VoIP Overview in Emerging Economies and Deregulating Markets

Daniel Raye

Manager of Sales Engineering

VocalTec Communications Ltd

Jan 21, 2003

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Section 1: About VocalTec

Section 2: VoIP at A Glance

Section 3: Market Trends

Section 4: Case Studies/Customer Success Stories

Section 5: VocalTec Solutions

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About VocalTec

- **VocalTec is widely recognized as the founder of VoIP technology**

- **Innovator and leading provider of VoIP solutions since 1995 with installed base in over 100 countries**

- **Traded publicly on NASDAQ stock market ("VOCL")**

- **VocalTec offers packet voice solutions for international and national long distance calling as well as hosted services**

- **Customer base includes world leading carriers such as NTT Com, China Telecom PTAs, Deutsche Telekom, CAT of Thailand, ITXC, etc.**

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VocalTec's Milestones

Feb 1995: Internet Phone

Mar 1997: Invented & developed first gatekeeper

Feb 1998: First complete IP telephony solution

January 2000: Largest deployment of VocalTec call center technology

VocalTec introduces new SoftSwitch architecture

| 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |

Deutsche Telekom selects VT as exclusive NGN partner for carrier services

Apr 2001: VocalTec SIP server addresses new markets

Jul 1999: First deployment of gateway 2000

Aug 1997: Deutsche Telekom invests in VocalTec

Feb 1996: industry IPO (NASDAQ: VOCL)

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Extensive field experience

"Having deployed H.323-based networks worldwide for the past 5 years, VocalTec has a wealth of experience and an installed base of gateways that few of its competitors can boast."

Current Analysis, October 2001

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VocalTec Powers the World`s Leading Carriers
with State-of-the-Art VoIP solutions

Section 1: VocalTec Overview

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VoIP Network advantages

- **Network providing all communications needs**
  - Voice, Fax and Data services
- **Lower OpEx**
  - Remote and Centralized Management
  - Less personnel needed
  - Reduced maintenance costs
  - Short training intervals for highly skilled staff
- **Lower CapEx**
  - Using commercially available hardware platforms
  - Less space consuming
  - Scalability – expend as you grow
  - Best price-per-mission effectiveness as entry-level is cheap
  - Faster time to market at a lower cost of provisioning
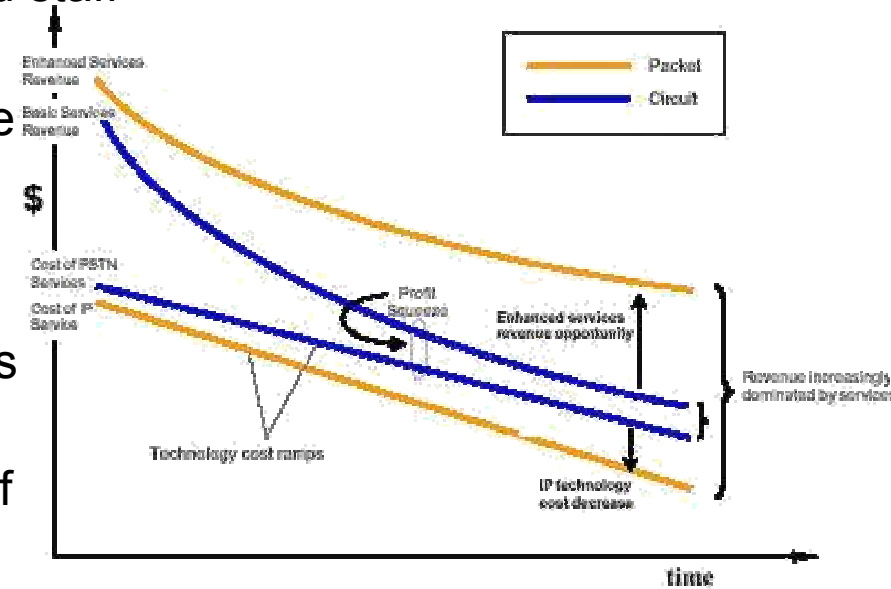
VoIP Network advantages

- **Packet-switched technology**
  - Provide evolution, flexibility, and innovative service creation
  - Shared resources throughout the network
  - Multipoint to multipoint nature - Better network flexibility to adjust and grow at a lower cost
  - Multi vendor sourcing
- **Centralized dialing plan rather then per switch**
  - Dialing plan provisioning as opposed to complex, switch-by-switch manner only
- **Turn-key and centralized introduction of services**
- **Enhanced Routing Capabilities:**
  - Hours of service (time-based routing)
  - Provide Differentiation of QoS/Source based routing: the termination criteria for a call is based on who (what gateway/domain) originated the call- different quality of paths (VPNs) will be provisioned to different customers.
  - Flexible gateway least-cost routing permissions/restrictions

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VoIP Network advantages
Maintain Quality of Service Features

- **Load balancing/Congestion Avoidance Features**
- **Quicker, more effective Routing**
  - Source-based routing
  - Interdomain polling
  - Hours-of service
  - Permissions/restrictions
  - Prioritizing and percentage

- **Distribute Call Load/ Prevent Congestion**
  - Resource Availability
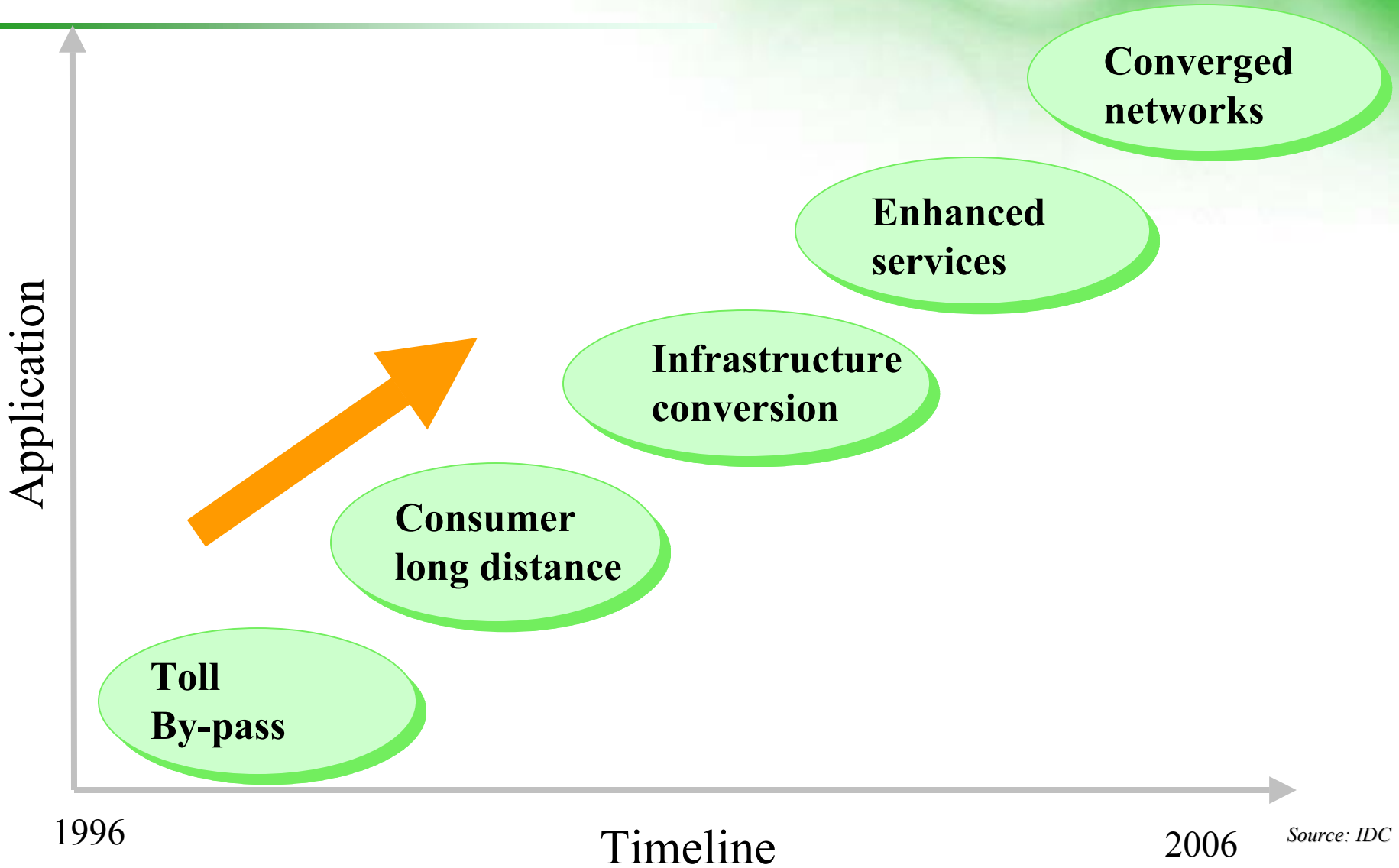 - GW redundancy: Can load balance on GWs
  - GK redundancy

