Hot Interconnects '12 – Panel Discussion

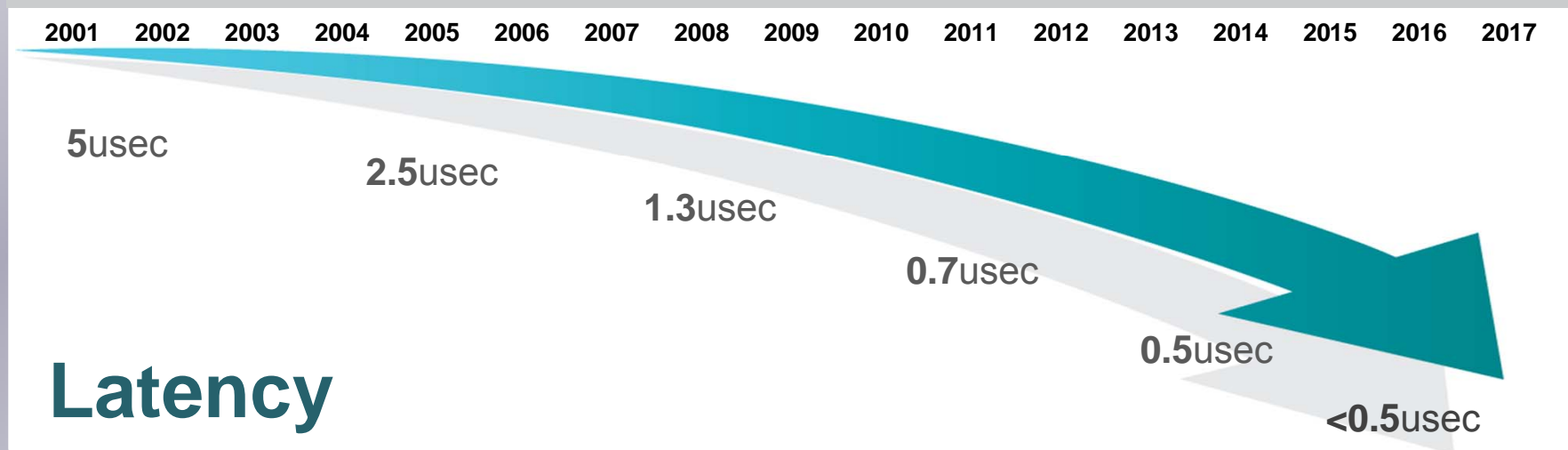Gilad Shainer – VP Market Development

Bandwidth

160/200Gb/s

100Gb/s

56Gb/s

40Gb/s

20Gb/s

10Gb/s

| 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
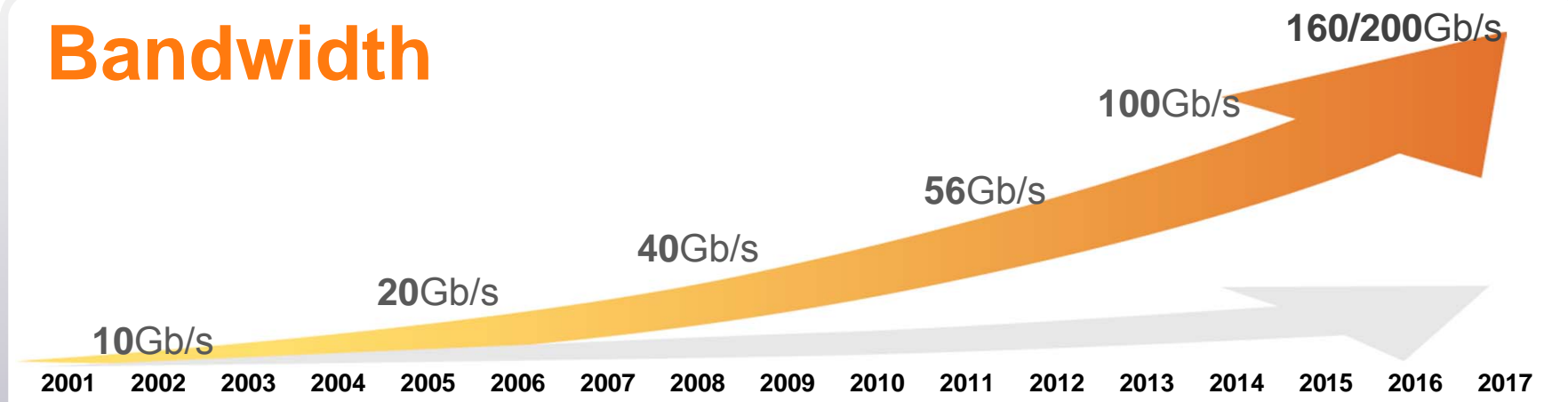
Same Software Interface

