10GBASE-T Requirements: An End User's Perspective

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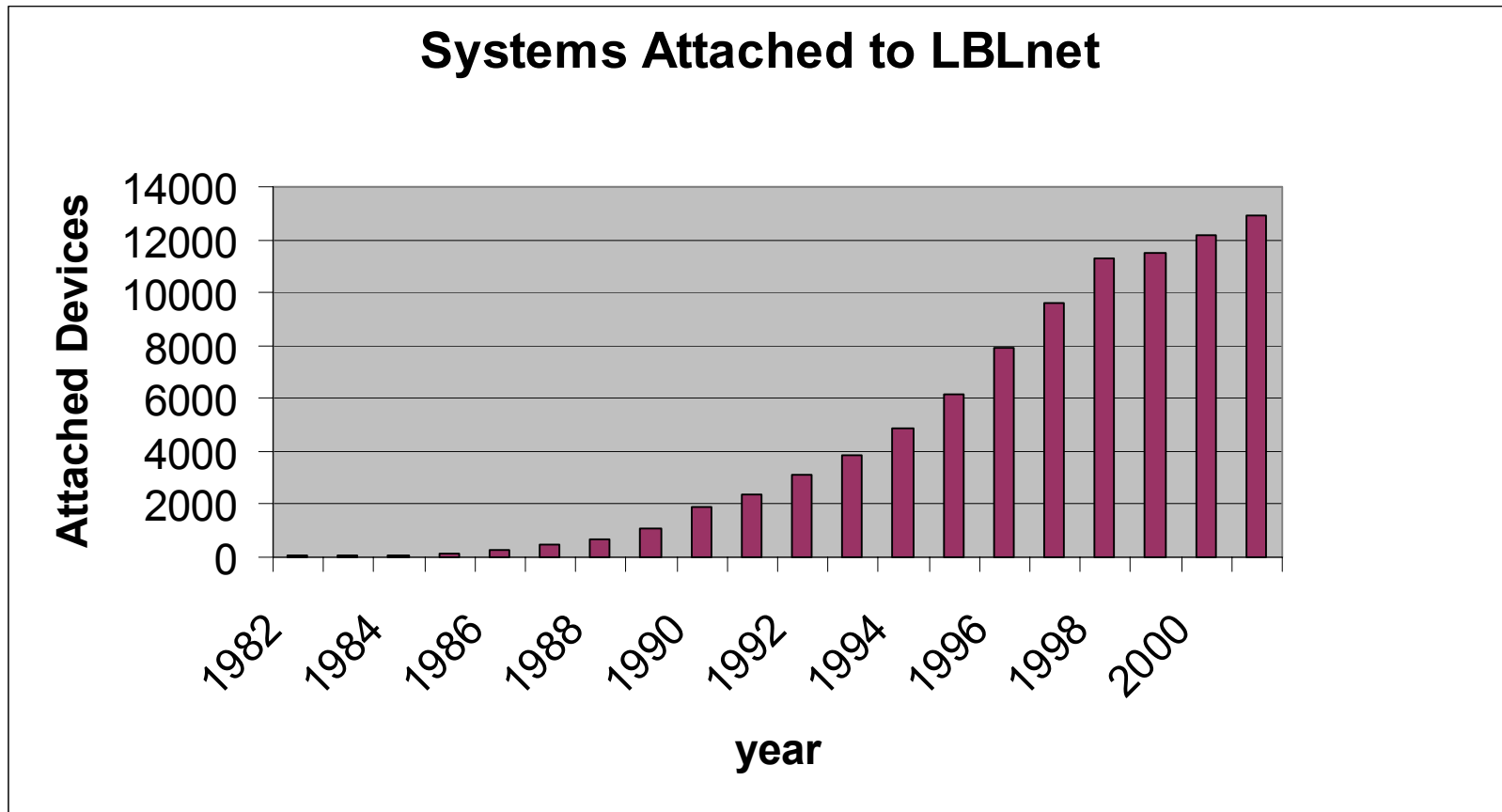**Vancouver B.C.**