VoIP Market Evolution

Application

Timeline

1996

2006

Toll By-pass

Consumer long distance

Infrastructure conversion

Enhanced services

Converged networks

Source: IDC
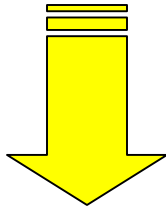
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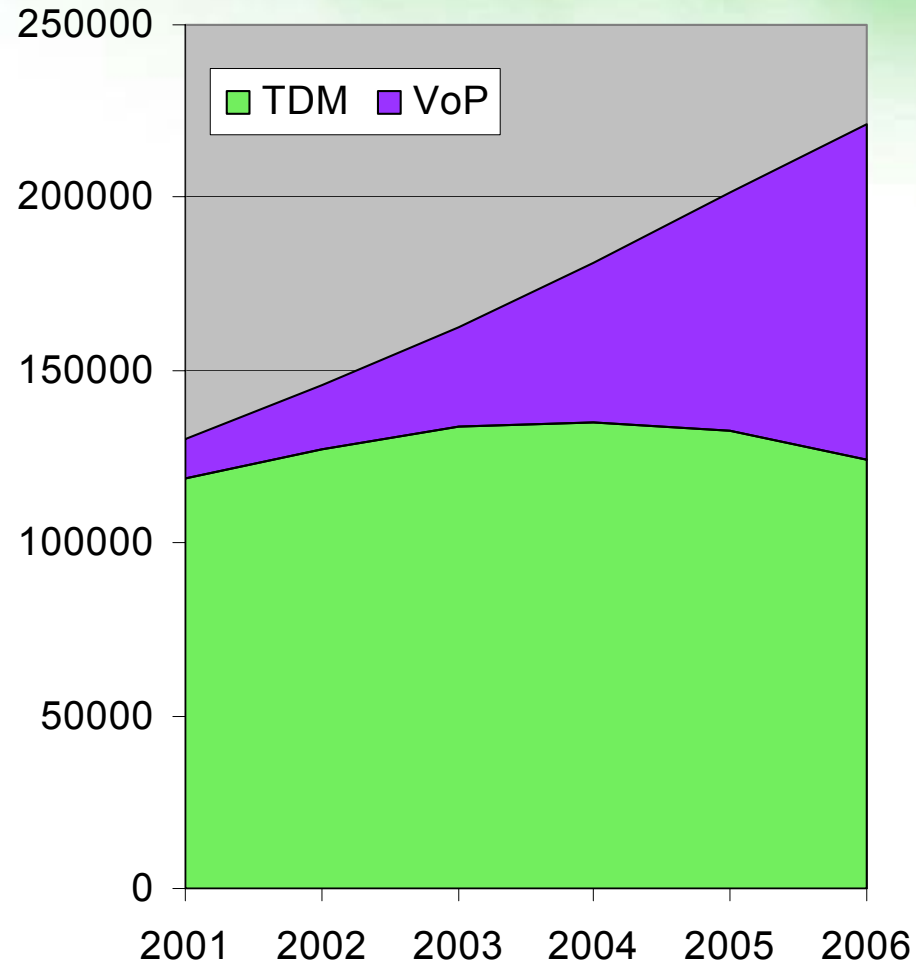
TDM vs VoP Growth

Growth Traffic for VoP in international networks

Growth in VoP traffic far surpasses growth in TDM traffic

VoP replace the TDM international network

TDM traffic to see negative growth starting 2004

Legend: TDM ■ (green) VoP ■ (purple)

Y-axis: 0, 50000, 100000, 150000, 200000, 250000
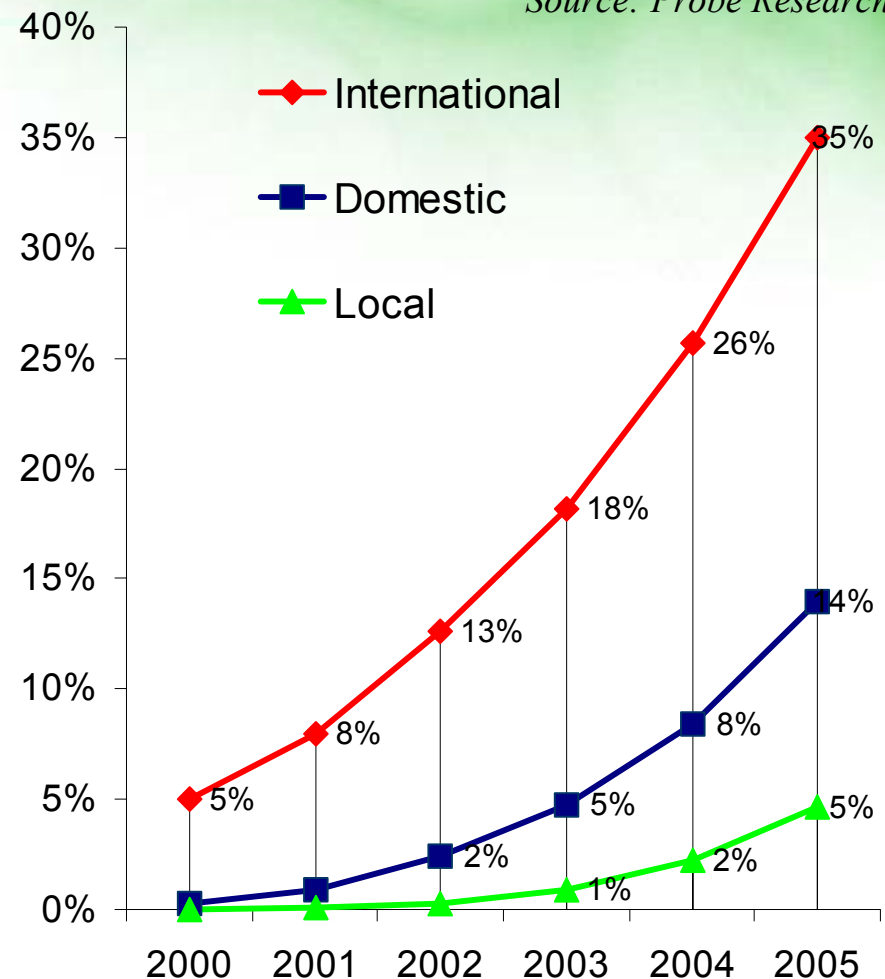X-axis: 2001, 2002, 2003, 2004, 2005, 2006

Source: Probe Research

International Continues to Drive VoIP Penetration

- **8% of all international traffic runs on VoIP (6% acc. to Telegeography)**

- **By 2006, 45% penetration of VoIP in ILD**
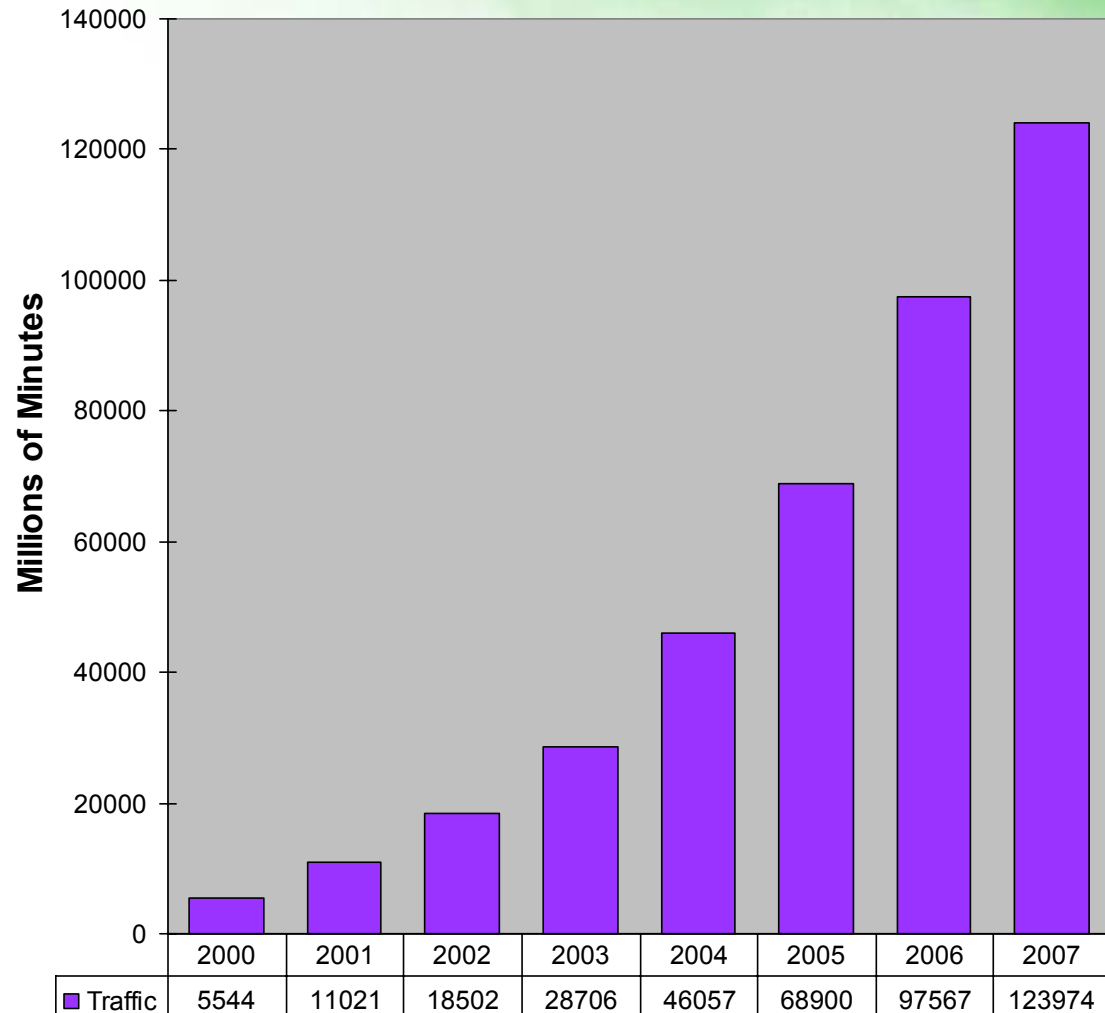
- **90% of all ILD traffic is run on H.323 networks**

"International traffic and services is one area where growth has proceeded rather predictably in the last couple of years. A growing volume of traditional international long distance calls is being transported over IP via either wholesale carriers or global business voice and data providers."- Probe Research

Chart legend:
- International (red)
- Domestic (blue)
- Local (green)

International: 2000 = 5%, 2001 = 8%, 2002 = 13%, 2003 = 18%, 2004 = 26%, 2005 = 35%

