

MOBILE BASE STATION ANTENNA VENDOR RANKING

Originally published August 15, 2019

Rosenberger

“OUT OF ALL THE VENDORS ASSESSED ROSENBERGER HAD THE HIGHEST YOY REVENUE GROWTH OF 28.8% IN 2018 TO GARNER 1.5 POINTS IN MARKET SHARE AND GAIN ONE RANK POSITION TO JOIN THE TOP 4. EXCEPT FOR HUAWEI ALL OTHER VENDORS LOST SHARE.”

Nick Marshall, Research Director
ABI Research

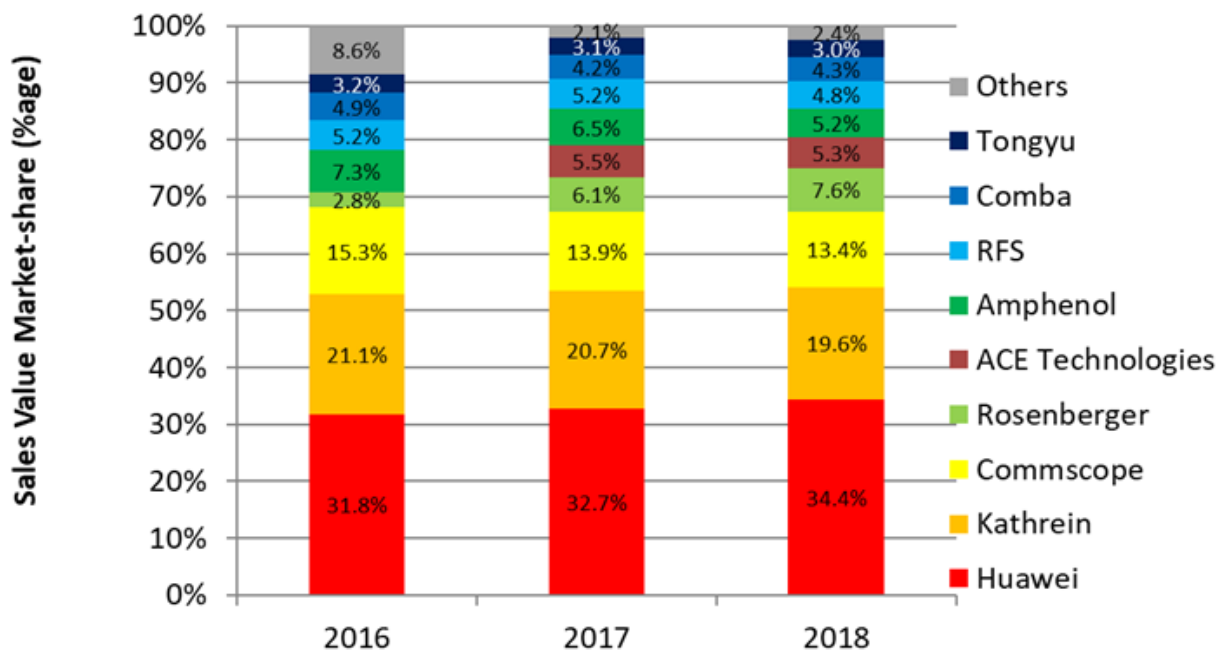
Competition in the mobile cellular antenna space is intense. As 5G is being deployed, the role of passive antennas remains relevant, especially because previous generations (2G, 3G, and 4G) systems rely on passive antenna units to operate. The increasing trend is to consolidate all of these systems into one antenna unit and in parallel, deploy Active

Antenna Units (AAUs) supporting Massive Multiple Input, Multiple Output (MIMO) for 5G. This has created new dynamics in the mobile base station antenna market, the results of which are outlined in this report.

Today's base station antennas now offer a complex portfolio of features, such as multi-band, multi-port, active antennas, and hybrid active passive configurations in MIMO and massive MIMO types. This increasing complexity is compounded by space constraints on the macro base station towers themselves. As mobile operators acquire additional spectrum, existing antennas need to adopt these additional antenna technologies and simultaneously offer more compact antenna form factors.

Mobile service providers (msps) design networks for five nines (99.999%) Availability or only 5 minutes per year downtime. Because base station antennas are located

Mobile Cellular Antenna Revenue Market Share
World Markets, 2016 to 2018



outdoors and often in remote, difficult to access locations or in harsh environments the antenna must be designed to withstand wind loads and be compatible with the climate and weather conditions for the location. In general, base station antennas are subject to enormous stress from the weather and the environment.

