

ABI RESEARCH COMPETITIVE RANKING
MOBILE ANTENNA VENDORS

Rosenberger



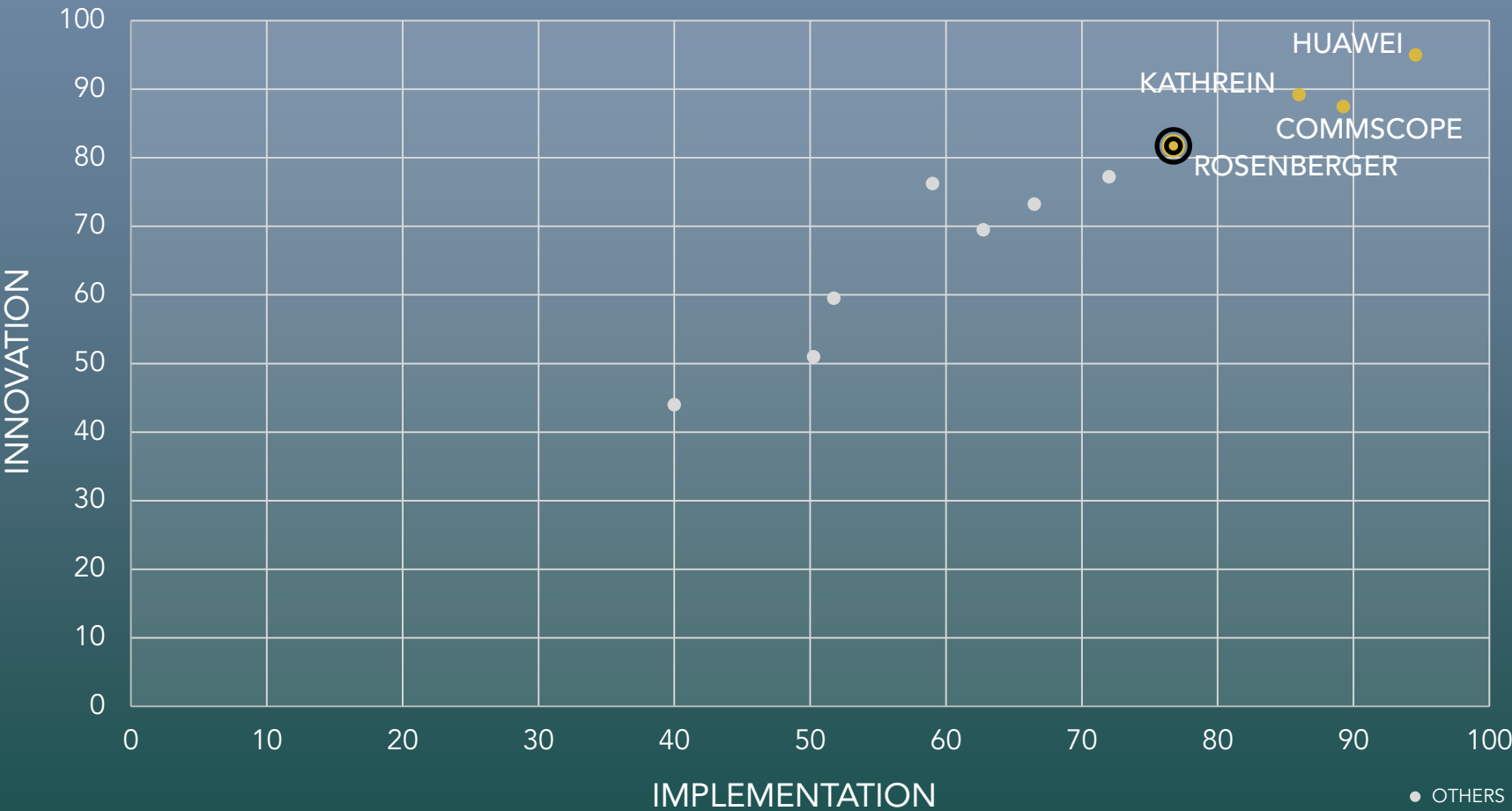
OVERALL: 79.3 | INNOVATION: 81.8 | IMPLEMENTATION: 76.8 | RANK: 4

Rosenberger



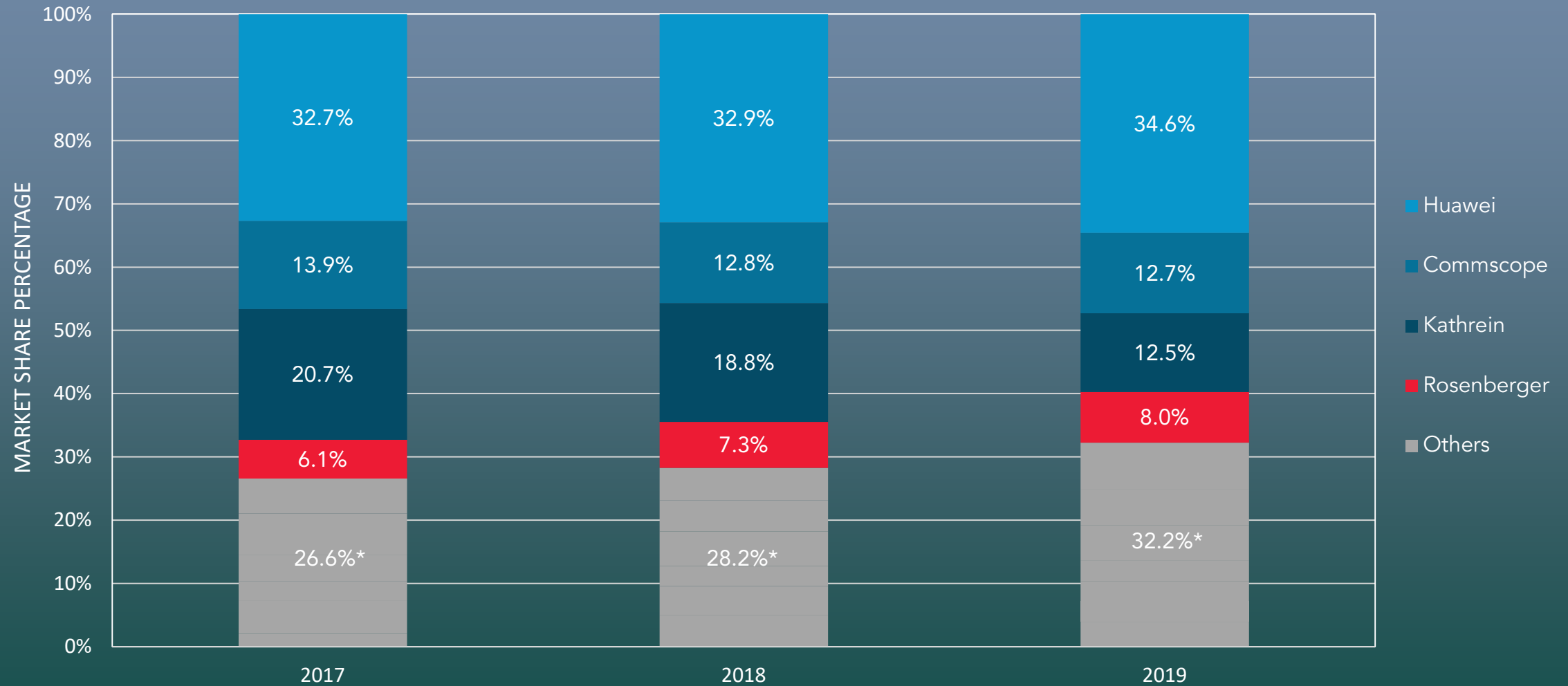
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ROSENBERGER'S MOBILE ANTENNA VENDOR INNOVATION *VERSUS* IMPLEMENTATION FOCUS



MARKET SHARE

MOBILE CELLULAR ANTENNA REVENUE, WORLD MARKETS, 2016 TO 2019



*Includes ACE Technologies, Amphenol, Comba, Tongyu, RFS, MOBI, Hengxin

RANKING LEADERS



COMMScope®

KATHREIN

Rosenberger

The largest antenna vendor in the market has been Huawei since 2015. In 2019, Huawei remained the top market share holder in the base station antenna market with 34.6%. Huawei has seen both increase in its annual revenue and shipment units in 2019.

Kathrein and CommScope has switched their ranking in 2019 with CommScope moving up to second. CommScope and Kathrein's market share is 12.7% and 12.5% respectively in 2019. Following is Rosenberger in fourth place with a market share of 8.0% in 2019.



