



AMD Opteron™ Processor for MP Server Systems

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Agenda



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- AMD Opteron™ processor overview
 - Contrast to existing MP system topology
 - Glueless MP system topology

AMD Opteron™ Processor Technology Overview



• Processor Core Overview

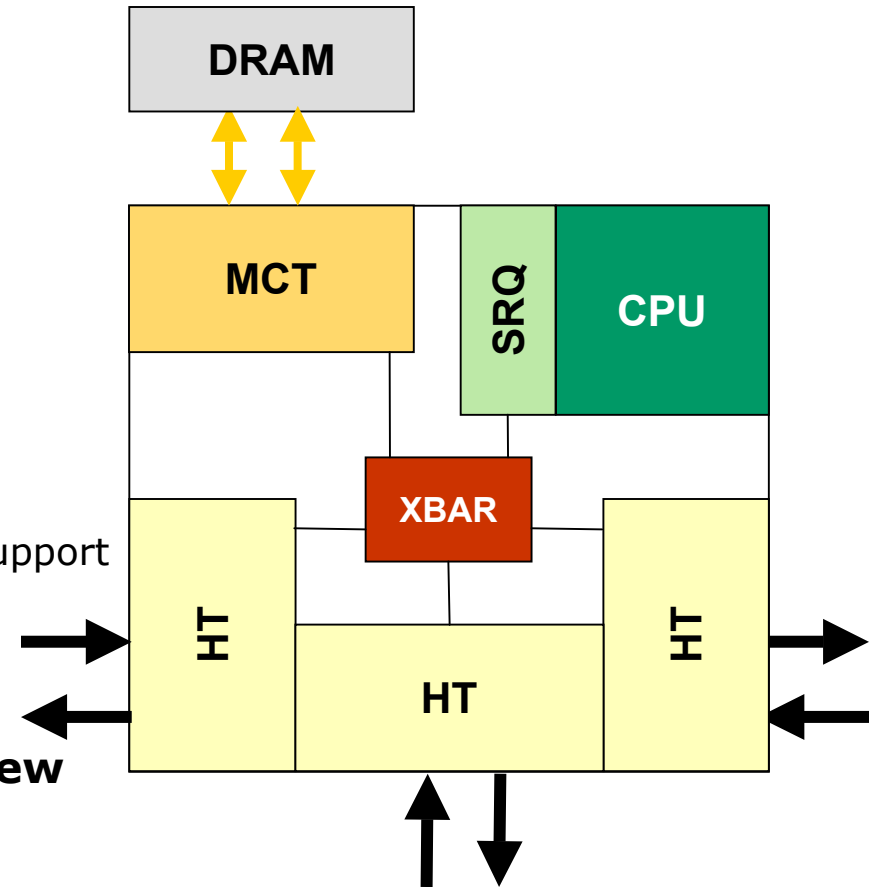
- Support for AMD's 64-bit technology
- 12-stage int, 17-stage fp pipelines
- Enhanced TLB structures
- TLB flush filter
- Enhanced branch prediction
- Large L2 cache (up to 1MB)
- ECC protection

• Memory Controller Overview

- Dual-channel DDR memory
- PC2700, PC2100, or PC1600 DDR memory support
- Registered or Unbuffered DIMMs
- ECC and Chip Kill
- High bandwidth (up to 5.3GB/s)

