

Distributed Acoustic Sensing Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028 Segmented By Type (Single Mode, Multimode), By Industry Vertical (Military, Oil Gas, Infrastructure, Telecommunication, Transportation, Smart Cities, Others), By Region, and By Competition

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Abstracts

In 2022, the Global Distributed Acoustic Sensing (DAS) Market reached a valuation of USD 570 Million and is set to undergo substantial growth in the forecast period, with an expected Compound Annual Growth Rate (CAGR) of 10.5% through 2028. This market is experiencing remarkable growth and transformation, assuming a pivotal role across diverse industries and revolutionizing how organizations collect and analyze data.

DAS technology harnesses optical fibers as sensing devices, enabling continuous and real-time monitoring of physical environments with unparalleled precision. This technology has found widespread applications in the oil and gas sector, facilitating the monitoring of wells and pipelines, enhancing operational safety, and optimizing production processes. Furthermore, it is increasingly employed in infrastructure security, offering advanced solutions for perimeter monitoring, intrusion detection, and safeguarding valuable assets. Additionally, the environmental monitoring sector benefits from DAS by enabling the detection of seismic activity and facilitating early warning systems for natural disasters.

The market's growth is driven by the escalating demand for efficient and cost-effective solutions for data acquisition and analysis in critical industries. This positions DAS as a key player in the ongoing digital transformation across various sectors. As the world continues to rely on data-driven decision-making, the Global Distributed Acoustic

Sensing Market is poised for sustained expansion and innovation, presenting a wealth of opportunities for organizations seeking advanced monitoring solutions.

Key Market Drivers

Increasing Demand for Real-Time Monitoring and Surveillance

The Global Distributed Acoustic Sensing (DAS) Market is experiencing dynamic growth, driven by the ever-increasing demand for real-time monitoring and surveillance solutions across a spectrum of industries. As organizations strive to enhance operational efficiency, safety, and security, DAS technology has emerged as a transformative force. Its unique ability to convert standard optical fiber cables into distributed sensors enables continuous and precise data collection in real-time. In the oil and gas sector, DAS systems are deployed along pipelines to detect leaks, monitor well integrity, and pinpoint unauthorized intrusions, ensuring the safe and efficient transportation of resources. In civil engineering and infrastructure, DAS technology is employed to monitor the structural health of bridges, tunnels, and buildings, enabling early detection of defects and potential hazards. Environmental monitoring benefits from DAS as well, with applications ranging from seismic activity detection to wildlife tracking. Furthermore, the security landscape has seen a paradigm shift, with DAS technology being leveraged for perimeter surveillance, intruder detection, and critical asset protection. The ability to provide real-time alerts and actionable insights is invaluable in thwarting security breaches and minimizing risks. This multifaceted demand for real-time monitoring and surveillance has catapulted the Global Distributed Acoustic Sensing Market to new heights, with continuous innovation and diversification of applications, making DAS a cornerstone technology for organizations seeking to elevate their safety, security, and operational excellence in an increasingly interconnected world.

Growing Need for Asset Protection and Security

The global distributed acoustic sensing (DAS) market is experiencing significant growth due to the growing need for asset protection and security across various industries. DAS technology utilizes fiber optic cables to convert them into an extensive network of sensors, enabling real-time monitoring and detection of acoustic vibrations along the entire length of the cable. This innovative technology has gained traction in sectors such as oil and gas, transportation, and infrastructure, where the protection of critical assets is of utmost importance. One of the key drivers behind the increasing demand for DAS solutions is the need for enhanced security measures. With the rise in security threats and the potential for sabotage or unauthorized access to critical infrastructure,

organizations are actively seeking advanced monitoring systems to safeguard their assets. DAS technology offers a unique advantage by providing continuous and comprehensive monitoring capabilities, enabling early detection of any unusual activities or potential threats. This proactive approach allows organizations to take immediate action, minimizing the risk of damage or disruption to their operations.

