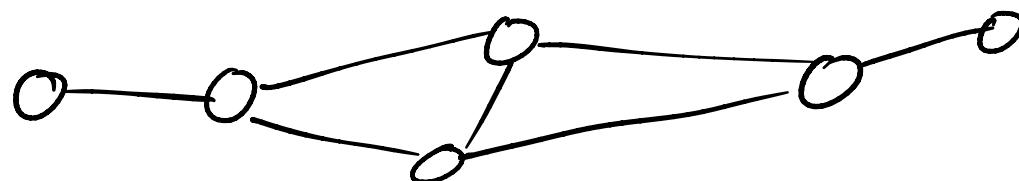


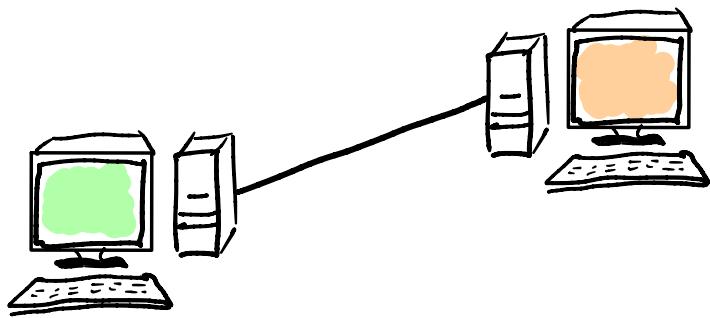
Lecture 1

Internet

as an infrastructure

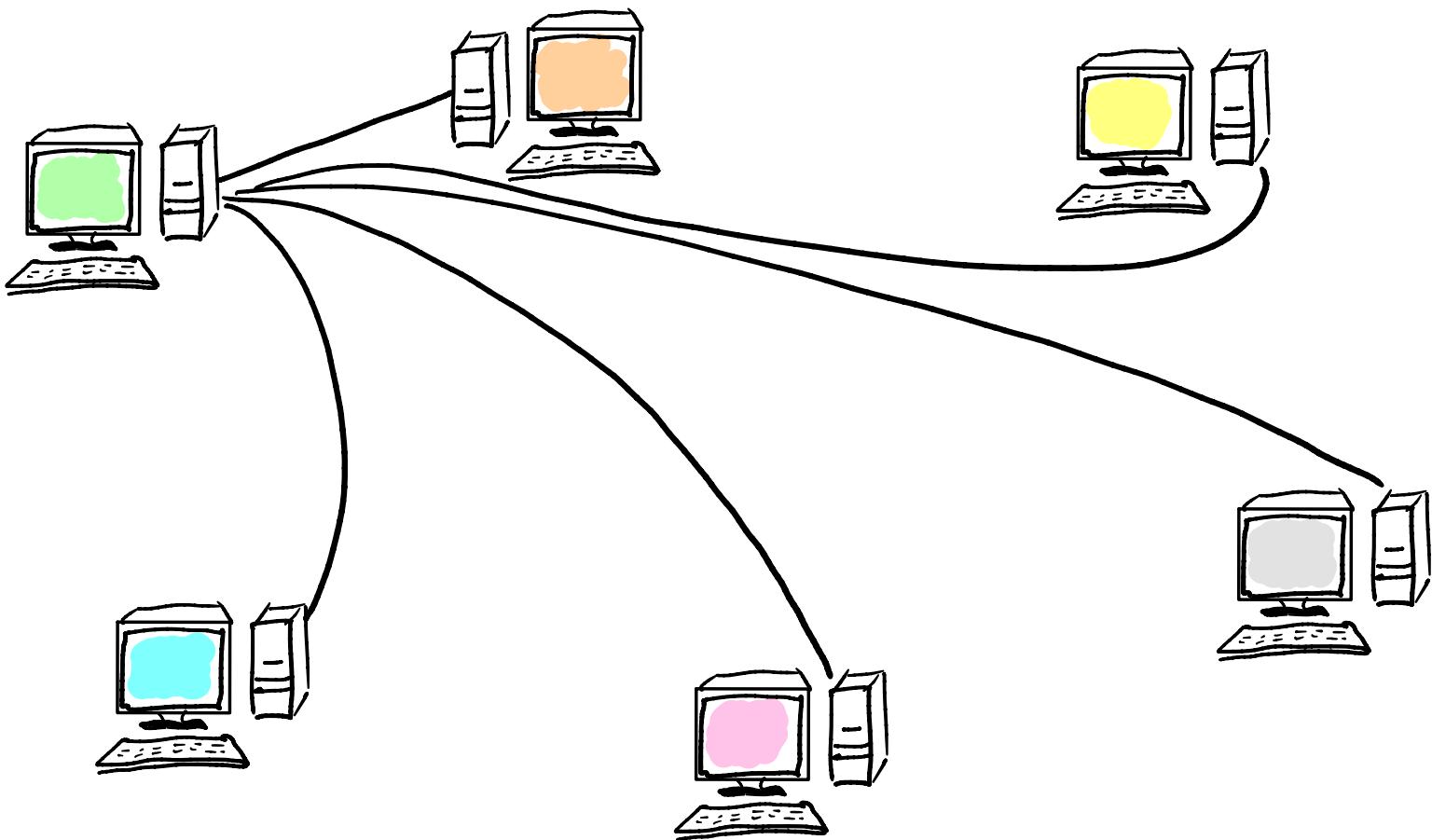


From computing to Communication (connecting you and me)

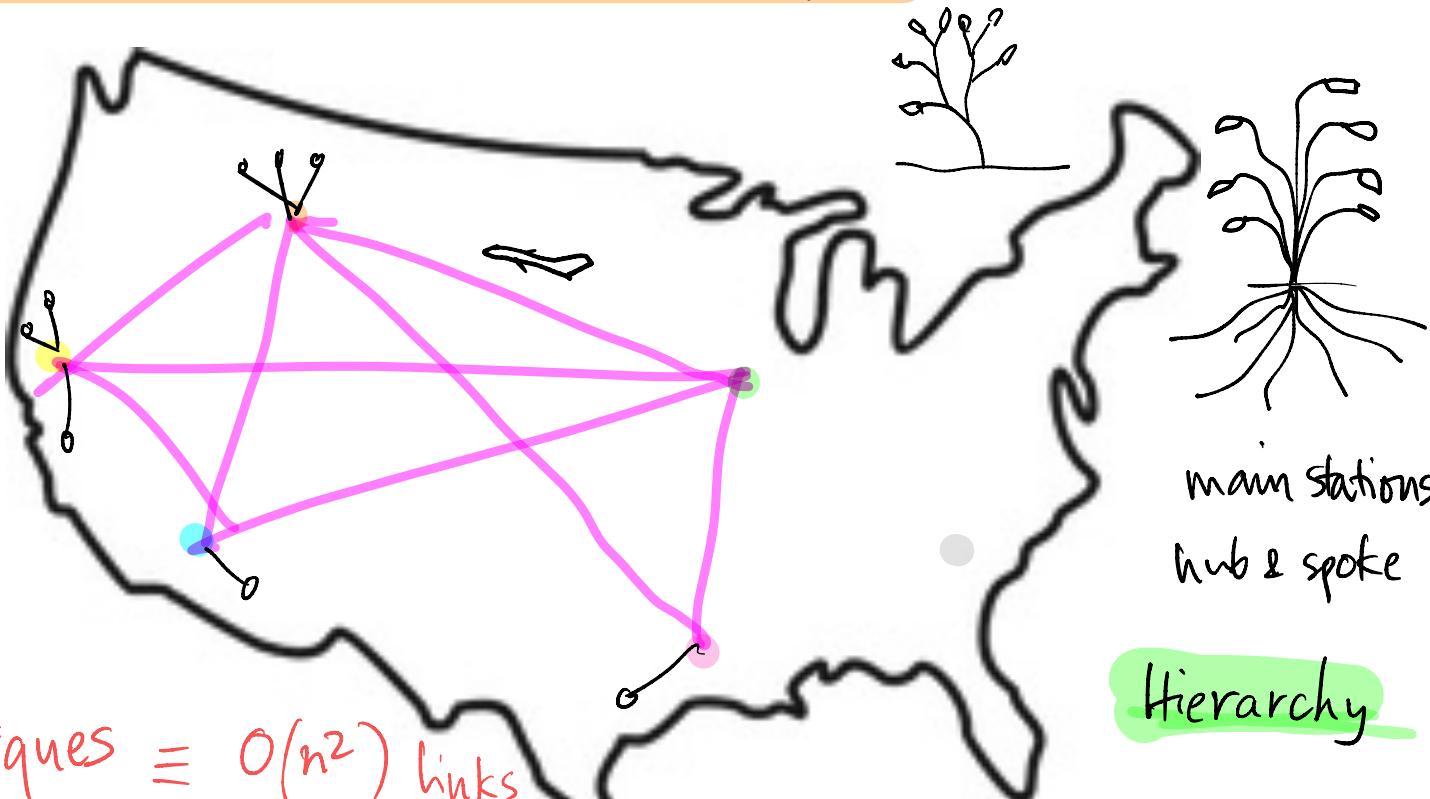


But connecting everyone → how many connections ?

