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Leapfrogging with New Telecoms Technologies

John Visser, P.Eng.

Chairman, ITU-T TSAG

+1 613 276 6096

jvisser@rogers.com

Abstract

Leading edge end users demand the latest services and capabilities, and these users are often the most lucrative for the operator. Operators are faced with an accelerating stream of evolving technologies and are therefore faced with ongoing decisions on upgrading or replacing their deployed infrastructure as each new Release or Generation is standardized and products become available. The latest technologies are attractive in terms of capacity, capability and cost. Local market needs are an essential input to determining what an operator should do. Leapfrogging to current technologies is a means to meet market needs, significantly reduce costs and increase access to services.

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Outline

- Introduction
- What users demand
- Challenges operators face
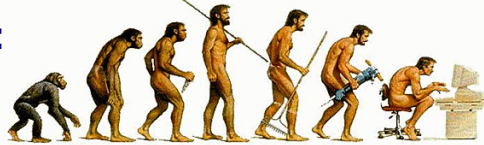- What holds us back?
- Taking advantage
- Summary and Conclusions

Introduction

- Society is evolving, with technology both driven by societal needs and a driver of societal directions
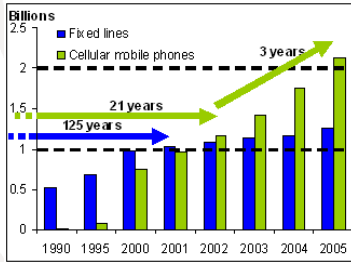 - Light heartedly:

  - Or more seriously:

Kashmir's mobile phone chroniclers
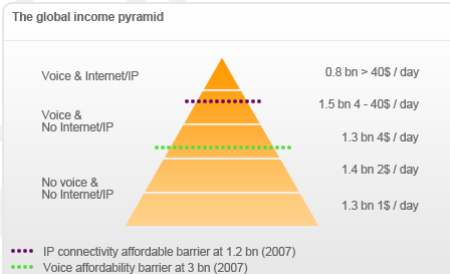http://news.bbc.co.uk/2/hi/south_asia/7618092.stm

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Introduction

- Telecommunications is becoming available everywhere, but is not always affordable:
  - 80% of the world's population is covered by GSM but <40% can afford it*

Billions

Fixed lines
Cellular mobile phones

3 years

21 years

125 years

1990 1995 2000 2001 2002 2003 2004 2005

ITU/UNCTAD, World Information Society Report, and ITU World Telecommunication Indicators Database

>4B subscribers today: www.gsmworld.com/

The global income pyramid

Voice & Internet/IP — 0.8 bn > 40$ / day

Voice & No Internet/IP — 1.5 bn 4 - 40$ / day

— 1.3 bn 4$ / day

No voice & No Internet/IP — 1.4 bn 2$ / day

— 1.3 bn 1$ / day

•••• IP connectivity affordable barrier at 1.2 bn (2007)
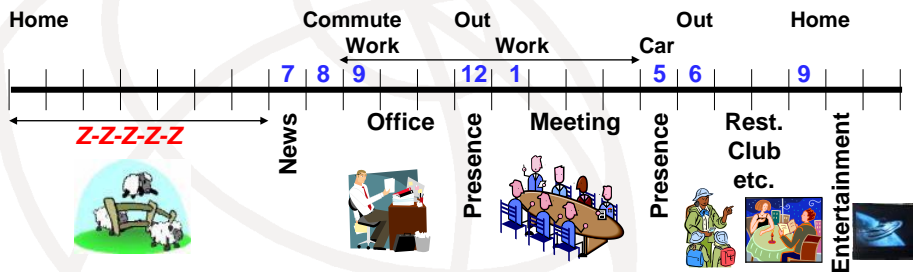•••• Voice affordability barrier at 3 bn (2007)

* This and above figure are from Nokia Siemens Networks web site: www.nokiasiemensnetworks.com/global/AboutUs/Corporate+responsibility/bringing-connectivity/Internet-for-the-next-billion.htm?languagecode=en

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Usage Patterns Are Changing

- Convergence, mobility and personalization

Home	Commute Work	Out Work	Out Car	Home

7 8 9   12 1   5 6   9

Z-Z-Z-Z-Z   News   Office   Presence   Meeting   Presence   Rest. Club etc.   Entertainment

Today: user must integrate across independent access means and live with device discontinuities

CATV 3G+   Ethernet   Wi-Fi   Ethernet   3G+   Wi-Fi   POTS CATV

Tomorrow: user enjoys seamless broadband communications services across multiple interoperable devices

Continuous broadband integrated wireline and wireless technologies

Usage Patterns Are Changing

What Users Demand

- Always on and available
  - People are used to interacting with those close by, miss doing so when apart
  - Telecoms bridges this gap but adds other benefits, especially being able to contact others instantly instead of spending a lot of time getting to where the other people are before being able to do so
  - Result: today most people can't do without their mobile phone

What Users Demand

- Anytime, anywhere, ...
  - just covered: saves a lot of time!
- ... and in any form
  - Not just voice but data, too (the Internet!)
  - When people talk face to face, they don't just exchange the sounds of their voices, but also their facial expressions and body language
  - The more telecoms can deliver the "in person" experience, the more effective it will be, hence ...