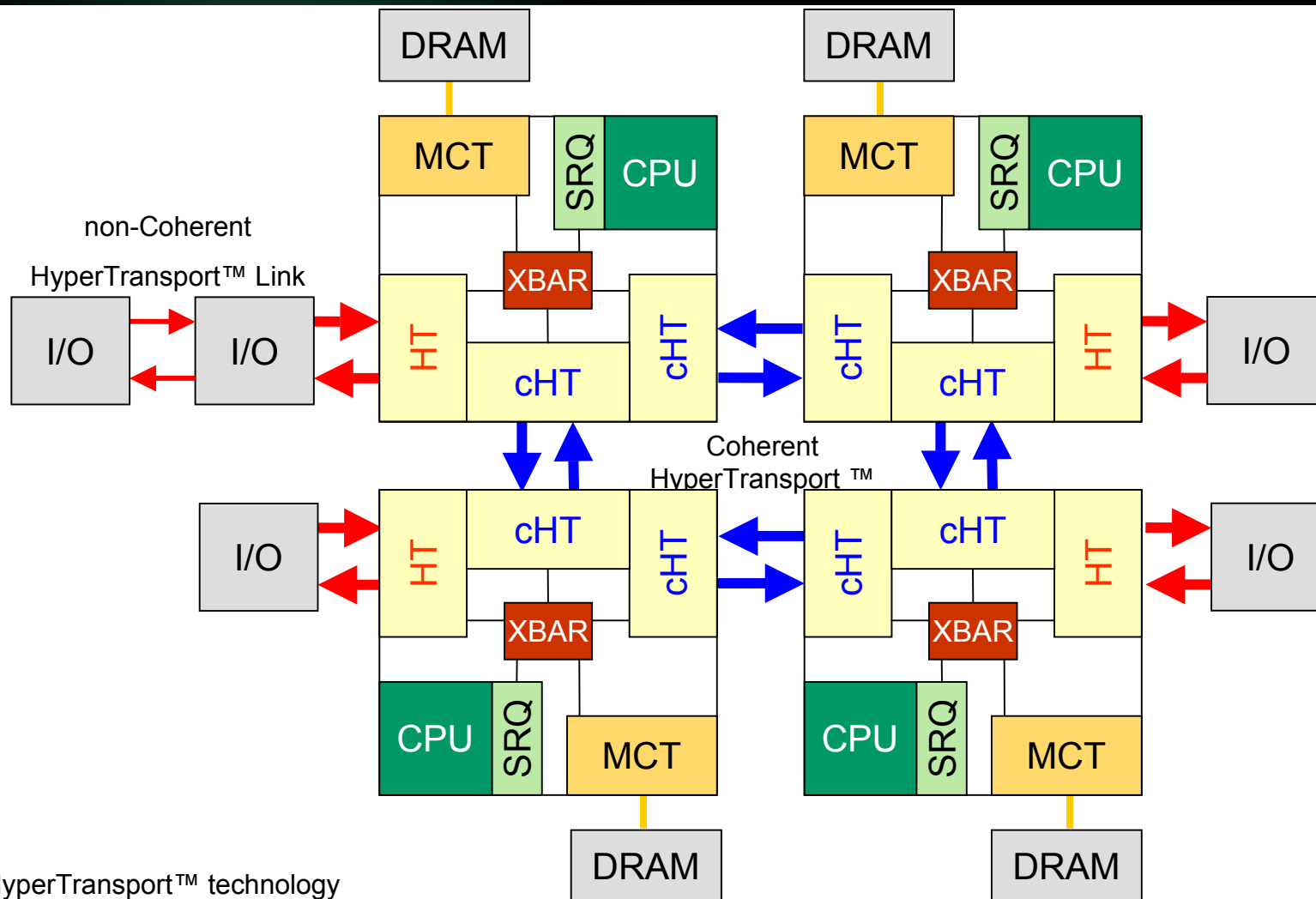
• HyperTransport™ Technology Overview

- Three links
- 2, 4, 8, 16, or 32-bits full duplex
- Up to 6.4 GB/s bandwidth per link
- 19.2 GB/s aggregate bandwidth