Furthermore, the growing complexity of infrastructure networks and the need for efficient asset management are also contributing to the adoption of DAS solutions. As infrastructure systems become more interconnected and expansive, traditional monitoring methods often fall short in providing comprehensive coverage. DAS technology addresses this challenge by offering a scalable and cost-effective solution that can monitor vast areas with a single fiber optic cable. This not only simplifies the monitoring process but also reduces the overall maintenance and operational costs associated with asset protection. Moreover, the oil and gas industry is a significant contributor to the growth of the DAS market. With the increasing demand for energy resources, oil and gas companies are continuously exploring new reserves in remote and challenging environments. DAS technology enables real-time monitoring of pipelines, wellbores, and other critical infrastructure, ensuring the safety and integrity of these assets. By detecting potential leaks, intrusions, or equipment failures, DAS systems help prevent accidents, minimize environmental impact, and optimize operational efficiency.

Expansion of Infrastructure Development Projects

The expansion of infrastructure development projects has emerged as a significant catalyst propelling the Global Distributed Acoustic Sensing (DAS) Market to new heights. As nations invest heavily in the construction and maintenance of critical infrastructure, including pipelines, railways, bridges, tunnels, and energy networks, the demand for efficient monitoring and security solutions has surged. DAS technology has proven instrumental in meeting these evolving needs. Its ability to convert optical fiber cables into highly sensitive and cost-effective sensors has revolutionized how infrastructure projects are managed. DAS systems offer continuous, real-time monitoring, enabling the early detection of structural defects, leaks, intrusions, and even seismic activity. This capability not only enhances safety but also minimizes downtime and operational disruptions, resulting in substantial cost savings. Moreover, DAS technology aligns seamlessly with sustainability initiatives, enabling more sustainable and resilient infrastructure. The robust adoption of DAS technology in infrastructure projects underscores its pivotal role in safeguarding critical assets, optimizing operational efficiency, and contributing to the successful execution of large-scale

endeavors. As infrastructure development projects continue to proliferate globally, the Global Distributed Acoustic Sensing Market is poised for sustained expansion, with innovative applications emerging across various sectors, from transportation and utilities to environmental monitoring and beyond.

Advancements in Fiber Optic Technology

The global distributed acoustic sensing (DAS) market is experiencing significant growth, largely driven by advancements in fiber optic technology. DAS is a cutting-edge technology that utilizes fiber optic cables to transform them into an array of virtual microphones, enabling real-time monitoring and analysis of acoustic signals along the entire length of the cable. This technology has revolutionized various industries, including oil and gas, transportation, and security, by providing continuous and precise monitoring capabilities. One of the key factors propelling the growth of the DAS market is the increasing demand for enhanced safety and security measures in critical infrastructure. Fiber optic cables, which are the backbone of DAS systems, offer several advantages over traditional sensing technologies. Firstly, they are immune to electromagnetic interference, making them highly reliable in harsh environments. Secondly, fiber optic cables can cover long distances without signal degradation, allowing for extensive monitoring capabilities. These features make DAS systems ideal for applications such as pipeline monitoring, perimeter security, and structural health monitoring. Furthermore, advancements in fiber optic technology have led to improved sensitivity and resolution of DAS systems. The development of specialized fibers, such as stimulated Brillouin scattering (SBS) fibers, has significantly enhanced the performance of DAS systems. SBS fibers can detect minute changes in temperature and strain along the fiber, enabling precise monitoring of assets and infrastructure. This level of accuracy is crucial in industries where early detection of anomalies can prevent catastrophic events and save lives. Moreover, the increasing adoption of fiber optic networks worldwide has created a favorable environment for the growth of the DAS market. The deployment of fiber optic cables for high-speed internet connectivity and telecommunications has resulted in an extensive network infrastructure that can be leveraged for DAS applications. This infrastructure not only reduces the installation costs of DAS systems but also enables seamless integration with existing communication networks.

