EDA Tools Market – Global Industry Size, Share, Trends, Opportunity, and Forecast Segmented by Type (Computer-aided Engineering (CAE), IC Physical Design and Verification, Printed Circuit Board and Multi-chip Module (PCB and MCM), Semiconductor Intellectual Property (SIP), Services), by Application (Communication, Consumer Electronics, Automotive, Industrial), By Region, Competition 2018-2028.

Abstracts

Global EDA Tools Market has valued at USD 17.05 Billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 8.24% through 2028. The main factors propelling the market's expansion are the growing need for compact electronic devices and the expanding use of SoC technology across various industries, including automotive, IoT, and AI. The silicon sector has evolved in recent years because of electronic design automation (EDA) techniques. EDA is responsible for creating the design tools necessary for the IC design process at a cost that enables the ecosystem to run profitably.

Some of the benefits of using EDA tools include reducing the amount of time needed to develop complicated ICs, cutting manufacturing costs, eliminating manufacturing defects, improving IC design and ease of use, etc.

Key Market Drivers

Increasing Demand for Semiconductor Devices

The increasing demand for semiconductor devices is a pivotal driver fueling the growth of the global Electronic Design Automation (EDA) Tools market. As technology becomes more deeply ingrained in our daily lives and industries, semiconductors have emerged as the backbone of modern electronics. This surge in demand is attributed to several factors, Firstly, the consumer electronics sector continues to witness robust growth. With the proliferation of smartphones, tablets, laptops, and smart home devices, the demand for smaller, more efficient, and powerful semiconductor components has skyrocketed. EDA tools play a vital role in designing these complex integrated circuits, ensuring they meet performance and power efficiency requirements.

Secondly, the automotive industry is undergoing a major transformation, marked by the development of electric vehicles (EVs), advanced driver-assistance systems (ADAS), and autonomous driving technology. These innovations rely heavily on semiconductors, and EDA tools enable the design of custom chips and systems tailored to the automotive industry's stringent safety and performance standards. Moreover, the healthcare sector is increasingly dependent on semiconductor devices for medical imaging, diagnostic equipment, and patient monitoring systems. This trend has been accelerated by the COVID-19 pandemic, which highlighted the critical role of electronics in healthcare. EDA tools are indispensable for designing reliable and precise medical devices.

Furthermore, the growth of 5G networks and the expansion of the Internet of Things (IoT) are further catalysts for semiconductor demand. EDA tools are essential for developing the specialized chips needed to support these technologies, enabling faster data transfer, lower latency, and improved connectivity. The aerospace and defense industries also rely heavily on semiconductor technology for advanced avionics, communication systems, and radar technology. EDA tools are crucial for designing these mission-critical components, ensuring they meet stringent performance and reliability standards. As the demand for semiconductor devices across these diverse industries continues to surge, the EDA Tools market is poised for significant growth. Designers and engineers increasingly turn to advanced EDA software to meet the complex design challenges posed by these high-demand sectors. EDA tools will remain at the forefront of innovation, facilitating the development of cutting-edge semiconductor solutions that power the technologies of tomorrow.

Advancements in Semiconductor Manufacturing Processes

Advancements in semiconductor manufacturing processes are a driving force behind the growth of the global Electronic Design Automation (EDA) Tools market. These

technological progressions in how semiconductor devices are fabricated have profound implications for the design and development phases, and they create a symbiotic relationship with EDA tools. Here's how these advancements are propelling the EDA Tools market, Shrinking Process Nodes: One of the primary advancements in semiconductor manufacturing is the continuous reduction in process nodes. As semiconductor manufacturers migrate to smaller nodes, such as 7nm, 5nm, and beyond, the complexity and intricacy of designing chips increase significantly. EDA tools are indispensable in navigating this complexity, ensuring designs are error-free and optimized for the latest manufacturing technologies.

Integration of New Materials: Emerging manufacturing techniques incorporate novel materials like extreme ultraviolet (EUV) lithography and advanced substrates. EDA tools must be capable of simulating and optimizing designs using these materials, ensuring that devices can harness their benefits, such as improved performance and power efficiency. 3D Integration and Packaging: Semiconductor manufacturers are increasingly exploring 3D integration and packaging to improve device performance and reduce footprint. EDA tools are essential for designing stacked and interconnected chips, enabling efficient thermal management, signal integrity, and power delivery.