- Clique
- NC₂
- Ports
- cost



Similar Problems in other walks of life? What's the solution?

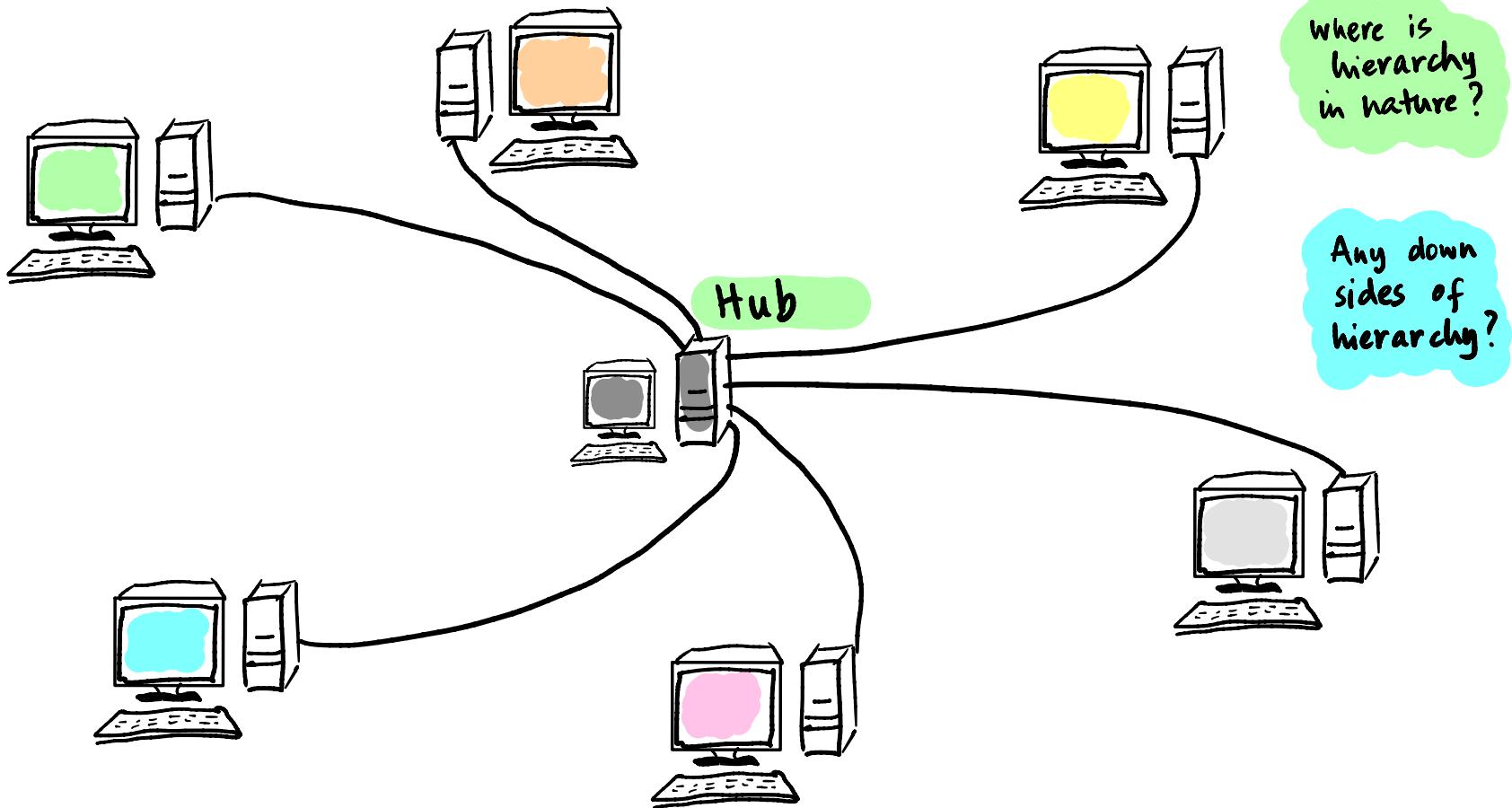


Cliques = $O(n^2)$ links

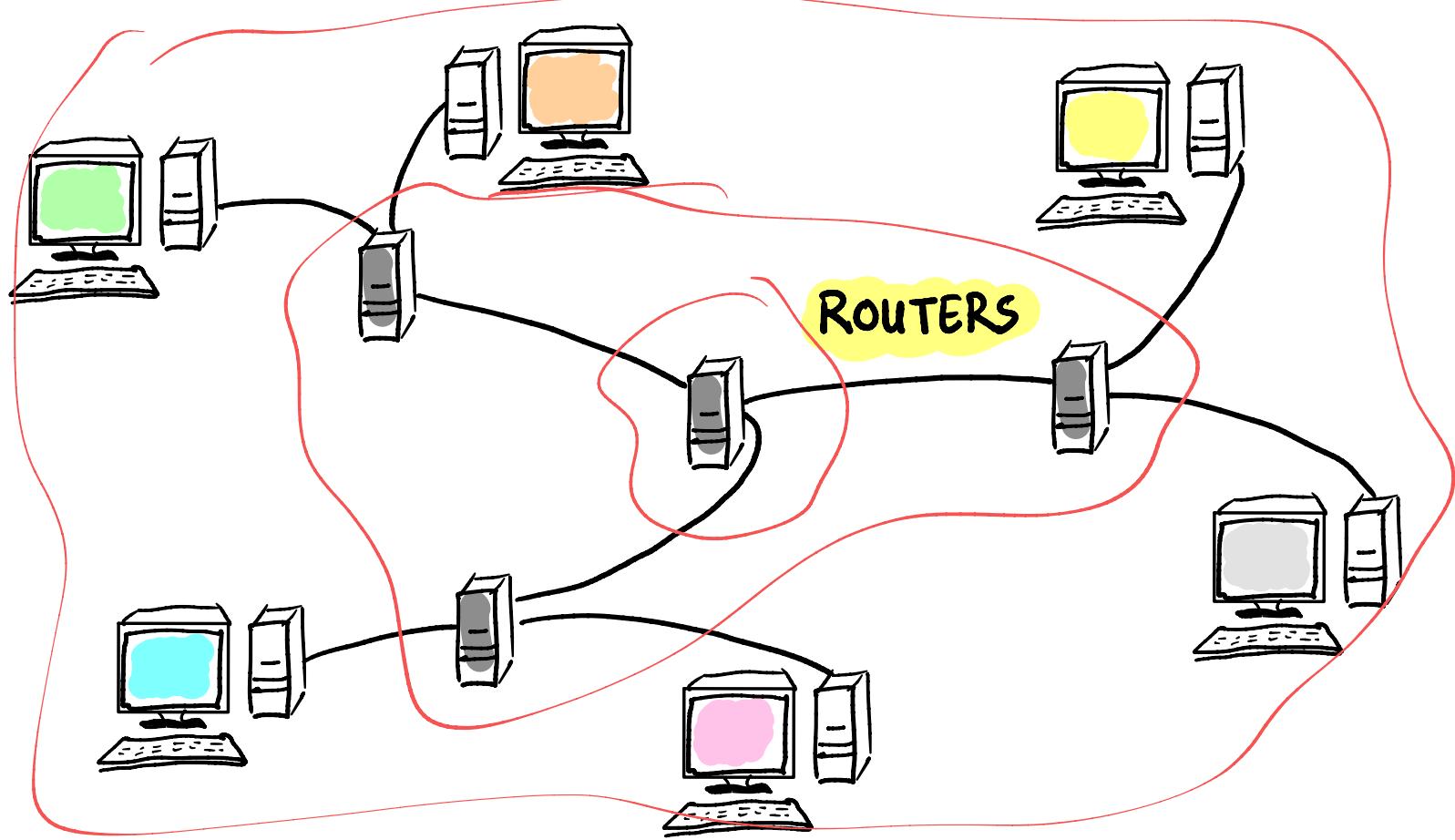
too costly

Hierarchy

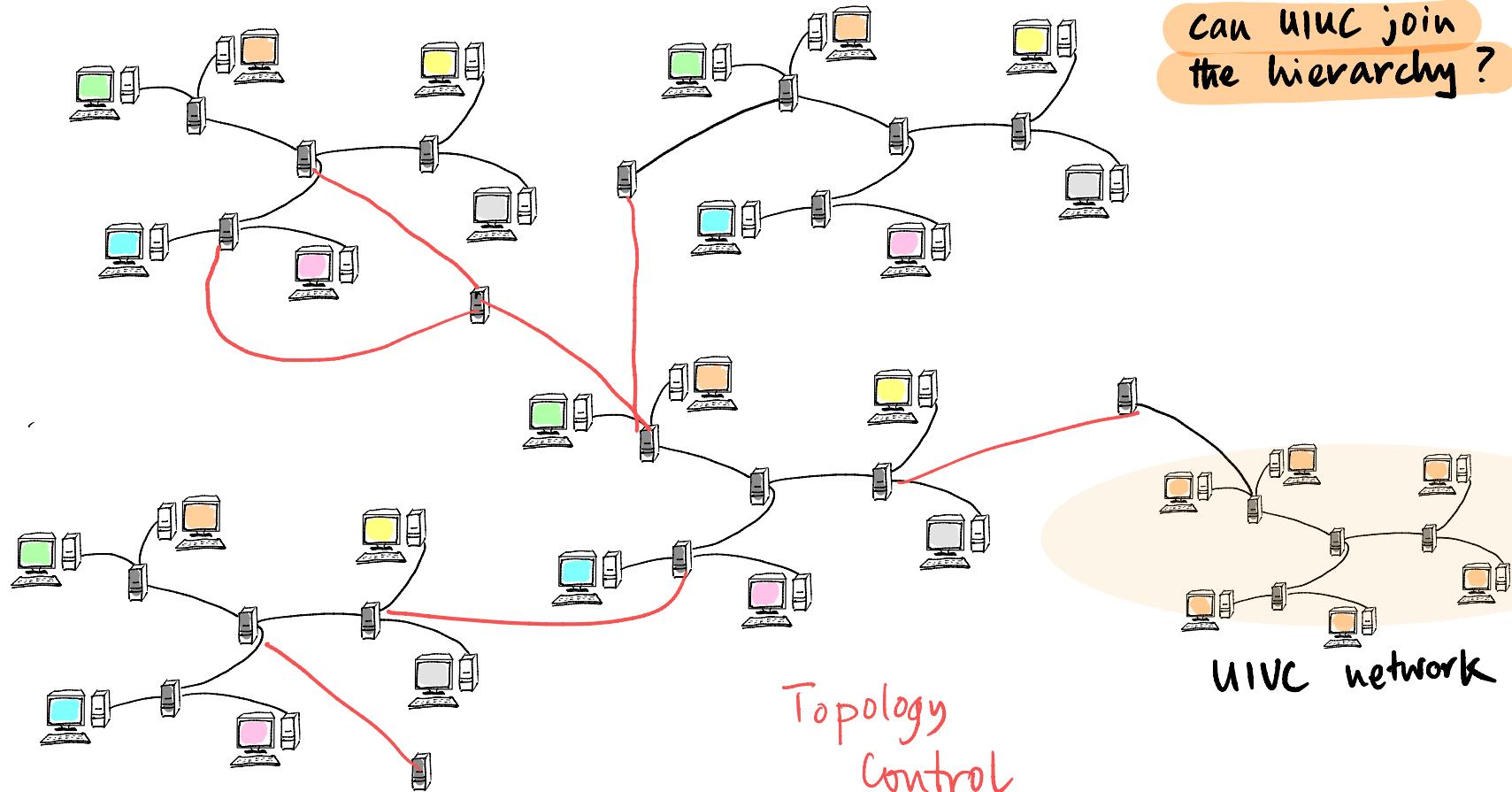
Hierarchy → Permeates natural & man-made efficiency



