

Millimeter Wave (MMW) Technology Market – Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Frequency Band (Below 30 GHz, 30 GHz to 100 GHz, 100 GHz to 300 GHz, Above 300 GHz), By Component (Antennas, Transceivers, Amplifiers, Oscillators, Frequency Sources, Other), By End User (Telecommunications, Aerospace & Defense, Automotive, Healthcare, Consumer Electronics, Industrial, Security & Surveillance), By Region & Competition, 2020-2030F

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Abstracts

The Global Millimeter Wave (MMW) Technology Market was valued at USD 3.93 billion in 2024 and is expected to reach USD 11.60 billion by 2030 with a CAGR of 19.59% through 2030.

The Millimeter Wave (MMW) Technology market refers to the industry centered on technologies that operate within the electromagnetic spectrum range of 30 to 300 gigahertz, characterized by their short wavelengths. These frequencies are pivotal for high-speed data transmission, offering significant bandwidth advantages over conventional wireless technologies. This market has gained substantial traction due to its application across diverse industries such as telecommunications, automotive, healthcare, and defense. In telecommunications, millimeter wave technology is a cornerstone of 5G networks, enabling ultra-fast data transfer speeds, low latency, and enhanced connectivity. In automotive, the technology supports advanced driver-assistance systems and autonomous vehicles through high-resolution radar imaging

and seamless communication. The healthcare sector leverages millimeter waves for imaging and diagnostics, while the defense industry utilizes them for secure communication and radar applications. The market is poised for growth due to several factors. The accelerating rollout of 5G networks globally, fueled by increasing data consumption and the need for enhanced connectivity, is a primary driver. Moreover, the surge in demand for high-bandwidth applications, such as augmented reality and virtual reality, underpins the adoption of millimeter wave solutions. Technological advancements in millimeter wave components, including transceivers and antennas, are also enhancing the efficiency and affordability of these systems, broadening their accessibility. Geographically, regions like Asia Pacific are at the forefront, driven by substantial investments in telecommunications infrastructure and the proliferation of smart cities. Furthermore, government initiatives to promote wireless communication technologies and the integration of millimeter wave technology in defense and security applications contribute to its upward trajectory. Despite challenges like high infrastructure costs and limited range in non-line-of-sight conditions, ongoing research and development activities are addressing these limitations. As industries continue to innovate and integrate millimeter wave technology into emerging applications, the market is expected to witness sustained growth, establishing itself as a critical enabler of next-generation connectivity solutions.

In January 2024, Verizon led in Coverage Experience with a score of 9.5 out of 10, surpassing AT&T and T-Mobile. T-Mobile excelled in 5G Coverage Experience with a score of 7.4 out of 10.

Key Market Drivers

Accelerating Deployment of 5G Networks

The roll-out of fifth-generation wireless networks is fundamentally transforming the telecommunications landscape, and millimeter wave technology is at the core of this evolution. The demand for high-speed internet, low latency, and the ability to connect numerous devices simultaneously has driven the adoption of 5G, which relies on millimeter wave frequencies for enhanced performance. The unique characteristics of millimeter waves, such as their ability to transmit large amounts of data over short distances, make them indispensable for achieving the high bandwidth and speed promised by 5G.

Governments and telecommunication companies across the globe are heavily investing in the deployment of 5G infrastructure, with regions such as North America, Europe,

and Asia Pacific leading the charge. For instance, the surge in smartphone penetration and increasing reliance on data-intensive applications, including video streaming, online gaming, and teleconferencing, are pushing network providers to enhance their services. Millimeter wave technology addresses this demand effectively by enabling seamless connectivity, even in densely populated urban environments.

Furthermore, advancements in hardware, such as the development of compact and cost-effective millimeter wave transceivers, are facilitating the integration of this technology into 5G networks. Telecommunication operators are also partnering with technology developers to overcome challenges like signal attenuation and limited range. As 5G adoption continues to accelerate, the dependency on millimeter wave technology is expected to grow exponentially, driving its market expansion over the forecast period. As of 2024, UK mobile users experienced the least reliable service among G7 countries, with a score of 859 out of 1,000. Factors contributing to this include the government's ban on Huawei equipment, low infrastructure investment, and planning challenge.

