

Product Brief

GHz frequencies for today's advanced SoC designs

- GHz product frequencies support the demanding needs of high performance multi-core processors and DDR3 memories

Advanced Concurrency

- Virtual channels allow optimal data flow through the network, efficiently utilizing logic and wiring resources
- Non-blocking flow control
- Quality-of-Service

Eases system partitioning for SoCs with multiple domains

- Integrated tools for managing multiple complex power, voltage, and clocking domains globally and within local subsystems
- Easy design flow and timing closure

Reduces wiring congestion

- Serialized, virtual channel based, packetized fabric reduces wiring area

Native AMBA interfaces

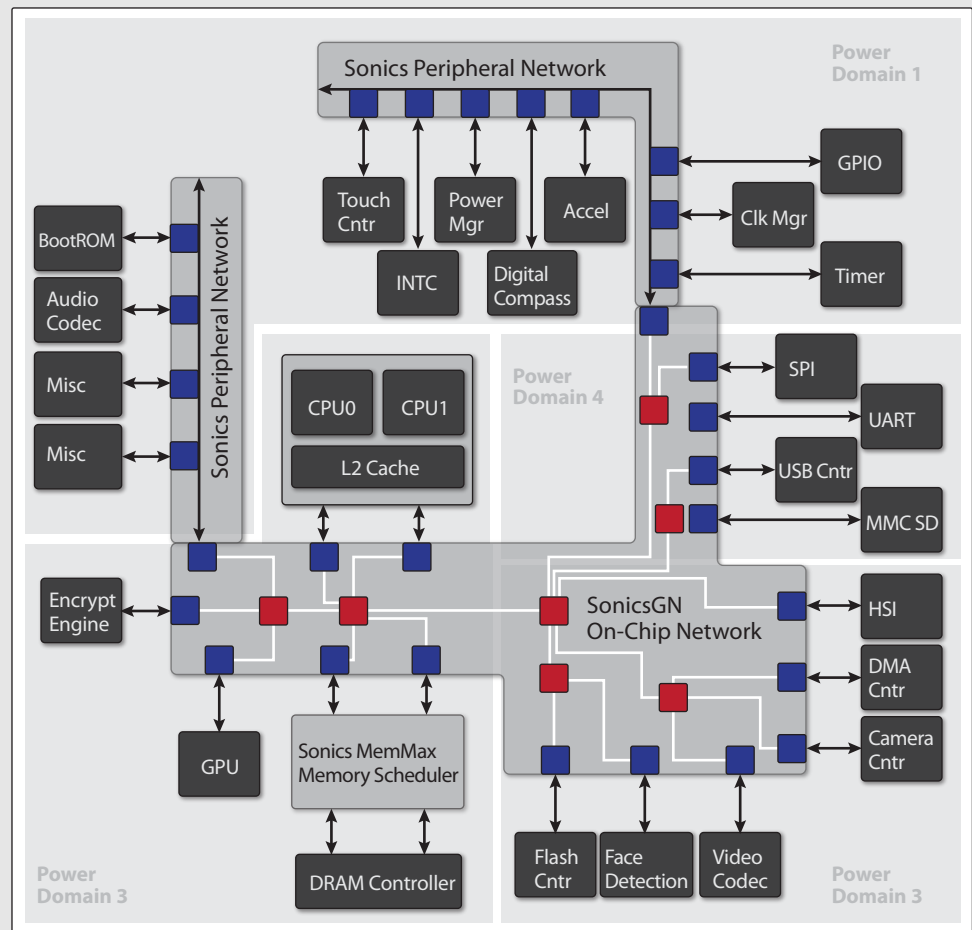
- Socket support for AXI3/AXI4
- Efficient interfaces to popular AMBA cores yields no loss of performance or area for protocol conversion

Ensures best performance for latency-sensitive cores

- Seamlessly integrates with low-latency subsystems for optimal SoC performance

SonicsGN™ (SGN) is Sonics' 4th generation, configurable, on-chip network enabling the design of advanced SoC communications networks using a high-speed scalable fabric topology structure. SGN's configurable IP, intuitive user interface, and robust verification environment provide all the tools necessary to create speedy, robust, gate-efficient on-chip communications networks for advanced SoC designs. Target applications include: smart mobile devices, networking, and home consumer devices.

SGN provides a high performance network for the transportation of packetized data, utilizing routers as the fundamental switching elements. Routers allow for pipelining and buffering, enabling designers to tailor these elements to their exact requirements for area and frequency. SGNs routed, packetized architecture can easily be combined with other Sonics connectivity components allowing the SoC designer unlimited flexibility when designing complex connectivity solutions for advanced SoC devices. This flexibility ensures the lowest area, highest wiring efficiency, and highest performance networks.



