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2015

COPPER MOUNTAIN
TECHNOLOGIES

2015 Global Vector Network Analyzer Competitive Strategy Innovation and Leadership Award

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50 Years of Growth, Innovation & Leadership

Contents

Background and Company Performance

Industry Challenges

Network analyzers are critical test and measurement equipment for any engineer. From a market perspective, this segment of the electronic test equipment market ranks fourth behind oscilloscopes, signal generators, and signal analyzers, generating revenues of about $315 million globally. However, these instruments are expensive, limiting sales. All customers who need a vector network analyzer (VNA) are not able to acquire the desired instrument and often have to use older second-hand equipment. Customers who cannot afford the best quality equipment in the market are forced to use lower performance, less reliable, and bulkier counterparts. Even those who can afford VNAs can only afford a small number of instruments, resulting in frustrations among engineers who often have to share the same equipment. Furthermore, VNAs are becoming even more expensive than they already are, making these instruments less and less accessible to those who need them. Although there is an increasing need for network analyzers, fewer engineers can afford them. Companies able to provide high performance yet affordable instruments to the market are expected to witness success.

Strategy Innovation and Customer Impact

Customer Ownership Experience

Copper Mountain Technologies (CMT) has a range of VNAs that is used across applications, including research and development, production, and fieldwork. The proliferation of Radio Frequency (RF) use is driving demand for VNAs, which are finding applications in a variety of new industries including medical equipment, food service, access control, etc., as wireless transceivers and receivers are being put in a range of equipment and devices.

The small form factor of CMT's VNAs makes them particularly well suited for field applications, such as antenna testing, enabling customers to bring laboratory-grade instruments to hard-to-reach places. The small size and low weight of CMT's VNAs are also advantageous for applications in the manufacturing industries. For example, applications such as base transceiver station (BTS) filter tuning or semiconductor manufacturing require a wide dynamic range and fast speed. CMT's C1209 and C1220 are ideal instruments for these applications because they not only address the performance requirements of the applications but their form factor also enables them to be put on top of the handlers rather than being put on the side, where they take up space. As a result, customers are able to put more handlers in a room, increasing throughput. With CMT's VNAs, customers also get the additional benefit of instantaneous data transfer as the VNA and the handler are in the same operating system (OS).

Customers are also finding new applications for CMT's VNAs as a result of their smaller size. While leading mid-range VNAs are too big, heavy, or expensive to be dragged

around, this is not the case for CMT's VNAs. Customers have been able to take the instruments to remote places. A case in point is Colorado State University, which has taken its VNA to the top of a glacier to perform experiments. CMT's VNAs are also used in CERN's particle accelerator in Geneva, Switzerland to measure cables' integrity and resonance frequency tuning. NASA Glenn Research Center in Cleveland, OH, USA is using CMT's reflectometers to measure the amount of liquid oxygen, which is used as propellant in space applications, remaining in a tank. These customers were not able to do this before due to the size and weight of the instruments they were using. Also, the instruments were so expensive that they did not want to risk damaging them. A number of customers are also using CMT's VNAs to enhance their sales efficiency. Sales personnel take them to tradeshows or client sites to showcase their product's performance rather than hand over data sheets.

Competitive Differentiation

CMT differentiates itself in the market by providing performance instruments at a lower price point and in a smaller form factor than the competition. Its VNAs are PC-driven, enabling them to be used with any Windows machine. The company offers compact as well as full-size instruments. Its patent-pending Planar R54 and R140reflectometers provide up to 100,001 measurement points, time domain with gating standard, DTF measurements, and fixture simulation, and have a frequency range of 85 MHz to 5.4 GHz or 14 GHz. Its compact VNA product line includes the TR1300/1, 5048, and 7530 models for applications ranging in frequency from 20 kHz to 4.8 GHz, featuring a dynamic range of up to 135 dB typical. Its full-size VNA product line includes four models: Planar 304/1, Planar 804/1, Planar 808/1, and Planar 814/1. These VNAs have the form factor of a 19-inch chassis and range in frequency from 100 kHz to 8 GHz. The 304/1 model provides a dynamic range of 140 dB while the other three models in the series provide 150 dB. In May 2015, the company extended its product line with the introduction of Cobalt, which includes two models, the C1209 and the C1220. The Cobalt units score high on price-performance with a frequency range of up to 9 or 20 GHz (depending on the model), a dynamic range of 145 dB typical, and measurement speed of 15 or 10 µs (depending on the model). These models are an innovative combination of fast measurement time, wide dynamic range, and small size. While there are competing instruments that provide similar performance, they are typically much bigger and more expensive.

