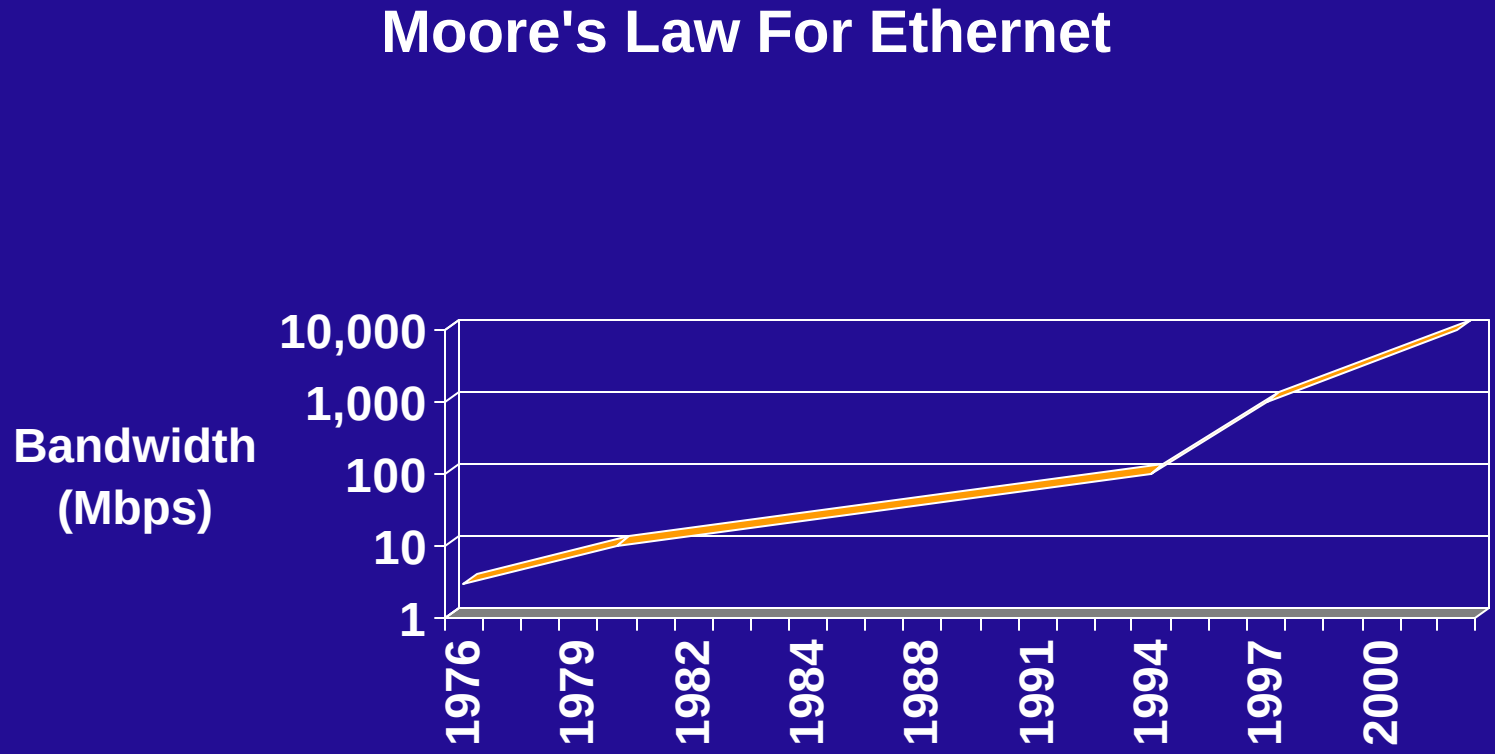
Market Requirements for 10 GbE:
Presentation to IEEE 802.3
Ad Hoc
Austin, Texas
Draft 4.1

Bruce Tolley
3Com Corporation
9 March 1999
Bruce_Tolley@3com.com
voice: 408-326-5950
fax: 408-326-5001

