

FROST & SULLIVAN

*ACHRONIX SEMICONDUCTOR*

**2022**  
**NEW**  
**PRODUCT**  
**INNOVATION**

*NORTH AMERICAN*  
*SEMICONDUCTOR INDUSTRY*

## Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. This process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Achronix Semiconductor Corporation (Achronix) excels in many of the criteria in the semiconductor space.

AWARD CRITERIA	
<i>New Product Attributes</i>	<i>Customer Impact</i>
Match to Needs	Price/Performance Value
Reliability	Customer Purchase Experience
Quality	Customer Ownership Experience
Positioning	Customer Service Experience
Design	Brand Equity

### Market Overview: Increasing Demand for Programmable Logic Devices

In 2020, every person created more than 1.7 megabytes of data per second. By 2025, people will generate about 463 exabytes of data each day.<sup>1</sup> In a context where models and algorithms need constant tuning, the challenge relies on processing ever increasing amounts of data each year. Data processing hardware architecture needs continuous evolution to provide power efficiency and optimized performance.

Field programmable gate arrays (FPGAs) are hardware programmable circuits that can be used to implement custom functions within a digital system. FPGAs can execute complex logic functions, and can be re-programmed, allowing repeated revisions and implementations during and after the manufactured end product. This flexibility provides higher design adaptability within semiconductor devices and faster time-to-market, adding to the technology’s competitive benefits.

While FPGAs can have a higher unit cost than application-specific integrated circuits (ASICs), they do not require a large non-reoccurring engineering (NRE) costs and allow for faster time to market. Moreover, users can implement FPGAs in various applications, making the technology more cost-efficient for low and medium-volume production or where industry standards are evolving and creating a fixed-function ASIC would be risky. Besides FPGAs, the leading technologies under programmable semiconductors are graphical processing units (GPUs), microprocessing units, and artificial intelligence (AI) accelerators. However, none

<sup>1</sup>Frost Radar™: FPGA, 2021 (Frost & Sullivan, March 2021)

of these technologies are hardware reprogrammable; therefore, FPGAs present an opportunity for greater algorithmic acceleration for various workload requirements. The proliferation of Internet-of-Things (IoT), AI, machine learning (ML), and Big Data technologies has triggered the demand for programmable logic devices, specifically FPGAs. Industries such wireless communications, networking, data centers, automotive and industrial rely on FPGAs to provide the performance and differentiation required.<sup>2</sup>

This dynamic, high-growth market motivates semiconductor companies to develop multiple product lines

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**- Kristin Portela,  
Best Practices Research Analyst**

and invest in newer applications for emerging industry trends, assertively investing a significant portion of their revenue into research and development efforts to build innovative FPGA-based product lines. In addition, large companies actively seek to acquire or partner with emerging companies, targeting disruptive start-ups to expand their product portfolio and reach new markets. Notably, large companies lean towards a platform-based approach focused on the FPGA fabric, leveraging heterogeneous processing capabilities to handle

various AI and ML workloads. At the same time, there is a high demand for innovative hardware solutions.

Ultimately, creating new products to address existing industry challenges, foreseeing potential problems, and building sophisticated platforms to address future IoT applications' difficulties are the backbone to market opportunities. Frost & Sullivan projects revenues for the semiconductor industry exceeding \$8 billion by 2023.<sup>3</sup>

FPGA solutions have seen a strong demand from data centers, communication infrastructure, networking smart retail, and healthcare during the pandemic. According to Frost & Sullivan's research, more than 80% of core network deployments will transform to virtualized networks, fueled by fifth-generation technology by 2025. FPGAs offer the ability to dramatically accelerate these virtualized workloads running on CPUs. FPGAs provide a cost and power optimized solution that can help scale data centers without adding more CPU resources. Therefore, Frost and Sullivan predicts that FPGAs will continue to gain market share within these high-growth applications.

