EQUINIX

The Past and Future of Cross Connects

AUSNOG-05

15th September, 2011

The first commercial cross connect…

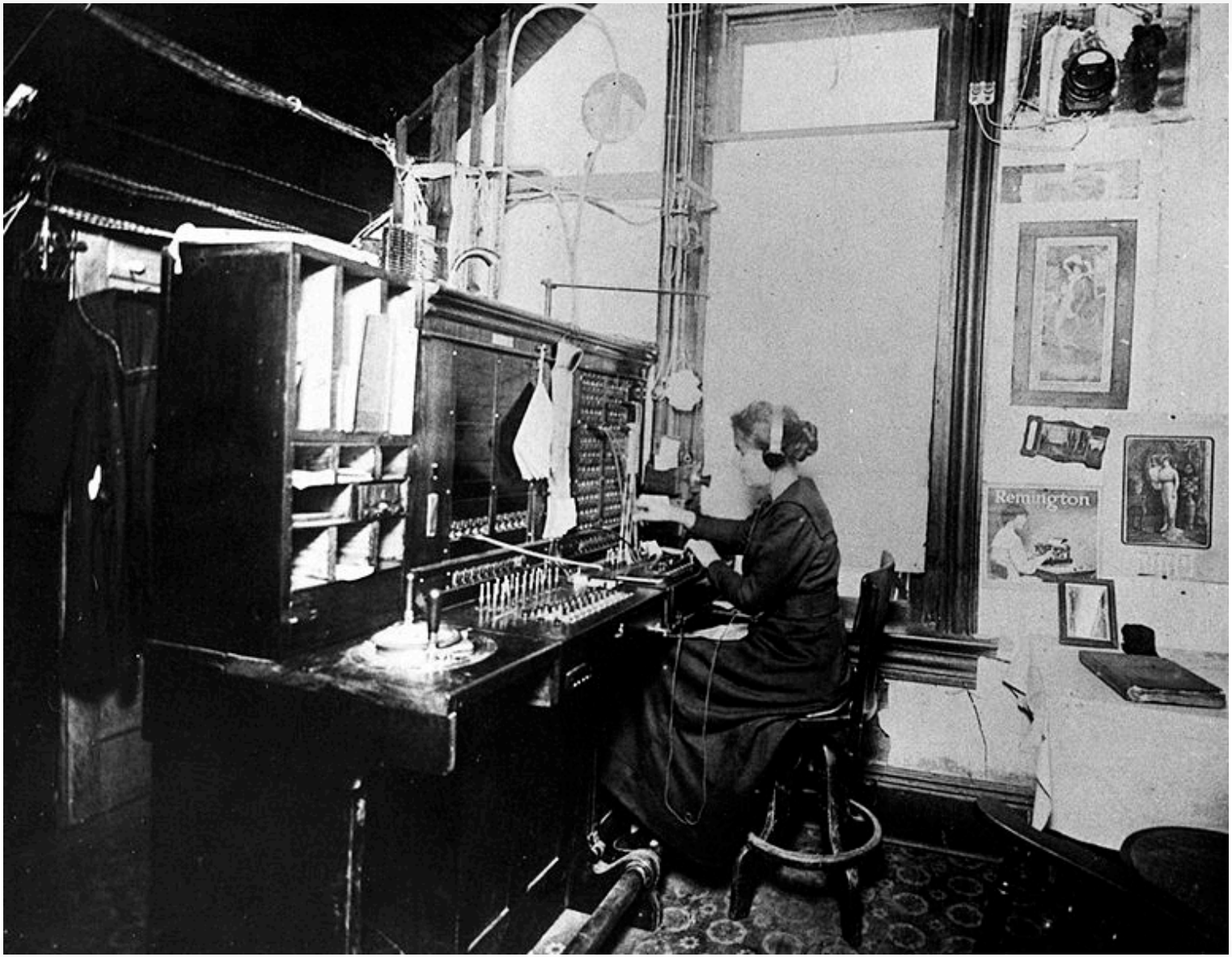


Photo source: http://en.wikipedia.org/wiki/File:TexasRichardson_telephoneExchangeOperator.jpg

