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2014

RAJANT

2014 Global Mesh Networking Solutions for the Industrial Environment Enabling Technology Leadership Award

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50 Years of Growth, Innovation & Leadership

Industry Challenges

Wireless devices have seen increased deployment in the industrial environment because of numerous benefits such as flexibility, cabling, and cost reduction. But, at the same time, they have met with challenges such as reliability, security, and safety. Several vendors have started offering a variety of devices for a variety of applications. This resulted in many devices based on proprietary protocols that varied from country to country. As bandwidth extends from wireless to broadband, different kinds of wireless networks have been established, such as point-to-point, point-to-multipoint, and mesh networks. Each has its own pros and cons. In spite of that, mesh-networking solutions, for example, have been found highly suitable for mobile applications in the mining and oil, and gas industries.

Because there are a variety of mesh technologies available in the market, the challenge for the end user is to find a vendor who can offer a solution that finds the best balance between economic cost and system quality. Since communication networks are subject to failure, there is the added cost of backhauling devices for safety as well as for balancing loads. Secondly, the wireless devices should have the ability to handle multiple frequencies in order to simultaneously transmit/receive a variety of application data on different channels. Thirdly, the new installations should integrate well with the existing infrastructure during the upgrades, because the end users have configured network installations at various times. Lastly, what the end user requires most is that the network solution be able to handle multiple applications, such as voice, video, and data communications, over the same network. In these cases, latency time is a critical factor so that the real-time connectivity might be ensured. Beyond these technical challenges, any end user will be looking to achieve maximum ROI (Return on Investments) on technology investments.

The challenges mentioned above are critical for deploying a wireless networking solution in the mining or oil and gas fields. Currently, those who run shale fields face tremendous challenges in making the right business and operational decisions at the right time. For them to make those business decisions in a highly dynamic market, the competitive edge derives from obtaining real-time data from the field. In addition to real-time production data, several other purposes depend upon the wireless networking solutions, such as video surveillance for the very high need of security, tracking for fleet management, and for safety in emergencies. Although these applications add many benefits to the end users, their success depends on how well the wireless broadband network can properly and securely transmit the data. Moreover, cloud-based SCADA facilities have emerged in recent days, which in turn require a robust, redundant, and secure WLAN network. All of these benefits rely on the wireless network, which is the backbone of the entire field infrastructure, as the entire visibility over assets is lost if it fails.

Customer Value and Technology Excellence of Rajant Corporation

Commitment to Innovation:

Numerous startup companies are pushing the wireless mesh networks to address the needs of numerous applications, from basic WLAN coverage and connectivity to Internet access. The main challenge in this system is the complexity: each wireless node has to act simultaneously as a router and as a host. In a market served by bigger participants such as Cisco Systems, Aruba Networks, and Motorola Solutions, Rajant Corporation is uniquely positioned in the market by offering a unique, robust product with a strong technological background.

Rajant comprehensively understands the need to fit the right product to the right kind of application and make a balanced tradeoff between sophisticated technology and cost. Keeping this in mind, Rajant offers its Breadcrumb® device in 3 versions: the LX series, the ME series, and the JR series. These versions aptly solve the bandwidth needs based on the end-user preferences over the network infrastructure. As the competitive edge is based highly on the technological soundness, Rajant constantly dedicates resources for developing new products, both in hardware and in software. This enables them to move easily from the contract-based mining and military sector to the emerging energy sector, especially the shale fields. To be apt, Rajant's Breadcrumb® hardware nodes and Instamesh software can provide a reliable, high-bandwidth, and secure network for the shale fields, which potentially is an enormous opportunity because of the exploding production of shale gas and tight oil in North America.

Rajant has created a strong foundation for the mesh-networking technology and enabled the creation of new products suiting the needs of shale fields. In fact, Rajant modified its product to handle the programmable logic controller PLC data in a seamless manner, as with any other application. Rajant's flexible and comprehensive architecture allowed it to address the problem with slight changes in the product platform to suit the needs of PLCs.