Why We Are Here: Beyond 1 Gbps Ethernet



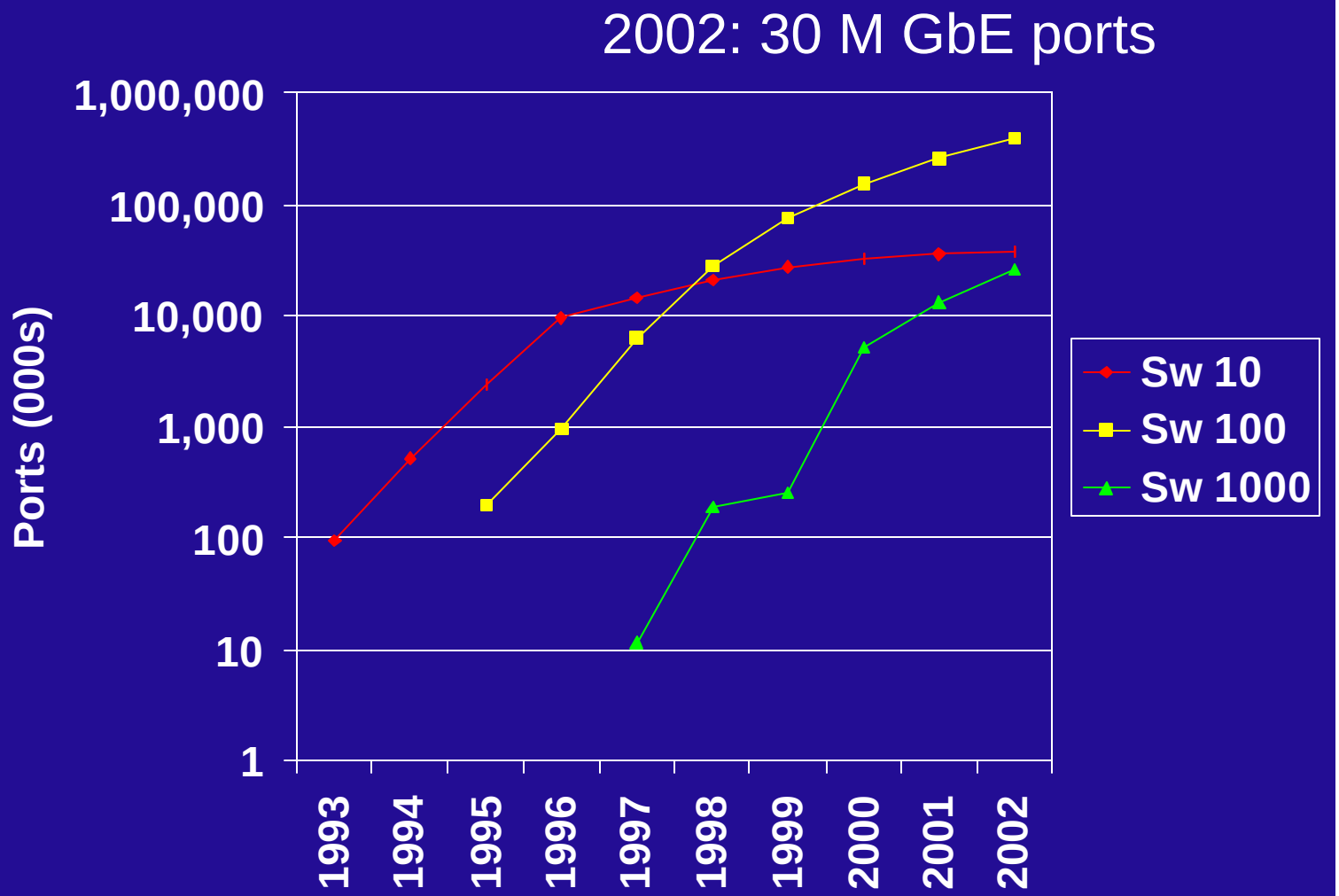
Customer Problems to be Solved with 10 GbE

- Traditional LAN applications and private enterprise applications
  - GbE to 10 GbE aggregating switches
  - Linking multi-port 10 GbE Switches
  - Linking multi-Gbps Routers inside a LAN
- LAN and Non-LAN private enterprise applications.
  - Provide fast interconnect for clustered computing environment.
  - Provide point-to-point backplane connection
  - Provide inter-box interconnect
- MAN, “RAN”

Why Start Now

- In 2 to 3 years, need to aggregate GbE
  - GbE market growth
  - History of FE and Ethernet
- Other emerging applications
- Feasible technologies seem on the near horizon
- Need to start before multiple, competitive, proprietary solutions are established

Switched Ports: Cumulative Shipments



Dell'Oro Group 2/99

Distance Assumptions

- No building will move because of 10 GbE
- Customers will expect to run 10 GbE over the same links as 1 GbE
- Customers will expect to use 10 GbE with new applications that are only emerging or still on the horizon
  - Access to RAN/MAN
  - Server switch clusters

