Future Directions

GLOBECOM 2004 KEYNOTE

November 30, 2004

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EXPLOIT TECHNICAL INNOVATION

OUTLINE

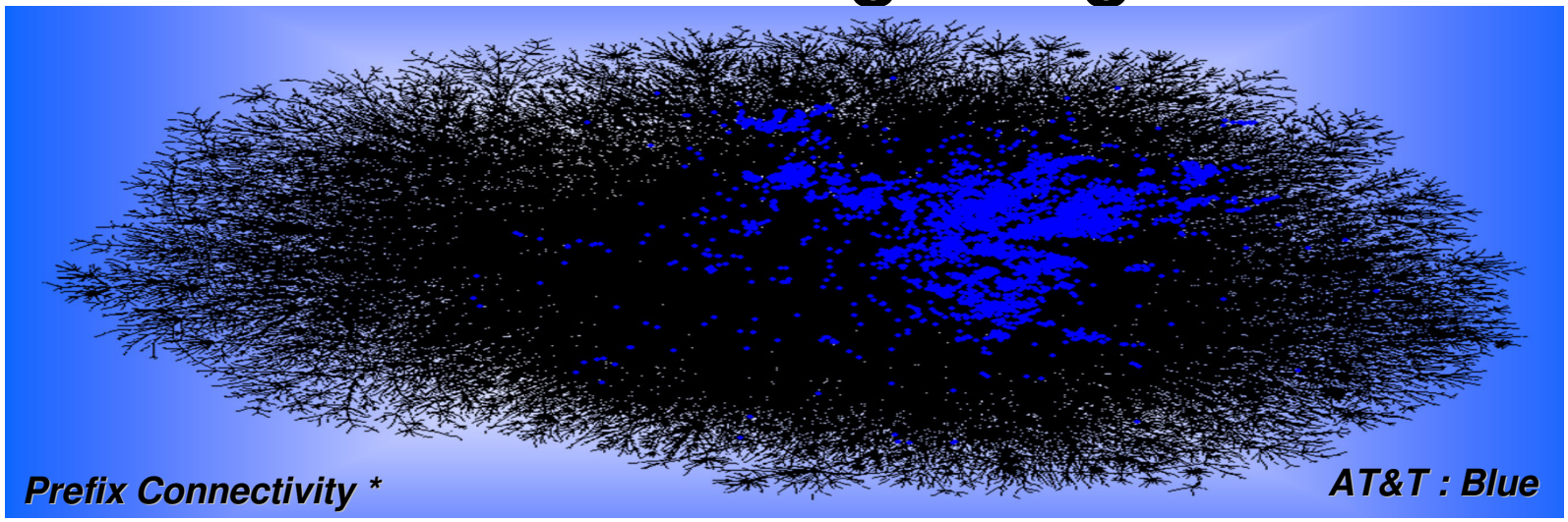
- **Setting the Stage – Major Trends**
- **Future Vision**

1. **Network**
2. **Information Technology**
3. **Services**
4. **Customer Experience**

Top Ten Technology Trends

1. **IP Will Eat Everything!**
2. **Convergence of Communications & Applications Will Be A Reality**
3. **Ethernet Will Be Universally Deployed**
4. **Wireless Internet Will Be Big – Driving Mobility**
5. **Sensor Networks Will Be Everywhere**
6. **Death of Locality**
7. **Broadband Will Be Common**
8. **Wireless & Wired Lines Will Converge – Accelerating Virtualization**
9. **Information Mining Will Transform the Way We Do Business**
10. **Home LANs Will Proliferate**

Internet Big Bang



Volume Expansion

Galaxy Integration

End Point Expansion

100,000
2002

10,000
1999

1,000
1996

1
1990

U.S. Traffic
TBytes/Month

Voice

Private Network

5k
1992

40k
1997

80k
2000

160k
2004

BGP Table Size

Arpanet
1969

APPLICATION EXPANSION

Mail, Web, Multimedia, Gaming

MATTER DISTRIBUTION

P2P, Grid Computing

Expansion, Expansion, Expansion

INOVATION

* AT&T Labs Research, Data Courtesy Lumetqa, Inc.

Top Ten IT Trends

1. **Data Volume & Storage Explosion Moves Faster Than Moore's Law.**
2. **e-Collaboration Will Dominate the Workplace**
3. **Move Towards A Universal Communication Device For All Video, Audio, and Communications Needs**
4. **Self-Adapting Networks Will Eliminate the Need For Human Intervention In Network Management**
5. **Proliferation of Communications & Online Business Processes Will Drive Just-In-Time Decision Making**
6. **Networks Will Be The Computers – Utility Computing Masks Computing Complexity From The Application**
7. **IT Cybernation Will Drive Operation Costs Dramatically Lower**
8. **Investment In IT Security And Its Complexity Will Continue To Escalate**
9. **Open Source Software Will Be Everywhere**
10. **PIN's & Passwords Will Disappear as Biometric Identification Takes Off**

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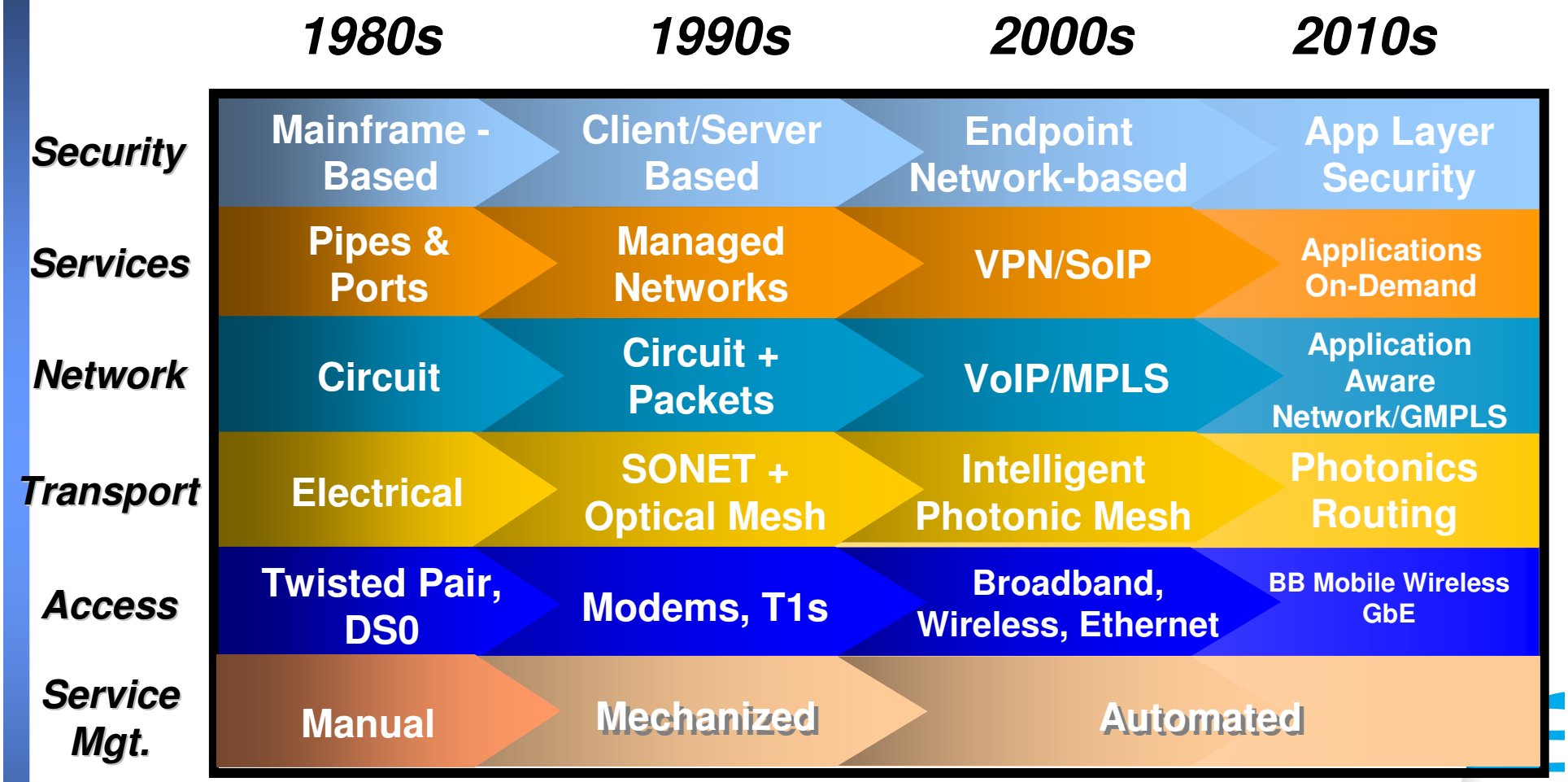
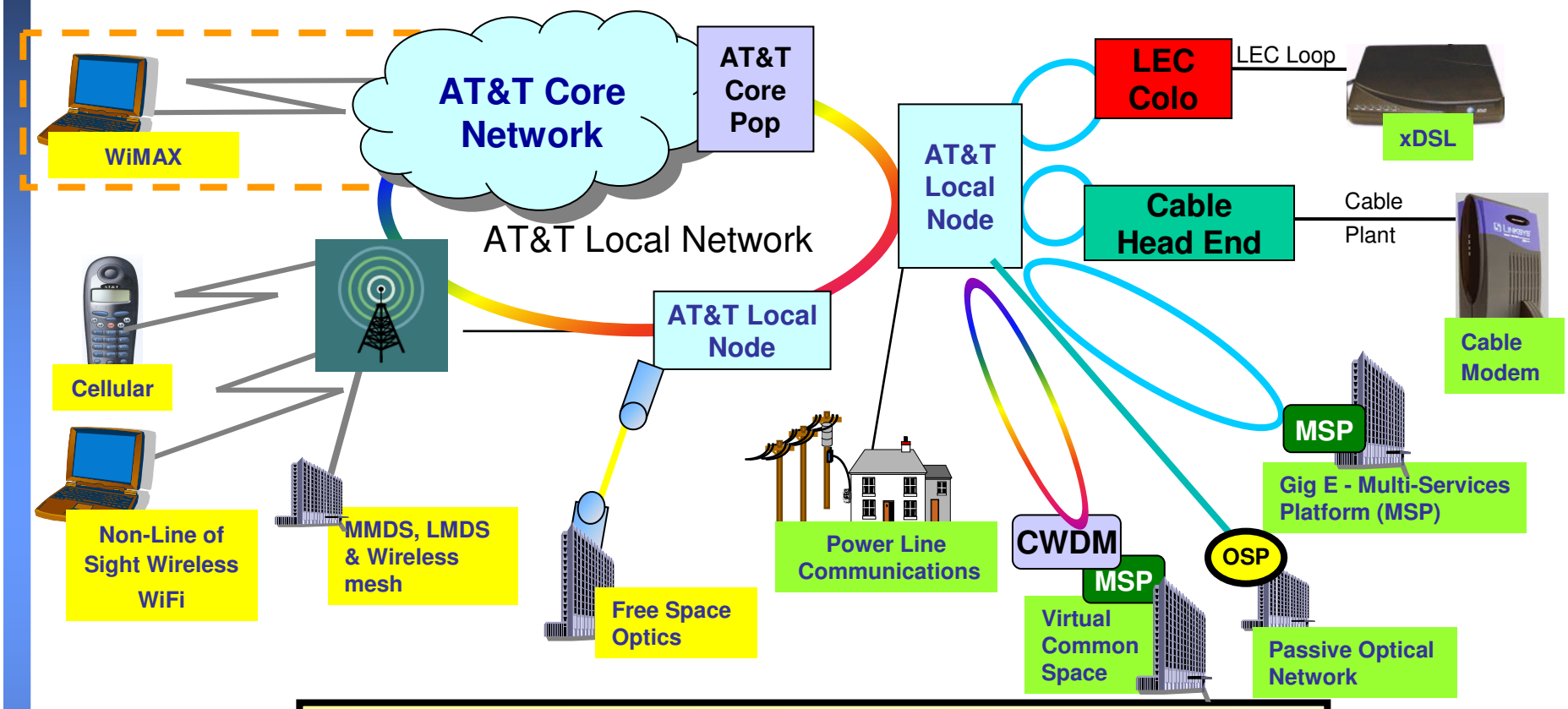
Evolution & Future of Network Architecture



