Teaching Elephants to Dance – 3G and the Challenge of Change

COMNET Conference
Washington, D.C.
January 29, 2003

www.idc.com
The Current Climate

Telecommunications Services

Telecommunications Equipment
Wireless & Mobile Network Infrastructure

EPILOGUE AS PROLOGUE

• 3G is not dead.

• The key logic for deployment of next-gen wireless remains solid:
  - Capacity constraints
  - New revenue streams, particularly data services
  - Operational efficiencies
Key drivers to network deployment

1. Capacity Constraint, by comparison (indicative only)

- Wireless access
- Fixed-line Broadband access
- Back-haul fiber

2. New Revenue Potential: Data services
   - MMS/SMS, Gaming, Entertainment
   - Location-based services, Information services

3. Operational Efficiencies
   - Both CDMA2000 and W-CDMA provide operational efficiencies
1. What is 3G and why the excitement?
2. Generations and standards
3. Standards & geographies
4. Subsystems, coordination and delays
5. Mobile infrastructure market size
6. Key trends
7. Operators & vendors to watch
8. Key take-home points
What Is 3G?

Formally, 3G is a family of air-interface standards

- Anytime, anywhere connectivity
- High data transmission rates, specifically:
  - 144 kbps in high mobility contexts (while driving),
  - 384 kbps in low mobility contexts (for pedestrians)
  - 2 Mbps for stationary wireless connection (indoors)
- Worldwide roaming capability
- Ability to support of high-quality MM services
- Real time location-based services
- Interoperability with fixed-line networks
The Promise of 3G

- Wireless Wrist Assist PDAs
- Wearable Wireless
- Location Tags
- Pocket Navigators
- Wireless Communicators
Hype and Reality

**Hype**
- Streaming audio / video
- Video on demand
- Full web surfing
- High color, full motion graphics

**Reality**
- SMS / MMS
- Email
- Instant messaging
- Wireless data, or mobile Internet
Wireless Data or Mobile Internet

Mobile Internet is different than fixed-line Internet

With fixed-line Internet:

- Network is transparent,
- Customer is “invisible”
- Customer behavior is difficult to track, and so,
- Customer is difficult to serve

In a mobile environment, the network knows …
Wireless Data, 3G & Opportunity

Enabling technology

- 2G
- 2.5G
- 3G

- 9.6 Kbps
- 2 Min.
- 28 Min.
- 170 Kbps

- Speed
- Cost
- Time

Potential for new services

- Applications & services that are personalized

Personalized suites of mobile, MM apps

Application communities

- Consumers
- Office Workers
- Personal Apps
- On the Move
- Transactions

Flexible app bundles for key user communities

IDC
Analyze the Future
Where’s the Content?
G Is for Generation

Mobile Telephony Through Time ...

We are here

1G Early 1980s
2G Early 1990s
2.5G Early 2000s
3G 2004/5 onward ...
4G? 2010 ...

IDC
Analyze the Future
### How Do Mobile Generations Differ?

<table>
<thead>
<tr>
<th>Generation</th>
<th>Technology</th>
<th>Standards</th>
<th>Transmission Data Rates</th>
<th>Functionality Supported</th>
<th>Switching Protocols</th>
<th>Customer Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1G (Analog)</td>
<td>FDMA</td>
<td>AMPS, TAC, NMT, other</td>
<td>9.6kbps</td>
<td>Voice</td>
<td>Circuit switched</td>
<td>Biz customer</td>
</tr>
<tr>
<td>2G (Digital)</td>
<td>TDMA/CDMA</td>
<td>GSM, PDC, TDMA IS 136, CDMA IS 95</td>
<td>9.6Kbps – 14.4Kbps</td>
<td>Voice &amp; some data</td>
<td>Circuit switched</td>
<td>Biz &amp; consumer</td>
</tr>
<tr>
<td>2.5G (Digital)</td>
<td>TDMA/CDMA</td>
<td>GPRS, CDMA 1x EDGE</td>
<td>115kbps GPRS 144kbps 1X</td>
<td>Voice &amp; data</td>
<td>Packet switched</td>
<td>Virtual Personal Network</td>
</tr>
<tr>
<td>3G (Digital)</td>
<td>CDMA</td>
<td>WCDMA, CDMA 1x EV</td>
<td>384kbps – 2Mbps</td>
<td>Voice, data, &amp; multimedia</td>
<td>Packet Switched, IP</td>
<td></td>
</tr>
</tbody>
</table>