Criteria for Distance Requirements

- Building wiring standards TIA/EIA-568-A, ISO/IEC 11801
- Compatibility with 1000BASE-X distances both as specified and as deployed with devices that exceed IEEE specification
- Support for new emerging and potential applications

Distances to Support

- Building wiring standards
  - Vertical risers: 500 meters
  - Building to building: 2 km

1000BASE-X: What's Happening Today

- 220 meters to 550 meters MM and SM fiber
- Possibility of 400 to 500 meters with enhanced 1000BASE-SX parts on MM fiber
- 10 km to 20 km with 1000BASE-LX 1300 nm on SM fiber
- 30 km with 1300 nm optics that interoperate with 1000BASE-LX
- 50 km to 70 km with GBIC 1550 nm optics

Emerging and Potential Applications

- Cluster computing inter-connect
  - Alternative and or complement to NGIO, FutureIO
  - up to 50 meters
- Access to dark fiber and MAN rings
  - up to 50 km
- Point to point within the RAN
  - greater than 50 km

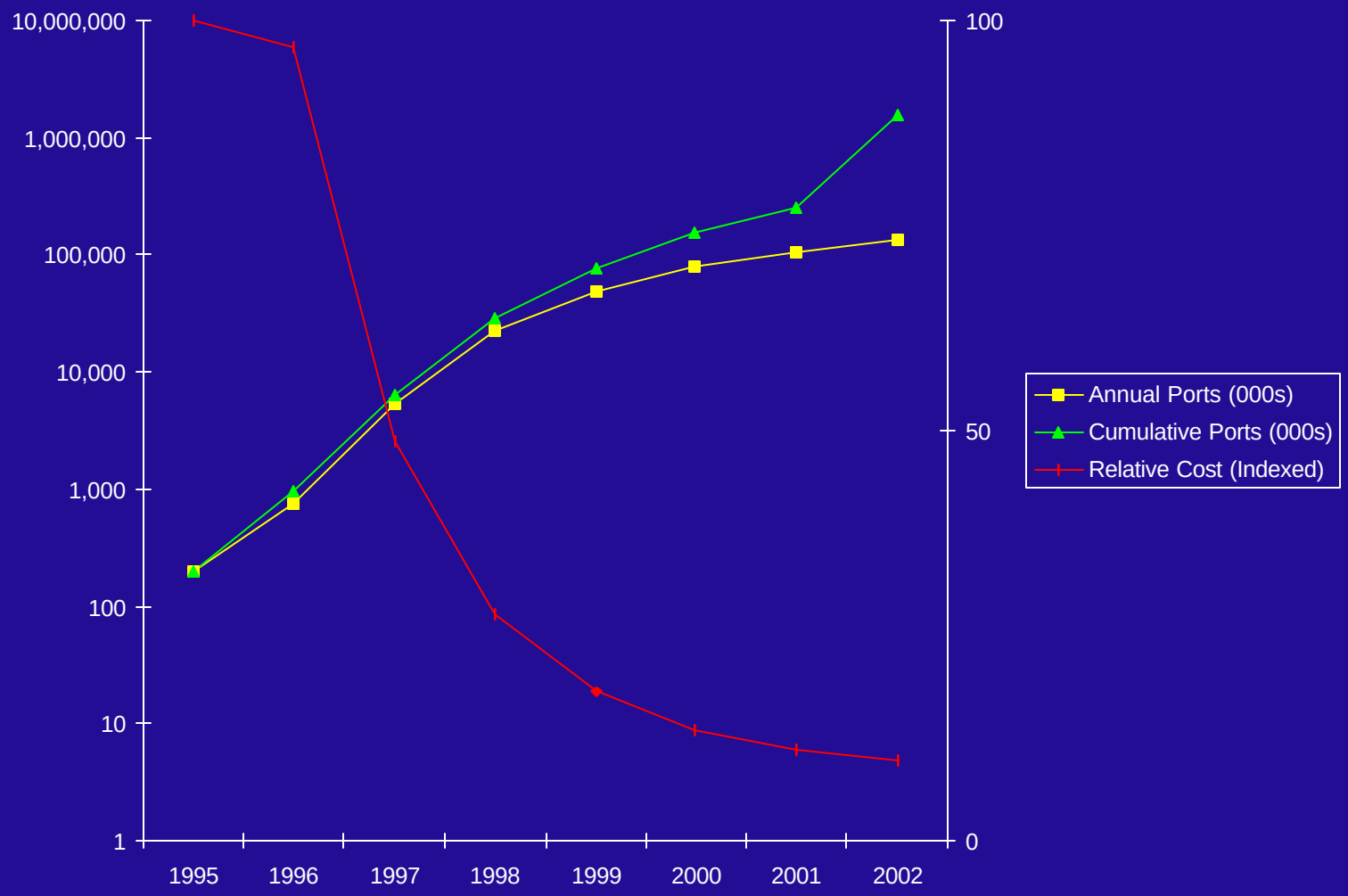
Some Starting Points for Distances

- Datacenter, server switch applications
  - up to 50 meters
- Building risers
  - up to 500 meters
- Campus LAN, building to building
  - 2 km to 10 or 20 km
- MAN, RAN
  - greater than 50 km

Media to Support

- Short distances (less than 25 meters)
  - Server cluster switching
    - » SM fiber, MM fiber, copper?
- Vertical risers
  - First priority: SM fiber
  - 2nd priority: MM fiber
- Campus LAN
  - SM fiber
- Longer distances
  - SM fiber