The largest antenna vendor in the market has been Huawei since 2015. In 2018, the vendor increased its number one position in the market with a 34.4% Share, up from 32.7% In 2017 growing revenue by 9.5%, While unit shipments decreased. This indicates that the value of each antenna has increased as more complex antennas make up an increasing portion of the total revenue mix. Kathrein and commscope retain second and third place in the global antenna market with 19.6% And 13.4%, respectively, in 2018.

While the top three remain essentially unchanged, with number one Huawei growing revenue by 9.5% in 2018 and Kathrein and CommScope with very little or no growth. ABI Research notes that Rosenberger continues to climb the rankings to now take the number four spot with a 7.6% market share or a growth in share of 1.5 percentage points compared to 2017, due to its large year-on-year revenue growth of 28%. Except for Huawei and Rosenberger, all other vendors lost market share.

In ABI Research's competitive mobile macrocell antenna vendor matrix assessment, Huawei achieved an overall score of 94.5, which places it in the number one spot on both the innovation and implementation scales. Kathrein maintained the second spot in the rankings (88.4). ABI Research assigned a ranking of 86.6 to CommScope. CommScope has a solid Long-Term Evolution (LTE) antenna portfolio and a strong presence in a number of high-value markets, such as North America. Rosenberger came in at the number four spot with a combined score of 78.2 and ACE Technologies was number five with a combined score of 73.7.

Rosenberger posted a score of 78.2 for the fourth spot due to its growth in revenue share growing three rank positions in 2017 to fifth and now one rank position to fourth in 2018. The German vendor has been an antenna vendor since 2008, and in the past 4 years, it has built up traction in a number of Asian markets, including India. A number of high-profile trials in the United States and in Europe contributed to a strong innovation score.

ABI Research expects the competition for the number two and three spots to heat up in 2019 with Rosenberger set to challenge number three CommScope, which in turn challenges number two Kathrein (which will be acquired by Ericsson in the third quarter). ABI Research expects Huawei to continue to dominate this market as it holds twice the market share of its nearest rival.

VENDOR MATRIX

After individual scores are established for innovation and implementation, an overall company score is established using the Root Mean Square (RMS) method:

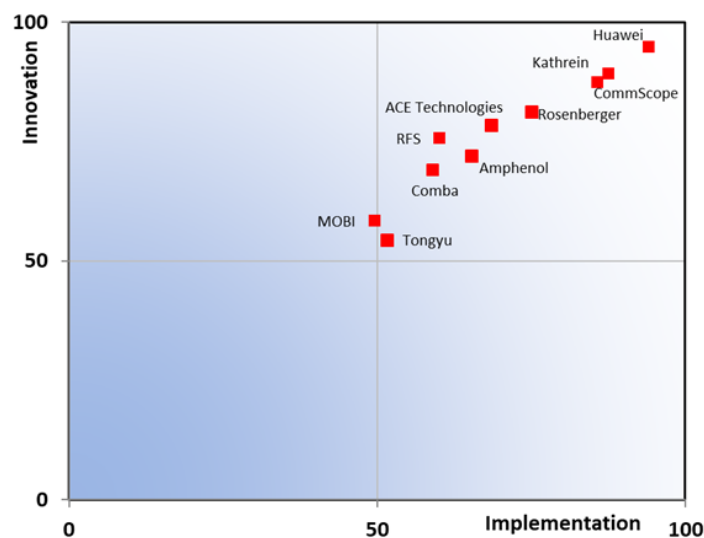
$$\text{Score} = \sqrt{\frac{\text{innovation}^2 + \text{implementation}^2}{2}}$$

The resulting overall scores are then ranked and used for percentile comparisons.

The RMS method, in comparison with a straight summation or average of individual innovation and implementation values, rewards companies for standout performance.

For example, using this method, a company with an innovation score of 9 and an implementation score of 1 would score considerably higher than a company with a score of 5 in both areas, despite the mean score being the same. ABI Research believes this is appropriate as the goal of these matrices is to highlight those companies that stand out from the others.

Innovation versus Implementation Vendor Matrix



The implementation benchmarks provide insight into the vendor's market reach, or its ability to turn product into traction in the market. The innovation benchmarks reflect the vendor's ability to innovate and generate new products. Assessing the state-of-the-art level of innovation is a complex process. Some firms, such as Huawei, conduct the Research and Development (R&D), antenna manufacture, and sales in-house. In other cases, firms like Kathrein conduct their own R&D, antenna manufacture, and sales in-house, but also have collaborations with the Original Equipment Manufacturers (OEMs). The focus of this report and the vendor matrix is on the wholesale antenna manufacturers.