AT&T Is Leading A Massive Industry Transformation

EXPLOIT TECHNICAL INNOVATION

Transformation: Last Mile Access



- Most of the Cost
- Least Competition
- Least Bandwidth
- Best Ability to Differentiate Yourself from Competitors

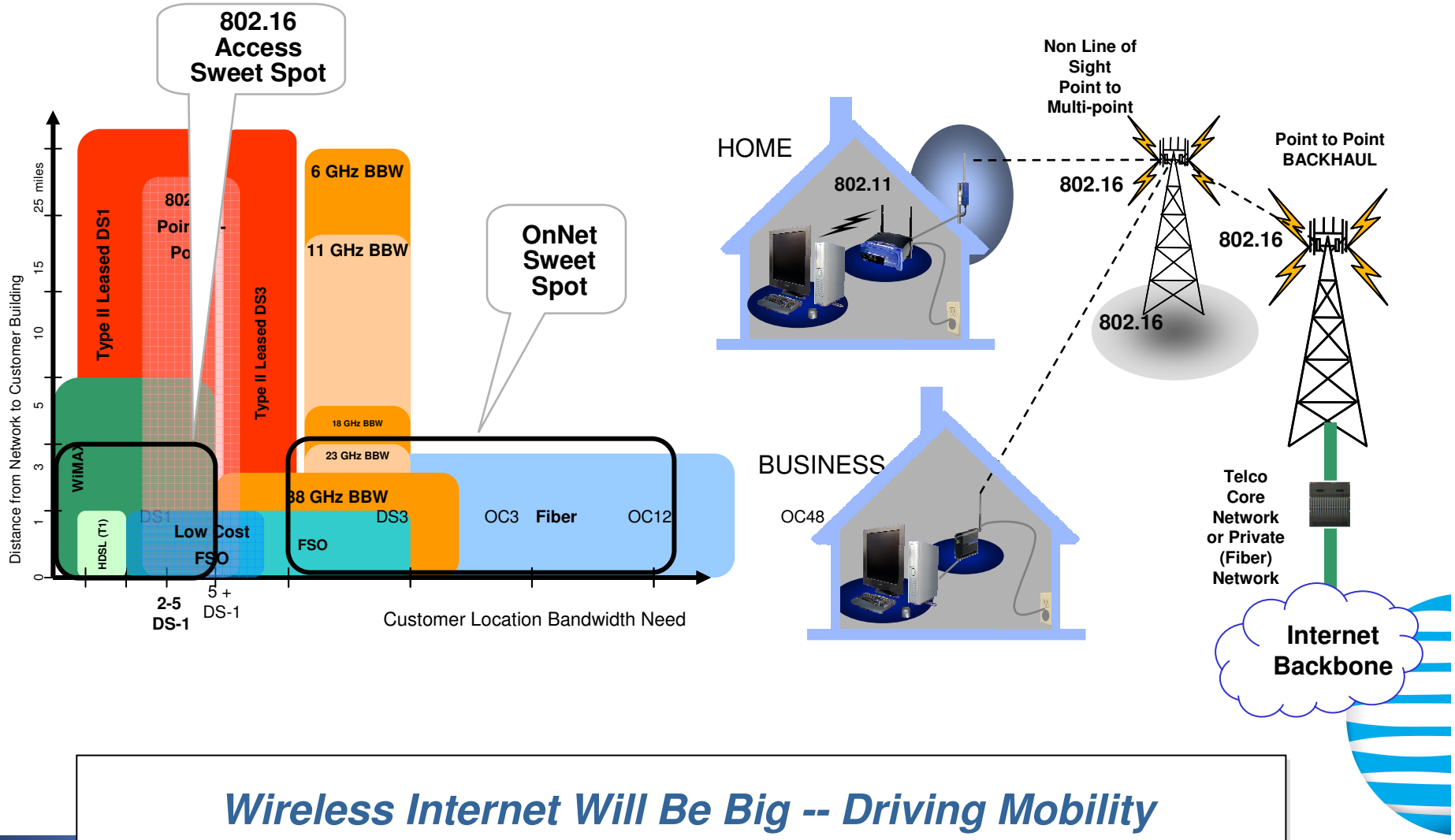
Wireless

Wireline

Over time all endpoints are reachable via IP and SoIP

EXPLOIT TECHNICAL INNOVATION

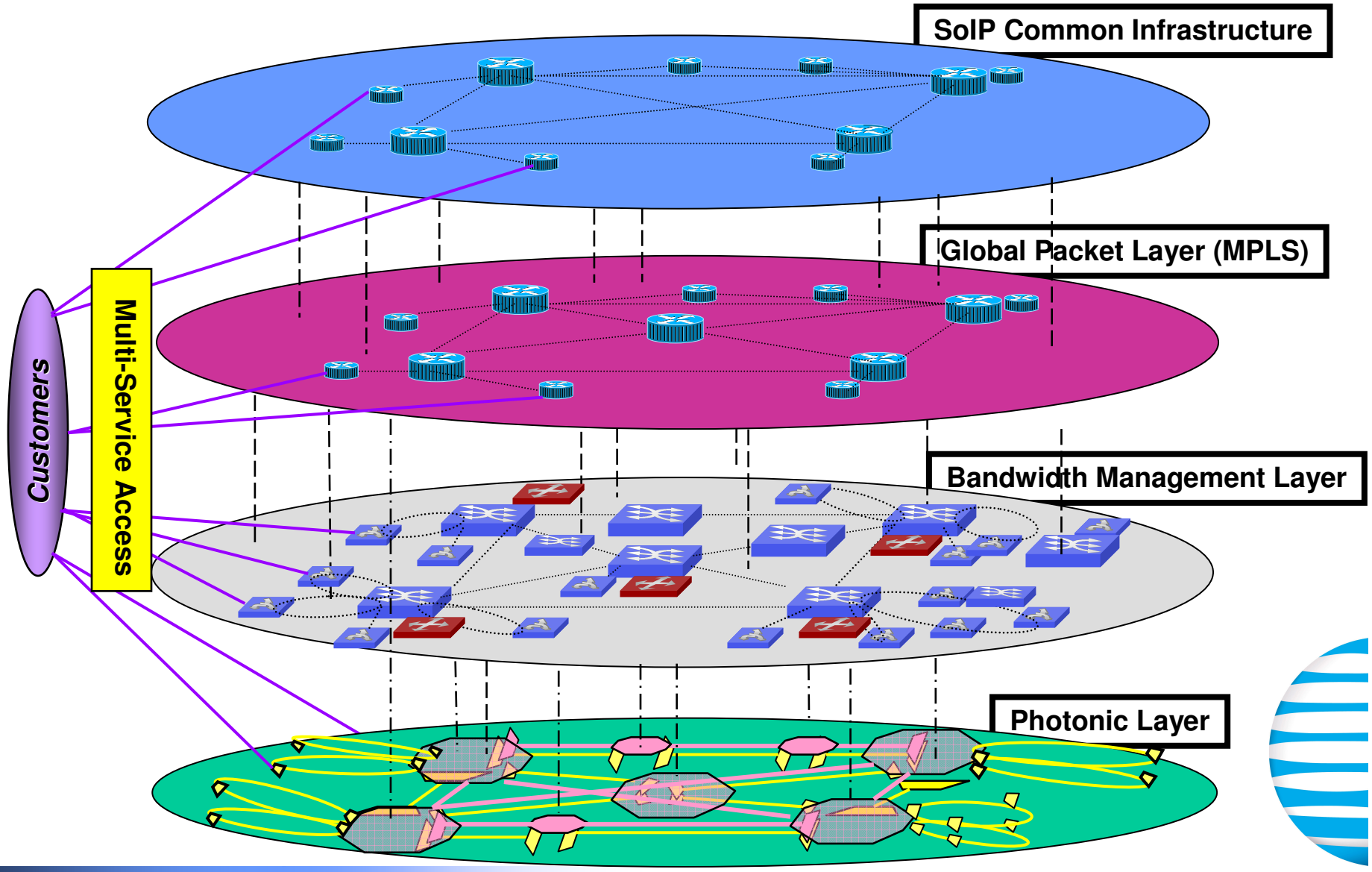
Broadband Wireless Access



Wireless Internet Will Be Big -- Driving Mobility

EXPLOIT TECHNICAL INNOVATION

Network Convergence Target Architecture

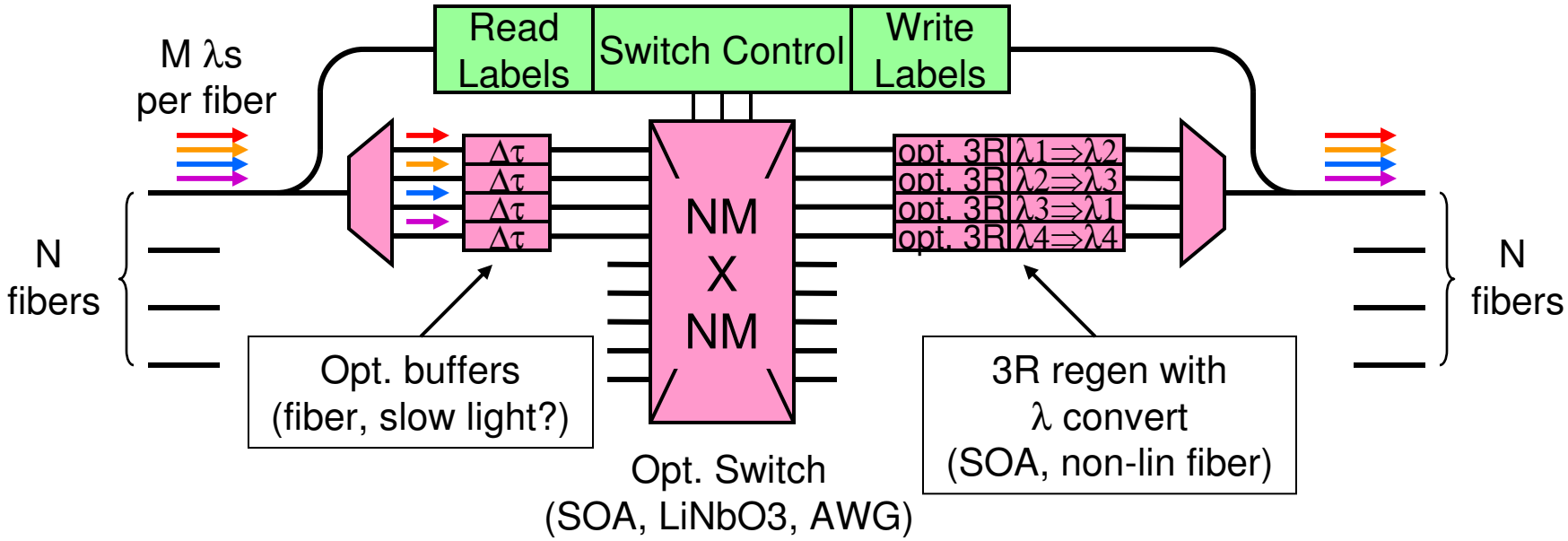


EXPLOIT TECHNICAL INNOVATION

Photonic Packet Networks

Data Remains Optical From Source To Destination

Photonic Packet Routers



- **Photonic Packet Networks pose a 'Grand Challenge' for the industry**
- **Optics challenges include fast switches, fast-tuning Tx & Rx, and optical buffers**
- **Network challenges include management, reliability, QoS, and basic architecture**
- **Cost, efficiency & functional capability will set the pace of photonic packetization**

