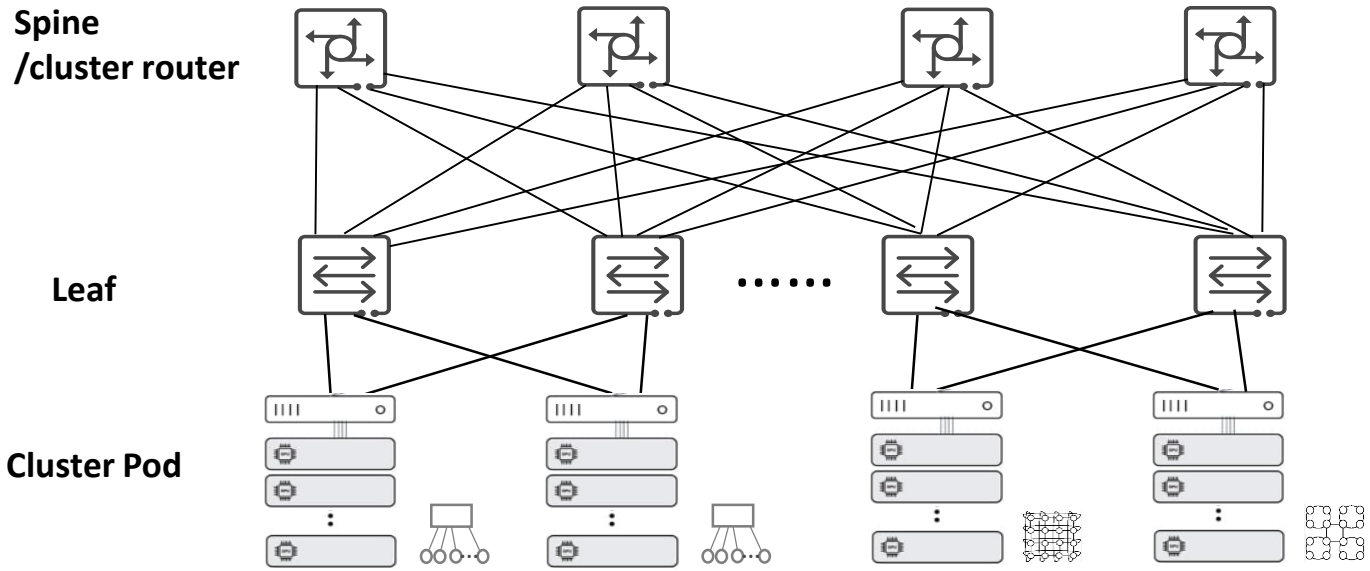
Update：The Challenges and Requirements for Routing in Computing Cluster network

draft-li-rtgwg-computing-network-routing-01

IETF122 RTGWG, Bangkok

Fengkai Li & Yizhou Li

Background



- **Some well-known characteristics**
  - Large scale, multiple path available
  - Prior knowledge of the topology, paths and traffic patterns
  - Provide high bandwidth and low latency for large data volume
  - High modularity, the system is composed of clusters with known structures
- **Key considerations on routing in computing cluster network**
  - Scalability and availability
  - Failure handling and route/path convergence
  - Complexity of network configuring and maintenance

Recap: find a good way to combine the advantages of distributed and centralized routing

- From the distributed routing
  - Absorb
    - Good scalability, not rely on centralized node to computing and inform
    - flexibility policy control, e.g. BGP
  - Reduce
    - High computing and storage overhead, e.g. each node stores LSDB of the entire network in IGP
    - Heavy configuration, e.g. BGP
    - Slow convergence (per-node calculation and propagation)
- From the centralized routing
  - Absorb
    - Global view, easier optimal routing path calculation
    - No or minimum routing calculation on network node
    - Light configuration
  - Reduce
    - Concerns on scalability
    - single point of failure
    - out of band control network
    - inefficient exception handlings as controller involved

Updates from 00 to 01

- Briefly examined a hybrid routing example: Primus
  - Global view: Use centralized controllers to collect/disseminate the network's link-states (LS)
  - Scalability: offload the actual routing calculation onto each switch
  - Minimize per-node computing and storage overhead: simplify each switch's routing calculation into a table-lookup manner by comparing LS changes with pre-installed base topology and updating routing paths according to predefined rules
- key strategy TBD by hybrid routing: how to properly divide the routing functions between the centralized controller and individual network nodes.
- Considerations for a hybrid routing candidate
  - Centralized controller is helpful to provide the global view and traffic planning.
  - Fully use of the prior knowledge like topology and its modularity, available paths and traffic pattern.
  - Quickly detect network failures and reroute traffic to alternative paths
  - Minimize per-node routing calculation especially when fault occurs for better scalability

Next Steps

- Revise the draft to elaborate the commonalities of hybrid routing from research in more details
- Welcome to join (liyizhou@huawei.com)