FROST & SULLIVAN

BEST PRACTICES AWARDS

BEHRTECH

2020 GLOBAL WIRELESS IOT PRODUCT LEADERSHIP AWARD

Contents

Background and Company Performance

Industry Challenges

The Internet of Things (IoT) has brought a paradigm shift in remote monitoring. The fast-paced technological advances are driving manufacturing, consumer, and select services sectors to adopt sensors gradually.

Rapid technological advancements in wireless IoT have increased the development of remote applications, such as asset tracking, process and quality control and facility management in manufacturing, oil and gas, mining and smart buildings. Given the large physical area of industrial plants and commercial spaces, using wireless IoT connectivity for monitoring and controlling various operations poses substantial challenges. In most plants, field devices are either hardwired to the control panel or not connected at all. Increased automation in industrial plants has complicated connecting networks immensely, presenting a significant challenge for both plant managers and solution developers to ensure robust connectivity solutions. Also, industries such as oil and gas and mining are in difficult-to-access locations. Hence, wireless network connectivity is the main option for data transmission. Infrastructure and asset monitoring, heating, ventilation, and air-conditioning (HVAC), air quality monitoring and occupancy detection generates extensive data. This presents critical challenges to data transmission and data security, poses interruption risks, and increases the cost of transferring data from various operations.

In this context, wireless IoT solution developers need energy-efficient solutions featuring high sensitivity and stability in harsh manufacturing environments, and application safety without compromising on accuracy. Data is only meaningful when it yields credible action-oriented analysis. The analysis of this wireless IoT data from plant and field operations is a big hurdle.

Moreover, data transmission needs among various process and discrete industries are diverse. Developing a universal wireless IoT transmission solution to meet the needs of both these industrial sectors is highly challenging.

If the above-mentioned challenges are not met, they can multiply as IoT connections are estimated to exceed 20 billion by 2025. Platforms like low-power wide-area network (LPWAN) can address these challenges. High-end performance delivers an excellent customer experience as they can achieve economies of scale despite limited budgets, and meet smart application needs. Such a value proposition attracts global-leading brands' attention and can increase the acceptance of wireless IoT devices and software solutions.

Product Family Attributes and Business Impact

Positioning

A group of proficient technology entrepreneurs in Canada founded and sponsored Behr Technologies Inc. (BehrTech), which operates globally. Its management's extensive experience in software, network management, and communications has been supporting BehrTech in expanding its IoT connectivity software solutions through continuous innovation.

The company has positioned itself as a wireless infrastructure provider working with systems integrators to meet user needs effectively compared to competing solutions. Its innovative connectivity platform and related products comply with the European Telecommunications Standards Institute's (ETSI) TS 103 357 specifications. BehrTech's wireless IoT platform transmits data through sub-packets and offers robust transmission security and higher capacity per gateway than both legacy and competing solutions.

BehrTech developed the robust MYTHINGS™ LPWAN platform in 2019 after introducing the MIOTY™ technology in early 2018. MYTHINGS is an enabling and flexible solution that suits diverse industrial and commercial applications. Unlike top competitors' license-based similar wireless IoT solutions, MYTHINGS operates in the unlicensed spectrum, thereby addressing the critical challenge of cost optimization for wireless IoT operations.

BehrTech's MYTHINGS offering, based on telegram-splitting ultra-narrowband technology, is an integrated hardware-agnostic, flexible, interoperable, and robust wireless connectivity software platform for IoT. MYTHINGS's high-end capabilities provide solutions for diverse industrial and commercial applications deploying wireless IoT networks. Its flexibility of being a universal solution, yet at the same time allowing a decent level of customization, enables its use in critical operations.

Supporting multiple operational modules enables wireless data transmission from both discrete and process industries for analysis and any required course correction. MYTHINGS's interference immunity, massive scalability, lower power consumption and output in both analog and digital forms distinguish it from its competing offerings.

MYTHINGS's enablement of wide-ranging applications involving integrated connectivity of devices to generate and transmit highly reliable data via the wireless network has positioned BehrTech as an effective and flexible wireless solution provider, enabling partners to serve the industry's unmet needs.