- **Transmission Data Rates**: 9.6kbps, 9.6Kbps – 14.4Kbps, 115kbps GPRS 144kbps 1X, 384kbps – 2Mbps, 10Mbps and beyond.
- **Functionality Supported**: Voice, Voice & some data, Voice & data, Voice, data, & multimedia, Voice, data, MM, and VR?
- **Switching Protocols**: Circuit switched, Circuit switched, Packet switched, Packet Switched, IP, Packet switched.
Standards, Geographies & Migration Paths

(Preliminary percentages, as of 2002 end)
CARRIERS

- Capex reductions
- A global slowdown, slowing subscriber growth
- Developing world sees more prepaid growth
- Slower transition: GPRS to UMTS
- Search continues for killer apps
- Managing network migration: When data takeoff?
- Biz model shift — dumb pipe to VAS, facilities to content provisioning
- Inflection point for TDMA operators
Wireless & Mobile: Key Trends /Global

EQUIPMENT VENDORS

- Increasingly Competitive Markets
- Learning curves and price erosions

- Network technology — circuit to packet to IP
- How to manage R&D for multiple standards

- Increasing technology complexity of networks
- Competing networks, niche networks

- Interoperability among standards, in live networks

IDC
Analyze the Future
M & I Trends — North America

- Spectrum issues, hence EDGE
- Next Gen investments: CDMA 1X / GPRS & EDGE
- Network sharing, to speed offerings

- Room for increased mobile penetration
  - Currently 50% (EU 65+%)
  - Migrating users from voice to data

- Called Party Pays remains an issue
- Location based services gain salience after 9/11
M & I Trends — Western Europe

- Significant operator debts from spectrum auctions
- Meltdown? Or mere investment write-down by few?
- High mobile penetration, reaching saturation level
- Focus on high ARPU quality subscribers
- GPRS to have longer play, EDGE after UMTS?
- Network sharing, to reduce deployment costs
- 2003 to see interoperability testing in live networks
M & I Trends - Asia Pacific

Japan / S. Korea
- Early adoption of 3G business model in Japan
- Japan, South Korea on high-end spending path
- i-mode, KDDI and Sha-mail

China / Developing Asia
- Enormous CDMA growth, GSM expansion in China
- 2G - 2.5G investment to continue through 2002 - 04
- World’s largest subscriber base (and growing)
  - But prepaid, and voice oriented
- State emphasis on local production
- Developing Asia (e.g., India) coming on board with 2G/2.5G spending
M & I Trends — Latin America

- Operator consolidation imminent
- Emergence of pan-regional players
- New spectrum allocation
- Enormous subscriber growth
  - But prepaid, and voice oriented
  - Wireline replacement
- TDMA inflection point
When Will 3G Be Available?

Coverage
- Data takeoff
- Applications
- Macro-economics
- Handset availability

Capacity
- Pricing models
- Regulation

Usage

Regulation

Time
3G is about Collaboration

Production
- Enterprise Apps: Groupware, EIA, ERP, CRM, SCM, etc.
- Entertainment: Games, music, sports
- Commerce: Banking, trading, ticketing, shopping

Applications
- Travel
- Banking
- Healthcare
- Gov’t
- Etc.

Enterprise Infrastructure
- Hardware, Security, Middleware, Management

Distribution
- SMS/MMS
- App Servers
- Location
- Voice Portal
- Storage
- RAN Standards: GSM, PDC, TDMA, iDEN, CDMA 1X, WCDMA
- Radio Access: BTS, BSC, Node-B, etc.
- CORE: IWF, MSC, PDSN, SGSN, GGSN, RNC, etc.
- Services: OSS, Network management, Billing, etc.