Key Market Challenges

Lack of Standardization Hinders Seamless Integration and Adoption of Global Distributed Acoustic Sensing Solutions

The Global Distributed Acoustic Sensing (DAS) market faces a significant challenge in terms of standardization. As organizations increasingly adopt DAS solutions from different vendors, the lack of standardized protocols and frameworks for seamless integration poses a hurdle to the effective implementation of DAS technology. Without standardized interfaces and interoperability, organizations struggle to connect and integrate their DAS systems with other monitoring and control systems, leading to fragmented data and potential inefficiencies. This challenge inhibits the market's growth potential as organizations hesitate to invest in solutions that may not integrate smoothly with their existing infrastructure.

Limited Awareness and Understanding of DAS Technology

The limited awareness and understanding of Distributed Acoustic Sensing technology pose a significant obstacle to market growth. Many organizations are not familiar with the capabilities and potential applications of DAS technology, which can hinder its adoption. Without a clear understanding of how DAS can enhance their operations and provide valuable insights, organizations may be hesitant to invest in DAS solutions. Increasing awareness and educating potential customers about the benefits and use cases of DAS technology is crucial for market expansion.

Data Privacy and Security Concerns

Data privacy and security concerns are another challenge for the Global Distributed Acoustic Sensing market. As DAS systems collect and analyze vast amounts of data, organizations must ensure the privacy and security of sensitive information. Protecting data from unauthorized access, breaches, and misuse is paramount, especially in industries where confidentiality is critical. Addressing these concerns and implementing robust data protection measures is essential to build trust and encourage the adoption of DAS solutions.

Cost and Return on Investment Considerations

The cost of implementing and maintaining Distributed Acoustic Sensing systems can be a barrier to market expansion. Organizations need to evaluate the return on investment (ROI) and justify the expenses associated with deploying DAS technology. The initial investment, ongoing maintenance costs, and the need for specialized expertise can make DAS solutions financially challenging for some organizations. Demonstrating the long-term value and cost-effectiveness of DAS technology is crucial to overcome this

challenge and drive market growth.

Key Market Trends

Rise in Adoption of Distributed Acoustic Sensing (DAS) Technology

The global distributed acoustic sensing (DAS) market is witnessing a significant rise in adoption as organizations recognize the value of this advanced sensing technology. DAS technology utilizes fiber optic cables to transform them into thousands of individual acoustic sensors, enabling real-time monitoring and analysis of sound and vibrations along the entire length of the cable. This technology offers a wide range of applications across various industries, including oil and gas, transportation, infrastructure, and security. With the ability to convert existing fiber optic cables into sensing devices, DAS provides a cost-effective solution for organizations looking to enhance their monitoring capabilities without significant infrastructure changes. The rise in adoption of DAS technology can be attributed to its ability to provide continuous, high-resolution monitoring over long distances, enabling early detection of potential issues and improved operational efficiency.

Increasing Demand for Infrastructure Monitoring and Security

One of the key drivers for the global DAS market is the increasing demand for infrastructure monitoring and security solutions. Organizations across sectors such as oil and gas, transportation, and utilities are leveraging DAS technology to monitor the integrity of critical infrastructure assets, including pipelines, railways, and power grids. DAS enables real-time monitoring of these assets, detecting any anomalies or potential threats such as leaks, intrusions, or structural weaknesses. By providing early warning systems, DAS technology helps organizations prevent accidents, minimize downtime, and ensure the safety and security of their infrastructure. The growing emphasis on infrastructure resilience and the need for proactive monitoring solutions are driving the adoption of DAS technology in the global market.