Rajant's Best Practice:

Rajant has introduced products in the market that can manage themselves and do not require any other facility to centrally manage the devices spread out in the field. In other competing solutions, this is not the case: management devices for controlling the network take a certain share of the available bandwidth. Also, in the case of Rajant's network of 100 nodes, the cost of managing the system is only 3% to 4% of the operational cost, unlike the competing solutions. Moreover, Rajant offers a wireless network solution that increases the bandwidth strength and availability when there is an increase in the number of nodes, unlike the solutions from competitors 1 and 2.

For Rajant, the majority of shale projects in progress are in Eagle Ford, Permian, and Cline. The organization is also in talks with companies across the US shale plays. Rajant has seen a tremendous amount of activity in these regions in the last 2 years and particularly anticipates 100% year-over-year growth in Eagle Ford by December. In one case, Rajant is providing a 20-to-40 Mbps network speed over 42 square miles covering

1,500 wells. This enables simultaneous monitoring of real-time data analysis on production, Internet access for contractors, safety, and security. This shows Rajant's capability to quickly adapt its product solutions to the emerging applications in the energy field and also on the network management levels suiting diverse needs in the shale field. In this way, Rajant is well equipped with its products, which entirely transform remote areas by enabling high-speed broadband and cloud computing.

The above facts illustrate the conscious, ongoing cultural development in Rajant Corporation that supports not only the pursuit of groundbreaking ideas but also pioneering successful implementation of kinetic mesh networks in the most demanding environments.

Commitment to Creativity:

Rajant Corporation constantly adjusts the current products for newer requirements and to address the pitfalls in the existing deployment. The key differentiating factors of the networking devices that Rajant brings to the market are its mobility, simplicity, reliability, scalability, multiple frequency handling capabilities, optimized power options, and load-balancing capabilities. Initially, end users relied on wireless networks for less critical applications, and gradually they adopted them for other several other applications, thus enabling wireless to become a core requirement in the energy and mining field infrastructure. This obviously reduces the performance of the existing system, as many applications which are non-critical will make traffic congestion with the highly critical control-level data. This necessitates the need for highly robust algorithms to route the data in the quickest available route. Rajant constantly updates the Instamesh software remotely to improve the performance, thus making the system more reliable.

Rajant's Instamesh, which is the company's proprietary routing technology, and BC Commander, which is its network management software, have been updated this year with a new set of enhanced features: supporting new devices, balancing optimal performance, and availability. Rajant has also added the much-demanded VoIP to its network as the default option. In addition, it has enabled administrators for bulk configuration of Breadcrumb nodes and added cryptographic options. The network has also been enhanced for viewing topology layouts and for live mapping with a GPS. These features are available in the market as isolated solutions, but Rajant's highly reliable solution with mobile options sets it apart from rest of the competitors.

Rajant's Best Practice:

The way in which Rajant upgrades the features of its existing products sets a benchmark for the mobile wireless networking solution. As the shale oil and gas industry has begun to use applications from industrial mobile solutions, Rajant has introduced new Breadcrumb API (BCAPI) to support multiple languages and enables users to use a variety of applications with best-in-class performance. Moreover, Rajant's network seamlessly integrates with the existing network that in turn proves the extensibility feature of Rajant's networking products. As the wireless network evolves, teams at Rajant push the limits of technology and application with sheer creative approaches and pursue towards

innovative applications.

Application Diversity:

The Breadcrumb devices are highly reliable for mobile applications in a highly rugged environment prevailing in energy and mining operations. It is very stable in extremely low temperatures as well in high temperatures and works very well for more than 5 years without any shutdowns. Rajant's kinetic mesh network can transport voice, video, and data from a virtually unlimited range of applications such as fleet management, condition-monitoring, tank-level-monitoring, high-precision drilling, excavating, well-monitoring, and location services with high throughput and low latency. The ever-expanding nature of application needs in the energy and mining industry as technology evolves provides significant opportunities for Rajant and its technology.

