# Evolution of High Capacity LANs
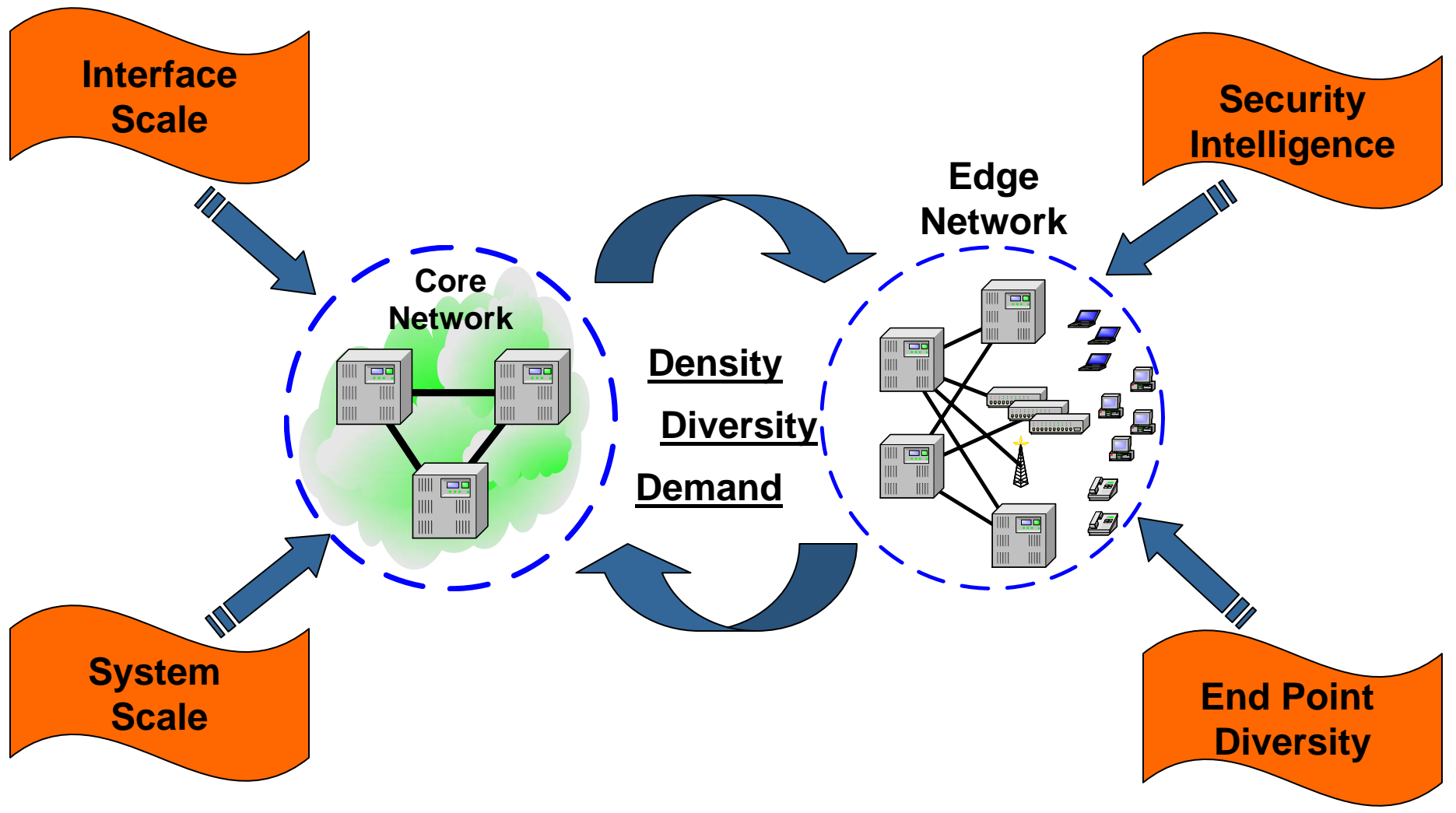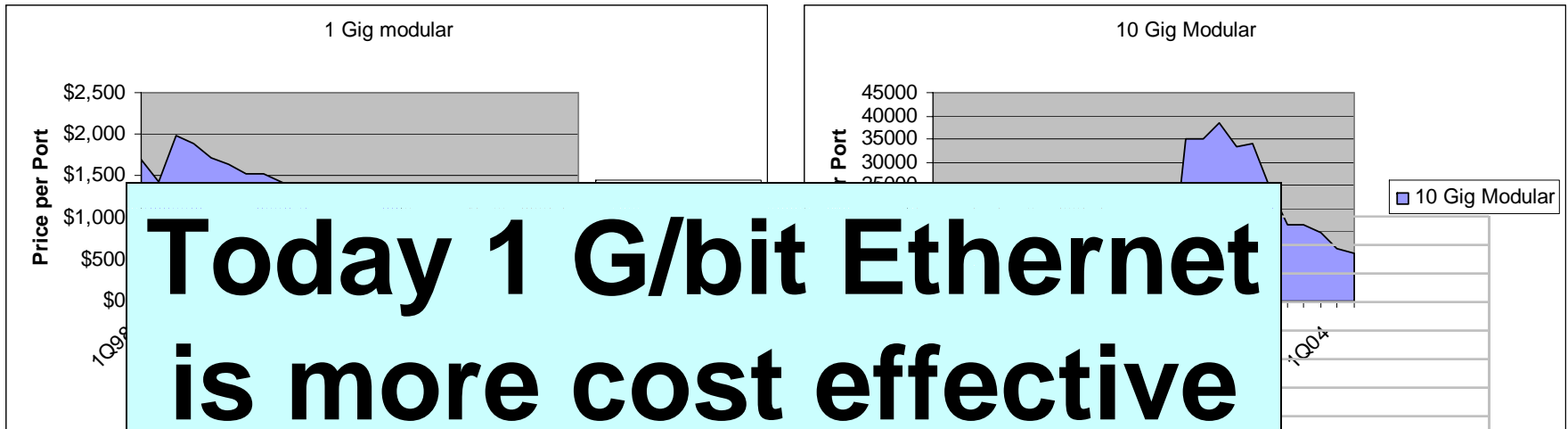
John J Roese

