# Evolution and Migration to IMT-2000 & Systems beyond

## 2.1.6: Mobile Network Evolution to NGN

***ITU-BDT Regional Seminar on IMT-2000 for CEE and Baltic States***
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## Abstract: Mobile Network Evolution to NGN

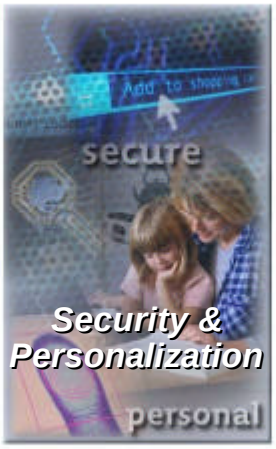
**Change is necessary. As we manage our lives more and more on telecommunications networks, we increase the traffic they must carry. This increases costs but does not drive up revenues as connectivity becomes a commodity. Today, we have different networks for different services, different networks for different enterprises. We have boundaries within service providers that cause different services to be provided by different platforms without something ensuring the overall consistency of the user experience. At many levels the transformed network needs to eliminate these boundaries. This is essential both for end user satisfaction and for operator profitability.**

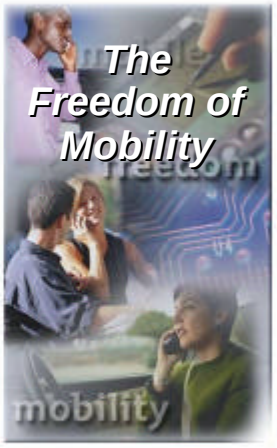
## Outline

- What do end users and operators want?
- Mobility is a key dimension of the NGN
- Review: ITU-T SSG: forward looking areas
- Major shifts occurring
  - Subscriber base
  - What the access technologies can deliver
- Convergence of Telecoms, Data, Broadcasting
  - Wireless access and network transformation
  - Blending user devices
- Realizing the Vision



## End Users Value ...

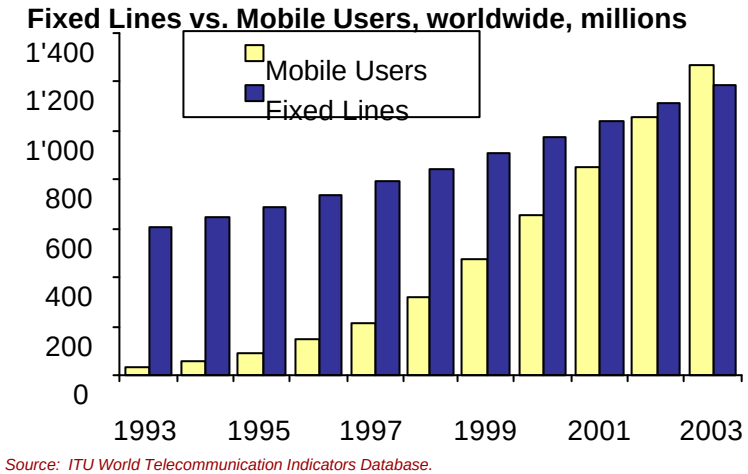




*… for enhanced productivity and user experience*

## Eliminate boundaries ...


***... to enable ubiquitous and seamless solutions***

## Mobile Revolution is underway




*Source: ITU World Telecommunication Indicators Database.*

## Forecasts

**Many available!**

- **Example: Yankee Group, News Release 24 Jun 03:**
  - **estimate 18.6 percent of world's population currently has mobile phones**
  - **global wireless user base will increase 49% over next 4 years, reach 1.72 billion by 2007**
  - **global cellular subscriber revenue will grow from $387 billion in 2002 to $584 billion in 2007, similar in value to crude oil production**

- **Mobility is a key dimension of the NGN**



## Summary of SSG Mandate

- **Lead SG on IMT-2000 and beyond and for mobility**
  - **Primary responsibility within ITU-T for overall network aspects of IMT-2000 and beyond**
- **To study:**
  - **Vision for IMT-2000 and Beyond (circa 2010)**
  - **Identification and globalization of IMT-2000 Family members**
  - **Support harmonization of evolving IMT-2000 Family members**
  - **Convergence of fixed and wireless networks**
- **To assist developing countries in applying IMT-2000**
- **Emphasis on strong cooperative relations and complementary programs with SDOs, 3GPPs**
- **Make use of provisional working procedures specific to SSG:**
  - **Recommendation A.9: Provisional working procedures for SSG**