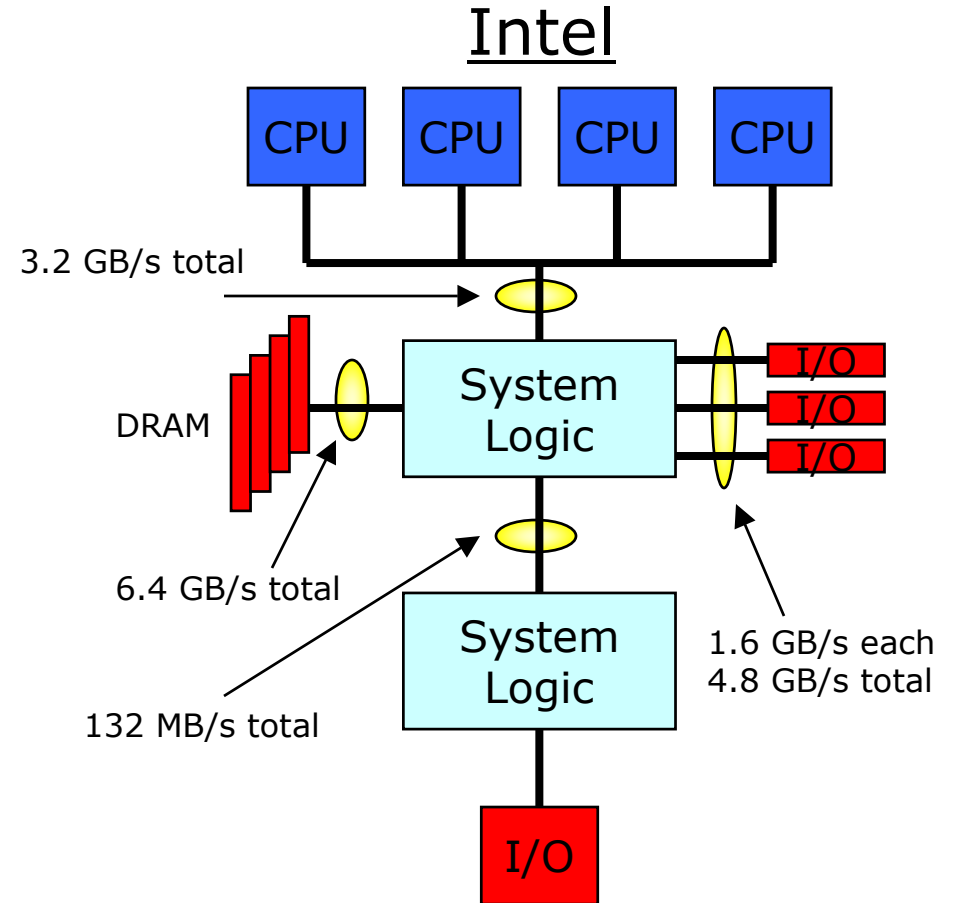
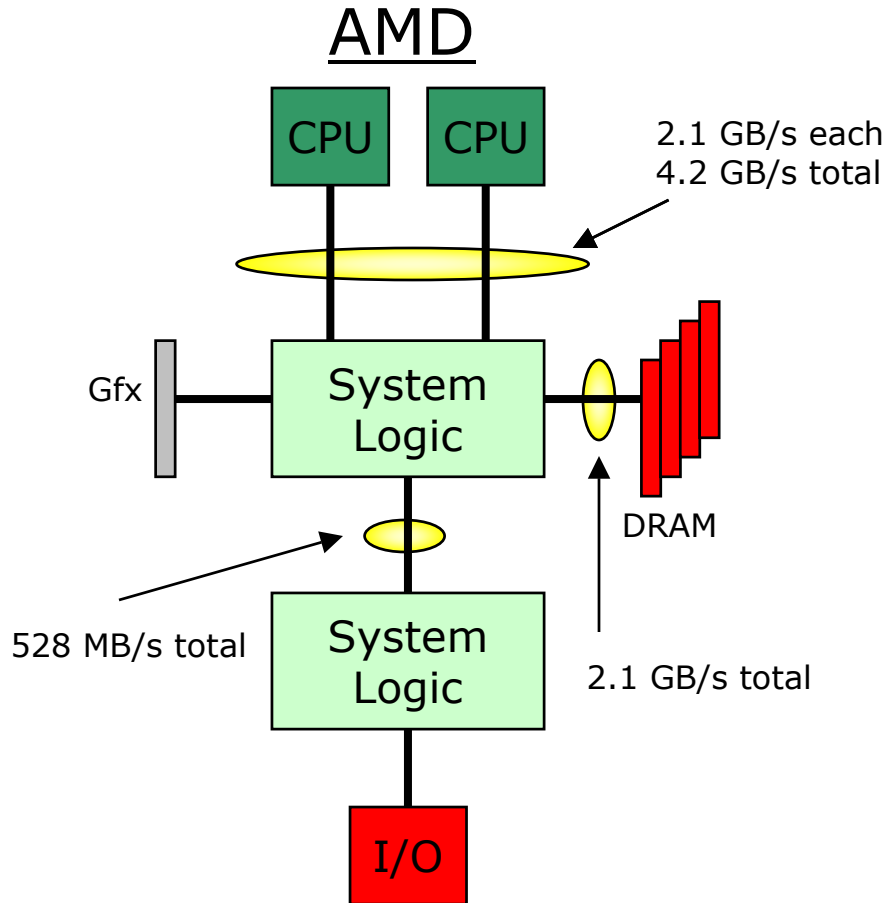
HT = HyperTransport™ technology