# Overview

- Model of LAN evolution

- Interface Capacity Trends

- System Capacity Trends

- Security and Intelligence Trends

- End system diversity Trends

- Edge/core Interplay

- Conclusions

# Network Evolution Drivers

**Interface Scale**

**Security Intelligence**

**Edge Network**

**Core Network**

Density

Diversity

Demand

**System Scale**

**End Point Diversity**

**Today 1 G/bit Ethernet is more cost effective than 10Gig but the trend predicts that the IEEE goal is in reach**
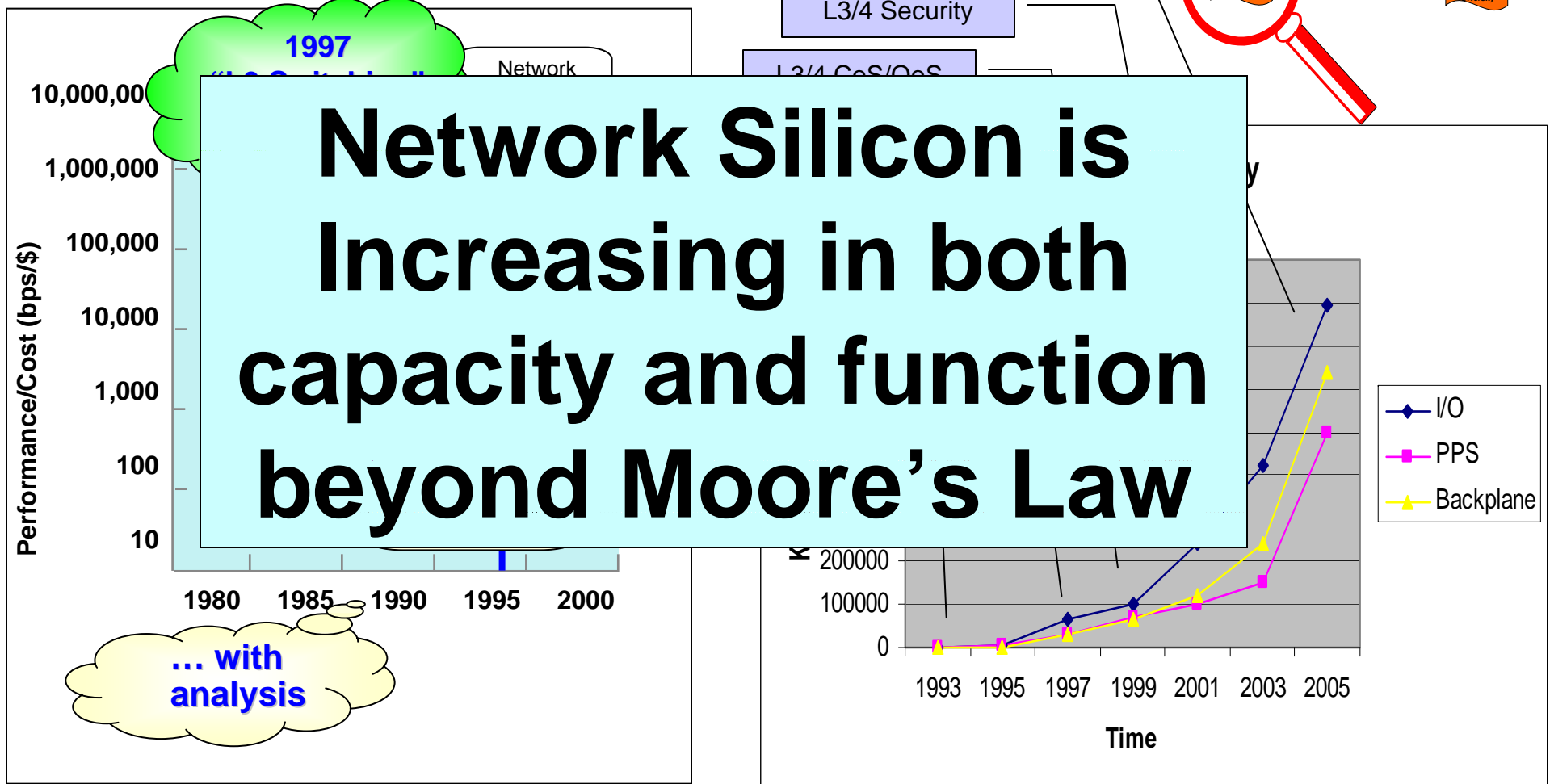
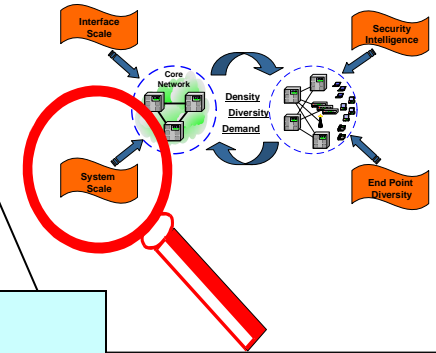- 1 Gigab[...]ble trend
- 10 Giga[...] [cr]iteria goal of 3X the 100[...]
- Cost pe[...]

[...] increase in available bandwidth in the full duplex operating mode will result in an improvement in the cost- performance ratio by a factor of 3. This cost model has been validated during both the 100 and 1000 Mb/s Ethernet deployment.

Source: Dell'Oro 2Q04 Data and IEEE 802.3

**enterasys**™
Networks that Know
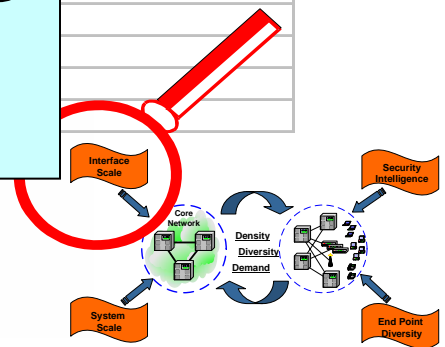
- System capacity by every measure has increased dramatically
- Capacity and functionality have been enhanced in each evolution
- **Faster-Smarter-More Scalable Devices**

IPv6/MPLS

L3/4 Security

L3/4 CoS/QoS

Network

1997
"L2 Switching"

## Network Silicon is Increasing in both capacity and function beyond Moore's Law

Performance/Cost (bps/$)