Growing Applications in Automotive and Transportation

The automotive sector is experiencing a paradigm shift with the rise of autonomous vehicles and advanced driver-assistance systems, both of which heavily rely on millimeter wave technology. High-frequency millimeter wave radar systems are integral to ensuring the safety and efficiency of autonomous driving by enabling real-time, high-resolution imaging for object detection, collision avoidance, and adaptive cruise control.

As the automotive industry moves toward automation, manufacturers are increasingly incorporating millimeter wave radar sensors into vehicles to enhance their capabilities. Governments worldwide are promoting the development of smart transportation systems, further encouraging the adoption of millimeter wave technology. For instance, countries in Europe and Asia Pacific are investing in intelligent transportation infrastructure, which utilizes millimeter waves for vehicle-to-vehicle and vehicle-to-infrastructure communication. These applications not only improve road safety but also optimize traffic management and fuel efficiency.

The rapid advancements in automotive technology, coupled with growing consumer awareness of safety features, are expected to significantly boost the demand for millimeter wave systems. As the sector continues to innovate, the integration of millimeter wave technology into autonomous and connected vehicles will play a crucial role in shaping the future of transportation, driving market growth in the process. In August 2024, the Australian Competition and Consumer Commission approved a

USD1.6 billion network-sharing deal between Optus and TPG. This agreement aims to enhance mobile coverage across regional Australia, targeting 98.4% population coverage and improving services for rural consumers

Increasing Demand in Healthcare and Medical Diagnostics

The healthcare sector is increasingly adopting millimeter wave technology for a range of applications, including imaging, diagnostics, and non-invasive treatments. The unique properties of millimeter waves, such as their ability to penetrate biological tissues with minimal interference, make them ideal for medical imaging and therapeutic purposes. This technology is particularly beneficial for early detection of diseases, enabling precise and accurate imaging of internal organs and tissues.

For instance, millimeter wave imaging is being used for skin cancer detection, providing a non-invasive and painless alternative to traditional diagnostic methods. Additionally, its use in monitoring vital signs, such as heart rate and respiration, is gaining traction in both clinical and home care settings. The demand for wearable medical devices that incorporate millimeter wave sensors is also on the rise, driven by the need for continuous health monitoring and preventive care.

The ongoing advancements in millimeter wave components, including compact and efficient sensors, are further expanding their applicability in healthcare. As healthcare providers and researchers continue to explore the potential of millimeter wave technology, its adoption in medical diagnostics and treatment is expected to grow, contributing to the market's overall expansion. Coverage for 4G/LTE networks is more limited, reaching about 52% of the population in low-income countries. In contrast, 4G/LTE coverage in high-income countries is significantly higher, reflecting disparities in infrastructure development

Key Market Challenges

Signal Attenuation and Limited Propagation Distance

One of the primary challenges facing the millimeter wave technology market is signal attenuation and limited propagation distance, which significantly impact the performance and scalability of this technology. Millimeter waves operate at high frequencies, typically ranging from 30 GHz to 300 GHz, and have shorter wavelengths compared to lower frequency bands. While this characteristic enables high data transmission speeds and enhanced bandwidth, it also makes millimeter waves highly susceptible to signal

attenuation. Factors such as atmospheric absorption, rain, humidity, and physical obstructions like buildings and trees severely degrade signal strength, leading to a reduced range and limited coverage area.

This challenge becomes particularly evident in outdoor environments and densely populated urban areas, where the presence of multiple obstacles hinders signal propagation. For instance, in the telecommunications sector, the deployment of millimeter wave-based 5G networks requires a dense network of small cells and base stations to maintain reliable connectivity. This not only increases the cost of infrastructure development but also complicates network planning and deployment.

The limited penetration capability of millimeter waves through walls and other solid structures restricts their applicability in indoor settings. This poses a challenge for industries such as healthcare, automotive, and defense, where seamless connectivity and reliable communication are critical. To address this issue, significant advancements in antenna design, beamforming techniques, and signal amplification technologies are required. However, the development and implementation of these solutions entail substantial investment, further adding to the cost burden for market players.