What Users Demand

- Voice and multimedia
  - Multimedia is now about adding images, initially still and monochrome, now colour and motion
  - Humans have five senses and we are now only exploiting two of them
    - 3GPP SA1 is starting to explore haptics (early draft of TR* available in S1-093398)
  - Today's science fiction is tomorrow's science fact

* Note that 3GPP TRs are informative documents used as part of the internal process leading to standardization. While Trs can be found the internet, they should not be used as references.

What Users Demand

- Self service, intuitive
  - Minimum administrative process
  - Should not require an engineering degree to set up and use
- Simple for the end user
  - Pick it up, turn it on: it works
  - UE HMI is obvious and simple to use
- Secure, trusted, reliable

What Users Demand

- Always on
- Anytime, anywhere and in any form
- Voice and multimedia
- Self service, intuitive
- Simple for the end user
- Secure, trusted and reliable

Challenges Operators Face

- User demands
- Is the existing infrastructure up to the task?
- Changing landscape
- Constant innovation
- Regulatory requirements and constraints

What leaps are needed to meet the challenges?

Is the existing infrastructure up to the job?

- Demand for new data services saw the voice network adapted for data calls (modems)
  - Major shift in average holding time
  - But calls still full time physical (analog) or virtual (TDM): inefficient, limited to number of connections (trunks) available, could be "busy" but not actually carrying payload
- Evolution of data networks and realization of value of voice traffic saw data networks adapted for voice (VoIP)

Leap from voice to data communications

Is the existing infrastructure up to the job?

- Evolution of core network to packet switching enables a major change in the types of services that can be provided
  - Short calls with small amounts of data handled efficiently
  - Long calls with bursty traffic handled efficiently
  - Voice traffic is bidirectional but tends to be half duplex hence can be more efficiently handled as data (VoIP)
  - Long calls with large amounts of data can be handled at least as efficiently as dedicated lines, and generally more so
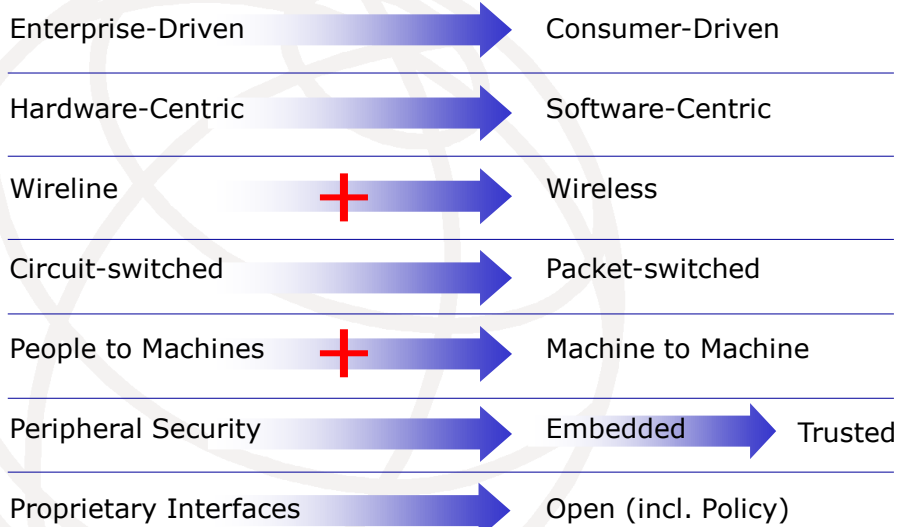
Leap from circuit-switching to packet switching

