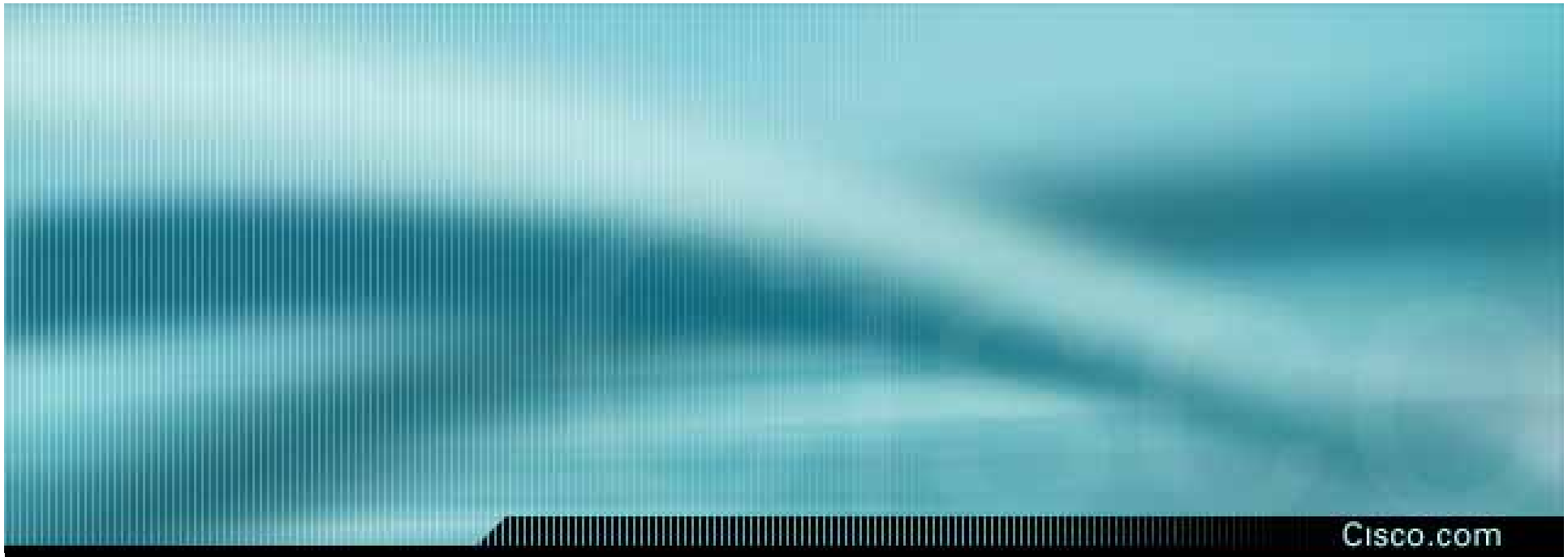


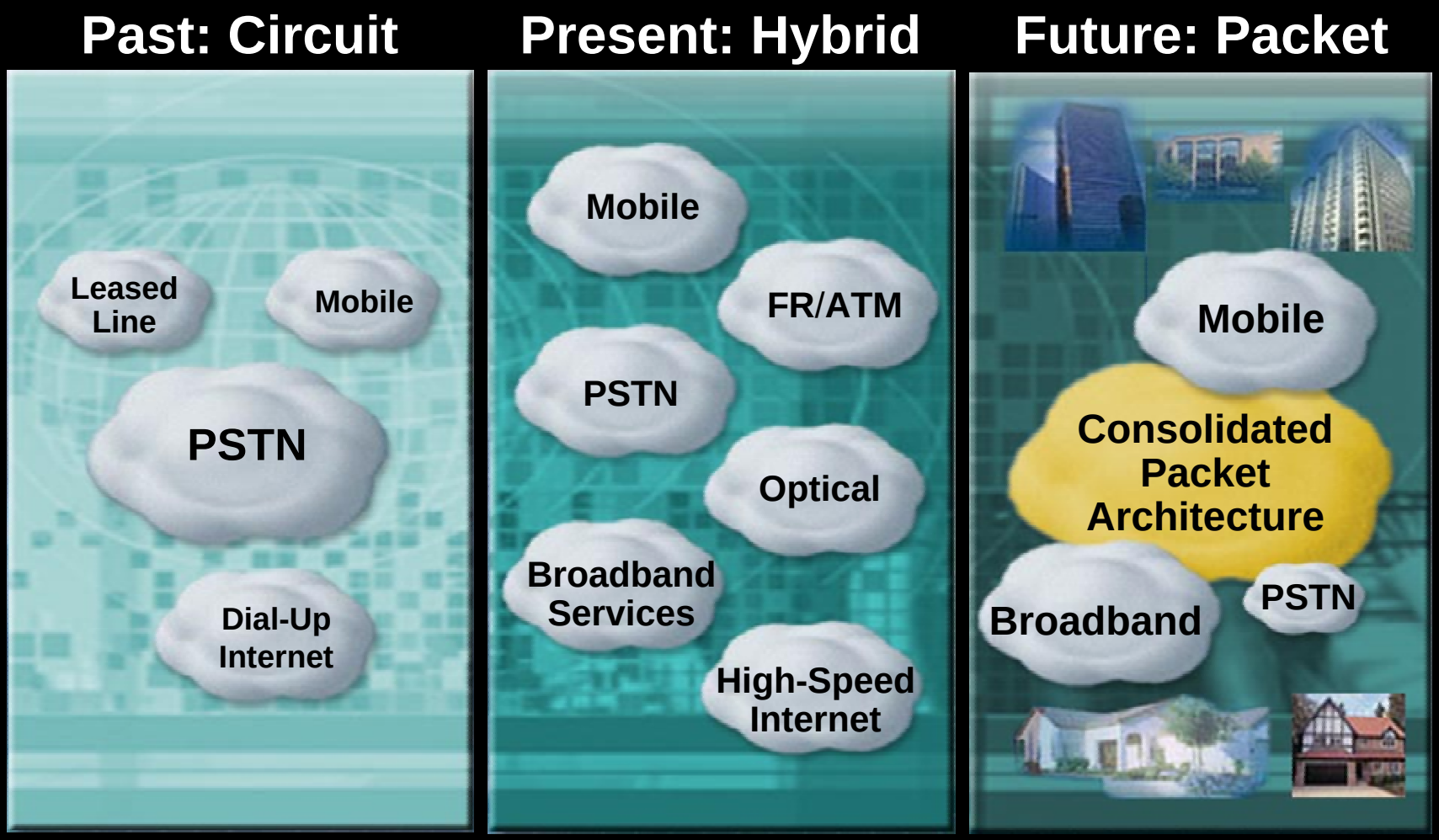
First Large Scale MPLS Deployment for Packet Voice A Case Study

Aleem Rizvan
Manager, Product Management
Cisco Systems
April 8, 2004

Agenda

- Market Dynamics
- Telecom Italia Case Study
- Lessons Learned
- Summary

Packet Migration Is Underway Worldwide



Industry Vision of Ideal Network (NGN)

