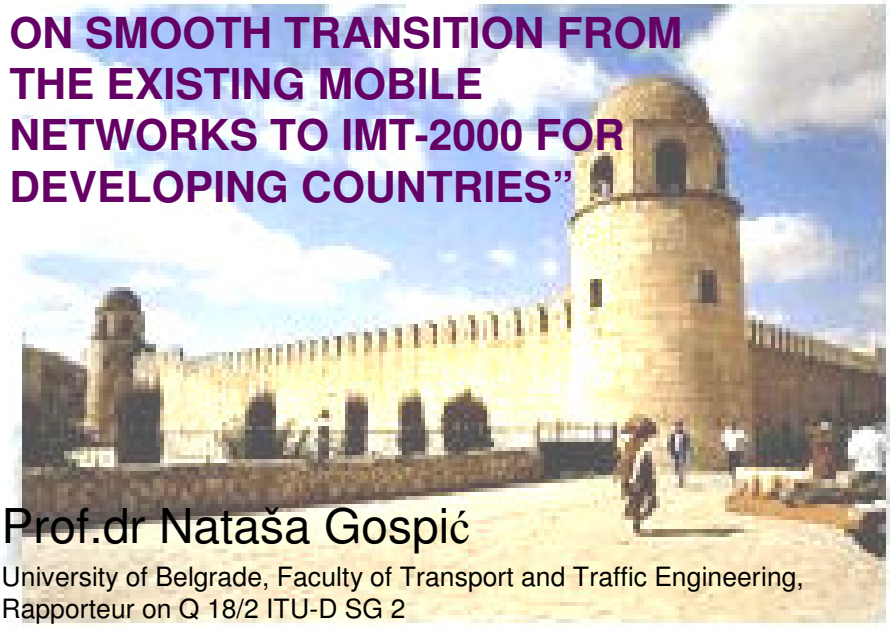
ITU-D "GUIDELINES ON SMOOTH TRANSITION FROM THE EXISTING MOBILE NETWORKS TO IMT-2000 FOR DEVELOPING COUNTRIES"



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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 PERIOD 2002-2006**
  - **STUDY GROUP 2**
    - Q19/2 «Strategy for migration from circuit-switched networks to packet-switched networks «
    - Q 18/2 «Strategy for migration of mobile networks to IMT-2000 and beyond«
    - Q 20/2 «Examination of access technologies for broadband communications«

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
EXPECTED OUTPUT

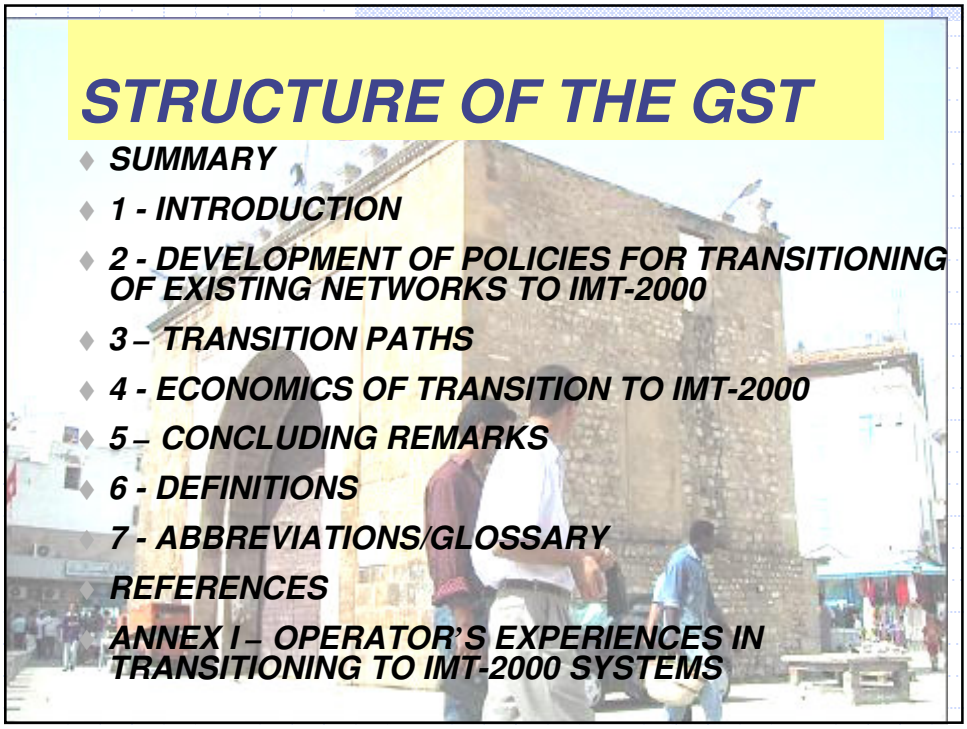
- **A GUIDELINES for smooth migration, including system interoperability among third- generation technologies, with proper collection, analysis and periodical dissemination of relevant data from relevant groups within ITU and those outside**
- **The course of next ITU-D study period (WTDC 2006) with mid-term guidelines by early 2004.**