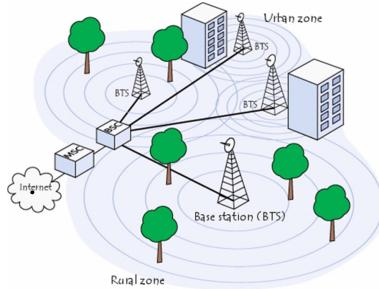
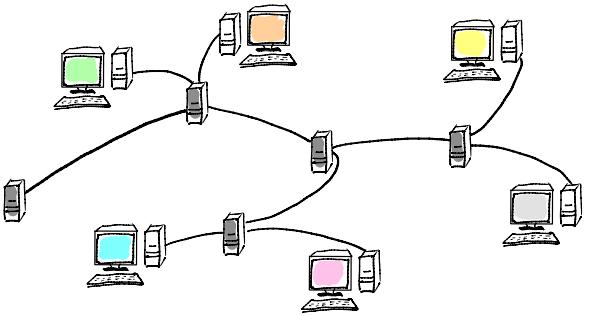
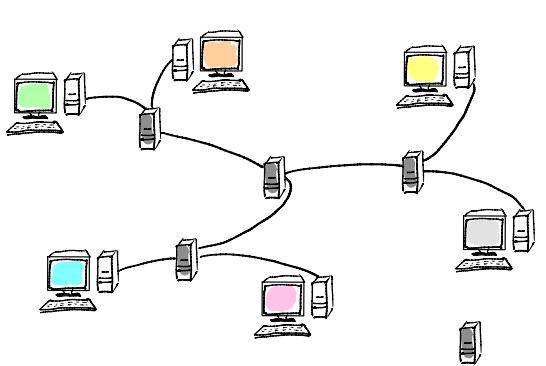
Hierarchy of hierarchy → Why not keep going?



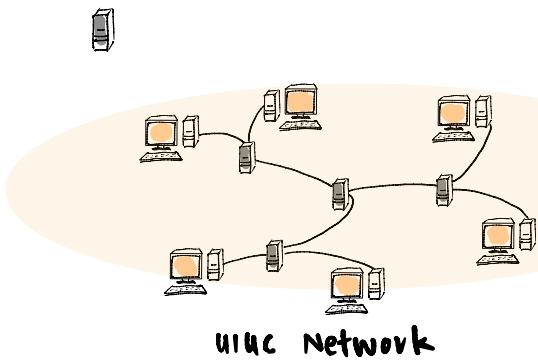
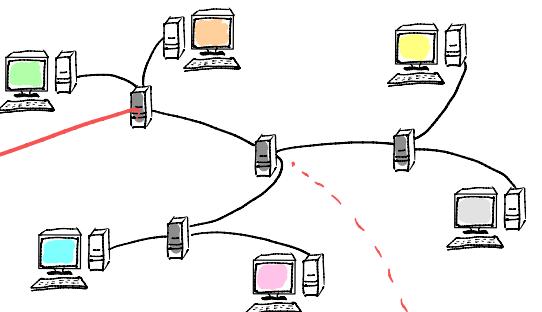
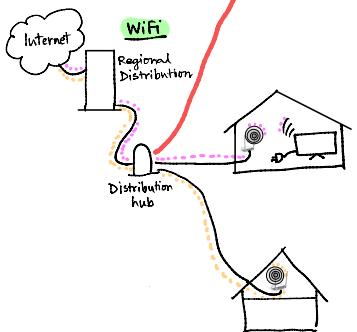
Can UIUC join
the hierarchy?



What about
failure,
disconnection?

