Wiring Instructions

Instructions on how to wire Earth Computing Datacenters

Cells in Earth Computing Neighbor-to-Neighbor (N2N) datacenters are wired more simply than conventional Any-to-Any (A2A) servers over a separate switched interconnect in today's datacenters. Instead of wiring cables *exactly* from a specific port on each server, to a specific port on a Top of Rack (ToR) switch, they are connected *directly* to their nearest neighbors, in an *approximate*, or semi-regular lattice.

Wiring Rules

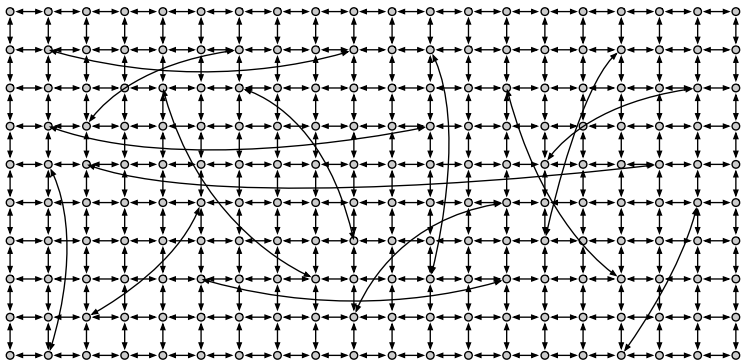
Each box is wired first to its neighbors. For cells with four ports, we use: one up, one down, one right one left (North, South, East, West). Eight-port cells include the four corners (NE, SE, SW, NW). These *local* connections should all be achieved with the shortest cables practicable. Cables shorter than 1 meter will allow the link to both run faster, and at lower power dissipation.

- Each short ($\leq$ 1m) cable connects two neighbor computers (not back to the same one). As shown in the figure at the bottom of the page. Once the local cables are connected, we then connect the Kleinberg links.
- Each medium ($\leq$ 10m) cable connects to any to available (open) ports between racks. For optimal performance, they should be stretched across multiple racks. i.e, two, four, eight *different* racks if possible.

The N2N links provide segment privacy between related applications running on different cells. Kleinberg links provide a *small-worlds* effect, where the hopcount from one end of the row of racks to the other is minimized. The figure to the right shows *random* links, but it really doesn't matter that much which particular machines are connected. Just stretch the cables across many *different* racks if you can.

These rules are not hard and fast. While they will enable the system to build optimal topologies, the routing algorithms are resilient to failures.

Figure 1 on the second page shows how a resilient topology can be created despite failures of the links. A blueprint like this will be drawn automatically once the systems are booted up. Figure 2 shows how a hybrid system can be wired, by connecting the unused links along the outsides to a conventional IP network through Top of Rack (ToR) switches.