Price-Performance Value

CMT provides instruments with comparable performance to leading mid-range VNAs for a lower price. For example, the new Cobalt C1209 has a price of under $24K while the C1220 is priced under $45K. One of the innovations that have enabled the company to lower the price of these instruments drastically is the removal of the computer that is included in the leading traditional VNAs in the market. Removing the computer also eliminates potential challenges for customers as computers evolve quickly and may

develop hard drive, display, or memory issues. Moreover, this removal translates into a significant reduction in size, which is helpful for portable applications, particularly as a large number of customers need to perform testing at the test point. This reduced size is also useful for applications in the manufacturing industry as it enables more machines to be put into plants. Although there are lower priced products in the market than CMT's VNAs, CMT offers the best value as no sacrifices are made in its products from a performance standpoint. Even extremely cost-conscious customers have opted for CMT's products after performing side-by-side comparisons with competing solutions. Significant innovation was put into the design of CMT's products to deliver similar or better performance than leading mid-range VNAs in a smaller form factor and at a lower price.

Strategy Effectiveness

CMT's strategy is to provide customers who have limited financial resources a good quality VNA. To that end, the company has developed its own algorithms and has a metrology group that ensures the devices have high precision, accuracy, and stability. Schmid & Partner Engineering AG (SPEAG), for example, which makes probes to test the dielectric properties of materials, has used CMT's Planar R140 to create a portable test system by attaching its probe directly to the port of the analyzer. The VNA's small form factor enables SPEAG to perform the testing directly on the material. The DockOn Engineering Team states, "CMT devices are lightweight, compact and a necessary tool for technical sales or engineers on the go. The software interface allows users to test RF products with any standard computer system. This is a revolution and a relief in terms of space occupied in the lab, measurement reliability and dynamic range. CMT provides the highest level of timely and attentive customer care."

A number of universities, such as Pennsylvania State University, have also conducted side-by-side performance comparisons of CMT's VNAs against leading brands and found them to perform as well as or better than the competing instruments. Providing quality performance instruments in a smaller form factor and at a lower price than comparable solutions have enabled the company to grow significantly since its inception, doubling its revenues every year.

Strategy Execution

The story of CMT started in 2006 when a group of engineers was frustrated with paying a lot of money for network analyzers and still not having enough instruments for all the engineers in the team. The group began to work on a product that would solve these problems and spent two years testing the product with select customers. The first product started shipping in 2008. Based on the positive response from the market, the company was officially created in 2011. From the very beginning, the company made it a point to bring an affordable instrument to the market but not sacrifice performance for the sake of a lower price. To that end, it put together a metrology group to develop high-performance instruments whose specifications would be guaranteed. Temperature stability and

measurement accuracy were top priorities for the development team during the design process of the products. Today, CMT uses a large portion of its revenue to fuel its development process to build more products and enhance the functionality of existing ones according to the feedback the company receives from customers. One of the greatest challenges for the company is the perception that a lower price product also provides lower performance. To overcome this challenge, the company has a significant pool of demonstration units to prove the capabilities of the product to potential customers.

Customer Service Experience

CMT has a team of engineers dedicated to answering questions from customers. They endeavor to go above and beyond the call of duty to serve customers that would not receive the same level of attention from larger competitors who focus on serving larger accounts. Recently, in response to a customer's request for an application note, the CMT team spent a few hours putting together a YouTube video to show the customer exactly how to proceed. Moreover, while visiting a cable assembly customer, the team noticed personnel manually performing tasks that could be automated and helped the customer set limit tests, parameters, and automate the tasks. While every VNA user benefits from CMT's innovation, the biggest beneficiaries are those that have limited financial resources. These customers also happen to have a higher requirement for support than larger companies and CMT intends to help them. CMT's purpose goes beyond selling a box to the customer.