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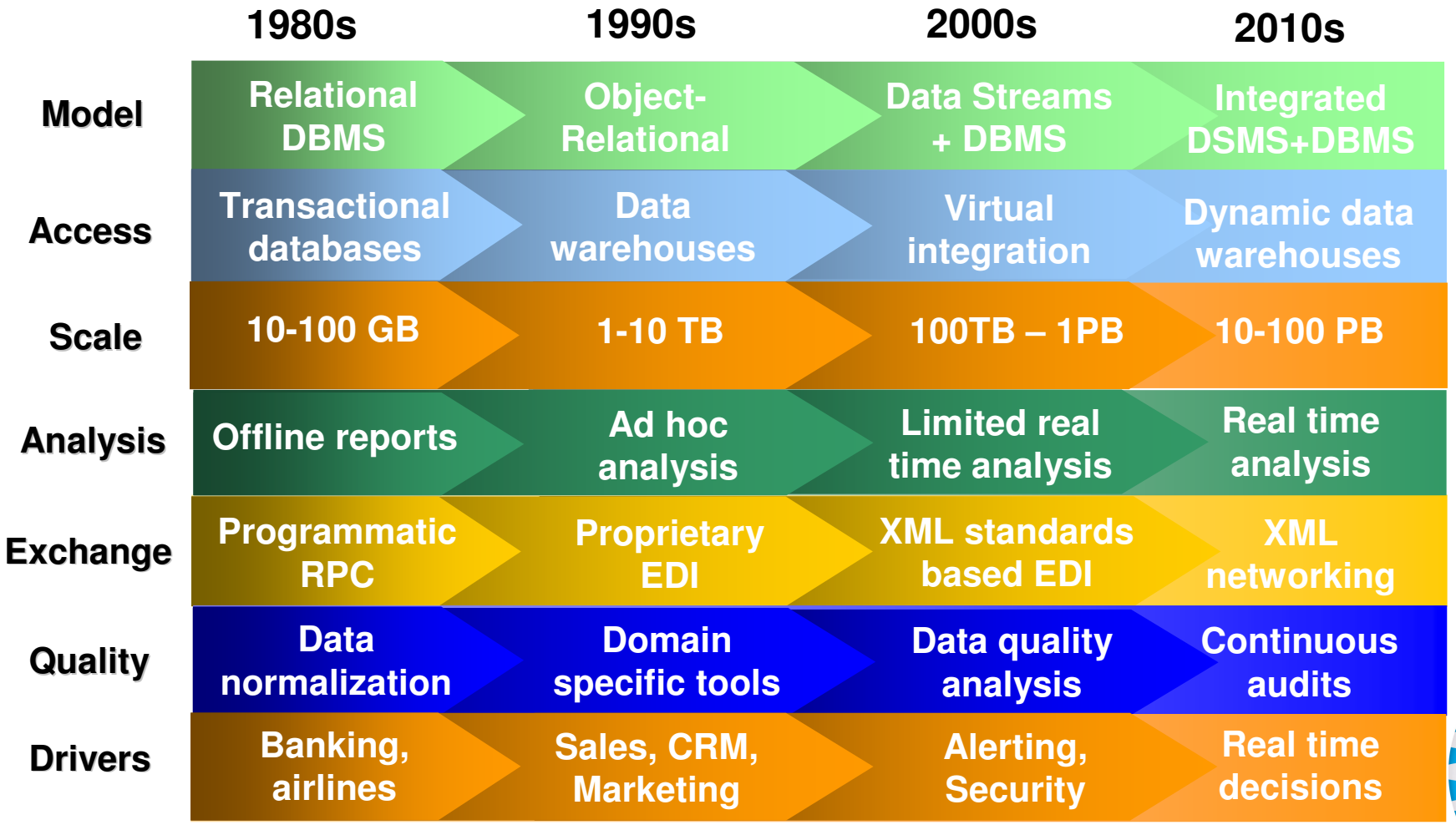
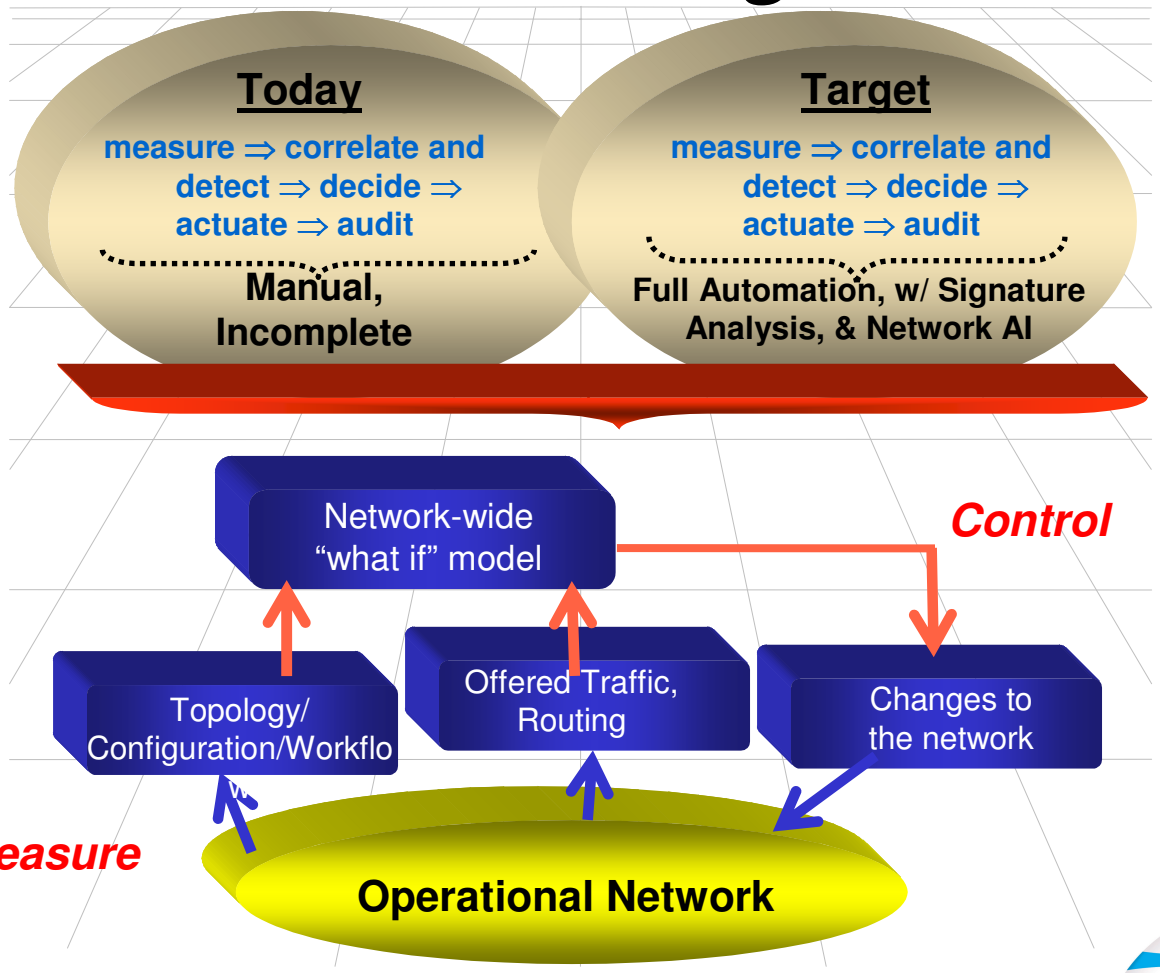
Evolution and Future of Data Management



Cybernated Networking

Adaptive actions:

- **Change parameters**: router configuration, video frame rate, spam definitions
- **Change software modules**: video encoder, caching
- **Change resource allocation**: bandwidth, CPUs



Automation, Adaptive Control

Critical Network Management Functionality – Automated Rather Than Manual

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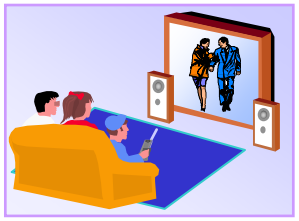
Emergence of the "Flat" SoIP Environment