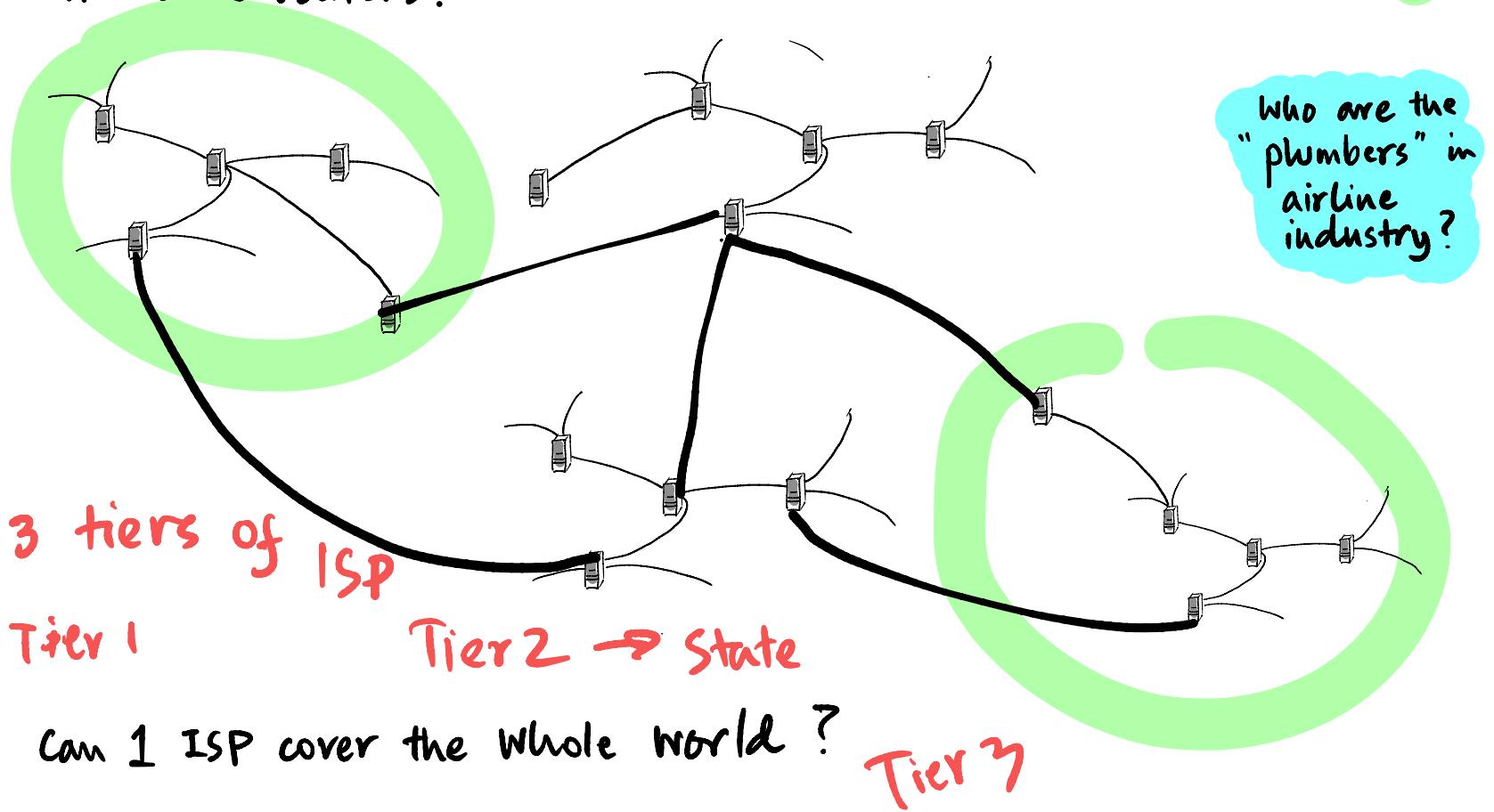


Connect
Everyone
at the edge !

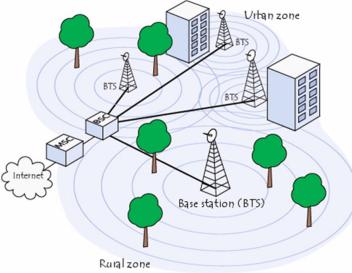
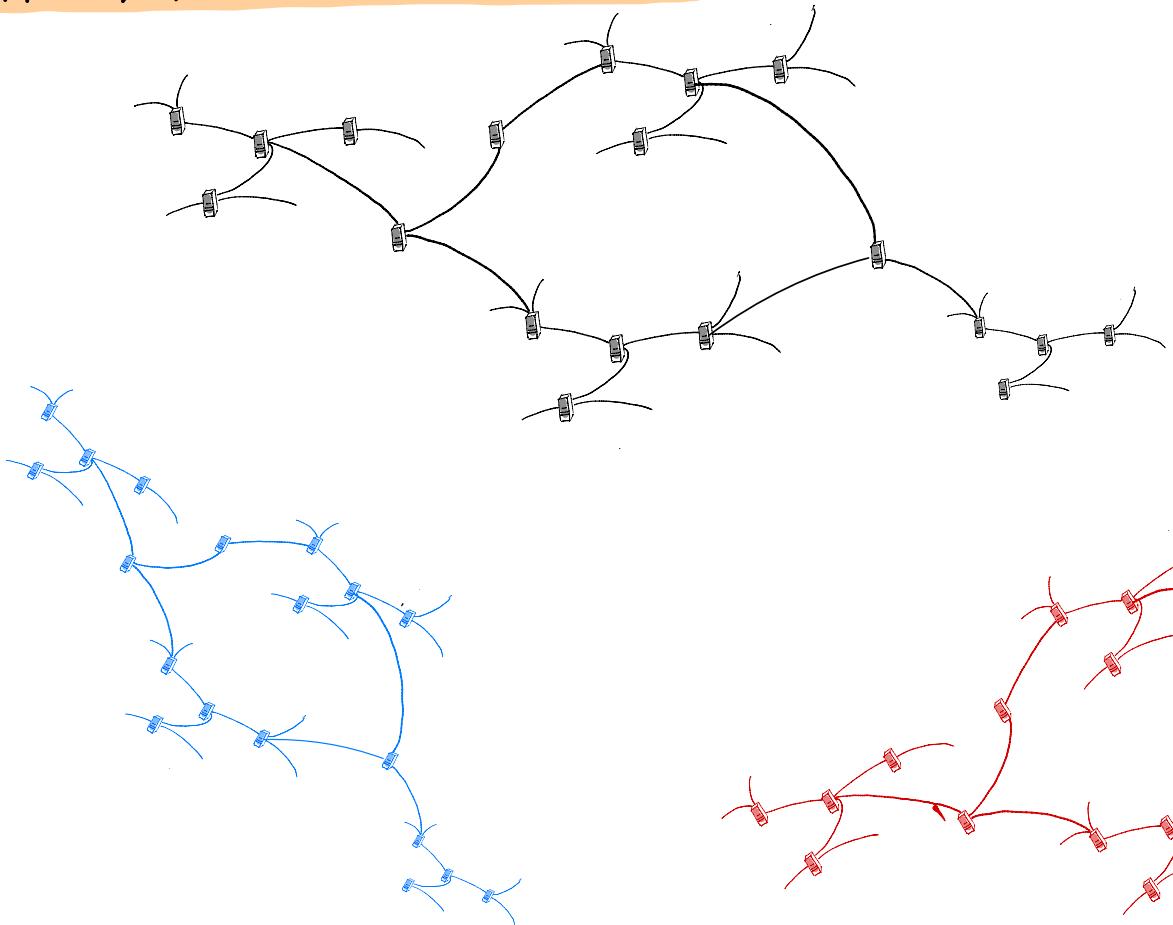


Endurance

who is doing the "plumbing", maintaining, managing? ISP
Who owns routers?