EQUINIX

Automated Telephone Exchanges

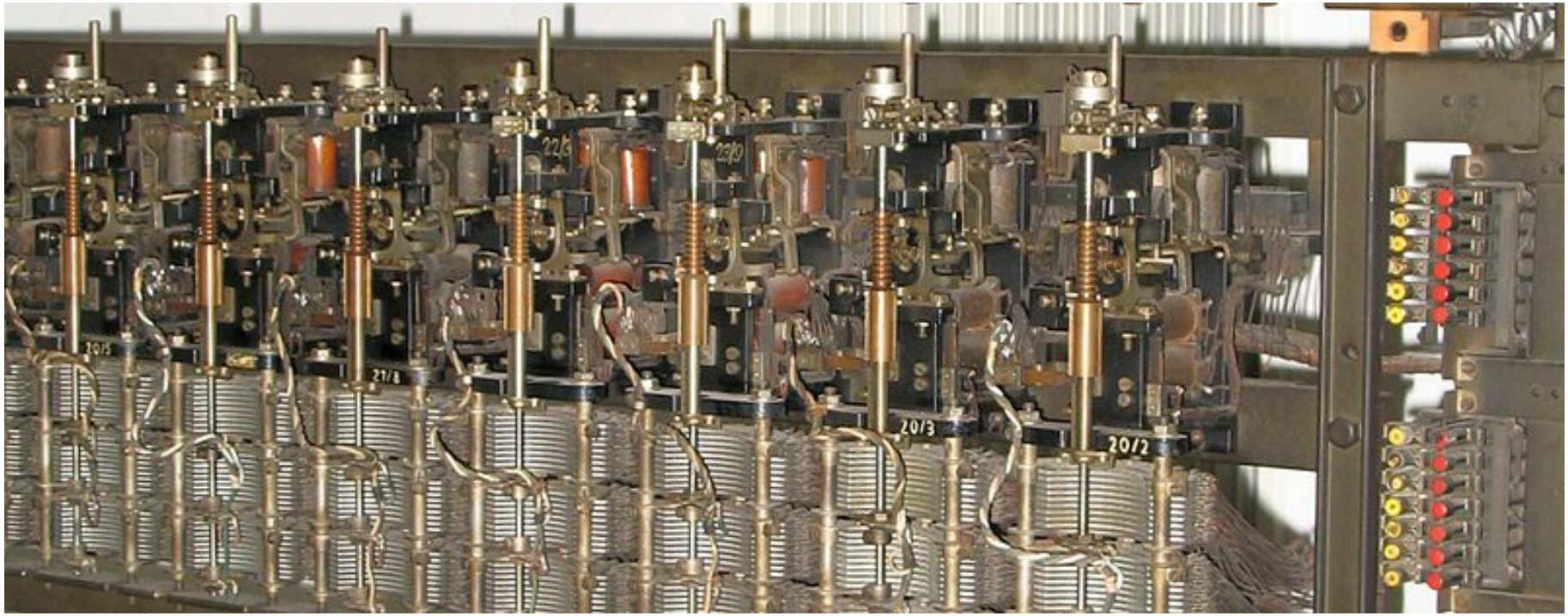


Photo source: http://en.wikipedia.org/wiki/File:Drehwaehlerbatterie_4893.jpg

EQUINIX

Digitization

Photo source: http://www.montagar.com/~patj/phone-switches.htm

EQUINIX

Packetization

Photo source: http://www.dnetit.com/voip.asp

EQUINIX

Cross Connects Today

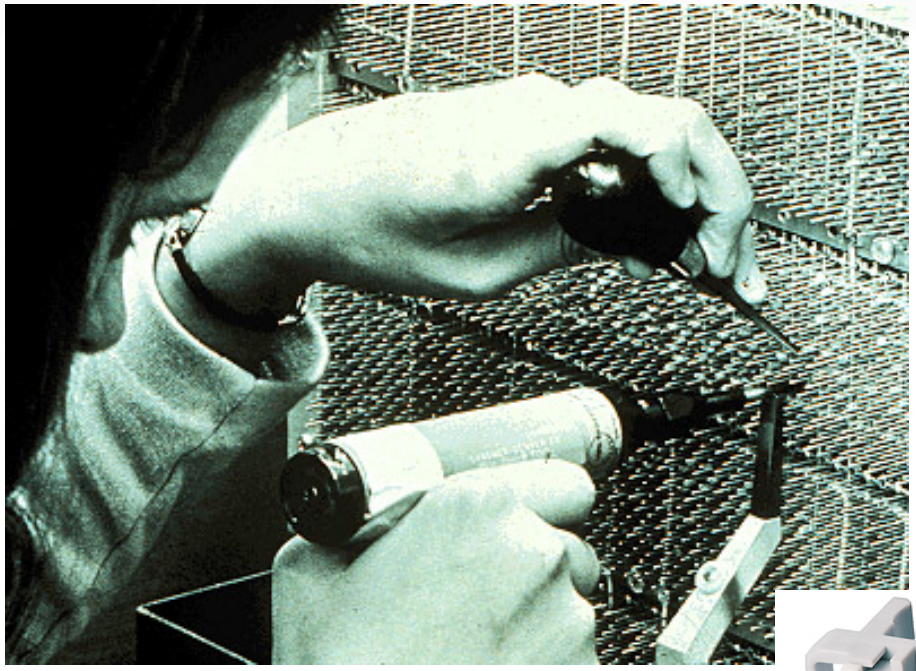
Photo source: http://www.wired.com/techbiz/it/multimedia/2008/03/gallery_one_wilshire?slide=2&slideView=10

