



COPPER MOUNTAIN
TECHNOLOGIES

2017 Global Universal Serial Bus (USB) Vector Network Analyzer (VNA) Product Leadership Award

FROST & SULLIVAN

BEST
2017 PRACTICES
AWARD

GLOBAL UNIVERSAL SERIAL BUS (USB)
VECTOR NETWORK ANALYZER (VNA)
PRODUCT LEADERSHIP AWARD

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Background and Company Performance

Industry Challenges

Frost & Sullivan's ongoing research confirms that Internet of Things (IoT), 5G, and automotive radars will be the key growth drivers for radio frequency (RF) instrumentation over the next 5 years. However, an important challenge lies ahead for customers as these technologies move from the research and development stage to the manufacturing stage: cost. In manufacturing, IoT devices are expected to be produced in mass quantities, but they cannot support a high cost of test. This drives the need for automation and less expensive test equipment, including vector network analyzers (VNAs). Similarly, the deployment phase of these products calls for a lower cost and small, highly portable instruments.

VNAs in particular are demanding test instruments, which has resulted in their higher price point and larger physical size than other RF instruments (like signal generators and signal analyzers). Frost & Sullivan points out that this clearly limits their use. A number of customers today need VNAs but do not have access to the technology due to the economic and size constraints. In addition, customers require strong support from their VNA suppliers, but many do not get it based on the focus suppliers typically give only to larger customers.

As a result of these challenges, Frost & Sullivan notes that a newer kind of instrumentation is emerging based on universal serial bus (USB). However, many of the early introductions of USB instruments were low in quality and performance. VNAs, in particular, are instruments that customers have uncharacteristically high expectations for, irrespective of their budgets. With the market moving IoT products from research to commercialization, customer requirements for reliability will also soar, along with demand for smaller, lower cost, and more automated instruments. Frost & Sullivan feels that the VNA suppliers best able to address these challenges will witness commercial success in the coming years.

Product Family Attributes and Business Impact

Match to Needs

Started in 2011, Copper Mountain Technologies (CMT) specializes in USB instrumentation—specifically, USB VNAs. The company supplies smaller instruments that can be easily integrated into systems and provide both quality measurements and reliable results.

Over the past few years, the company has expanded its product portfolio of USB VNAs to include various models of different performance, size, and price points to accommodate the needs of a variety of customers. Its portfolio of VNAs includes a line of 1-port VNAs

(also known as reflectometers or cable and antenna analyzers) and the Compact, Planar, and Cobalt product lines. CMT offers 4 models for 1-port VNAs that range in frequency from 1 MHz to 18 GHz. Its Compact product line, which scores high in form factor while still providing sufficient performance for many customers, includes 6 models ranging in frequency from 9 kHz to 8.5 GHz. Planar, CMT's full-size VNA product line, includes 4 models ranging in frequency from 100 kHz to 8 GHz. Finally, CMT's flagship Cobalt line includes 12 models ranging in frequency from 100 kHz to 20 GHz. The company also offers the CobaltFX system, which is a high-performance (yet affordable) millimeter-wave solution and is the result of its partnership with Farran Technology. At IMS 2017, CMT continued on its path and launched new models in its award-winning Cobalt family of VNAs, including 2-port and 4-port analyzers with options for Direct Receiver Access and frequency extensions.

Compared to other test instruments such as oscilloscopes and spectrum analyzers, Frost & Sullivan points out that VNAs are typically more demanding and complex. Overall, customers are looking for smaller and less expensive VNA solutions but are not willing to compromise on feature set and performance. They are not willing to sacrifice the highly metrological aspects of VNAs and demand both accuracy and traceability.

CMT has spent over 10 years working on the metrological aspects of its VNA solutions to address these expectations, keeping instrument performance a priority. The company has a dedicated metrology group that focuses on temperature stability and measurement accuracy during the design phase of the instruments in order to guarantee that solutions will perform as per the specifications.

Positioning

CMT targets Tier II and Tier III customers that do not have the needs or the means to afford high-end VNA solutions from incumbents. The majority of its revenues (around 90%) come from medium and small companies. However, by using independent sales representatives and solving particular issues large customers face, CMT also counts larger companies as customers. The company has been successful with large customers by providing solutions to specific problems that traditional analyzers cannot solve, including the need for a small, portable instrument with high performance, an embedded module that provides bench-top VNA quality measurements, or specific arrangements fitting for specific space or automation constraints.

From an industry standpoint, Frost & Sullivan agrees that the company's customer base is extremely varied. One area in which the company has experienced much interest lately is in material testing. It has worked with several customers in this area, notably Compass Technologies, which has achieved advances by using CMT's 1-port VNA. This has enabled Compass Technologies to increase the accuracy of its tests by eliminating the use of unstable test cables. The company has also seen success in the education sector, with

colleges interested in CMT's VNAs because they are able to acquire 5 to 10 instruments with the same funding typically required for one traditional VNA.