Fusing the Best of Today's Networks and More

Mobility of the Wireless Network

Content Richness of Television

Reliability of the PSTN

Service Awareness

Next Generation Network

Service Richness

Service Flexibility

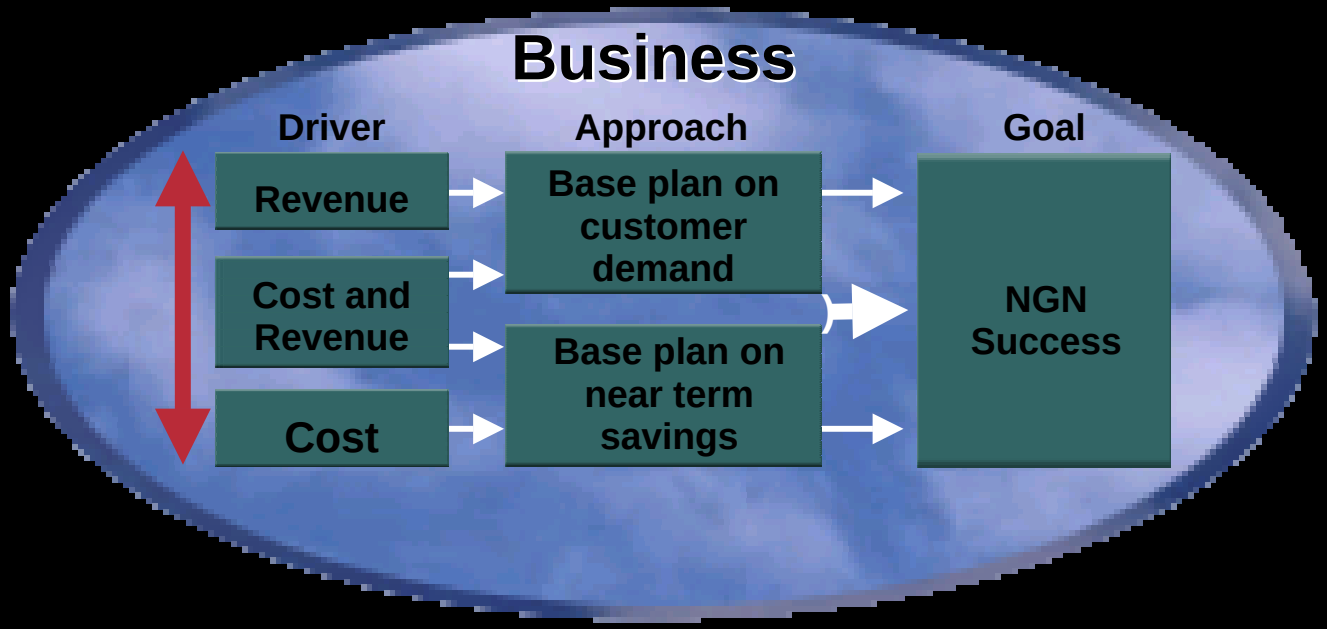
Ubiquity of the Internet

Capacity of an Optical Network

Simplicity of Ethernet

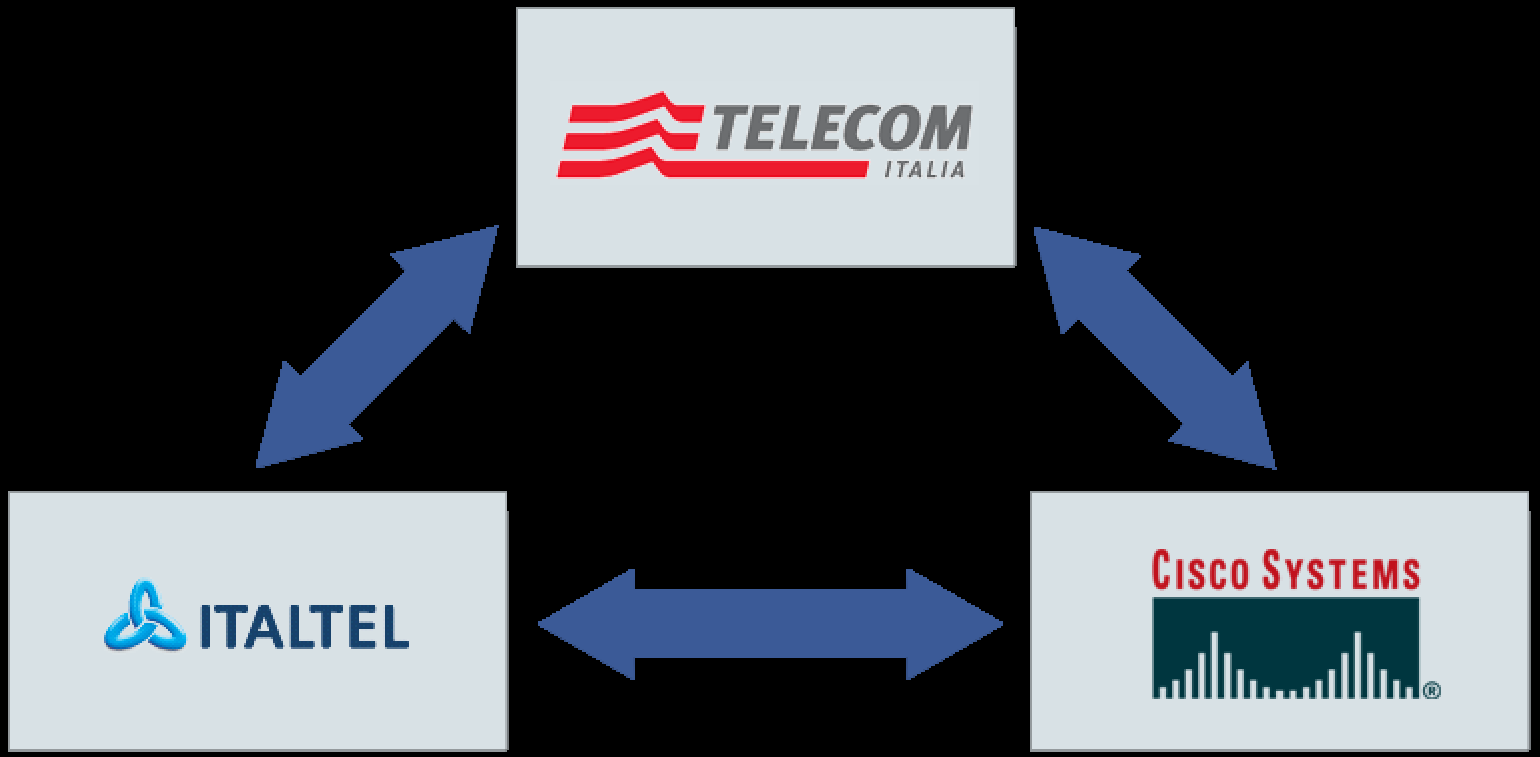
Security of a Private Network

The Business of NGN
Grow Revenue & Reduce Cost



- Primary Drivers for NGN vary by customer
  - OpEx Savings
  - New Services Revenue
  - Both
- Choice based on customer needs and preference

