A GLOBAL, CONVERGED IP NETWORK. NO ASSEMBLY REQUIRED.

Traffic growth and expanding services
Jos Martens
Agenda

- Intro to Global Crossing
- Juniper Partnership
- The Traffic Growth and Global Crossing
- What does a global carrier do with IMS/FMC
Who We Are

At Global Crossing, Customer Relationships are as Global as our Network.

Sales and Customer Support presence in 18 countries, fluent in over 20 languages

- Sales Teams: North America, Europe, Latin America, and Asia Pacific
- Global Partners Program Team
- IRU and Capacity Services Team
- Sales Engineers and Sales Support Team

“Global Network with Local Relationships”
Some of Our Customers

- **Cable TV Providers**
- **Internet Service Providers**
- **Application Service Providers**
- **Global Carriers**
- **PTT/National IXCs**
- **CLECs, ILECs**
- **Facility-based Resellers**
- **Switchless Resellers**
- **Prepaid Card Providers**
- **Wireless Carriers**
- **Satellite Service Providers**
- **Virtual Network Operators**

Logos of various companies including Qwest, PCCW, T-Mobile, TELMEX, Cable & Wireless, Cablevision, Vodafone, EMERGIA, FIBERNET, and Global Crossing.
Capacity Magazine Names Global Crossing “Best Global Wholesale Provider”

"With many qualified candidates from which to choose, the judges enthusiastically agreed that Global Crossing should receive top honors as 'Best Global Wholesale Provider' for consistently delivering market-leading, quality global wholesale services," said Mark Kemp, Capacity's CEO. "Global Crossing has pioneered next-generation services, offering a full range of industry-leading IP, data, and voice products. In addition, Global Crossing's customer feedback is consistently positive - a strong indicator of superior service."

Mark Kemp, CEO Capacity Magazine

Other Awards

- 2006 Atlantic ACM U.S. Carrier Wholesale Excellence: Global Crossing #1 Quality of Data Products & Value
- 2005 Frost & Sullivan Industry Innovation & Advancement Award
- 2005 Frost & Sullivan Product Differentiation Innovation Award
Full Suite of Wholesale Solutions Supporting Customer Specific Solutions

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<tr>
<th>Data/Transport Services</th>
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<th>VoIP Services</th>
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<td>End User Access</td>
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Fast-Track Services

Services subject to availability
Global Partners Program

Fast-Track Services: Global Reach and Service Expansion

- **Global reach**
  - Serve out-of-region end customers with voice, video and data with minimal capital expense

- **Service expansion**
  - Increase revenue by offering value-added services in new markets

- **Reduced time-to-market**
  - Faster revenue realization

- **CAPEX/OPEX savings**
  - Build network/add service capabilities without significant CAPEX or OPEX

A powerful alternative to Equant and BT/Infonet providing the advantages of partnering with a provider oriented to this changing world.
Global Crossing Network Overview

- Exceeds FIVE 9s (99.999%) availability worldwide

- Build out to 300 cities and 30 countries.
- Services to 600+ cities and 5 continents.
- 2006 New POPs in Brussels, Munich, Helsinki, Toronto more to follow
Our French locations

- Paris-Clichy Rue Petit 7 - 9, BIC building, 92110
- Paris-Tremblay Avenue des nations 227, Zone Industrielle Paris Nord II, 93290
- Paris-Courbevoie Boulevard de Verdun 124, 92400 Courbevoie
- Paris, Redbus, 130 Bd de Verdun, 92413 Courbevoie Cedex
- Paris, Réaumur, Rue Réaumur 115, 75002 Paris
- Paris, Integra, Rue de la Belle Etoile, ZI Paris Nord 2 167
- Paris, IXEurope, Rue de la Belle Etoile, ZI Paris Nord 2 167
- Paris, Telehouse 1, Rue des Jeuneurs 38, 75002 Paris
- Paris, Telehouse 2, Boulevard Voltaire 137, 75011 Paris-en-Roissy
- Paris, InterXion 1 + 2 20 rue des gardinoux, 93 Aubervilliers
- Paris, Alcatel, Rue Latécoère 10, 78140 Villacoublay (Paris)
- Paris, Multicom, Allée Latécoère, Véligy 6, 78140 Vilacoublay (Paris)
- Paris, LDCom Netcentre MMR, Boulevard de Verdun 124, 92400 Courbevoie (Paris)
- Paris, Le Capitole, Rue des Champs Pierreux 55, 92000 Nanterre (Paris)
- Paris, Completel, Rue des Sorins 15, 92000 Nanterre (Paris)
- Paris, Primus, Rue des Sorins 15, 92000 Nanterre
- Paris, Bouvets, Boulevard des Bouvets 1-5, 92000 Nanterre
- Paris, Valmy Tower, Cours Valmy, La Defense 17, 92987 Paris
- Paris, N9UFTelecom/ Véligy site, Rue Nieuport 6, 78140 Velizy (Paris)
- Marseilles, Rue Leon Gozlan 4, Telehouse Markley, 6th floor, 13004 Marseille
- Lyon, Carrier Hotel 6 Rue George Maranne 69200 Venisseux
- Strasbourg-Kehl, Hafenstrasse 3, Ground & 1st Floors, 77694 Kehl
Swiss PoP’s