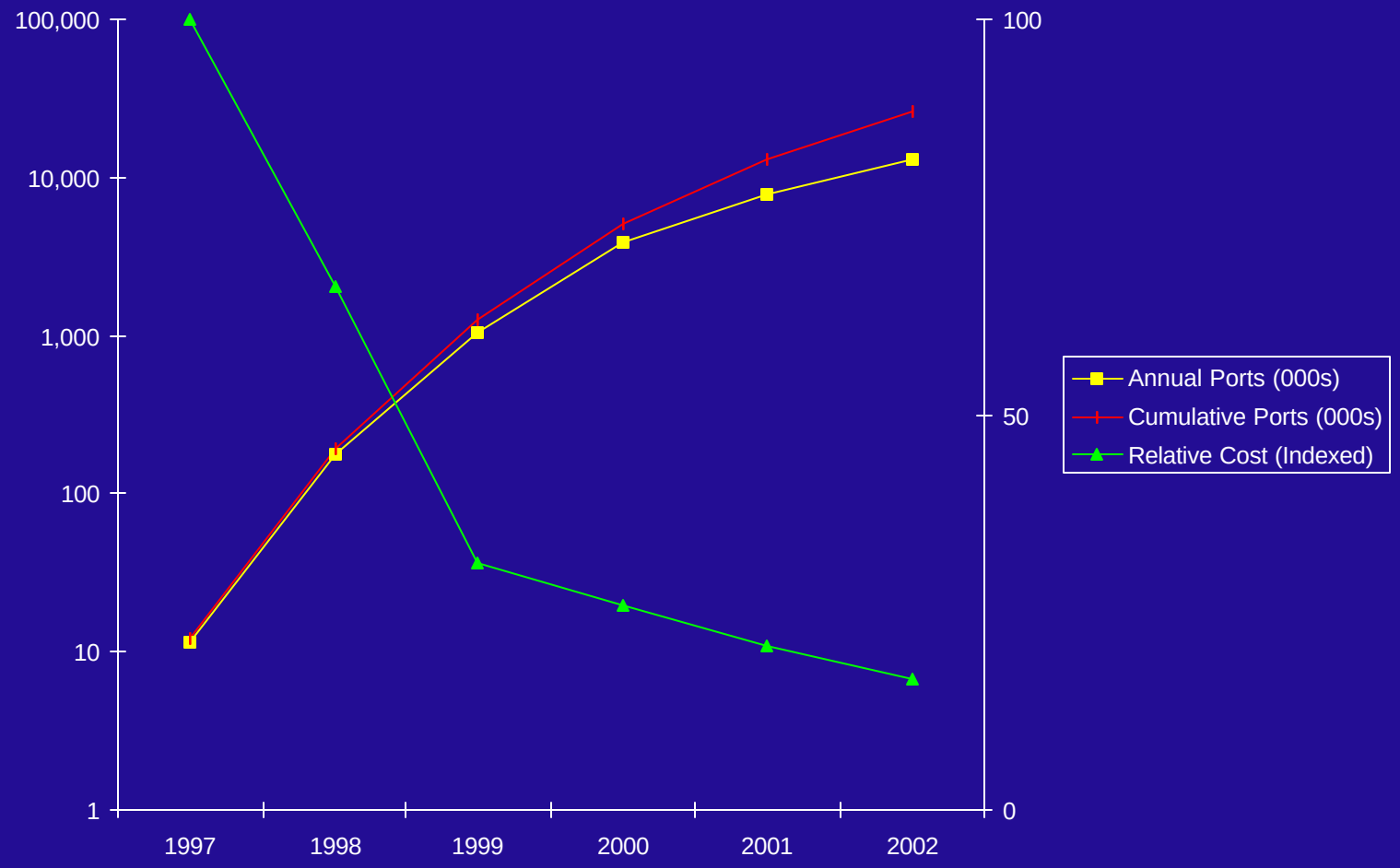
Sw 100 Shipments and Relative Costs



Dell'Oro Group 2/99

Normalized Cost, Index: Cost in 1995=100

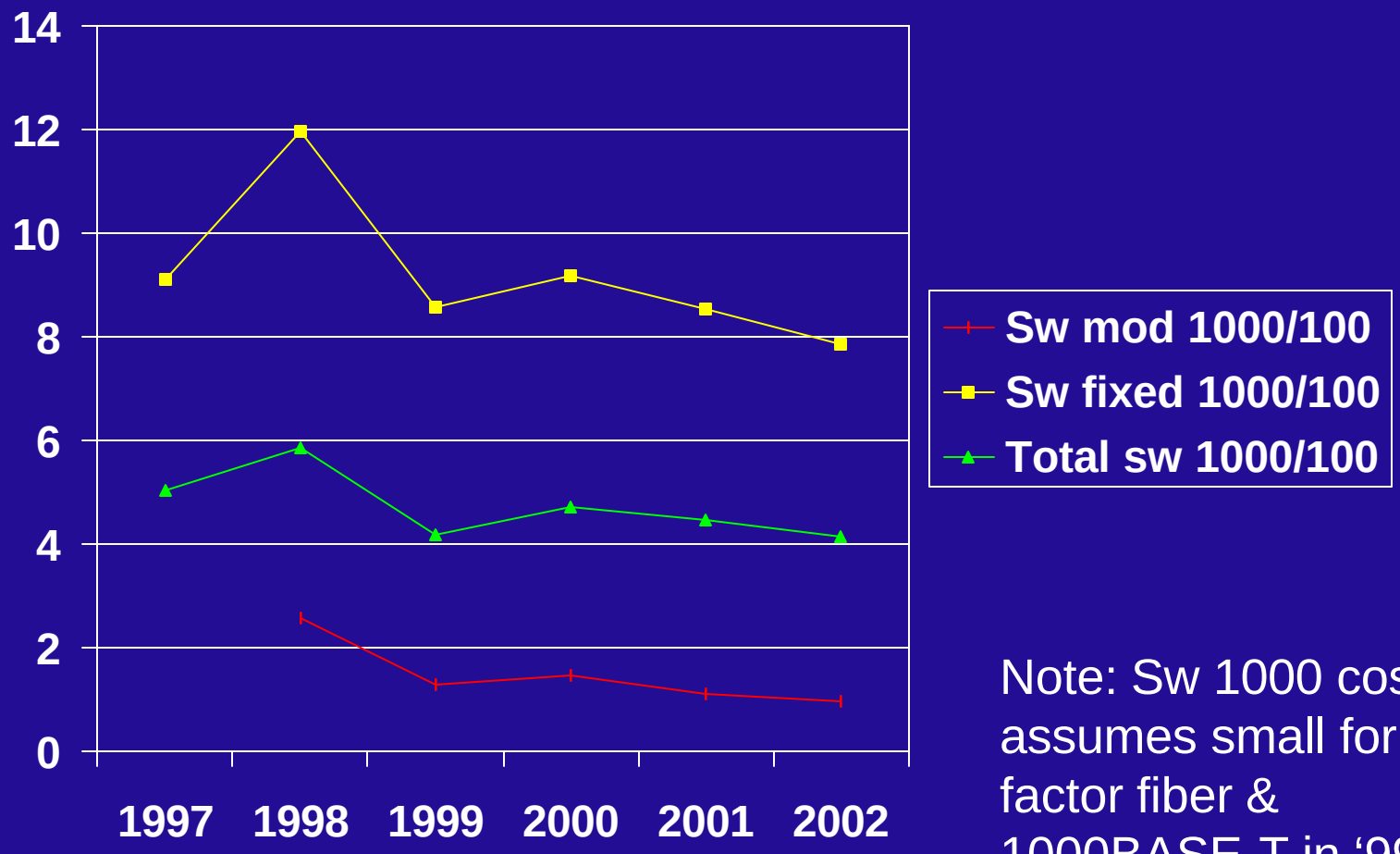
1000BASE-X Shipments and Relative Costs



Source: Dell'Oro Group 2/99

Normalized Cost: Index Cost in 1997=100

Cost Ratios: Sw 1000 to Sw 100



Source: Dell'Oro Group 2/99

Note: Sw 1000 costs assumes small form factor fiber & 1000BASE-T in '99 and '00