A Case Study: Telecom Italia BBN (National Backbone Network)



Partnership to Deliver World's First Full-Service IP and Packet Voice Network

Telecom Italia Agenda: Overall Network Enhancement Program

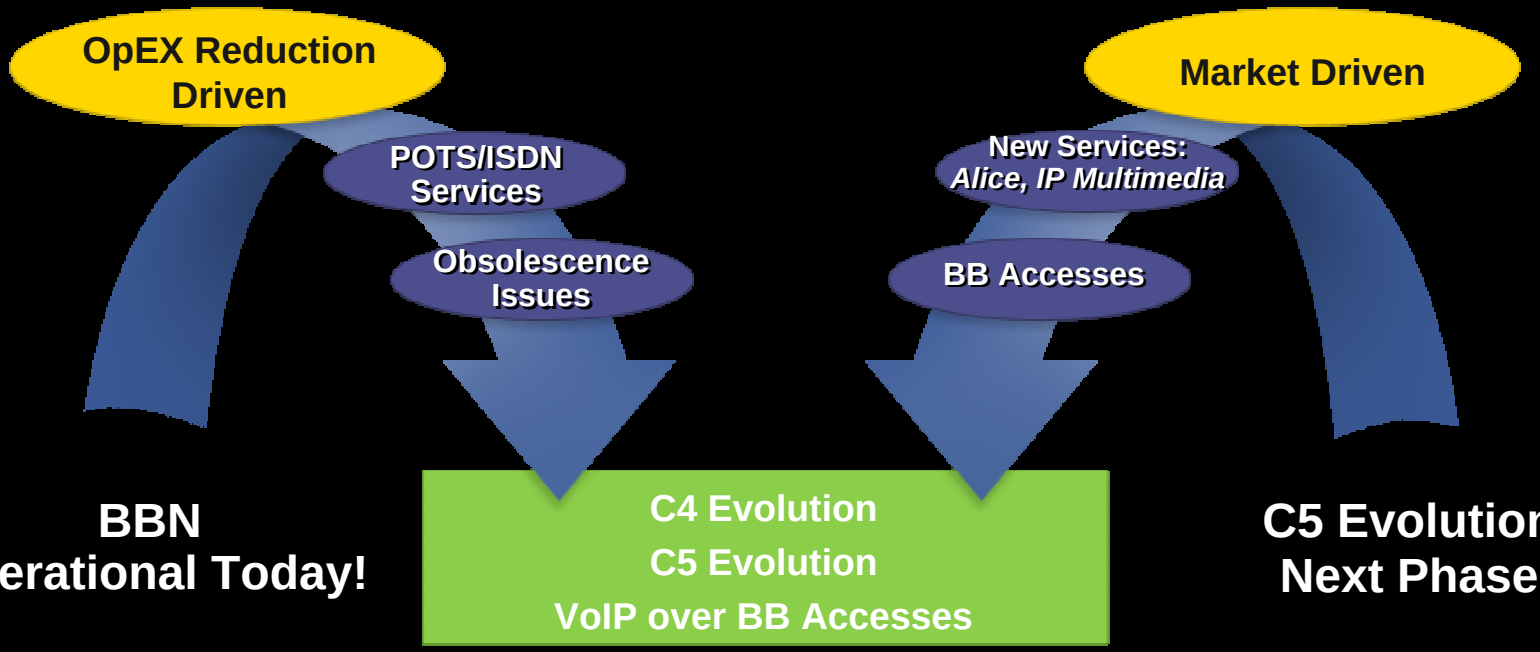
Evolution Trends and Main Projects

- **Backbone**
  - Optical Packet Backbone (OPB)
  - Class 4 evolution (BBN)
- **Access Networks**
  - Broadband xDSL
  - Optical Access (GBE, SDH, LRE)
  - Class 5 evolution
  - Optical Metro Network Evolution
  - WiFi access in Hot Spots

Goals of Enhancement Program:

Build Infrastructure for Tomorrow, Improve Operational Efficiency, Deliver New Services

