

NGBASE-T, Reach, Density, Power & Throughput Relationships

Harry Forbes
CTO



- ◆ Examine the relationship between cable reach, network port density, PHY power & throughput
- ◆ How does this match end user customer needs & expectations?
- ◆ Provide data for discussion and future work

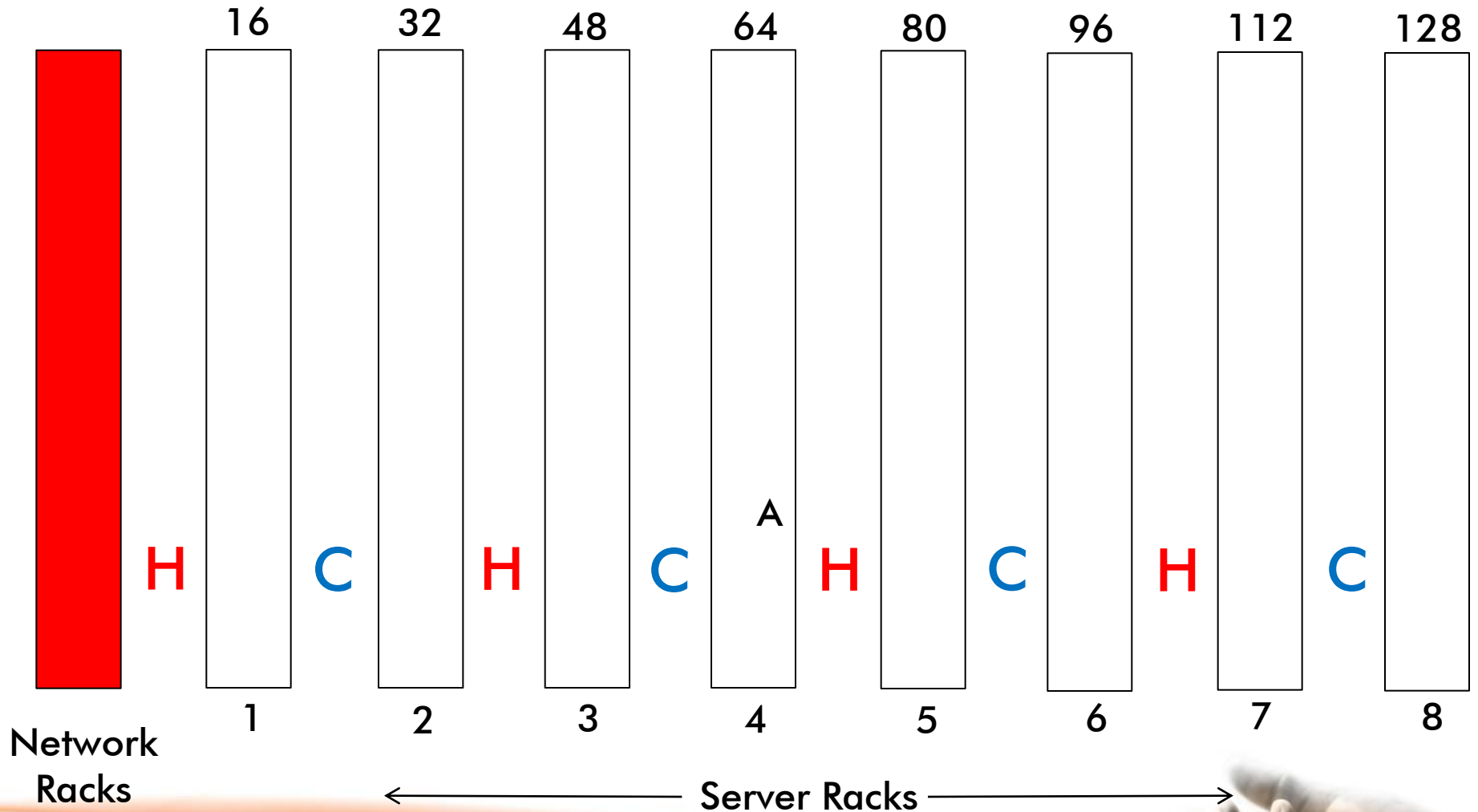


- ◆ 40G data rate
- ◆ 3 x BASE-T network ports per server (2 x LOM + 1 Mgt)
- ◆ 100G fibre optic uplinks
- ◆ Oversubscription ratio approaching parity 1:1
- ◆ Continuous trend to achieve maximum population of devices within network and server racks
- ◆ Forced air cooling will predominate for the foreseeable future
- ◆ Network switches & servers are 1U high