High Development and Deployment Costs

The high costs associated with the development, manufacturing, and deployment of millimeter wave technology pose a significant challenge to market growth. The advanced nature of millimeter wave systems necessitates the use of sophisticated components such as high-frequency transceivers, antennas, and integrated circuits, which are expensive to produce. Moreover, the design and fabrication of these components require specialized expertise and state-of-the-art facilities, driving up research and development costs for companies operating in this space.

The cost challenge extends to the deployment phase as well, particularly in the telecommunications sector. The roll-out of millimeter wave-based 5G networks demands extensive infrastructure investment, including the installation of a dense network of small cells, base stations, and backhaul solutions. This is because millimeter waves have a shorter range and are more prone to interference, requiring a larger number of access points to ensure adequate coverage and performance. For telecommunication operators, this translates into increased capital expenditure and operational costs, which can be a deterrent for widespread adoption, especially in developing regions with budget constraints.

Additionally, the high cost of millimeter wave technology affects its accessibility and affordability for end users in sectors such as automotive, healthcare, and consumer electronics. For instance, the incorporation of millimeter wave radar systems in vehicles for advanced driver-assistance systems adds to the overall cost of the vehicle, potentially limiting adoption among price-sensitive consumers. Similarly, the high price of millimeter wave-enabled medical devices and equipment can restrict their use in healthcare facilities with limited budgets. Addressing this challenge requires a concerted effort by industry stakeholders to develop cost-effective solutions and streamline manufacturing processes to achieve economies of scale.

Key Market Trends

Expanding Adoption in 5G Telecommunications Networks

The increasing deployment of millimeter wave technology in fifth-generation telecommunications networks is one of the most prominent trends shaping the market. Millimeter wave frequencies, ranging from 30 GHz to 300 GHz, offer unparalleled data transmission speeds and high bandwidth capabilities, making them an essential component of 5G networks. As telecommunication operators worldwide accelerate their 5G rollouts, the demand for millimeter wave technology is surging. This trend is driven by the need to accommodate exponential growth in mobile data traffic, enable low-latency applications, and support the proliferation of connected devices.

Governments and private organizations are investing heavily in millimeter wave infrastructure to achieve ultra-reliable communication. For instance, advanced beamforming and massive multiple-input multiple-output technologies are being integrated into base stations and small cells to overcome the propagation challenges of millimeter waves. Additionally, several countries, including the United States, South Korea, and Japan, have allocated spectrum specifically for millimeter wave applications in 5G, further driving its adoption. As the global demand for faster, more efficient communication networks continues to rise, the integration of millimeter wave technology into 5G systems is expected to gain further momentum.

Advancements in Automotive Radar Systems

The automotive sector is emerging as a significant growth area for millimeter wave technology, primarily due to its application in advanced driver-assistance systems and autonomous vehicles. Millimeter wave radar systems, operating in the 77 GHz to 81 GHz frequency range, are widely recognized for their ability to provide high-resolution

imaging and accurate distance measurement, even in challenging weather conditions. These features make them indispensable for applications such as adaptive cruise control, lane-keeping assistance, and collision avoidance systems.

The increasing focus on vehicle safety and regulatory mandates to incorporate advanced safety features are driving automakers to adopt millimeter wave radar technology. Leading automotive manufacturers and suppliers are investing in research and development to enhance radar accuracy and reduce system costs. For example, innovations in silicon-based radar chipsets and signal processing algorithms are enabling the production of compact, cost-effective radar modules. With the growing emphasis on autonomous driving and smart transportation systems, the adoption of millimeter wave radar technology in the automotive sector is poised to expand significantly in the coming years.

Growing Applications in Healthcare and Medical Imaging

Millimeter wave technology is witnessing growing adoption in the healthcare industry, particularly in medical imaging and diagnostics. The unique properties of millimeter waves, such as their ability to penetrate tissues and detect minute changes in biological structures, make them highly suitable for applications like non-invasive imaging, cancer detection, and skin disease diagnosis. Researchers and medical device manufacturers are exploring the use of millimeter wave-based sensors and imaging systems to develop advanced diagnostic tools that offer high precision and minimal patient discomfort.