The disruptive technologies such as SCADA over the cloud, industrial mobility applications, Big Data analytics, and M2M technologies in the energy sector depend solely on the network infrastructure. Rajant's Breadcrumb nodes along with the state-of-the-art Instamesh software that enables the aforementioned technologies are best positioned to provide a high-throughput network solution. This was possible for Rajant as it developed technologies that serve multiple purposes and can be embraced by multiple end-user verticals.

Rajant's Best Practice:

Railroads became a new market segment for wireless networks that emerged out of the exploding shale gas and tight oil production, as the industry needed an alternative mid-stream operation because of the limitations in pipelines. Because of sharp increases in tight-oil production overwhelm pipeline capacity; railcars are currently in high demand to transport tight oil from the distant Bakken field to refineries on the Gulf Coast. However, there is a critical need for safety, security, logistics management, and continuous traceability to manage the operations in a safe, secure, and efficient manner. At this juncture, Rajant came forward to empower railroad data command centers with real-time data for monitoring equipment health, train speeds and locations, wheel sensors and freight status, weather conditions, fuel consumption, traffic optimization, and more. They have named it Rail Mesh, which is again based on Rajant's proven kinetic mesh-networking technology, as it readily and reliably connect hundreds and thousands of mobile railroad assets.

Commercialization Success:

Rajant sees energy as a huge market that is currently underserved for wireless network solutions. Hence, Rajant invests much in market development to push its proven kinetic mesh-networking products and solutions in offshore platforms, shale fields, and even Canadian oil sands. Rajant strongly believes it will make a huge difference in the above fields, because its solution is capable of providing a reliable network infrastructure that is highly scalable for growing needs. As wireless becomes the de facto standard for

monitoring, surveillance, and control, Rajant could possibly expand its business from North America across the world in key regions such as Australia, Russia, China, and other Asia-Pacific countries.

Any innovative company will face a significant challenge of a proven track record in taking new technologies to the market with a high rate of success. In this case, Rajant possess a technology development team that anticipates the future needs of users across multiple industries and successfully deployed the solution for various application requirements in multiple environments. However, its standardized kinetic mesh-networking solution is very flexible, secure, and scalable enough to address mission-critical connectivity requirements as it is not application-specific. This enables it to quickly commercialize its products into new markets with ease and gain trust with end users with rapid deployment and management.

Rajant's Best Practice:

In the Canadian oil sands, Rajant anticipates that its products will become the benchmark for all communication purposes and in all properties. Currently, they work with Canadian Natural Resources Limited (CNRL), Albian Sands Energy, Inc., Suncor Energy, Inc., Syncrude Energy, Inc., BP, and Shell to build the network infrastructure in the Canadian oil sands. As an early mover, Rajant fills a huge gap in the market for reliable and mobile network solutions in that region. Its technology enables it to achieve roughly around 20% improvement in profits and provide a network infrastructure to manage its assets and operations in an efficient manner. From mining to oil sands to shale fields, Rajant delivers reliable and resilient networks in a shorter span of time in the innovation cycle.

Product/Service Value:

Wireless communication becomes a desirable service as enunciated by the tremendous growth in both cellular and wireless local area networks. However, the main drawback of the technology is its complexity, as the main source of this complexity is a combination of wireless technology (with its flexibility and drawbacks) and the unusual role of each wireless node (as simultaneously router and host). Rajant's mesh network enables mobility and ease of use without much hassle of configuration. Moreover, its BreadCrumb® device can be used in conjunction with the other competing products already in place and enables the user to establish communication in a totally new environment. The self-healing feature of Rajant enables mesh networks to take whatever is added into the network and configure it automatically without any impact. These are some of the value-added features that Rajant offers as the best value for the price when compared to similar offerings in the market.

Rajant's Best Practice:

In the case of a Kennecott Utah copper mine (KUCC), the client faced the challenge of expanding wireless networks with its mine expansion but with non-stop operations. Moreover, they also needed a mobile solution that could adapt to the network facilities. Rajant provided BreadCrumb® wireless solution to this client challenge and installed an

infrastructure that adapts to the mine expansion. Moreover, they also ensured enough bandwidth was available to support many new applications in the future. As a result of the Rajant wireless network enabling these applications, KUCC was able to save more than $7 million in operational cost in the first 90 days alone.