Product/Service Value

Frost & Sullivan analysis confirms that CMT distinguishes itself from competition by offering quality measurement VNAs that provide reliable results, yet are small, can be simply integrated into systems, and are more affordable than traditional analyzers. Because of the typical customer's size, many have to pay list price for VNAs with competitors, which typically means between \$50,000 and \$60,000 for an instrument comparable to CMT's VNAs. Alternatively, customers may seek used instruments.

In addition, Tier II and Tier III customers largely do not receive the specialist support they need to address their specific application from incumbents. In contrast, CMT puts a great emphasis on providing outstanding support to such customers and has a dedicated team of engineers tasked to respond to customer questions. Its smaller (but more innovative) software team provides the VNA software application for the hardware to customers and supports them in automation. In the past year, the team wrote production automation software for customers that run their entire production test process and cover test runs, test results sorting and storage, work order generation, work order status recording, labeling, and part number assignments. These services go far beyond what competitors do for small customers.

CMT has also increased its focus on customization in the past year. Without a computer inside the VNA box, CMT is not limited by a computer or screen size, dials, and buttons. CMT can easily move modules and PC boards around, thereby changing the form factor, type, and location of connectors to conform to specific customer requirements in terms of form factor or dimensions.

Customer Acquisition

CMT's current customer base consists heavily of companies involved in research activities. Innovators/early adopters are more willing to adopt new technology compared to customers in mission-critical applications (like production) and have been CMT's first customers. However, production customers have been evaluating CMT units for several years and using them in various parts of their operations. Because of this experience, they are now confident about using the units more extensively. Last year, the company witnessed success on this front particularly in the cable TV industry, which embraced CMT's 75-ohm solution. The company stands at the dawn of an era during which it will experience significant adoption in the production and deployment space as IoT products move from research and development to the manufacturing phase and as customers require more cost-effective and smaller solutions. Frost & Sullivan expects this to fuel the growth of CMT in the next few years.

Growth Potential

As a result of the challenges customers face with the cost of tests, the awareness and adoption of USB instrumentation is growing in the market. CMT improves its growth potential by partnering with companies in the broader USB instrumentation ecosystem, a method that further increases the value proposition of USB instrumentation to customers. For example, in recent seminars, CMT and Berkeley Nucleonics demonstrated how different USB instruments can be integrated with a common user interface (UI) on the same computer, thereby delivering added value to customers.

Financial Performance

CMT has now been in business for around five years and has witnessed significant growth year-over-year during this time period. 2016 was a difficult year for the market, which slowed down the company's revenue performance. Still, the company continued to deliver growth over 2015 mainly due to its higher price-performance value. In 2016, CMT received a record level of quote requests, and the first part of 2017 has been quite successful due to the conversion of quote requests received over the past few months into orders. With newer product introductions scheduled throughout the year, CMT is expected to witness increasingly strong growth in 2017 and beyond.

Conclusion

A pioneer in the universal serial bus (USB) vector network analyzer (VNA) market, Copper Mountain Technologies (CMT) has introduced a range of solutions aligned with the growing customer requirements for less expensive, smaller, more portable, and higher performance VNAs over the past 10 years. CMT's unrivalled commitment to the development of quality USB VNAs has fueled the company's growth. The imminent move of many IoT technologies from research to commercialization is expected to drive the demand for lower cost instrumentation over the next 5 to 10 years. Frost & Sullivan research concludes that CMT is well positioned to capitalize on this opportunity with a strong and established USB VNA offering coupled with superior customer support spanning customer service, software development, and customization.

With its strong overall performance, Copper Mountain Technologies has earned the 2017 Frost & Sullivan Global Product Leadership Award.

Significance of Product Leadership

Ultimately, growth in any organization depends upon 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 three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



Understanding Product Leadership

Demand forecasting, branding, and differentiating all play a critical role in finding growth opportunities for a superior product line. This three-fold focus, however, must be complemented by an equally rigorous focus on pursuing those opportunities to a best-in-class standard. Customer communications, 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, increased market share will inevitably follow over time.

Key Benchmarking Criteria

For the Global Product Leadership Award, Frost & Sullivan analysts independently evaluated two 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

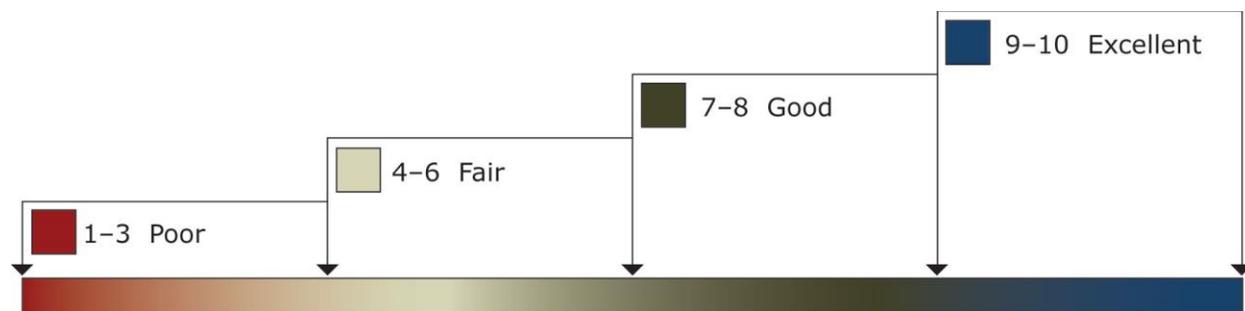
- Criterion 1: Financial Performance
- Criterion 2: Customer Acquisition
- Criterion 3: Operational Efficiency
- Criterion 4: Growth Potential
- Criterion 5: Human Capital