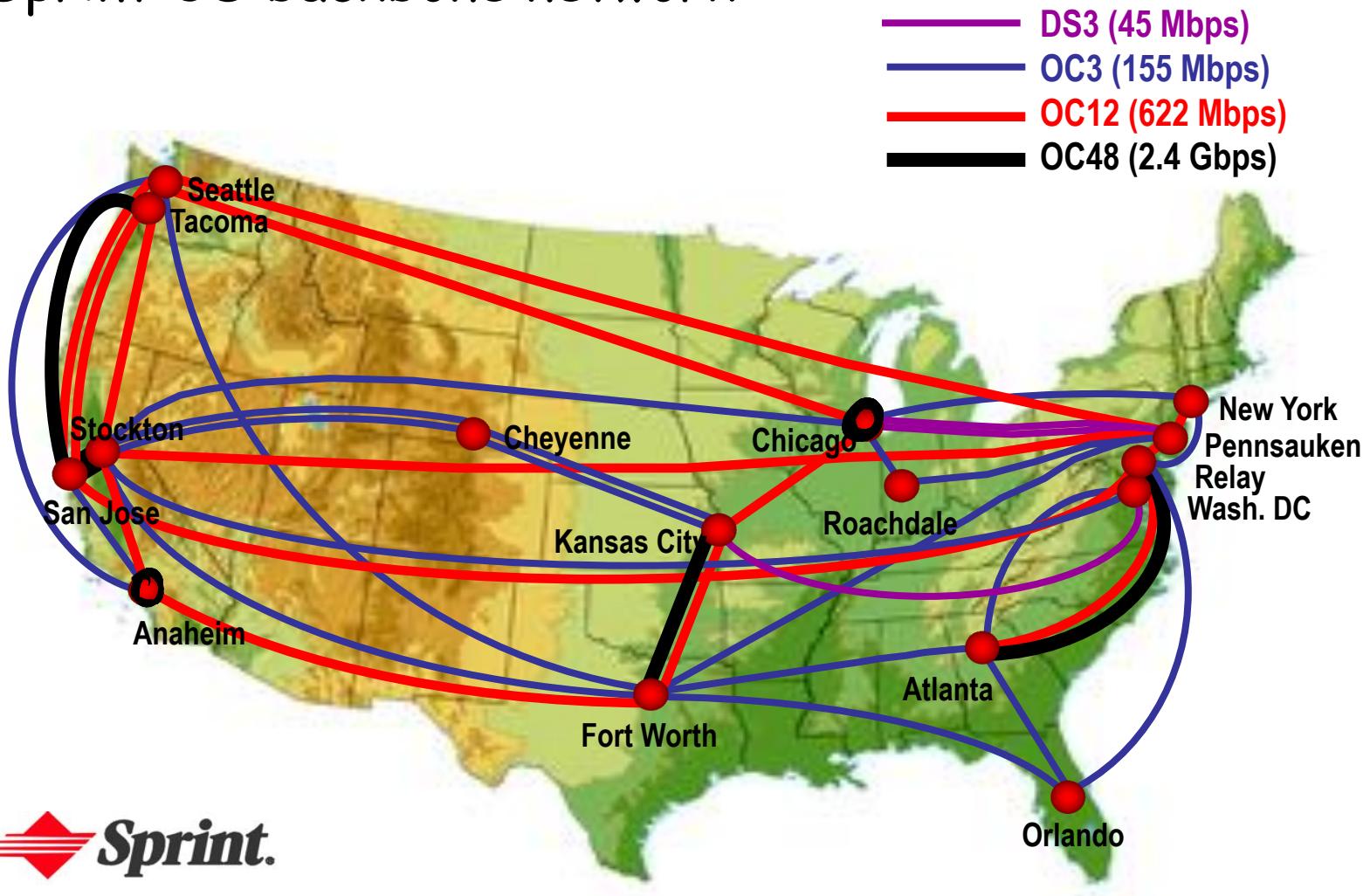


Tier 1,2,3 Service Providers



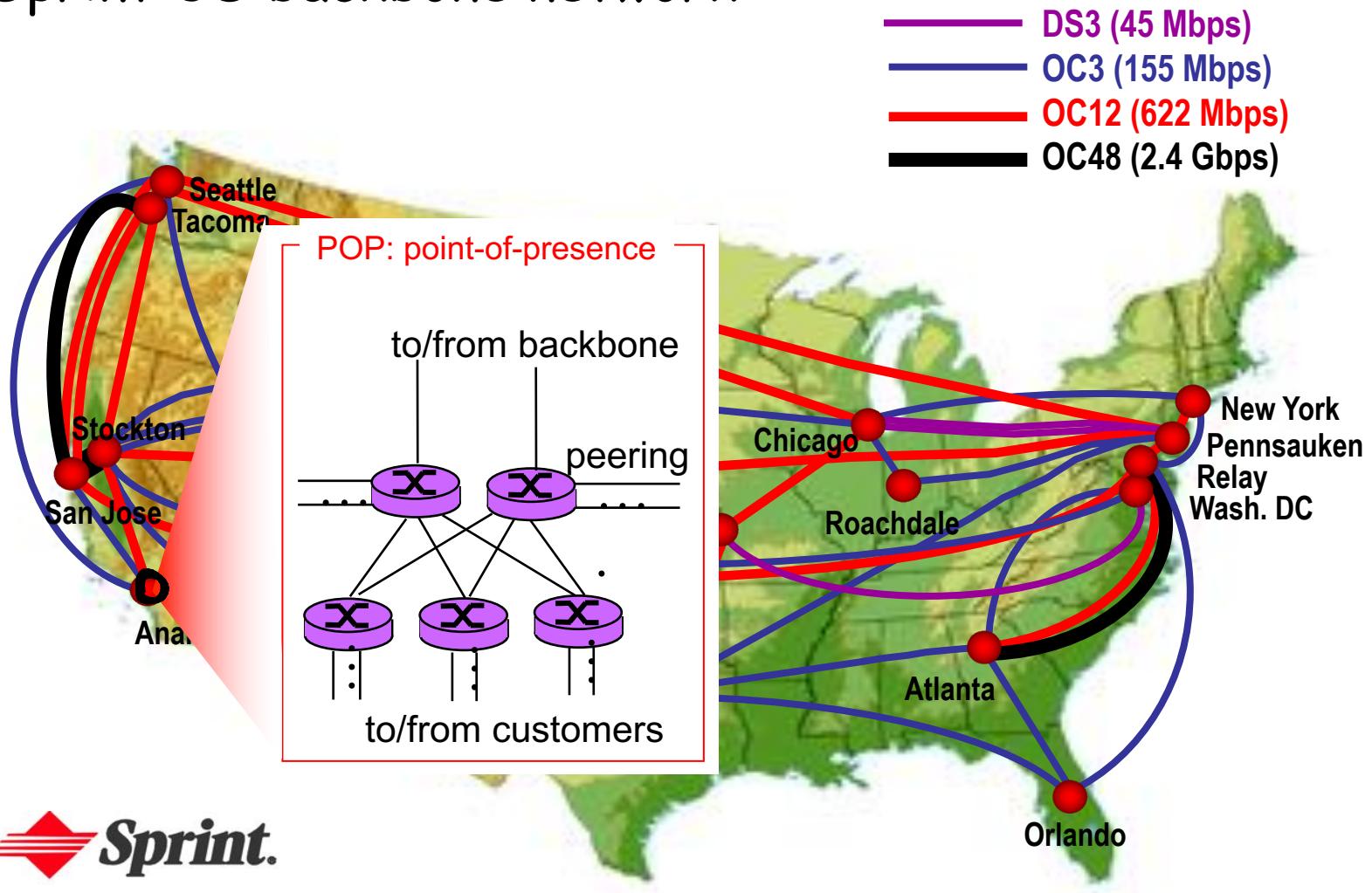
Tier-1 ISP: e.g., Sprint

Sprint US backbone network

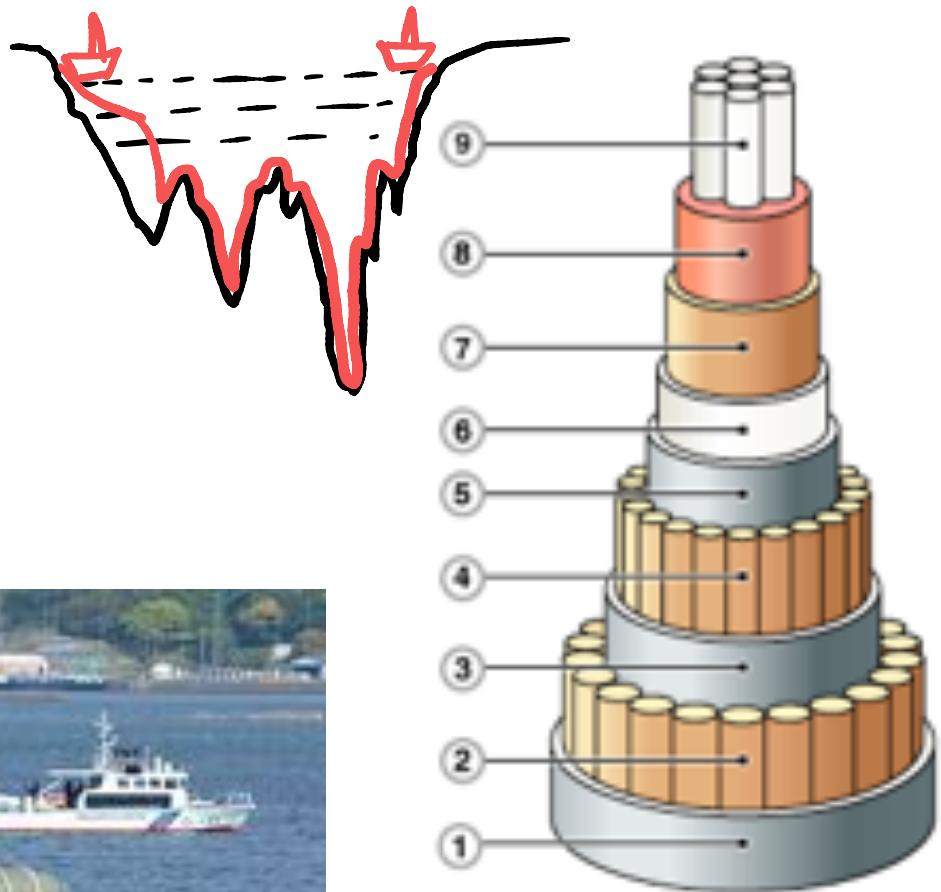


Tier-1 ISP: e.g., Sprint

Sprint US backbone network

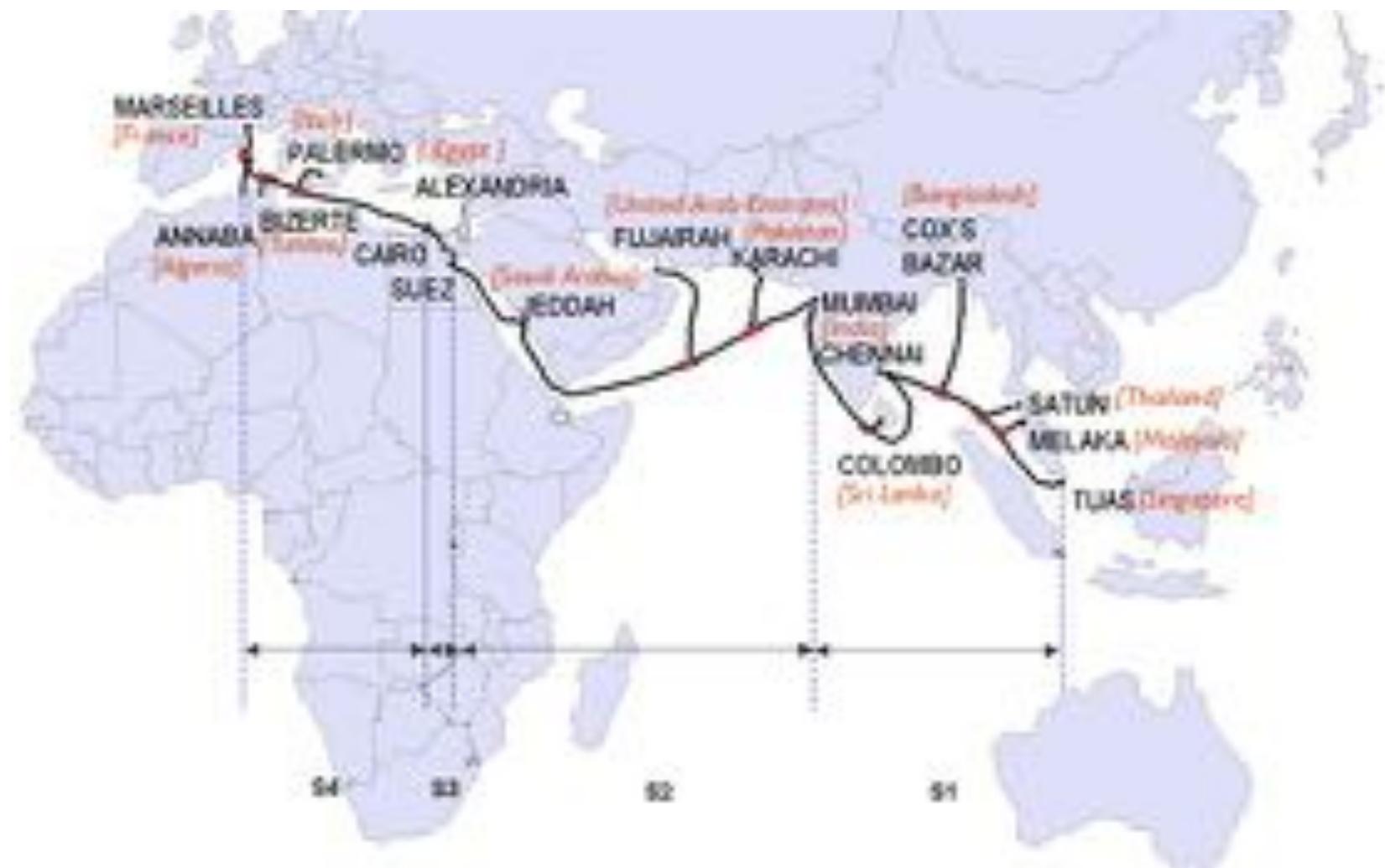