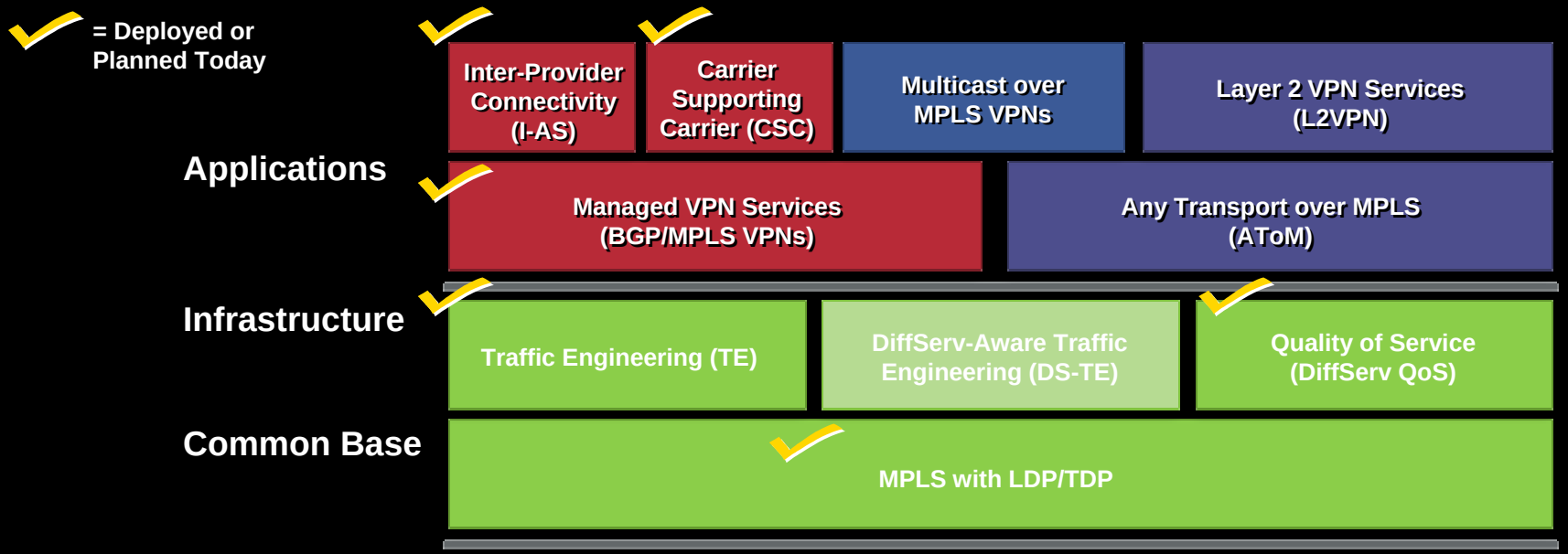
PSTN Evolution: OpEX and Market Driven and Evolution Phases Towards NGN



