Various Interconnections Schemes for a 16-Slot VPX Backplane

Here are five different 16-slot VPX backplane implementations. Each of the five implementations represents offers different fabric mapping. What is common between all five examples is the following:

- 16 slots
- 5HP spacing
- Each slot has four channels for connection to other slots.
- Each channel consists of four bi-directional links.
- Each fabric interconnection scheme is accomplished entirely within the J2 connector.

Here is the first implementation. It is described as four clustered 4-slot meshed sections with each cluster chained to the next and the two ends connected. Note that this could be viewed as based upon an 8-node tetrahedron as shown in below.

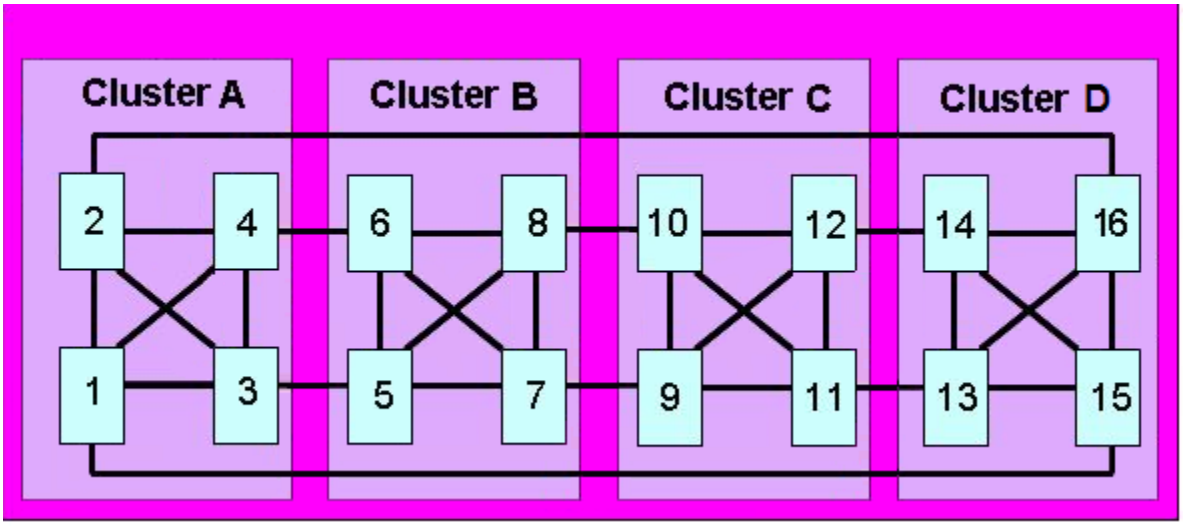

Figure 1 This is a series of fully meshed 4-slot clusters.

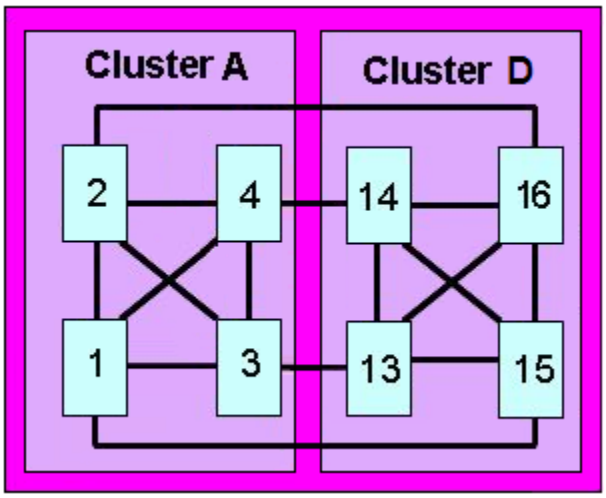

Figure 2 A tetrahedron connection topology is a subset of the topology shown above.

The second implementation arranges the sixteen slots into two nested cubes which has the same connection topology as a tesseract. This structure is more commonly known as a hypercube.