Total Customer Experience:

Generally, the end users in the energy sector prefer to buy end-to-end solutions from a single vendor, from a complete-solution provider, or from a system integrator. In the past, Rajant has partnered with Tata Consulting Services (TCS) to provide mesh-networking solutions to its mining customers, including Rio Tinto's Mine of the Future program. They have also partnered with Ivara to provide an infrastructure for Ivara's asset management solutions in mining. In this way, Rajant is constantly working with integrators and solution providers to implement safety systems, security systems, quality assurance systems, and VOIP applications. In wireless integration, they also work with big companies such as Cisco and Juniper as a complementary partner in providing a best-in-class network infrastructure.

Seeing the enormous number of opportunities in shale energy operations, Rajant has its development team design products by anticipating the future needs of Rajant users across multiple industries. Rajant is very confident in giving a solution that includes a routing technology and a network management platform that is flexible and secure and that allows for rapid deployment. Because this is an emerging market, Rajant's leading kinetic mesh-networking technology can influence the market and transform the way in which the fields are currently operating. It is an obvious choice for the system integrators or complete-solution providers to partner with Rajant to enable its solutions and pass on the benefits to the end users. Considering the present situation in the shale fields' upstream and midstream operations, Rajant can make a great difference with its kinetic mesh-networking technology.

Rajant's Best Practice:

Rajant is always looking for new partners to help take its Breadcrumb® wireless network nodes to the market. Recently, Rajant partnered with Trimble, a solution provider for applications based on location or position; this enabled Trimble to add a wireless mesh-network solution to its mining solutions, provide a complete communication infrastructure, and enabled the purpose of mapping the location or position. This enables Rajant's customers to receive exceptional services at every stage of the purchase cycle.

Conclusion

Breadcrumb® hardware nodes, Instamesh routing software, and BC commander (a network management tool) together furnish a complete kinetic mesh-networking solution that sets the standard for performance and reliability. Rajant provides a highly suitable network solution for mobile environments, such as mining, military, and energy operations. Rajant's kinetic mesh network can be a best-in-class solution for the growing needs of shale energy operations and for connecting rail cars over the country-wide railroad network. The