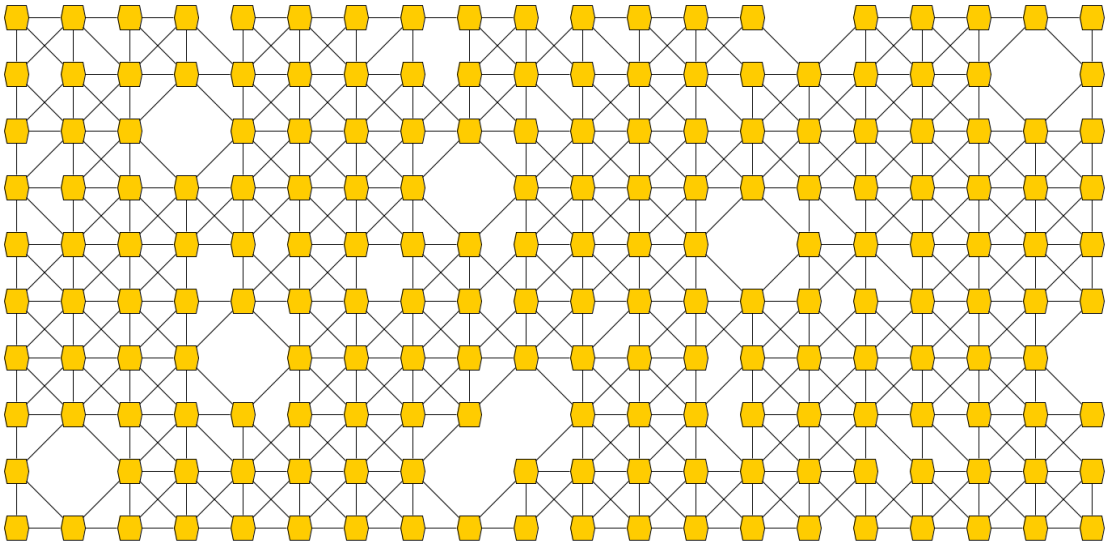


Figure 1: Unstructured Neighbor to Neighbor (N2N) Connections. Showing some failed links.

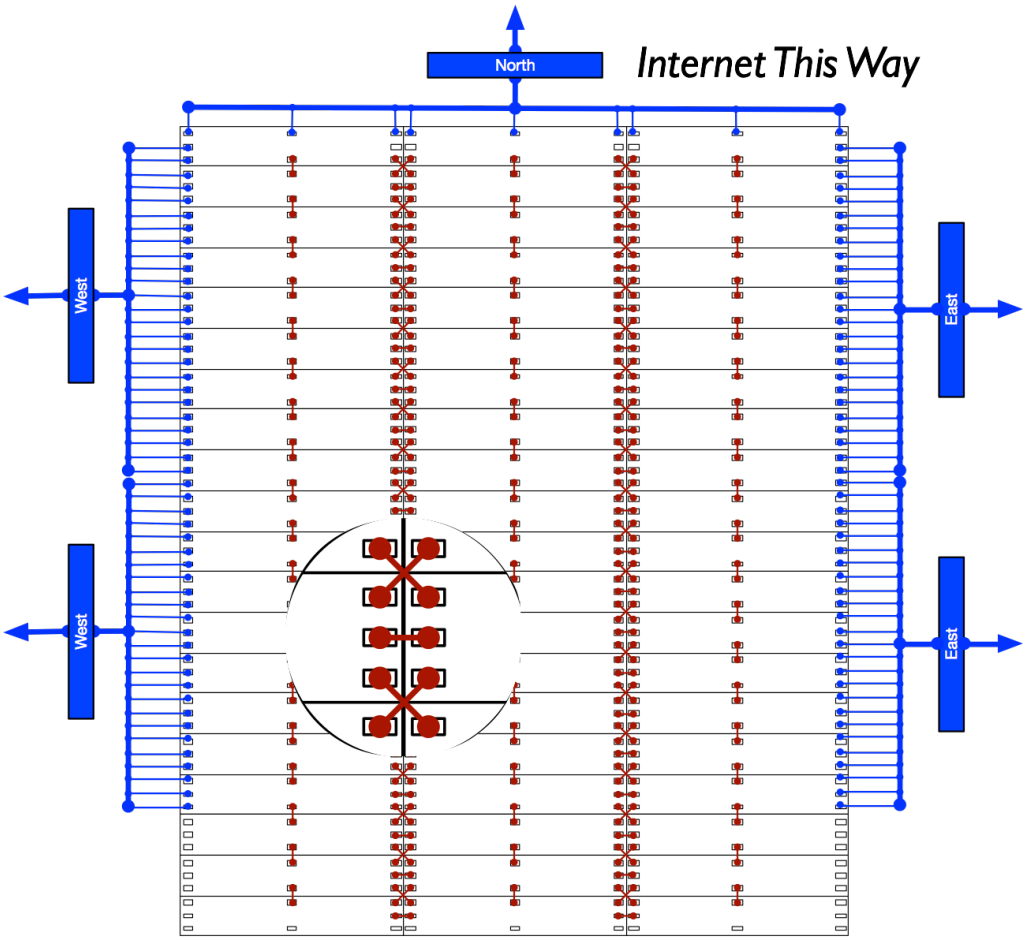


Figure 2: Hybrid Neighbor to Neighbor (N2N) Connections and ToR switches.