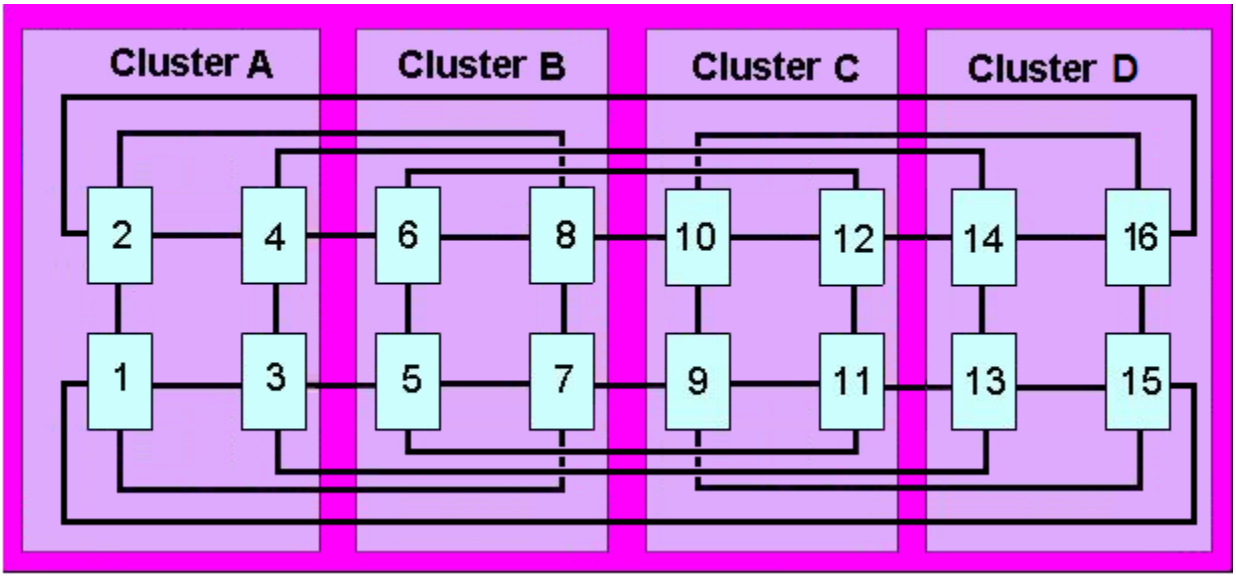

Figure 3 This is a hypercube.

The third implementation (figure 4 below) is similar to figure 1 above but the connections within the meshed clusters are replaced with x4 channel Infiniband sockets. This allows Infiniband cables to be used to reconfigure the fabric connections. This could be handy to accommodate smaller numbers of boards.

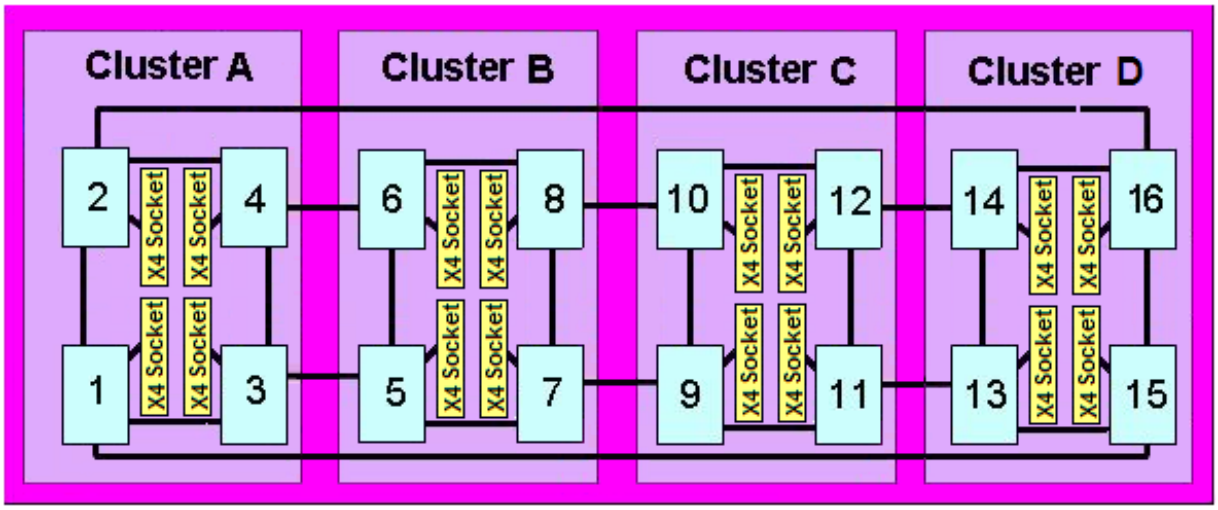

Figure 4 This is similar to figure 1 but with configurable links within each cluster.

16-Slot VPX Interconnect Schemes (continued)

In this fourth implementation (figure five below) each of the four clusters is a full mesh in itself. The links between the clusters are flexible and accomplished with x4 Infiniband cables.

