GUIDELINES ON SMOOTH TRANSITION FROM THE EXISTING MOBILE NETWORKS TO IMT-2000 FOR DEVELOPING COUNTRIES -GST

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OUTLINE

- ITU-D Study group 2
- Q 18/2 (Study period 2002-2006)
- MTG and GST
- IMT-2000 terrestrial technologies
- Development of policy for transition
  - Special needs of developing countries
  - Government policy
  - Operator's perspective
- Strategies for smooth transition
- Transition Paths to IMT-2000 Systems –
- Economics of Mobile Network Deployment
- ANNEX 1: OPERATOR'S EXPERIANCES

ITU www.itu.int

- ITU objectives:
  - Development of new systems concepts and recommendations
  - *Assistance to developing countries in developing policy and strategy to meet broadband infrastructural requirements for the emerging Information Society.*

ITU-D www.itu.int/itu-d

- **ITU-D**
  - **STUDY GROUP 2 Study period 2002-2006**
    - Q 18/2 “Strategy for migration of mobile networks to IMT-2000 and beyond”
  - **STUDY GROUP 2 Study period 2006-2010**
    - **Q 18-1/2** “Implementation aspect of IMT-2000 and information-sharing on systems beyond IMT-2000 for developing countries

Technology shift
WTDC ISTANBUL 2002

- **HOW IMT-2000 WILL PROGRESS IN DEVELOPING COUNTRIES?**
- **HOW TO ASSIST MEMBER STATE AND SECTOR MEMBERS IN DEVELOPING COUNTRIES IN TRANSITION TO IMT- 2000, FROM BOTH TECHNICAL AND ECONOMICAL ASPECT?**
- ***Q 18/2: "STRATEGY FOR MIGRATION OF EXISTING MOBILE NETWORKS TO IMT 2000 AND BEYOND"***

Q 18/2: Strategy for migration of mobile network to IMT 2000 and beyond

- **Issues proposed for study:**
  - Identify the economic impact and development aspect for such migration, with particular attention to cost affordability for end users, as well as identification of migration techniques taking into consideration the experience of developing countries and the special needs of developing countries
  - Examine the possibility of using first and second generation spectrum for IMT 2000 and beyond

Q 18/2 framework

- ITU-D SG 2, Rapporteur for Q 18/2: Nataša Gospić
- Rapporteur Group on Q 18/2 was created, composed of experts from developed and developing countries
- After two and half years, Mid Term Guidelines for Smooth Transition of the Existing Mobile Networks to IMT-2000 (MTG) for developing countries was approved by SG 2, September 2004.
- Guidelines for Smooth Transition of the Existing Mobile Networks to IMT-2000 (GST) was approved by ITU-D SG 2 meeting, September 2005

Q 18/2 Output results

- Guidelines for Smooth Transition of the Existing Mobile Networks to IMT-2000 (GST)
- www.itu.int/imt2000

- Mid Term Guidelines for Smooth Transition of the Existing Mobile Networks to IMT-2000 (MTG) (http://www.itu.int/itudoc/itu-d/question/studygr2/87040.html)

New ITU-D Study period 2006-2010

- ITU-D SG 2
  - CHAIRPERSON: NABIL KISRAWI
  - nabil.kisrawi@itu.int
- NEW Q 18-1/2 (presented in the next presentation)
  - RAPPORTEUR: ALBERTO ZETINA
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Structure of the Midterm Guidelines-MTG (http://www.itu.int/itudoc/itu-d/question/studygr2/87040.html)

- *SUMMARY*
- *1 - INTRODUCTION*
- *2 - DEVELOPMENT OF POLICIES FOR TRANSITIONING OF EXISTING NETWORKS TO IMT-2000*
- *3 – TRANSITION PATHS*
- *4 - ECONOMICS OF TRANSITION TO IMT-2000*
- *5 – CONCLUDING REMARKS*
- *6 - DEFINITIONS*
- *7 - ABBREVIATIONS/GLOSSARY*
- *REFERENCES*
- *ANNEXES A - F*
- *ANNEX G – OPERATOR EXPERIENCE IN TRANSITIONING TO IMT-2000 SYSTEMS*