Information Services

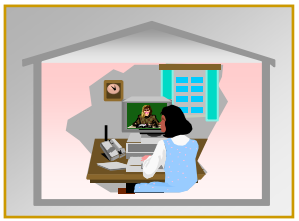
Education Services

Entertainment Television

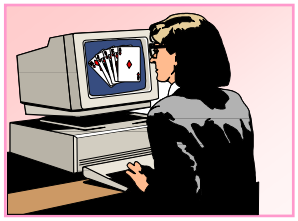


Information Services

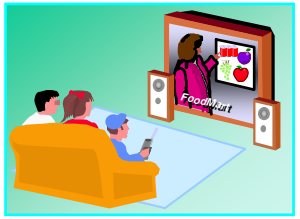
Software Distribution



Interactive Games



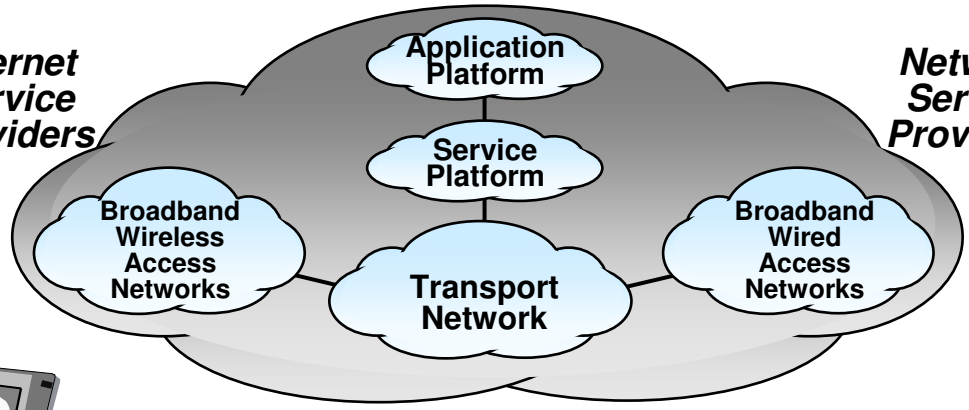
Electronic Shopping



Application Service Providers

Internet Service Providers

Network Service Providers



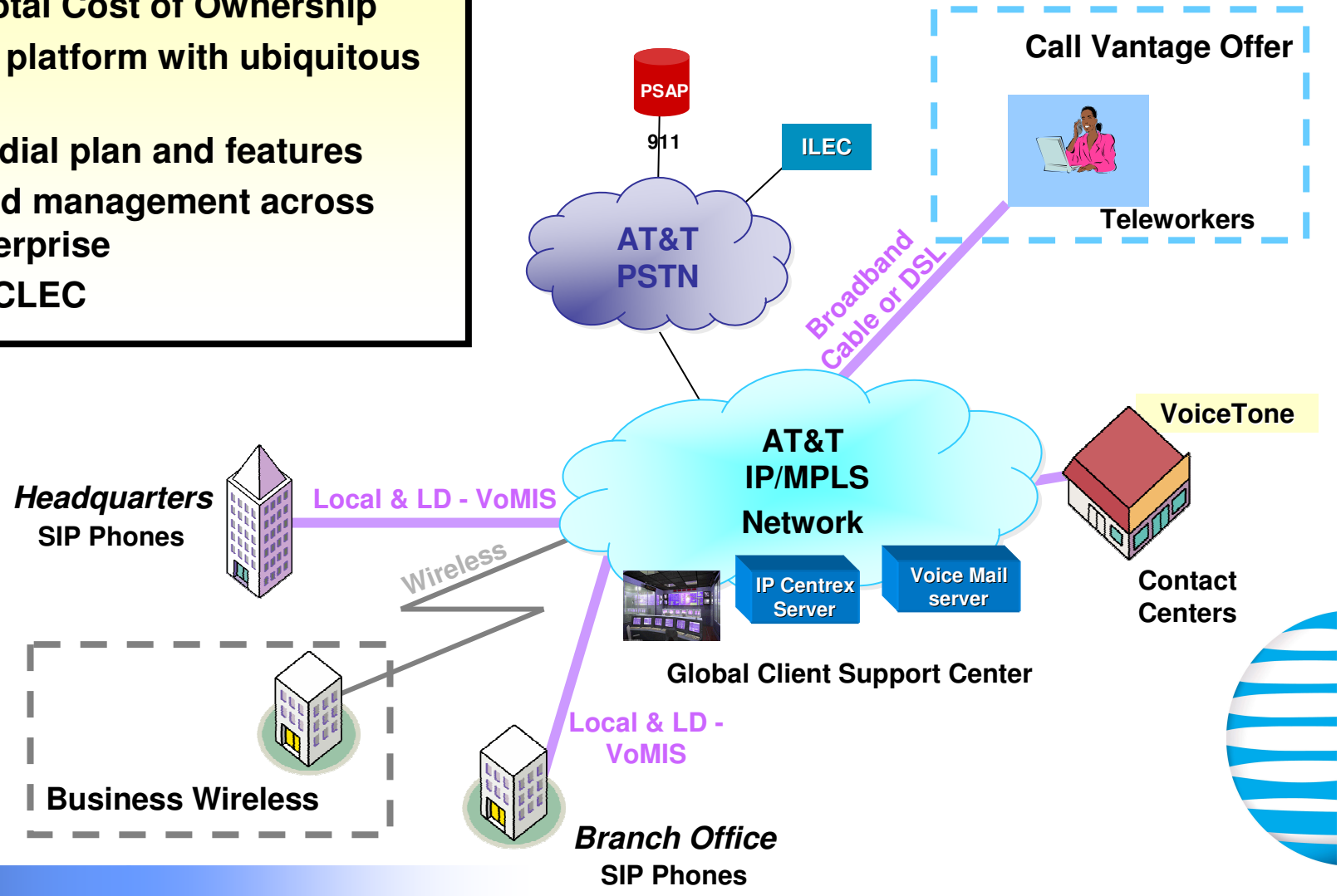
Information Appliances

EXPLOIT TECHNICAL INNOVATION

SoIP Applications

Supporting Enterprise Sites with IP Solutions

- **Lower Total Cost of Ownership**
- **Scalable platform with ubiquitous reach**
- **Uniform dial plan and features**
- **Simplified management across your enterprise**
- **Largest CLEC**



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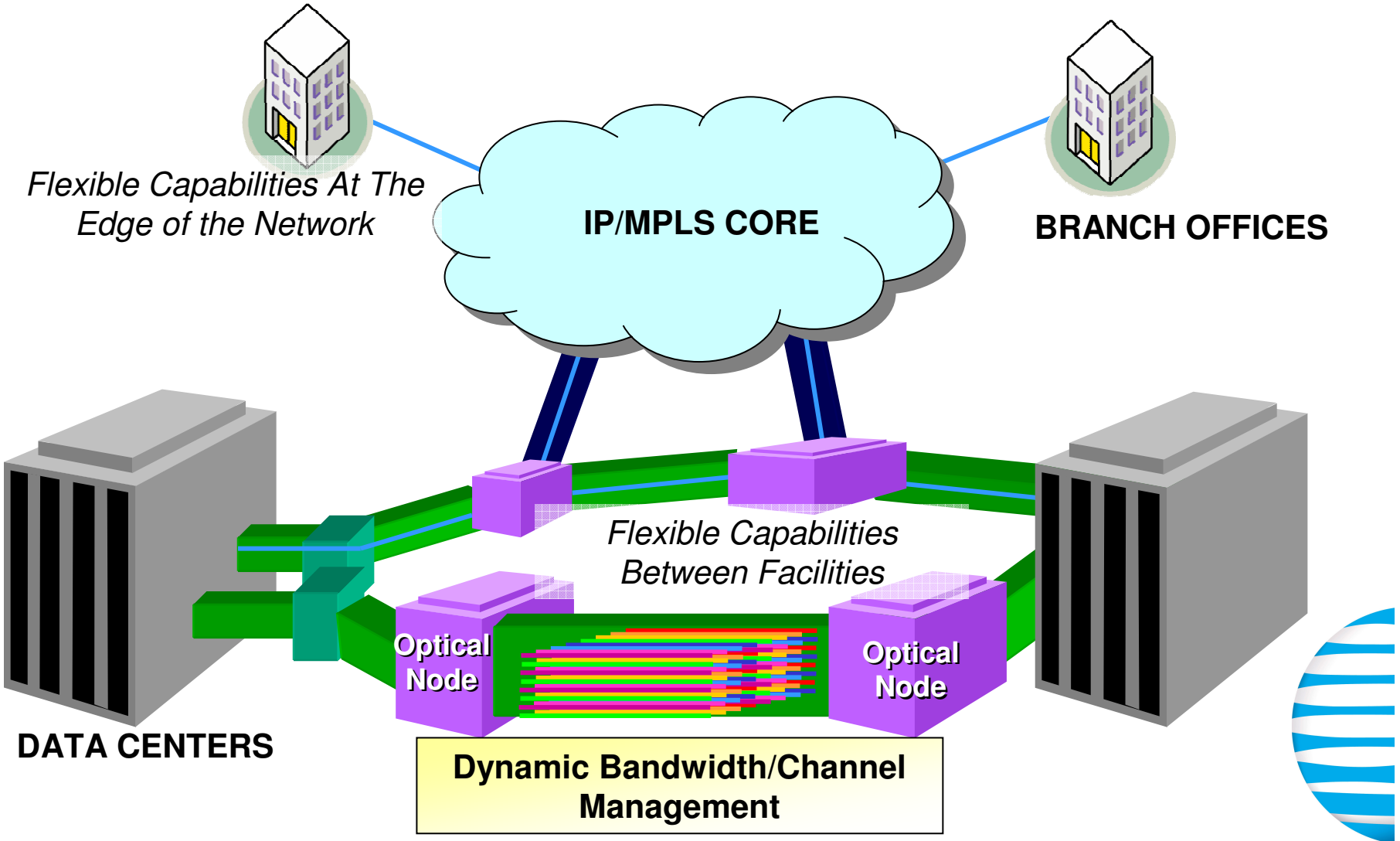
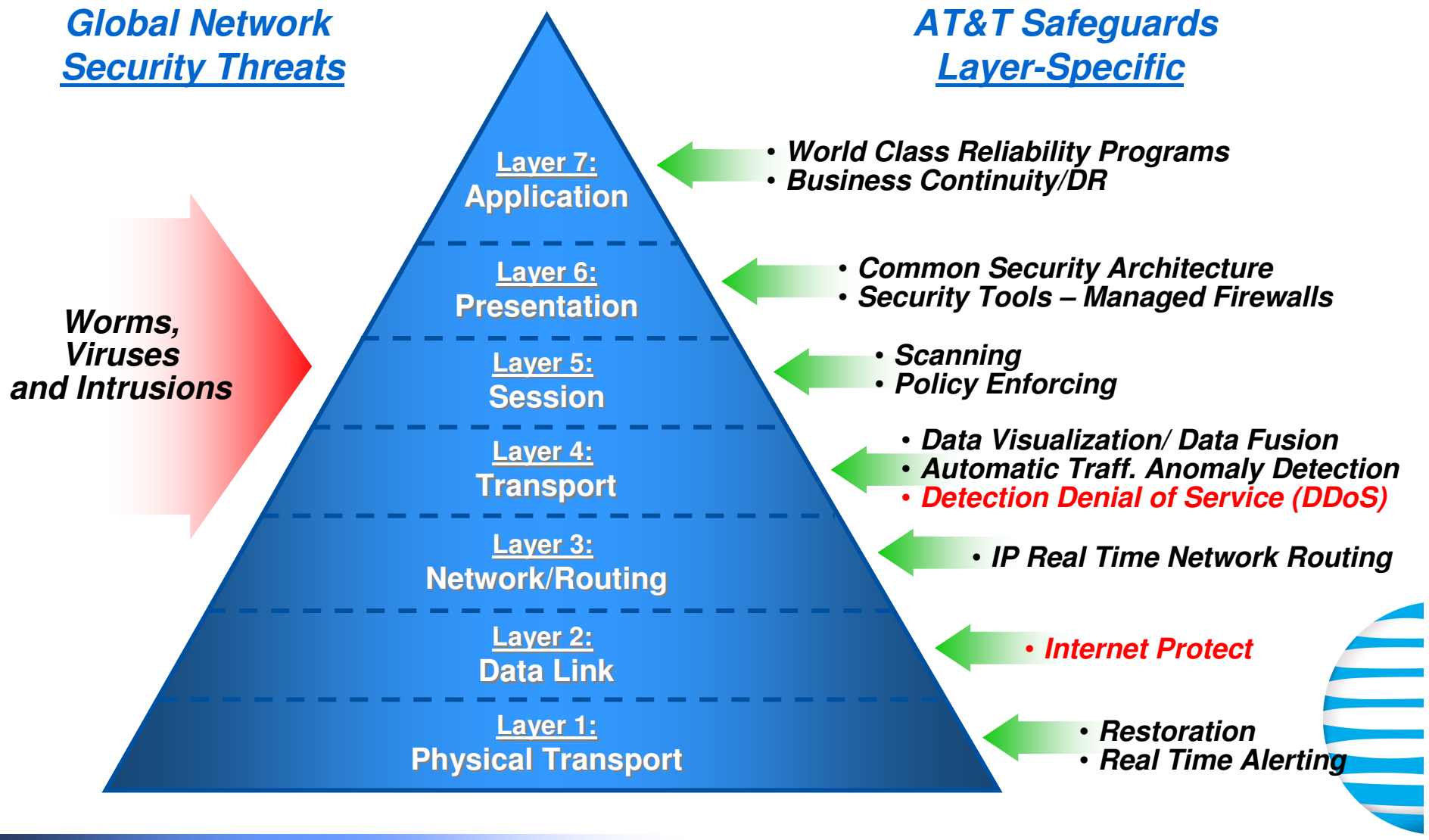
Dynamic Bandwidth Management