Cables Laid Out in the Oceans



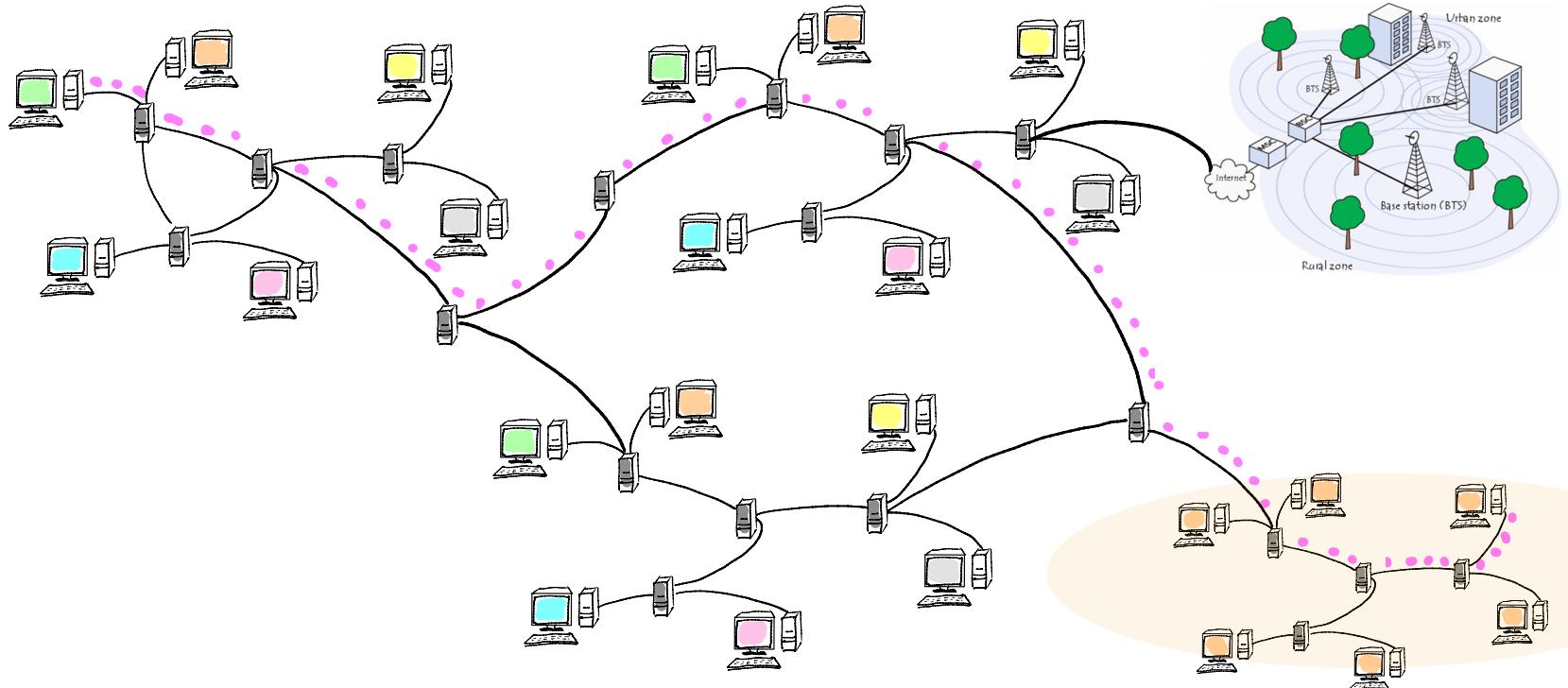
Optical Fiber cross-section

Cable Connections carry 95% traffic (rest?)



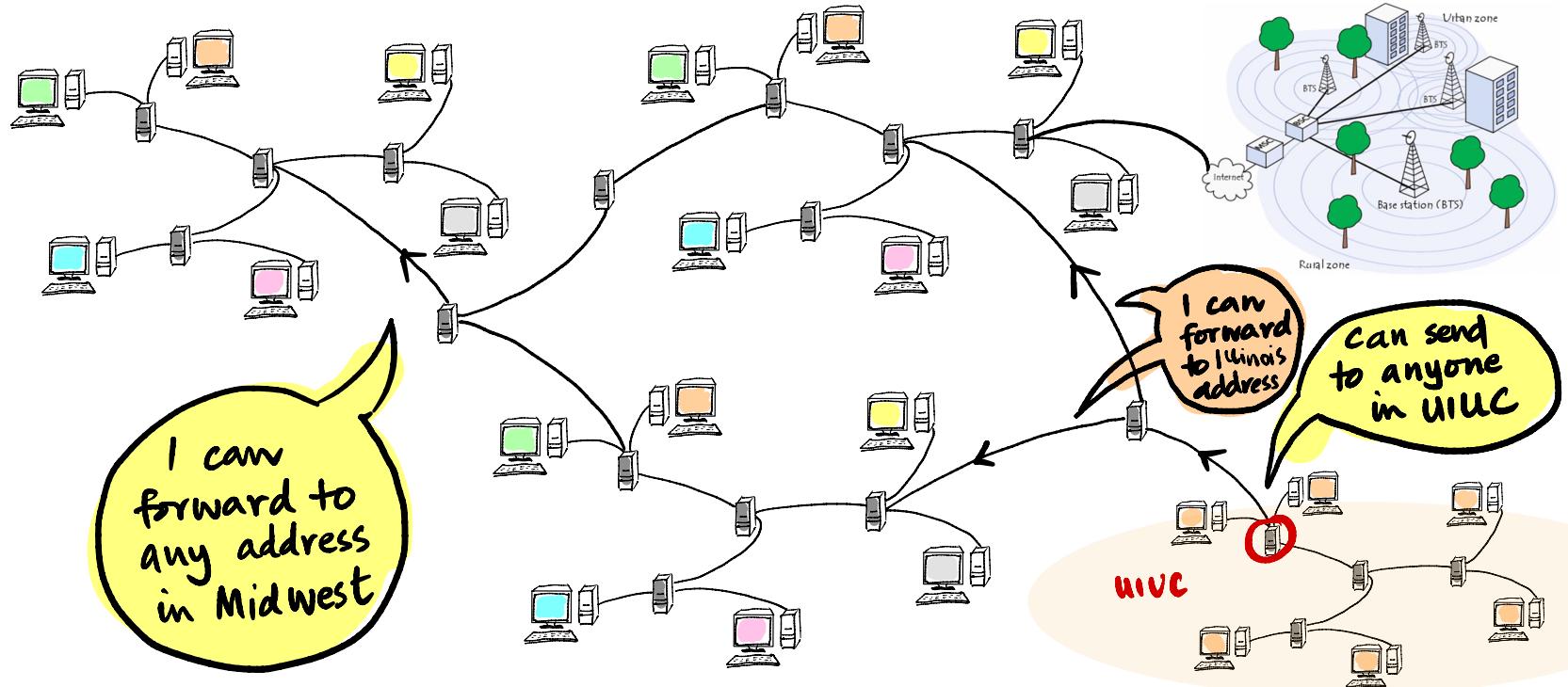
Infrastructure Ready !! Now communicate . . . but wait !

To whom ? Which address ?