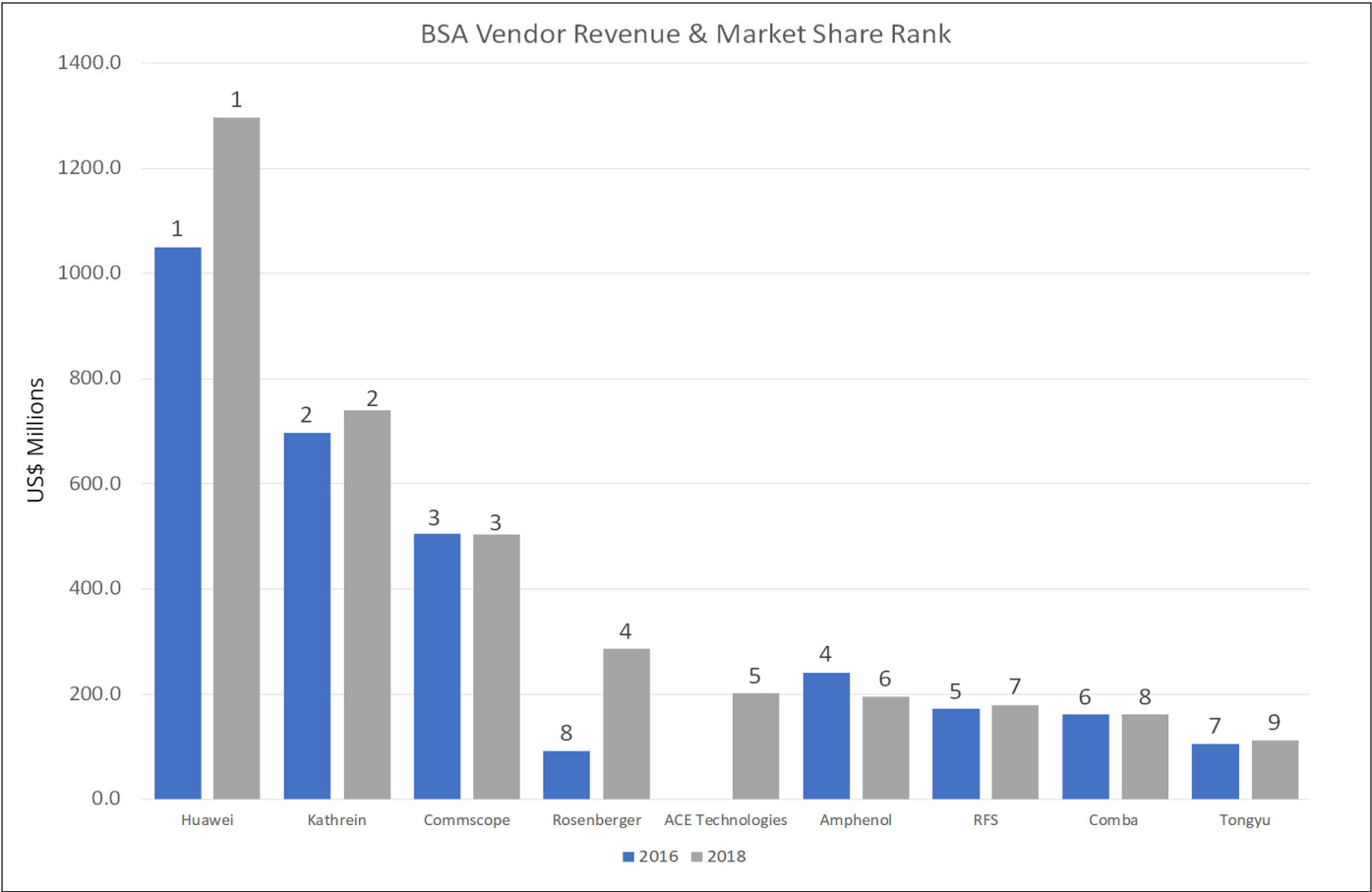
INNOVATION

Today's base station antennas now offer a complex portfolio of features such as multi-band, multi-port, multi-beam, and MIMO (Multiple-Input, Multiple-Output) and massive MIMO, and antennas need to incorporate these technologies in the increasingly space-constrained cell tower as well as resist enormous stresses from the weather and the environment in general.