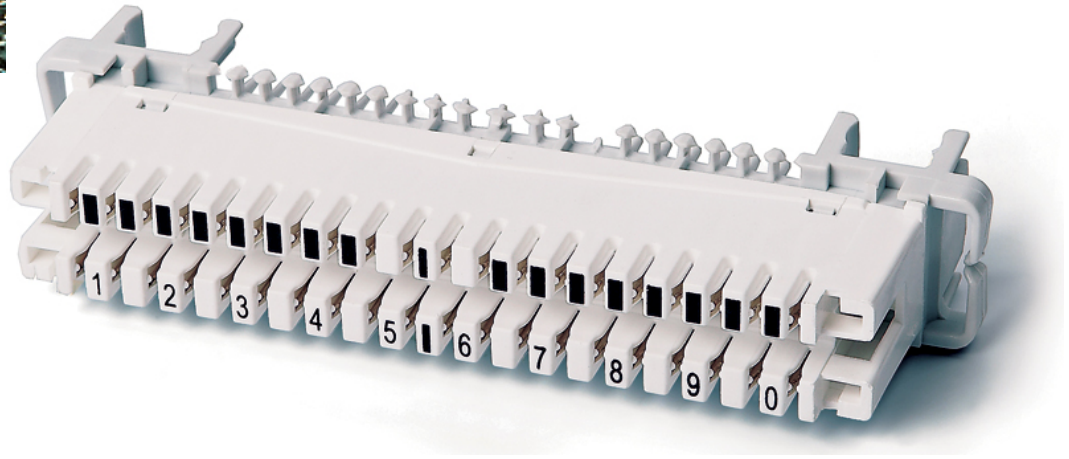
EQUINIX

Technology Progress of Cross Connects

EQUINIX

Technology Progress of Cross Connects





http://drhart.ucoz.com/index/laser_show_control_history/0-136

http://www.hyperline.com/catalog/cross/krn-plint.shtml

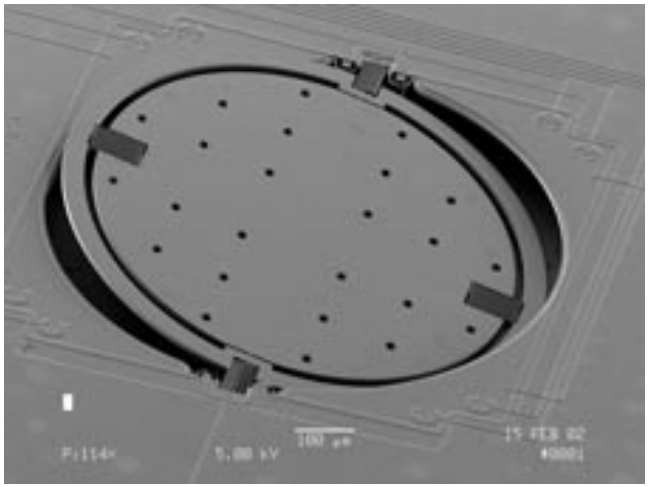
EQUINIX

Challenges

- Scalability
  - O(n!)
- Provisioning
  - Time
  - Errors
- Adaptability to future workloads
  - Connectivity on demand
  - Machine to machine
  - Many to many

What else is out there?

- Robotic Cross Connect
- MEMS Cross Connect
- Packetized Data Center Fabric



Robotic Cross Connect

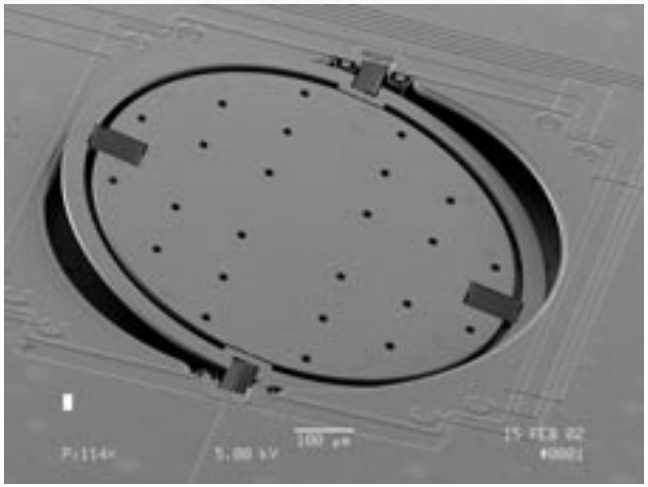
- Pricing ~ O(100) - O(1000) per fiber
- Port Density ~ O(100) - O(1000) per unit
- Time to connect ~ 10s of seconds
- Completely passive, no power required
- No limit to interface speed, wavelengths