One of the key drivers of this trend is the increasing prevalence of chronic diseases and the rising demand for early diagnosis and personalized treatment. Additionally, the development of portable and wearable medical devices utilizing millimeter wave technology is enabling real-time health monitoring, further expanding its potential applications. For example, millimeter wave-enabled thermal imaging systems are being used for remote temperature monitoring and infection detection in pandemic scenarios.

As the healthcare sector continues to embrace technological innovation, the integration of millimeter wave technology into medical devices and diagnostic systems is expected to grow. This trend underscores the potential of millimeter wave technology to revolutionize healthcare delivery and improve patient outcomes.

Segmental Insights

Frequency Band Insights

In 2024, the segment encompassing frequencies from 30 GHz to 100 GHz emerged as the dominant category in the millimeter wave technology market and is anticipated to maintain its leading position throughout the forecast period. This frequency band is widely favored due to its optimal balance between high data transmission rates and manageable propagation challenges, making it a crucial enabler for several high-demand applications. The proliferation of 5G telecommunications networks has significantly driven the adoption of this frequency range, as it provides the necessary bandwidth for ultra-reliable and low-latency communication. Moreover, industries such as automotive, healthcare, and defense are increasingly integrating millimeter wave technology operating within this band into their systems for radar, imaging, and secure communication applications.

The 30 GHz to 100 GHz band is also pivotal for next-generation wireless technologies such as fixed wireless access and high-speed satellite communication. Regulatory authorities across the globe have allocated substantial spectrum within this range to support innovation and technological advancement, further propelling its adoption. For instance, governments in regions like North America, Europe, and Asia-Pacific have allocated mid-band frequencies within this range to ensure seamless integration into 5G infrastructure. Additionally, advancements in semiconductor technologies, particularly in the development of efficient and cost-effective transceivers and antennas, have made the deployment of systems operating in this band more accessible for commercial applications.

As the demand for high-capacity data networks and advanced communication systems continues to rise, the 30 GHz to 100 GHz frequency band is expected to remain the cornerstone of the millimeter wave technology market, driving growth across diverse industries and regions.

Regional Insights

In 2024, North America emerged as the dominant region in the millimeter wave technology market and is expected to maintain its leadership position throughout the forecast period. This dominance can be attributed to several factors, including the early adoption of advanced communication technologies and significant investments in the development of 5G infrastructure. The presence of key market players in the region, such as Qualcomm Incorporated, Keysight Technologies, and Siklu Communication Ltd., has further strengthened the market's growth trajectory by driving innovation and

facilitating large-scale deployment of millimeter wave-based solutions.

North America's leadership is particularly evident in its robust telecommunications sector, where millimeter wave technology is being extensively utilized to meet the surging demand for high-speed and low-latency communication. The United States, in particular, has been at the forefront of 5G network rollouts, leveraging the unique properties of millimeter wave frequencies to enhance network capacity and speed. Additionally, the region's defense and aerospace industries have played a pivotal role in the adoption of millimeter wave technology for applications such as radar systems, secure communication channels, and advanced imaging technologies.

The increasing adoption of millimeter wave technology in healthcare for applications like medical imaging and in automotive for advanced driver assistance systems and autonomous vehicles further supports the region's dominance. Moreover, favorable regulatory environments and spectrum allocations by organizations such as the Federal Communications Commission in the United States have provided the necessary impetus for market growth.

As North America continues to invest in research and development and expand its industrial applications of millimeter wave technology, it is well-positioned to sustain its dominance in the global market, driven by its technological advancements, strong industrial base, and strategic initiatives in emerging sectors.

Key Market Players

Qualcomm Incorporated

Keysight Technologies, Inc

Ceragon Networks Ltd

L3Harris Technologies, Inc

NEC Corporation.

AVIAT NETWORKS, Inc.

Smiths Group plc.

Vubiq Networks, Inc.

REMEC Broadband Wireless Networks LLC.

Ducommun Incorporated.

