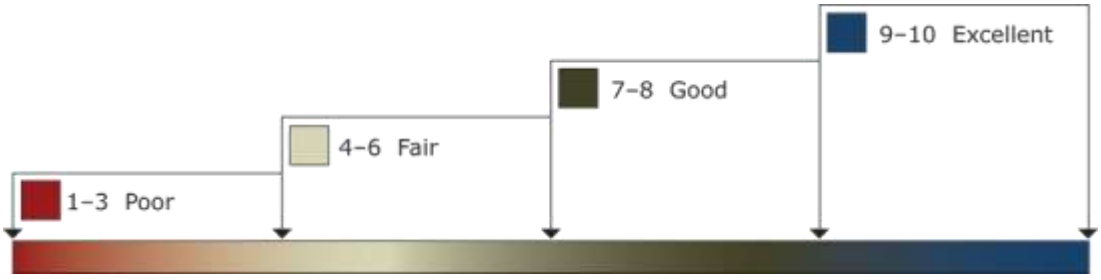
Criterion 5: Human Capital

Best Practice Award Analysis for Wind River

Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Stratecast | 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 Technology Attributes and Future Business Value (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, we have chosen to refer to the other key players as Competitor 2 and Competitor 3.

DECISION SUPPORT SCORECARD FOR TECHNOLOGY INNOVATION AWARD

Measurement of 1–10 (1 = poor; 10 = excellent)			
Technology Innovation	Technology Attributes	Future Business Value	**Average Rating**
Wind River	9.0	8.4	8.7
Competitor 2	6.0	6.2	6.1
Competitor 3	7.2	6.6	6.9

Technology Attributes

Criterion 1: Industry Impact
Requirement: Technology enables the pursuit of groundbreaking new ideas, contributing to the betterment of the entire industry

Criterion 2: Product Impact
Requirement: Specific technology helps enhance features and functionality of the entire product line for the company

Criterion 3: Scalability
Requirement: Technology is scalable, enabling new generations of products over time, with increasing levels of quality and functionality

Criterion 4: Visionary Innovation
Requirement: Specific new technology represents true innovation based on a deep understanding of future needs and applications

Criterion 5: Application Diversity
Requirement: New technology serves multiple products, multiple applications, and multiple user environments

Future Business Value

Criterion 1: Financial Performance
Requirement: High potential for strong financial performance in terms of revenues, operating margins and other relevant financial metrics

Criterion 2: Customer Acquisition
Requirement: Specific technology enables acquisition of new customers, even as it enhances value to current customers

Criterion 3: Technology Licensing
Requirement: New technology displays great potential to be licensed across many sectors and applications, thereby driving incremental revenue streams

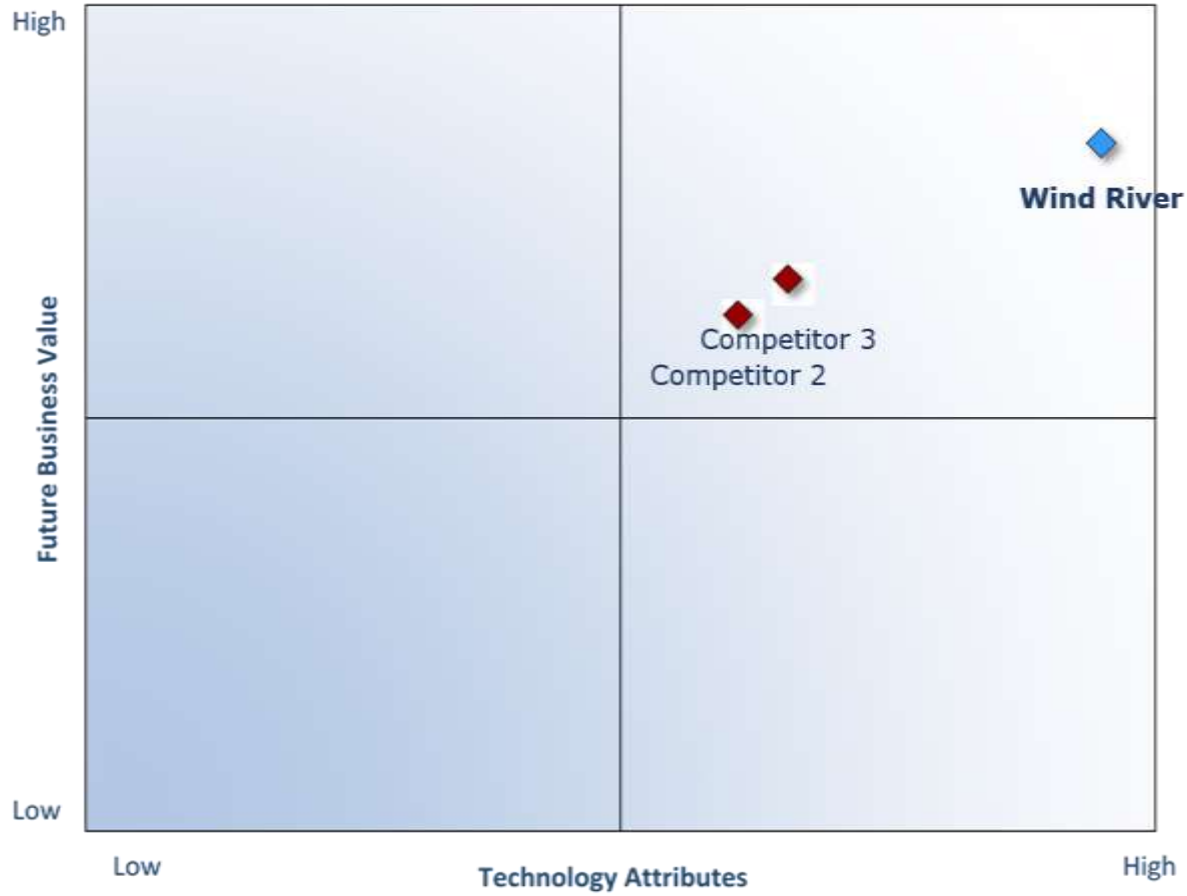
Criterion 4: Brand Loyalty
Requirement: New technology enhances the company's brand, creating and/or nurturing brand loyalty