GST STRUCTURE

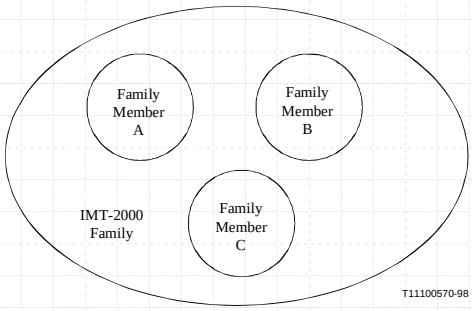
- SUMMARY
- 1. INTRODUCTION
- 2. DEVELOPMENT OF POLICIES FOR TRANSITIONING OF EXISTING NETWORKS TO IMT-2000
- 3. TRANSITION PATHS
- 4. ECONOMICS OF TRANSITION TO IMT2000
- 5. CONCLUDING REMARKS
- 6. DEFINITIONS
- 7. ABBREVIATIONS/GLOSSARY
- REFERENCES
- ANNEX I – OPERATOR'S EXPERIENCES IN TRANSITIONING TO IMT-2000 SYSTEMS

For whom and for what is developed the GST?

- **TELECOM POLICY DECISION MAKERS**
- **REGULATORS**
- **OPERATORS**
- **OPERATIONAL STAFF**
- **TRAINING MATERIAL FOR INTRODUCTION OF IMT-2000 SERVICES**
- **TUTORIALS FOR IMT-2000 STUDIES**

IMT-2000 TERRESTRIAL TECHNOLOGIES

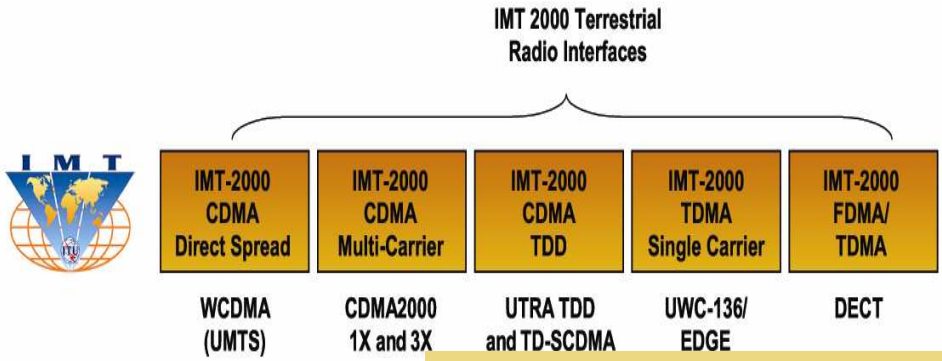
ITU IMT-2000 Family of Systems Concept



The IMT-2000 Family is a group of IMT-2000 Systems providing IMT-2000 capabilities to its users as identified in IMT-2000 Capability Sets. However, individual family members may have different intra-system specifications (e.g., functionalities in physical entities, signaling protocols, etc.)

An IMT-2000 Family Member is an IMT-2000 System. A Family Member integrates and incorporates the IMT-2000 functions into physical entities and associated interfaces as necessary to provide IMT-2000 capabilities

IMT-2000 Radio Access Networks and Standards



ITU in October 2007 made a decision to include "**WiMAX-derived" technology based on IEEE 802.16** into the framework of the International Mobile Telecommunications IMT-2000 set of standards, incorporating it as the **sixth terrestrial IMT-2000 radio interface.**