Because the clusters are fully meshed within the backplane this arrangement is like having four separate 4-slot backplanes but with the ability to connect the backplanes to each other.

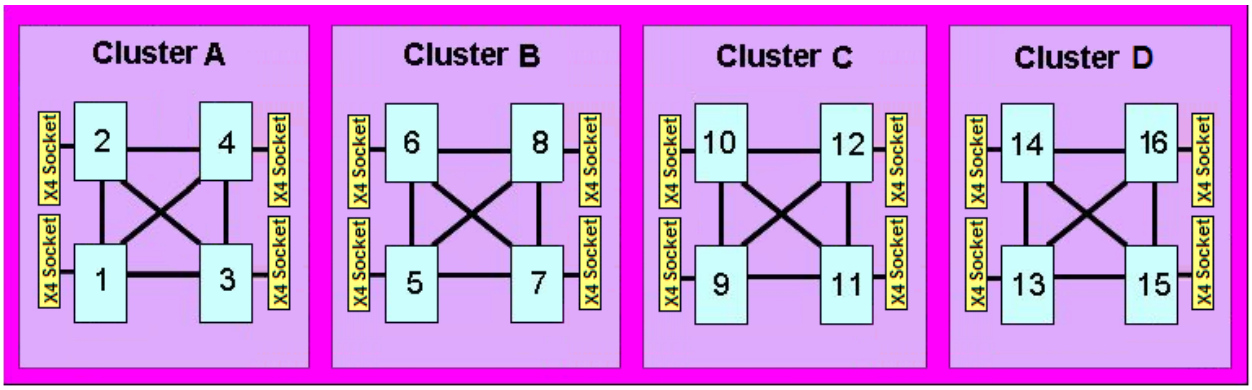

Figure 5 Also similar to figure 1 but with configurable links between each cluster.

In this fifth implementation (figure 6 below), there are five clusters. Each cluster consists of three slots fully meshed. When three slots are a full mesh the structure can also be viewed as a ring. In this case, however, the clusters are each joined to the next cluster with either one or two links depending upon the orientation of the clusters to each other. Each slot has a fourth channel that is accessible by a x4 Infiniband cable.

Note that each of the three nodes in cluster B could be connected by cable to its corresponding node in cluster C. Clusters D and E could be connected in the same way thus creating two tetrahedrons.

One aspect of this structure is that it has a full connection topology within the backplane and the additional links can be used for application specific configuration.

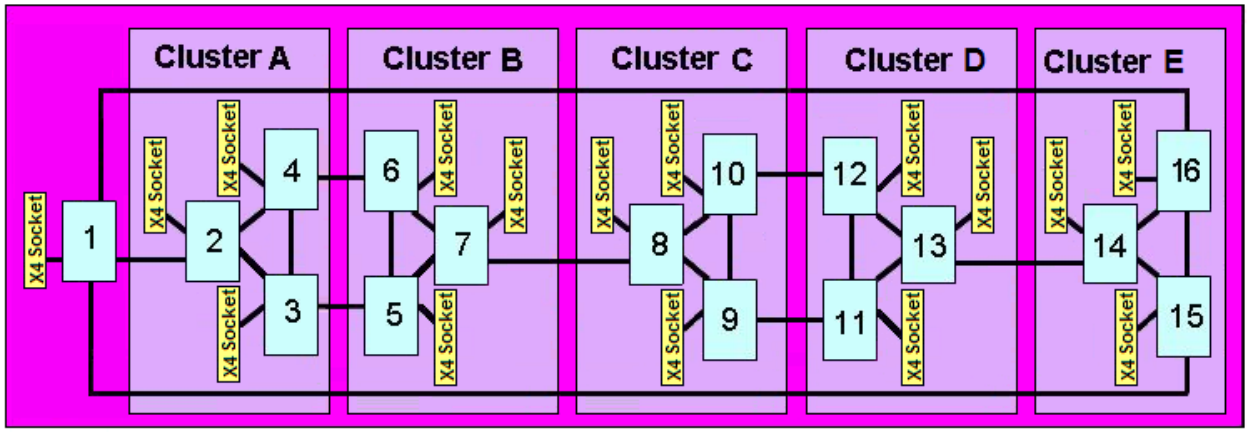

Figure 6. This is five three slot meshes that are chained one to another.