Process Variability Management: Advanced manufacturing processes introduce greater variability, which can impact device performance and yield. EDA tools with sophisticated modeling capabilities are crucial for managing and mitigating this variability, ensuring consistent and reliable semiconductor production. Customization for Specific Applications: Advancements allow for more customization of semiconductor designs to cater to specific applications. EDA tools enable designers to tailor chips for diverse industries, such as automotive, IoT, and artificial intelligence, where unique requirements demand specialized semiconductor solutions.

Power Efficiency and Performance Optimization: New manufacturing techniques often come with opportunities to enhance power efficiency and overall device performance. EDA tools are pivotal in optimizing designs to leverage these advantages, especially in applications where energy consumption is a critical concern.

Design for Manufacturability: Ensuring that semiconductor designs are manufacturable at scale is paramount. EDA tools aid in the design-for-manufacturability process by simulating manufacturing conditions, predicting yield rates, and identifying potential production challenges. As semiconductor manufacturing continues to advance, the intricacies and challenges of designing cutting-edge chips grow in tandem. EDA tools evolve to meet these challenges, providing design engineers with the necessary

capabilities to leverage the latest manufacturing processes effectively. This symbiotic relationship between manufacturing advancements and EDA tool development ensures that semiconductor devices continue to push the boundaries of performance, efficiency, and innovation, driving the growth of the global EDA Tools market.

Growth of IoT and AI

The growth of the Internet of Things (IoT) and Artificial Intelligence (AI) is a significant driver propelling the expansion of the global Electronic Design Automation (EDA) Tools market. Both IoT and AI technologies rely heavily on specialized hardware, and EDA tools are crucial for designing the custom chips and systems required to support their increasing demands. Here's how the growth of IoT and AI is driving the EDA Tools market, IoT Proliferation: The IoT market is experiencing explosive growth across various sectors, including smart homes, industrial automation, healthcare, and agriculture. IoT devices require specialized, often low-power, and highly integrated semiconductor solutions. EDA tools enable designers to create chips that meet the unique requirements of IoT applications, including connectivity, energy efficiency, and small form factors.

AI's Insatiable Appetite for Processing Power: Artificial Intelligence applications, such as machine learning and deep learning, require massive computational power. Custom hardware accelerators, like GPUs and TPUs, are essential to meet these demands efficiently. EDA tools are instrumental in designing and optimizing AI-specific chips, ensuring they deliver the computational performance required for AI workloads. Edge Computing: IoT and AI are driving the shift toward edge computing, where data processing occurs closer to the data source, reducing latency and improving real-time decision-making. EDA tools play a vital role in creating energy-efficient, high-performance processors and accelerators for edge devices, which need to operate in resource-constrained environments.

Complexity and Heterogeneity: IoT and AI devices often require complex, heterogeneous system-on-chip (SoC) designs that integrate different processing elements, such as CPUs, GPUs, and AI accelerators. EDA tools provide the means to design, simulate, and validate these complex architectures. Energy Efficiency: Both IoT and AI applications place a premium on energy efficiency, especially in battery-powered devices. EDA tools help designers optimize power consumption through techniques like low-power design, dynamic voltage and frequency scaling, and power gating. Security Considerations: Security is paramount in IoT and AI, where data privacy and device integrity are critical. EDA tools support the design of secure hardware by enabling the

incorporation of hardware-based security features, cryptographic accelerators, and secure boot mechanisms.

Customization: IoT and AI applications often require customized hardware solutions tailored to specific use cases. EDA tools empower designers to create application-specific integrated circuits (ASICs) that deliver optimal performance for these specialized tasks. Market Competition: As the IoT and AI markets grow, competition intensifies. EDA tools are indispensable for companies looking to gain a competitive edge by designing innovative and efficient semiconductor solutions. The expansion of IoT and AI technologies is creating a robust ecosystem of semiconductor innovation. EDA tools are at the forefront of this evolution, enabling designers to develop the specialized chips and systems that underpin the transformative capabilities of IoT and AI. As these technologies continue to permeate various industries, the demand for EDA tools will remain robust, driving the growth of the global EDA Tools market.

Key Market Challenges

Rapid Technological Advancements

While rapid technological advancements can be a driving force for innovation and growth in many industries, they can also present challenges and potential disruptions in the global Electronic Design Automation (EDA) Tools market. These advancements, while offering benefits, can indeed hamper the EDA Tools market in several ways, Continuous Learning Curve: EDA tools are intricately tied to the semiconductor industry, which evolves at a breakneck pace. The rapid introduction of new manufacturing processes, materials, and design methodologies requires design engineers to continually learn and adapt to stay current with EDA tool capabilities. This learning curve can slow down design processes and increase the time-to-market for new products.