The innovation ranking is very similar to the implementation in terms of results, mainly due to the linear development nature of antennas. The most innovative vendors are most likely to implement the best products, especially since cellular antennas require heavy R&D spend and effort. Huawei, Kathrein and CommScope are leading, with Rosenberger, ACE Technologies, Amphenol and RFS following.

The multi-band capabilities and ultrawide-band capabilities of the macro base station antenna heavily influence the innovation score on the vendor matrix. While Huawei obtained a first-place score of 95 for innovation, the number two Kathrein, number three CommScope, and number four Rosenberger all lie within fewer than eight points of each other for innovation, indicating an intensely competitive market. ACE Technologies, RFS, and Amphenol form the next group of companies challenging the top four. The point spread between these companies is small, at 6.5 points, meaning that, again, competition is intense and any of these companies could rise to challenge the top four in 2019.

The relative revenue and market share rank between these companies is shown below:



ABOUT ROSENBERGER

Rosenberger was founded in Germany in 1958. Rosenberger provides products and solutions for the telecommunication, automotive electronics, information technology, test & measurement, aviation, and medical & industries sectors. For over half a century, Rosenberger has been a supplier of impedance-controlled and optical connectivity technology. Rosenberger maintains 19 factories and 9 R&D centers, with its Kunshan plant in China and its Goa plant in India being its largest antenna manufacturing centers.

Rosenberger's Antenna R&D center is based in Kunshan, Jiangsu Province in China with more than 4,000 employees. It develops advanced antenna technology for multi-band and multi-port antennas with more than 300 professional RF experts with relevant telecommunications academic and professional qualifications. The company also has its own advanced, near-field test chamber, its outdoor far-field test range, and a number of other environmental test equipment and chambers.

To support the growing mobile data traffic and the development of 5G technology, as a global wireless solutions provider, Rosenberger offers advanced 5G solutions, including a 64T64R Massive MIMO antenna and a 16T16R MIMO antenna covering wide frequency bands (1710 MHz to 2300 MHz, 2400 MHz to 2690 MHz, and 3400 MHz to 3800 MHz), which use beamforming technology to enhance the mobile data capacity and improve spectrum efficiency. Furthermore, Rosenberger has developed Massive MIMO antenna solutions to meet operators' various needs. Rosenberger provides additional communication solutions for densely populated areas. These include multi-band small cell antennas, as well as panel, quasi-omni, and small diameter omni-whip antennas.

To meet the wide range of spectrum needs of MSPs, its antennas can provide broad frequency coverage (617 MHz to 960 MHz, 1695 MHz to 2690 MHz, 3550 MHz to 3700 MHz, and 5150 MHz to 5925 MHz) for site-sharing among 3G/4G/5G systems. Rosenberger antennas can support up to LTE-Advanced and 5G New Radio (NR) 4 x 4 MIMO and carrier aggregation.

MSPs are facing extreme challenges as traffic volumes grow exponentially. To address these constraints, operators will start to deploy six and higher sector solutions to meet the capacity expansion requirements. Rosenberger's 7" diameter Quasi-Omni has a reduced weight and footprint, as well as improved pattern radiation performance. The ultra-slim, multi-band whip antennas are the first whip antenna in the world to cover three bands (1695 MHz to 2180 MHz, 3550 MHz to 3700 MHz, and 5150 MHz to 5925 MHz). Due to its well-recognized connector design expertise, Rosenberger's small cell antennas are fitted with innovative NEX10 connectors, which are the latest generation of RF connectors designed for 5G applications, featuring superior PIM performance, compact size, and robust design.

Alongside Rosenberger's 5G solutions, the company also provides complete multi-port antenna solutions with broad frequency coverage (617 MHz to 960 MHz, 1427 MHz to 2690 MHz, and 3200 MHz to 3800 MHz), compact size, and enhanced performance. The current portfolio features antennas with up to 18 ports with up to 3 columns of low-band elements (6 ports) and up to 6 columns of high-band elements (12 ports); supporting independent remote electrical down-tilt, multi-band carrier aggregation, and supporting 4x4 and higher order MIMO.

For questions on this research, please contact ABI Research.

© 2019 ABI Research. Used by permission. Disclaimer: Permission granted to reference, reprint or reissue ABI products is expressly not an endorsement of any kind for any company, product, or strategy. ABI Research is an independent producer of market analysis and insight and this ABI Research product is the result of objective research by ABI Research staff at the time of data collection. ABI Research was not compensated in any way to produce this information and the opinions of ABI Research or its analysts on any subject are continually revised based on the most current data available. The information contained herein has been obtained from sources believed to be reliable. ABI Research disclaims all warranties, express or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.