10,000,000
1,000,000
100,000
10,000
1,000
100
10

1980  1985  1990  1995  2000

… with analysis

- I/O
- PPS
- Backplane

200000
100000
0

1993  1995  1997  1999  2001  2003  2005

**Time**

Source: "Is Circuit Switching Doomed?" Peter Sevcik BCR, September 1997 and ETS Product Specifications 1993-2005
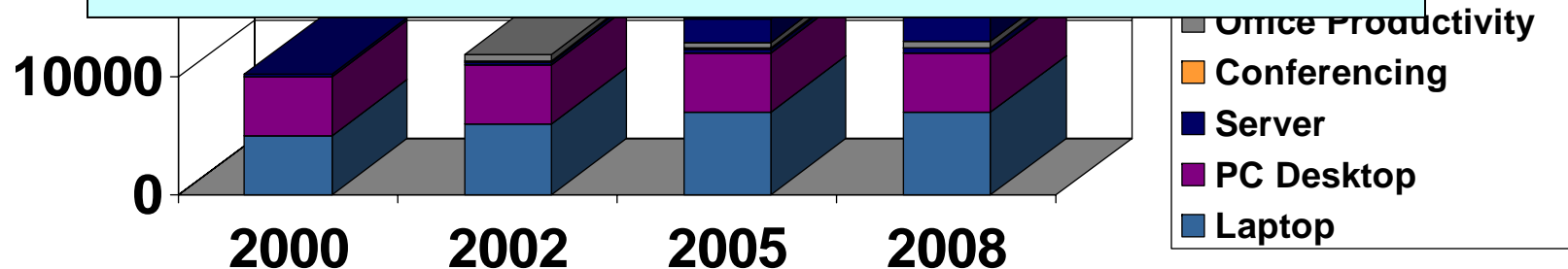
- Growth of networking in EMEA and NA has little to do with adding more people

- Machine centric network enablement will spawn expansion and diversity requirements

- Tremendous challenges:

  — "How do I secure a control system in a process line?"

  — "How do I detect a heterogeneous IP telephone network?"

  — "How ~~do I implement a policy...~~"
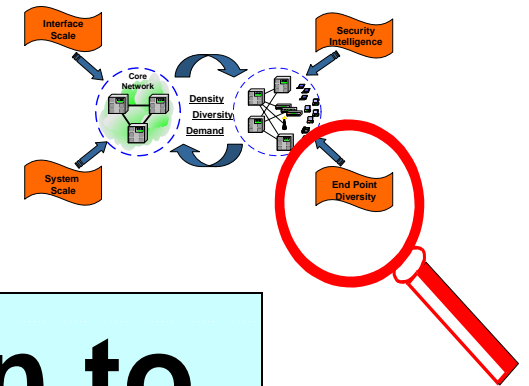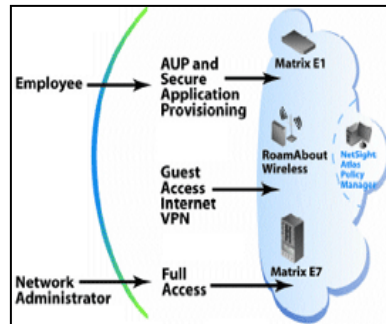
## Metcalf's Law taken to the next step

## "The value of the network is equal to the square of the connected devices"

**400**

**300**

**200**

**10000**

**0**

**2000    2002    2005    2008**

- Systems
- ~~...ory~~
- ~~...eo~~
- ~~...ntrol~~
- Devices
- Office Productivity
- Conferencing
- Server
- PC Desktop
- Laptop

# Security and Intelligence



• Pervasive Access Control
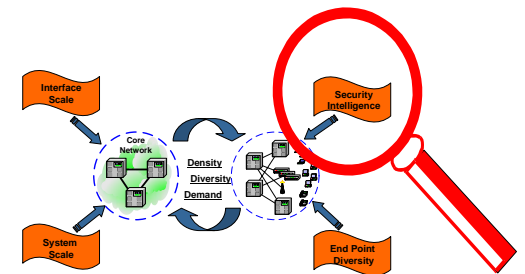
•Proactive Protection