INNOVATION SUMMARY

In 2019, the top four vendors remained similar to the previous year. Huawei has remained at the top of the ranking. In the innovation ranking, multi-band and ultra-wide band capabilities take on the heaviest weighting. Increasingly, vendors have to address the challenge of consolidating the legacy bands into one antenna and making effective use of the tower space. Antennas and systems that simplify the complexity of antenna deployment will be essential in moving towards the 5G era. Rosenberger's base station antenna portfolio consists of multi-band, multi-beam, FDD+TDD hybrid, as well as small cell and 5G antennas, and caters for LTE Advanced, 5G New Radio 4x4 MIMO, 8T8R Beamforming, and Massive MIMO.



IMPLEMENTATION SUMMARY

Huawei, CommScope and Kathrein continues to lead the implementation table due to their leading network globally and consistent implementation of new antennas and integrated units. Rosenberger follows closely with growth in revenue share. The market share criterion takes on the most significant criterion within the implementation ranking. Huawei continues to hold its fort at number one while Commscope and Kathrein at number two and three respectively. Another key aspect of the implementation ranking is the regional and geographical penetration of the vendors. The presence and outreach of the vendor are key to capturing market opportunities and developments.

INNOVATION

Rosenberger



INNOVATION
SCORE: 81.8

Rosenberger was founded in 1958 in Germany. The company currently employs around 11,300 employees worldwide with about 2,300 employees in its HQ in Fridolfing (Germany). In 2019 the Rosenberger Group recorded a sales revenue of 1.29 Billion Euros (US\$1.44 billion), deriving it mainly from 3 regions: Europe representing about 37% of total sales revenue while Asia represents 36% and the Americas 25%. As of 2019, The Rosenberger Group operates globally 22 manufacturing locations and 10 R&D centers with sales offices in more than 70 different countries. Recently, new facilities in Germany, Hungary, as well as in India were established as a response to the growing market demand worldwide for its different product lines.

Rosenberger's base station antenna portfolio consists of multi-band, multi-beam, FDD+TDD hybrid, as well as small cell and 5G antennas. The company antenna portfolio caters for LTE Advanced, 5G New Radio 4x4 MIMO, 8T8R Beamforming, and Massive MIMO.

Their multi-band antennas run up to 24 and 30 ports configuration and provide frequency coverage from the 600 MHz to 3.8 GHz. These antennas are also equipped with field-exchangeable Remote Electrical Tilt (RET) systems. The FDD+TDD hybrid antennas are catered for the demand of FDD+TDD frequencies operation. They also have various configurations such as 4 low bands with 5 high bands and the 3.5 GHz band.

Rosenberger also has antennas that are meant for TDD only deployments, for example in the 2.3 and 2.6 GHz bands. Aside from these, Rosenberger has solutions catered for 5G, by providing antennas with Massive-MIMO, beamforming, and multi-beam capabilities for 5G deployments. In addition, Rosenberger has also showcased its antenna capabilities in several regions.

Based on conversion rate Euro to USD on 31st Dec 2019. [1 EUR to 1.12 USD]

INNOVATION

Rosenberger



INNOVATION
SCORE: 81.8

For example, they've showcased their FDD antenna solutions, with 24 ports and 30 ports deployments in the Middle East region. Such solutions are equipped with wideband antennas (698 – 960 MHz and 1,427 MHz – 2,690 MHz) in anticipation of future network upgrades. They also used an FDD+TDD beamforming antenna solution covering multiple bands including the 2.6 GHz and 3.5 – 3.8 GHz.

In the Asia Pacific region, Rosenberger has showcased multiple solutions for different deployment scenarios. Catering to the different demands in cities and rural areas, Rosenberger has an FDD antenna solution, with 22 ports, and two configurations (city and non-city area configuration). They have also deployed multi-beam antenna solutions with 4T4R twin-beam capability for FDD-LTE at various frequencies (850 MHz, 1.8 GHz, 2.3 GHz) to improve the overall system capacity.

Aside from base station antennas, Rosenberger also has PIM test equipment and the NEX10 connector which provides excellent PIM stability (-166 dBc) with a smaller size which saves valuable tower space.