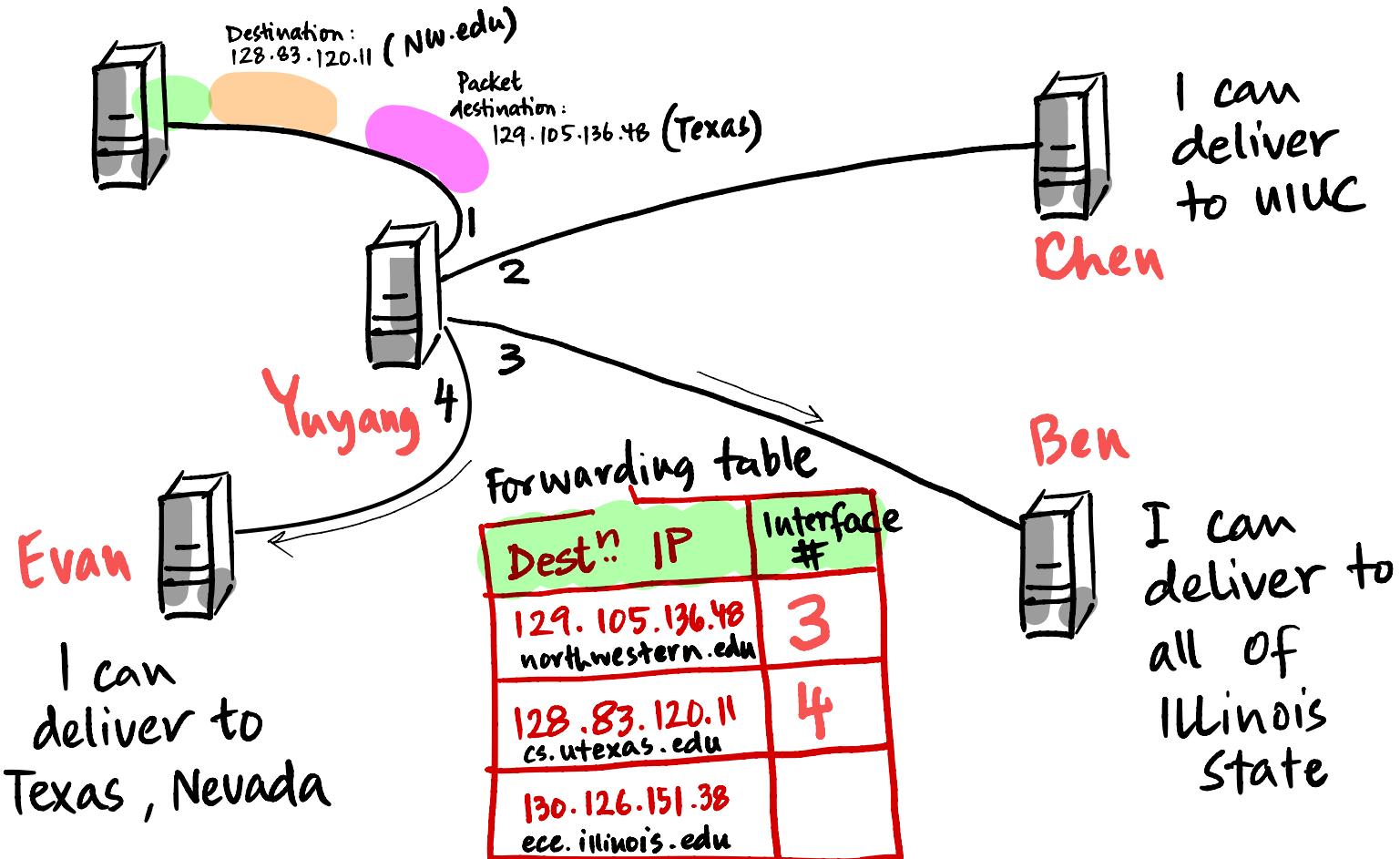
IP address : ece.illinois
130.126.151.38

Advertising : Who can deliver to which address

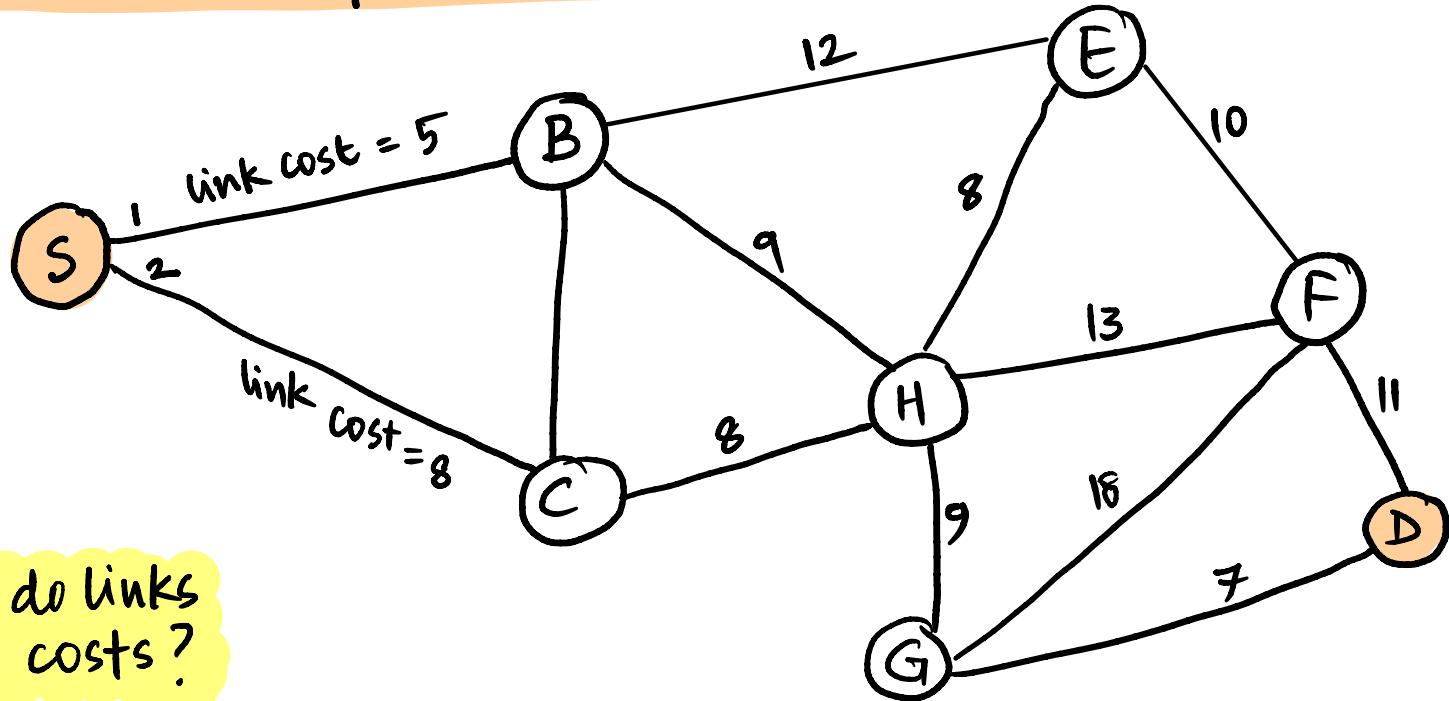


As if Routers are

Forwarding packets based on Destination Address



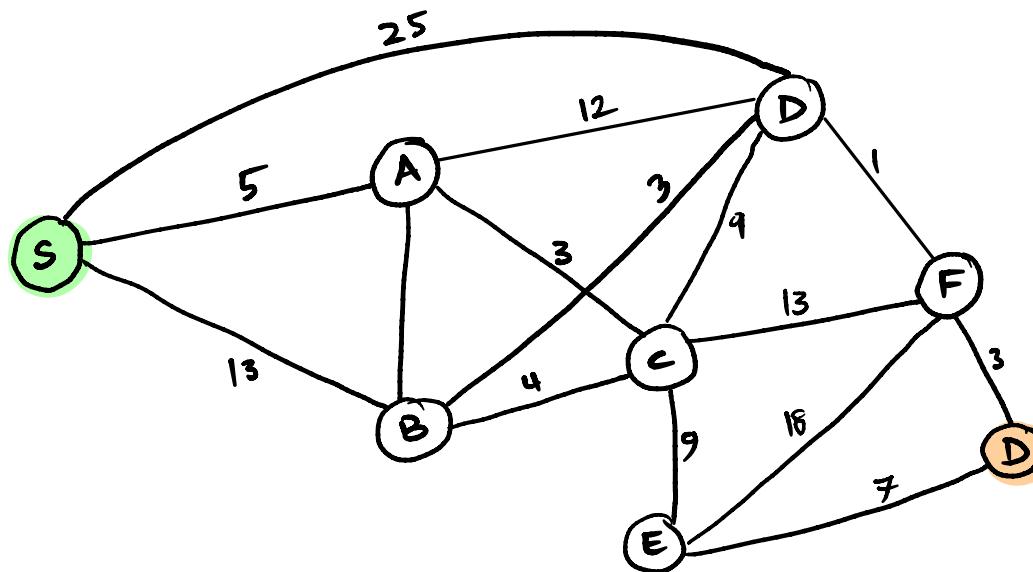
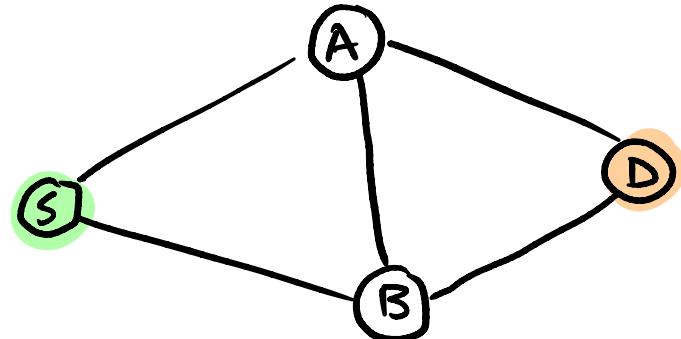
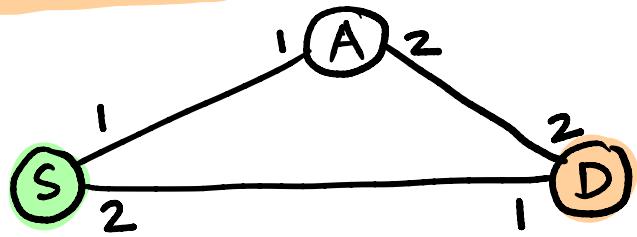
Network Graph → Routing