Radio interfaces for terrestrial IMT-2000

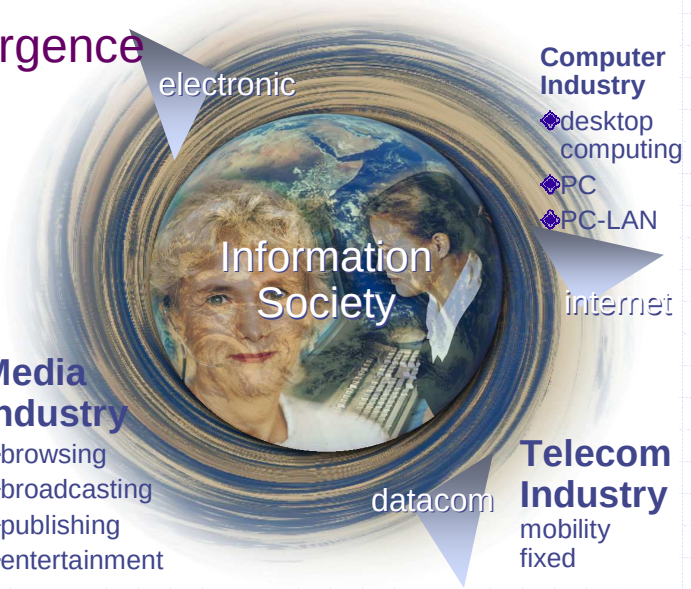
FULL NAME OF IMT-2000 FAMILY MEMBER	COMMON NAME
IMT-2000 CDMA Direct Spread	UTRA FDD WCDMA UMTS
IMT-2000 CDMA Multi-Carrier	CDMA2000 1x and 3x CDMA2000 1xEV-DO CDMA2000 1xEV-DV
IMT-2000 CDMA TDD (time-code)	UTRA TDD 3.84 mcps high chip rate UTRA TDD 1.28 mcps low chip rate (TD-SCDMA) UMTS
IMT-2000 TDMA Single-Carrier	UWC-136 EDGE
IMT-2000 FDMA/TDMA (frequency-time)	DECT

IMT-2000 core networks

FULL NAME	ITU-T RECOMMENDATIONS IDENTIFYING THIS CN	IMT-2000 RADIO TECHNOLOGIES
GSM evolved UMTS Core Network	Q.1741.1 (referring to 3GPP Release 99) Q.1741.2 (3GPP Release 4) Q.1741.3 (3GPP Release 5) Q.1741.m (m signifies future releases)	IMT-2000 CDMA Direct Spread IMT-2000 CDMA TDD IMT-2000 TDMA Single-Carrier
ANSI-41 evolved Core Network with cdma2000 Access Network	Q.1742.1 (3GPP2 spec. as of 17 July 2001) Q.1742.2 (3GPP2 spec. as of 11 July 2002) Q.1742.3 (3GPP2 spec. as of 30 June 2003) Q.1742.n (n signifies future releases)	IMT-2000 CDMA Multi-Carrier

What are driving forces worldwide?

Convergence

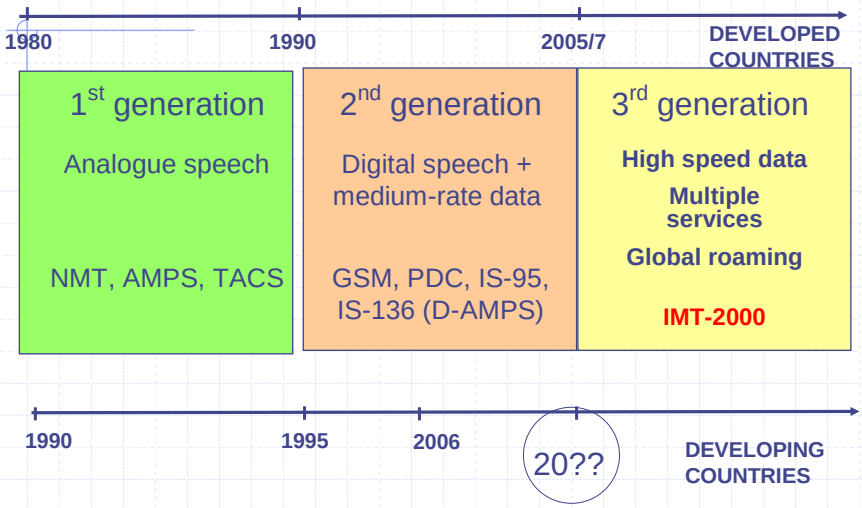


Computer Industry
- desktop computing
- PC
- PC-LAN

Media Industry
- browsing
- broadcasting
- publishing
- entertainment

Telecom Industry
mobility
fixed

Where are the most of developing countries?