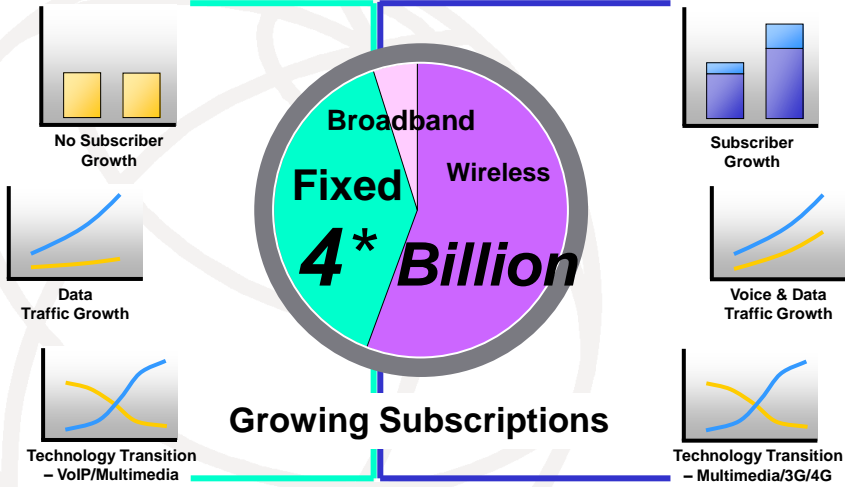Santo Domingo, Dominican Republic; 25-27 November 2009   15

Landscape is changing

Enterprise-Driven	➡	Consumer-Driven
Hardware-Centric	➡	Software-Centric
Wireline	➕ ➡	Wireless
Circuit-switched	➡	Packet-switched
People to Machines	➕ ➡	Machine to Machine
Peripheral Security	➡	Embedded ➡ Trusted
Proprietary Interfaces	➡	Open (incl. Policy)

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Telecom Market Trends

No Subscriber Growth

Data Traffic Growth

Technology Transition – VoIP/Multimedia

Broadband

Fixed

Wireless

4* *Billion*

Subscriber Growth

Voice & Data Traffic Growth

Technology Transition – Multimedia/3G/4G

Growing Subscriptions

* >4B subscribers today: www.gsmworld.com/

Telecommunications Industry: Constant Innovation

VoIP and Converged Communications

Wireless to WiMAX/4G/LTE

Wireline to Wireless

Copper to Fiber

Analog to Digital

Change comes from disruption. And disruption is constant!

Regulatory Requirements and Constraints

- Universal access requirements
  - Costs and subsidies
  - Applies equally to all?
- Competition
  - Incumbents, "green field," virtual operators
- Regulation basis
  - Technology (changes rapidly), or
  - Services (changes slowly)
- Regulators and technology convergence
  - How to regulate VoIP vs. traditional circuit-switched analog/TDM systems?
  - How to cope with convergence across voice, data and broadcast?

Need to leap past old models and ways of doing things.

What Holds Us Back?

- Legacy infrastructure
  - What is the current state of what we have in place? Is it old and obsolete and not up to the demands? Is it getting too expensive to operate for the revenue it earns? Have we just installed it and it seems to be obsolete already? And the latest technology seems to be so much better!

What Holds Us Back?

- Finances
  - Money does not grow on trees!
  - Telecoms requires significant up front investment

- Market uncertainty
  - Is the demand there? Users need to live within their means so telecoms services have to be profitable at price points that users can afford. (Ref: chart 5)

What Holds Us Back?

- Technology uncertainty
  - Core network: circuit-switched, TDM, all-IP?
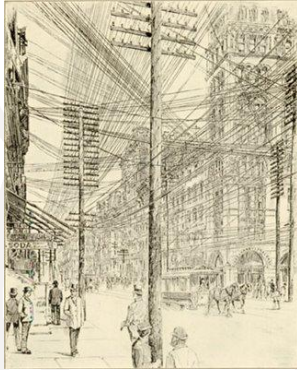 - Fixed access networks: Cu, xDSL, fibre?
  - Radio access: 2G, 3G, 3.14159G (πG ☺), 4G?

Digital wireless evolution 1990 - 2010
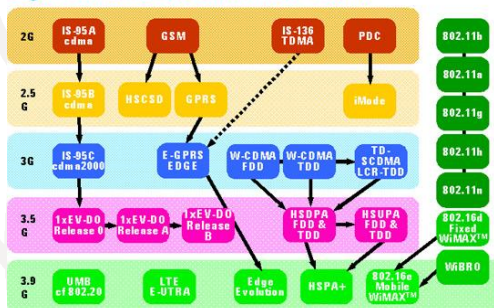
www.agilent.com/about/newsroom/tmnews/background/2008/01oct2008_fieldfox

Taking Advantage

- No need to take the same path as our predecessors!
  - But we're still doing it!

???