Match to Needs

BehrTech has been at the forefront in serving diverse vertical market applications. MYTHINGS's high-end performance is attributable to MIOTY's (TS-UNB) standards-based algorithms and wireless (sensor and network) technology. MYTHINGS's open and interoperable platform makes it compatible with sensor devices from different manufacturers. It has the ability to penetrate diverse industrial applications like midstream and downstream oil and gas, manufacturing and mining, as well as smart buildings and smart cities. MYTHINGS being an integrated wireless IoT solution, seamlessly meets challenges of both process and discrete industrial sectors. Compared to its top competing solution, the data packet error rate (percentage of failed data packet transmission) under interference conditions using MYTHINGS in both process and discrete industries is almost zero.

MYTHINGS makes network security a priority. AES-128 encryption at the wireless communication level protects data transfer, while the transport layer security protocol ensures security at the application level. This built-in security allows data sub-packets from all types of devices and nodes to move seamlessly.

MYTHINGS has proven to be excellent when deployed in critical operations like quality control, predictive maintenance, asset tracking and worker safety in complex manufacturing facilities and remote mining and oil and gas operations.

In industrial manufacturing, engineers could leverage MYTHINGS to transmit mission-critical data using wireless connectivity. Large amounts of process parameter data like temperature, pressure, flow, moisture, humidity, vibration, and pH values are gathered and transmitted for analysis. Any course correction can be performed accordingly to ensure process integrity and enable timely predictive maintenance to maintain zero downtime.

MYTHINGS has also proven performance in smart buildings initiatives. For example, MYTHINGS-enabled presence detection sensors monitor the traffic flow of people through each door and traffic density of common areas in high-rise commercial buildings. MYTHINGS-enabled environmental sensors collect temperature, lighting and air quality. These real-time insights help pinpoint underutilized spaces, optimize HVAC systems, and improve tenant comfort and productivity. Leak-detection sensors alert management of leaks within minutes to minimize potential damage, enable predictive maintenance, and improve sustainability.

Offering scalability for long-range remote connectivity, MYTHINGS could also enable an appropriate level of automation in smart farms. For example, farm operators and agriculture scientists could remotely collect soil acidity as well as fertility, climate, and crop data to make decisions on water, fertilizer, and pesticide resource conservation to enhance crop yields.

The design flexibility, hardware-agnostic approach built into MYTHINGS allows developers to decide on the number of node installations and type of sensor-connected devices, fitting them for use in various environments like high-speed and low-power applications. It complies with both simple and intricate topologies both over the ground and underground.

Design Differentiations

BehrTech has designed MYTHINGS for harsh industrial and commercial operations in an open, license-free spectrum and is ahead of other competing wireless IoT solutions. It differentiates itself in its ease of use. It can receive data from thousands of unique nodes, enabling uninterrupted data transmissions. MYTHINGS's robustness allows zero data drops.

BehrTech has achieved design excellence in integrating compatible software and hardware solutions with in-built flexibility on the MYTHINGS platform. ATtention (AT) command set, being an open software interface, enables the integration of high-end monitoring software and control commands to ensure seamless operations. mikroBUS™, as an open hardware interface, permits integration with a large number of different field sensors to achieve

proven operational excellence in both harsh industrial environments and complex commercial activities.

MYTHINGS is distinct as it can receive millions of messages using a single base station. It seamlessly allows adding IoT devices with minimum infrastructure deployment.

MYTHINGS enables direct wireless transmissions of up to 15KMs without requiring any repeater hardware. With MYTHINGS rapid prototyping module that is compatible with more than 900 mikroBUS click boards, users can construct multiple combinations of sensors hardware, interfaces, and displays for their specific deployment. It is also cost-effective as it uses microcontrollers compatible with the IoT platform.

MYTHINGS is compatible with high-speed devices and the mobile platform. It differentiates itself from various wireless platforms in its built-in ability to collect and transmit data at a high speed of 120km per hour (2km per minute).