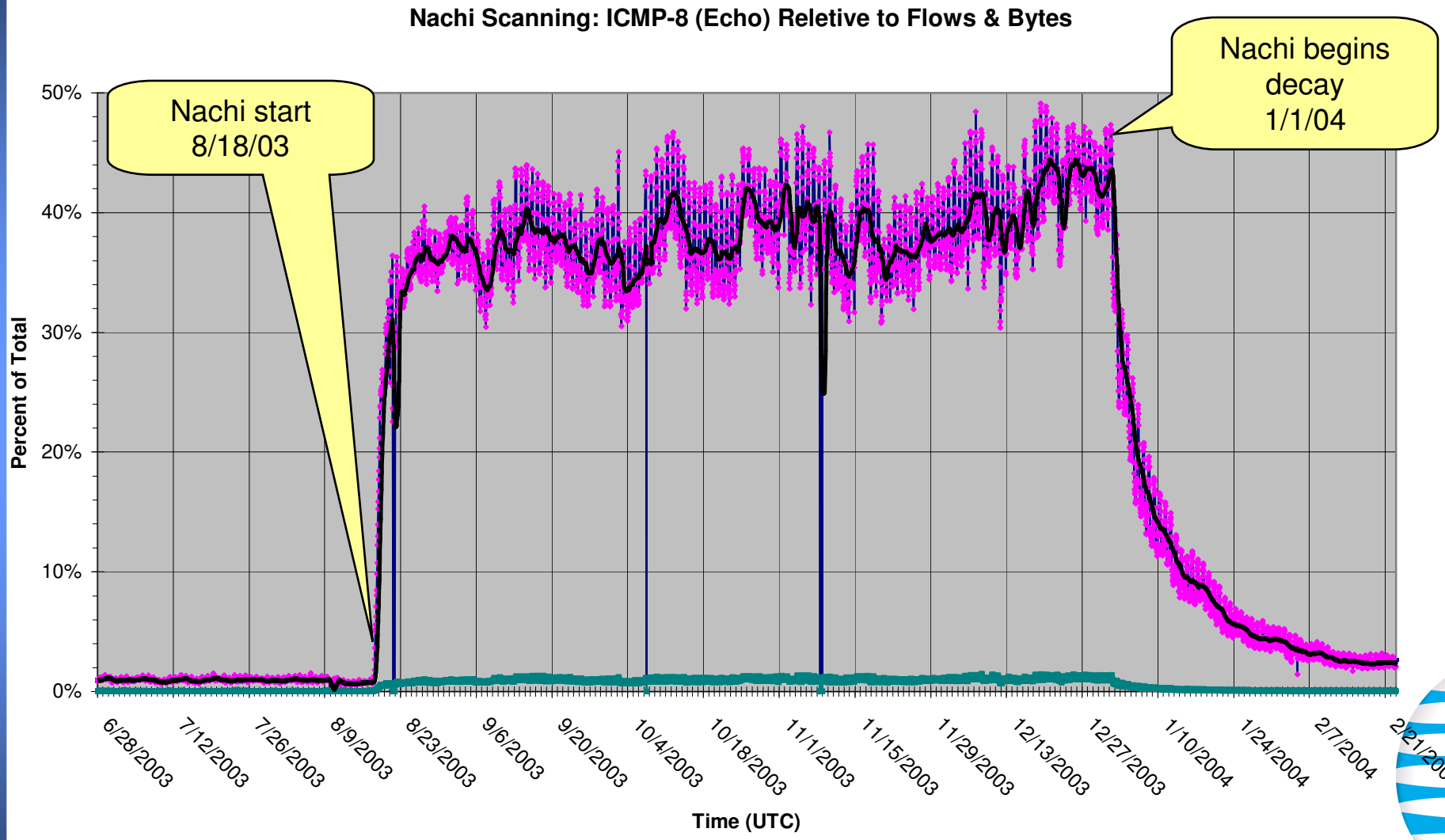


Security Services



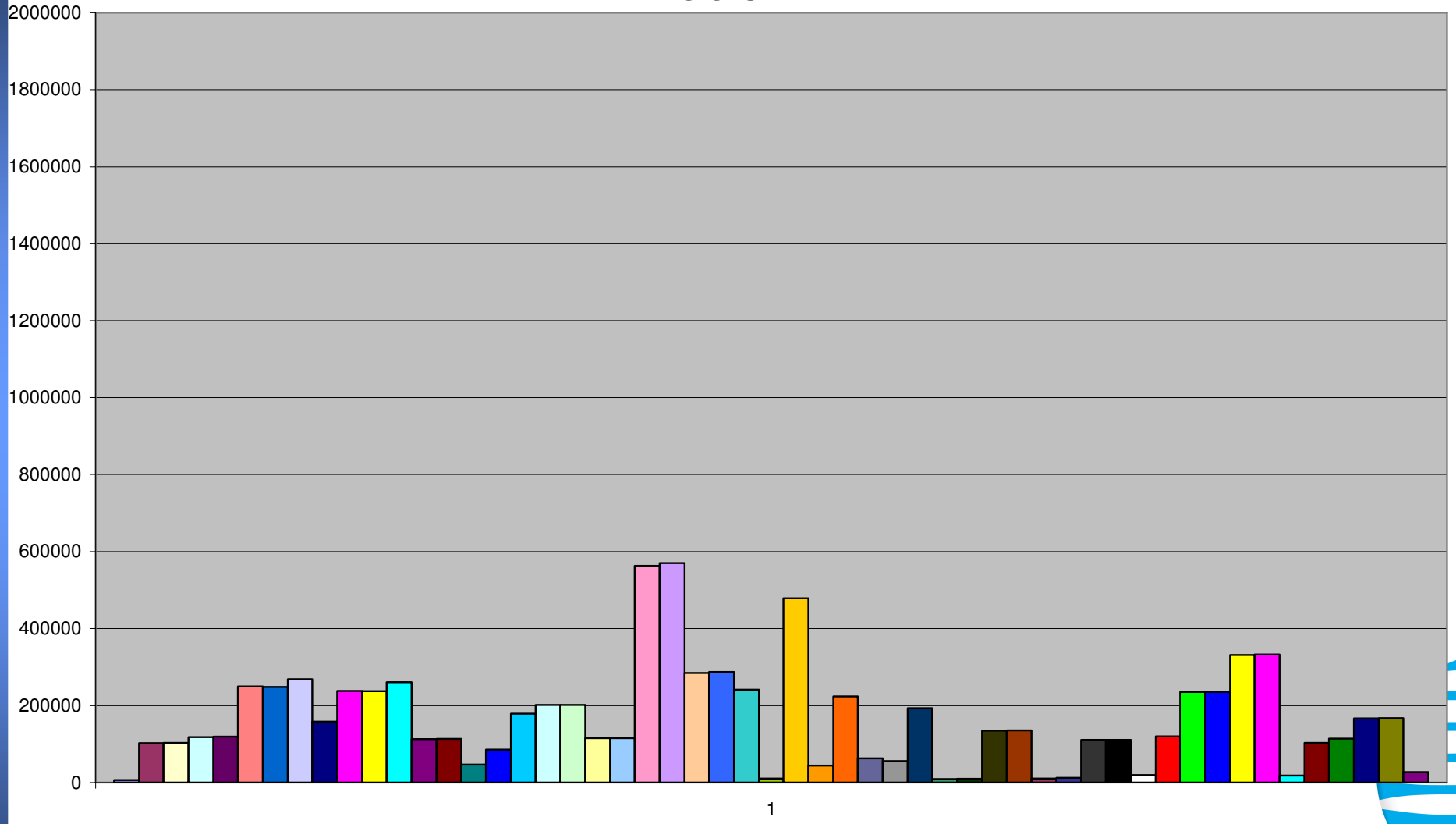
EXPLOIT TECHNICAL INNOVATION

Life-Cycle of Nachi



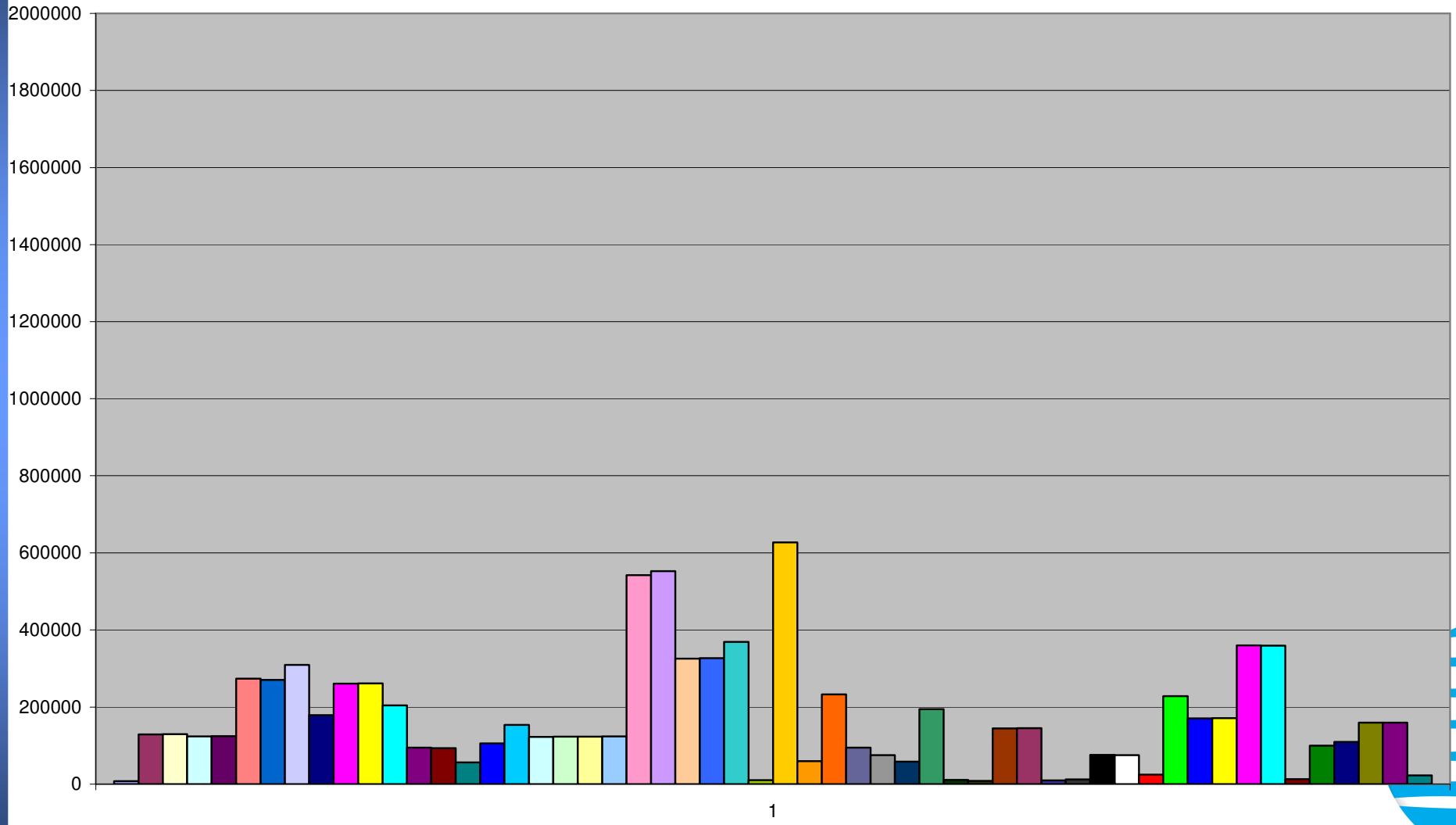
Pre-Nachi – ICMP/8 (Echo) - 8/17

2200GMT