AMD Opteron™ Processor Glueless MP System Overview

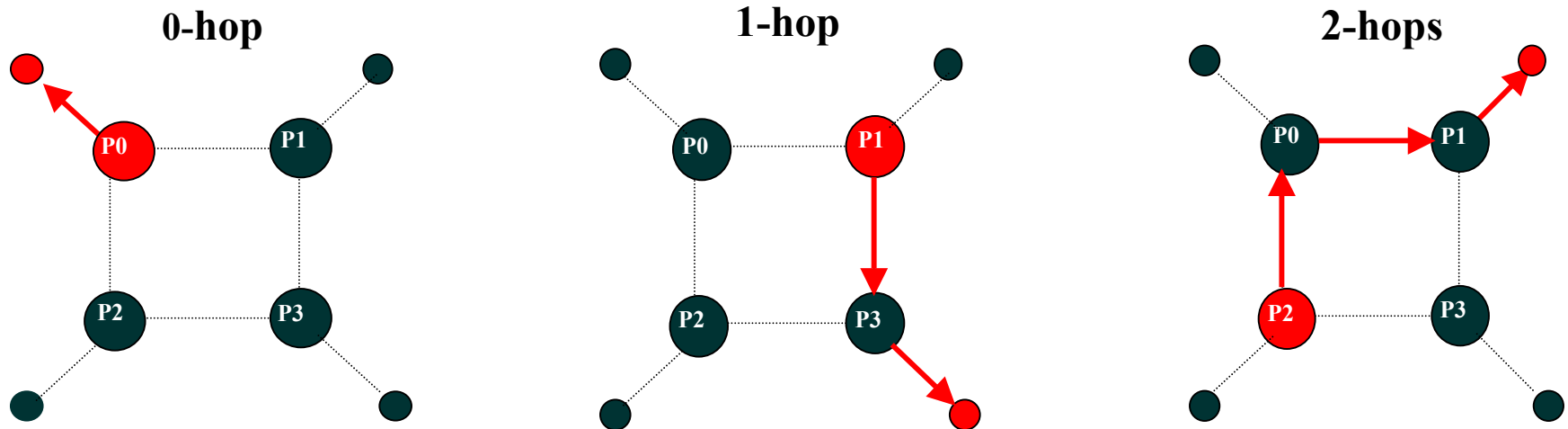


HT = HyperTransport™ technology

Existing MP System Topology

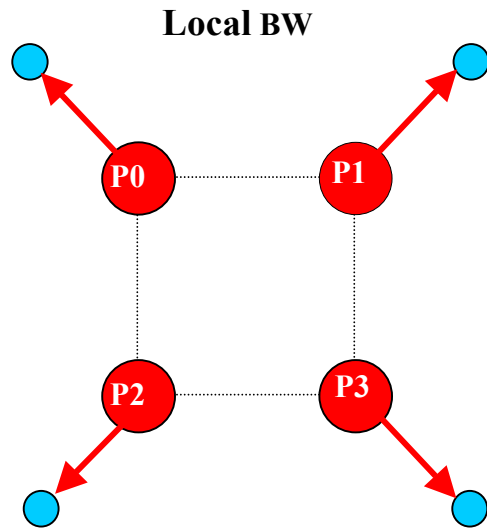


Local vs. Remote Memory Access

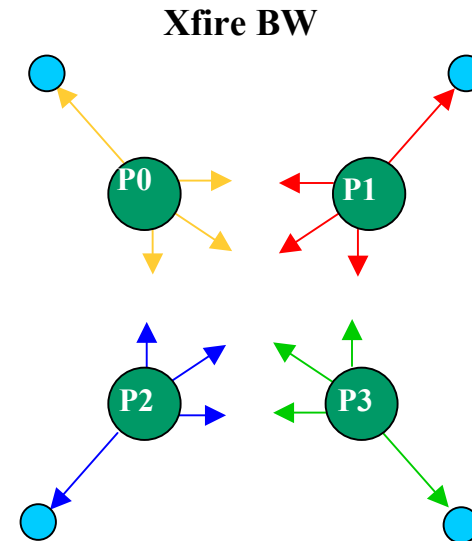


- 0 Hop: Local Memory Access
- 1 Hop: Remote 1 Memory Access
- 2 Hop: Remote 2 Memory Access
- Diameter: maximum hop count between any pair of nodes
- Average distance: average hop count between nodes

