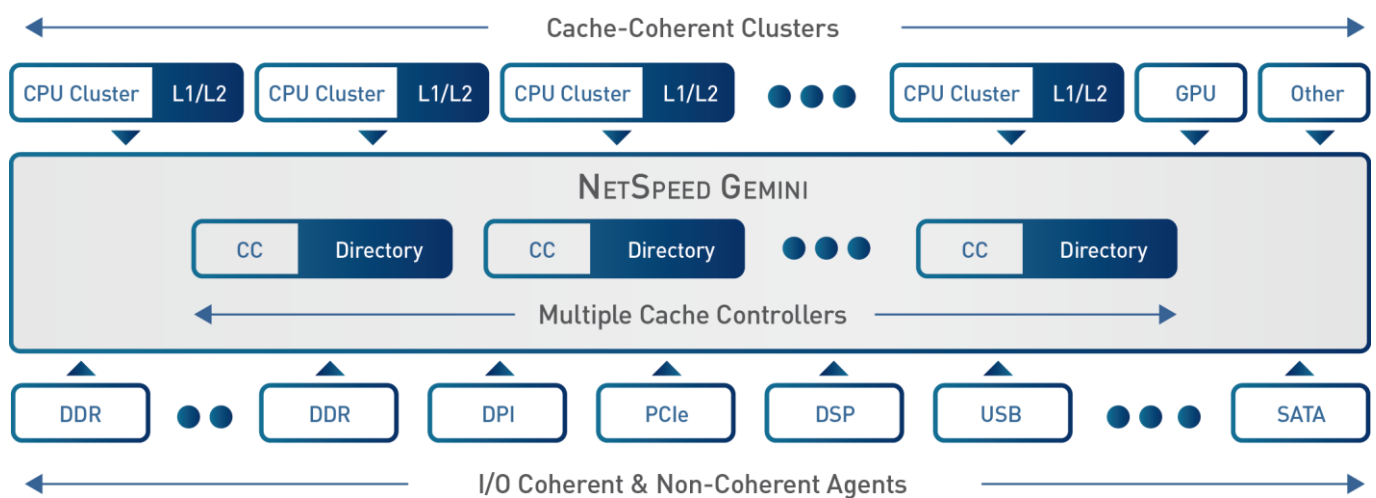


### NetSpeed Gemini: Supercharge your SoC with Cache Coherency

Existing hardware-based coherency solutions have two key limitations on performance and scalability. First, coherency systems are usually fixed configurations, which means they cannot adapt to your system requirements. They may be over-designed or under-performing. Second, to manage the complex on-chip communications, they employ separate interconnects for coherent and non-coherent traffic. This creates unnecessary floor planning obstacles, prevents efficient resource sharing, requires multiple interconnect methodologies, and requires additional hardware support to allow the traffic to interact.

NetSpeed Gemini is a cache-coherent, high-performance Network-on-chip IP that is used for rapidly designing and analyzing highly efficient and scalable cache-coherent interconnects for a wide variety of SoCs. To quickly produce efficient high-performance cache-coherent NoC IPs, Gemini uses a requirements-driven design approach and an innovative directory-based design. Using Gemini, SoC architects can connect anywhere from 1 to 64 fully cache-coherent CPU clusters, GPUs or other compute units. It also supports 1 to 200 I/O coherent and non-coherent agents.



#### KEY FEATURES

##### Physically-aware, Latency Optimized Design

Gemini is physically aware of the layout of the on-chip system components producing an interconnect topology that is customized for the SoC layout. Coherency components can be partitioned, distributed and co-located near the coherent masters that typically utilize them, providing improved latency and power efficiency. Latency sensitive traffic can use dedicated connections to reduce arbitration and congestions

##### Coherent I/O Accelerators

NetSpeed Gemini includes an accelerator for ordered coherent traffic. It **achieves higher ordered throughput** by performing coherent lookups in parallel while ensuring completion occurs in the specified order.

##### Innovative Directory

NetSpeed Gemini coherency architecture is based on an innovative directory that scales the number of coherency modules depending on high-level SoC specifications while **dramatically reducing area and power**.

#### KEY BENEFITS

##### Unlimited Configurability, Unique Differentiation

Gemini is based on a highly distributed architecture, where both the interconnect fabric and the coherency components can be scaled independently. Based on system requirements such as cache capacity and total coherent bandwidth, coherency components are added, customized and placed in the interconnect. The fabric itself can be designed and customized based on fine-grained requirements such as total and per-flow system bandwidth and chip layout. Gemini uses an **algorithmic directory** that limit unnecessary snoop traffic giving power efficiency and faster responses.

##### Best in Class Performance, Power and Area

Gemini's underlying hardware elements, including its coherency controller, coherency directory and NoC router are designed for higher throughput and can sustain Terabits per second of on-chip bandwidth and clock frequencies of **2 GHz and above**.

##### Correct-by-Construction NoC

Gemini is constructed to be deadlock free. NetSpeed IP uses graph-theory based approach and formal techniques to ensure that there are no cyclical loops in the entire message dependency chain of the system, thereby ensuring a deadlock-free solution.



**NETSPEED**  
SYSTEMS