Pre-Nachi – ICMP/8 (Echo) - 8/18

0000GMT



Pre-Nachi – ICMP/8 (Echo) - 8/18

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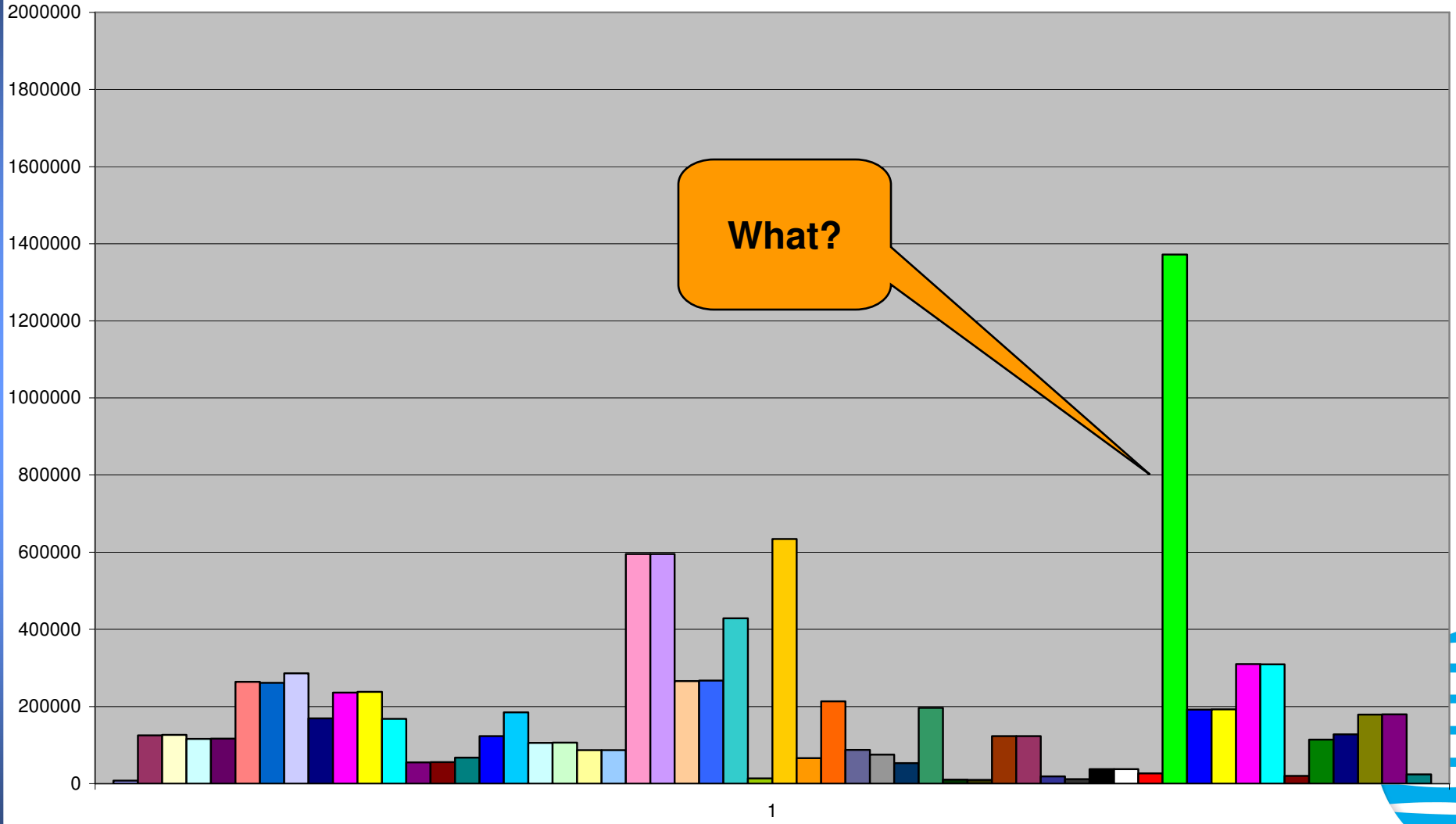

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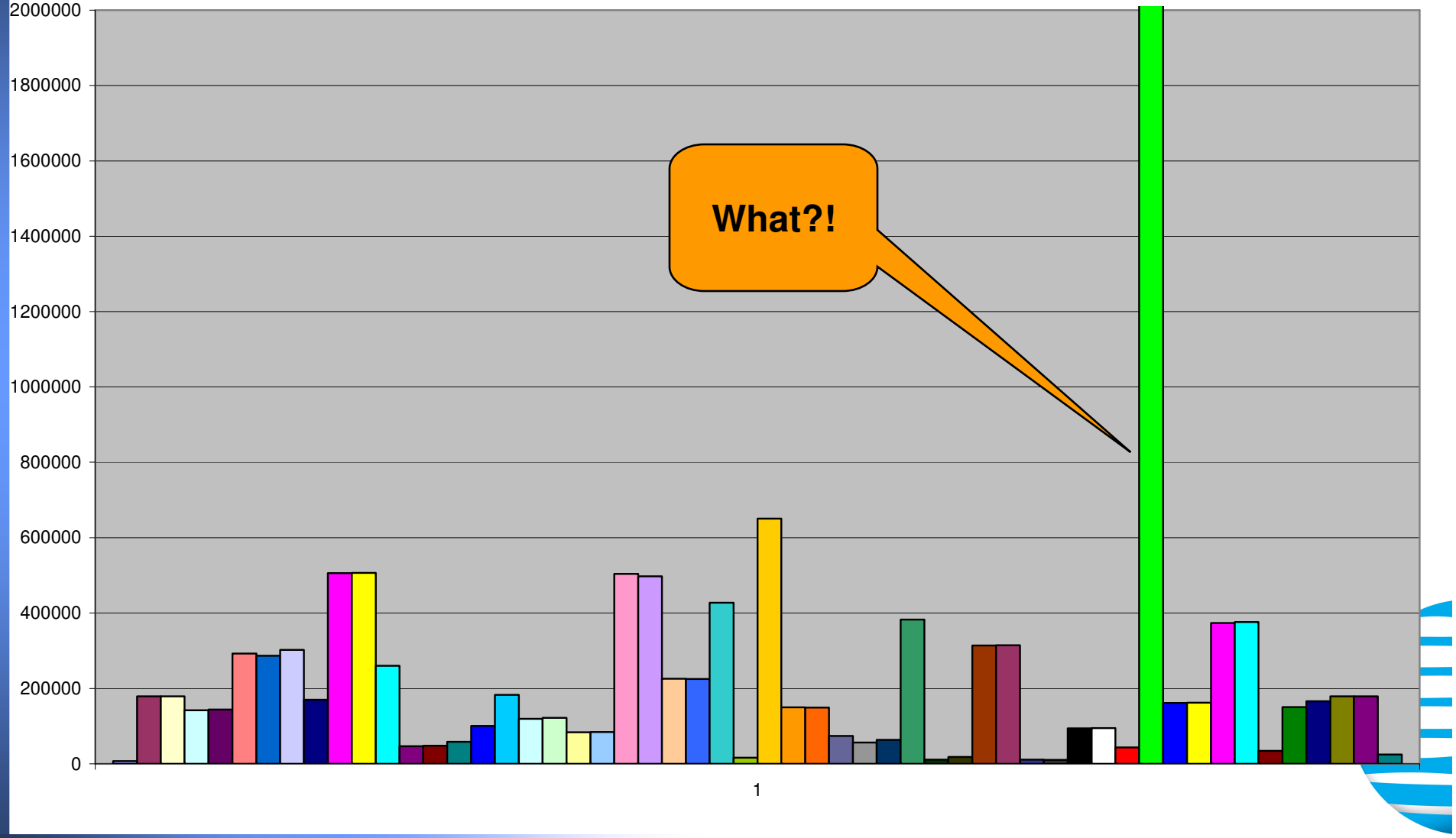