Domestic: 2002 = 2%, 2003 = 5%, 2004 = 8%, 2005 = 14%

Local: 2003 = 1%, 2004 = 2%, 2005 = 5%

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ILD VoP Minutes Forecast

- **2001- roughly 10B VoIP ILD minutes of use**

- **2002: Grow 68% to 18.5 billion minutes of use.**

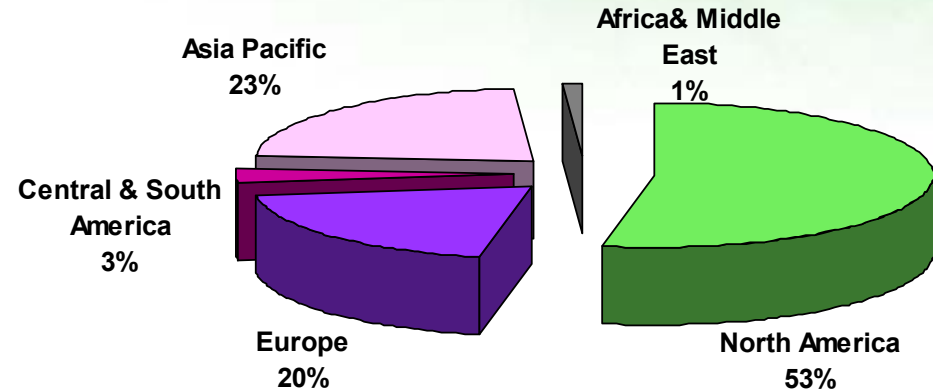- **2007, volumes expected to reach 124 billion minutes of use.**

	2000	2001	2002	2003	2004	2005	2006	2007
■ Traffic	5544	11021	18502	28706	46057	68900	97567	123974

Y-axis: Millions of Minutes

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International VoP Traffic Patterns
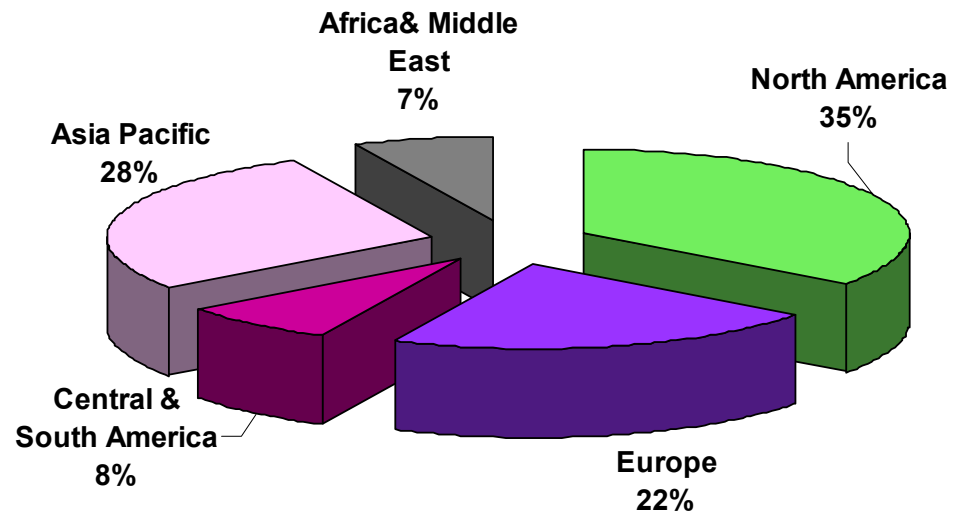
- 2002: 50% of the International VoP traffic originates from the US alone

- 2007: Balance of power will shift with US originated VoP accounting for only 35%.

- This will be due to rapid deregulation & adoption in Asia-Pacific, Eastern Europe and Africa

- National markets with high VoP penetration for outbound ILD include Nigeria, Australia, Korea, the Philippines, Thailand, the Czech Republic, Finland, Norway, Sweden, the UK, and all the larger countries in South America.

- National markets with high VoP penetration for inbound ILD include: Israel, China, Indonesia, Japan, Korea, the Philippines, Taiwan, Thailand, Russia, Mexico, the US and most of the larger countries in South America.

International VoP Traffic by Originating Region—2002

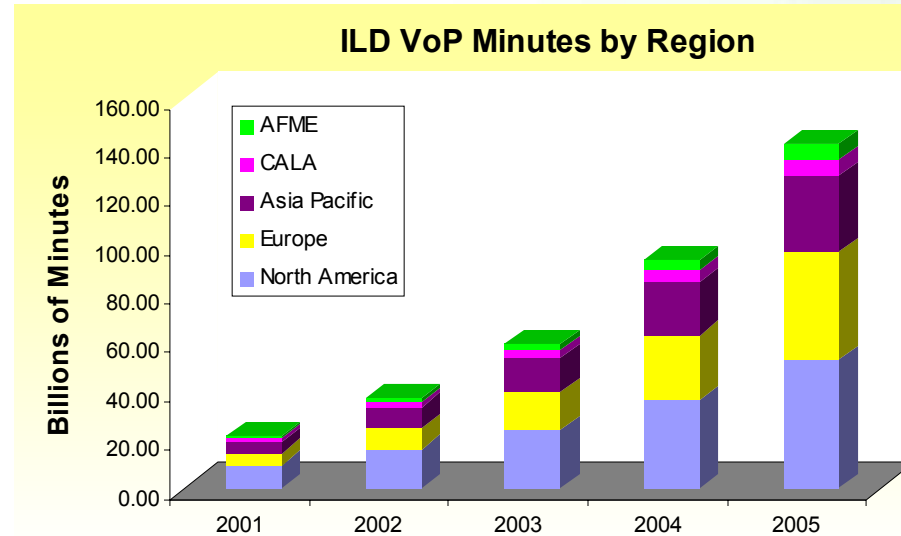Asia Pacific 23%
Africa& Middle East 1%
Central & South America 3%
Europe 20%
North America 53%

International VoP Traffic by Originating Region—2007

Africa& Middle East 7%
North America 35%
Asia Pacific 28%
Central & South America 8%
Europe 22%

WorldWide ILD VoP Minutes Forecast

WW ILD Minutes – Probe Research

	2001	2002	2003	2004	2005
	10.82B	18.39B	29.55B	46.88B	70.41B

ILD VoP Minutes by Region

Legend:
- AFME
- CALA
- Asia Pacific
- Europe
- North America

Y-axis: Billions of Minutes (0.00 to 160.00)
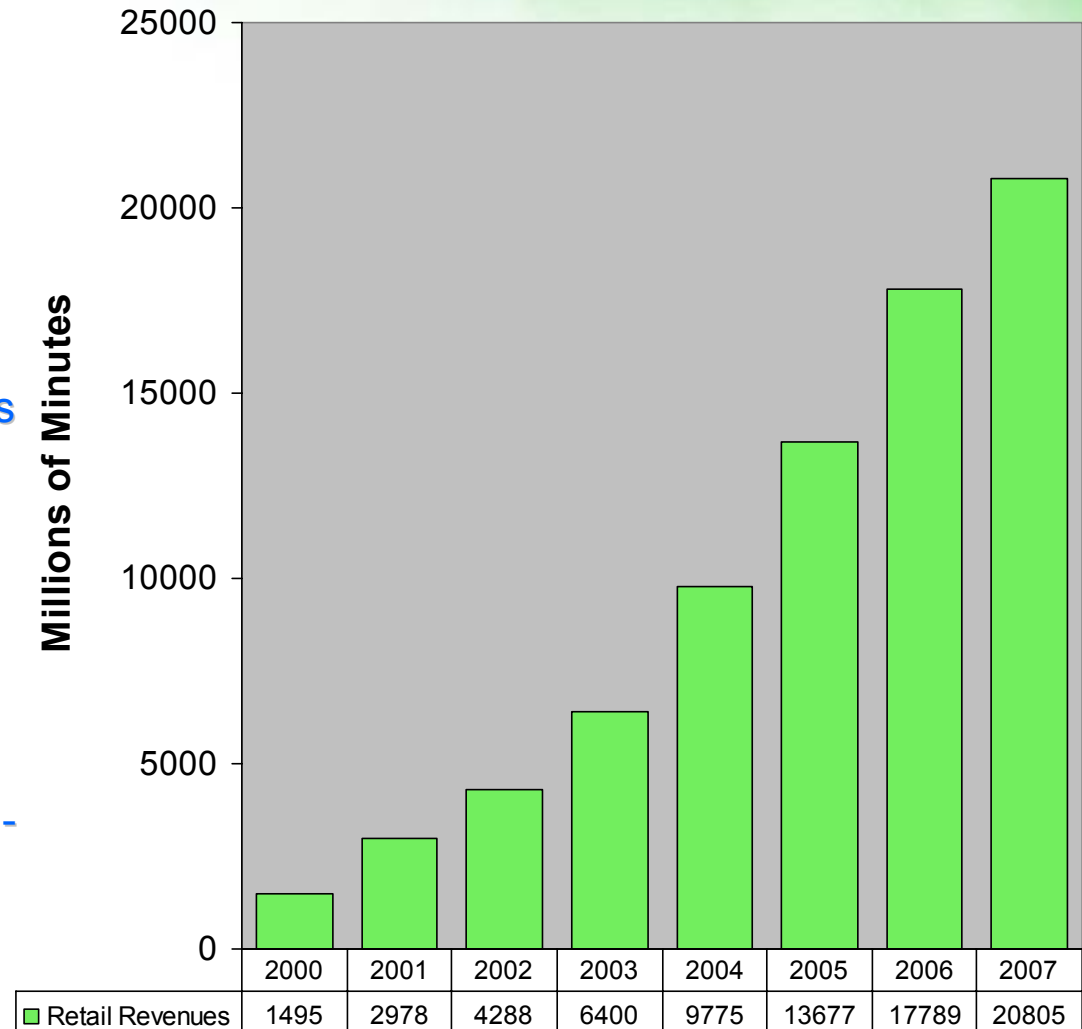X-axis: 2001, 2002, 2003, 2004, 2005

Source: Probe Research

- **North America continues to be the biggest market**
- **Growth is more prominent/promising in APAC and Africa/Middle East Region**

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International Long Distance: Pricing Trends

- International rates, in the current telecom environment are not expected to erode as quickly as previously expected, resulting in higher industry revenue for international calls.