Criterion 5: Human Capital
Requirement: Customer impact is enhanced through the leverage of specific technology, translating into positive impact on employee morale and retention

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts can then 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 TECHNOLOGY INNOVATION AWARD



The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Stratecast | 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 Stratecast | 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.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS

Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Stratecast | Frost & Sullivan Awards follow a 10-step process to evaluate award candidates and assess their fit with select best practice criteria. The reputation and integrity of the Awards are based on close adherence to this process.

	STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1	**Monitor, target, and screen**	Identify award recipient candidates from around the globe	• Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies	Pipeline of candidates who potentially meet all best-practice criteria
2	**Perform 360-degree research**	Perform comprehensive, 360-degree research on all candidates in the pipeline	• Interview thought leaders and industry practitioners • Assess candidates' fit with best-practice criteria • Rank all candidates	Matrix positioning all candidates' performance relative to one another
3	**Invite thought leadership in best practices**	Perform in-depth examination of all candidates	• Confirm best-practice criteria • Examine eligibility of all candidates • Identify any information gaps	Detailed profiles of all ranked candidates
4	**Initiate research director review**	Conduct an unbiased evaluation of all candidate profiles	• Brainstorm ranking options • Invite multiple perspectives on candidates' performance • Update candidate profiles	Final prioritization of all eligible candidates and companion best-practice positioning paper
5	**Assemble panel of industry experts**	Present findings to an expert panel of industry thought leaders	• Share findings • Strengthen cases for candidate eligibility • Prioritize candidates	Refined list of prioritized award candidates
6	**Conduct global industry review**	Build consensus on award candidates' eligibility	• Hold global team meeting to review all candidates • Pressure-test fit with criteria • Confirm inclusion of all eligible candidates	Final list of eligible award candidates, representing success stories worldwide
7	**Perform quality check**	Develop official award consideration materials	• Perform final performance benchmarking activities • Write nominations • Perform quality review	High-quality, accurate, and creative presentation of nominees' successes
8	**Reconnect with panel of industry experts**	Finalize the selection of the best-practice award recipient	• Review analysis with panel • Build consensus • Select winner	Decision on which company performs best against all best-practice criteria
9	**Communicate recognition**	Inform award recipient of award recognition	• Present award to the CEO • Inspire the organization for continued success • Celebrate the recipient's performance	Announcement of award and plan for how recipient can use the award to enhance the brand
10	**Take strategic action**	Share award news with stakeholders and customers	• Coordinate media outreach • Design a marketing plan • Assess award's role in future strategic planning	Widespread awareness of recipient's award status among investors, media personnel, and employees

About Stratecast

Stratecast collaborates with our clients to reach smart business decisions in the rapidly evolving and hyper-competitive Information and Communications Technology markets. Leveraging a mix of action-oriented subscription research and customized consulting engagements, Stratecast delivers knowledge and perspective that is only attainable through years of real-world experience in an industry where customers are collaborators; today's partners are tomorrow's competitors; and agility and innovation are essential elements for success. Contact your Stratecast Account Executive to engage our experience to assist you in attaining your growth objectives.

About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best in class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages almost 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from 31 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.