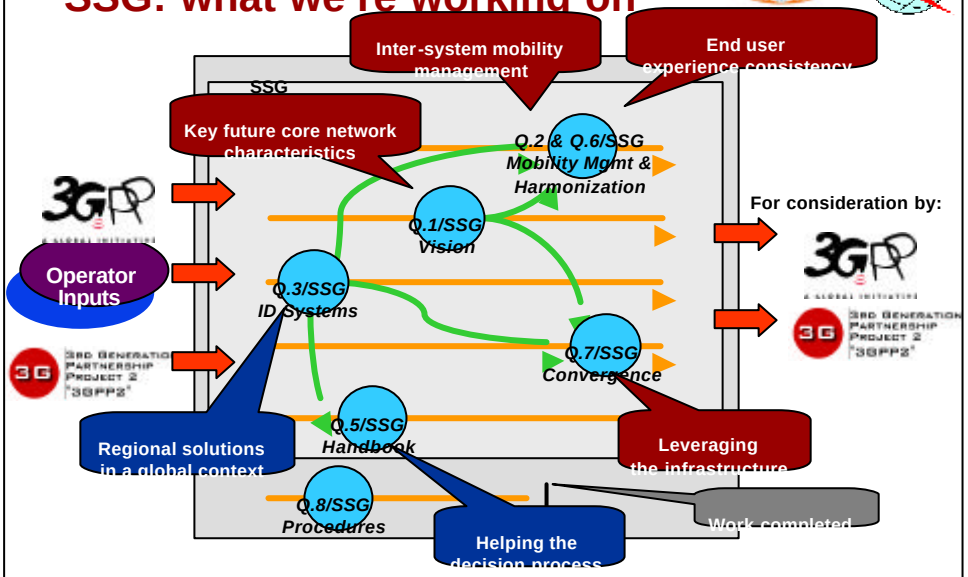
# SSG Mandate translated into Study Questions

- **Q.1/SSG** Service and network capability requirements and network architecture ("Vision")
- **Q.2/SSG** NNI Mobility Management protocol
- **Q.3/SSG** Identification of existing and evolving IMT-2000 Systems ("ID Systems")
- **Q.4/SSG** Interworking functions to be used with existing and evolving IMT-2000 systems
- **Q.5/SSG** Preparation of a Handbook on IMT-2000 ("Handbook")
- **Q.6/SSG** Harmonisation of existing IMT-2000 Systems
- **Q.7/SSG** Convergence of fixed and existing IMT-2000 systems ("Convergence")
- **Q.8/SSG** Special Study Group working procedures ("Procedures") (now deleted: work finished)

**Details available at:** http://www.itu.int/ITU-T/studygroups/ssg/questions.html



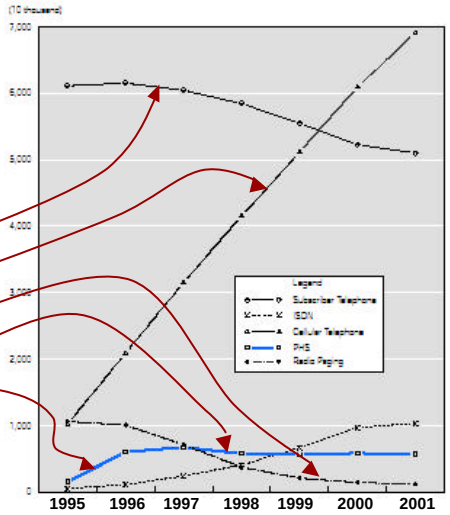
# SSG: what we're working on



# Large shifts taking place in subscriber base!

- **Example: TCA Japan Telecom Data Book 2003**
  - **Ref: http://www.tca.or.jp/eng/database/annual/2003/index.html**

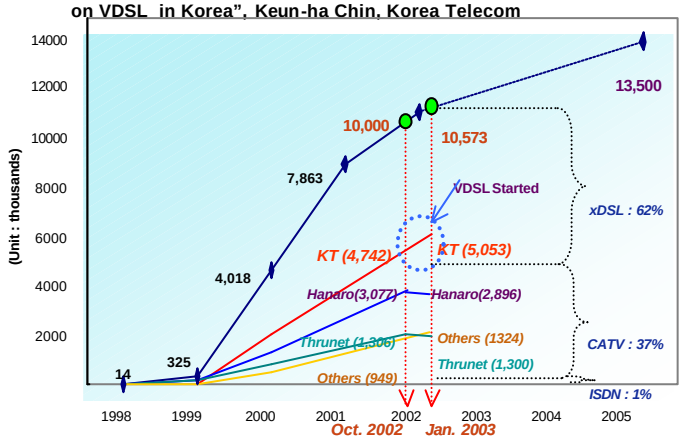
**Fixed subscriber lines**
**Mobile subscribers**
**Paging**
**PHS**
**ISDN**