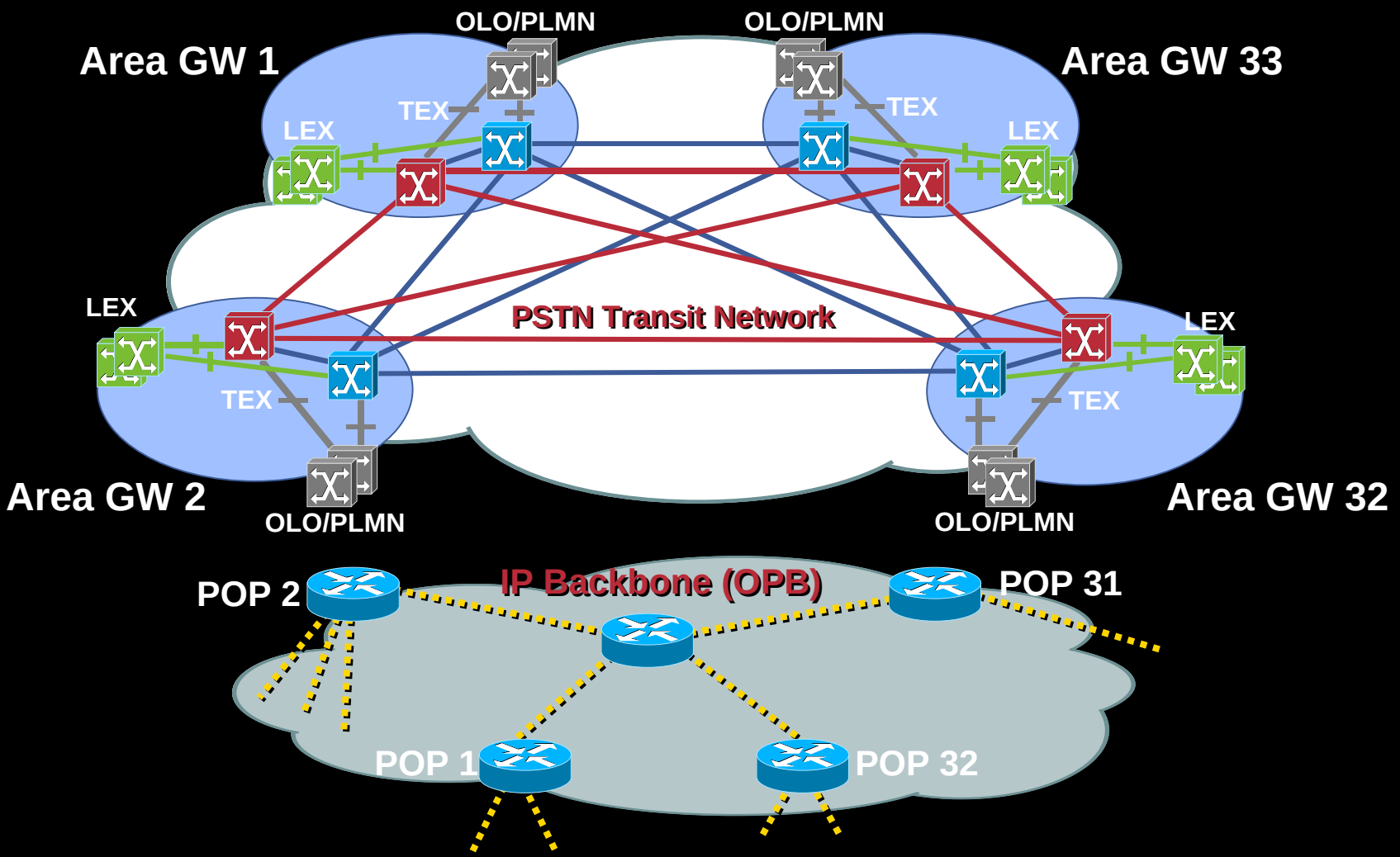
- Phase 0: Pan European Backbone (PEB): VoIP on the international network
- Phase 1: National Backbone Class 4 (BBN): VoIP at the national transit exchange level
- Phase 2: Native VoIP services over broadband accesses: Class 5 Softswitch for broadband corporate customers and SOHO
- Phase 3: Next Generation Class 5 (CL5-I): VoIP at the local exchange level

OPB: IP Backbone Strategy