2. DEVELOPMENT OF POLICY FOR TRANSITION

Special needs of developing countries

- Government policy for development
- Operator perspective
- Regulator perspective
- Consumer-user perspective

Government development policy

- DEVELOPING COUNTRIES ARE CHALLENGING THE ENTRANCE TO GLOBAL E-ECONOMY MARKETS (KNOWLEDGE ECONOMY)
- GENEVA WSIS PRINCIPLES OF DECLARATION, PLAN OF ACTION
- TUNIS WSIS AGENDA AND COMITMENT

Government development policy

WSIS DECLARATION OF PRINCIPLES:

Building the Information Society: a global challenge in the new Millennium

–Information and communication infrastructure: an essential foundation for an inclusive information society

–A well-developed information and communication network infrastructure and applications, adapted to regional, national and local conditions, easily-accessible and affordable, and making greater use of broadband and other innovative technologies where possible, can accelerate the social and economic progress of countries, and the well-being of all individuals, communities and peoples

Government development policy

WSIS ACTION PLAN to be achieved by 2015:

a) to connect villages with ICTs and establish community access points;

b) to connect universities, colleges, secondary schools and primary schools with ICTs;

c) to connect scientific and research centres with ICTs;

d) connect public libraries, cultural centres, museums, post offices and archives with ICTs;

e) to connect health centres and hospitals with ICTs;

f) to connect all local and central government departments and establish websites and email addresses;

g) to adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances;

h) to ensure that all of the world's population have access to television and radio services;

i) to encourage the development of content and to put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet;

j) to ensure that more than half the world's inhabitants have access to ICTs within their reach.

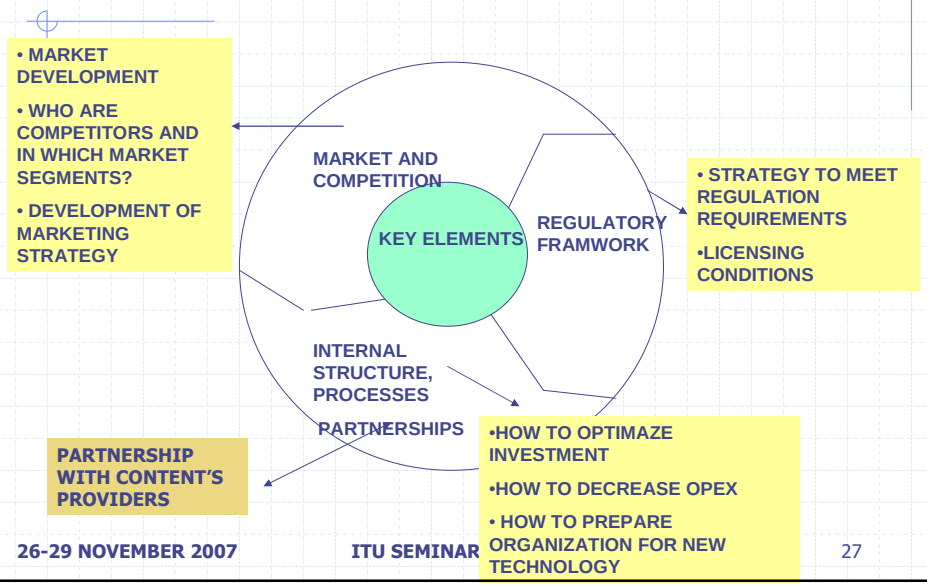
IMT-2000 accommodates needs for NII in developing countries

- FOR URBAN AREAS
- FOR SPARCELY POPULATED AREAS
- FOR MIX URBAN/RURAL AREAS

Operator' perspective for transition to IMT 2000

- Cost
- Fixed wireless access
- Coverage and deployment obligations
- Transition time
- Mass application
- Spectrum
- Infrastructure sharing
- Satellite components
- Market analysis and business case
- Service and applications
- Availability of equipment from multiple vendors

Operator's business position towards IMT-2000



Regulator's perspective

ITEM	REGULATOR'S NEEDS AND RATIONALE
LICENSE HANDLING AND ALLOCATION	Capitalize on experience of developed countries on ◆license awarding method ◆license conditions, ◆license fees, ◆number of licenses
DATABASES	Capitalize on experience of developed countries on: ◆RFP (Request for Proposal) issued for awarding IMT-2000 licenses; ◆Rationale behind the preferred license awarding methods; ◆Information on the method of determination of Lowest Bid Rates; ◆Standard concession agreements – including provisions related to QoS numbering, interconnection, roaming, coverage, infrastructure sharing etc. – that were signed with the IMT-2000 operators; ◆A list of rights and obligations of the IMT-2000 operators, including the rationale behind each.