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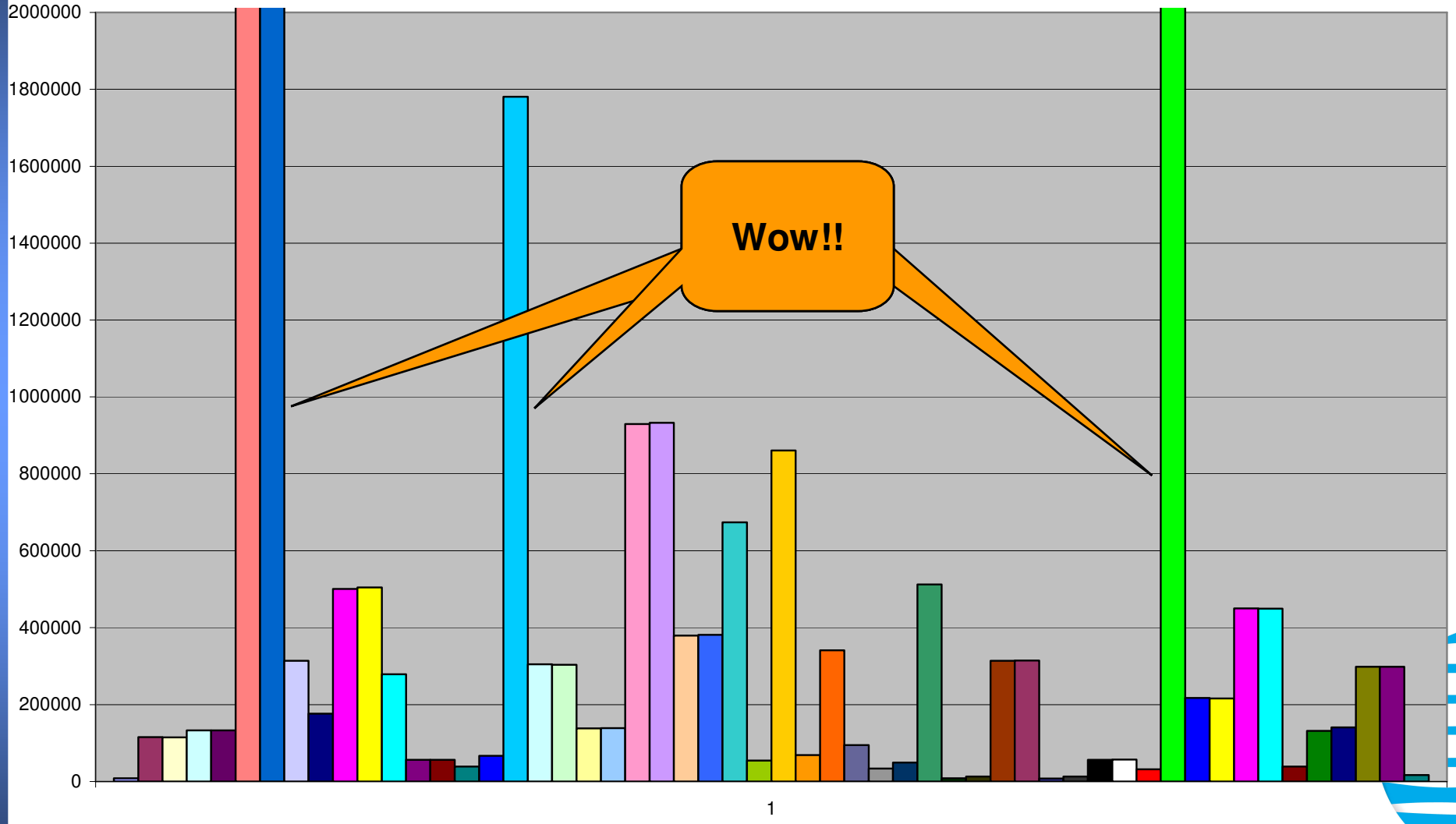
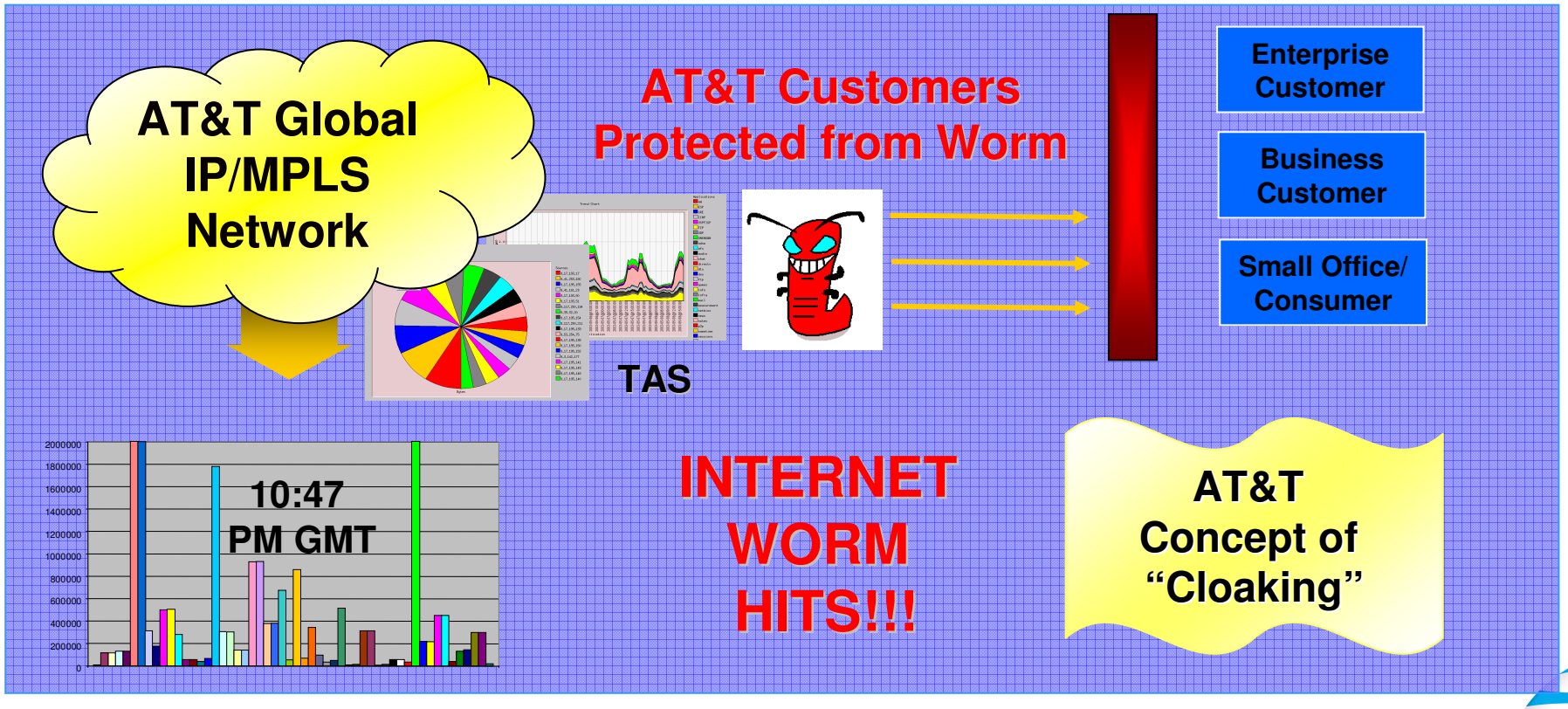


Internet Protect

Leveraging Innovation to Meet Customer Needs



- Cloaking: Worms Targeting Customers with Network Blocks are Protected
- AT&T Internet Protect Reinvents "Network Intrusion Detection"

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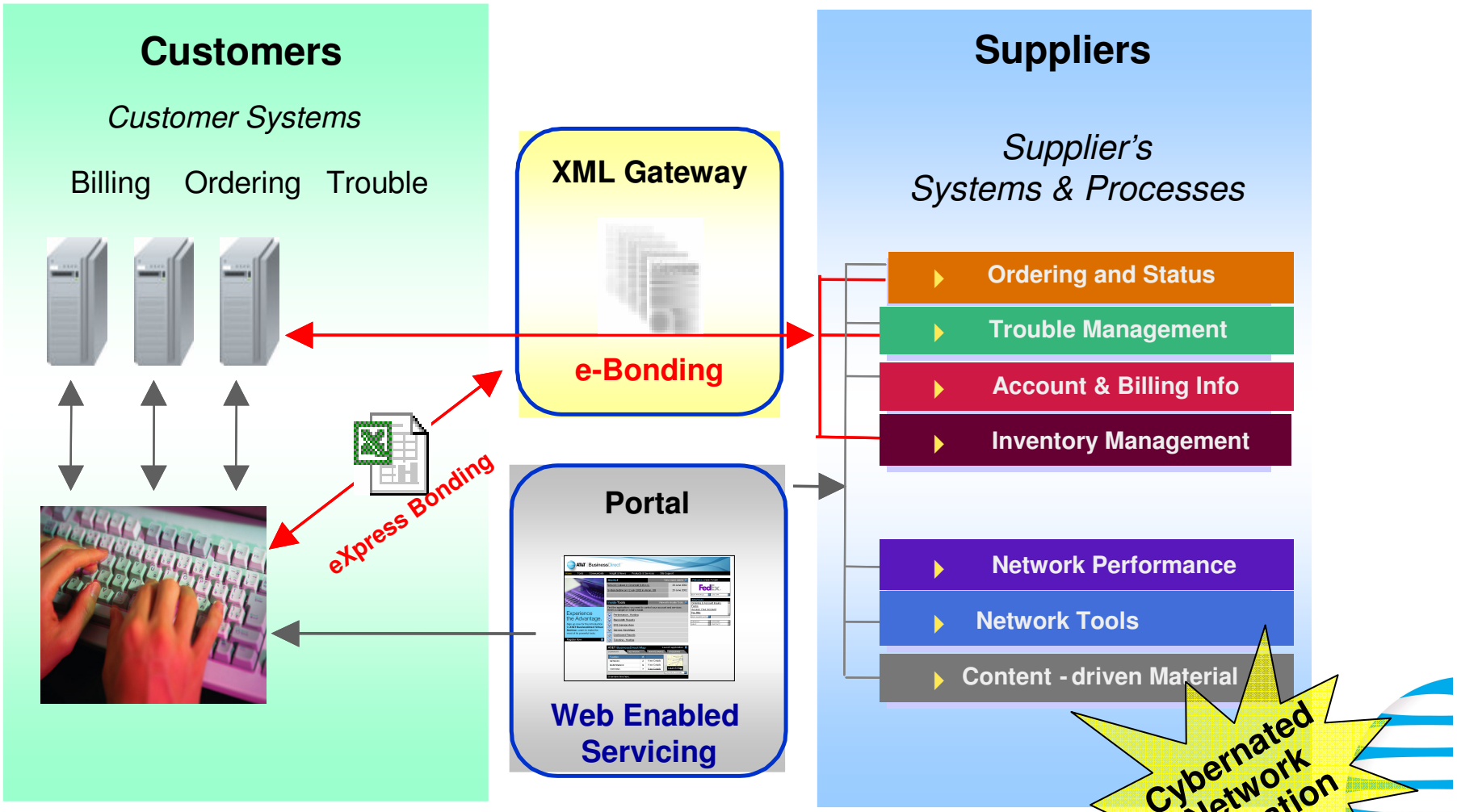
Business-to-Business e-Bonding

