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FROST & SULLIVAN BEST PRACTICES AWARD

INDOOR LOCATION POSITIONING NORTH AMERICA

Technology Leadership 2019

Polaris Wireless

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2019 BEST PRACTICES AWARD

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Background and Company Performance

Industry Challenges

Location-based services (LBS) consist of a range of services that incorporate location information with other data to provide a value-added service or experience to consumers, enterprises, or governments. Location services generally rely on combined terrestrial, satellite, and software-based measurement technologies to pinpoint the location of a user, which is then integrated with contextual data to enhance services.

The Public Safety Sector Drives Demand for Enhanced Location Capabilities

Demand for advanced LBS continues to accelerate within the public safety sector as a result of federal mandates. In 2015, the Federal Communications Commission (FCC) released new requirements for emergency location benchmarks requiring network carriers to demonstrate their accuracy of locating wireless 911 calls to a 50-meter horizontal accuracy for 80% of all wireless 911 calls by 2021. The new templates require network carriers to begin independent trials of new technologies to achieve these set standards, and to reach vertical (z-axis) location information capability in the top 25 cellular market areas. Furthermore, the FCC is working closely with key stakeholders in the public safety sector to ensure a seamless and cost-effective transition to Next Generation 9-1-1- (NG9-1-1). As a result, accurate location and vicinity capabilities (both indoor and outdoor) have rapidly evolved from a competitive differentiator to a competitive requirement.

Approximately 85% of Emergency Calls Now Originate From Mobile Devices

Frost & Sullivan's independent research indicates that nearly 90 percent of the United States population now owns a smartphone. The National Emergency Number Association (NENA) estimates that 240 million calls are made to 9-1-1 each year. Frost & Sullivan research suggests that nearly 85% of these calls currently originate from a mobile device and that this number will only continue to increase. Interestingly, approximately 70 to 80% of these calls originate from indoor environments.

In addition to the most recent FCC increased mandates, in 2011, NENA approved the i3 architecture, providing the framework for the core technical guidelines for the implementation of NG9-1-1 systems. The i3 framework outlines an architecture designed as an IP-based network of networks for all public safety and emergency service entities. Public Safety Answering Points (PSAPs) will be challenged to keep up with the pace of technology innovation and evolving consumer behaviors, requiring PSAPs to replace legacy systems with new versatile NG9-1-1 solutions to continue towards the digital transformation. The next 12 to 24 months expects to be the most critical period for state and local 9-1-1 administrators to identify and secure the appropriate partners for their NG9-1-1 implementations.

Shortcomings of Stand Alone Location Determination Technologies

LBS currently uses a number of techniques to determine the location of people and objects through mobile phones and connected devices; however, these technologies present tradeoffs in terms of overall accuracy and functionality.

- Global positioning system (GPS) technology can provide an accurate location in blue-sky environments, but provides sub-optimal accuracy during bad weather conditions, obscured line-of-sight, and indoor environments
- Conventional indoor positioning solutions experience time lags between the event and reporting and are limited in their proximity tracking capabilities, making location tracking of moving targets inaccurate (very common during 9-1-1 calls)
- Wi-Fi—i.e., geomagnetic sensors—consume a battery quickly, curtailing the efficiency of its use for any duration. Furthermore, indoor location solutions typically require hardware components, increasing costs and overall difficulty of management

Moreover, the majority of solutions depend on proprietary platforms for specific devices, operating systems, or networks. Traditional LBS solutions often manage services using a "fallback tree" method, attempting to use one type of location determination technology (e.g., GPS) and if that does not work, falling back upon another type (e.g., cell ID). As a result, location accuracy is limited to only that of one type of location technology.

Technology Leverage and Business Impact of Polaris Wireless

Polaris Wireless's advanced Wireless 3D Location platform is the first hybrid software leveraging a multitude of location technologies to provide highly advanced location pinpoints. The company continuously evolves wireless location technology to enhance algorithms to leverage all available data from all devices in any environment to generate the best possible location estimate. As a result of the company's commitment to ongoing innovation, the company's deep technical patent portfolio includes over 100 patents awarded.

Fusing Technologies and Techniques for Industry-leading Accuracy

Unlike traditional LBS that rely on a fallback-tree method, Polaris Wireless' hybrid location technology is the first and only true software-based location solution that integrates available sensor inputs from devices and wireless networks. The Polaris Wireless 3D location platform utilizes all available signals and sensor measurements combined with the company's patented algorithms. The hybrid location technology is a fusion of industry-leading geo-location and measurement technologies to provide best-in-class software-based location accuracy. The company's hybrid location technology leverages a variety of location measurement technologies—including cellular, GPS, Wi-Fi, barometric pressure, Bluetooth, and other types of smartphone sensors—to create a highly robust indoor and outdoor solution across all topologies. As a result, the highly innovative Polaris Wireless 3D Location platform can provide accurate location tracking both horizontally and vertically.

Furthermore, the Polaris Wireless 3D Location platform is now cloud-based and available to application developers via a standard Android and iOS SDK. As a result, it does not require any additional hardware in the wireless carrier networks or firmware in the devices for Polaris Wireless' solution. Since the system operates independently—i.e., over-the-top—of wireless carrier networks, the platform is universal and easily adaptable to new sensors, technologies, devices, and networks to evolve without additional modification or

network hardware. Polaris Wireless' hybrid technology demonstrates the ability to locate wireless devices in the vertical dimension, or z-axis, within one-floor level and has further improved indoor horizontal accuracy.