Manila, 2007
www.ericmackonline.com/ICA/blogs/emonline.nsf/dx/would-you-like-dsl-or-cable-internet-with-that

Etching of Overhead Telephone and Telegraph Wires in Broadway, 1890
Book of Old New York
Henry Collins Brown 1913

Taking Advantage

- No need to separate mobile from fixed networks from data form broadcast
  - Services are rapidly becoming independent of access
  - Broadcast is more about frequency band allocations than about content when content is available anytime, anywhere and on any access
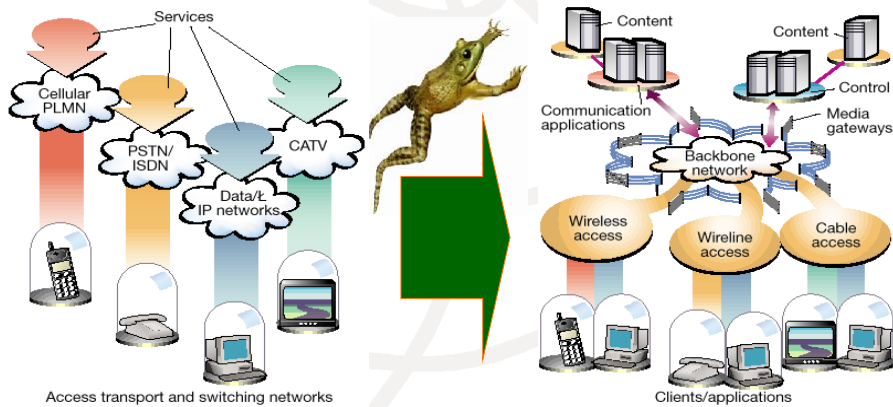

Services

Cellular PLMN

PSTN/ISDN

CATV

Data/IP networks
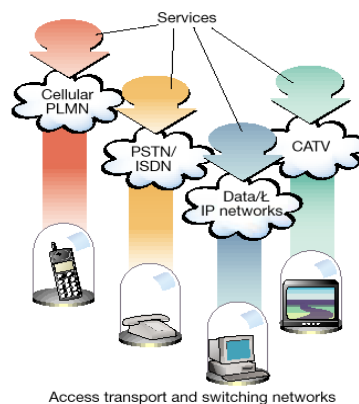
Access transport and switching networks

Taking Advantage

- Technology enables combining what used to be separate ...

Taking Advantage

- It is much less expensive to install and manage a common infrastructure
- Moore's Law: both UE and core network infrastructure capabilities have increased greatly while costs have declined significantly
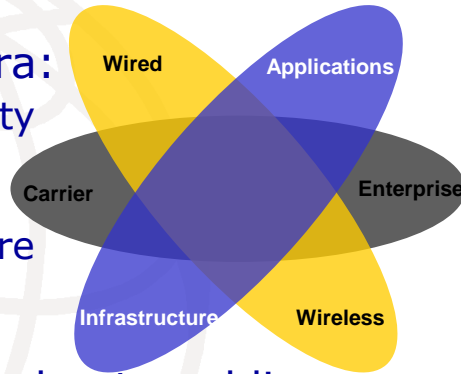

http://en.wikipedia.org/wiki/Moore%27s_law
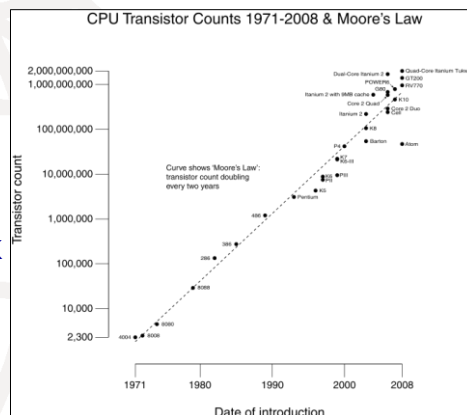
Megatrends

- Mega trends are defining a new era:
  - Hyper-connectivity
  - Network-aware applications and applications-aware networks
  - True Broadband
- Technology is all about enabling users to do what they want to do

Wired **Applications** **Carrier** **Enterprise** **Infrastructure** **Wireless**

Taking Advantage

- Mobile access and Next Generation Networks has been the leading edge of telecom standards work for some time now
  - "Megatrends" are the key drivers
  - There is sufficient experience and maturity to enable adoption with confidence

NGN Benefits

- NGN: forward looking technologies, lower costs, greater flexibility, can meet user demands now and in the future
- NGNs will:
  - promote fair competition
  - encourage investment
  - meet regulatory requirements
  - provide open access to networks ...
- ... while:
  - ensuring universal access to services
  - promoting equality of opportunity to users
  - promoting cultural and linguistic diversity
  - recognizing need for global cooperation

Summary and Conclusions

- People want to communicate
  - The next billion users will be primarily mobile
  - The Internet will increasingly be accessed from mobile terminals
- Major changes have taken place in both technology and markets
  - Every network is in transition
  - Wealth of experience to draw on and apply
- No need to follow all the same steps: leapfrog to success with new telecoms technologies

Thank you!

John Visser, P.Eng.
Chairman, ITU-T TSAG
+1 613 276 6096
jvisser@rogers.com

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