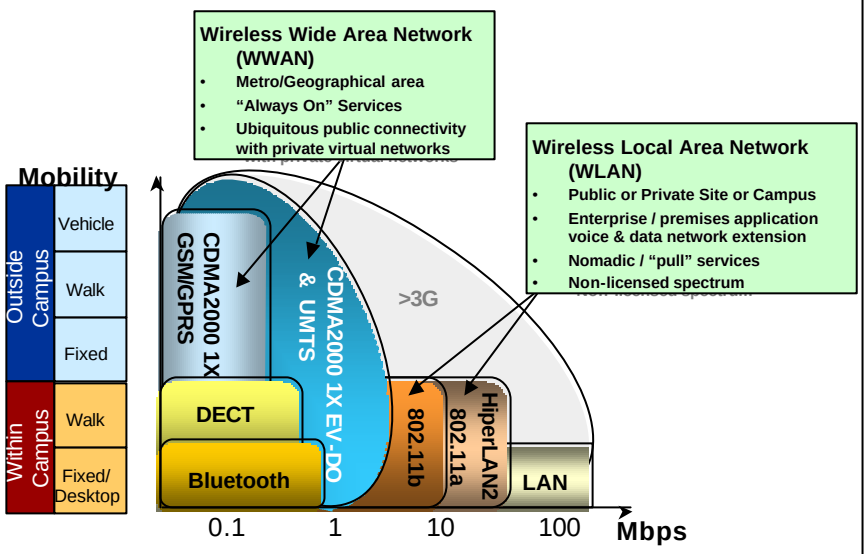



# Large shifts taking place in subscriber base!

- **Example: South Korea: >10 million broadband access as of Jan 2003**
  - **Ref: GSC-8 (Ottawa) Doc. 76 "Broadband Service Status and implementation issues on VDSL in Korea", Keun-ha Chin, Korea Telecom**



# The Wireless Landscape






# Looking forward: the Internet and Telecoms Convergence

- PSTN designed for voice
  - Data added by making it behave like voice (modems, ...)
- ISDN designed for both data and voice
  - Voice treated as data using CS paradigm (2B+D, ...)
- Internet designed around "best effort" data transfer (IP, ...)
  - QoS, performance issues for voice, high quality audio, high quality video, real time interactive applications
  - can be addressed using a "managed" internet
- Major changes in data capabilities of access interfaces

## Convergence

- Internet, Broadcasting, Telephony, ...

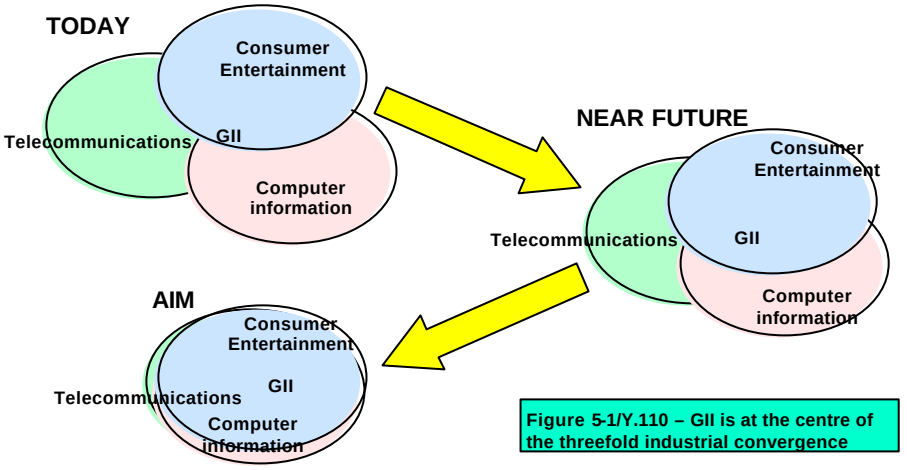
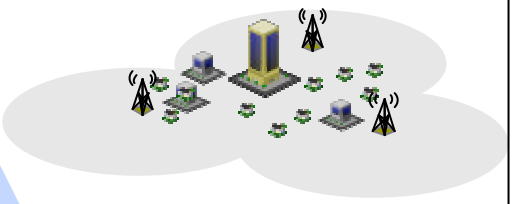