- In 2001: Increase in the average per-minute rate for international calls in over half of the 60 countries tracked by Probe

- Larger and more long-term contracts in wholesale are commanding a higher rate

- There is a the growing demand for terminating calls to mobile phones - allowing the wholesalers a little extra margin over the premiums they must pay to wireless carriers.

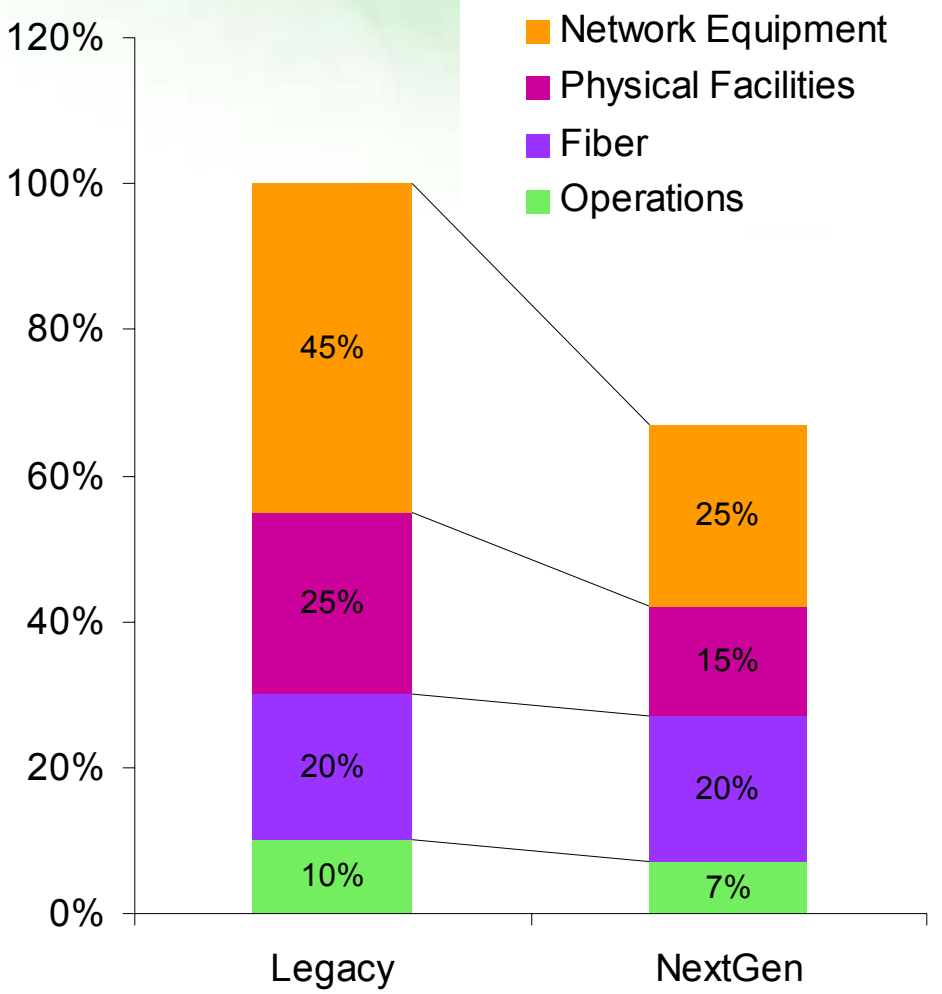**Millions of Minutes**

	2000	2001	2002	2003	2004	2005	2006	2007
Retail Revenues	1495	2978	4288	6400	9775	13677	17789	20805

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Changing Market Drivers for VoP

Toll by Pass or Arbitrage opportunity was the biggest driver for deployment of VoP
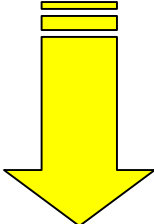
**Core network efficiencies & commercial maturity becoming the prominent driver for VoP deployments:**

- Time to market
- Capital & Opex cost savings
- Routing Flexibility
- Path to innovations

Legend
- ■ Network Equipment
- ■ Physical Facilities
- ■ Fiber
- ■ Operations

Legacy
- Network Equipment: 45%
- Physical Facilities: 25%
- Fiber: 20%
- Operations: 10%

NextGen
- Network Equipment: 25%
- Physical Facilities: 15%
- Fiber: 20%
- Operations: 7%

Source: CIBC

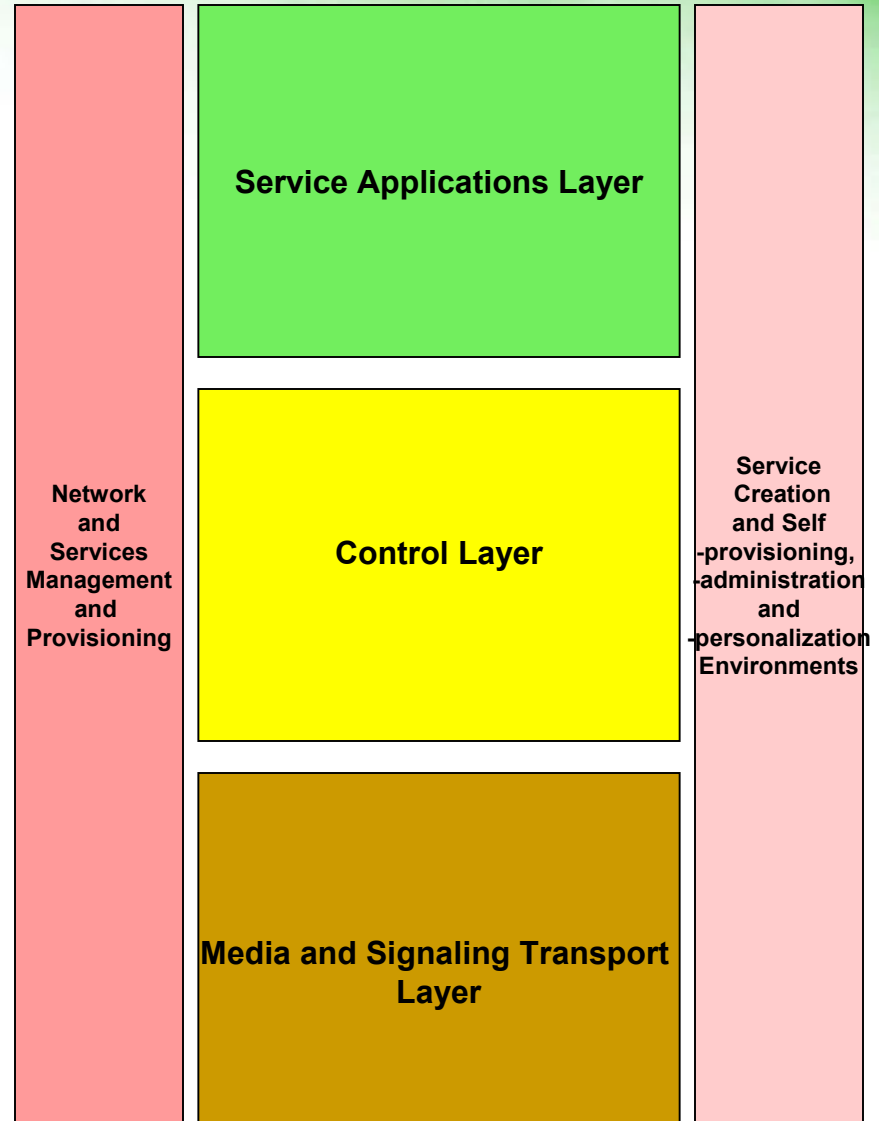# Softswitch Architectures Are Gaining Momentum

Today 90% of VoIP ILD minutes are on softswitches controlled networks that utilize <u>H323 protocol</u>
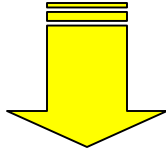
VoIP Networks are migrating to <u>multi protocol</u> Softswitch Architecture. Softswitches are software-based "switches" providing:

- Layered, open architectures

- Support for multiple standard protocols e.g. SIP, MGCP, Megaco, Sigtran, H.323

- Carrier-grade performance and reliability

- A high degree of scalability

- A multi-vendor network environment enabled by open APIs

Network and Services Management and Provisioning	Service Applications Layer	Service Creation and Self-provisioning, -administration and -personalization Environments
	Control Layer	
	Media and Signaling Transport Layer	

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Adoption by new carriers vs. Incumbents