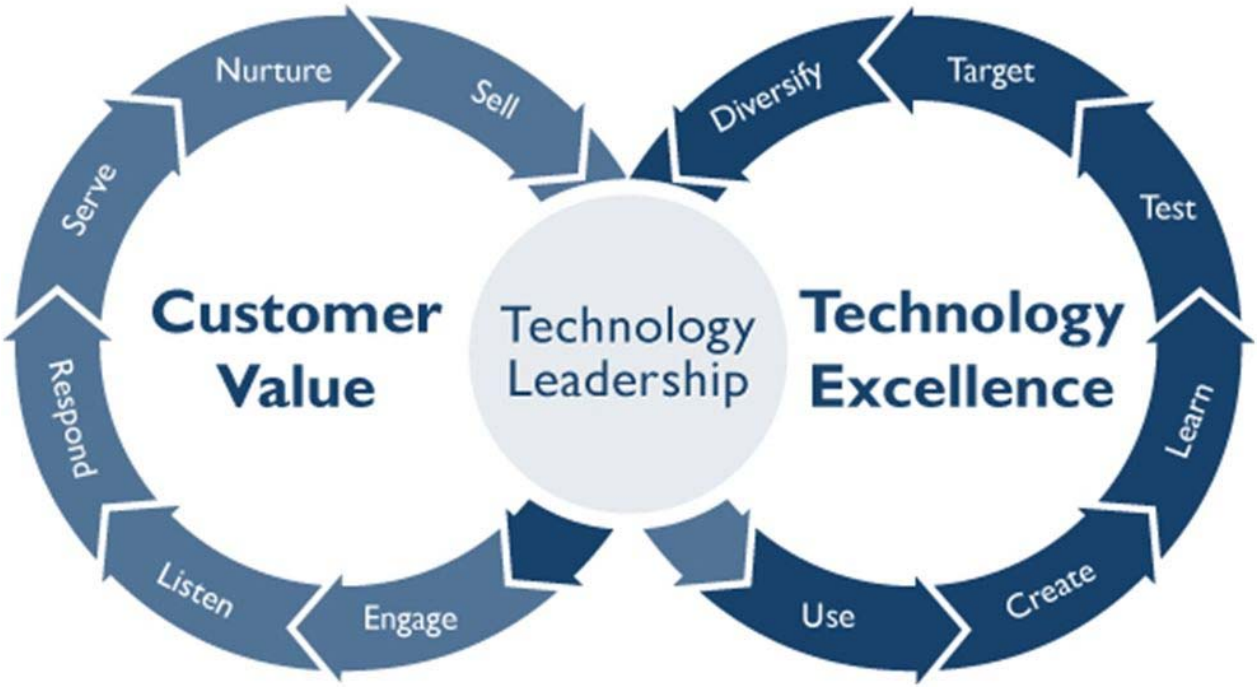
company constantly modifies its existing products and introduces newer versions suiting the requirements of end users. In addition, they have partnered with several leading system integrators, complete solution providers, and (in some cases) even other competitive solution providers to provide a complementary, robust, reliable, and scalable solution. In total, Rajant has given a thoroughly game-changing technology to the energy, mining, and military market and now is busy with many business development activities in shale energy and the Canadian oil sands. The company strongly believes that it can make a huge difference in performance of profits of oil producers by providing a reliable, high-bandwidth network solution. According to Frost & Sullivan's independent analysis of total mesh-networking solutions, Rajant Corporation is recognized with the 2014 Global Mesh Networking Solutions for the Industrial Environment Enabling Technology Leadership Award.

Significance of Enabling Technology Leadership

Ultimately, growth in any organization depends upon customers purchasing from your company, and then making the decision to return time and again. In a sense, then, everything is truly about the customer—and making those customers happy is the cornerstone of any long-term successful growth strategy. To achieve these goals through technology leadership, an organization must be best-in-class in three key areas: understanding demand, nurturing the brand, differentiating from the competition. This three-fold approach is explored further below.

Understanding Technology Leadership

Of course, product quality (driven by innovative technology) is the foundation of delivering customer value. When complemented by an equally rigorous focus on the customer, companies can begin to differentiate themselves from the competition. From awareness, to consideration, to purchase, to follow-up support, best-practice organizations deliver a unique and enjoyable experience that gives customers confidence in the company, its products, and its integrity. This dual focus – customer value and technology excellence – is explored further below.



Frost & Sullivan's Global Research Platform

Frost & Sullivan maintains more than 50 years in business and is a global research organization of 1,800 analysts and consultants who monitor more than 300 industries and 250,000 companies. The Company's research philosophy originates with the CEO's 360 Degree Perspective, a holistic research methodology that encourages us to consider growth challenges, and the solutions companies employ to solve them, from every angle. This unique approach enables us to determine how best-in-class companies worldwide manage growth, innovation and leadership. Based on the results of our research in enabling technology leadership, Frost & Sullivan is proud to present the 2014 Global Enabling Technology Leadership Award in Mesh Networking Solutions for the Industrial Environment to Rajant Corporation.