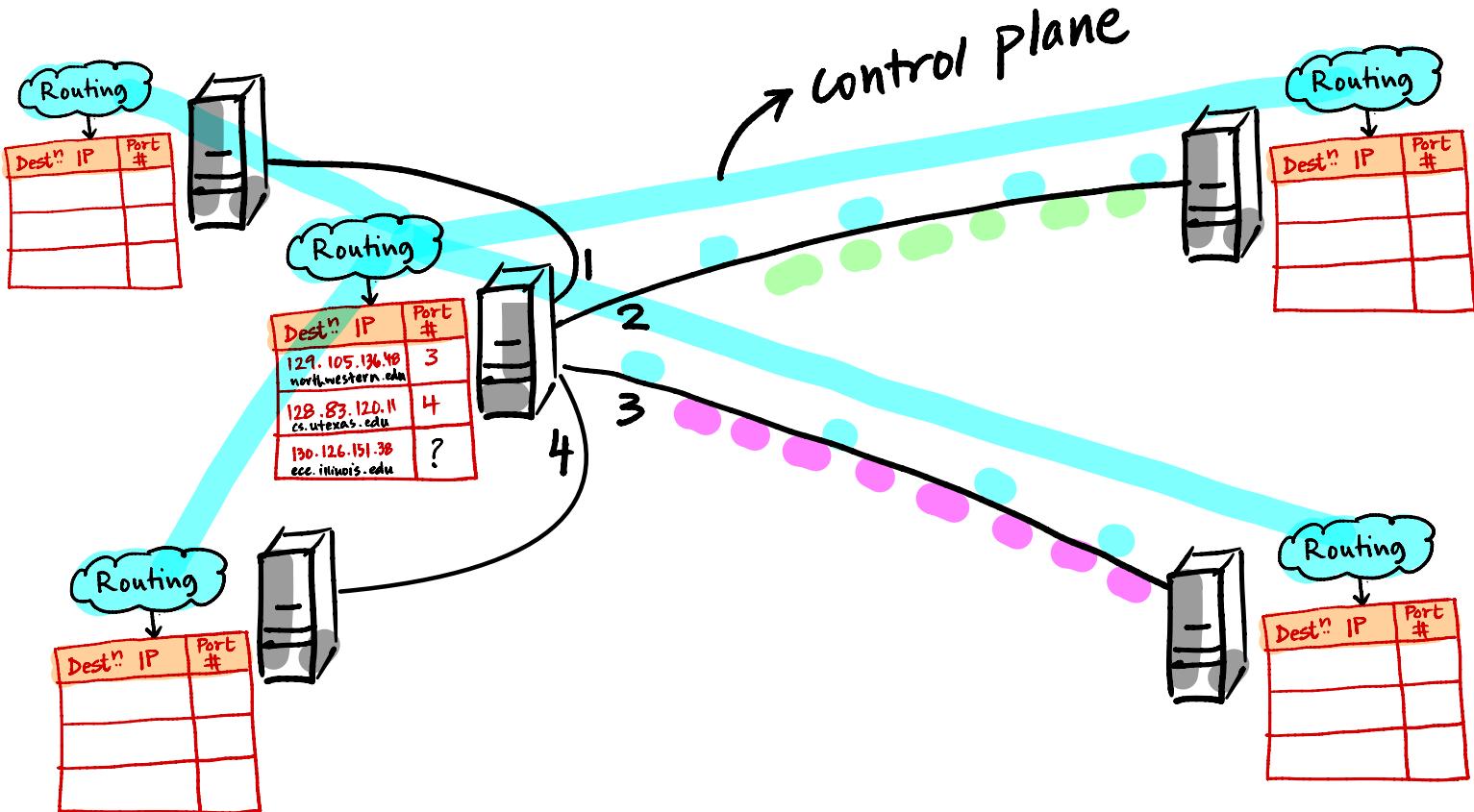
Why do links have costs?

What do they depend on?

Let's Route

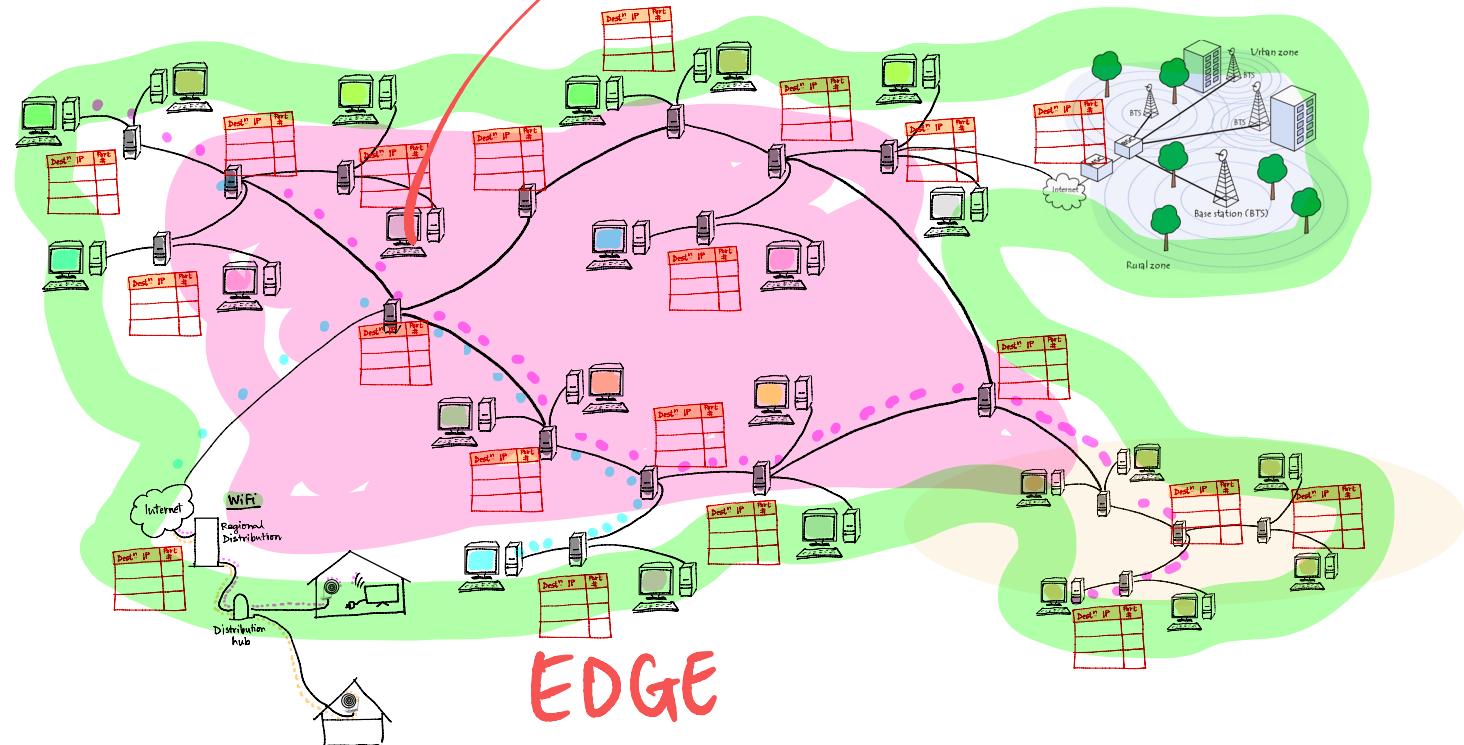


IP Address based Routing : Control plane , Data plane.



Zoom Out

CORE



Questions?