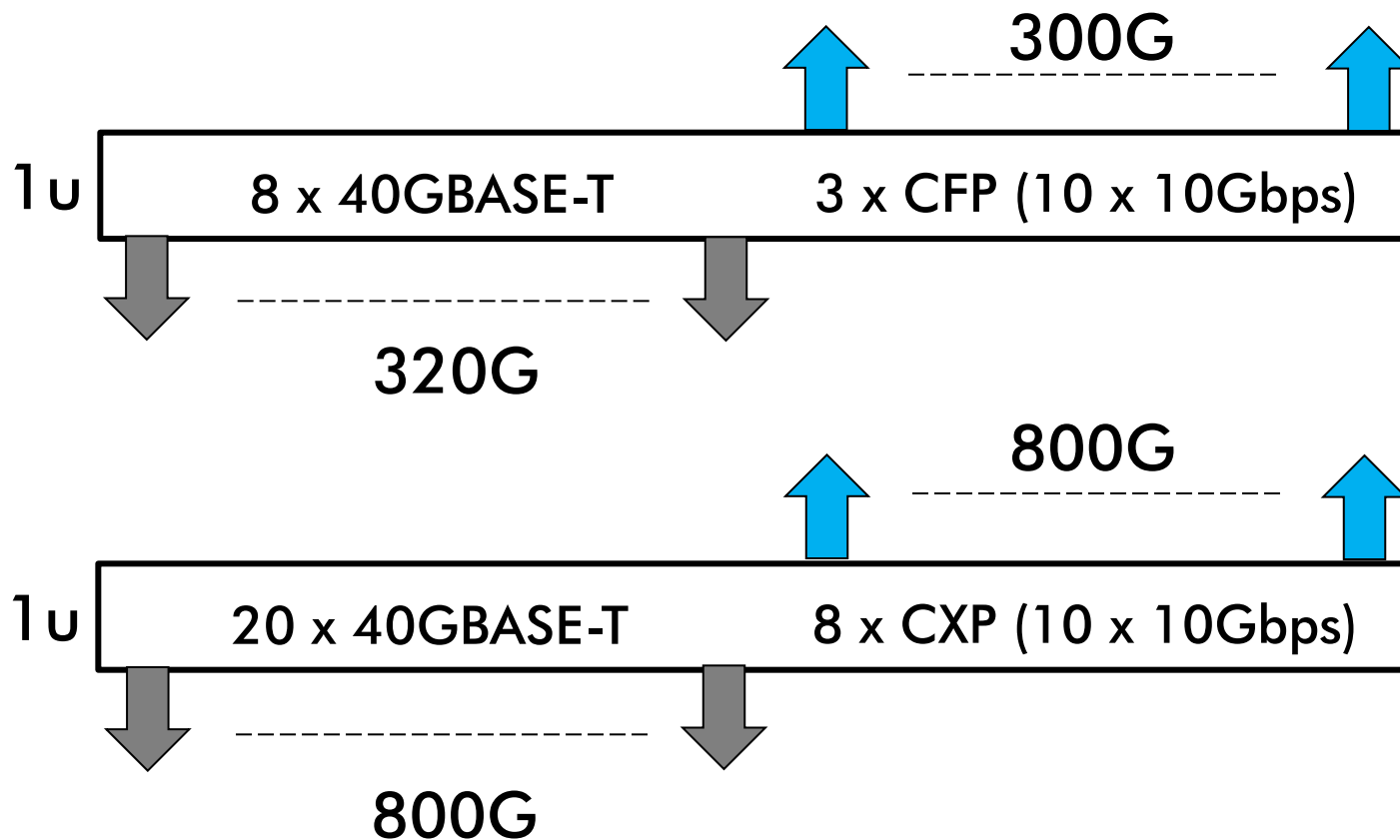


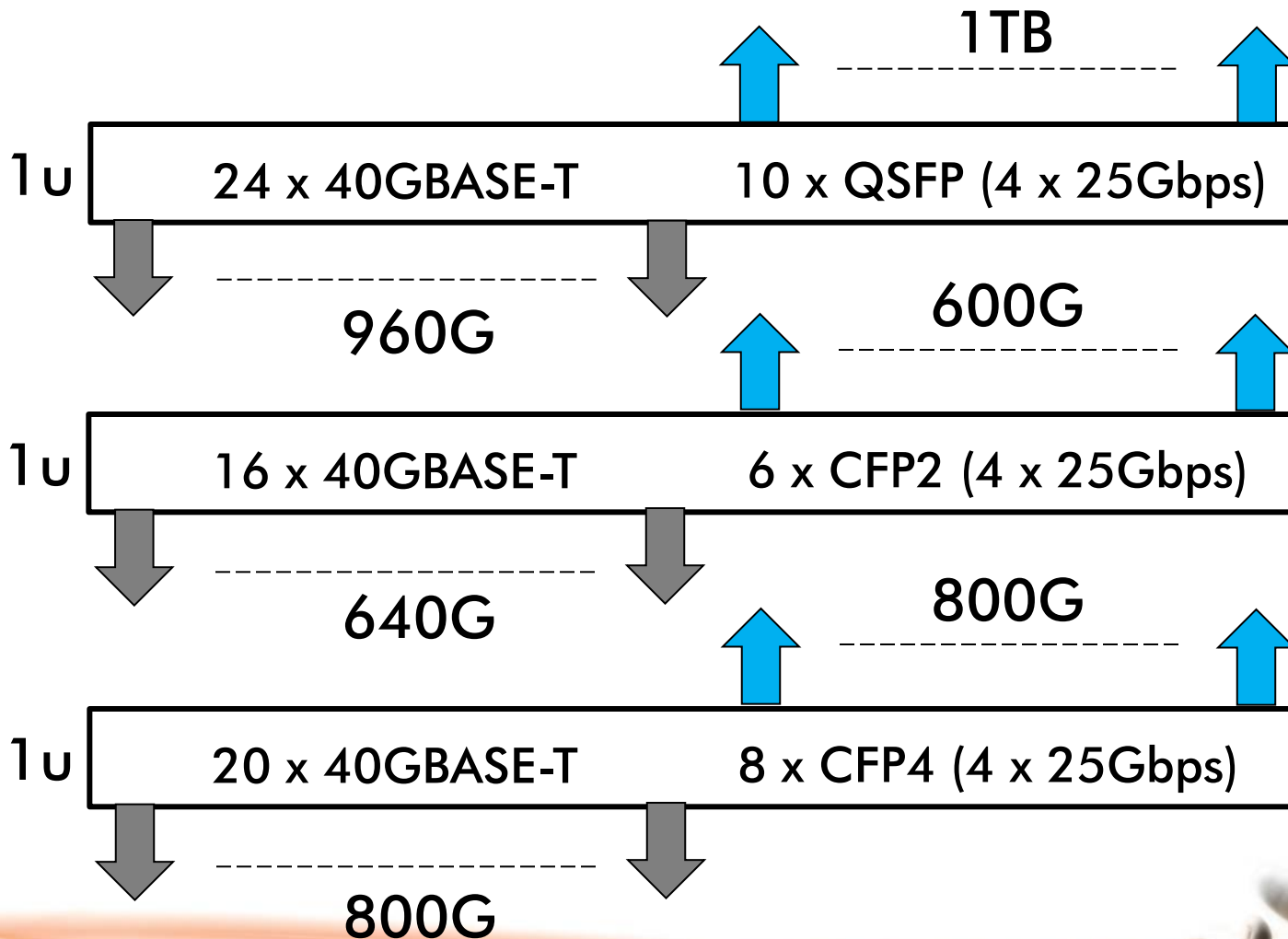
- ◆ Based upon worst case conditions that will determine longest reach required
- ◆ Driven by density of switch ports per rack
- ◆ In turn driven by cooling capacity
- ◆ Forced air cooling at maximum of 8kW per equipment rack
- ◆ Based upon 800mm wide equipment racks
- ◆ Longest reach model based upon edge of computer room network switches



