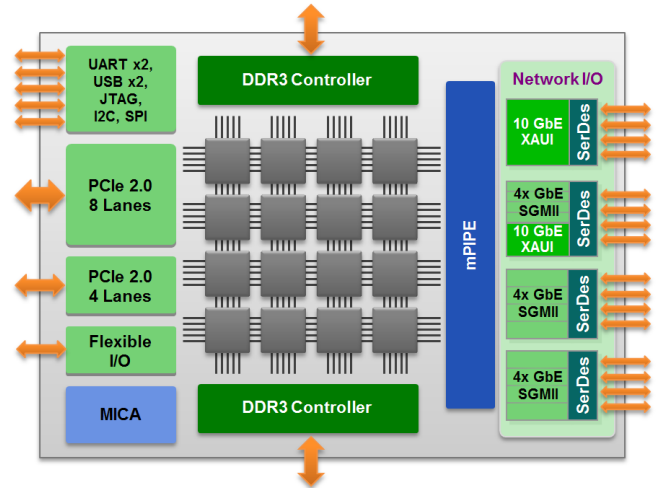


# TILE-Gx8016™ Processor

## Specification Brief

The TILE-Gx8016™ Processor is optimized for networking and multimedia applications and delivers powerful compute and I/O with complete “system-on-a-chip” features. The device includes 16 identical processor cores (tiles) interconnected with Tiler’s iMesh™ on-chip network. Each tile consists of a full-featured processor core as well as coherent cache and a non-blocking switch that connects the tiles into the mesh. Each tile consists of a full-featured processor core as well as L1 and L2 cache and a non-blocking Terabit/ sec switch that connects the tiles into the mesh and providing full cache coherence among all the cores. The TILE-Gx8016 is targeted at network appliances requiring 10 to 20 Gbps of performance.



### Powerful Processor Cores

- 16 cores at 1.0 to 1.2 GHz
- 64-bit architecture (datapath and address)
- Three execution pipelines
- Robust virtual memory system with TLBs, multiple page size support and Hardwall™ protection
- ISA extensions for multimedia and SIMD processing

### Cache

- 5 Mbytes total on-chip cache
- Dynamic Distributed Cache (DDC™) scalable hardware coherence
- 32 KB L1i, 32 KB L1d per core
- 256 KB L2 per core
- 4 MB coherent L3 cache

### iMesh Interconnect

- Five independent low-latency mesh networks
- 21 Tbps aggregate bandwidth
- Non-blocking, cutthrough switching with 1 clock cycle per hop

### Ordering Guide

Device	Part Number	Core Frequency	Memory Speed	# of Tiles	Typical Power*	Operating Temp	Package
TILE-Gx8016	TLR4-01680CG-10C	1.0 GHz	1,600 MTps	16	15 W	Commercial	1,265 BGA
TILE-Gx8016	TLR4-01680CG-12C	1.2 GHz	1,600 MTps	16	18 W	Commercial	1,265 BGA
TILE-Gx8016	TLR4-01680CG-10CE (with crypto)	1.0 GHz	1,600 MTps	16	15 W	Commercial	1,265 BGA
TILE-Gx8016	TLR4-01680CG-12CE (with crypto)	1.2 GHz	1,600 MTps	16	18 W	Commercial	1,265 BGA

\*Power may vary based on application and I/O configuration.

### Integrated Memory Controllers

- Two 72-bit DDR3 controllers with ECC support
- 512 GB total memory capacity
- Up to 1,600 MTps speeds
- Advanced request reordering

### PCI Express

- Two integrated (5G SerDes) Gen2 PCIe controllers
- Each configurable as root complex or endpoint
- High-performance coherent transaction DMA engine
- Multiple configurable transaction modes for efficient data movement
- SR-IOV support

### StreamIO Interfaces

- Two high-performance transaction ports for chip-to-chip or FPGA interconnect
- Multiplexed with PCIe SerDes
- 20 Gbps peak performance per 4-lane port

### Networking Interfaces

- Two 10 Gbps XAUI ports, including double-XAUI support
- Up to twelve 10/100/1000 SGMII ports (four multiplexed with one XAUI port)
- Egress QoS queuing and traffic shaping support
- IEEE1588v2 precision timing controller support
- IEEE802.1Qbb priority flow control and datacenter Ethernet (DCE) support

### mPIPE™ Wire-Speed Packet Engine

- C-programmable classification
- 30 Mpps performance for minimum size packets
- Programmable checksum and CRC offload for packet headers and payload
- Multi-mode Load-balancer with direct-to-cache packet delivery
- Flexible buffer manager with 32 configurable memory domains

### Cryptographic & Compression Acceleration

- MiCA™ engines deliver low-latency, high-bandwidth offload
- 20 Gbps encryption throughput (-E option)
- Support for IPsec, SSL, TLS, MACsec, SRTP, 3GPP
- Public Key accelerator (RSA, DSA, DH, ECC)
- True random number generator
- Deflate compress/decompress with Gzip compatibility

### System Integration Features

- Two USB 2.0 interfaces; one host and one host/endpoint
- Four I<sup>2</sup>C interfaces
- One SPI (master) interface
- Two high-speed UART interfaces
- 64 GPIO/Interrupt pins
- JTAG port

### Package Information

- 37.5 mm x 37.5 mm BGA
- 1 mm ball pitch