## Automated Context Based Intelligence

## "Identity, Location, Conversation control at a system level in real time"

•Behavioral Policy Management

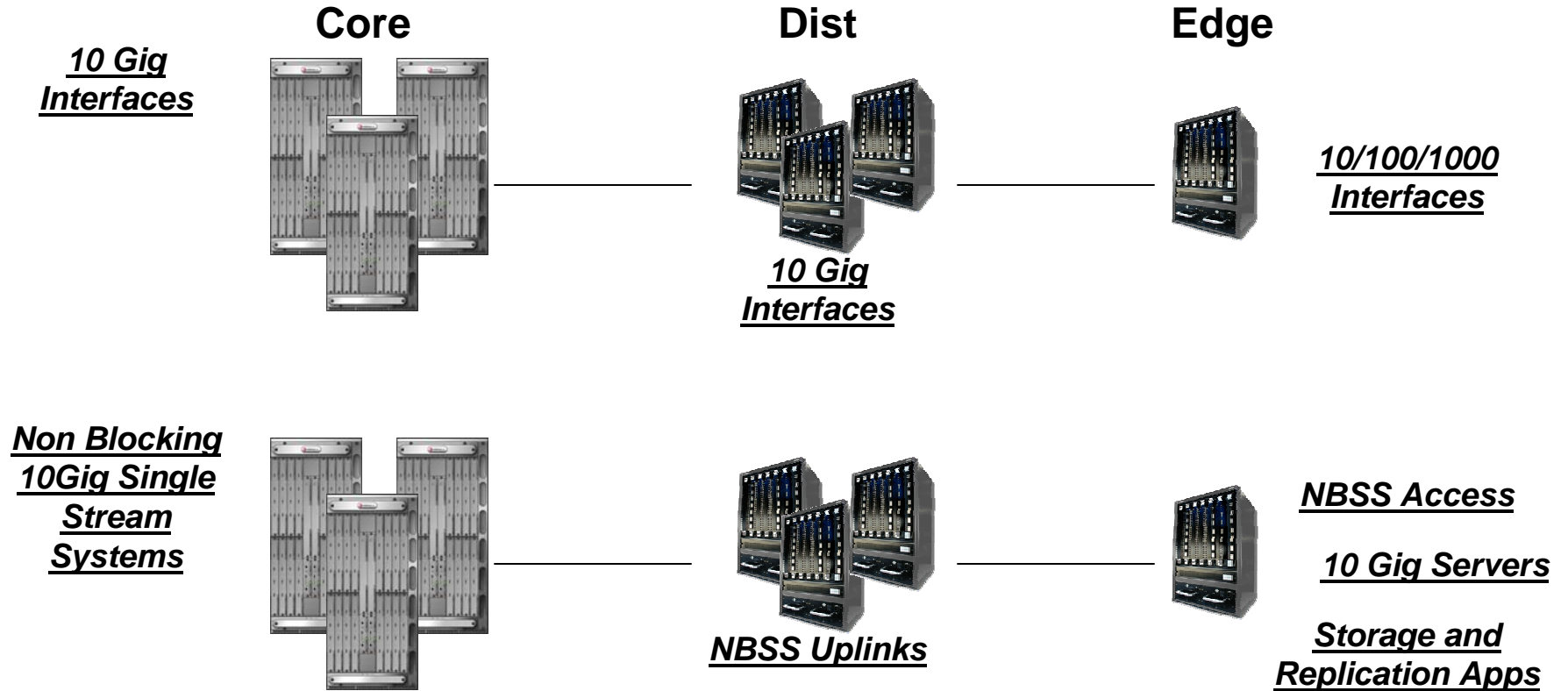•Dynamic Response

# Interplay



**Core**

**Dist**

**Edge**

*10 Gig Interfaces*

*10/100/1000 Interfaces*

*10 Gig Interfaces*

*Non Blocking 10Gig Single Stream Systems*

*NBSS Uplinks*

*NBSS Access*

*10 Gig Servers*

*Storage and Replication Apps*

**Edge Security**

**Identity**

**Location**

**Control**

**Policy**

**Aggregation**

"Today's core is tomorrow's edge"

**Density** ← **Diversity** ← **Demand**

"The edge seeds the core"

**Multi-Modal Devices**

**Machines**

**End Point Expansion**

**BW Guarantees**

**Increased Classes of Service**

**Increased Traffic Classes**

**Distribution Layer Policy**

# Conclusion

- Capacity is growing faster than Moore's Law

  —10 Gig Ethernet LAN Phy interfaces are currently not the most cost effective

  —10 Gig Ethernet LAN Phy interfaces will cross over 1Gig efficiency soon

  —Common System Capacity is approaching 1Tbit per system

  —Single stream 10Gig systems exist

- High Capacity Network Systems will be highly influenced by end point diversity and intelligence/security needs

- LAN evolution was about connectivity and capacity, and still is… but only if we can provide the security capabilities required to create a trusted environment

  —Edge intelligence density and diversity drives core density and demand

  —Core capacity and density drives edge expansion

**The focus must be on the evolution of high capacity, highly functional ecosystems not simply high capacity devices or interfaces**

**Thank You**