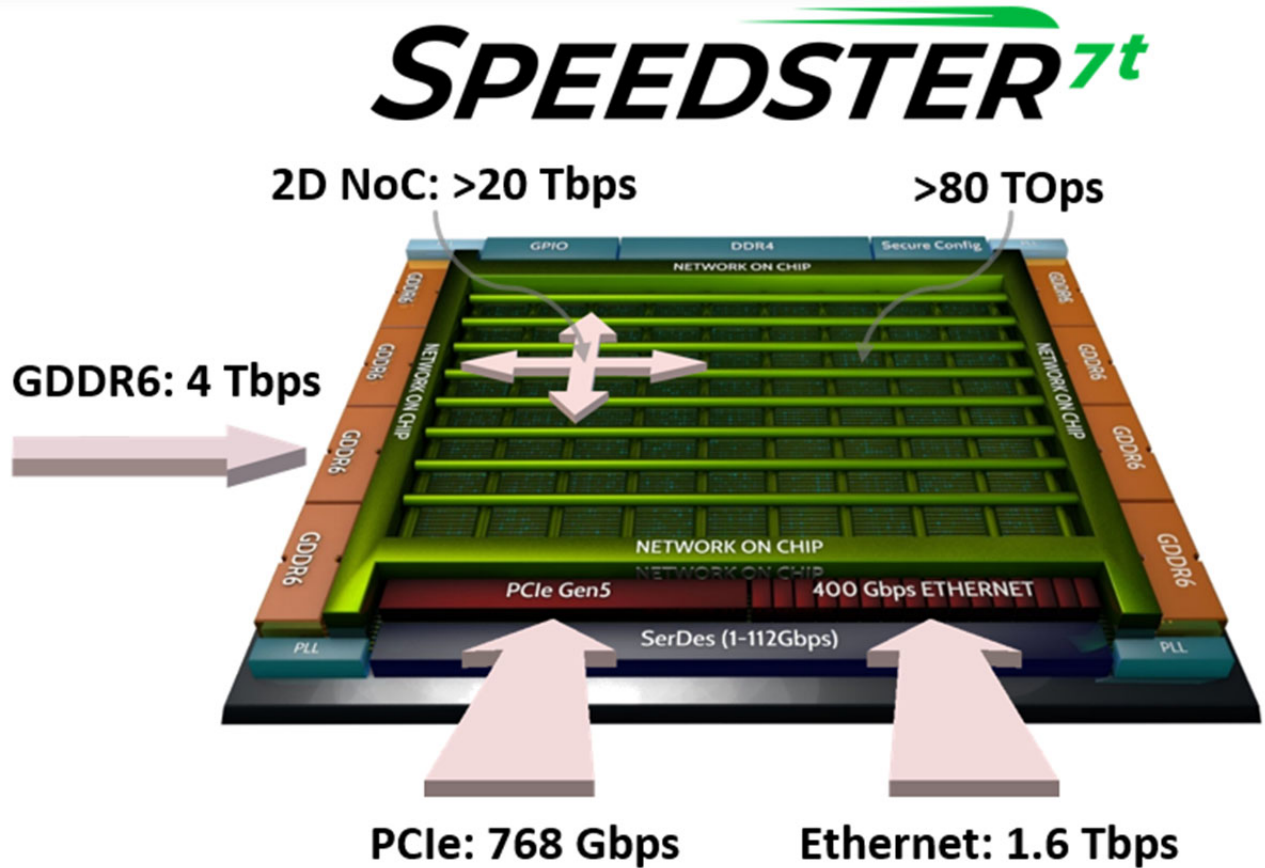
### ***Reliability and Design: Hardware and Software Optimization***

The Achronix product line includes high-performance FPGAs, embedded (eFPGA) IP, design tools, and accelerator card solutions. As algorithms used to process data continuously change and require constant hardware optimization, changing the software is insufficient to meet the high data processing demands. The company's FPGAs are designed into applications with 10 to 15-year life cycles, requiring both high reliability and long-term support. Customers can reprogram Achronix's products to incorporate new features, fix bugs, and enhance security, enabling them to continue to innovate in hardware and software while using the same hardware platform.