One of MYTHINGS's unique features is the division of data/messages into smaller data packets (sub-packets) before transmission. This eases transfer and avoids congesting the wireless network. These sub-packets are transmitted with varying frequency patterns at different time intervals. This protects data packets from external interference and improves system efficiency to allow for lower data-packet loss.

Reliability and Quality

MYTHINGS's proven reliability in high data transmission performance consistently exceeds customer expectations. BehrTech adopts a partnership approach. The integration of MYTHINGS with partner products and services has contributed to its robustness, flexibility, sensor and device interoperability, and streamlined complex designs. This has ensured uninterrupted data transmissions, data security, and high-quality performance. The proven quality and reliability of the MYTHINGS platform has led to its integration with products of 16 different multinational partners.

MYTHINGS is hardware agnostic; it supports many off the shelf transceiver, gateways and application platforms. For example, BehrTech has integrated the MYTHINGS library software into the M2.COM wireless sensor platform from Advantech Co Ltd, introducing an off-the-shelf module with industry-grade design. To provide connectivity with some of the largest cloud platforms, the company has integrated Microsoft Azure, Amazon AWS and Software AG Cumulocity as well as Message Queuing Telemetry Transport (MQTT) in its network and device management solution. Such integrations enable data ingestion and real-time analysis to maintain operational efficiency and process integrity in industrial applications exceeding user expectations.

Partnering with hardware and software technology companies allows BehrTech to advance in developing user-centric solutions for diverse verticals, irrespective of the type, complexity, and size of operations. To enrich the customer purchase experience, BehrTech offers demonstrations and training for nearly all product applications. Customers gain first-hand knowledge on how to test, modify, and operate the products efficiently. The BehrTech front line team takes customer input, such as feature requests and communicates it to the application development team. These efforts position the company to go to market with products/applications that match customer needs precisely. This strategy translates into an excellent customer purchase experience BehrTech's alliance with world-class technology partners, including Microsoft, Advantech, HPE, and Intel, enables it to incorporate MIOTY and MYTHINGS for diverse end users and geographic regions globally.

Product Value

The value-added attributes of BehrTech's entire product range enhance value for its customers. BehrTech's solutions have proven efficiency consuming lower power than competing solutions, thereby ensuring users a higher return on investment (ROI). Such low power consumption makes BehrTech's technology platform suitable for battery-operated applications, enabling batteries to run longer thus boosting device uptime. This lengthened battery life increases applications' overall performance efficiency, translating into enhanced productivity. Consequently, users gain high ROI as the operational cost decreases drastically.

MYTHINGS offers cloud connectivity, an immense value addition compared to competing solutions, and uses open interfaces, which enhances its universal deployment in a variety of environments. The interoperability leads to cost optimization and ease of device replacement.

Additionally, design flexibility with MYTHINGS rapid prototyping modules empowers customers to customize packages according to their application-specific needs. Therefore, customers benefit from a reduction in material consumption, cost, and time, which translate into a superior customer value proposition. Driven by its commitment to revolutionize the customer experience further, BehrTech enables the development of sensor-based solutions for batch and continuous process operations.

Conclusion

The versatile MYTHINGS solutions' industry-leading features of low power consumption, long range, high performance in harsh industrial applications, and high operational efficiency have positioned it to cater to customers from broad-ranging industries. This has enabled it to successfully meet cost optimization challenges and enhance transmission with proven data security in critical industrial operational environments. Key industries benefitting from the solution include oil and gas, mining, smart cities, smart buildings, and manufacturing.

With telegram-splitting technology at the core, these solutions enjoy an edge over competitors in terms of mobility, gateway capacity, and much lower error transmission. Hence, they enable the transfer of extensive data generated in industrial plants. Customers reap the utmost benefits out of BehrTech offerings in terms of unmatched energy efficiency, reduced expenses, and operational scalability, significantly increasing production and yield.

MYTHINGS connects thousands of nodes and offering data transmission interference immunity over long ranges without requiring repeaters. It also stands out among competing solutions with its ability to capture data moving at 120km per hour with the lowest data drop.