Goals for a 10 Gbps Ethernet Standard

- Support for Campus LAN applications in risers and building to building at distances of 500 to 2 km
- Support for access to dark fiber (RAN/MAN) at distances greater than 50 km
- Cost less than 10X GbE for shorter distances

Summary: Time to Start is Now

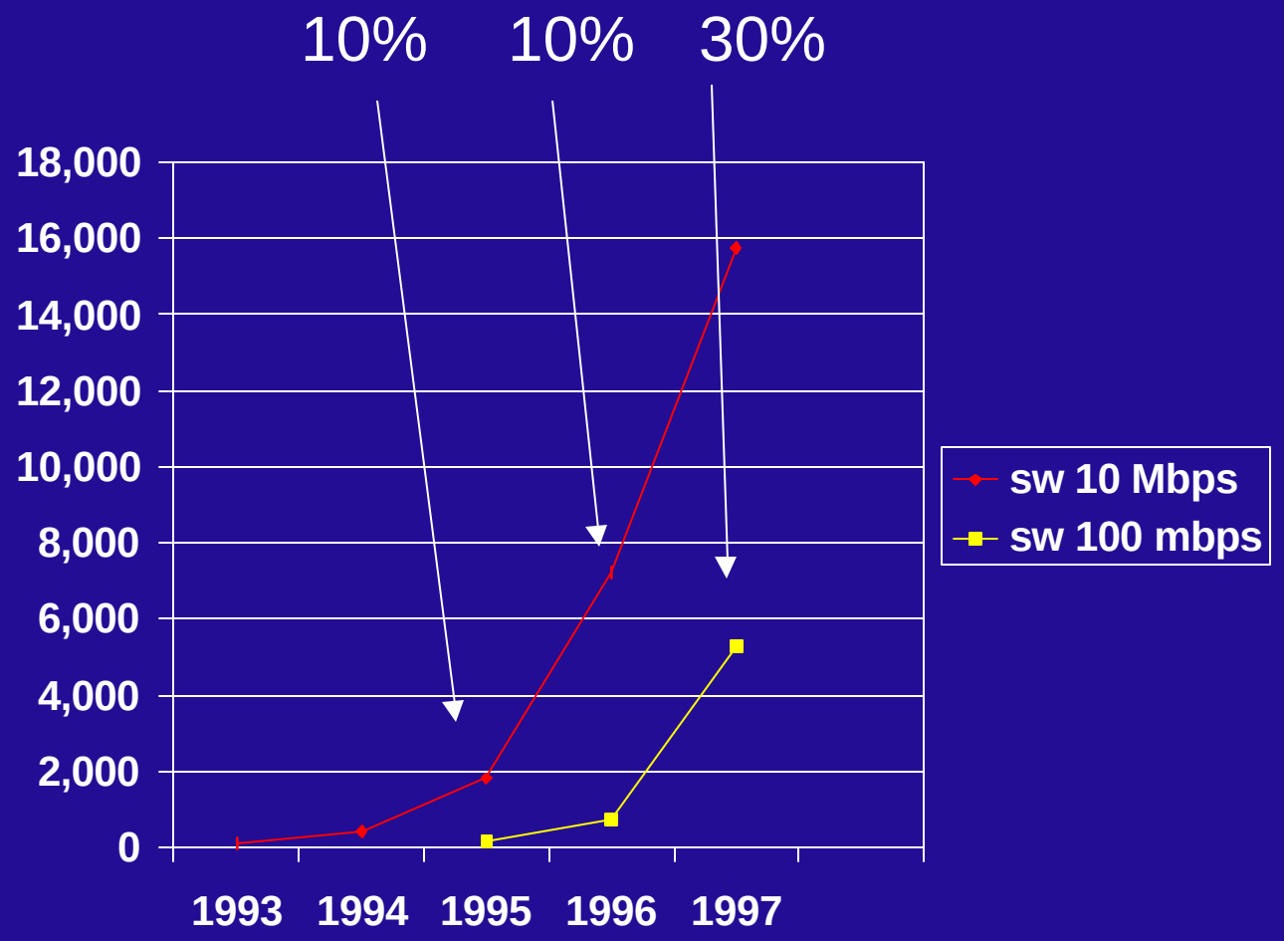
- Need to start before multiple, competitive, proprietary solutions are established
- Need to aggregate projected installed base of 30M GbE switched ports by 2002
- Support campus LAN application distances: risers 500 m, bldg to bldg: 2 to 10 km
- Support MAN/RAN distances of greater than 50 km
- Support server-cluster interconnect at distances less than 50 m
- 1000BASE-X launched at 5 to 12 times cost of switched 100 (cost per sw port)
- Cost goal for 10KBASE-X: (substantially) less than 10X GbE