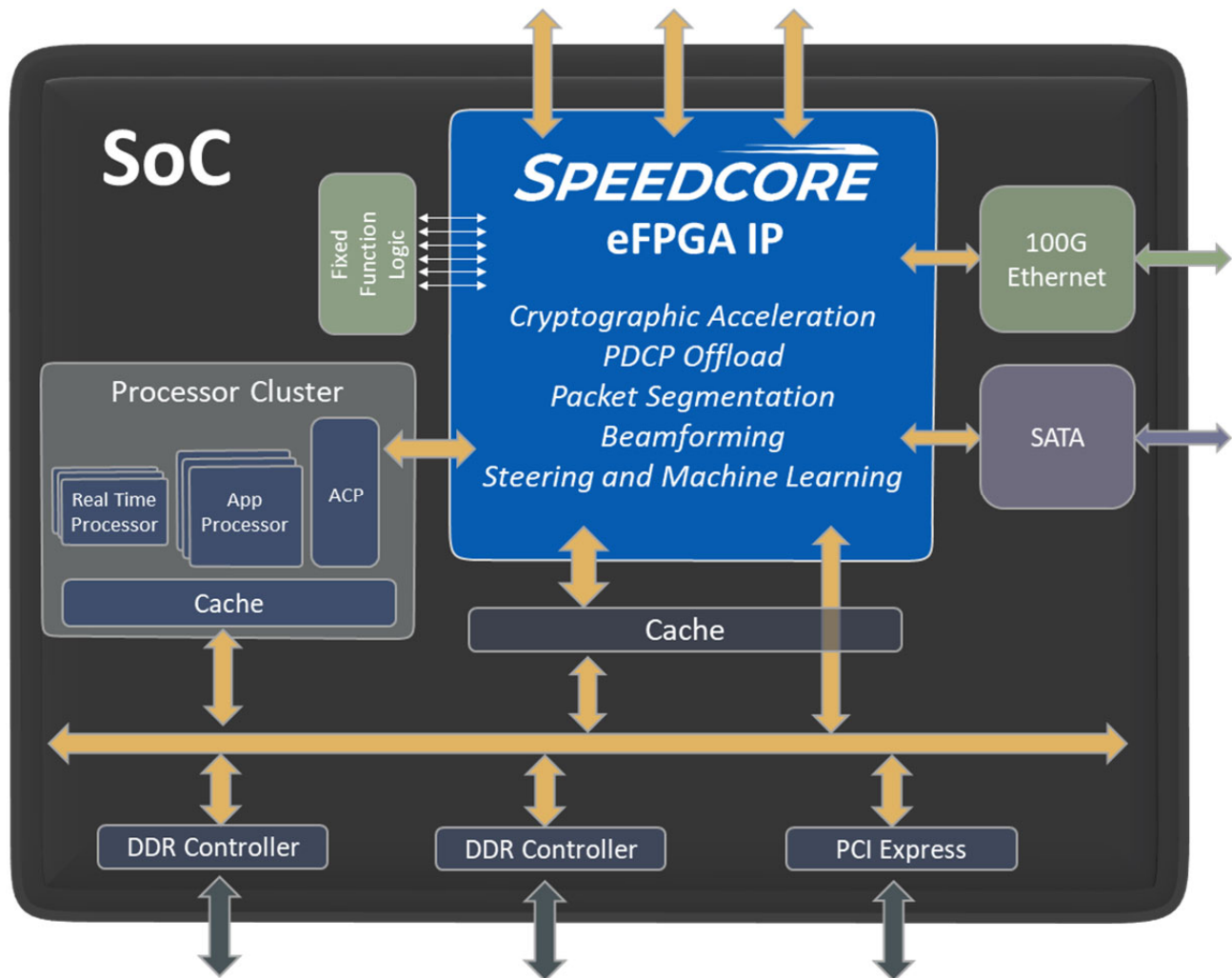
<sup>2</sup>Growth Opportunities for Programmable Semiconductor Technologies (Frost & Sullivan, September 2020)

<sup>3</sup>Frost Radar™: FPGA, 2021 (Frost & Sullivan, March 2021)

Achronix developed innovative features and capabilities that significantly differentiate its products in the market, specifically with its Speedster7t FPGAs. The Speedster 7t architecture includes innovative features such as a revolutionary two-dimensional network-on-chip (2D NoC), for high-speed data transport through the FPGA's external interfaces and into the programmable logic fabric. It also includes machine learning processors (MLP) optimized to accelerate AI/ML workloads. Finally, additional differentiating products include the VectorPath accelerator card that supports 400G Ethernet in a PCIe form factor and the Speedcore embedded FPGA (eFPGA) IP for integration into a custom ASIC or SoC.