Integration of DAS with Artificial Intelligence and Machine Learning

The integration of DAS technology with artificial intelligence (AI) and machine learning (ML) algorithms is another significant trend in the global market. By combining DAS data with advanced analytics capabilities, organizations can gain valuable insights and predictive capabilities. AI and ML algorithms can analyze the vast amount of data collected by DAS systems, identify patterns, and detect anomalies that may indicate

potential issues or threats. This integration enables organizations to move from reactive to proactive maintenance strategies, optimizing asset performance and reducing operational costs. Additionally, AI and ML algorithms can enhance the accuracy and reliability of DAS systems by continuously learning and adapting to changing environmental conditions. The integration of DAS with AI and ML is expected to drive innovation and open up new opportunities in the global market.

Growing Focus on Environmental Monitoring and Geophysical Applications

The global DAS market is witnessing a growing focus on environmental monitoring and geophysical applications. DAS technology can be used to monitor natural phenomena such as earthquakes, landslides, and groundwater movements. By leveraging the sensing capabilities of fiber optic cables, DAS systems can provide real-time data on these events, enabling early warning systems and facilitating timely response and mitigation efforts. Additionally, DAS technology can be deployed in geophysical exploration applications, providing valuable insights into subsurface conditions and helping organizations make informed decisions in industries such as oil and gas, mining, and geothermal energy. The increasing awareness of environmental risks and the need for sustainable practices are driving the adoption of DAS technology in these applications.

Segmental Insights

Type Insights

In 2022, the global distributed acoustic sensing (DAS) market witnessed a dominant performance by the single-mode type segment. Single-mode DAS technology refers to the use of a single optical mode to transmit signals, allowing for longer distances and higher data rates. This segment's dominance can be attributed to several factors. Firstly, single-mode DAS offers superior performance in terms of signal quality and sensitivity, making it suitable for a wide range of applications such as oil and gas, security and surveillance, and infrastructure monitoring. Additionally, the increasing adoption of single-mode DAS in the oil and gas industry for reservoir monitoring and production optimization has significantly contributed to its market dominance. The ability of single-mode DAS to provide real-time, continuous monitoring of wellbore and reservoir conditions has proven invaluable in enhancing operational efficiency and reducing costs. Furthermore, the growing investments in infrastructure development projects, particularly in emerging economies, have further fueled the demand for single-mode DAS solutions. The ability of single-mode DAS to accurately detect and locate

events such as leaks, intrusions, and structural defects in pipelines, railways, and other critical infrastructure has made it an indispensable tool for ensuring safety and reliability. Looking ahead, the single-mode DAS segment is expected to maintain its dominance during the forecast period. The increasing demand for advanced monitoring and surveillance solutions across various industries, coupled with ongoing technological advancements in single-mode DAS, is anticipated to drive its market growth. Additionally, the rising focus on improving operational efficiency and safety standards in sectors such as oil and gas, transportation, and utilities is likely to further propel the adoption of single-mode DAS in the coming years.

Industry Vertical Insights

In 2022, the Global Distributed Acoustic Sensing (DAS) market witnessed significant growth across various industry verticals. Among these segments, the Telecommunication sector emerged as the dominant player, and it is expected to maintain its dominance during the forecast period. The increasing demand for high-speed internet connectivity, the proliferation of smartphones, and the rapid expansion of 5G networks have been the key drivers behind the growth of the DAS market in the Telecommunication sector. Distributed Acoustic Sensing technology offers several advantages in this industry, including real-time monitoring of fiber optic cables, detection of cable faults, and enhanced security measures. These capabilities make DAS an ideal solution for telecommunication companies to ensure the uninterrupted flow of data and maintain the reliability of their networks. Additionally, the deployment of DAS technology in telecommunication networks enables operators to optimize their infrastructure, improve network performance, and enhance the overall customer experience. With the increasing demand for seamless connectivity and the continuous advancements in telecommunication networks, the Telecommunication sector is expected to maintain its dominance in the Global DAS market during the forecast period. However, it is worth noting that other industry verticals such as Oil & Gas, Infrastructure, and Smart Cities are also witnessing significant growth and are expected to contribute substantially to the overall market in the coming years.

