FPGAs & ASICs for Telecom

EXECUTIVE SUMMARY

Field programmable gate arrays (FPGAs) and application-specific integrated circuits (ASICs) are widely used in networking and telecom systems. Both FPGAs and ASICs allow system designers to use silicon devices that implement their own designs rather than using merchant silicon that may not match their particular requirements. Most FPGAs are configured in the target system when the power is applied. This allows system designers to develop the hardware before the FPGA logic is finalized and to implement rapid updates to fix system issues or add new features. ASICs give system designers access to the same silicon technology that is used for many merchant silicon designs. This can deliver significant competitive advantage but requires a large investment in engineering time and development costs.

FPGAs and ASICs are used in many different ways from complete system on chip (SoC) designs to simple connections between different interfaces on merchant silicon devices. The latest FPGAs and ASICs support high-speed serial lanes up to 32 Gbit/s and integrate hard IP for 100G Ethernet, Interlaken, PCI Express Gen4 and DDR4 memory controllers. Several FPGAs also integrate 64-bit ARMv8 quad core processors. Other FPGAs are optimized for cost-effective implementations where security and reliability are particularly important. This is a developing market where the latest silicon technology is providing new opportunities.

The use of FPGAs continues to grow in networking and telecom applications. Smaller devices provide important interfacing and control functionality; larger devices enable complete system designs in one or more FPGAs. The integration of hard IP for common interface and processing functions has dramatically increased the efficiency of FPGAs, and the introduction of the latest silicon technology has dramatically increased the maximum number of logic elements. The combination has made FPGAs very attractive for all but the highest volume applications. ASICs continue to be used by many system developers; however, the time and cost of development is a major issue that is limiting their use to applications that require leading-edge system performance or will be manufactured in high volumes.

The integration of hard IP for high-speed SerDes and common interfaces, including 100G Ethernet, Interlaken, PCI Express and DDR3/4, has made FPGAs very attractive for networking and telecom applications. FPGA and ASIC vendors have made their solutions easy to use in telecom applications by developing or acquiring IP for complete system functions, such as OTN framers and mappers and wireless basebands. Developments like the eASIC approach that limit the cost and time developing ASICs will be important in maintaining the role of ASICs as a key platform for custom chip development.

FPGAs & ASICs for Telecom details and analyzes FPGA and ASIC solution from 10 vendors. The report profiles the vendors, reviews platform architectures and analyzes important devices for networking and
telecom applications, identifying key features and highlighting the advantages they hold for system developers and service providers.

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The report evaluates and analyzes the products and strategies of these 10 vendors.

FPGAs and ASICs are used in many different applications within networking and telecom systems. The following excerpt shows the solutions for wired networking targeted by Xilinx with their FPGA solutions. This includes packet processing and switching, optical transport network (OTN) functions and connectivity in the data center and across the whole network. In some cases an ASIC or FPGA will implement the whole packet processing, switching or other function. In many cases ASICs and FPGAs are used to connect between merchant silicon devices and provide proprietary functionality.

Excerpt: Solutions for Wired Networking

![Excerpt: Solutions for Wired Networking](source:Xilinx)

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