Special needs of users

- Due to lower income levels, in many developing countries, the users' ability to pay for telecommunications services is lower in developing countries than in developed ones.
- The availability of an affordable service offering and of reasonably priced handsets is a particularly important issue in these countries.

User's perspective

ITEMS	USER NEEDS AND RATIONALS
COST	User affordability for services and terminals. ◆Tariffs should be affordable to the end-users
TERMINALS	Ease of use and convenience of terminals. ◆The terminals should support local requirement in terms of language and must take into consideration the literacy level across the country.
EASY ROMING	◆Users want to use their usual terminals when traveling. ◆Roaming is facilitated by low prices and by the availability of compatible technologies/terminals in foreign countries.
Services and applications	Use of IMT-2000 for education in remote villages, rural economic development, access to Internet at affordable price. Training of users on wireless data applications.

STRATEGIES FOR SMOOTH TRANSITION

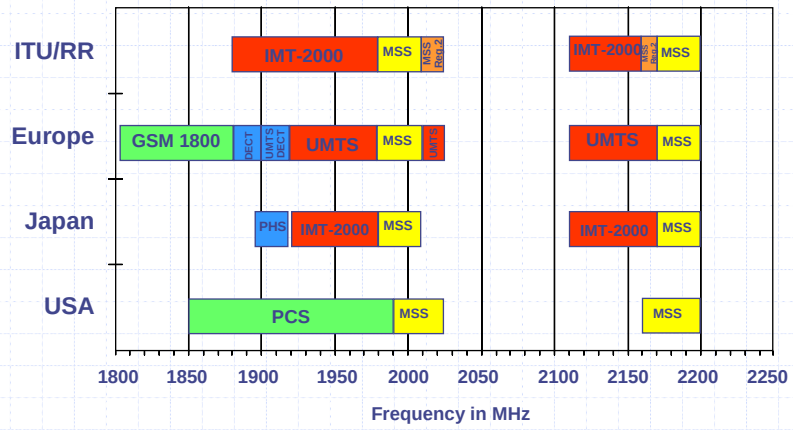
Regulatory flexibility

- ADOPTION OF FLEXIBLE POLICY FOR SPECTRUM ALLOCATION
- ITU FREQUENCY BANDS FOR IMT 2000
- POSSIBILITY TO FACILITATE IN-BAND MIGRATION

Identified frequency bands

- **WARC-92**:
  - ***1885-2025 MHz i 2110-2200 MHz***
- **WRC-2000**:
  - ***806-960 MHz, 1710-1885 MHz and 2500-2690 MHz***

Allocation of spectrum



Licensing aspects

- Licensing conditions
  - Technology Requirements -neutral
  - Financial requirements: They help to eliminate non-serious players and ensure a certain level of performance.
  - Coverage: To prevent the development of information-rich and information-poor communities,
  - Timing of IMT-2000 licenses: The timing for introduction of a new service is crucial and varies from country to country. It is necessary to judge the market potential and to deploy technologies that are proven and established. Developing countries can ill-afford to experiment with technology. However, the process of introducing wideband wireless services is time consuming and would require licensing and regulatory preparedness from an early period. It would be advisable that developing countries begin consultation right as early as possible.
  - Number of operators: The limited availability of spectrum restricts the number of operators. In developed countries 3 to 5 operators have been preferred. Another issue is who should be eligible for this license: fixed operators, mobile operators, new operators, all or a combination of these. Japan, as an example, decided to exclude fixed operators from the licensing process.
  - Infrastructure Sharing: It reduces the cost of network deployment and can improve penetration. It would also be necessary to identify the elements that can be shared, the amount of cost reduction that such sharing would bring about, for example, antenna masts, towers, and land building.
- Methods of spectrum licensing
  - First Come, First Served
  - Beauty Contest
  - Lotteries
  - Hybrid