Conclusion

Officially launched in 2011, Copper Mountain Technologies is a breath of fresh air in the network analyzers market. The company has introduced network analyzers that offer mid-range performance in a smaller form factor and at a lower price than existing solutions in the market, thereby making this instrument more accessible to a number of customers who had a need for it but could not afford the more expensive existing solutions. The market responded positively to the new products and the customer-focused approach of the company, driving its revenue growth over the past 4 years.

With its strong overall performance, Copper Mountain Technologies has earned Frost & Sullivan's 2015 Competitive Strategy Innovation and Leadership award.

Significance of Competitive Strategy Innovation and Leadership

Any successful approach to achieving top-line growth must (1) take into account what competitors are, and are not, doing; (2) meet customer demand with a comprehensive, value-driven product or service portfolio; and (3) establish a brand that resonates deeply with customers and stands apart from other providers. Companies must succeed at these three things—brand, demand, and positioning—to achieve best-practice levels in competitive strategy.

Understanding Competitive Strategy Innovation and Leadership

As discussed above, driving demand, brand strength, and competitive differentiation all play a critical role in delivering unique value to customers. This three-fold focus, however, must ideally be complemented by an equally rigorous focus on strategy innovation and customer impact.

Key Benchmarking Criteria

For the Competitive Strategy Innovation and Leadership Award, Frost & Sullivan analysts independently evaluated two key factors—Strategy Innovation and Customer Impact—according to the criteria identified below.

Strategy Innovation

Criterion 1: Strategy Effectiveness
Criterion 2: Strategy Execution
Criterion 3: Competitive Differentiation
Criterion 4: Executive Team Alignment
Criterion 5: Stakeholder Integration

Customer Impact

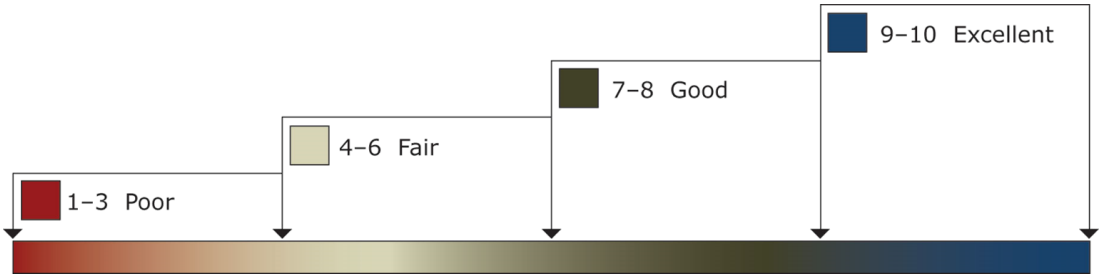
Criterion 1: Price/Performance Value
Criterion 2: Customer Purchase Experience
Criterion 3: Customer Ownership Experience
Criterion 4: Customer Service Experience
Criterion 5: Brand Equity

Best Practice 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 Strategy Innovation and Customer Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criteria are provided beneath the scorecard). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to

the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key players as Competitor 1, Competitor 2 and Competitor 3.

DECISION SUPPORT SCORECARD FOR COMPETITIVE STRATEGY INNOVATION AND LEADERSHIP AWARD

Measurement of 1–10 (1 = poor; 10 = excellent)			
Competitive Strategy Innovation and Leadership	Strategy Innovation	Customer Impact	**Average Rating**
Copper Mountain Technologies	9.6	9.0	9.3
Competitor 1	8.2	7.8	8.0
Competitor 2	8.2	7.4	7.8
Competitor 3	8.6	7.8	8.2

Strategy Innovation

Criterion 1: Strategy Effectiveness

Requirement: Strategy effectively balances short term performance needs with long-term aspirations and vision for the company

Criterion 2: Strategy Execution

Requirement: Adoption of best-in-class processes to support the efficient and consistent implementation of business strategy

Criterion 3: Competitive Differentiation

Requirement: Unique competitive advantages with regard to solution or product are clearly articulated and well accepted within the industry

Criterion 4: Executive Team Alignment

Requirement: The executive team is aligned on the organization's mission, vision, strategy and execution

Criterion 5: Stakeholder Integration

Requirement: Strategy reflects the needs or circumstances of all industry stakeholders, including competitors, customers, investors, and employees