Report Scope:

In this report, the Global Millimeter Wave (MMW) Technology Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Millimeter Wave (MMW) Technology Market, By Frequency Band:

Below 30 GHz

30 GHz to 100 GHz

100 GHz to 300 GHz

Above 300 GHz

Millimeter Wave (MMW) Technology Market, By Component:

Antennas

Transceivers

Amplifiers

Oscillators

Frequency Sources

Other

Millimeter Wave (MMW) Technology Market, By End User:

Telecommunications

Aerospace & Defense

Automotive

Healthcare

Consumer Electronics

Industrial

Security & Surveillance

Millimeter Wave (MMW) Technology Market, By Region:

North America

United States

Canada

Mexico

Europe

Germany

France

United Kingdom

Italy

Spain

Belgium

Asia Pacific

China

India

Japan

South Korea

Australia

Indonesia

Vietnam

South America

Brazil

Colombia

Argentina

Chile

Middle East & Africa

Saudi Arabia

UAE

South Africa

Turkey

Israel

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Millimeter Wave (MMW) Technology Market.

Available Customizations:

Global Millimeter Wave (MMW) Technology Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

Contents

1. PRODUCT OVERVIEW

- 1.1. Market Definition
- 1.2. Scope of the Market
 - 1.2.1. Markets Covered
 - 1.2.2. Years Considered for Study
 - 1.2.3. Key Market Segmentations

2. RESEARCH METHODOLOGY

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Formulation of the Scope
- 2.4. Assumptions and Limitations
- 2.5. Sources of Research
 - 2.5.1. Secondary Research
 - 2.5.2. Primary Research
- 2.6. Approach for the Market Study
 - 2.6.1. The Bottom-Up Approach
 - 2.6.2. The Top-Down Approach
- 2.7. Methodology Followed for Calculation of Market Size & Market Shares
- 2.8. Forecasting Methodology
 - 2.8.1. Data Triangulation & Validation

3. EXECUTIVE SUMMARY

4. VOICE OF CUSTOMER

5. GLOBAL MILLIMETER WAVE (MMW) TECHNOLOGY MARKET OVERVIEW

6. GLOBAL MILLIMETER WAVE (MMW) TECHNOLOGY MARKET OUTLOOK

- 6.1. Market Size & Forecast
 - 6.1.1. By Value
- 6.2. Market Share & Forecast
 - 6.2.1. By Frequency Band (Below 30 GHz, 30 GHz to 100 GHz, 100 GHz to 300 GHz, Above 300 GHz)

6.2.2. By Component (Antennas, Transceivers, Amplifiers, Oscillators, Frequency Sources, Other)

6.2.3. By End User (Telecommunications, Aerospace & Defense, Automotive, Healthcare, Consumer Electronics, Industrial, Security & Surveillance)