Local vs. Crossfire Memory Bandwidth

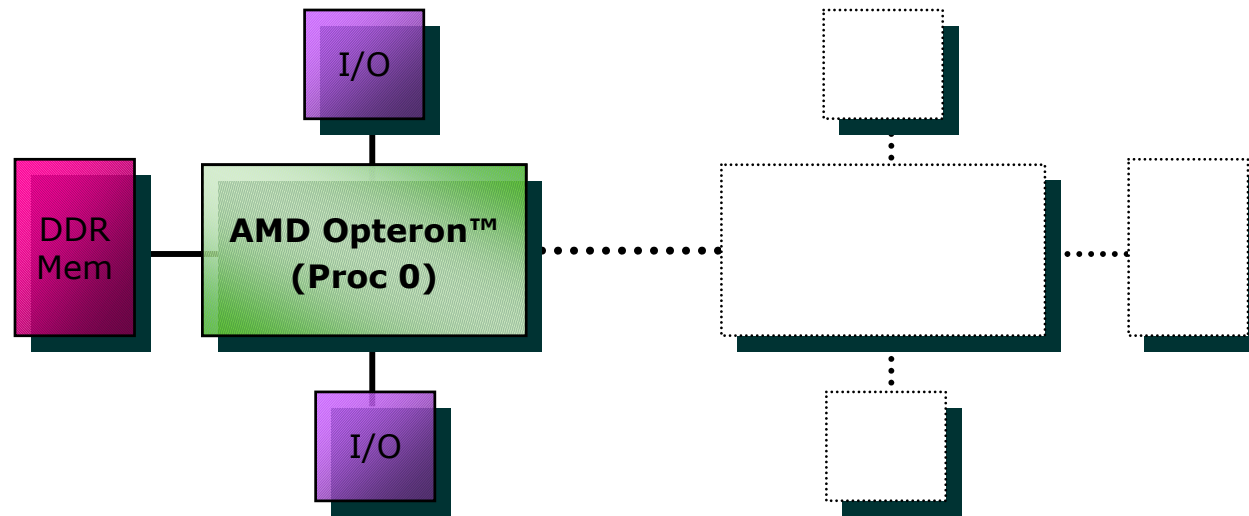


- Local memory access bandwidth
 - Each processor reads data from its own local memory



- Xfire memory access bandwidth
 - All processors read data from memory at all nodes

Single Processor Population



System Parameters:

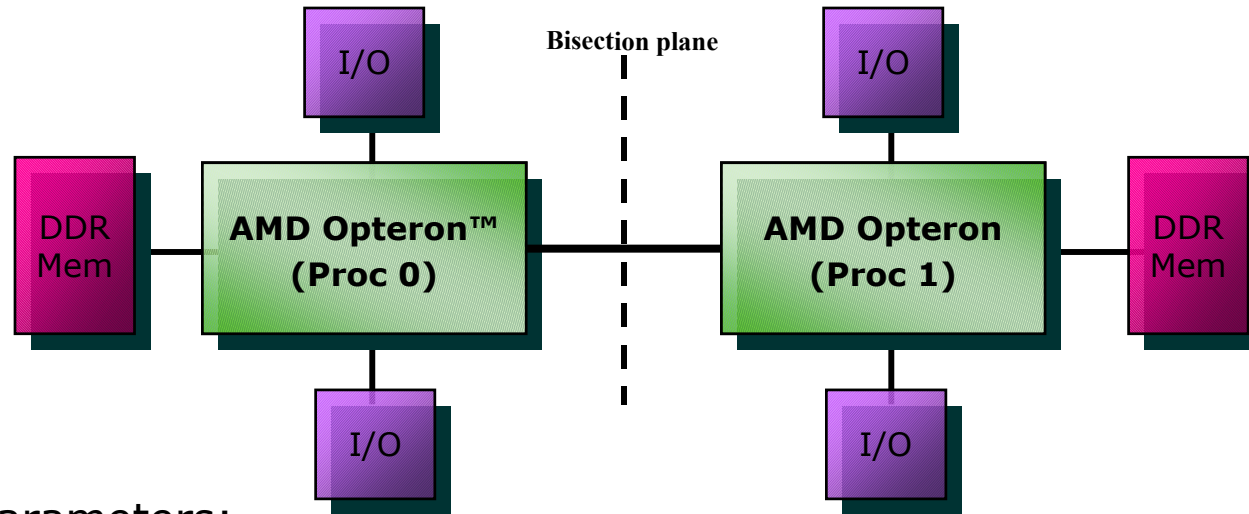
- 8 DIMMs (up to 16 GB using 256Mb DRAM)
- 2 HyperTransport™ links available for I/O
- Processor-to-Memory Read Bandwidth = 5.3 GB/s
- I/O Bandwidth = 6.4 GB/s (per link)