Customer Impact

Criterion 1: Price/Performance Value

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

Criterion 2: Customer Purchase Experience
Requirement: Customers feel like they are buying the most optimal solution that addresses both their unique needs and their unique constraints

Criterion 3: Customer Ownership Experience
Requirement: Customers are proud to own the company's product or service, and have a positive experience throughout the life of the product or service

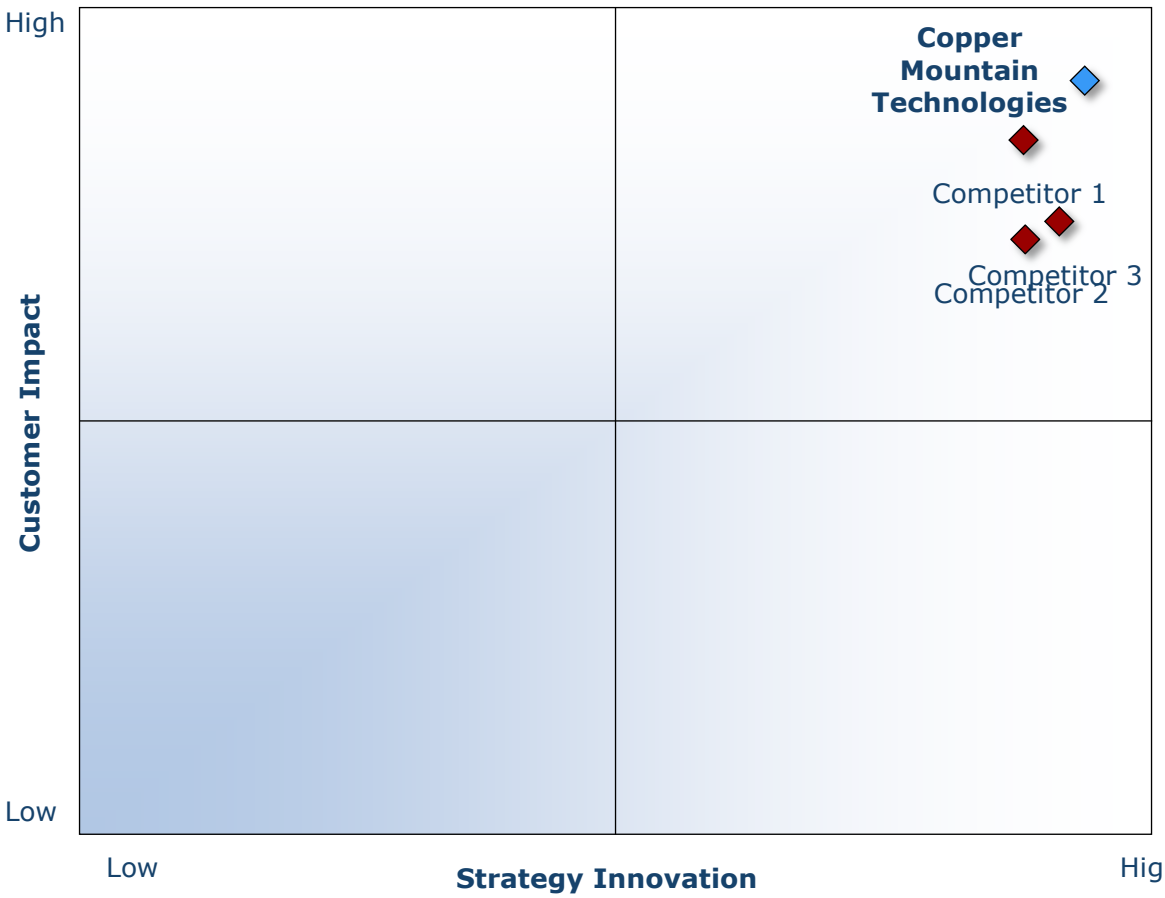
Criterion 4: Customer Service Experience
Requirement: Customer service is accessible, fast, stress-free, and of high quality

Criterion 5: Brand Equity
Requirement: Customers have a positive view of the brand and exhibit high brand loyalty

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts can then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.

DECISION SUPPORT MATRIX FOR COMPETITIVE STRATEGY INNOVATION AND LEADERSHIP AWARD



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

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

About 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.