➔ Zurich Aargauerstr. 10,
➔ Zurich, IXEurope, Hardstrasse 235
➔ Zurich (TIX) - IX Europe Telehouse 2, Josefstrasse 225

➔ Geneva Route du Bois-des-Freres 48
➔ Geneva, Cern building 513, Route de Meyrin

➔ Basel, IWB Telehouse, Margarethenstrasse 40
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Global Crossing & Juniper
History of the Relationship

- Relationship began over six years ago
- Juniper has a strong presence in the core of GC network
- The partnership continues to grow with GC Super Core
- Global Crossing chosen as a Global Elite Partner for resale
- Global resale entire Juniper portfolio: hardware, software and maintenance
 Carrier Benefits

- Juniper reseller that is one of Junipers biggest clients and highly experienced with Juniper technology
- Single point of contact & single Global Crossing invoice
- Juniper Elite Partner pricing
- Broad hardware (J/M/T Series) portfolio for all size carrier needs
  - Includes Maintenance & Security components
- Juniper lab facilities
- Educated technical Juniper trained and “certified” resources
A GLOBAL, CONVERGED IP NETWORK. NO ASSEMBLY REQUIRED.

The Traffic Growth & Global Crossing
For years, the fiber-optic communications industry has been awash in spare capacity that sent prices for data transmission plunging. Now, thanks to continued growth in Internet traffic, demand is beginning to catch up with supply in many areas of the active global network.

Still, plenty of inactive fiber-optic lines remain -- the majority of the lines put into the ground or underwater have gone unused for years and can be activated on short notice and relatively inexpensively. That means the glut has not come to a definitive end and consumer prices are unlikely to rise. But at the moment, prices for sending data traffic at least appear to be stabilizing, providing a welcome reprieve for companies that operate the so-called backbone of the world's telecommunications infrastructure.

Across the Atlantic, the industry raised capacity by about one terabit (a trillion bits) per second to about 5.5 terabits per second last year to meet growing demand, TeleGeography calculates.

Level 3 Chief Executive James Crowe admits "our crystal ball got cracked pretty badly there" during the tech boom, but says on Level 3's network now "there's every sign that inventory that was up on the shelf is being drawn down and in some areas even exhausted."

Mark Heinzl at mark.heinzl@wsj.com and Shawn Young at shawn.young@wsj.com
The Bandwidth Glut is Over

Following several rough years, the global bandwidth market is showing signs of improved health: supply equilibrium, price stability, and competitor consolidation. Persistent international bandwidth demand growth has depleted inventories of unsold circuits on many submarine cables and on some segments of terrestrial networks. This has led many network operators, including VSNL, FLAG Telecom, Asia Netcom, and Telefonica, among others, to light additional wavelengths and fiber pairs on an as-needed basis. This incremental approach to managing spare circuit inventories means that lit bandwidth supply and bandwidth demand are coming into balance. This doesn't mean a network construction boom is pending. Instead, operators will need to make more of what they already have -- most of the potential capacity in fiber networks remains untapped. According to the latest analysis released in TeleGeography's Global Bandwidth Research Service, by the end of 2006 little more than 14 percent of the potential capacity on major submarine cables will be lit.
International Internet Traffic and Capacity, 2003-2008

Slow Growth Scenario

- Internet Bandwidth
- Peak Traffic
- Average Traffic

Fast Growth Scenario

- Internet Bandwidth
- Peak Traffic
- Average Traffic

© PriMetrica, Inc. 2005
Dwindling Trans-Atlantic and Trans-Pacific Bandwidth Inventories