VoIP started mainly by adoption by collection of phone card marketers, gray operators, and few competitive operators
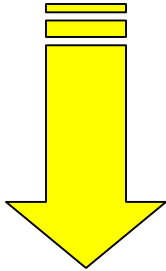
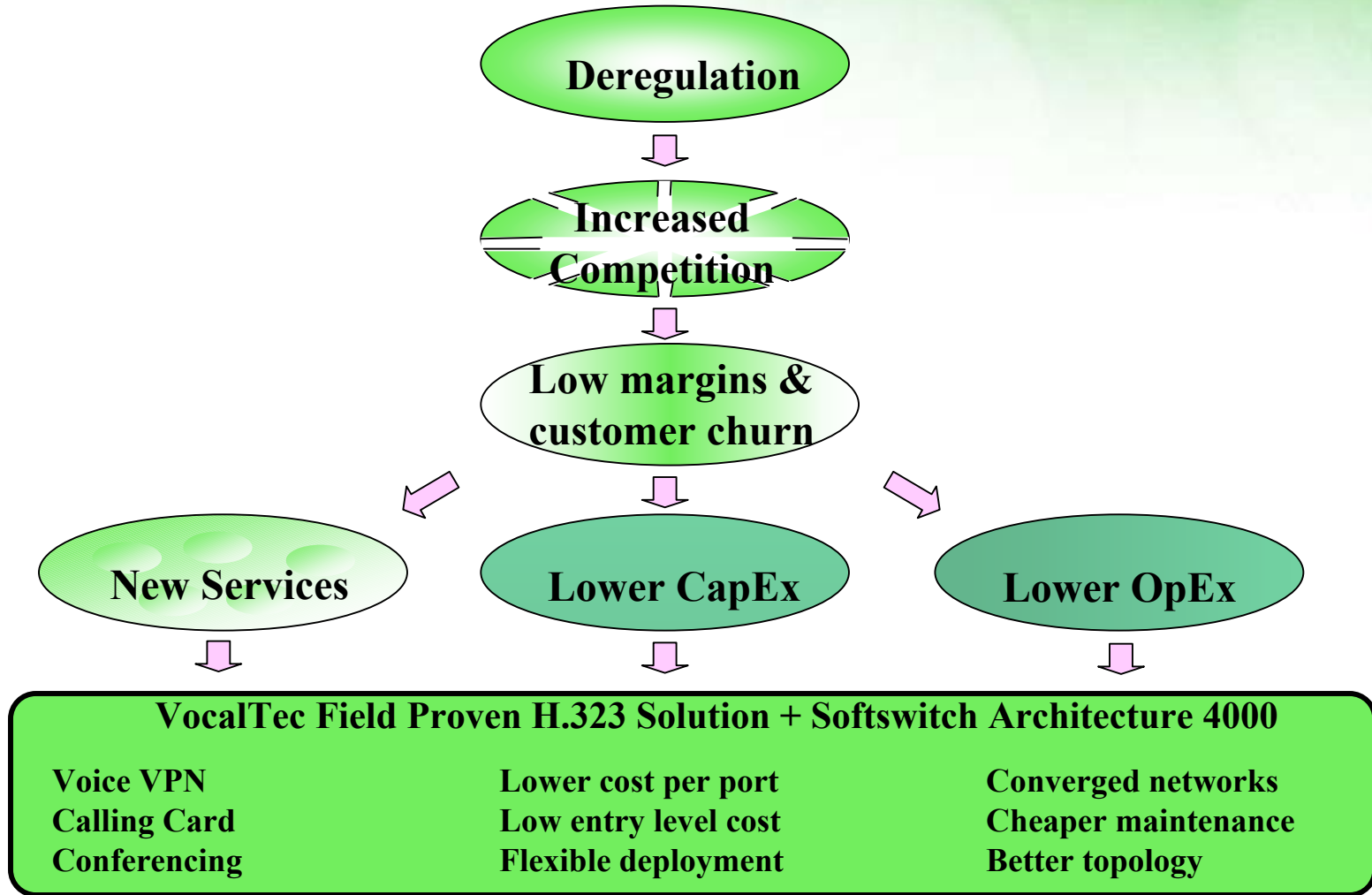**More and more incumbents and competitive operators are increasingly adopting the VoP technology:**

- led by competitive and revenue drivers.

Incumbents & Leading Carriers deploying VoIP

Some VocalTec Incumbent Customers:

-**Deutsche Telekom**

-**Communications Authority of Thailand(CAT)**

-**RomTelecom (Romania)**

-**Netia, Poland**

-**Marconi, Portugal**

-**Entel, Chile**

-**China Telecom**

-**Data Access**

-**ITXC**

- **iBasis**

Conclusion: Market Driving Forces

```
                    Deregulation
                         │
                         ▼
                     Increased
                    Competition
                         │
                         ▼
                  Low margins &
                  customer churn
            ┌────────────┼────────────┐
            ▼            ▼            ▼
      New Services   Lower CapEx   Lower OpEx
            │            │            │
            ▼            ▼            ▼
```

VocalTec Field Proven H.323 Solution + Softswitch Architecture 4000

Voice VPN	Lower cost per port	Converged networks
Calling Card	Low entry level cost	Cheaper maintenance
Conferencing	Flexible deployment	Better topology

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Case Studies/Customer Success Stories

- **1. Carrier-class Solution – Global Deployment**
  - Global Customer Support, Unmatched SS7 Flavors **– Deutsche Telekom**

- **2. Newly Deregulated Market – ILD Termination -> NLD -> Voice VPN**
  - Time to Market, Minimized CapEx & OpEx **– Data Access, India**

- **3. International Long Distance Wholesale – Exchange Carrier**
  - Superior Routing, Proven Interoperability **– ITXC**

- **4. Rural Telephony – VoIP + VSAT/WLL**
  - Low Entry Cost, Promptly Addressing Customer Needs **– Bhutan & Africa**

- **5. Revenue Generating Quick ROI – NLD/Calling Card Solution**
  - Beating Competition, Cash Cow Service **– China Telecom, Liaoning PTA**

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1. Case Study – T-Systems
Global Support, Superior SS7 Solution

- **T-Systems (Deutsche Telekom) – Europe's 2nd largest integrated systems provider**

- **Carrier-grade global VocalTec-powered VoIP network for wholesale international services – in service since January 2001**

- **Certified carrier-grade system**
  - Full SS7 tunneling over IP and SS7 redundancy
  - Guaranteed level of service using T-System's dedicated lines
  - Carrier-class telephony gateways with superior voice quality
  - Seamless VoIP billing based on PSTN-like CDR format
  - Centrally managed, fully redundant network

- **Recently expanded by T-Systems to handle growing demand for VoIP-based international services**

- **Reseller agreement enables T-Systems to resell VocalTec VoIP equipment to carrier customers**

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2. Case Study – Data Access
Time To Market ILD/NLD – Stay Ahead of Competition

- **Background**
  - Data Access (India) Ltd. is a joint venture between SPA Enterprises Ltd. and Hong Kong based Pacific Century Cyberworks (PCCW).
  - Data Access provides wholesale voice & data services
  - Data Access was incorporated in 1999 and launched the Network of the World (NOW) brand in India in October 2000 and its ILD service in July 2002
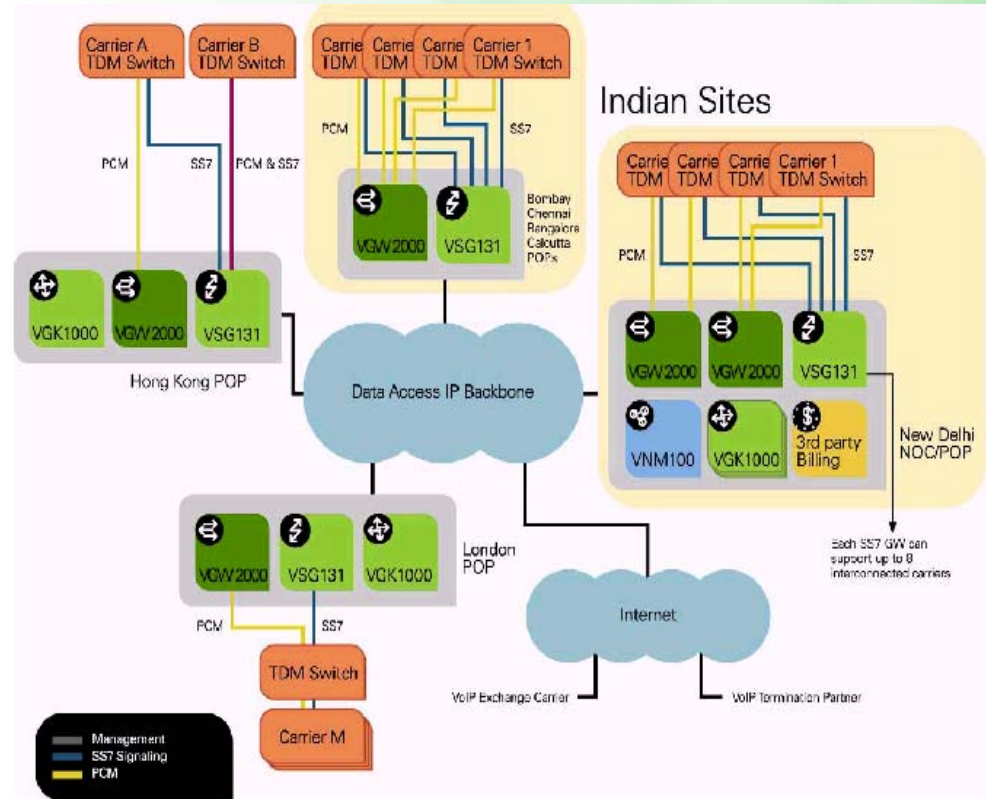
- **ILD Network on VocalTec Platform**
  - Data Access built up India's largest private sector global connectivity operation for TDM and IP, which will now be leveraged for both voice and data.
  - Within 4 months of operation, Data Access has been able to garner 25% market the total ILD minutes
  - VocalTec's ILD solution has enabled Data Access to fully meet its business requirements:
    - **Superior Voice Quality: Data Access' MOS is 4.5 for BSNL**-originated calls, and 4.62 for MTNL-originated calls, well above the license-stipulated minimum of 4.
    - **High Call Completion Rate Leads to Customer Satisfaction** –The average CCR over Data Access' packet telephony network is 62%
    - **Time to Market**:VocalTec completed the installation of 5 POPs in the space of 2 weeks

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"Our network performance in terms of MOS, PDD and CCR ensures that our customers enjoy the highest level of call quality and service reliability," said *Siddhartha Ray, CEO at Data Access.* "The network is of an international quality and is comparable to that of Deutsche Telekom, MCI, Telstra, NTT and Teleglobe. It makes us a generation ahead of all international carriers in India."