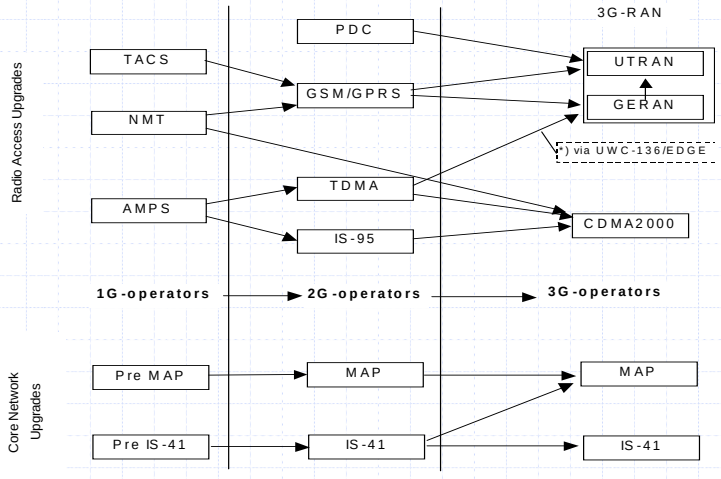
3. TRANSITION PATHS

Transition Paths to IMT-2000 Systems – Evolution and Migration

- ***Evolution* --- "a process of change and development toward enhanced capabilities"***
- ***Migration* --- "movement of users and/or service delivery from an existing system to a new system"***

** ITU-R Recommendation M.1308*

Transition Paths to IMT-2000 Systems



Operator important aspects to decide on a certain transition path

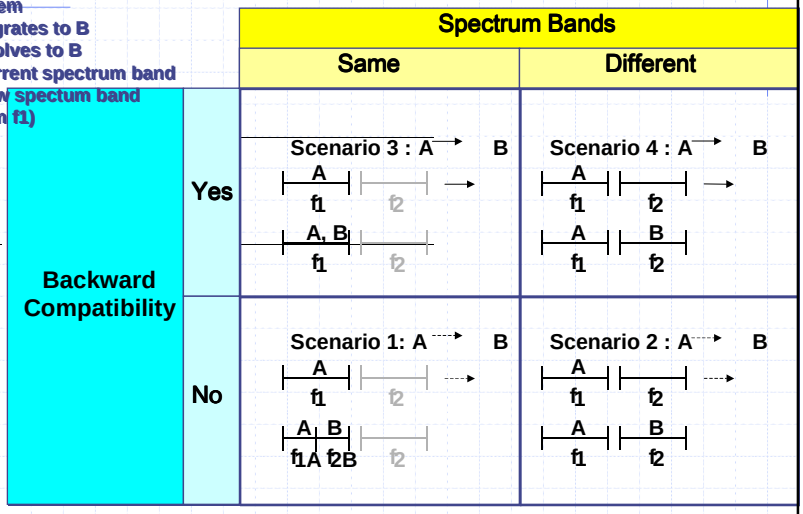
- a) Operation in worldwide harmonized frequency bands;
- b) Existing/forecasted market share/market penetration of the target technology;
- c) Probability that other operators will adopt similar transition paths;
- d) Ease of the transition from existing technology to the desired technology;
- e) The system architecture of the target technology has to be future proof (i.e., capability to expand to cope
- with new requirements and new emerging services);
- f) Status of the corresponding standards.

KEY ISSUES IN TRANSITION

- In case of transition of a system, the major issues are spectrum usage and system configuration.
- When an operator transitions to an IMT-2000 system, coverage and capacity gains occur.
- Therefore as users transition from the pre-IMT-2000 system the operator can gain spectrum efficiencies with the more advanced system.
- As for spectrum usage, four scenarios are possible and they are subject to regulatory conditions

Transition Paths to IMT-2000 Systems -Spectrum Usage

KEY
A: pre-IMT-2000 system
B: IMT-2000 system
A -------> B: A migrates to B
A - - - - > B: A evolves to B
f1: operator's current spectrum band
f2: operator's new spectum band
(different from f1)