6.2.4. By Region (North America, Europe, South America, Middle East & Africa, Asia Pacific)

6.3. By Company (2024)

6.4. Market Map

7. NORTH AMERICA MILLIMETER WAVE (MMW) TECHNOLOGY MARKET OUTLOOK

7.1. Market Size & Forecast

7.1.1. By Value

7.2. Market Share & Forecast

7.2.1. By Frequency Band

7.2.2. By Component

7.2.3. By End User

7.2.4. By Country

7.3. North America: Country Analysis

7.3.1. United States Millimeter Wave (MMW) Technology Market Outlook

7.3.1.1. Market Size & Forecast

7.3.1.1.1. By Value

7.3.1.2. Market Share & Forecast

7.3.1.2.1. By Frequency Band

7.3.1.2.2. By Component

7.3.1.2.3. By End User

7.3.2. Canada Millimeter Wave (MMW) Technology Market Outlook

7.3.2.1. Market Size & Forecast

7.3.2.1.1. By Value

7.3.2.2. Market Share & Forecast

7.3.2.2.1. By Frequency Band

7.3.2.2.2. By Component

7.3.2.2.3. By End User

7.3.3. Mexico Millimeter Wave (MMW) Technology Market Outlook

7.3.3.1. Market Size & Forecast

7.3.3.1.1. By Value

7.3.3.2. Market Share & Forecast

7.3.3.2.1. By Frequency Band

7.3.3.2.2. By Component

7.3.3.2.3. By End User

8. EUROPE MILLIMETER WAVE (MMW) TECHNOLOGY MARKET OUTLOOK

8.1. Market Size & Forecast

8.1.1. By Value

8.2. Market Share & Forecast

8.2.1. By Frequency Band

8.2.2. By Component

8.2.3. By End User

8.2.4. By Country

8.3. Europe: Country Analysis

8.3.1. Germany Millimeter Wave (MMW) Technology Market Outlook

8.3.1.1. Market Size & Forecast

8.3.1.1.1. By Value

8.3.1.2. Market Share & Forecast

8.3.1.2.1. By Frequency Band

8.3.1.2.2. By Component

8.3.1.2.3. By End User

8.3.2. France Millimeter Wave (MMW) Technology Market Outlook

8.3.2.1. Market Size & Forecast

8.3.2.1.1. By Value

8.3.2.2. Market Share & Forecast

8.3.2.2.1. By Frequency Band

8.3.2.2.2. By Component

8.3.2.2.3. By End User

8.3.3. United Kingdom Millimeter Wave (MMW) Technology Market Outlook

8.3.3.1. Market Size & Forecast

8.3.3.1.1. By Value

8.3.3.2. Market Share & Forecast

8.3.3.2.1. By Frequency Band

8.3.3.2.2. By Component

8.3.3.2.3. By End User

8.3.4. Italy Millimeter Wave (MMW) Technology Market Outlook

8.3.4.1. Market Size & Forecast

8.3.4.1.1. By Value

8.3.4.2. Market Share & Forecast

8.3.4.2.1. By Frequency Band

- 8.3.4.2.2. By Component
- 8.3.4.2.3. By End User
- 8.3.5. Spain Millimeter Wave (MMW) Technology Market Outlook
 - 8.3.5.1. Market Size & Forecast
 - 8.3.5.1.1. By Value
 - 8.3.5.2. Market Share & Forecast
 - 8.3.5.2.1. By Frequency Band
 - 8.3.5.2.2. By Component
 - 8.3.5.2.3. By End User
- 8.3.6. Belgium Millimeter Wave (MMW) Technology Market Outlook
 - 8.3.6.1. Market Size & Forecast
 - 8.3.6.1.1. By Value
 - 8.3.6.2. Market Share & Forecast
 - 8.3.6.2.1. By Frequency Band
 - 8.3.6.2.2. By Component
 - 8.3.6.2.3. By End User

9. ASIA PACIFIC MILLIMETER WAVE (MMW) TECHNOLOGY MARKET OUTLOOK

- 9.1. Market Size & Forecast
 - 9.1.1. By Value
- 9.2. Market Share & Forecast
 - 9.2.1. By Frequency Band
 - 9.2.2. By Component
 - 9.2.3. By End User
 - 9.2.4. By Country
- 9.3. Asia Pacific: Country Analysis
 - 9.3.1. China Millimeter Wave (MMW) Technology Market Outlook
 - 9.3.1.1. Market Size & Forecast
 - 9.3.1.1.1. By Value
 - 9.3.1.2. Market Share & Forecast
 - 9.3.1.2.1. By Frequency Band
 - 9.3.1.2.2. By Component
 - 9.3.1.2.3. By End User
 - 9.3.2. India Millimeter Wave (MMW) Technology Market Outlook
 - 9.3.2.1. Market Size & Forecast
 - 9.3.2.1.1. By Value
 - 9.3.2.2. Market Share & Forecast
 - 9.3.2.2.1. By Frequency Band