Best Practices Award Analysis for Copper Mountain Technologies

Decision Support Scorecard

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

RATINGS GUIDELINES



The Decision Support Scorecard is organized by Product Family Attributes and Business Impact (i.e., These are 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, we have chosen to refer to the other key participants as Competitor 2 and Competitor 3.

<i>Measurement of 1-10 (1 = poor; 10 = excellent)</i>			
Product Leadership	Product Family Attributes	Business Impact	Average Rating
CMT	9.6	9.0	9.3
Competitor 2	8.4	8.0	8.2
Competitor 3	8.0	7.5	7.8

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 need 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 revenues, 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

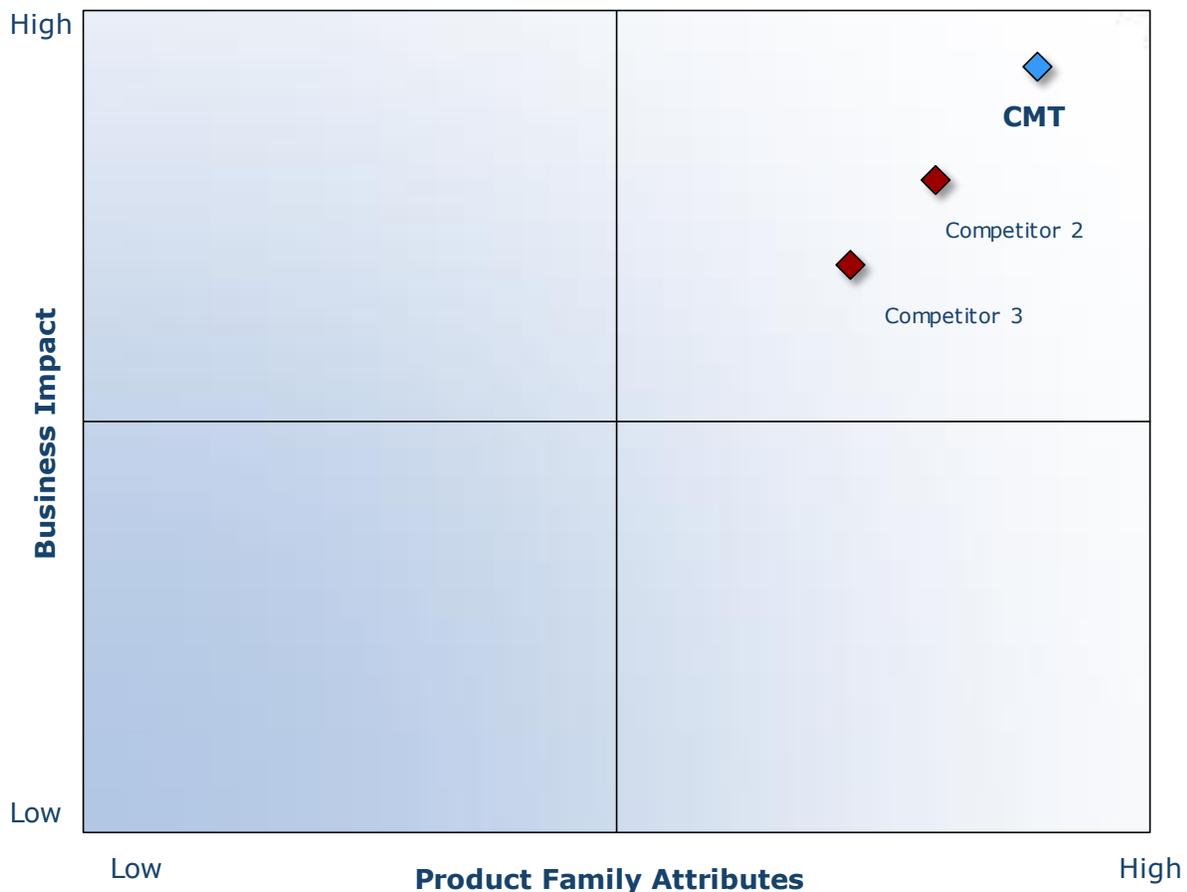
Requirements: Product quality strengthens brand, reinforces customer loyalty, and enhances growth potential.

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 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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