Speedster7t FPGA



### Speedcore eFPGA IP

The company's Speedster7t FPGA 2D NoC acts as a data superhighway, routing data within the FPGA device at 2 GHz speeds and provides 20 Tbps of data bandwidth. This chip benefits FPGA designers by providing streamlined data distribution throughout the FPGA fabric, delivering very high performance without using additional logic resources needed in traditional FPGA products. The 2D NoC also allows designers to connect to interfaces such as PCIe Gen5 and GDDR6 memory controllers with simple industry-standard AXI transactions. For Speedster7t FPGA designers, the 2D NoC reduces design time and allows them to focus on developing differentiating IP, instead of on low-level tasks such as managing data flows within the FPGA.

The Speedster7t FPGA MLP (dedicated arithmetic units), another differentiating product feature, supports various number formats optimized for or various matrix and vector manipulation requirements including AI and ML applications. The supported number formats include 4-, 8-, and 16-bit integers, FP16, FP24, bfloat16, and block floating-point. Block floating point is a newer format, which provides the high dynamic range of floating-point arithmetic at less complexity and power than fixed-point arithmetic. The Speedster7t FPGA is the only FPGA that natively supports block floating-point in the MLP without additional soft logic resources.

The final major differentiating feature of the product line includes the Speedster7t FPGA memory and I/O interfaces optimized for high-speed data transfers. The Speedster7t FPGA uniquely supports eight GDDR6 memory interfaces that provide 4 Tbps of total memory bandwidth. It also includes high-speed data interfaces with integrated PCIe Gen5 hard controller that supports 768 Gbps of data bandwidth, ideal for customers looking to accelerate CPU-based systems using FPGA hardware accelerators. The Speedster7t FPGA also includes four 400G Ethernet controllers, which provide 1.6 Tbps of data bandwidth. These controllers are ideal for FPGAs when used in networking applications that require high-bandwidth capabilities.

The Achronix FPGA product line is further supported by a production ready, deployable accelerator card, jointly developed by Achronix and BittWare (a Molex company). The accelerator provides designers a PCIe form factor card that features the Speedster7t AC7t1500 device, GDDR6 memory, and high-speed Ethernet ports. The accelerator card, for prototyping and volume production applications, includes a one-year license to the Achronix tool suite and BittWare toolkit. The company's eFPGA IP is based upon the same proven architecture used in the Speedster7t FPGA and allows customers to develop a custom eFPGA IP core that can easily integrate into an ASIC or SoC.



#### VectorPath Accelerator Card

By offering FPGAs and eFPGA IP, Achronix empowers hardware designers to develop highly optimized data acceleration solutions that meet their power, performance, and cost requirements. No other FPGA manufacturer has a similar product strategy, i.e., offering standalone FPGAs and eFPGA IP both supported from the same Achronix tool suite. The company's FPGA and eFPGA IP provide hardware that can be used

for the acceleration of various workloads that require complex processing providing superior reliability and design than its industry peers. Achronix understands the highly competitive market; thus, its primary focus for growth is on standalone FPGA and eFPGA IP and applications with high-performance workloads. For instance, its Speedcore eFPGA is suitable for the automotive and industrial electronics market. Achronix end customers have shipped over 10 million eFPGA IP units.

### ***Commitment to Customer Growth and Satisfaction***

Besides product development, the customer ownership experience is another priority for Achronix. The

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***- Kristin Portela,  
Best Practices Research Analyst***

company offers dedicated sales and support teams for customer engagement and an online support system for customers to connect with applications experts at any time to solve issues related to the design-in process. Achronix also has a partner program that its customers to connect with IP vendors providing highly specialize, market-specific solutions. Regular interactions with its customers'

executive teams provide insights to ensure its key silicon investments align with their needs.