IMPLEMENTATION

Rosenberger



IMPLEMENTATION
SCORE: 76.8

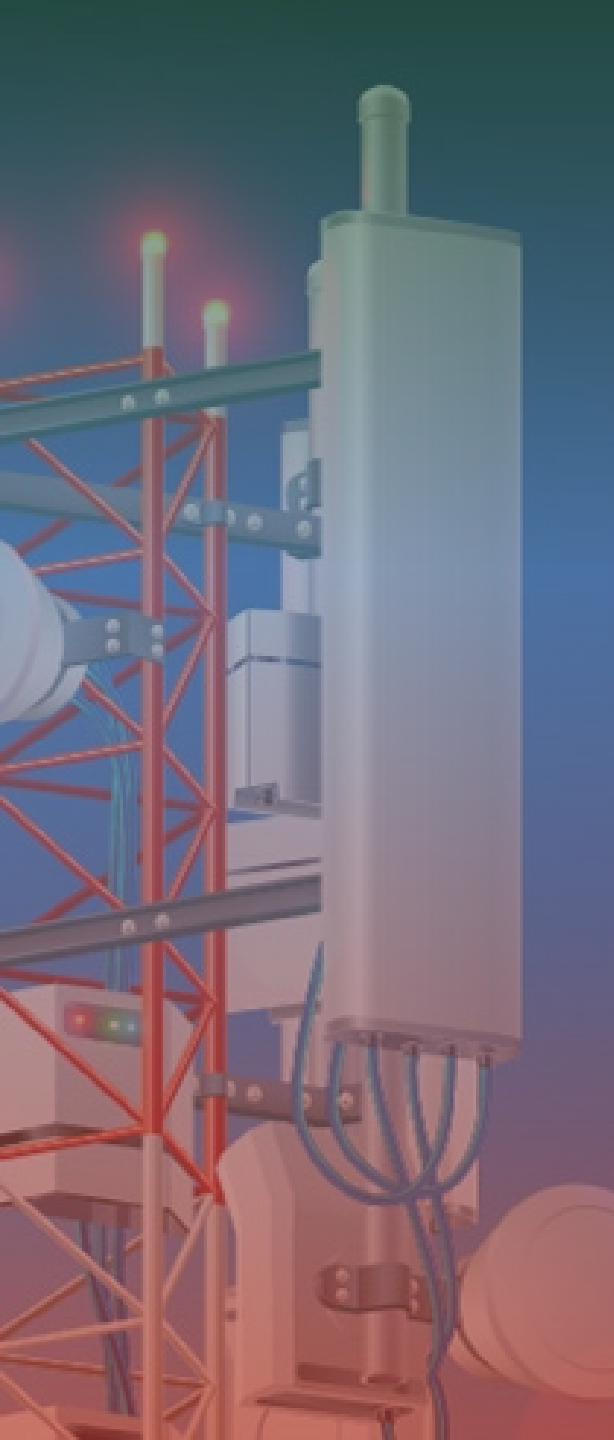
Rosenberger has a global outreach for its antenna business and a sizable amount of it is from the Asia Pacific, Europe and the Middle East. They have also extended its reach into the Latin American market with the aid of its offices in Brazil and Chile.

In Asia, there are 4 factories located within China with offices established in Bangladesh, Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Pakistan, Philippines, Russia, Singapore, Sri Lanka, Thailand, UAE and Vietnam. Recently, Rosenberger has opened a new manufacturing facility for base station antennas, RF cables, and active telecommunication products in Pune, India.

On top of its antenna business, Rosenberger deals and operates with multiple products for various industries including aerospace, defense, communication, automotive, medical, and test/measurement equipment.

CRITERIA AND METHODOLOGY





VENDOR MATRIX

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

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

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 performances.