- **Trans-Atlantic**
  - Purchased Capacity (Fast Growth Scenario)
  - Supply of Lit Capacity
  - Purchased Capacity (Slow Growth Scenario)

- **Trans-Pacific**
  - Purchased Capacity (Fast Growth Scenario)
  - Supply of Lit Capacity
  - Purchased Capacity (Slow Growth Scenario)

© PriMetrica, Inc. 2005

Global Crossing®
International Internet Provider Types, 2005

- Percent of Companies:
  - National: 85%
  - Regional: 11%
  - Global: 4%

- Percent of Bandwidth:
  - National: 13%
  - Regional: 23%
  - Global: 64%

© PriMetrica, Inc. 2005
Major International Routes in Europe, 2005
Interregional Internet Bandwidth, 2005

24,416 Mbps

U.S. & Canada

307,318 Mbps

100,943 Mbps

668,757 Mbps

2.964 Mbps

4,159 Mbps

Asia

Latin America

Africa

Europe
Global Crossing

We see our internet traffic growing rapidly:

- 130G end of 2005
- 190G end of Q1
- Expect to be at 300G by year end

Redesign and upgrade of our complete backbone

- New hub architecture
- 16 Super Core Nodes (in place Q1)
- 5 Super Edge Nodes
- Juniper T640 in Core
- Cisco 7609 in Edge

- Multiple 10G backbone connecting the Super core and edge
Old WHIP Hub Design

WR= WAN Router
CR = Core Router
AR = Aggregation Router
BR = Border Router
VR = VoIP Router
PR = Provider’s Edge
VPN Router

2.5 or 10 Gbps
622 Mbps
<=155Mbps
New Design

![Image of a network design diagram](image-url)
Services
- IP Transit
- IP VPN Services
- VoIP Services
- Private Line
- Ethernet
- IP Video and Collaboration services
- ATM and Frame Relay Services
- Wavelength and Dark Fiber Services

Pan-European Network Statistics
- 14,463 Mile / 23,276 Km Fiber Network
- 40 Points of Presence
- 11 Metro Networks
- 2.5G and 10G DWDM Systems
- Self-Healing Ring Architecture
- Scalable Transport
- IP/ATM/SDH/DWDM

UK Network Statistics
- 8,066 Miles (12,981 km) Fiber Network
- 158 Points of Presence
- 11 Metro Markets
- 2.5G and 10G DWDM Systems

Pan-European Crossing (PEC) – Terrestrial System
What does a global carrier do with IMS/FMC
Trend: Mobile and Convergence Drive Continued Consolidation

Top Telecom Carriers by Revenue

1999 ($ in billions)

NTT  AT&T  DT  WorldCom  Bell Atlantic  BT  FT  SBC

2004 ($ in billions)

NTT  DT  Verizon  Vodafone  FT  Telecom Italia  Telefónica  SBC

Gartner Communications Group Research Oct 2005
Trend: Economics and Value of Voice Fundamentally Shift

By 2009:

- 99% of new voice connections will be wireless
- 70% of total voice connections will be wireless
- One-third of consumers will disconnect their PSTN lines in favor of VoIP and wireless
- Vonage, Ebay/Skype, Google, Yahoo, Microsoft and others win share via:
  - Integration with IM, SMS
  - Persistent directory
  - Presence integration
  - Unified communications with P2P architecture
Figure 42 Western Europe: voice minutes

Source: Ovum
Figure 44 **Western Europe: all PSTN, mobile and broadband revenues**

Source: Ovum
Changing Industry View has Developed

- Complexity with today’s VoIP services: multiple devices, multiple accounts, no services consistency
- Wireless preferred over fixed for voice, messaging and data are quickly catching up
- Many new entrants via Voice over Broadband (Vonage, etc.)
- Crowded field, similarity of services makes differentiation difficult, and deployment of services too long

New Business Model
- Single provider of wireless, wireline, and services
- Mobile voice a key bundle component
- Voice over Broadband as a strategy for consumer wireline voice access
- Differentiation via innovative services provided to all subscriber access methods
**Figure 7** Major threats to service operators

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<th>2007</th>
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<td>Moderate</td>
<td>Low</td>
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</tbody>
</table>

Main threat to PSTN operators: Mainstream threat to PSTN operators

Main threat to mobile operators: Mainstream threat to mobile operators

GAMEYs: Google, AOL, MSN, eBaySkype, Yahoo!