- 9.3.2.2.2. By Component
- 9.3.2.2.3. By End User
- 9.3.3. Japan Millimeter Wave (MMW) Technology Market Outlook
 - 9.3.3.1. Market Size & Forecast
 - 9.3.3.1.1. By Value
 - 9.3.3.2. Market Share & Forecast
 - 9.3.3.2.1. By Frequency Band
 - 9.3.3.2.2. By Component
 - 9.3.3.2.3. By End User
- 9.3.4. South Korea Millimeter Wave (MMW) Technology Market Outlook
 - 9.3.4.1. Market Size & Forecast
 - 9.3.4.1.1. By Value
 - 9.3.4.2. Market Share & Forecast
 - 9.3.4.2.1. By Frequency Band
 - 9.3.4.2.2. By Component
 - 9.3.4.2.3. By End User
- 9.3.5. Australia Millimeter Wave (MMW) Technology Market Outlook
 - 9.3.5.1. Market Size & Forecast
 - 9.3.5.1.1. By Value
 - 9.3.5.2. Market Share & Forecast
 - 9.3.5.2.1. By Frequency Band
 - 9.3.5.2.2. By Component
 - 9.3.5.2.3. By End User
- 9.3.6. Indonesia Millimeter Wave (MMW) Technology Market Outlook
 - 9.3.6.1. Market Size & Forecast
 - 9.3.6.1.1. By Value
 - 9.3.6.2. Market Share & Forecast
 - 9.3.6.2.1. By Frequency Band
 - 9.3.6.2.2. By Component
 - 9.3.6.2.3. By End User
- 9.3.7. Vietnam Millimeter Wave (MMW) Technology Market Outlook
 - 9.3.7.1. Market Size & Forecast
 - 9.3.7.1.1. By Value
 - 9.3.7.2. Market Share & Forecast
 - 9.3.7.2.1. By Frequency Band
 - 9.3.7.2.2. By Component
 - 9.3.7.2.3. By End User

