Valiant Load-Balancing in Backbone Networks

Rui Zhang-Shen
rzhang@stanford.edu
Backbone Networks: Observations

- A few tens of “core” nodes,
- Each aggregating traffic for a region,
- Interconnected by an increasingly rich mesh of long-haul optical trunks
  - Robustness
  - Load-balancing
- Low utilization—links over-provisioned for
  - Uncertainty of traffic matrix the network is designed for
  - Headroom for future growth
  - Prepare to take over when links or routers fail
  - Minimize congestion and delay variation
- Efficiency sacrificed for robustness and flexibility
Our Approach

- Assume we know or estimate the traffic entering and leaving each Regional Network
  - Requires only local knowledge of users and market estimates
- Connect regional nodes by a logical full-mesh
- Use Valiant Load Balancing (VLB) over whole network
  - Can support all traffic matrices
  - Efficient use of capacity
Valiant Load-Balancing