Regional Insights

The global distributed acoustic sensing (DAS) market witnessed significant growth, with several regions contributing to its expansion. However, one region stood out as the dominant force in this market and is expected to maintain its dominance during the forecast period. That region is North America. North America emerged as the leading region in the global DAS market in 2022, primarily due to the presence of advanced

infrastructure and a strong focus on technological advancements. The region's well-established oil and gas industry, along with the increasing adoption of DAS technology in various sectors, played a crucial role in its dominance. The United States, in particular, played a significant role in driving the growth of the DAS market in North America. The country has a robust network of oil and gas pipelines, which require continuous monitoring for safety and security purposes. DAS technology offers real-time monitoring capabilities, enabling early detection of leaks or intrusions, thereby enhancing the overall safety and efficiency of these pipelines. This has led to a widespread adoption of DAS technology in the region. Furthermore, North America has witnessed a growing demand for DAS in other sectors as well, such as transportation, infrastructure, and security. The ability of DAS to provide continuous monitoring and surveillance in these sectors has been a key driver for its adoption. Additionally, the region's strong focus on research and development, coupled with favorable government initiatives, has further propelled the growth of the DAS market. Looking ahead, North America is expected to maintain its dominance in the global DAS market during the forecast period. The region's continued investments in infrastructure development, coupled with the increasing adoption of DAS technology across various industries, are anticipated to drive the market's growth. Moreover, advancements in DAS technology, such as improved sensing capabilities and enhanced data analytics, are likely to further fuel the market's expansion in North America.

Key Market Players

Halliburton

Schlumberger

Yokogawa Electric Corporation

Prysmian Group

QinetiQ Group plc

OptaSense

FISO Technologies

Silixa Ltd

Dataflow Dynamics

Actility

PiezoPhoton

Report Scope:

In this report, the Global Distributed acoustic sensing Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Distributed acoustic sensing Market, By Type:

Single Mode

Multimode

Distributed acoustic sensing Market, By Industry Vertical:

Military

Oil Gas

Infrastructure

Telecommunication

Transportation

Smart Cities

Others

Distributed acoustic sensing Market, By Region:

North America

United States

Canada

Mexico

Europe

France

United Kingdom

Italy

Germany

Spain

Asia-Pacific

China

India

Japan

Australia

South Korea

Indonesia

Vietnam

South America

Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Distributed acoustic sensing Market.

Available Customizations:

Global Distributed acoustic sensing market report with the given market data, Tech Sci 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. IMPACT OF COVID-19 ON GLOBAL DISTRIBUTED ACOUSTIC SENSING MARKET