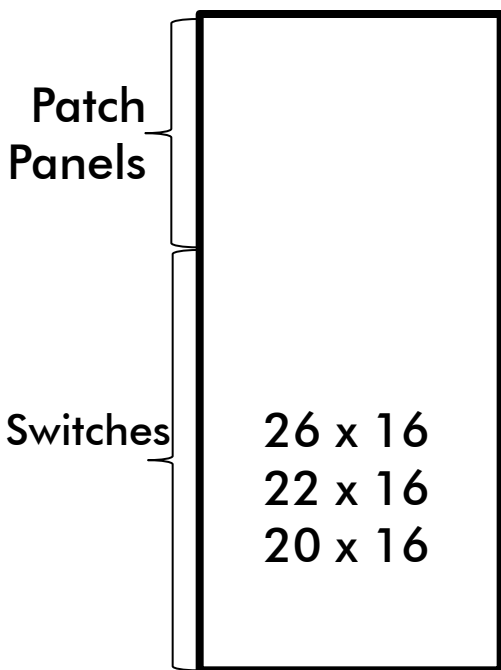


Power/sw	300W	350W	400W
#Switches	26	22	20

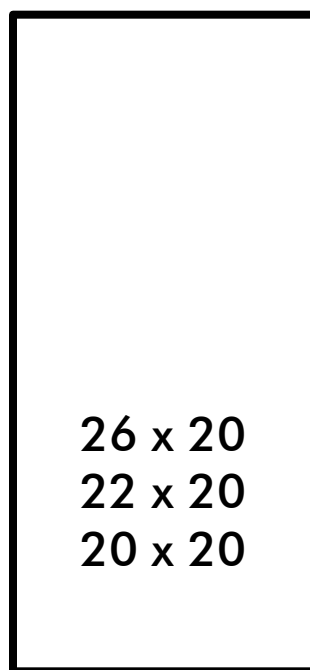




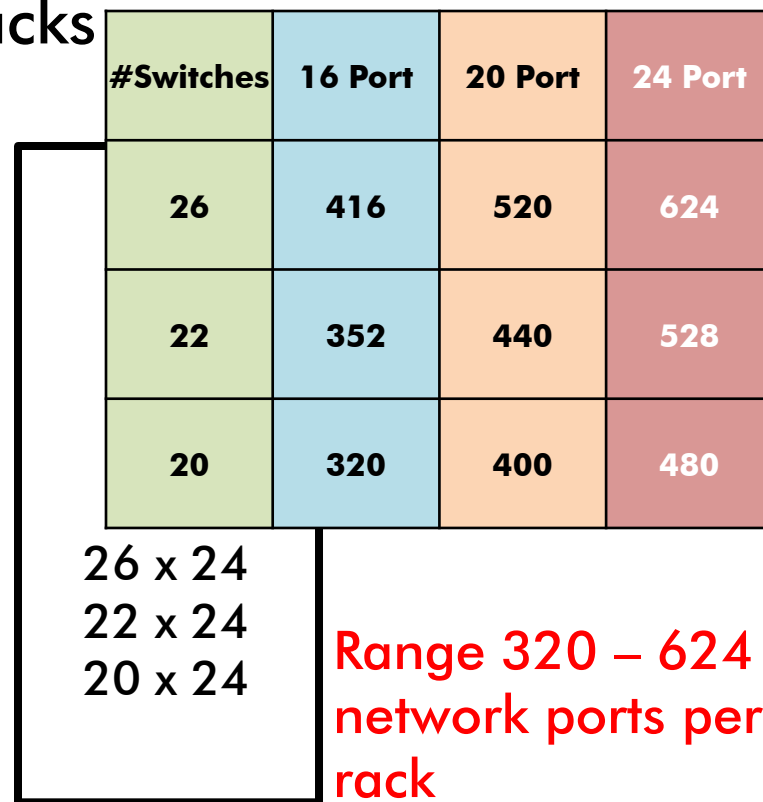
Network Equipment Racks



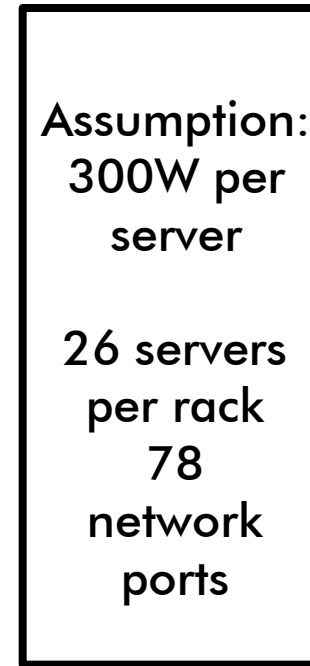
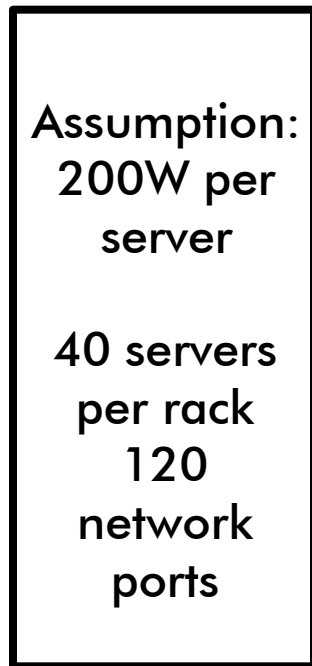
16 Port Switches



20 Port Switches



24 Port Switches



Range 78 – 120
network ports
per rack

8kW max forced
air cooling



		Switch Ports/Rack	
		320	624
Server Power	200W	42	83
	300W	65	128

Cable Reach 24m – 35m
2 connector model
3/4 connector model adds
minimum 10m reach



- ◆ 24m = 42 racks 200W per server = 1,680 servers
- ◆ 35m = 128 racks 300W per server = 3,328 servers
- ◆ Very large Scale Data Centres : 2000+ server count
- ◆ 35m reach captures 100% of market with room for expansion

- ◆ Market trending towards high density server and switch racks
 - Co-location companies designing for greater server space to rent out
 - Driving energy efficiency – colos charging for energy
 - Requires greater flexibility with placement of devices
 - Requires high density switches
- ◆ Increase in switch port density enables connection to greater number of servers
- ◆ Large increase in server connections for incremental increase in reach
- ◆ Trade off between short reach for less PHY power consumption and longer reach to support energy efficiency
- ◆ Oversubscription ratio trending towards 1:1 as east west traffic increases – reduces switch port downlink density