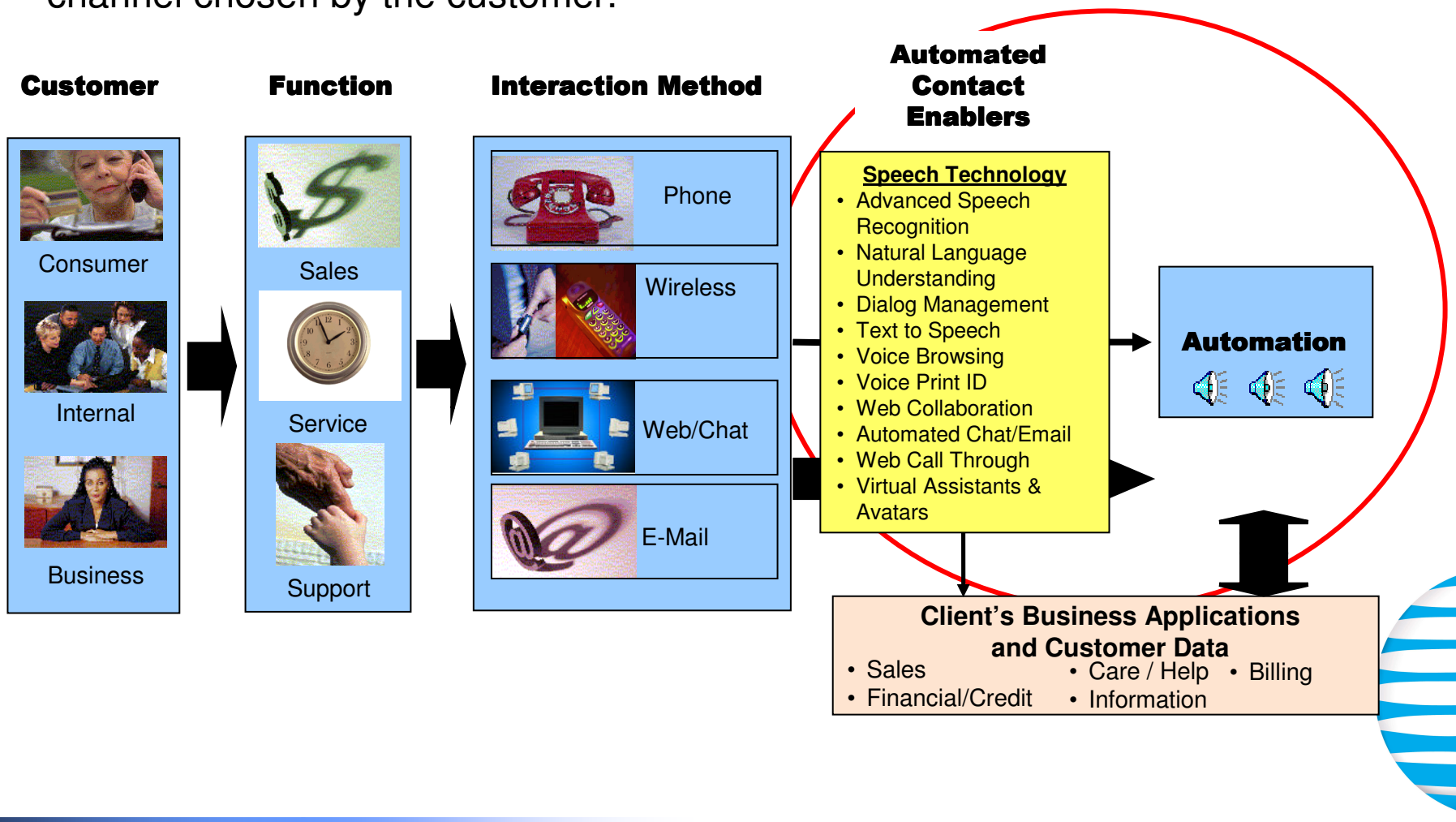


… moving to a service-oriented architecture

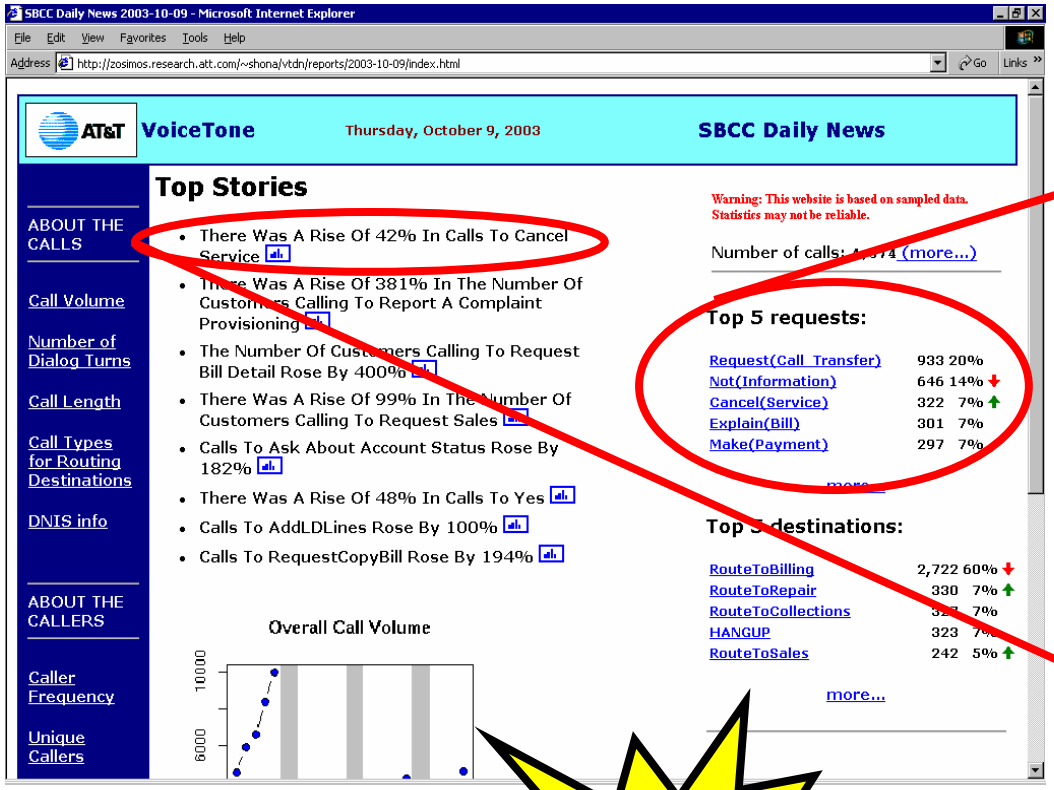
EXPLOIT TECHNICAL INNOVATION

Next Generation Contact Centers

Managed, hosted web enabled contact center services deliver a consistently personalized and natural customer experience, regardless of the interaction channel chosen by the customer.

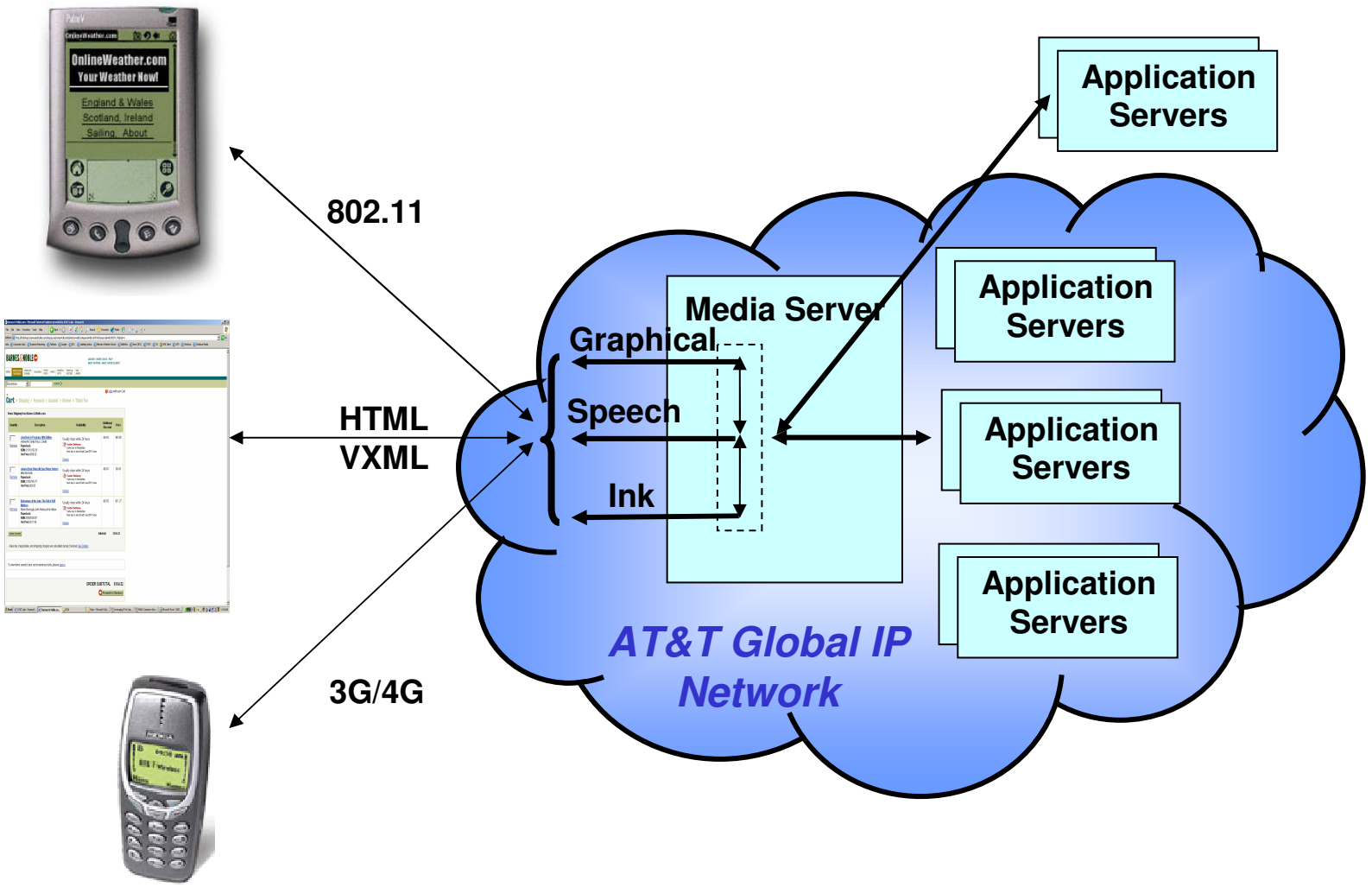


Speech Mining - "Business Intelligence"



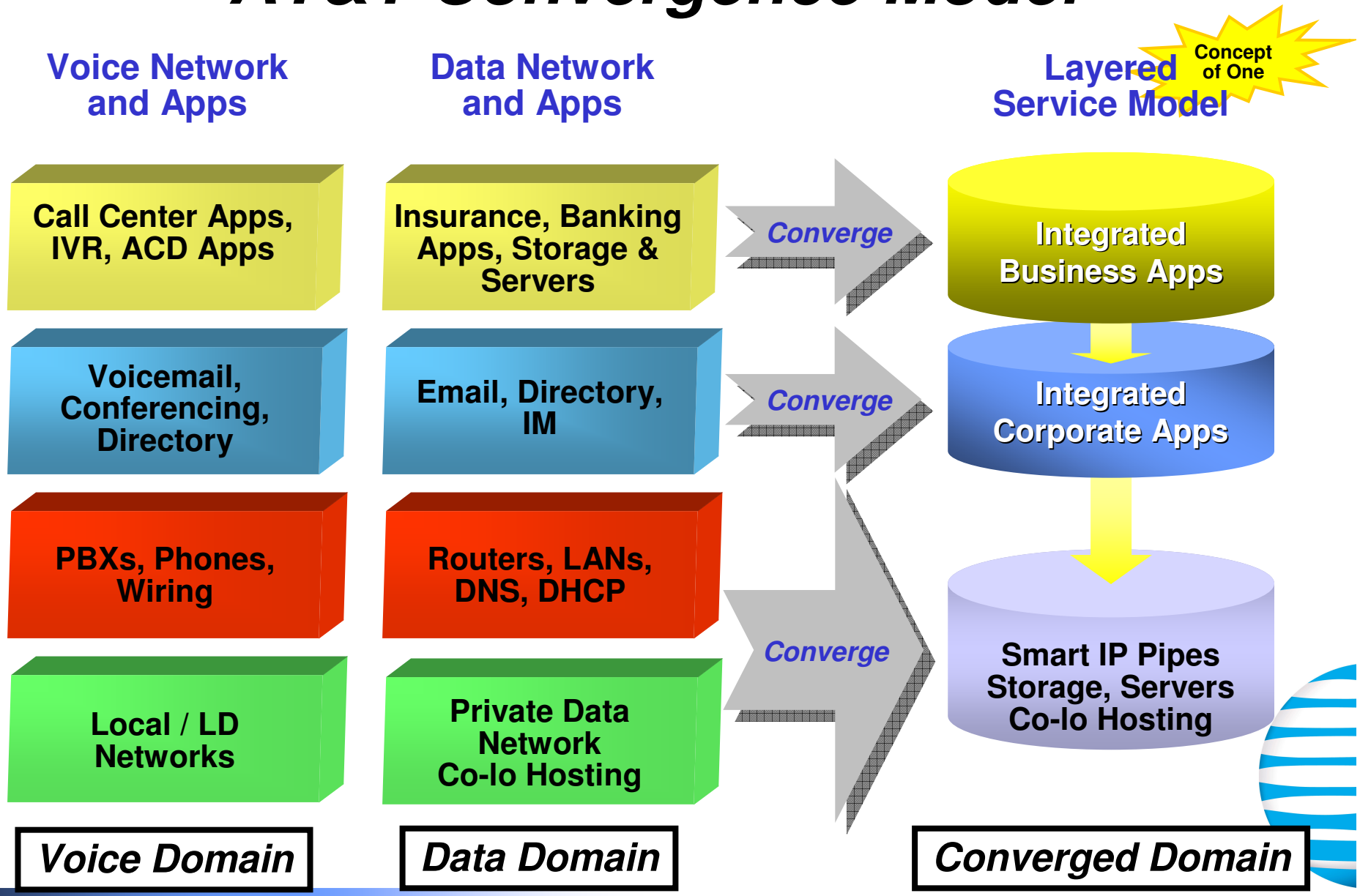
- **Automatically extract business intelligence and track service performance trends from spoken customer care data and call center operation data**
- **Uses advanced statistical data mining and machine learning algorithms for tracking trends and generating headlines**

Leveraging IP for Next Generation Voice Services



EXPLOIT TECHNICAL INNOVATION

AT&T Convergence Model



EXPLOIT TECHNICAL INNOVATION

Thank You!