These benefits are attracting the attention of leading customers for applications in both process and discrete industries.

With its strong overall performance, Behr Technologies Inc. has earned Frost & Sullivan's 2020 Product Leadership Award in the wireless IoT industry.

Significance of Product Leadership

Ultimately, growth in any organization depends on customers purchasing from a company and then making the decision to return time and again. A comprehensive product line filled with high-quality, value-driven options is the key to building an engaged customer base. To achieve and maintain product excellence, an organization must strive to be best-in-class in 3 key areas: understanding demand, nurturing the brand, and differentiating from the competition.

Understanding Product Leadership

Demand forecasting, branding, and differentiating all play critical roles in finding growth opportunities for your product line. This 3-fold focus, however, must be complemented by an equally rigorous focus on pursuing those opportunities to a best-in-class standard. Customer communication, customer feedback, pricing, and competitor actions must all be managed and monitored for ongoing success. If an organization can successfully parlay product excellence into positive business impact, market share will inevitably increase.

Key Benchmarking Criteria

For the Product Leadership Award, Frost & Sullivan analysts independently evaluated 2 key factors, Product Family Attributes and Business Impact, according to the criteria identified below.

Product Family Attributes

Criterion 1: Match to Needs
Criterion 2: Reliability and Quality
Criterion 3: Product/Service Value
Criterion 4: Positioning
Criterion 5: Design

Business Impact

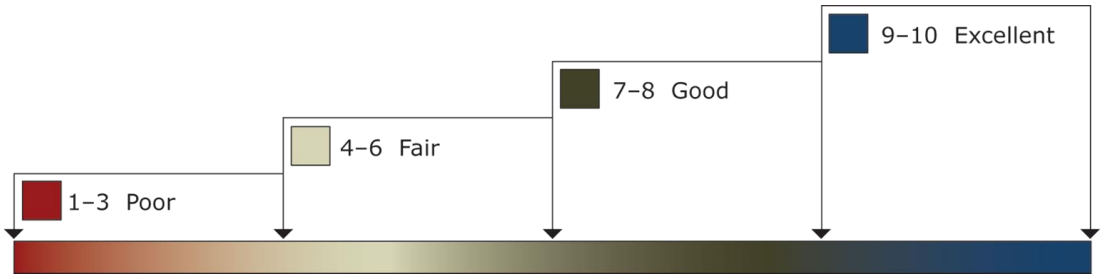
Criterion 1: Financial Performance
Criterion 2: Customer Acquisition
Criterion 3: Operational Efficiency
Criterion 4: Growth Potential
Criterion 5: Human Capital

Best Practices Award Analysis for Behr Technologies Inc

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 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 considers Product Family Attributes and Business Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criterion 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 participants as Competitor 1 and Competitor 2.

Measurement of 1–10 (1 = poor; 10 = excellent)			
Product Leadership	Product Family Attributes	Business Impact	**Average Rating**
Behr Technologies Inc	**9.8**	**9.6**	**9.7**
Competitor 1	7.5	7.7	7.6
Competitor 2	7.2	7.0	7.1

Product Family Attributes

Criterion 1: Match to Needs

Requirement: Customer needs directly influence and inspire the design and positioning of the product family.

Criterion 2: Reliability and Quality

Requirement: Products consistently meet or exceed customer expectations for performance and length of service.

Criterion 3: Product/Service Value

Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

Criterion 4: Positioning

Requirement: Products or services address unique, unmet needs that competitors cannot easily replicate or replace.

Criterion 5: Design

Requirement: The product features an innovative design, enhancing both visual appeal and ease of use.