Network Infrastructure
- Operating Systems: PalmOS, EPOC32, WIN CE, PocketPC, RIM OS, cHTML, WML, Symbian, Java ME

Consumption
- Devices: 2G, 3G phones, SmartPhones, PDAs, pagers, PCs
- Semiconductors: ASICs, chipsets, Flash/SRAM, DSP

Support & Maintenance
- Professional Services
  - Design
  - Consulting
  - Deployment
  - Integration

Source: IDC, 2002
Why Elephants Must Learn to Dance

• For 3G to succeed, 3 sub-systems must work together
  ▪ Production sub-system (applications, services from data comm world)
  ▪ Distribution sub-system (networks, from the telecom world)
  ▪ Consumption sub-system (access devices, from consumer electronics; chipsets, from folks in semiconductor industry)

• Elephants must learn to dance!
Consider MMS

- Discounts
- Sports
- Insurance
- News
- Shopping
- Opera
- Location-based services
- Movie ads
- Holidays

IDC
Analyze the Future
MMS: Issues That Need Attention

- Next gen Networks
- Storage
- Data centers
- Billing
- Usage metering
- Clearinghouses
- Affordable pricing
- Service availability
- Interoperability
- Digital rights management
- User interface
- Handsets
- Security
- Sanctity of data
- Authentication
- Useful, usable applications
- Data roaming & Clearinghouses
MMS: All These Need to Come Together

Cost of coordination is paid in currency of time
The Key Challenge of Change

• The Idealist / Strategic Gap
  ▪ Idealist View: Normative, what should be Anchored in a notion of social good
  ▪ Strategic View: Anchored in ROI considerations Show me the money!

• Of course, vendors and policymakers will seek to push the idealist view.

• Network operators, responding to shareholders and ratings agencies, will follow the strategic course.
3G Will Happen: Too Much at Stake!

- Industry Employees
- Investors
- National Governments
- Content Providers
- Wireless ASPs
- Advertisers & Agencies
- Middleware Vendors
- Equipment Vendors
- Service Providers
- Handset Vendors

IDC
Analyze the Future

Millions ($)

- 3G
- 2.5G*
- 2G

*CDMA1x/EDGE considered as 2.5G
Some Key Operators to Watch

North America
- AT&T Wireless
- Bell Mobility
- Cingular
- Nextel
- Sprint PCS
- Verizon Wireless
- T-Mobile VoiceStream

Western Europe
- KPN Mobil
- mmO2
- Orange
- Vodafone
- Telefonica
- TIM
- T-Mobile

Asia/Pacific
- China Mobile
- China Unicom
- Hutchison
- KDDI
- NTT DoCoMo
- SK Telecom
- Telstra

Latin America
- América Movil
- Bell South Int’l
- Telefonica
- Telcel
Key Equipment Vendors to Watch

**Pack leaders**
- Ericsson
- Nokia
- Siemens
- Nortel Networks

**Regional players**
- ZTE
- DoT, India
- Huawei

**Other majors**
- Lucent Technologies
- Alcatel
- Motorola
- Fujitsu
- NEC
- Samsung
- Cisco Systems
- CommWorks
- Brooktrout Technology

**Other players**
- Starent Networks
- WaterCove Networks
Key Take-Home Points

- The future is wireless. The future is mobile. And 3G is happening – though not in Internet time!
- Essential rationale for 3G is intact
- Wireless data presents a tremendous opportunity. Network speed & bandwidth are key.
- Separation of infrastructure and services creates opportunities — and risks!
- MMS likely to help create a mobile data culture
- 3G network deployment is going to be driven by strategic intent of operators, not a sense of idealistic mission
- Elephants must learn to dance, given interdependencies.
- Regulators will play a key role.
Thank you.

Any Questions?

Please email me at sbakhshi@idc.com