Global Wholesale – Proven Interoperability

- **VocalTec was the initiator of VoIP wholesale business model in 1997 and co-founder of ITXC (NASDAQ: ITXC) in 1998**
  - ITXC went EBITDA positive in Q1 2002
  - No net debts and strong balance sheet (http://www.itxc.com)
  - Chairman and CEO: Tom Evslin
  - VocalTec selling to ITXC substantially all of shares to ITXC, Nov 2002

- **ITXC, largest US-based international wholesale carrier**
  - 892 POPs in 434 cities and 152 countries (March 31st, 2002) in 4 years
  - Network carries international traffic of 14 out of 15 top carriers
  - "ITXC Reaches 10 Million Minute Day Milestone " (April 22, 2002)
  - ITXC does on an average 838 Million Minutes a quarter (October, 2003)
  - 7th largest International Carrier – achieved in under 4 years in operation

- **VocalTec`s VoIP SoftSwitch Solution powers ITXC`s network**
  - 70+% of all POPs are based on VocalTec VoIP infrastructure
  - 99% of all POPs are managed centrally out of Princeton, New Jersey by VocalTec`s industry leading Gatekeeper
  - Interoperability

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3.2 Case Study – ITXC
## Global Wholesale – Proven Interoperability

- **Simple, straight forward cost-effective Network Infrastructure**
    - Three main hubs: New Jersey & Los Angeles/US, London/UK
    - Aggregated PSTN traffic & send it via IP to termination POPs
    - ITXC owns no fiber. Relies solely on IP bandwidth from three major ISPS, two of which have Tier 1 backbones.
    - Route 75% percent over the open Internet (guaranteed Quality of Service)
    - Most of the termination POPs are not owned by ITXC – under 100m US$ aggregated capital expenses
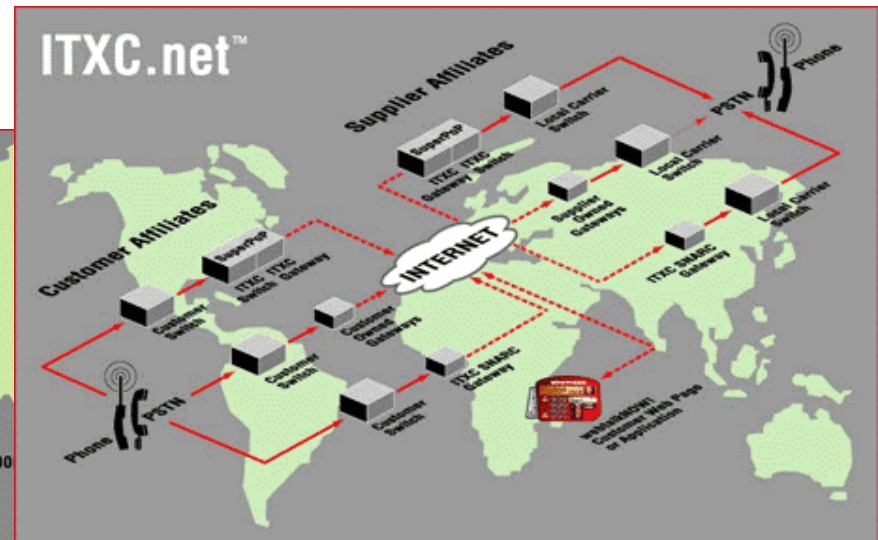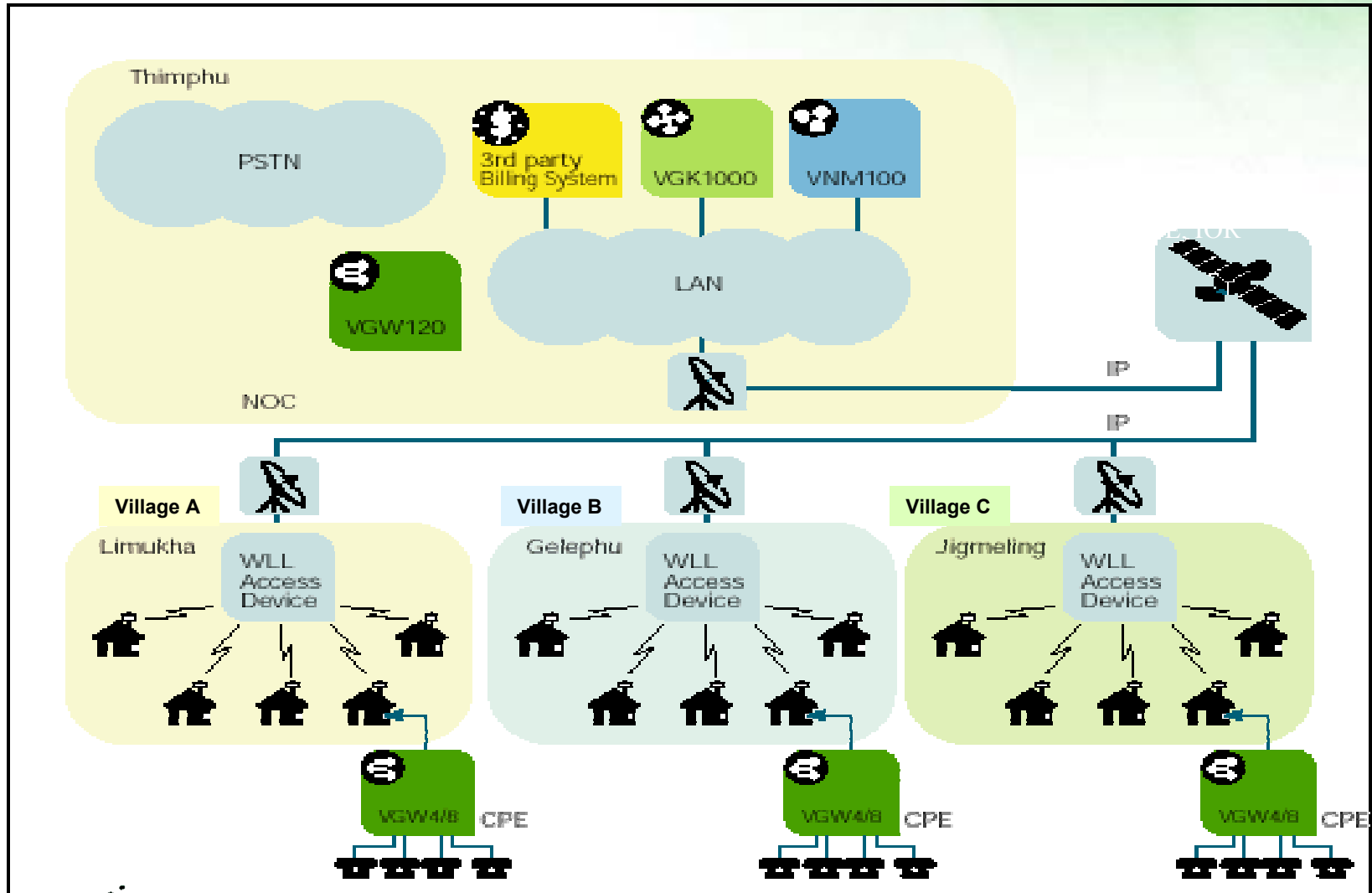
5. China Telecom Liaoning PTA

Consumer Calling Card/NLD - Cash Cow Services

- # NOC
  - 2 Gatekeepers➔ 3 GKs
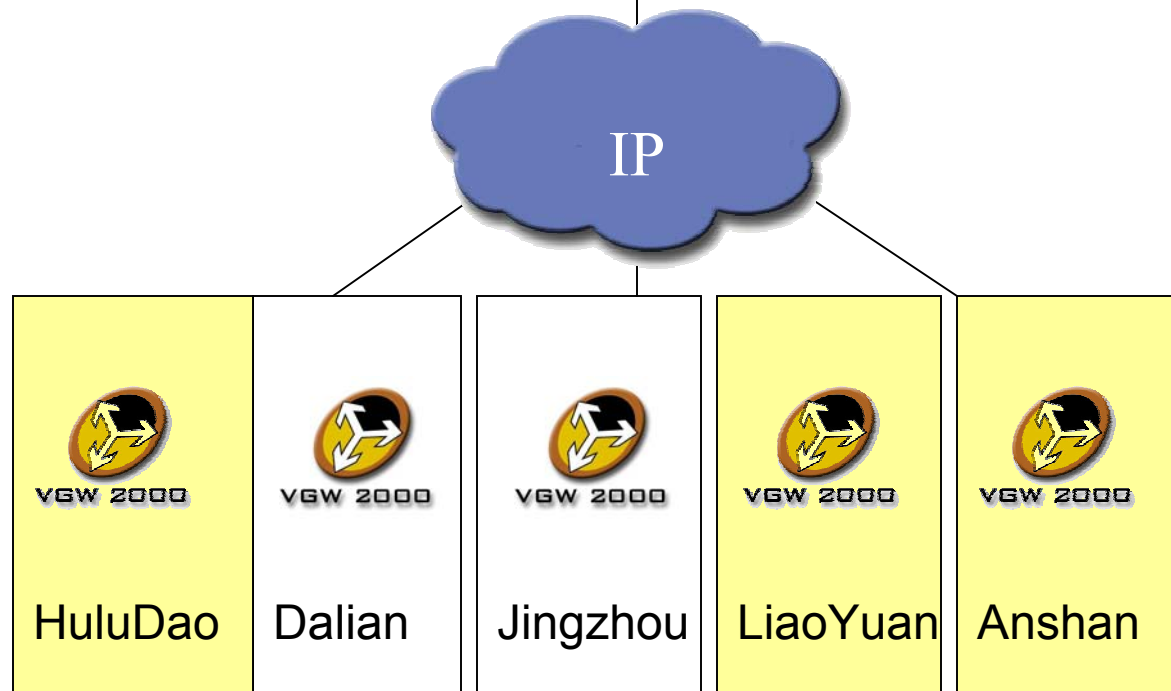 - 1 VNM
  - 2 Billing Real Time Server
  - 1 Billing DB
- # POPs
  - 3 Cities➔ 6 Cities
    - Shenyang
    - Dalian➔Huludao,Anshan
    - Jingzhou➔LiaoYuan
  - 4 Gateways 2000
- # Telephony
  - 56 E1➔ 164E1
  - ISDN