The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

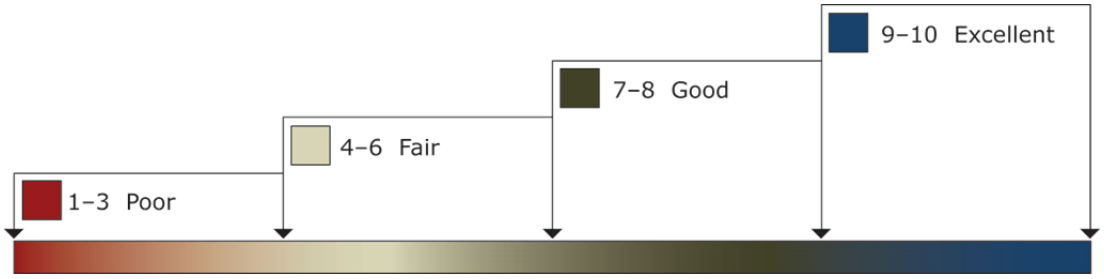
Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often, companies make important growth decisions based 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

Decision Support Scorecard and Matrix

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard and Matrix. This analytical tool compares companies' performance relative to each other. It features criteria unique to each award category and ranks importance by assigning weights to each criterion. The relative weighting reflects current market conditions and illustrates the

associated importance of each criterion according to Frost & Sullivan. This tool allows our research and consulting teams to objectively analyze performance, according to each criterion, 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.



Best Practice Award Analysis for Rajant Corporation

Decision Support Scorecard: Customer Value Excellence

The Decision Support Scorecard, shown below, includes all performance criteria and illustrates the relative importance of each criterion and the ratings for each company under evaluation for the Enabling Technology Leadership Award. The research team confirms the veracity of the model by ensuring 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.

Finally, to remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key players in as Company 2 and Company 3.

DECISION SUPPORT SCORECARD FOR ENABLING TECHNOLOGY LEADERSHIP AWARD (ILLUSTRATIVE): CUSTOMER VALUE EXCELLENCE

Measurement of 1–10 (1 = poor; 10 = excellent)	**Award Criteria**					
Customer Value Excellence	Total Customer Experience	Product/Service Value	Purchase Experience	Ownership Experience	Service Experience	**Weighted Rating**
Relative Weight (%)	**20%**	**20%**	**20%**	**20%**	**20%**	**100%**
Rajant Corporation	8.0	8.0	8.0	10.0	8.0	8.4
Company 2	7.0	7.0	7.0	5.0	6.0	6.4
Company 3	6.0	7.0	8.0	7.0	7.0	7.0

Criterion 1: Total Customer Experience

Requirement: Customers receive exceptional impression at every stage of the purchase cycle

Criterion 2: Product/Service Value

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

Criterion 3: Purchase Experience

Requirement: It is as simple for salespeople to sell the product or service as it is for the customer to buy the product or service

Criterion 4: Ownership Experience

Requirement: Customers are proud to own and use the company's product or service

Criterion 5: Service Experience

Requirement: Customer service is accessible, fast, and stress-free

DECISION SUPPORT SCORECARD FOR ENABLING TECHNOLOGY LEADERSHIP AWARD (ILLUSTRATIVE): TECHNOLOGY EXCELLENCE

Measurement of 1–10 (1 = poor; 10 = excellent)	**Award Criteria**					
Technology Excellence	Commitment to Innovation	Commitment to Creativity	Stage Gate Efficiency	Commercialization Success	Application Diversity	**Weighted Rating**
Relative Weight (%)	**20%**	**20%**	**20%**	**20%**	**20%**	**100%**
Rajant Corporation	8.0	9.0	9.0	10.0	9.0	9.0
Company 2	6.0	7.0	7.0	5.0	6.0	6.2
Company 3	7.0	8.0	8.0	7.0	8.0	7.6

Criterion 1: Commitment to Innovation

Requirement: Conscious, ongoing development of an organization culture that supports the pursuit of groundbreaking ideas

Criterion 2: Commitment to Creativity

Requirement: Employees known for pushing the limits of form and function, and who are unafraid to pursue "white space" innovation

Criterion 3: Stage Gate Efficiency

Requirement: A process that moves creative, groundbreaking concepts quickly and profitably from early-stage investments to late-stage prototyping

Criterion 4: Commercialization Success

Requirement: A proven track record of taking new technologies to market with a high rate of success

Criterion 5: Application Diversity
Requirement: The development of technologies that serve multiple purposes and can be embraced by multiple user types

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.