| 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |

5usec

2.5usec

1.3usec

0.7usec

0.5usec

Latency

<0.5usec

The Interconnect Beyond Hero Numbers

Management
- **Monitoring, Diagnostics**
- **Scheduling**
- **Power management**

Application
- **CPU Offloads**
- **RDMA, Direct Connections**
- **Reliability, Quality of Service**
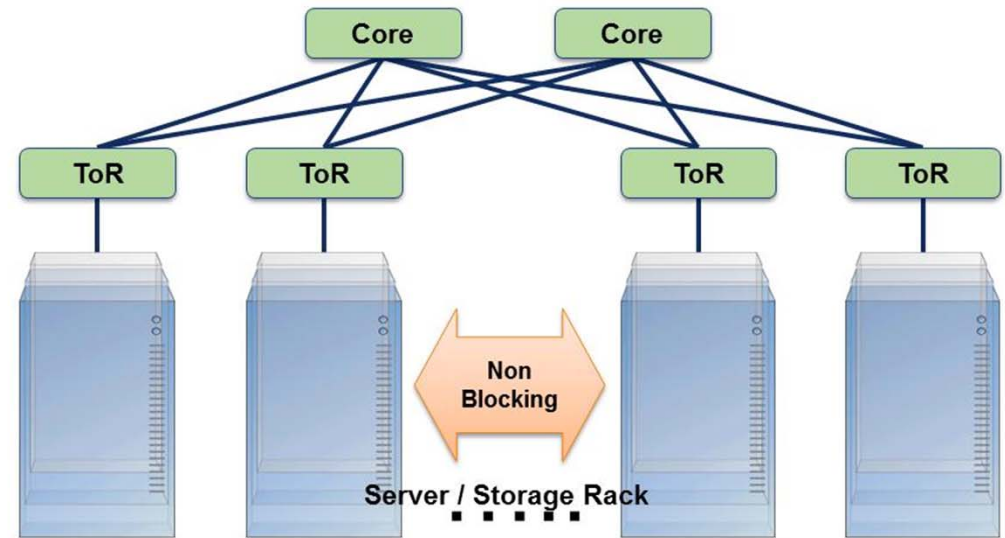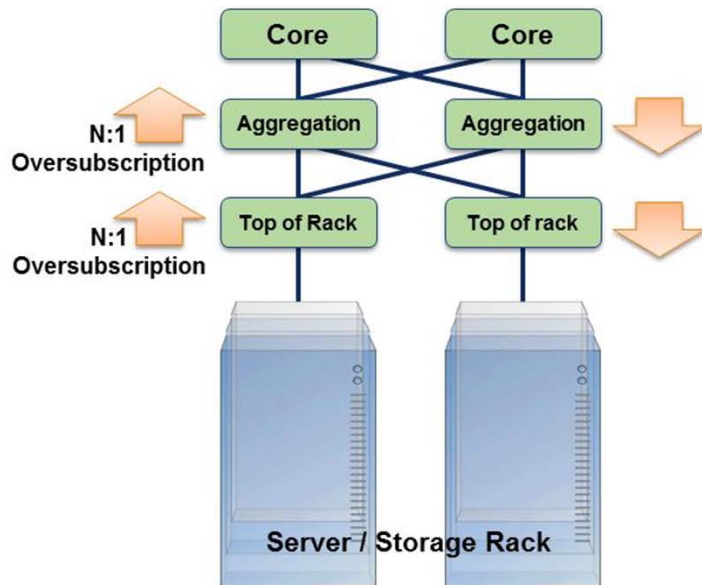- **Virtualization**