5. VOICE OF CUSTOMER

6. GLOBAL DISTRIBUTED ACOUSTIC SENSING MARKET OVERVIEW

7. GLOBAL DISTRIBUTED ACOUSTIC SENSING MARKET OUTLOOK

- 7.1. Market Size & Forecast
 - 7.1.1. By Value

7.2. Market Share & Forecast

7.2.1. By Type (Single Mode, Multimode),

7.2.2. By Industry Vertical (Military, Oil Gas, Infrastructure, Telecommunication, Transportation, Smart Cities, Others)

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

7.3. By Company (2022)

7.4. Market Map

8. NORTH AMERICA DISTRIBUTED ACOUSTIC SENSING MARKET OUTLOOK

8.1. Market Size & Forecast

8.1.1. By Value

8.2. Market Share & Forecast

8.2.1. By Type

8.2.2. By Industry Vertical

8.2.3. By Country

8.3. North America: Country Analysis

8.3.1. United States Distributed acoustic sensing 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 Type

8.3.1.2.2. By Industry Vertical

8.3.2. Canada Distributed acoustic sensing 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 Type

8.3.2.2.2. By Industry Vertical

8.3.3. Mexico Distributed acoustic sensing 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 Type

8.3.3.2.2. By Industry Vertical

9. EUROPE DISTRIBUTED ACOUSTIC SENSING MARKET OUTLOOK

9.1. Market Size & Forecast

9.1.1. By Value

9.2. Market Share & Forecast

9.2.1. By Type

9.2.2. By Industry Vertical

9.2.3. By Country

9.3. Europe: Country Analysis

9.3.1. Germany Distributed acoustic sensing 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 Type

9.3.1.2.2. By Industry Vertical

9.3.2. France Distributed acoustic sensing 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 Type

9.3.2.2.2. By Industry Vertical

9.3.3. United Kingdom Distributed acoustic sensing 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 Type

9.3.3.2.2. By Industry Vertical

9.3.4. Italy Distributed acoustic sensing 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 Type

9.3.4.2.2. By Industry Vertical

9.3.5. Spain Distributed acoustic sensing 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 Type

9.3.5.2.2. By Industry Vertical

10. SOUTH AMERICA DISTRIBUTED ACOUSTIC SENSING MARKET OUTLOOK

10.1. Market Size & Forecast

10.1.1. By Value

10.2. Market Share & Forecast

10.2.1. By Type

10.2.2. By Industry Vertical

10.2.3. By Country

10.3. South America: Country Analysis

10.3.1. Brazil Distributed acoustic sensing 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 Type

10.3.1.2.2. By Industry Vertical

10.3.2. Colombia Distributed acoustic sensing 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 Type

10.3.2.2.2. By Industry Vertical

10.3.3. Argentina Distributed acoustic sensing 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 Type

10.3.3.2.2. By Industry Vertical

11. MIDDLE EAST & AFRICA DISTRIBUTED ACOUSTIC SENSING MARKET OUTLOOK

11.1. Market Size & Forecast

11.1.1. By Value

11.2. Market Share & Forecast

11.2.1. By Type

11.2.2. By Industry Vertical

11.2.3. By Country

11.3. Middle East & Africa: Country Analysis

11.3.1. Saudi Arabia Distributed acoustic sensing 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 Type
 - 11.3.1.2.2. By Industry Vertical
- 11.3.2. UAE Distributed acoustic sensing 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 Type
 - 11.3.2.2.2. By Industry Vertical
- 11.3.3. South Africa Distributed acoustic sensing 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 Type
 - 11.3.3.2.2. By Industry Vertical

12. ASIA PACIFIC DISTRIBUTED ACOUSTIC SENSING MARKET OUTLOOK

- 12.1. Market Size & Forecast
 - 12.1.1. By Type
 - 12.1.2. By Industry Vertical
 - 12.1.3. By Country
- 12.2. Asia-Pacific: Country Analysis
 - 12.2.1. China Distributed acoustic sensing Market Outlook
 - 12.2.1.1. Market Size & Forecast
 - 12.2.1.1.1. By Value
 - 12.2.1.2. Market Share & Forecast
 - 12.2.1.2.1. By Type
 - 12.2.1.2.2. By Industry Vertical
 - 12.2.2. India Distributed acoustic sensing Market Outlook
 - 12.2.2.1. Market Size & Forecast
 - 12.2.2.1.1. By Value
 - 12.2.2.2. Market Share & Forecast
 - 12.2.2.2.1. By Type
 - 12.2.2.2.2. By Industry Vertical
 - 12.2.3. Japan Distributed acoustic sensing Market Outlook
 - 12.2.3.1. Market Size & Forecast
 - 12.2.3.1.1. By Value