Business Impact

Criterion 1: Financial Performance

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

Criterion 2: Customer Acquisition

Requirement: Product 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

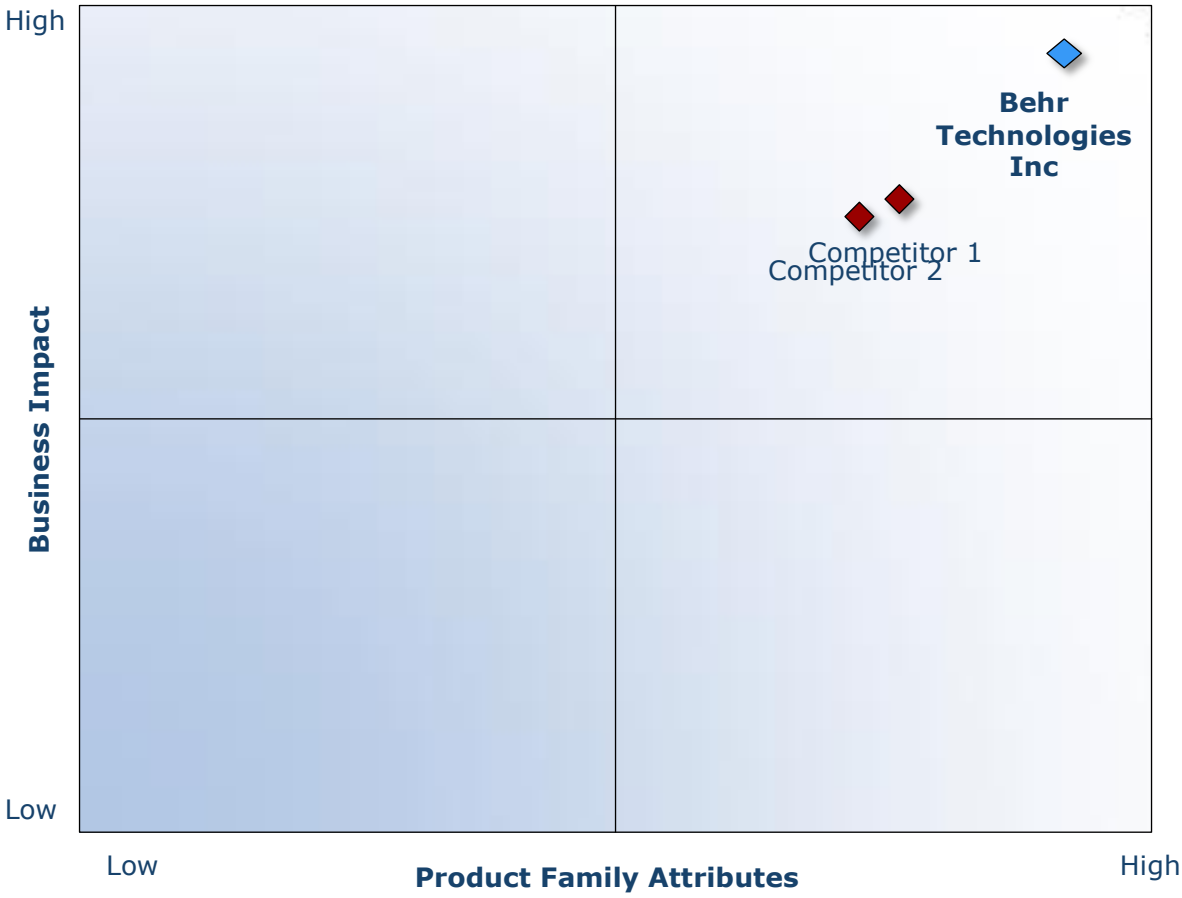
Requirements: Product quality strengthens brand, reinforces customer loyalty, and enhances growth potential.

Criterion 5: Human Capital

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

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts 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.



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

Frost & Sullivan analysts follow a 10-step process to evaluate award candidates and assess their fit with select best practices 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 world	• Conduct in-depth industry research • Identify emerging industries • Scan multiple regions	Pipeline of candidates that potentially meet all best-practices 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 practices 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 practices 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 practices 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 practices award recipient	• Review analysis with panel • Build consensus • Select recipient	Decision on which company performs best against all best practices criteria
9	**Communicate recognition**	Inform award recipient of recognition	• Announce 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 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, resulting in 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 participants 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, helps clients 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 practices models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages nearly 60 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on 6 continents. To join Frost & Sullivan's Growth Partnership, visit http://www.frost.com.