Figure 5-1/Y.110 – GII is at the centre of the threefold industrial convergence



## The Wireless Packet Network

- Wireline Network
  - Good for Voice, not Data
- Data Router Network
  - Best Efforts
- Wireless Network
  - Mobility



### Wireless Packet Network Attributes

- Voice over IP
- Universal Mobility
- Five 9's Reliability for Mission-Critical Applications
- Network-embedded Services – VPN, QoS, Billing, ...
- Enable Consumer and Business Services

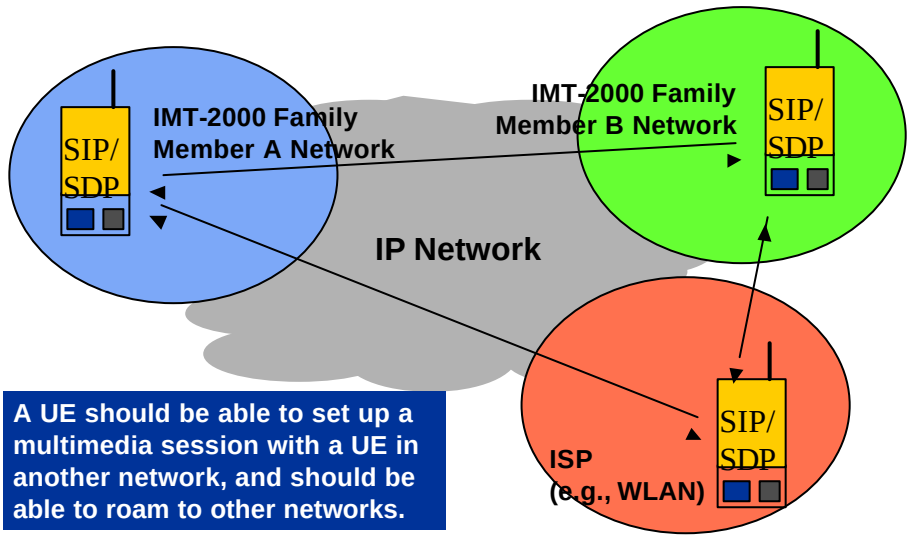
## What does this mean for the IMT-2000 Core Network?

- Common CN solution: IP-based using IETF protocols
- Integration of Wireless LANs into basic mobile telecommunications paradigm
- Common issues to be dealt with:
  - QoS
  - Fraud/Privacy
  - CS (legacy) interworking
  - Charging
  - ...

- Solution: do it on a common infrastructure
- But there are issues ...



## IMS and Interworking



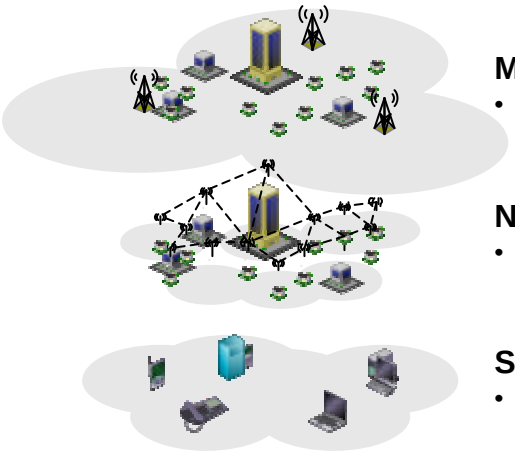

A UE should be able to set up a multimedia session with a UE in another network, and should be able to roam to other networks.

