

# Scalable Commodity Data Center Network Architecture

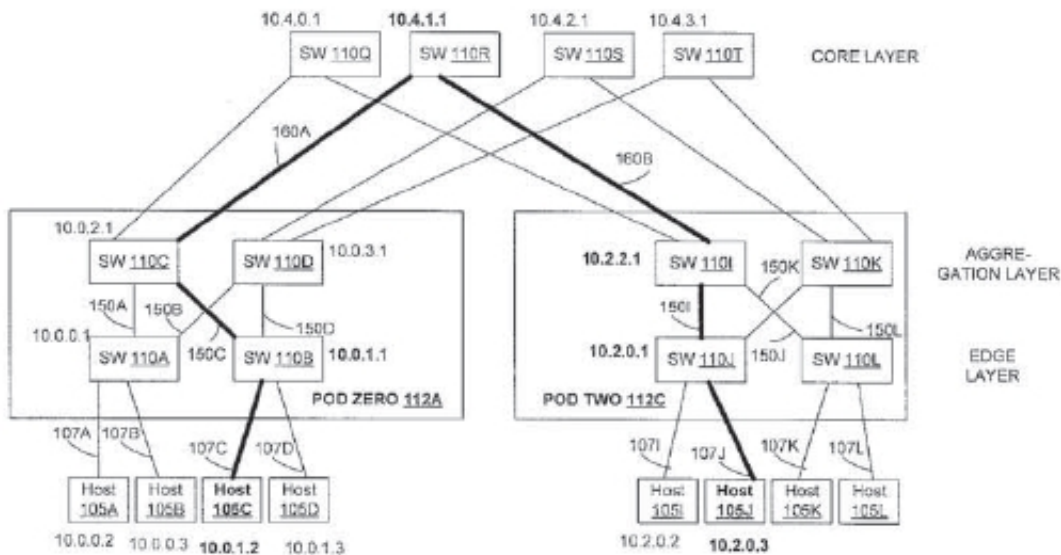
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## BACKGROUND

Server farms can include tens, hundreds, or thousands of computers interconnected to provide functions, such as searching, storage, Web-based hosting, e-mail servers, transaction processing (e.g., credit checks, credit card transactions, etc.), Web-based ad placement, and the like. Typically, the computers are organized into some form of architecture or topology. Since there can be thousands of computers in a large data center, the typical topology implements cheaper, lower capacity switches (so-called "edge" switches) to connect directly to the computers. The traffic from those edge switches is typically aggregated and switched using fewer but more expensive, higher capacity switches. The topology thus allows any given computer in the data center to access (e.g., send and receive packets) another computer in the data center.

## TECHNOLOGY DESCRIPTION

UC San Diego researchers have patented a novel way to leverage a set of largely commodity Ethernet switches to support the full bisection bandwidth of clusters of scalable size, even with tens of thousands of compute nodes. The invention uses an approach that requires no modifications to the end host network interface, operating system, or applications, and so it is fully backward compatible with Ethernet, IP, and TCP.



- This invention presents an alternative to increasing bandwidth using specialized hardware and communication protocols (such as Infiniband or Myrinet) with the following design goals:
- Scalable interconnection bandwidth: an arbitrary host in the data center can communicate with any other host in the network at the full bandwidth of its local network interface.
  - Economically scaleable: just as personal computers became the basis for large-scale computing environments, this invention can leverage cheap off-the-shelf Ethernet switches the basis for high-performance large-scale data center networks.
  - Backward Compatibility: existing data centers, which almost universally leverage commodity Ethernet and run IP, can take advantage of this new interconnect architecture with no modifications.
  - Packaging and cabling efficiency: the topology must not introduce complexities to the hardware configuration and management.

## STATE OF DEVELOPMENT

Detailed information can be found below under Patent Status (US#8,463,096; 09Jul2013).

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## OTHER INFORMATION

### KEYWORDS

data transfer, networking, Ethernet, IP, TCP

### CATEGORIZED AS

- **Communications**
  - Networking
- **Computer**
  - Hardware
  - Other
  - Software

### RELATED CASES

2008-223-0

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