1/9/2003

Agenda

- **LBNL Overview**

- **LBLnet infrastructure**

- **Requirements**

- **Objectives/Criteria**
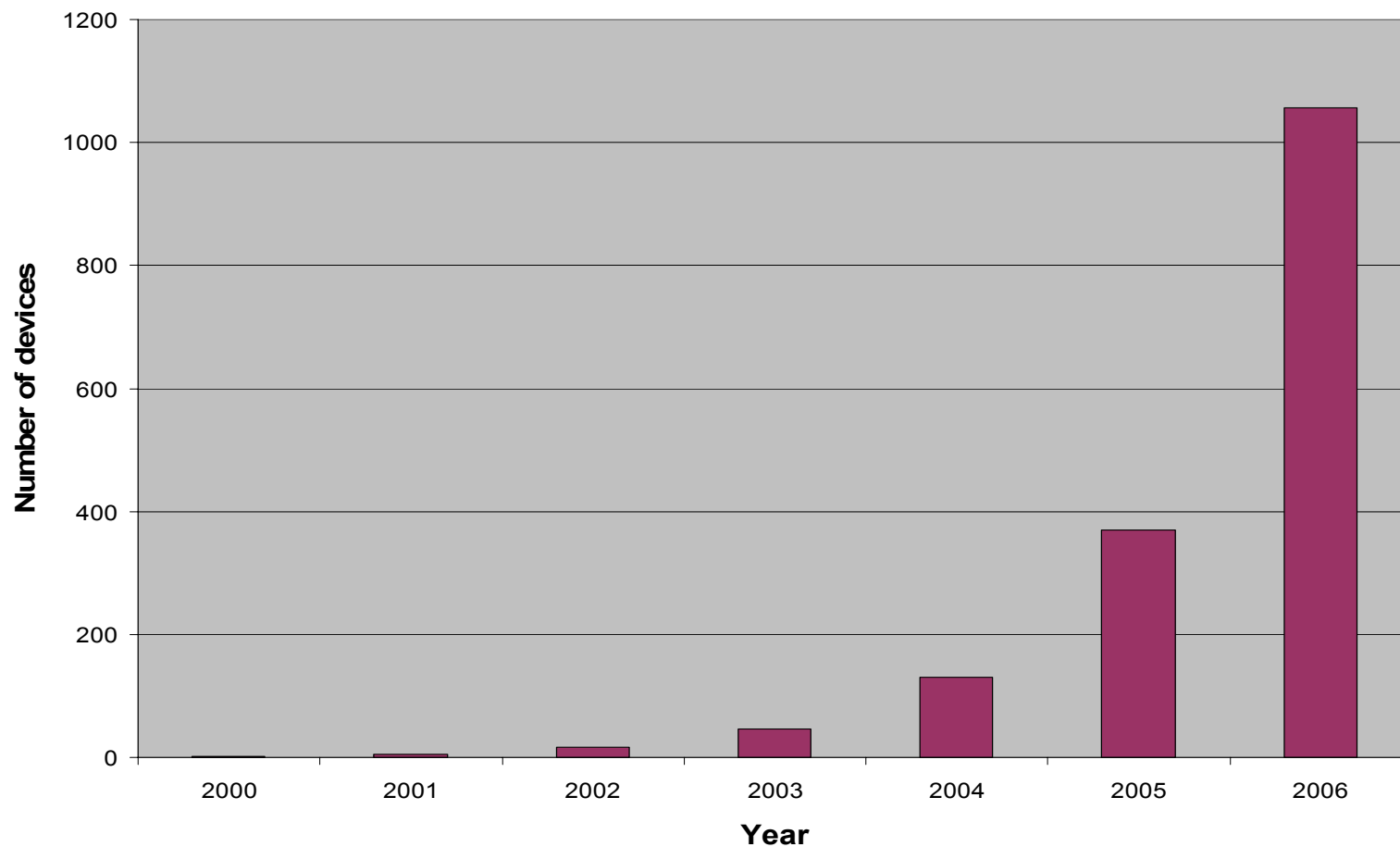
- **Issues**

- **Conclusion**

LBNL Overview

- **First of 9 National Labs**

- **Leading edge research in general sciences:**
  - **biological, physical, materials, chemical, energy, and computing sciences**