Section 1: VocalTec Overview
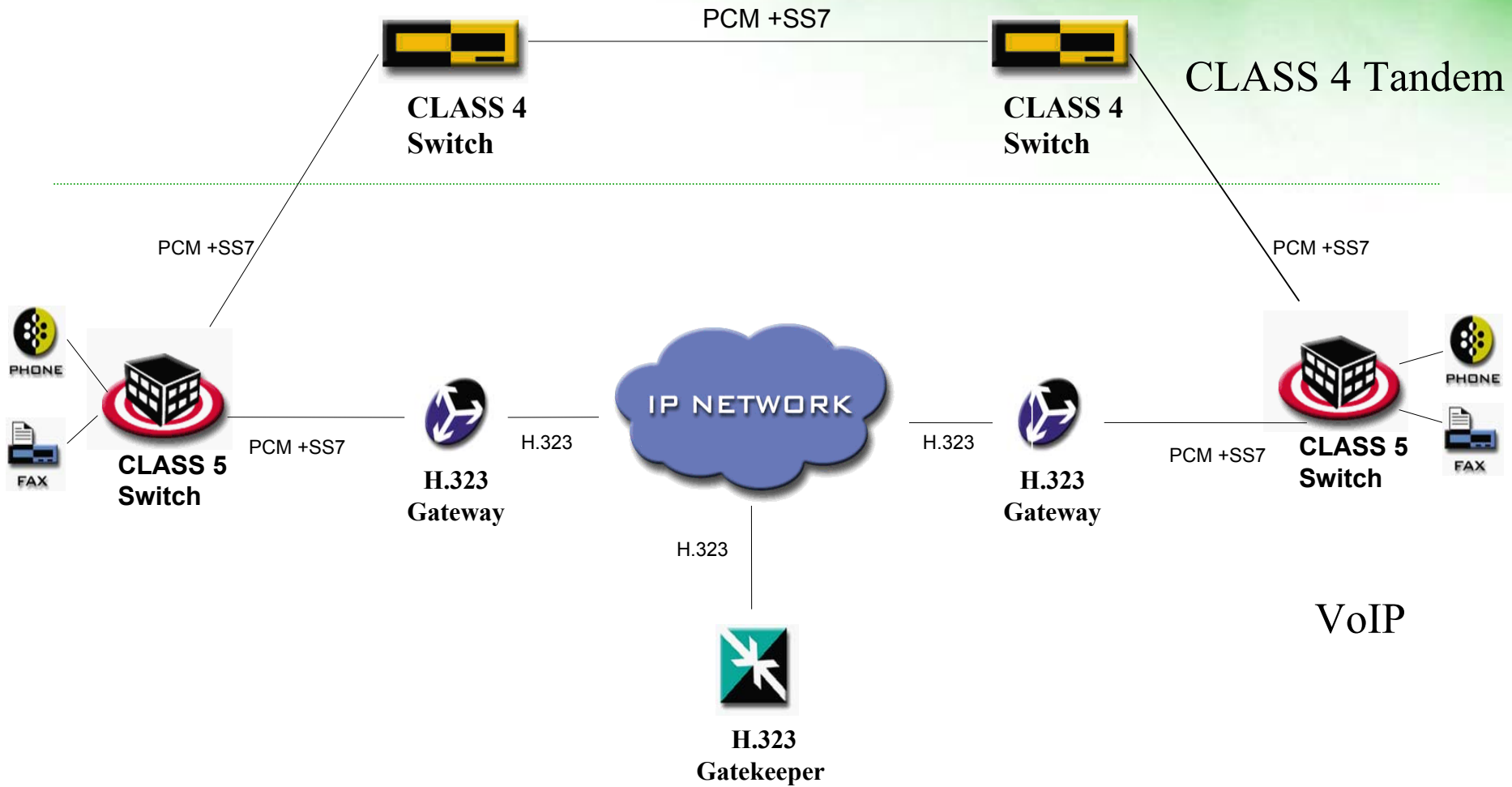
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Deregulating Economies: Market Trends

- **Increase telephony minutes of use and tele-density**
  - Using less bandwidth
  - At reduced levels of capital investment and lower operating costs
  - With easier maintenance, better support and, ultimately, greater self-sufficiency
- **Enable lower rates without incurring lower margins**
- **Handling post-reform competition**
- **Enable rapid development of pre-paid services, enhanced business services and fixed-line/cellular integration**
  - Faster and less expensively than on legacy TDM systems
- **Adopt an infrastructure that can economically support Rural Telephony and low teledensity environments**

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H.323 Packet Tandem Switching Solution

PCM +SS7

CLASS 4 Switch

CLASS 4 Switch

CLASS 4 Tandem

PCM +SS7

PCM +SS7

PHONE

FAX

CLASS 5 Switch

PCM +SS7

H.323 Gateway

H.323

IP NETWORK

H.323

H.323

H.323 Gateway

PCM +SS7

CLASS 5 Switch

PHONE

FAX

VoIP

H.323 Gatekeeper

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Packet Tandem Switching

- **Sometimes called "CLASS 4 Replacement"**
  - In the PSTN CLASS 4 switches perform this function
  - Flexible routing, not limited like PSTN to point to point
  - Centralized and easier management leading to reduced operational costs and faster response to market changes
  - Requires support for multiple national and international SS7 flavours to interconnect with PSTN operators
- **Moving network infrastructure to IP**
  - Routing national long distance efficiently (convergence)
  - New opportunities for International long distance (routing)
- **IP network voice applications lay on top**
  - Calling Card
  - VPN
  - Others

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Carrier Solutions
Traffic Peering Program Solution

- **Hundreds of Exchange Carriers want to send their minutes over IP**

- **VocalTec is interoperable with 60% of VoIP ports today.**

- **By implementing a simple system (Gatekeeper, Gateways) a carrier can receive traffic from all around the world**

- **A Carrier's investment is almost limited to**
  - VOIP System
  - PSTN termination

- **Reduced investment in**
  - Marketing
  - Calling Cards
  - Sales people

Wholesale Carrier

- **Worlds' leading exchange carriers using VocalTec**

- **State of the Art routing capabilities**

- **Superior Peering**
  - **Minimized** PDD (**Post Dial Delay**) for Exchange Carriers via simultaneous polling
  - Unique IDM (**Inter Domain**) Connection Management

- **Network Interconnect Management**

- **Service Level Agreement (SLA) over incoming and outgoing traffic**

- **VocalTec promotes peering agreements between its customers on a global basis**
  - Benefit: Immediate termination opportunities for regional and/or global reach

Calling Card Solution

- **Prepaid and Postpaid Calling Card service**

- **Proven money making solution**

- **Minimal capital investment**

- **Rapid deployment and quick time to market**

- **Much lower rates**

- **Various payments modes**

- **Multiple language support and enhanced menu via IVR**

VoIP VPN

VoIP VPN enables **Service Providers** to provide **multiple** corporate customers with **private** voice communications on top of a shared **IP** network.
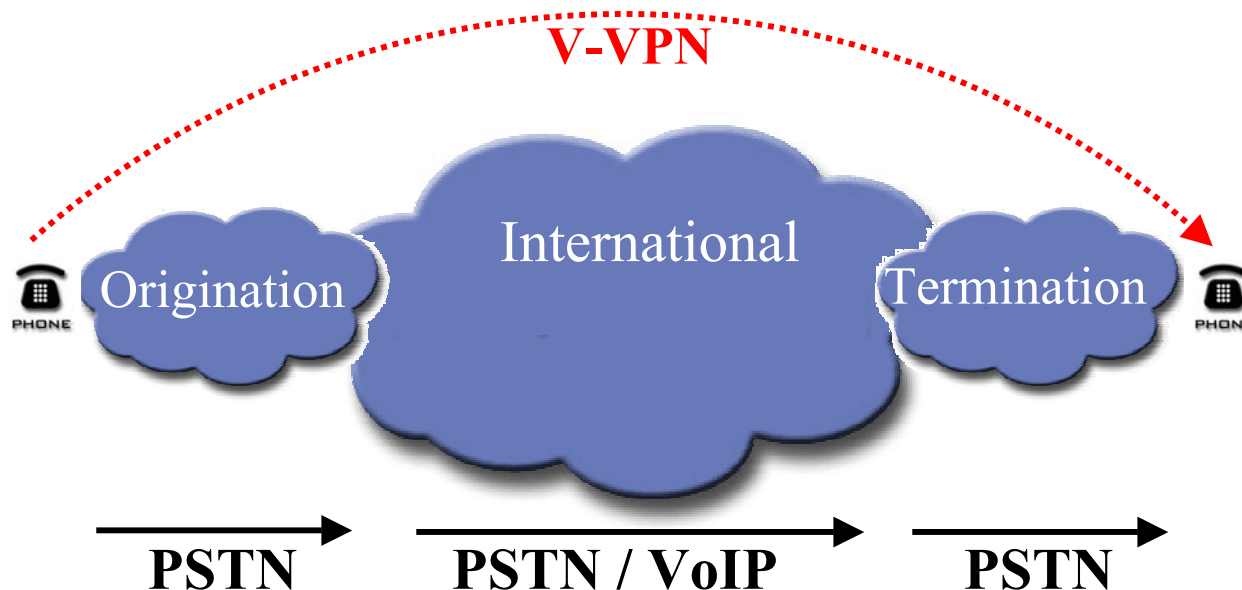
Supports multiple different call modes to enable high cost savings for the enterprise and new revenue streams for the service provider