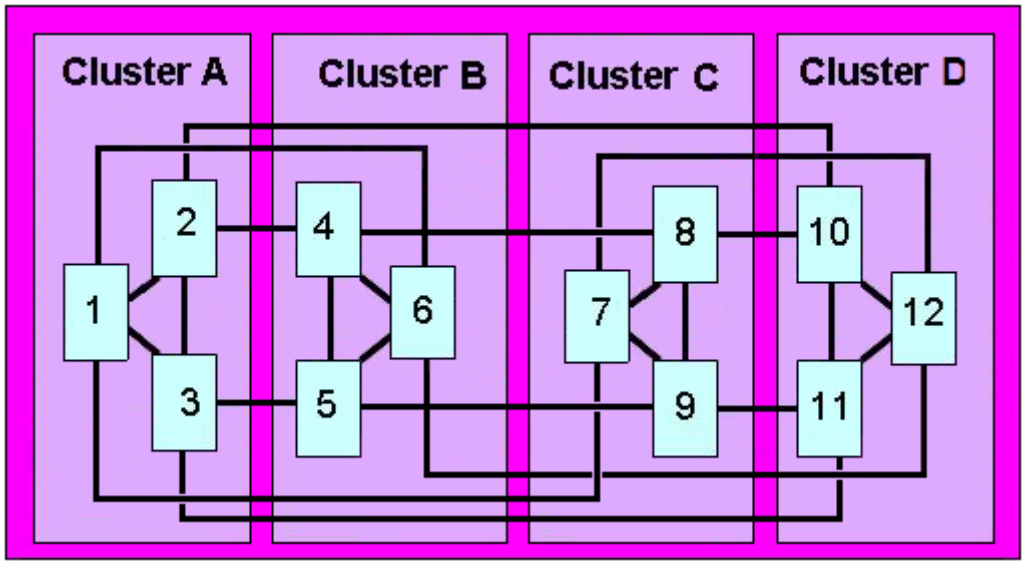

Figure 7 This twelve slot example is just a subset of figure 6 above. It shows an example of how four of the five clusters could be joined connected within the PCB or with the cables provided in figure 6.

Figure 8 below shows how a typical x4 channel is connected within the VPX MultiGig connector.

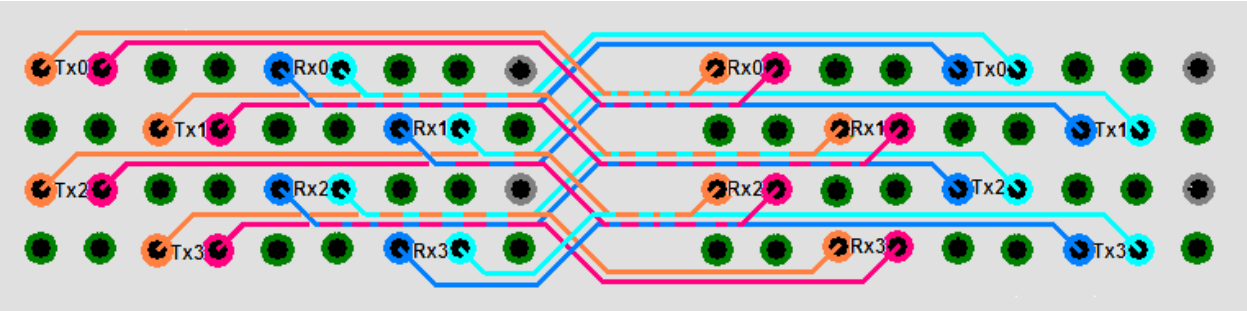

Figure 8 A typical serial x4 VPX channel.

Figure 9 below shows one bi-directional link. This is sometimes called a “thin pipe” in contrast to a channel above with four of these bi-directional links which is sometimes referred to as a “fat pipe”.

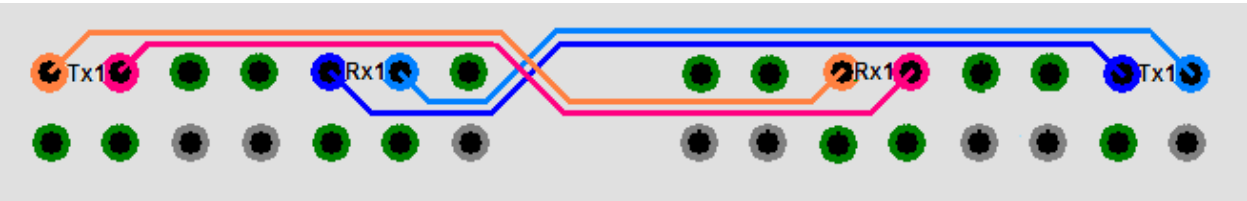

Figure 9 A single bi-directional serial differential link.