## Enhanced End User Experience: Blending User Devices

- PC, phone(s) and PDA: different user interfaces to the same network-based application
- Common, network-based directory for:
  - Phone numbers
  - Buddies & presence
  - Email address book
  - All applications
- Just one address to reach the user
- Unified, network-based, user profile applying to all terminals
  - E.g., set presence location, (call routing preferences), etc., on any terminal and it applies to all



## The Un-Wiring of the Future



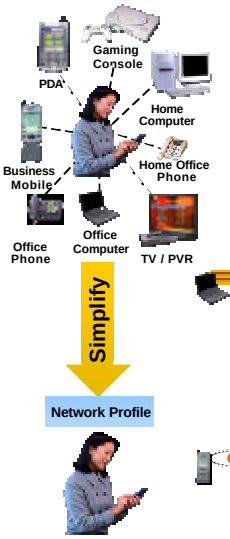
**Mobility / WWAN**
- *A Million nodes @ $50k*

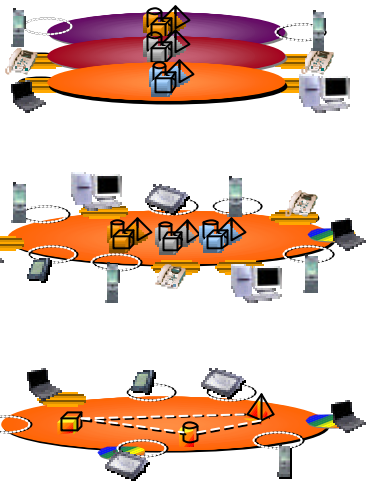
**Nomadic / Mesh / WLAN**
- *Millions of Nodes @ $100*

**Sensor / Ad-hoc / WPAN**
- *Billions of Nodes @ $1*

***… connected through the Wireless Packet Network***

# Network Transformation



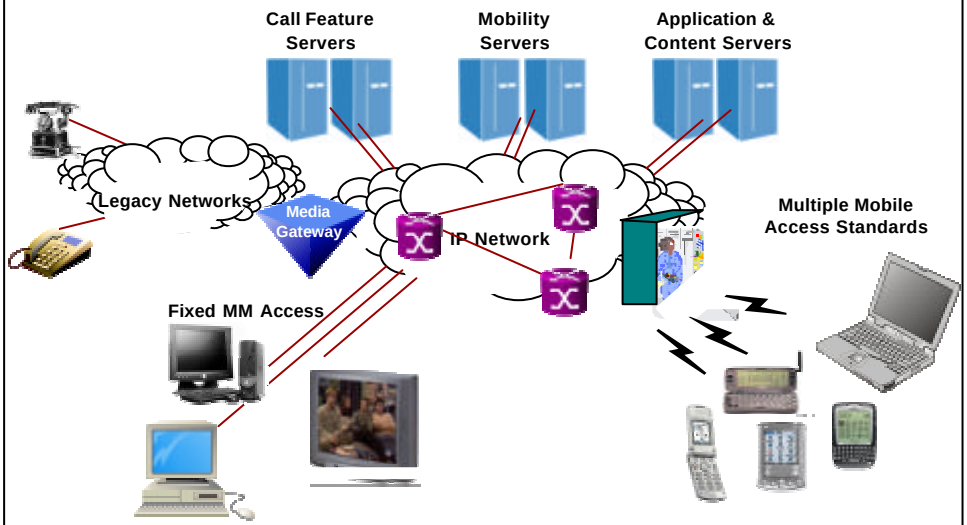
**Existing**
- Multiple networks
- Simple devices
- Disparate services

**Transition**
- Converged packet network
- Multimedia devices
- Linked services

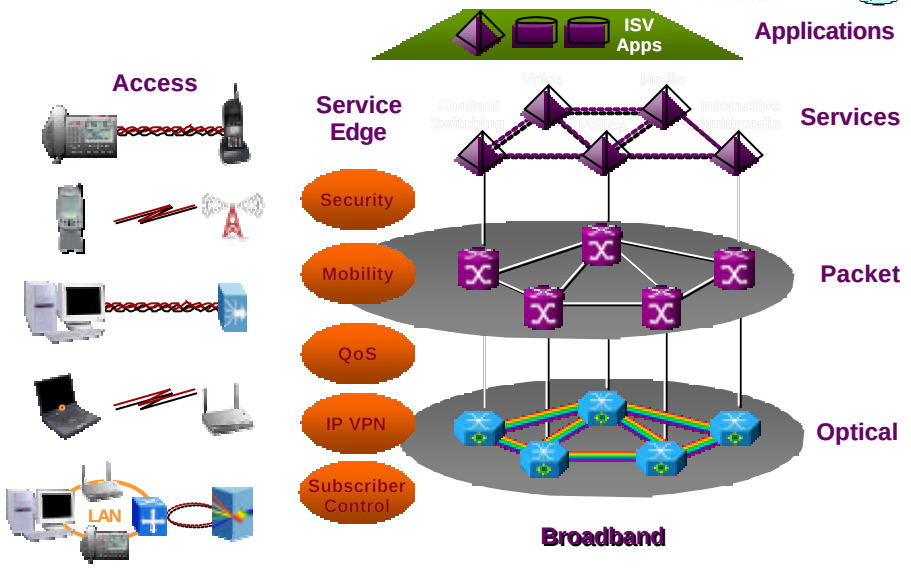
**Transformed**
- Dynamic packet/ optical network
- Secure multimedia services
- Ubiquitous broadband
- Integrated functionality