- On-net to On-net
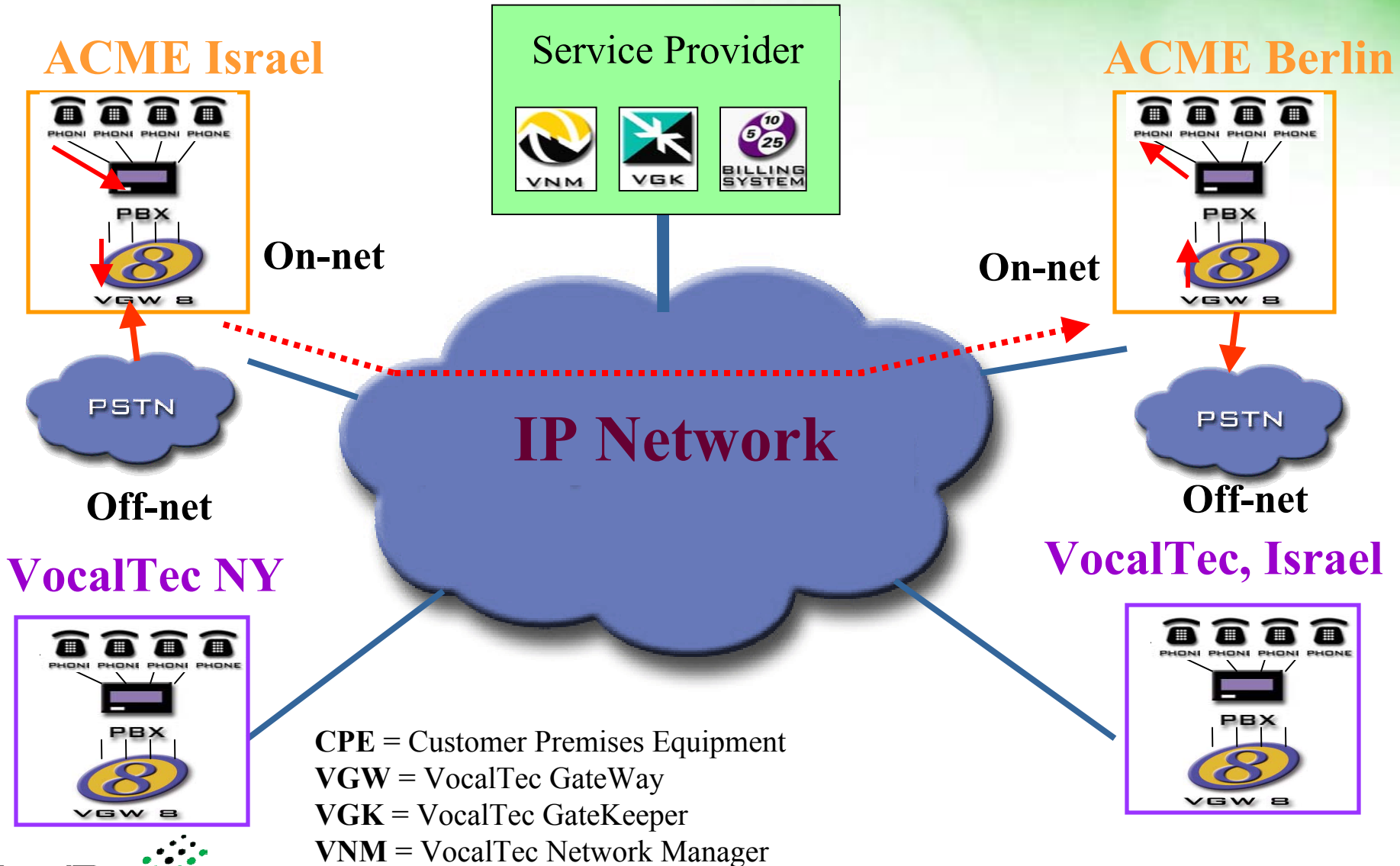
- On-net to Off-net

- Off-net to Off-net

Service Provider Value Proposition

VoIP-VPN As The Complete Toll Bypass – Improve Margins

- Local PSTN charges are significant!

- VoIP-VPN is an 'end to end' VoIP solution

- VoIP-VPN improves Service Provider's margins by by-passing the origination and termination PSTN networks
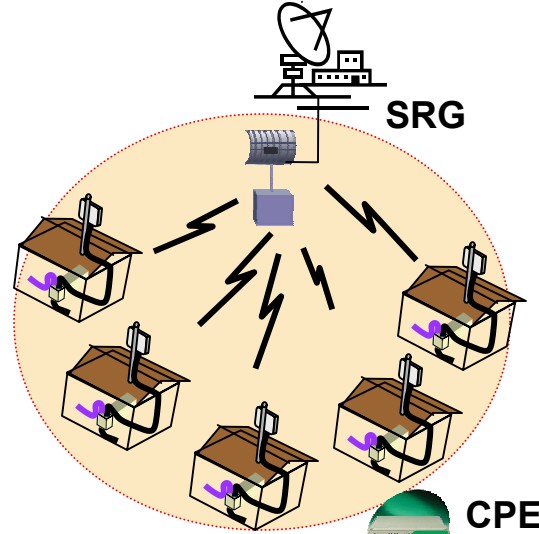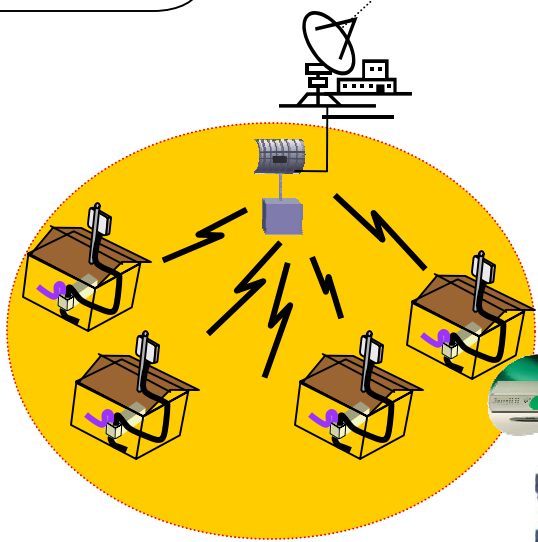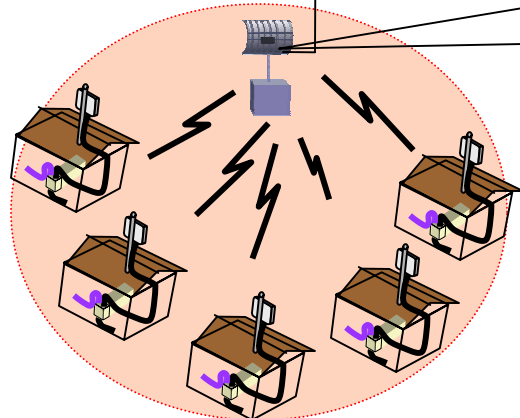

V-VPN

International

Origination Termination

PHONE PHONE

PSTN PSTN / VoIP PSTN

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Basic Solution Architecture

ACME Israel

Service Provider

VNM | VGK | BILLING SYSTEM

ACME Berlin

On-net

PBX
VGW 8

On-net

PBX
VGW 8

IP Network

PSTN

PSTN

Off-net

Off-net

VocalTec NY
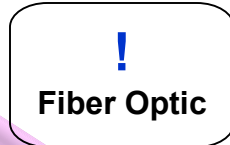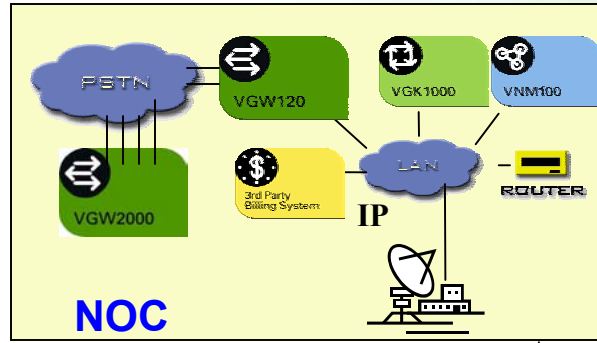
VocalTec, Israel
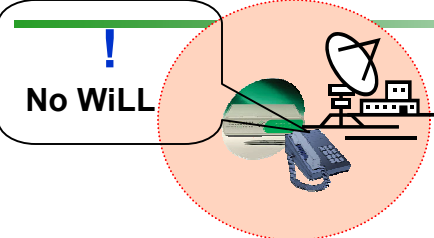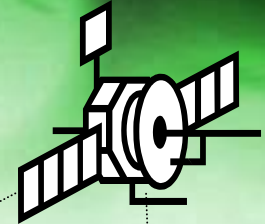
PBX
VGW 8

PBX
VGW 8

CPE = Customer Premises Equipment
VGW = VocalTec GateWay
VGK = VocalTec GateKeeper
VNM = VocalTec Network Manager

Rural Telephony and Low Teledensity Solutions

The challenge

- **To increase Tele density and Internet density (public telephone and Info. services) in infrastructure scarce areas with focus on rural areas in a cost effective manner**

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VSAT/WLL based VoIP Solutions

No WiLL

Fiber Optic

WLL Access Device

NOC

IP

IP

SRG

CPE

CPE

CPE

PSTN

VGW120

VGK1000

VNM100

VGW2000

3rd Party Billing System

LAN

ROUTER

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VoIP for Low Teledensity environment

- **Convergence of Voice and Data**
- **Less Bandwidth is needed**
- **Platform is prepaid-ready !**
  - Calling Cards services
- **Providing complete turn key solution**
  - Providing Central Billing, Management and Provisioning
- **Rapid introduction of enhanced Services**
  - ILD
  - Voice VPN
  - Voice Mail
  - Conferencing
  - Source Based Routing
  - Global Call Center

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Collecting Revenues in Rural areas

- **Interactive Voice Response on the all Gateways**
  - Load Calling Card
  - Calling Card Status
- **Multi-lingual support**
- **Integrated Billing solution supporting:**
  - Real Time billing
  - Voice and Data
  - Virtual carriers option
  - Interdomain
  - Flexible prepaid service creation

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Section 1: VocalTec Overview

Section 2: VoIP at A Glance

Section 3: Market Trends

Section 4: Case Studies/Customer Success Stories

Section 5: VocalTec Solutions

Summary

VoIP – Ingredients for Success

- **VoIP Advantages**
  - Converged networks
    - Reduced Opex and Capex
  - Time to market
- **Mature Technology**
  - Proven scalability, reliability
  - Interoperability with existing TDM networks
  - Adoption by incumbent and Next Gen carriers
- **Revenue generating services – available today!**
  - Class 4 Replacement
  - Calling Card
  - Wholesale
  - VPN
  - Rural Access
- **Future promise of multi-protocol softswitch based systems**
  - Next generation of value added services
  - Class 5 services, local access