

Atomic Clock Market Forecast to 2028 - COVID-19 Impact and Global Analysis By Type (Rubidium Atomic Clock and CSAC, Cesium Atomic Clock, and Hydrogen Maser Atomic Clock) and Application (Space and Military/Aerospace, Scientific and Metrology Research, Telecom and Broadcasting, and Other Applications)

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Report description:

The atomic clock market is expected to reach US\$ 745.79 million by 2028. It is estimated to grow at a CAGR of 6.5% during 2022-2028.

The cesium atomic clock market demand is rising due to the growing need for improved precision in radio astronomy labs and metrology. Also, military, aerospace, and navigation satellites are among the critical applications for cesium atomic clocks, where they are used for the measurement of pulsar stability, differential GPS (DGPS), geographical exploration, global positioning systems (GPS), geology, palaeontology, archaeology, and environmental studies. The US is the largest producer of cesium atomic clocks which is propelling the regional atomic clock market growth. China and Japan are major countries producing cesium atomic clocks in Asia Pacific. Moreover, two significant firms offering cesium atomic clocks are Microchip and Oscilloquartz. Also, Microsemi is the only commercial supplier of cesium beam-tube clocks, used in national laboratories across the world. Further, the Indian Space Research Organization (ISRO) has developed its own cesium atomic clock ensemble. Moreover, ISRO has been working on high precision atomic clocks based on rubidium. Such factors are bolstering the atomic clock market size.

With the increasing number of consumers, telecommunication network providers require highly precise clocks for digital signals to be transmitted effectively. Compared to hydrogen maser atomic clocks, the cesium beam has a higher holdover, while hydrogen maser atomic clocks are more effective in size and power consumption. Therefore, the cost of hydrogen maser atomic clock is higher than the cesium beams atomic clock, which fuels the demand for atomic clock market. In addition, due to its high technology learning curve, hydrogen maser atomic clock manufacturing is a stringent process. The key requirements for the

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manufacture of these clocks are the highly-priced rare elements and the availability of technical workers. These are the main reasons for the reduction in the number of hydrogen maser atomic clock producers. However, the larger companies engaged in high technology production can enter the hydrogen maser atomic clock market size with the passage of time and increasing demand.

At present, most of the applications for communication, navigation, financial transactions, distributed cloud, and defense rely on the accurate timing of atomic clocks or clocks that track time based on the highest degrees of atom oscillation accuracy. New applications and technologies such as 5G networks and GPS alternatives will need accurate timekeeping on portable platforms, which would propel the demand for high performance miniaturized atomic clock market. Defense Advanced Research Projects Agency (DARPA) has invested a huge amount in the advancement and miniaturization of atomic clock market share over the past few decades, generating commercially available chip-scale atomic clocks (CSACs) and offering unprecedented timing stability in regards with size, weight, and power (SWaP). However, the physics associated with their designs limit the performance of first-generation CSACs. For instance, timing errors can be created by calibration requirements and frequency drift, which makes it difficult to achieve the highest degrees of precision and reliability in a portable package. Thus, next-generation chip-scale atomic clock (CSACs)/miniaturization is anticipated to provide opportunities to the atomic clock market players during the forecast period.

The growth of the atomic clock market in Europe is attributed to the increasing number of projects focusing on atomic clock development. In May 2022, AccuBeat (a leading provider of Rubidium oscillators, Time Servers, and GPS disciplined atomic clock) announced that it was selected to develop and produce an Ultra Stable Oscillator (USO) for the European Space Agency's (ESA) JUICE (Jupiter Icy Moons Explorer) mission as Space missions and deep space exploration programs rely on high precision atomic clocks. Europe has the presence of satellite communication solutions providers such as Satcom Global Ltd and Holkirk Communications Ltd. However, the onboard atomic clocks driving satellite-navigation signals on the European Galileo network have noticeably failed, and 9 clocks have stopped working on the 18 satellites in orbit. These factors hinder the growth of the atomic clock market player's businesses in Europe.

China is one of the most significant revenue contributors to the atomic clock market in APAC. China led the APAC atomic clock market with a share of 37.28% in 2021. It declared the BeiDou Navigation Satellite System (BDS) official commissioning in July 2020, marking it formally available for global users. More than 400 agencies and 300,000 research personnel and technicians are involved in the BDS system. The China Academy of Space Technology (CAST), a satellite developer, has brought together leading experts and manufacturers across the country and integrated the most advanced technologies and high-quality materials and products for the project. Rubidium atomic clocks provide BDS satellites with time and frequency standards, and these clocks play vital role in the system's positioning, speed measurement, and timing accuracy. More than 100 rubidium atomic clocks, including 70 high-precision clocks, have been delivered to the BDS program by the Xi'an branch in the last two decades. Further, APAC is anticipated to register the highest CAGR in the global atomic clock market during the forecast period. The rise in the use of atomic clocks in satellite antennas in the aviation, telecommunications, and broadcasting applications in countries such as India and China is anticipated to boost the region's atomic clock market growth during the forecast period.

AccuBeat Ltd., Excelitas Technologies Corp., IQD Frequency Products Ltd., Leonardo, Microchip Technology Inc., Orolia, Oscilloquartz, Stanford Research Systems, Tekron, and VREMYA-CH JSC are a few key players profiled in the atomic clock market study. The atomic clock market report provides detailed market insights, which will help the key players strategize growth in the coming years.

The ongoing developments in the atomic clock market are driving the market growth. In November 2022, China launched its lab module called Mengtian as a part of its ambitious space station currently under construction. Mengtian is set to carry the world's first space-based set of cold atomic clocks consisting of a hydrogen clock, a rubidium clock, and an optical clock.

The global atomic clock market is segmented on the basis of type and application. Based on type, the market is segmented into

rubidium atomic clock and CSAC, cesium atomic clock, and hydrogen maser atomic clock. Based on application, the market is segmented into space and military/aerospace, scientific and metrology research, telecom/broadcasting, and others.

The atomic clock market is segmented into five major regions-North America, Europe, Asia Pacific (APAC), the Middle East & Africa (MEA), and South America. In 2022, North America is led the market with the largest share, followed by Europe. Further, APAC is expected to register the highest CAGR in the market from 2022 to 2028.

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