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- System Configurations
 - AMD Opteron™ processor operating at 2.0GHz
 - Registered PC2700 DDR memory

 - SPECint[®] 2000:
 - Estimated score = 1202

 - SPECfp[®] 2000:
 - Estimated score = 1170

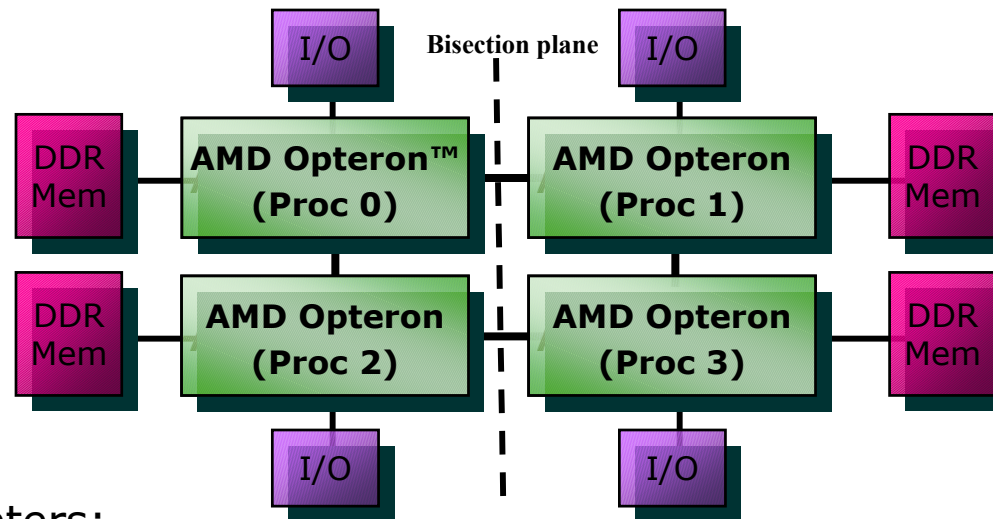
Dual Processor System Topology



System Parameters:

- 16 DIMMs (up to 32 GB using 256Mb DRAM)
- 4 HyperTransport™ links available for I/O
- Bisection-bandwidth = 6.4GB/s
- Diameter = 1, Avg distance=0.5
- Local Memory Read Bandwidth = 10.67 GB/s
 - Local Bandwidth/processor = 5.3 GB/s
- Xfire Memory Read Bandwidth = 7.06 GB/s
 - Xfire Bandwidth/processor = 3.53 GB/s