10. SOUTH AMERICA MILLIMETER WAVE (MMW) TECHNOLOGY MARKET

OUTLOOK

10.1. Market Size & Forecast

10.1.1. By Value

10.2. Market Share & Forecast

10.2.1. By Frequency Band

10.2.2. By Component

10.2.3. By End User

10.2.4. By Country

10.3. South America: Country Analysis

10.3.1. Brazil Millimeter Wave (MMW) Technology Market Outlook

10.3.1.1. Market Size & Forecast

10.3.1.1.1. By Value

10.3.1.2. Market Share & Forecast

10.3.1.2.1. By Frequency Band

10.3.1.2.2. By Component

10.3.1.2.3. By End User

10.3.2. Colombia Millimeter Wave (MMW) Technology Market Outlook

10.3.2.1. Market Size & Forecast

10.3.2.1.1. By Value

10.3.2.2. Market Share & Forecast

10.3.2.2.1. By Frequency Band

10.3.2.2.2. By Component

10.3.2.2.3. By End User

10.3.3. Argentina Millimeter Wave (MMW) Technology Market Outlook

10.3.3.1. Market Size & Forecast

10.3.3.1.1. By Value

10.3.3.2. Market Share & Forecast

10.3.3.2.1. By Frequency Band

10.3.3.2.2. By Component

10.3.3.2.3. By End User

10.3.4. Chile Millimeter Wave (MMW) Technology Market Outlook

10.3.4.1. Market Size & Forecast

10.3.4.1.1. By Value

10.3.4.2. Market Share & Forecast

10.3.4.2.1. By Frequency Band

10.3.4.2.2. By Component

10.3.4.2.3. By End User

11. MIDDLE EAST & AFRICA MILLIMETER WAVE (MMW) TECHNOLOGY MARKET OUTLOOK

11.1. Market Size & Forecast

11.1.1. By Value

11.2. Market Share & Forecast

11.2.1. By Frequency Band

11.2.2. By Component

11.2.3. By End User

11.2.4. By Country

11.3. Middle East & Africa: Country Analysis

11.3.1. Saudi Arabia Millimeter Wave (MMW) Technology Market Outlook

11.3.1.1. Market Size & Forecast

11.3.1.1.1. By Value

11.3.1.2. Market Share & Forecast

11.3.1.2.1. By Frequency Band

11.3.1.2.2. By Component

11.3.1.2.3. By End User

11.3.2. UAE Millimeter Wave (MMW) Technology Market Outlook

11.3.2.1. Market Size & Forecast

11.3.2.1.1. By Value

11.3.2.2. Market Share & Forecast

11.3.2.2.1. By Frequency Band

11.3.2.2.2. By Component

11.3.2.2.3. By End User

11.3.3. South Africa Millimeter Wave (MMW) Technology Market Outlook

11.3.3.1. Market Size & Forecast

11.3.3.1.1. By Value

11.3.3.2. Market Share & Forecast

11.3.3.2.1. By Frequency Band

11.3.3.2.2. By Component

11.3.3.2.3. By End User

11.3.4. Turkey Millimeter Wave (MMW) Technology Market Outlook

11.3.4.1. Market Size & Forecast

11.3.4.1.1. By Value

11.3.4.2. Market Share & Forecast

11.3.4.2.1. By Frequency Band

11.3.4.2.2. By Component

11.3.4.2.3. By End User

11.3.5. Israel Millimeter Wave (MMW) Technology Market Outlook

11.3.5.1. Market Size & Forecast

11.3.5.1.1. By Value

11.3.5.2. Market Share & Forecast

11.3.5.2.1. By Frequency Band

11.3.5.2.2. By Component

11.3.5.2.3. By End User

12. MARKET DYNAMICS

12.1. Drivers

12.2. Challenges

13. MARKET TRENDS AND DEVELOPMENTS

14. COMPANY PROFILES

14.1. Qualcomm Incorporated

14.1.1. Business Overview

14.1.2. Key Revenue and Financials

14.1.3. Recent Developments

14.1.4. Key Personnel/Key Contact Person

14.1.5. Key Product/Services Offered

14.2. Keysight Technologies, Inc

14.2.1. Business Overview

14.2.2. Key Revenue and Financials

14.2.3. Recent Developments

14.2.4. Key Personnel/Key Contact Person

14.2.5. Key Product/Services Offered

14.3. Ceragon Networks Ltd

14.3.1. Business Overview

14.3.2. Key Revenue and Financials

14.3.3. Recent Developments

14.3.4. Key Personnel/Key Contact Person

14.3.5. Key Product/Services Offered

14.4. L3Harris Technologies, Inc

14.4.1. Business Overview

14.4.2. Key Revenue and Financials

14.4.3. Recent Developments

- 14.4.4. Key Personnel/Key Contact Person
- 14.4.5. Key Product/Services Offered
- 14.5. NEC Corporation.
 - 14.5.1. Business Overview
 - 14.5.2. Key Revenue and Financials
 - 14.5.3. Recent Developments
 - 14.5.4. Key Personnel/Key Contact Person
 - 14.5.5. Key Product/Services Offered
- 14.6. AVIAT NETWORKS, Inc.
 - 14.6.1. Business Overview
 - 14.6.2. Key Revenue and Financials
 - 14.6.3. Recent Developments
 - 14.6.4. Key Personnel/Key Contact Person
 - 14.6.5. Key Product/Services Offered
- 14.7. Smiths Group plc.
 - 14.7.1. Business Overview
 - 14.7.2. Key Revenue and Financials
 - 14.7.3. Recent Developments
 - 14.7.4. Key Personnel/Key Contact Person
 - 14.7.5. Key Product/Services Offered
- 14.8. Vubiq Networks, Inc.
 - 14.8.1. Business Overview
 - 14.8.2. Key Revenue and Financials
 - 14.8.3. Recent Developments
 - 14.8.4. Key Personnel/Key Contact Person
 - 14.8.5. Key Product/Services Offered
- 14.9. REMEC Broadband Wireless Networks LLC.
 - 14.9.1. Business Overview
 - 14.9.2. Key Revenue and Financials
 - 14.9.3. Recent Developments
 - 14.9.4. Key Personnel/Key Contact Person
 - 14.9.5. Key Product/Services Offered
- 14.10. Ducommun Incorporated.
 - 14.10.1. Business Overview
 - 14.10.2. Key Revenue and Financials
 - 14.10.3. Recent Developments
 - 14.10.4. Key Personnel/Key Contact Person
 - 14.10.5. Key Product/Services Offered

15. STRATEGIC RECOMMENDATIONS

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