Development Costs: Keeping EDA tools up to date with the latest technological advancements demands substantial research and development investments. Smaller EDA tool companies may struggle to keep pace with these costs, potentially leading to consolidation and fewer options for consumers. Compatibility Challenges: Rapid technological advancements often result in fragmented standards and formats. EDA tools must navigate compatibility issues when dealing with various design data formats and semiconductor manufacturing processes. This can lead to inefficiencies and design roadblocks.

Shorter Tool Relevance: The accelerated pace of technological change in the semiconductor industry means that EDA tools can become obsolete more quickly. Companies may hesitate to invest in EDA tools if they fear that the tools will no longer be relevant in a short time frame. Resource Intensiveness: Advanced technology nodes and designs require more computational resources, including high-performance computing clusters. The cost and scalability of these resources can be a challenge for EDA tool providers and users alike.

Turbulent Market Dynamics: Rapid advancements can introduce market uncertainty, as companies may be hesitant to adopt new EDA tools or methodologies until they have been thoroughly tested and proven. This can lead to fluctuations in demand and market stability. Integration Complexity: As EDA tools incorporate new features and capabilities to support advanced technologies, integrating them into existing design environments can become more complex. Design teams must invest time and effort in adapting their workflows, which can temporarily disrupt productivity.

Global Competition: The global EDA Tools market is highly competitive, and companies are constantly striving to outpace their rivals with the latest features and innovations. This intense competition can strain resources and profitability. To mitigate these challenges, EDA tool providers must strike a balance between innovation and stability. They need to invest in research and development to keep pace with technological advancements while also ensuring backward compatibility and providing robust support for their tools. Collaboration within the industry to establish common standards and best practices can also help reduce some of the challenges posed by rapid technological change. Ultimately, navigating the ever-evolving semiconductor landscape requires a strategic and adaptive approach to sustain and thrive in the EDA Tools market.

High Development Costs

High development costs represent a significant challenge that can hamper the growth and accessibility of the global Electronic Design Automation (EDA) Tools market. EDA tools are vital for designing and verifying semiconductor components and integrated circuits, but the substantial costs associated with their development and maintenance pose several obstacles, Research and Development Expenses: Developing and enhancing EDA tools requires substantial investments in research, engineering talent, and ongoing innovation. Staying at the forefront of technology to meet the demands of an ever-evolving semiconductor industry entails high R&D costs. Smaller EDA tool companies may struggle to compete with larger, more financially endowed players.

Continuous Updates: The semiconductor industry is marked by rapid technological advancements, from shrinking process nodes to the integration of novel materials. EDA tool providers must continually update their software to keep pace with these changes. This ongoing commitment to development adds to the overall cost burden. Complexity and Performance: As semiconductor designs become more intricate and technologically advanced, EDA tools must offer increasingly sophisticated features and capabilities. These complex requirements not only demand more significant investments but also require skilled engineers to develop and maintain the software, further contributing to costs.

Competing with Established Players: The EDA Tools market is dominated by well-established, large corporations with extensive resources. New entrants face a daunting challenge in terms of funding and market penetration, as they must invest heavily in development to compete effectively. Balancing Affordability: Striking a balance between offering cutting-edge, high-performance tools and making them affordable for a broad range of users can be a delicate challenge. High development costs can result in expensive licensing fees, which may limit access for smaller design teams or emerging markets.

Limited Innovation: The high costs associated with EDA tool development can sometimes stifle innovation, as companies may prioritize maintaining their existing products over investing in groundbreaking features or disruptive technologies. Resource Intensive: EDA tools require substantial computational resources to perform simulations and analyses, especially for advanced semiconductor designs. These resource requirements contribute to the overall costs of using EDA tools effectively.

To address the challenge of high development costs, EDA tool providers need to adopt strategic approaches: Collaboration: Industry collaboration and partnerships can help pool resources and share development costs, particularly for areas of common interest such as standardization efforts. Cloud-Based Solutions: Cloud-based EDA tools can reduce upfront infrastructure costs for users, making advanced design and simulation capabilities more accessible. Open-Source Initiatives: Embracing open-source initiatives can reduce development costs and foster community-driven innovation, potentially lowering the barriers to entry for new EDA tool providers.