Networking
- **Transport Services**
- **Security, Isolation**
- **Adaptive Routing**
- **Congestion Management**

Server and Storage High-Speed Connectivity

- **Latency**
- **Bandwidth**

- **CPU Utilization**
- **Message rate**

Data Center Network Architecture Facing New Demands

- North-South Traffic
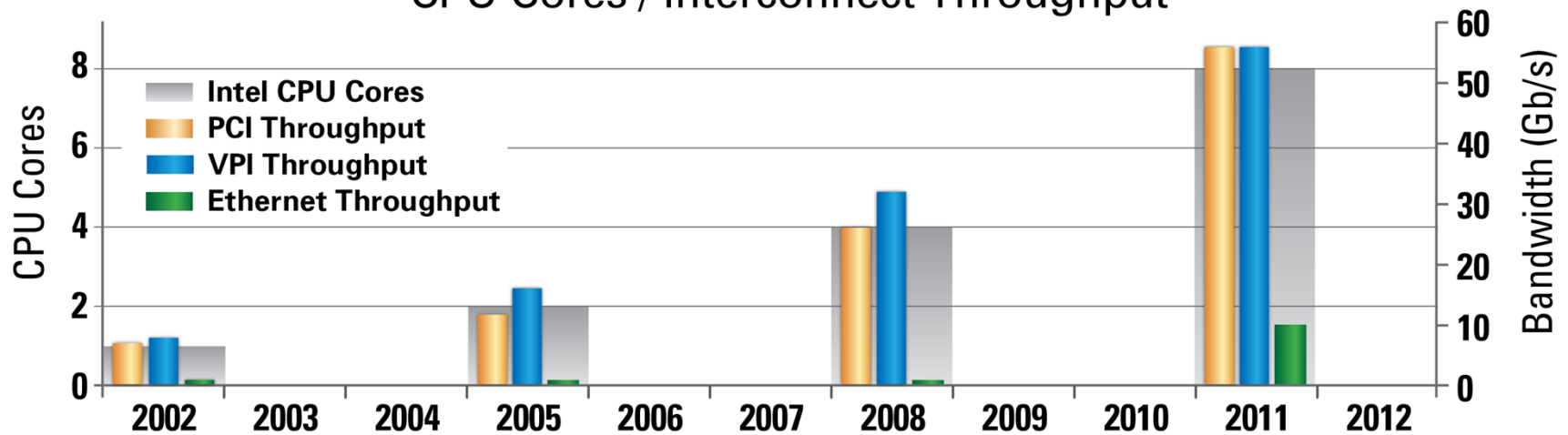- N-Tier Network
- Performance Limits
- Expensive, Hard to Manage

- East-West Traffic
- Flat Network
- Fast Interconnect
- Scalable and Manageable

From Slow and Complex to Fast and Flat

Data Center Trends
CPU Cores / Interconnect Throughput

Legend:
- Intel CPU Cores
- PCI Throughput
- VPI Throughput
- Ethernet Throughput

VPI – Virtual Protocol Interconnect (Ethernet and InfiniBand)

Balanced System = Uncompromised Performance

- Panel named

"THE NETWORK IS MOVING INTO THE SOCKET"

- Panel named

"THE NETWORK IS MOVING INTO THE SOCKET"

- Should have been

"THE SOCKET IS MOVING INTO THE NETWORK"

("THE NETWORK IS THE COMPUTER")

THE SOCKET IS MOVING INTO THE NETWORK

- **Interconnect technology has equal or higher importance**
  - Intel (NetEffect, Fulcrum, QLogic IB, Cray I/O, Whemcloud); AMD (SeaMicro)
  - Others will emerge as well, market does not accept monopolies

- **We will witness several potential technologies integrations**
  - NVIDIA (ARM) etc.

- **Any integration has pros and cons**
  - CPU / interconnect development / innovations not aligned (interconnect faster)

- **Overall compute / storage architecture will remain the same**

- **Technology development is the key – the better technology (not integration) will win**

Thank You