- 12.2.3.2. Market Share & Forecast
 - 12.2.3.2.1. By Type
 - 12.2.3.2.2. By Industry Vertical
- 12.2.4. South Korea Distributed acoustic sensing Market Outlook
 - 12.2.4.1. Market Size & Forecast
 - 12.2.4.1.1. By Value
 - 12.2.4.2. Market Share & Forecast
 - 12.2.4.2.1. By Type
 - 12.2.4.2.2. By Industry Vertical
- 12.2.5. Australia Distributed acoustic sensing Market Outlook
 - 12.2.5.1. Market Size & Forecast
 - 12.2.5.1.1. By Value
 - 12.2.5.2. Market Share & Forecast
 - 12.2.5.2.1. By Type
 - 12.2.5.2.2. By Industry Vertical
- 12.2.6. Indonesia Distributed acoustic sensing Market Outlook
 - 12.2.6.1. Market Size & Forecast
 - 12.2.6.1.1. By Value
 - 12.2.6.2. Market Share & Forecast
 - 12.2.6.2.1. By Type
 - 12.2.6.2.2. By Industry Vertical
- 12.2.7. Vietnam Distributed acoustic sensing Market Outlook
 - 12.2.7.1. Market Size & Forecast
 - 12.2.7.1.1. By Value
 - 12.2.7.2. Market Share & Forecast
 - 12.2.7.2.1. By Type
 - 12.2.7.2.2. By Industry Vertical

13. MARKET DYNAMICS

- 13.1. Drivers
- 13.2. Challenges

14. MARKET TRENDS AND DEVELOPMENTS

15. COMPANY PROFILES

- 15.1. Halliburton
 - 15.1.1. Business Overview

- 15.1.2. Key Revenue and Financials
- 15.1.3. Recent Developments
- 15.1.4. Key Personnel/Key Contact Person
- 15.1.5. Key Product/Services Offered
- 15.2. Schlumberger
 - 15.2.1. Business Overview
 - 15.2.2. Key Revenue and Financials
 - 15.2.3. Recent Developments
 - 15.2.4. Key Personnel/Key Contact Person
 - 15.2.5. Key Product/Services Offered
- 15.3. Yokogawa Electric Corporation
 - 15.3.1. Business Overview
 - 15.3.2. Key Revenue and Financials
 - 15.3.3. Recent Developments
 - 15.3.4. Key Personnel/Key Contact Person
 - 15.3.5. Key Product/Services Offered
- 15.4. Prysmian Group
 - 15.4.1. Business Overview
 - 15.4.2. Key Revenue and Financials
 - 15.4.3. Recent Developments
 - 15.4.4. Key Personnel/Key Contact Person
 - 15.4.5. Key Product/Services Offered
- 15.5. QinetiQ Group plc
 - 15.5.1. Business Overview
 - 15.5.2. Key Revenue and Financials
 - 15.5.3. Recent Developments
 - 15.5.4. Key Personnel/Key Contact Person
 - 15.5.5. Key Product/Services Offered
- 15.6. OptaSense
 - 15.6.1. Business Overview
 - 15.6.2. Key Revenue and Financials
 - 15.6.3. Recent Developments
 - 15.6.4. Key Personnel/Key Contact Person
 - 15.6.5. Key Product/Services Offered
- 15.7. FISO Technologies
 - 15.7.1. Business Overview
 - 15.7.2. Key Revenue and Financials
 - 15.7.3. Recent Developments
 - 15.7.4. Key Personnel/Key Contact Person

15.7.5. Key Product/Services Offered

15.8. Silixa Ltd

15.8.1. Business Overview

15.8.2. Key Revenue and Financials

15.8.3. Recent Developments

15.8.4. Key Personnel/Key Contact Person

15.8.5. Key Product/Services Offered

15.9. Dataflow Dynamics

15.9.1. Business Overview

15.9.2. Key Revenue and Financials

15.9.3. Recent Developments

15.9.4. Key Personnel/Key Contact Person

15.9.5. Key Product/Services Offered

15.10. Actility

15.10.1. Business Overview

15.10.2. Key Revenue and Financials

15.10.3. Recent Developments

15.10.4. Key Personnel/Key Contact Person

15.10.5. Key Product/Services Offered

15.11. PiezoPhoton

15.11.1. Business Overview

15.11.2. Key Revenue and Financials

15.11.3. Recent Developments

15.11.4. Key Personnel/Key Contact Person

15.11.5. Key Product/Services Offered

16. STRATEGIC RECOMMENDATIONS

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