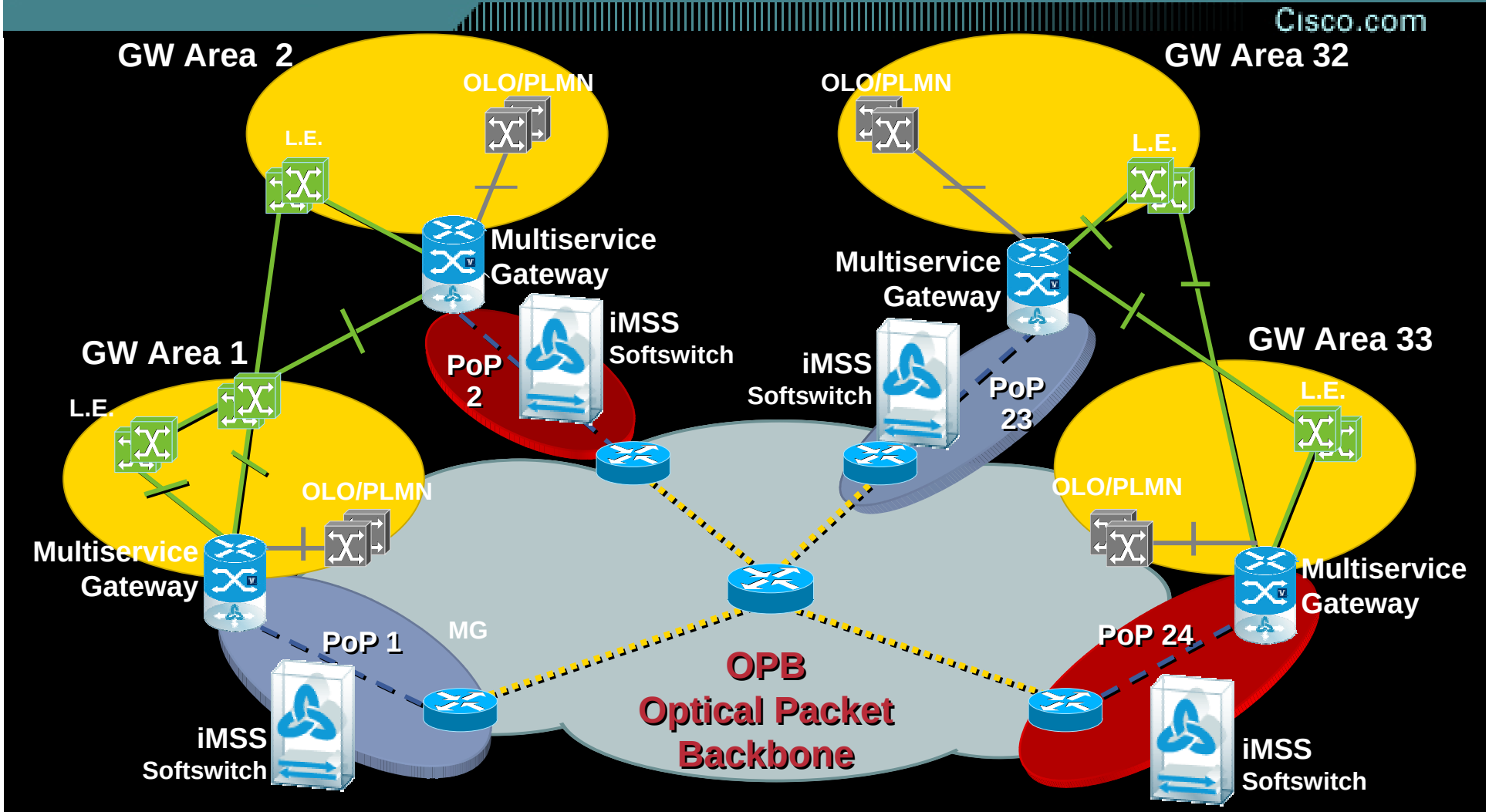
- **Goals:**
  - CapEX reduction in deploying a single backbone infrastructure
  - OpEX reduction related to the number of network elements
  - Deployment of a future proof IP Technology
  - New connectivity services
- **Tools:**
  - Broadband and high performance IP infrastructure
  - Enhanced IP/MPLS functionalities (CoS/QoS, MPLS Traffic Engineering, MPLS Fast Rerouting, MPLS VPN)