Subscription and Licensing Models: EDA tool providers can explore flexible licensing models, including subscriptions and pay-as-you-go options, to make their tools more accessible and affordable for a broader user base. While high development costs remain a formidable challenge in the EDA Tools market, innovative strategies, industry

collaboration, and evolving business models can help mitigate these challenges and ensure that EDA tools continue to play a crucial role in the semiconductor design ecosystem.

Key Market Trends

Customization for Specific Applications

The trend of customization for specific applications is poised to be a significant driver of growth in the global Electronic Design Automation (EDA) Tools market. As industries across the board increasingly rely on specialized electronic systems tailored to their unique needs, EDA tools are playing a pivotal role in enabling this customization. Here's how this trend is driving the EDA Tools market, Industry-Specific Requirements: Different industries, such as automotive, aerospace, healthcare, and IoT, have distinct requirements for electronic systems. These requirements encompass factors like power efficiency, performance, safety, and security. EDA tools are evolving to allow designers to fine-tune semiconductor designs to meet these specific needs.

Automotive Electronics: The automotive industry demands customized chips and systems for advanced driver-assistance systems (ADAS), infotainment, electric vehicles (EVs), and autonomous driving. EDA tools enable the development of semiconductor solutions that meet automotive safety and reliability standards. Aerospace and Defense: Aerospace and defense applications require chips that can withstand extreme conditions and deliver high reliability. EDA tools support the design of radiation-hardened and ruggedized components for mission-critical systems.

IoT Sensors: IoT devices, which are integral to smart cities, industrial automation, and environmental monitoring, often require ultra-low-power sensors with specific communication protocols. EDA tools facilitate the design of energy-efficient, compact sensor nodes for IoT deployments. Healthcare Devices: Medical devices demand precision, reliability, and adherence to strict regulatory standards. EDA tools assist in creating semiconductor solutions for medical imaging, patient monitoring, and diagnostic equipment, ensuring they meet healthcare industry requirements. AI Accelerators: The AI revolution is driving the need for specialized hardware accelerators. EDA tools enable designers to create custom AI chips optimized for machine learning and deep learning workloads, enhancing AI performance and efficiency.

Energy Efficiency: Many industries are increasingly focused on reducing energy

consumption and environmental impact. EDA tools support the development of energy-efficient semiconductor solutions, helping organizations meet sustainability goals. Market Differentiation: Customized semiconductor solutions allow companies to differentiate their products in competitive markets. EDA tools empower designers to create unique features and capabilities that set their products apart. Small-Batch Production: Customization is not limited to large-scale production. EDA tools enable small-batch or even one-off designs, making it feasible for niche applications and startups to access tailored semiconductor solutions.

Design Complexity Management: While customization introduces complexity, EDA tools are equipped with features to help manage this complexity efficiently. They provide design automation, verification, and simulation capabilities to ensure that customized designs are error-free and meet performance targets. The customization trend aligns EDA tools with the demands of diverse industries, driving innovation and market growth. As the need for specialized semiconductor solutions continues to expand across sectors, the EDA Tools market is likely to experience sustained growth, as design engineers increasingly rely on these tools to create tailored electronic systems that meet the unique requirements of their respective applications.

Cloud-Based EDA Tools

The emergence and adoption of cloud-based Electronic Design Automation (EDA) Tools are poised to be a driving force in the global EDA Tools market. Cloud-based EDA tools offer numerous advantages, making them a compelling choice for semiconductor design teams and businesses. Here's how this trend is set to drive the growth of the EDA Tools market, Scalability and Flexibility: Cloud-based EDA tools provide scalable computing resources that can be adjusted to match project requirements. Design teams can access high-performance computing clusters on-demand, ensuring they have the computational power needed for complex simulations and analyses. This scalability allows businesses to efficiently manage workloads without significant upfront infrastructure investments.

Cost Efficiency: Traditional on-premises EDA tools require substantial investments in hardware, software licenses, and IT infrastructure. In contrast, cloud-based EDA tools often follow a subscription or pay-as-you-go model, reducing upfront capital expenditures. This cost-efficiency appeals to both established companies and startups with limited budgets. Accessibility and Collaboration: Cloud-based EDA tools are accessible from anywhere with an internet connection. Design teams can collaborate seamlessly across geographic locations, enhancing productivity and enabling global

collaboration. This accessibility also simplifies remote work arrangements and accelerates design iterations.