High Accuracy Outshining FCC Mandates

Polaris Wireless 3D technology performance has been tested independently by the CTIA Test Bed, proving its advanced capabilities. During the test, the Polaris Wireless 3D Location platform performed in 48 buildings across 3 cities with over 55,000 test calls. The platform achieved 23.6 meters in horizontal indoor accuracy at the 80th percentile, significantly exceeding the 50-meter horizontal accuracy required by the FCC mandates. Furthermore, Polaris Wireless 3D Location platform showed a vertical accuracy of 2.8 meters at the 80th percentile, within the FCC's proposed mandate of 3 meters at the 80th percentile. By integrating Polaris Wireless 3D Location platform into end user's applications, developers can provide customers with pinpoint location, including indoors and in high-rise buildings, with floor-level accuracy and can be well ahead of meeting the new industry standards.

Continuing Innovation with Partnerships

Polaris Wireless is entering new markets through a variety of partnerships, most recently announced Orion Labs, Inc. (Orion) and Mark43. Orion delivers leading instant and secure mission critical push-to-talk voice and location communication through its communication platform, applications, and devices. Mark43 delivers a single, cloud-native platform that integrates modern and intuitive dispatch, records and evidence management, and analytics. Both partners' solutions inherently use location, and with their own customers seeking higher accuracy, especially indoors and vertically, working with Polaris Wireless's cloud-based solution was a natural fit. These advanced partnerships mutually allow both companies to expand into different marketing channels and offer customers with advanced capabilities. Polaris Wireless is also partnering with other companies to expand capabilities into other channels and integrate with other leading capabilities.

Exceptional Service to Ensure ROI

Polaris Wireless understands the importance of continuing innovation; as a result, the company's engineering team holds over 100 patents in various LBS technical areas. The company demonstrates a commitment to remaining at the forefront of innovation and continually changes its algorithms to leverage additional data from all sensors, in any environment, with the highest possible location accuracy.

In addition to a dedication to innovation, Polaris Wireless provides customers with 24/7 support, ensuring that it can address any urgent needs as soon as possible. The company's strategic approach to 3D location as a software offering ensures that customers experience a high return on investment as they avoid costly and time-consuming maintenance of hardware required of traditional LBS platforms. Finally, the software-based platform allows Polaris Wireless to push out software updates wirelessly, ensuring customers always receive the most advanced capabilities.

Conclusion

Frost & Sullivan research indicates that many traditional location positioning solutions often leverage only one location technology at a time, limiting efficacy. In contrast, Polaris Wireless's advanced Wireless 3D Location platform is the first hybrid software leveraging a multitude of location technologies to provide highly advanced location pinpoints. The company's groundbreaking platform is a cloud-based solution that does not require costly hardware investments. Finally, the company's commitment to innovation has led it to develop over 100 patents across various location technologies, enabling Polaris Wireless to remain at the forefront of innovation in the industry.

For its strong overall performance, Polaris Wireless is recognized with Frost & Sullivan's 2019 Technology Leadership Award.

Significance of Technology Leadership

Technology-rich companies with strong commercialization strategies benefit from the increased demand for high-quality, technologically-innovative products. Those products help shape the brand, leading to a strong, differentiated market position.

Understanding Technology Leadership

Technology Leadership recognizes companies that lead the development and successful introduction of high-tech solutions to customers' most pressing needs, altering the industry or business landscape in the process. These companies shape the future of technology and its uses. Ultimately, success is measured by the degree to which a technology is leveraged and the impact that technology has on growing the business.

Key Benchmarking Criteria

For the Technology Leadership Award, Frost & Sullivan analysts independently evaluated two key factors—Technology Leverage and Business Impact—according to the criteria identified below.

Technology Leverage

Criterion 1: Commitment to Innovation

Requirement: Conscious, ongoing development of an organization's culture that supports the pursuit of groundbreaking ideas through the leverage of technology

Criterion 2: Commitment to Creativity

Requirement: Employees rewarded for pushing the limits of form and function, by integrating the latest technologies to enhance products

Criterion 3: Technology Incubation

Requirement: A structured process with adequate investment to incubate new technologies developed internally or through strategic partnerships

Criterion 4: Commercialization Success

Requirement: A proven track record of successfully commercializing new technologies, by enabling new products and/or through licensing strategies

Criterion 5: Application Diversity

Requirement: The development of technologies that serve multiple products, multiple applications, and multiple user environments

Business Impact

Criterion 1: Financial Performance

Requirement: Overall financial performance is strong in terms of revenues, revenue growth, operating margin, and other key financial metrics.

Criterion 2: Customer Acquisition

Requirement: Overall technology strength enables acquisition of new customers, even as it enhances retention of current customers.

Criterion 3: Operational Efficiency

Requirement: Staff is able to perform assigned tasks productively, quickly, and to a high-quality standard.

Criterion 4: Growth Potential

Requirements: Technology focus strengthens brand, reinforces customer loyalty, and enhances growth potential.

Criterion 5: Human Capital

Requirement: Company culture is characterized by a strong commitment to customer impact through technology leverage, which in turn enhances employee morale and retention.

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

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 of 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 recipient	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**	Upon licensing, company is able to 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

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.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS

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 more than 50 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.