End of Presentation

Backup and Misc Slides

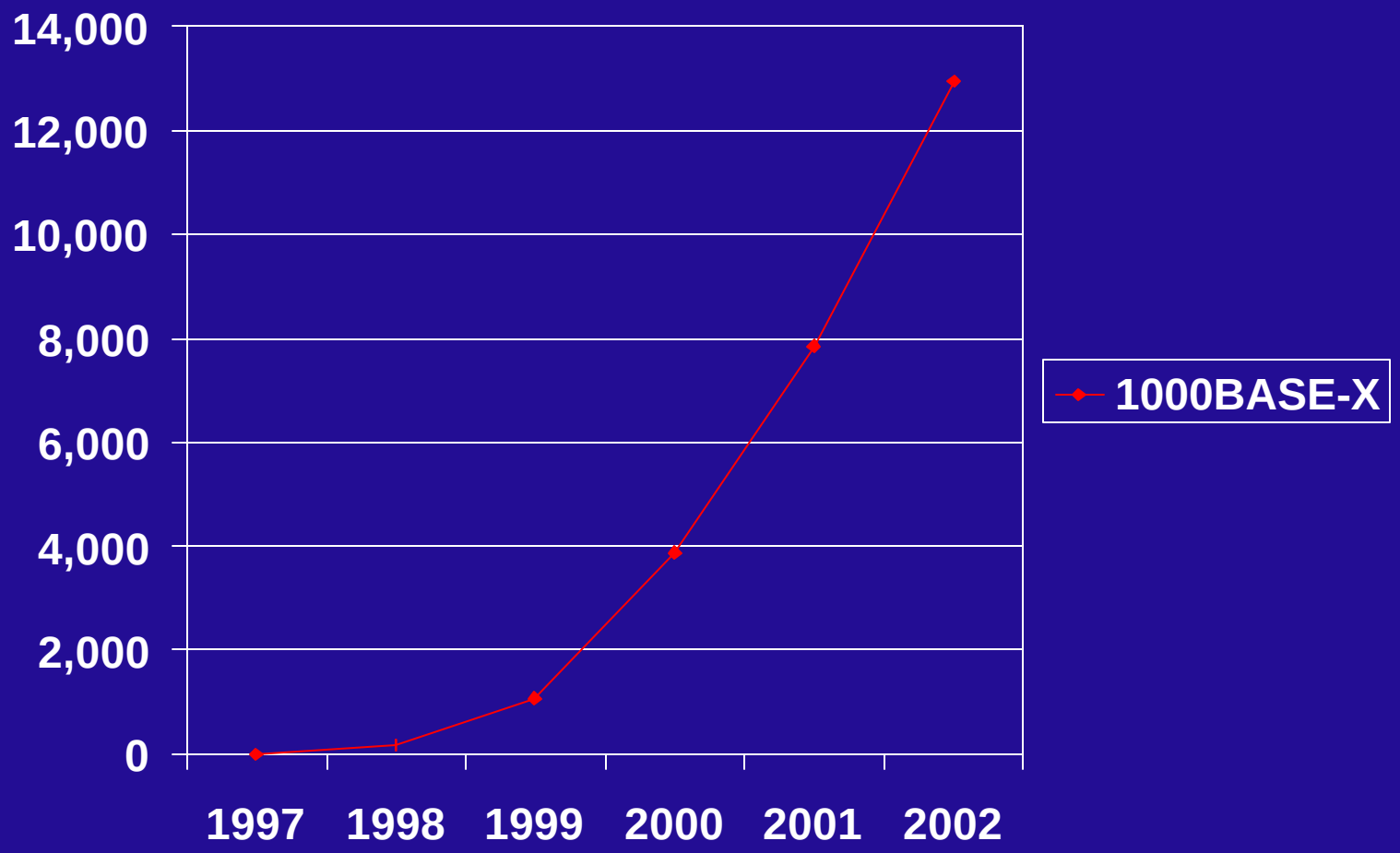
10 and 100 Mbps Switch Ports (shipments)