In addition, SGN offers designers a variety of rich features which enable the customization and streamlining of advanced fabric generation. These features include, rich partitioning support, AXI and OCP native protocol support, concurrency, robust Quality of Service, advanced address mapping, power management capabilities, and floor plan topology optimization. These are just some of the features that make SGN the clear choice for advanced on-chip network design.

SGN is configured using Sonics advanced development environment: Sonics StudioXE. The SGN Front-End Design Tool provides a precise methodology and workflow to assist the architects and designers in the creation, optimization, and verification of the on-chip network.

SonicsGN On-Chip Network

FEATURES

SCALABILITY

SGNs' routed fabric allows for efficient gate count per core connection. Routers are used to construct the on-chip network, easily scaling to allow cores to be incrementally added. In addition, because of their distributed nature, routers have the ability to be placed strategically within the network to minimize the overall wire-load in the system. Using SGN configuration utilities, designers are able to create an area optimized communications system while achieving performance requirements.

Solving complex SoC connectivity issues:

- Efficient data flow, wire congestion, power consumption, and timing closure
- Routed connections can coexist with other on-chip network topology structures for "best of breed" implementation for maximum performance, minimum gate counts, and minimum latency

PARTITIONING SUPPORT

The unique structure of SGN allows easy instantiation of domain crossings for SoCs that have multiple voltage (switched, scaled), power, and clock domains.

- Supports divided clock, mesochronous and asynchronous clock crossings
- Design capture tool provides a simple interface for domain specifications
- Automated instantiation of correct crossing component at the most efficient points in the network

NATIVE PROTOCOL SUPPORT

AXI3 and AXI4 protocols, and the Open Core Protocol (OCP2 and OCP3) are both natively supported within SGN, allowing cores with either interface to be connected directly to the SGN fabric:

- AHB and APB are easily supported through built-in, optimized links

CONCURRENCY

SGN provides robust concurrency features at the fabric interface (agent), as well as throughout the fabric itself. The SGN fabric and the agents provide concurrency which enables out-of-order transaction completion through the use of OCP threads, tags, or AXI IDs. The concurrency schemes allow performance of the system to be improved through the optimization of link utilization throughout the network:

- SGN allows for system-wide network concurrency
- Virtual channels support:
 - Packets can "overtake" other blocked or lower priority packets
 - Enables non-blocking flow control
 - Fewer buffers and wire resources are required

POWER MANAGEMENT

Using SGNs' robust partitioning support, designers can choose to partition SGN into multiple power management domains (PMDs) to allow for flexible power management control by an external system power manager (SPM).

- Support for easy design of an external system power manager
- Provides a 'power bundle' at each interface with signals that include power down request/acknowledge, auto wake-up and an active signal
- Allows for very fast and efficient wake-up and shut-down

QOS

Protecting data flows within complex SoCs has become a critical part of advanced design methodology. Sonics provides a variety of Quality of Service (QoS) mechanisms within SGN to enable chip designers to effectively tune their system performance and minimize gate count while ensuring priority traffic flows remain uninterrupted.

- Transaction-based QoS:
 - Aligns each transaction to a level of service based upon the state of the AXI4 AWQOS and ARQOS signals
 - AXI socket initiator traffic is assigned to one of four SGN QoS levels of service: best effort (basic least recently serviced arbitration) and three priority levels
- Target-based QoS:
 - Target determines which priority levels are assigned to the connections
 - Three levels of priority for arbitration

FLOOR PLAN TOPOLOGY OPTIMIZATION

SGN provides designers with a novel approach to the challenge of generating a SoC network-on-chip infrastructure which allows logical topology to match physical / floorplan topology.

- Automated link between logical and physical layout
- Allows for partitioning after the creation of a topology
- Performance optimized topology which can then be partitioned later by the implementation team
- Easy re-partitioning or, topology modification

USER INTERFACE

SGN is configured using StudioXE, Sonics advanced development environment. SGN Front End tool allows for the design capture and system analysis using a variety of capture tools along with performance analysis tools. A clear methodology and workflow is supplied to enable SoC architects to easily capture their design, then tune it to meet their performance, power, and area requirements.

- Design Capture
 - Requirements capture, Partitioning, and Configuration
 - Re-entrant design flow to make changes as the design evolves and analysis is performed
 - Auto-generate settings and/or manually adjust specific needs
- Analysis / Refinement
 - Static Analysis, System Scenarios, System Modeling and Dynamic Analysis