BBN Project:
Merging TDM and IP Backbones



BBN Goal and Reality: Multiservice National Backbone Built in 18 Months!



Components in BBN Architecture

The Cisco MGX® 8000 Series Carrier Voice Gateway

Media Gateway:
Conversion of TDM Voice to IP

The Cisco 12000 Series Router

IP/MPLS Core Router

The Cisco Catalyst® 6500 Series

Ethernet Switches

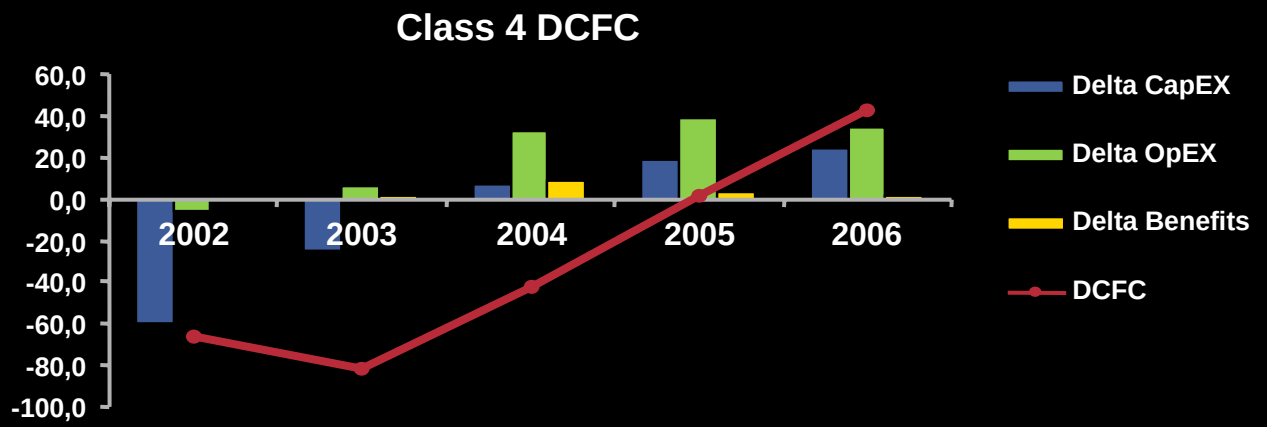
The Italtel iMSS® 4040

Softswitch

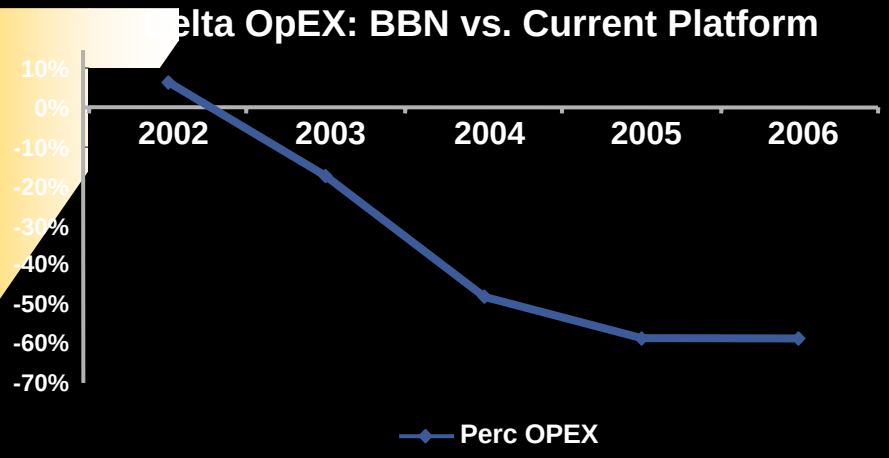
BBN Benefits

- **Operational cost savings:**
  - **20% cost saving during 2003**
  - **Expect a total of more than 50% in 2004**
- **Reduction obtained from:**
  - **Number of trunking routes reduced from 1000 to 24**
  - **Number of the switching points of presence reduced from 66 to 24**
  - **Number of switching technologies reduced from 3 to 1**
  - **Use of the same IP/MPLS backbone for voice and data**
  - **Centralization of the network operation center**

Voice Network Evolution: Economics



- Reduction of Number of Trunks Groups (from 1100 to 24)
- Simpler and Integrated Network Management Organization
- Reduction of Industrial Space Occupancy
- Reduction of Energy Need
- Reduction of Faults Rate



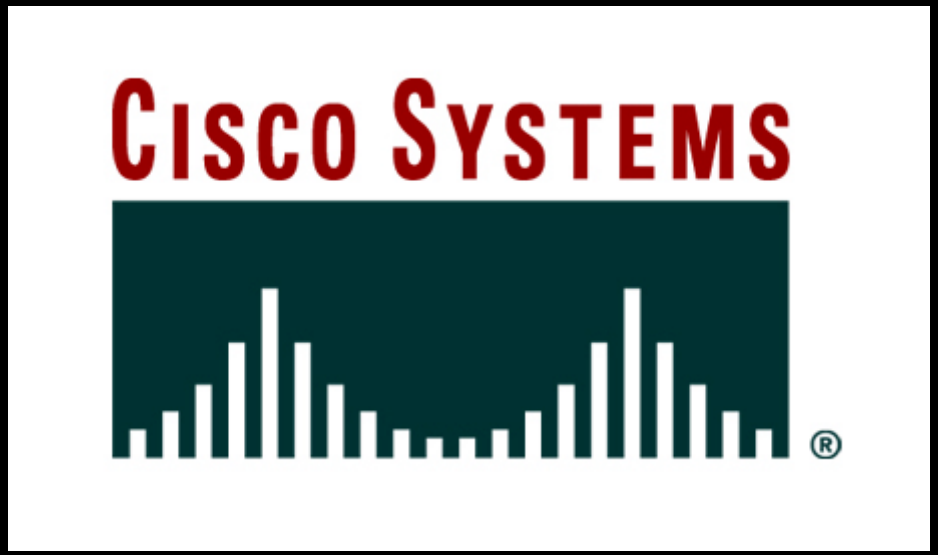
Lessons Learned

- Partnership and Commitment keys to success
- Focus beyond “Speeds and Feeds” connectivity of legacy equipment to better understanding of services running on the network
  - Fax Machines
  - Voice-Band Data Traffic (Legacy Modems, POS Equipment, etc.)
- Reduce emphasis on bandwidth savings using compression
  - Potential savings in the access network
  - Over use impacts voice quality due to multiple transcoding hops, not all of which is controllable by the operator
- Network Management & OSS Integration
  - New technology brings new management procedures
- Incremental steps towards final goal of next-generation network
  - Evolution not Revolution
- Project Justification at every step of the way
  - Operational Savings, Lowered CapEx, Efficient Allocation of CapEx

Summary

- Customer drivers for Next-Generation network deployment varies based on need
  - OpEx Savings
  - New Services Revenue
  - Both
- Consolidating core networks provides significant Operational Savings
  - IP/MPLS Provides features required for delivery of delay-sensitive traffic such as VoIP
- Delivery of new differentiated services requires IP/MPLS at the core
  - End-points are IP-based [SIP Phones, Residential Gateways, MTA etc.]
  - MultiService VPN for Enterprise and SMB Customers
- Partnership and commitment between customer and vendors are key to success

Thank You!



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