# Common infrastructure

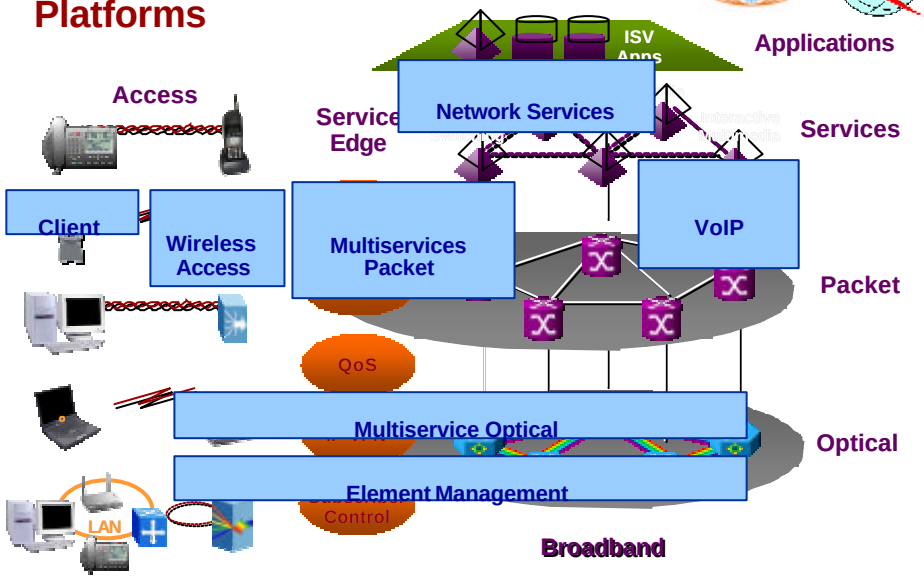


## Transformed Network Architecture






## Transformed Network Architecture Platforms



# Some Key Work Areas for Realizing the Vision

**SERVICE ENABLING ENVIRONMENT**
- Voice quality & functionality
- Presence technology
- Application integration
- Server & database integrity
- Security
- Multi-service networking
- Carrier grade scaling, performance, reliability
- Mobility services

**COMMON OPTICAL & PACKET FOUNDATION**
- Multi-service access
- High speed high density
- Lambda management
- Photonic switching

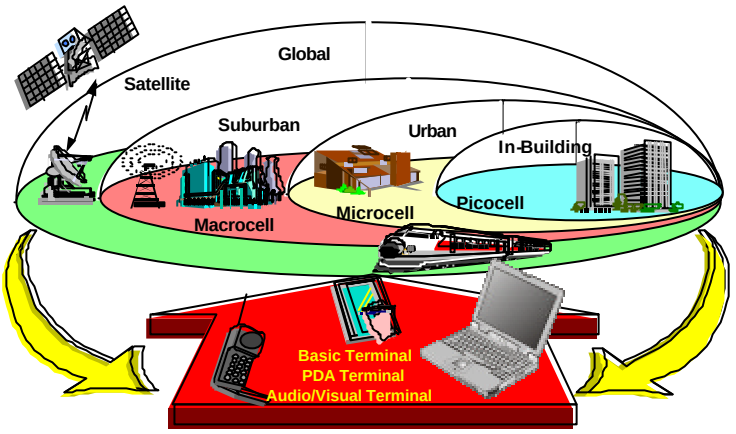
**NETWORKING ATTRIBUTES**
- System availability
- Hardware availability
- Real-time software
- Scalability
- Interoperability
- Distributed software
- Management integration
- Solution integration

***Much interesting and challenging work still to be done!***



# The Transformed Network

## IMT-2000 and Beyond...




***Realizing the Vision will require an ongoing and well-coordinated global effort.***



# Thank you!