Other Operator's key elements

- There are likely to be four key elements to the decision by operators regarding the evolution of their particular pre-IMT-2000 systems:
- 1) *Feasibility of Evolution to IMT-2000* – ITU-R and ITU-T sectors have introduced the feasibility of evolution by providing sufficient flexibility within the scope of their IMT-2000 Recommendations for the broadest set of pre-IMT-2000 systems. Of course, providing for the evolution of pre-IMT-2000 systems does not undermine the achievement of the goals for IMT-2000.
- 2) *Cost-Effectiveness of Evolving to IMT-2000* – The benefits of evolving to IMT-2000 should be weighed against the cost incurred in executing this evolution option. This cost would also be incurred when evolving to any other more advanced non-IMT-2000 standard. The ITU made every effort to provide flexibility within the scope of the IMT-2000 Recommendations to help minimize the cost of evolution to IMT-2000.
- 3) *Attractiveness of Evolution to IMT-2000* – Evolution to IMT-2000 must be the most attractive approach among the various directions that can be taken in the advancement of today's mobile communications systems. As such, decision-makers would need to have a clear view of what IMT-2000 is, and how it is an improvement over the pre-IMT-2000 systems.
- 4) *Awareness of Evolution to IMT-2000* – An awareness of the advantages of the IMT-2000 evolution option is important for those who control or influence either the direction of pre-IMT-2000 standards and systems or the allocation and use of spectrum in the short and long term.

Other operator's key elements

- Feasibility, Cost effectiveness, and Attractiveness of evolution should be used as measures for evaluating and resolving the issues associated with evolving pre-IMT-2000 systems toward IMT-2000.

Characteristics of IMT-2000 Radio Access and Core Networks technologies

- **IMT-2000 CDMA Direct Spread**
- **IMT-2000 CDMA Multi-Carrier**
- **IMT-2000 CDMA TDD**
- **IMT-2000 TDMA Single Carrier**
- **IMT-2000 FDMA/TDMA (frequency-time)**

4. ECONOMICS OF MOBILE NETWORK DEPLOYMENT

It is a subject of separate presentation

Economics

- **Market analysis and trends**
- **Costs of Transition**
  - **Costs of the network transition for the operator**
  - **Cost affordability for end users**
  - **Roaming considerations**
- **Business plan and analysis**

CONCLUDING REMARKS

CONCLUSION

- Evolution and migration are the phases through which a transition materializes, with the mix and sequence determined on the basis of economic and strategic decisions.
- However, experience shows that in time every technology will reach its expansion limits (i.e., even evolutionary enhancements will eventually lead to unacceptable system complexity).
- At that stage, technology jumps are necessary, leading to the need for a new system, which is then incompatible with the old one and requires an appropriate migration and interoperability strategy.
- Preliminary data has shown that improved and more widespread mobile networks, such as IMT 2000, have a correlation with economic improvements,
- IMT-2000 networks are deployed across the developing world, their advanced data and multimedia capabilities provide users and service providers with new tools for driving economic development, and enabling the implementation of infrastructure for the emerging **Information Society**

ANNEX I: OPERATOR'S EXPERIANCES

Scenarios	*Operator Experiences*	*Pre IMT–2000 (Frequency)*	*IMT–2000 Network (Frequency)*
Scenario 1	Russian Federation	NMT 450 (450 MHz)	CDMA2000 1x (450 MHz)
Scenario 2	Chile (Telefónica Móvil de Chile)	AMPS/TDMA (850 MHz)	GS+M/GPRS/EDGE (1 900 MHz)
Scenario 2	Japan (NTT DoCoMo)	PDC (800 MHz)	WCDMA (2 000 MHz)
Scenario 3	Hong Kong (Hong Kong CSL Ltd)	GSM/GPRS (900/1 800 MHz)	GSM/GPRS/EDGE (900/1 800 MHz)
Scenario 3	Japan (KDDI: au)	cdmaOne (800 MHz)	CDMA2000 1x (800 MHz)
Scenario 3	Thailand (Advanced Info Service Public Co. Ltd)	GSM/GPRS (900 MHz)	GSM/GPRS/EDGE (900 MHz)
Scenario 3	Venezuela	TDMA (800 MHz)	CDMA2000 1x (800 MHz)
Scenario 4	Hungary (Pannon GSM Telecommunications Ltd)	GSM (900 MHz)	GSM/GPRS/EDGE (1 800 MHz)

СПАСИБО!!!