

Exploring ATCA 3.1 vs. ATCA 3.2

A Closer Look at the ATC5231 and ATC5232 Nodes from DTI

The ATC5231 ATCA CPU Node is an ATCA 3.1 blade, whereas the ATC5232 is an ATCA 3.2 Node. ATCA 3.1 specifies the use of Ethernet and Fibre Channel as the networking technologies behind the board itself. These are ubiquitous technologies that form the makeup of most networks in existence. ATCA 3.2, however, specifies the use of InfiniBand, which is a switched fabric communications link used as a connection between the processor and (typically) storage I/O.

ETHERNET AND FIBRE CHANNEL: ATCA 3.1

The physical layer of Ethernet is specified by the 802.3 standard and contains many references for different media interfaces and speeds. The twisted pair copper cabling model is the most common. Typical speeds over Ethernet range from 10 Megabits per second to 10 Gigabits per second, with auto-negotiating 10/100/1000 connections being the most common.

Above the physical layer, Ethernet communicates by sending small blocks of data that are individually transmitted to and from each station. Each Ethernet station is given a MAC address, which specifies the source and destination of each packet.

All generations of Ethernet share the same frame formats and interfaces for higher levels, and can therefore be readily and inexpensively interconnected.

Fibre Channel is a gigabit networking technology that is mainly used in a storage capacity. At the physical layer, Fibre Channel signaling can run on both twisted-pair copper wire and/or fiber optic cables, the same Ethernet uses.

The most common Fibre Channel topology is the Switched Fabric (FC-SW), in which all devices or loops of devices are connected via Fibre Channel switches on the board itself, which manage the state of the fabric.

Within AdvancedTCA, all ATCA 3.1 Nodes and Switches are defined as being completely interchangeable and compatible, due to the compatibility of the many different Ethernet physical layers, and most users of 3.1 products are familiar with the hardware, as Ethernet is the most ubiquitous protocol used in networking.

INFINIBAND: ATCA 3.2

InfiniBand is similar to Fibre Channel (as well as PCIe and SATA) in that it is a point-to-point, bi-directional serial link. InfiniBand has many signaling rates and links can be bonded together for additional bandwidth, as with PCI Express.

The standard signaling rate of the InfiniBand serial connection is full-duplex 2.5 gigabits per second, with double and quad data speed connections making raw signaling rates of 5Gbit/s and 10Gbit/s possible. The use of 8B/10B encoding within InfiniBand means that the net data transmission rate is $\frac{4}{5}$ of the raw data rate.

As stated, InfiniBand links can be bonded in units of 4 or 12, called 4x InfiniBand and 12x InfiniBand, respectively. The maximum theoretical throughput, then, is a quad-rate 12x link carrying 120Gbit/s raw data, or 96 Gbit/s of “useful” data.

InfiniBand is not compatible with Ethernet, however. A node may have base Ethernet channels with InfiniBand fabric. The base can be connected to any Ethernet switch or port, however the InfiniBand may only be connected to other InfiniBand sites.

WHICH IS RIGHT FOR YOUR APPLICATION?

It depends entirely on your needs of performance and compatibility. We recommend further reading:

The Case for InfiniBand with AdvancedTCA

http://www.dtims.com/whitepapers/atca_infiniband.pdf

Ethernet Protocols Primer for AdvancedTCA

http://www.dtims.com/whitepapers/atca_protocols.pdf

InfiniBand Wikipedia Page

<http://www.wikipedia.org/wiki/Infiniband>