Reduced Maintenance Burden: Cloud-based EDA tools are maintained and updated by the service provider, relieving design teams of the responsibility of managing software updates, patches, and hardware maintenance. This frees up time and resources for design engineers to focus on innovation and optimization. Fast Deployment: Setting up and configuring on-premises EDA tools can be time-consuming. Cloud-based solutions offer rapid deployment, allowing design teams to start working on projects immediately. This agility is particularly valuable in fast-paced industries where time-to-market is critical.

Resource Sharing: Cloud-based platforms allow for resource sharing and efficient utilization. Design teams can share design data, collaborate on projects, and access shared libraries and templates, fostering innovation and consistency in design practices. Security and Compliance: Cloud providers invest heavily in security measures, often exceeding the capabilities of on-premises solutions. They offer robust encryption, access controls, and compliance certifications, addressing concerns about data security and regulatory compliance. Elasticity for Peak Workloads: During peak workloads or project spikes, cloud-based EDA tools can quickly allocate additional resources to meet demand. This elasticity ensures that design projects remain on schedule and can handle unexpected computational requirements.

Energy Efficiency: Cloud data centers are often designed for energy efficiency, reducing the environmental impact of computations. This aligns with the growing emphasis on sustainability and green practices in the semiconductor industry. Integration Capabilities: Cloud-based EDA tools can seamlessly integrate with other cloud-based services, such as data storage, machine learning, and data analytics. This integration enables comprehensive solutions for advanced design and analysis. As design teams increasingly recognize the benefits of cloud-based EDA tools, the market for these solutions is likely to expand significantly. Cloud-based EDA tools offer a cost-effective, flexible, and collaborative approach to semiconductor design, making them a driving force in shaping the future of the EDA Tools market.

Segmental Insights

Type Insights

IC Physical Design and Verification segment is expected to dominate the market during

the forecast period. IC physical design refers to the creation of geometric representations of ICs, using EDA tools. EDA is used to divide the chip into smaller blocks and then plan the specific space required for each block to ensure maximum performance. These blocks are then placed, using before and after clock synthesis.

The recent technological advancements have been helping several chipset manufacturers to make use of ASIC technology, mainly for 5G. The advent of structured ASIC, having elements of both ASICs and field-programmable gate arrays (FPGA), like architecture, has led to the cost of production becoming cheaper compared to full-blown ASIC, which requires the addition of a modifiable on top of the base ASIC layer.

Regional Insights

North America is expected to dominate the market during the forecast period. EDA tools often design circuit boards, processors, and other complex electronics. The adoption of EDA tools in industries such as consumer electronics, and automotive, is set to increase demand for the market in North America. Also, growing developments in the semiconductor industry and circuit manufacturing industry have raised the market's prominence in the region. Also, some of the significant vendors of EDA tools are headquartered in North America, such as Xilinx Inc., Ansys Inc., Keysight Technologies Inc., Cadence Design Systems Inc., and Synopsys Inc.

Some North American suppliers have been investing in improving the company's product lines and broadening the firm reach to meet the demand for EDA tools in the region. For instance, in May 2022, Chipmaker Advanced Micro Devices Inc. announced that the company intends to move some of its electronic design automation workloads for chip design onto Google Cloud to expand the capabilities of the company's data centers. This will allow taking advantage of Google's most recent computer optimized C2D virtual machine instances, which are powered by 3rd Gen AMD EPYC processors, as well as advanced networking, storage, and artificial intelligence capabilities.

Key Market Players

Altium Limited

Ansys Inc.

Cadence Design Systems Inc.

Keysight Technologies Inc.

Agnisys Inc.

Aldec Inc.

Lauterbach GmbH

Mentor Graphic Corporation (Siemens PLM Software)

Synopsys Inc.

Xilinx Inc.

Report Scope:

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

Global EDA Tools Market, By Type:

Computer-aided Engineering (CAE)

IC Physical Design and Verification

Printed Circuit Board and Multi-chip Module (PCB and MCM)

Semiconductor Intellectual Property (SIP)

Services

Global EDA Tools Market, By Application:

Communication

Consumer Electronics

Automotive

Industrial

Other

Global EDA Tools Market, By Region:

North America

United States

Canada

Mexico

Asia-Pacific

China

India

Japan

South Korea

Indonesia

Europe

Germany

United Kingdom

France

Russia

Spain

South America

Brazil

Argentina

Middle East & Africa

Saudi Arabia

South Africa

Egypt

UAE

Israel

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global EDA Tools Market.

Available Customizations:

Global EDA Tools 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).

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