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

RANKING CRITERIA

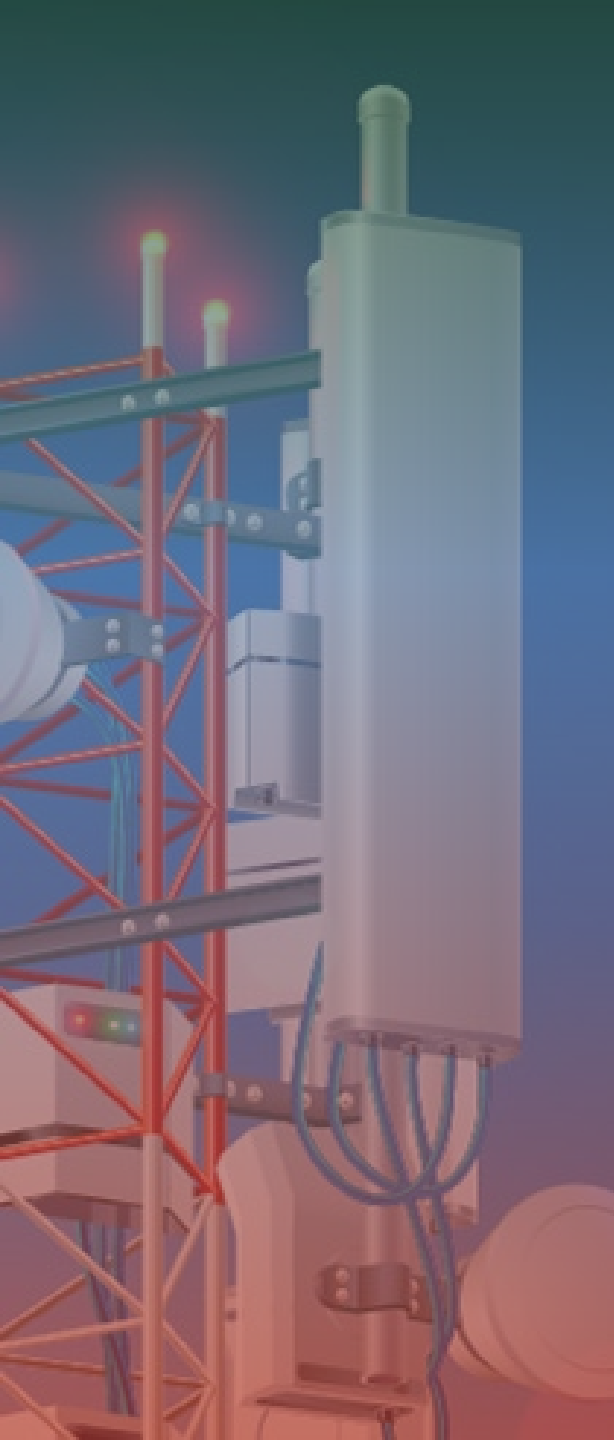
Leader: A company that receives a score of **75 or above** for their overall ranking

Mainstream: A company that receives scores **between 60 and 75** for their overall ranking

Follower: A company that receives a score of **60 or below** for their overall ranking

Innovation Leader: A company that receives a score of **75 or above** for their innovation ranking.

Implementation Leader: A company that receives a score of **75 or above** for their implementation ranking.



INNOVATION CRITERIA

Multi-Band Capabilities: Degree of support for multi-band capabilities, but also need to deliver high gain and coverage. This criterion is given a weighting of 30 out of 100 points.

Ultra-Wide Band Capabilities: How extensive is the vendor's antenna support for ultra-wide band capabilities, but also supporting high gain and coverage? This criterion is given a weighting of 25 out of 100 points.

Essential Intellectual Property and Research and Development (R&D): Level of intellectual property, also factors in collaborative partnerships, and quality of the antenna design and manufacturing process. This criterion is given a weighting of 15 out of 100 points.

Active Antenna Capability: How capable is its Active Antenna System (AAS) capability and the maturity of its AAS product inclusive of MIMO and massive MIMO? This criterion is given a weighting of 20 out of 100 points.

Antenna Configurability and Maintenance: Degree of maintenance; quality of materials and components to resist downtime of antenna; and simplicity of configuration, Self-Organizing Network (SON), and Remote Electrical Tilt (RET). This criterion is given a weighting of 10 out of 100 points.

IMPLEMENTATION CRITERIA

Overall Antenna Sales Market Share: The greater the market share, the better the ranking. This criterion is given a weighting of 45 out of 100 points.

Antenna Sales Regional Geographical Penetration: Partly based on sales presence in each global region. Also, the more regions the vendor's clients are in, the better the ranking. This criterion is given a weighting of 20 out of 100 points.

Financial and Organizational Health: Based on the size of overall firm sales and operating margin. Tries to assess how robust the vendor is to shocks and to fund internal needs, such as R&D, regional distribution, channel expansion, *etc.* This criterion is given a weighting of 5 out of 100 points.

Major Antenna Customer Contract Wins: Weights based on significant clients. Major player decisions often reassure/guide small operators. Operators have a herding instinct. This criterion is given a weighting of 15 out of 100 points.

Vendor's Antenna Portfolio: Range of portfolio. Does the portfolio support all the protocols, have a wide range of spectrum bands, and competitive pricing? This criterion is given a weighting of 15 out of 100 points.



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