Quad Processor System Topology



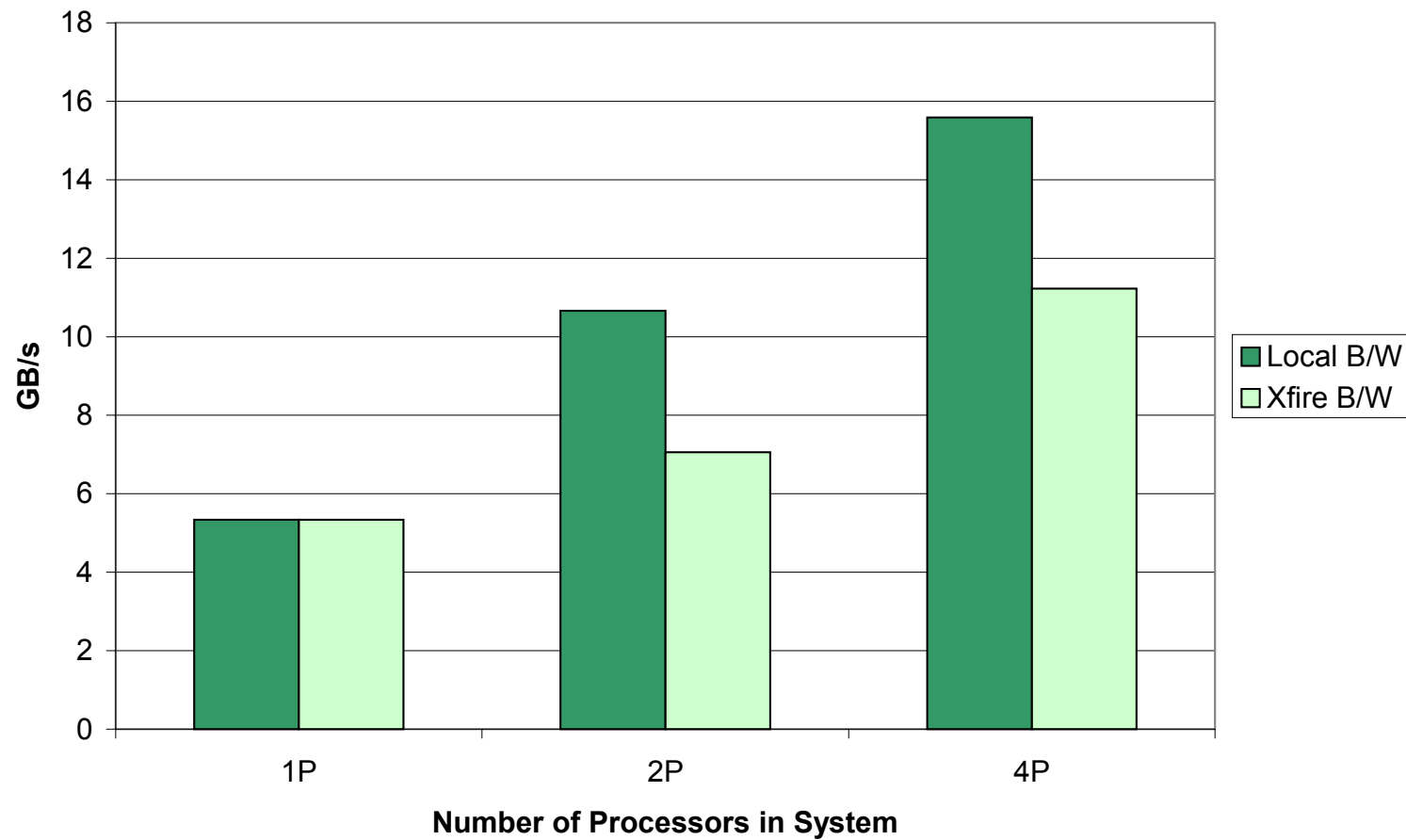
System Parameters:

- 32 DIMMs (up to 64 GB using 256Mb DRAM)
- 4 HyperTransport™ links available for I/O
- Bisection-bandwidth = 12.8GB/s
- Diameter = 2, Avg distance = 1
- Local Memory Read Bandwidth = 15.59 GB/s
 - Local Bandwidth/processor = 3.9 GB/s
- Xfire Memory Read Bandwidth = 11.23 GB/s
 - Xfire Bandwidth/processor = 2.8 GB/s

MP System Scalability Memory Bandwidth



Memory Bandwidth Scalability



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- **The AMD Opteron™ processor is designed to provide industry leading performance for enterprise class servers**
 - 32-bit performance leadership substantiated by delivering on AMD's promise of nearly doubling x86-based SPEC® CPU performance from a year ago
 - Simultaneous 32 and 64-bit performance

 - **AMD Opteron "plumbing" is designed to provide exceptional MP scalability**
 - Performance advantage grows versus competitive platforms
 - Memory capacity and bandwidth scales
 - I/O capacity and bandwidth increases

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