For eFPGA IP designers, Achronix has a design process that incorporates several phases including eFPGA IP sizing, creating a custom version of the Achronix tool suite specifically supporting the customer's specific eFPGA IP core and a well-defined design handoff process to ensure that the eFPGA IP meets customers' requirements before fabricating their ASIC.

Achronix has proven its ability to drive higher customer satisfaction and broaden business opportunities, excelling in standalone and embedded FPGA IP products that allow for high-bandwidth data acceleration. The company has successfully positioned itself as a solid semiconductor supplier that enables the fastest time to market for customers. In addition, it has a web based-support portal to communicate with technical support teams and browse knowledge-based articles. This portal includes training videos providing detailed product features and extensive documentation, e.g., white papers, user guides, datasheets, and application notes.

Achronix works alongside its customers providing them direct access to their applications and engineering organizations during the evaluation process. Acting as a trusted partner and advisor, the company assists with board design and code reviews and provides high-quality, local technical support for rapid issue resolution. For designers who need design help, or to validate functional or performance requirements for specific requirements, Achronix has a large selection of pre-verified partners who can assist them in completing their FPGA and ASIC design.

### ***Innovation that Matches Customers' Needs***

Given the high costs of developing a new ASIC with an eFPGA IP core, Achronix has regular customer interactions to understand their needs and customize products to specific applications. While incorporating new silicon features and tool suite enhancements, the company has a feedback system leveraging its role as

a trusted advisor and partner. This bi-directional feedback loop process starts before a contract and ends with the final delivery of the eFPGA IP files. During the development phases, the company adds the customer's eFPGA IP to their software design tools, which then the customer uses to program the Speedcore eFPGA in their ASIC. Each phase of the process concludes by delivering an updated version of the Achronix tool suite and a customer sign-off, ensuring satisfaction and deliverable acceptance at each step.

## Conclusion

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With increasing amounts of data being generated each year and high demands of data processing solutions flexible enough to provide power efficiency and optimized performance, Achronix Semiconductor Corporation stands out for its solid and reliable high-performance FPGAs, FPGA IP, design tools, and accelerator cards. Achronix is the only company offering both standalone FPGAs and eFPGA IP, a unique product strategy. Moreover, Achronix works alongside its customers and provides them direct access to its applications and engineering organizations, acting as a reliable partner and advisor for rapid issue resolution.

For its outstanding commitment to innovation, high-quality products, and match to customers' and market needs, Achronix earns Frost & Sullivan's 2022 North American New Product Innovation Award in the semiconductor industry.



## What You Need to Know about the New Product Innovation Recognition

Frost & Sullivan's New Product Innovation Award recognizes the company that offers a new product or solution that uniquely addresses key customer challenges.

### Best Practices Award Analysis

For the New Product Innovation Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

#### *New Product Attributes*

**Match to Needs:** Customer needs directly influence and inspire product design and positioning

**Reliability:** Product consistently meets or exceeds customer performance expectations

**Quality:** Product offers best-in-class quality with a full complement of features and functionality

**Positioning:** Product serves a unique, unmet need that competitors cannot easily replicate

**Design:** Product features an innovative design that enhances both visual appeal and ease of use

#### *Customer Impact*

**Price/Performance Value:** Products or services provide the best value for the price compared to similar market offerings

**Customer Purchase Experience:** Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

**Customer Ownership Experience:** Customers proudly own the company's product or service and have a positive experience throughout the life of the product or service

**Customer Service Experience:** Customer service is accessible, fast, stress-free, and high quality

**Brand Equity:** Customers perceive the brand positively and exhibit high brand loyalty

## About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at <http://www.frost.com>.

## The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.

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### Key Impacts:

- **Growth Pipeline:** Continuous Flow of Growth Opportunities
- **Growth Strategies:** Proven Best Practices
- **Innovation Culture:** Optimized Customer Experience
- **ROI & Margin:** Implementation Excellence
- **Transformational Growth:** Industry Leadership



## The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

### Analytical Perspectives:

- **Mega Trend (MT)**
- **Business Model (BM)**
- **Technology (TE)**
- **Industries (IN)**
- **Customer (CU)**
- **Geographies (GE)**