- **Unique user facilities include:**
  - **Advanced Light Source**
  - **Joint Genome Institute**
  - **National Energy Research Scientific Computing Center (NERSC)**

LBLnet Infrastructure

- **Moderately sized enterprise network**
  - LBNL campus
  - Metropolitan network to sites in Berkeley and Oakland
  - Remote sites in Walnut Creek and Washington D.C.
- **Simple network design**
  - Star topology
  - 99.99% Ethernet
    - Sadly, we have 2 ATM links over a microwave link to Oakland
- **Stats:**
  - There are 13,867 network attached devices as of 11/2002
  - 106 subnets
  - 26 Gigabit Ethernet distribution links
  - 25 1000BASE-T connected machines
    - Either cluster machines or high performance servers

LBLnet Infrastructure (cont.)

- **Growth at LBNL**

Systems Attached to LBLnet

LBLnet Infrastructure (cont.)

1000BASE-T Devices on LBLnet

LBLnet Infrastructure (cont.)

- **Our cable infrastructure is based on TIA/EIA-568-A**
  - **Max distance from network distribution equipment to NIC: 100 meters**

- **We're currently upgrading our cable plant**
  - **Evaluating whether to use Category 5e or Category 6**
    - **Leaning toward Cat 5e**
      - **Cheaper**
      - **Less restrictive installation procedures**
      - **Don't have to purchase new test equipment**
      - **Sufficient for use with 1000BASE-T**
    - **Other national labs and universities have installed Cat 5e instead of Cat 6 for the same reasons**

Requirements for 10GBASE-T

- **Support full duplex operation only**
  - **802.3ae doesn't do half duplex**
- **Support auto-negotiation**
- **Forget about jumbo frames**
  - **Waste of study group time**
- **Operate over 100m of Category 5e cable or better**
  - **Reference ISO/IEC 11801:2002**
- **Cost should be < 6x 1000BASE-T**
  - **According to Rado_1_1102 this would be true in mid 2005**

Objectives/Criteria

- **I would support the following objectives:**
  - **Provide line transmission which supports the full duplex Ethernet MAC only**
  - **Support operation over 100 meters of Category 5e or better balanced cabling**
  - **Support Auto-Negotiation (Clause 28)**

Objectives/Criteria (cont.)

- **I would support the following concept for the 5th criterion (economic feasibility):**
  - …projections indicate that the cost/performance ratio for 10GBASE-T compared with 1000BASE-T will be about the same as that of 1000BASE-T compared with 100BASE-T at the time of initial introduction. The cost of proposed implementations are expected to be 4-6X that of 1000BASE-T.

Issues

- **Need to address 802.3 Annex 40A** *Additional Cabling Design Guidelines*
  - **This is most likely a maintenance issue for 802.3 but it will either contribute to or reduce the confusion users of the technology will experience when trying to determine whether or not they're using the right cable for the job**

Issues (cont.)

- **Should we consider leaving 10BASE-T and 100BASE-T, or just 10BASE-T out of the AN capabilities of 10GBASE-T?**
  - **Would I buy a 10GBASE-T NIC or switch port and then operate it at 10/100 Mbs?**
    - **Probably not**
  - **If by leaving out these capabilities we can lower the cost of 10GBASE-T, then I say yes, leave it out**

Conclusion

- **10GBASE-T should be**
  - **Simple**
    - **FDX only and no jumbos**
  - **Cheap**
  - **Compatible with previous generations of Ethernet**
    - **Perhaps to a point … if the cost savings is great enough then leave out 10/100BASE-T**
  - **Able to operate on installed base of cable or lowest cost upgrade (Cat 5e) at a distance of 100m**
- **Thank you!**