Source: Ovum
Service Provider Opportunity & Strategy

Mobile Attacks
Wireline

Cable Attacks
Both Fronts

ASP’s Seize Early
Opportunity – Sell
Hosted FMC
Applications

Wireline Attacks
Mobile & Cable

Low-Cost VoIP
MVNO’s Emerge
The Exploding Network Edge
New Traffic Characteristics

Petabytes/Day Worldwide

Source: IDC 2006, GRO estimates


2009–2015

Traditional file and record-oriented payload

Interactive, upload-heavy payload
The FMC Fear Factor

- Fear is based on history, state of network
- Carriers without a significant VoIP deployment will require large CAPEX (RBOC, MNO’s)
- Pre-IMS SIP Interoperability Problems required great deal of time, technical resources to sort out
- Full IMS/VOIP deployments require significant integration
- Full Mobile IP Architectures (3GPP UMTS R5) will not be deployed for a couple of years, why invest now?

How scary is it to fund deployment of FMC and an IMS Core?
Fixed Mobile Convergence steps

Figure 11: FMC

- **Device convergence**
  - One seamless experience
  - One device
  - One number
  - One voicemail
  - One application set

- **Integration**
  - One service bundle
  - One bill
  - One customer service
  - Bundling

- **Customer benefit**
  - Low
  - High

Source: Ovum
**Fixed-Mobile Enterprise services**

**Figure 3 Enterprise Fixed-Mobile Services Evolution**

- **Fixed-mobile service bundles take hold**
  - Cingular qualifies WorldView partner spends for discounts
  - KPN’s Sympac launches managed mobile solutions in five countries

- **FMC technology comes of age**
  - SIs offer tailored BlackBerry, device management, mobile voice and data
  - Operators’ managed remote-access adds 2.5/3G options
  - European and Asian carriers align for regional roaming

- **Global fixed-mobile solutions are standard**
  - All major operators have fixed-mobile offers

- **2005**
  - Mobile roaming alliances add 3G data
  - US operators integrate US mobile with remote-access offers
  - 3G/Wi-Fi aggregation heats up

- **2006**

- **2007**

- **2008**
  - Global multiregional fixed-mobile offers emerge
  - Global operator MVNOs offer true FMC in many markets

- **2009**

- **2010**

- **Fixed-mobile alliances emerge (e.g., AT&T-Cingular, Verizon-Vodafone, or BT-Vodafone)**

Source: Forrester Research, Inc.
Extending Our Vision of IP Convergence

IP Convergence

“Innovation is born from the interaction between constraint and vision.”*

- Leverage the IMS framework and IP core to deliver presence-based interactive multimedia enterprise and personal services.
- Extend Wireless VoIP services through network-based converged functionality supported by IMS and dual-mode mobile devices.
- Broaden enterprise IP VPN and VoIP services to include WLAN, etc.
- Leverage IP VPN remote access to provide VoIP mobility via WiFi and WiMax.
- Migrate to a fully converged IP core (MPLS and IPv6). Deliver foundational IP services: VoIP and IP VPN.

*Marissa Ann Mayer, VP Search Products and User Experience at Google (BusinessWeek, February 13, 2006)
VoIP and Converged Services evolution set the stage for IMS to change current business models
The IMS Architectural Model – A High-Level Overview

Applications Layer
AS
AS

Control Layer
HSS
PDF
MGCF/SG
MRF

Connectivity Layer
IP/MPLS Network
PSTN/PLMN

Operations Support Systems
Provisioning
Management
Charging

End-User Devices with Wireline or Wireless Access and SIP Clients

Source: In-Stat, 7/06
A Winning Strategy

IP enables IMS, addressing network and user requirements
- Person-to-person real-time IP-based multimedia communications
- Person-to-device communications
- Integrated real-time and non-real-time multimedia communications
- Interaction among services and applications

IMS facilitates FMC
- Centralized service structure and session management
- Reduced cost associated with deploying new applications
- Standardized signaling protocol (SIP) with backward compatibility
- Common application interfaces mean faster time to market of rich services

Mobile Operator Wins
Retain revenues from mobile phone off-net access and intra-company calling

Cable Co Wins
Many are already offering “triple play” service of TV, voice and Internet – mobile is next

Broadband Wireline Wins
Increase customer stickiness via carrier hosted solutions enabled by presence capabilities

New Entrant Wins
Footholds in new markets with innovative targeted solutions

Ultimately – the customer wins!

Contributing source: Norwegian University of Science and Technology
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Thank you!

Global Crossing®