- Applications
  - Physical optical connect automation
    - Lights out operations
  - Customer self service cross connects
    - Emergency restoration provisioning
    - Loopback testing
    - Temporary workload provisioning

MEMS Mirror Cross Connect

- Pricing ~ O(1000) per fiber
- Port Density ~ O(100) per unit
- Time to connect ~ O(10ms)
- Active, power required for operation
- No limit to interface speed, wavelengths

- Applications
  - High speed circuit restoration/failover
  - High speed circuit re-provisioning

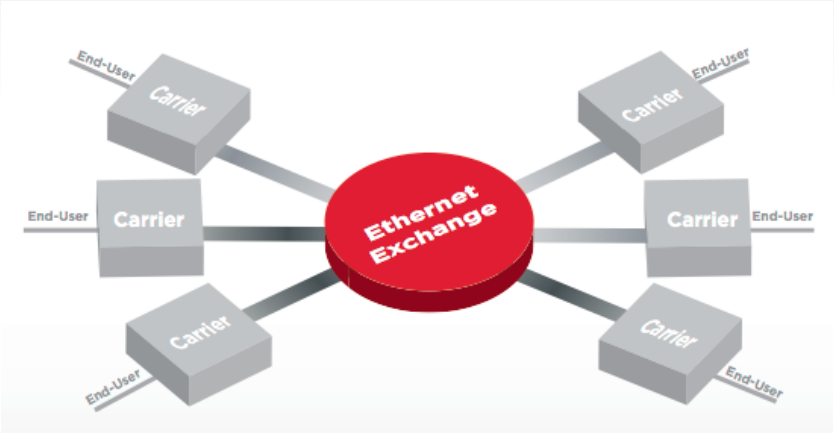


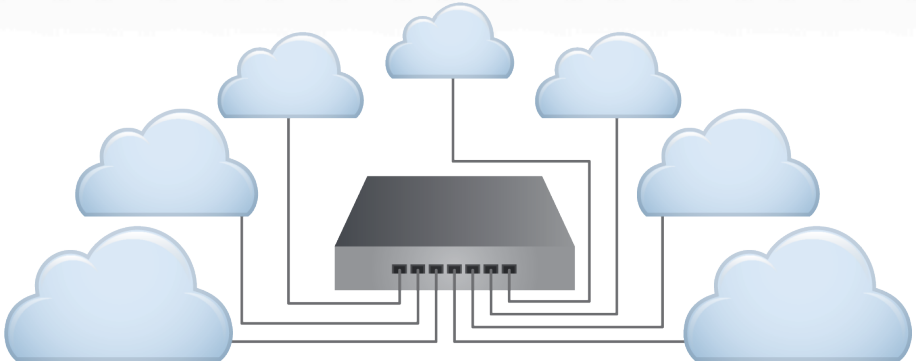
Data Center Fabric

- Pricing ~ O(100) – O(1000) per 10G
  ~ O(1000) per 40G
  ~ O(100000) per 100G
- Port Density ~ O(100) 10G per unit
- Time to connect ~ O(1s)
- Active, power required for operation
- Limited to port speed
- Stat Mux capabilities

- Applications
  - Everything over Ethernet
    - Peering/NNI
    - Storage, Data, Backup, Security, etc
    - Services Marketplace
  - Multipoint distribution (e.g. financial data)
  - Customer self service cross connects

Equinix Data Center Fabric





Equinix Carrier Ethernet Exchange (ECEE)

- MPLS Pseudowire based ELAN/ETREE
- QoS policy supported, including remapping of 802.1q P-bits
- Portal Marketplace and Provisioning
- 802.1ag/Y.1731 OAM
- Customer assigned IP address and routing
- Not publically reachable, Secure

Equinix Internet Exchange (EIE)

- Layer 2 shared Ethernet fabric
  - Private VLANS on request
- Optional v4/v6 MLPE servers
- Equinix assigned IP address
- Exchange routing information via BGP
- Publically reachable

Challenges

- Scaling to support every customer in data center remains a challenge
  - >2000 cabinets in each AP metro and expanding
- Additional point of failure?
- Customer demand?
  - Specific, focused products (ECEE, EIE, etc)
  - Other specific needs? (Optical Exchange?)
- Please talk to me!