Aggregation of 10 Mbps drove market for 100 Mbps



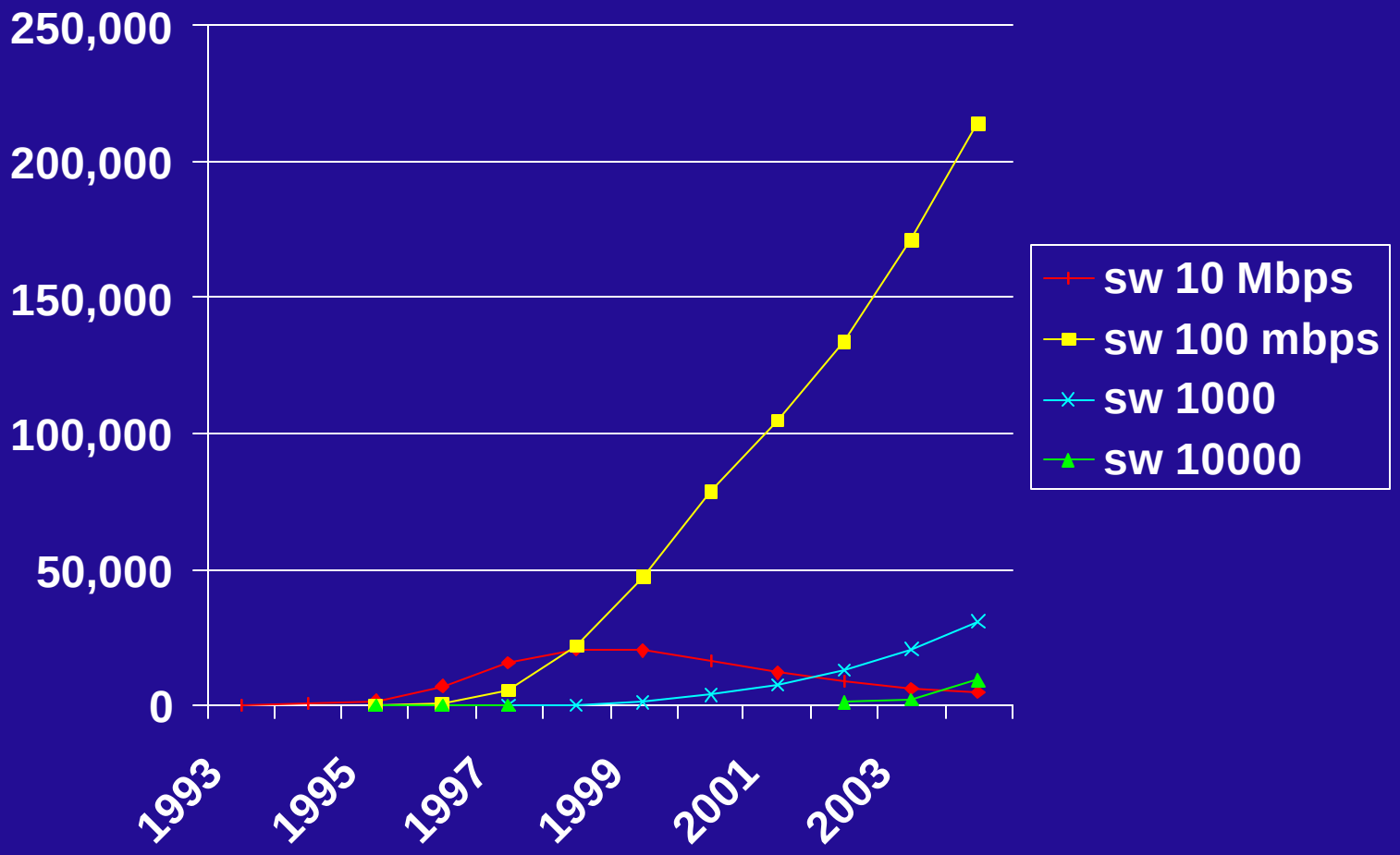
Del'Oro Group 2/99

GbE Forecast, Ports (000s)



Dell'Oro Group 2/99

Switch Port Annual Shipments (000s)



Dell'Oro Group 2/99 and 3Com estimates