Q 18/2 FRAMEWORK

- ITU-D SG 2
- 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) was approved by SG 2, September 2004, (http://www.itu.int/itudoc/itu-d/question/studygr2/87040.html).
- Guidelines for Smooth Transition of the Existing Mobile Networks to IMT-2000 (GST) was approved by ITU-D SG 2 meeting, September 2005.
- The last meeting in Cameroon was with a great contributions from developing counties.

Structure of the Midterm Guidelines-MTG (http://www.itu.int/itudoc/itu-d/question/studygr2/87040.html)

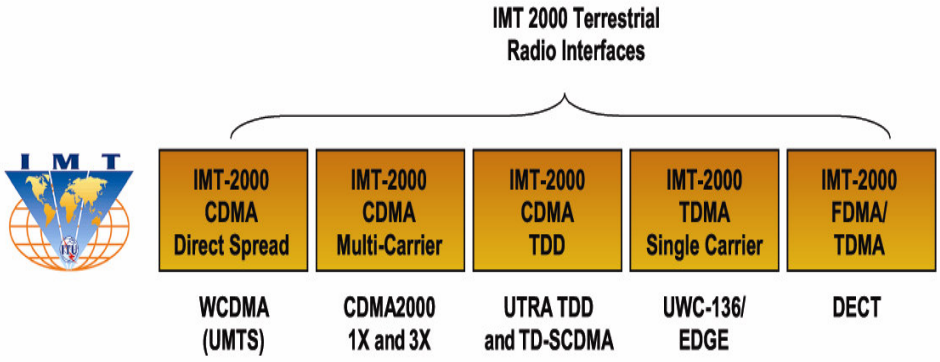
- *SUMMARY*
- *1 - INTRODUCTION*
- *2 - DEVELOPMENT OF POLICIES FOR TRANSITIONING OF EXISTING NETWORKS TO IMT-2000*
- *3 – TRANSITION PATHS*
- *4 - ECONOMICS OF TRANSITION TO IMT-2000*
- *5 – CONCLUDING REMARKS*
- *6 - DEFINITIONS*
- *7 - ABBREVIATIONS/GLOSSARY*
- *REFERENCES*
- *ANNEXES A - F*
- *ANNEX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



Acknowledgements

- These Guidelines have been prepared using information provided by a variety of administrations, companies, industry groups and associations, including examples of their products, systems, models and case studies.
- The contribution and advice of ITU–R WP8A and WP8F, as well as ITU–T SG 19, are gratefully acknowledged

IMT-2000 Family members



RADIO INTERFACES FOR TERESTRIAL 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

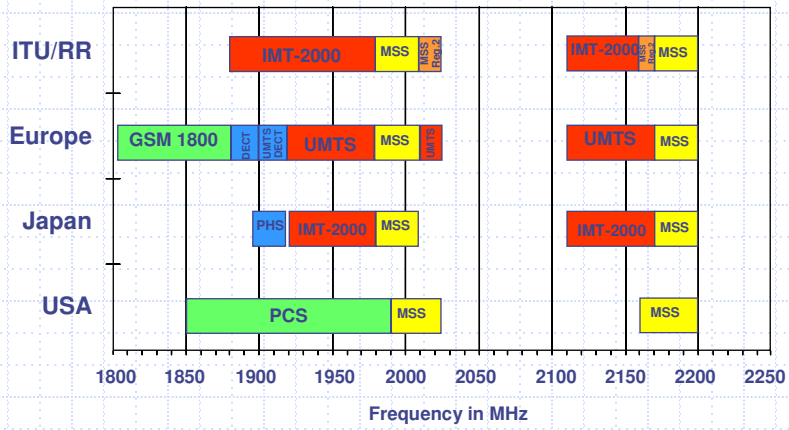
IMT-2000 CORE NETWORKS

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

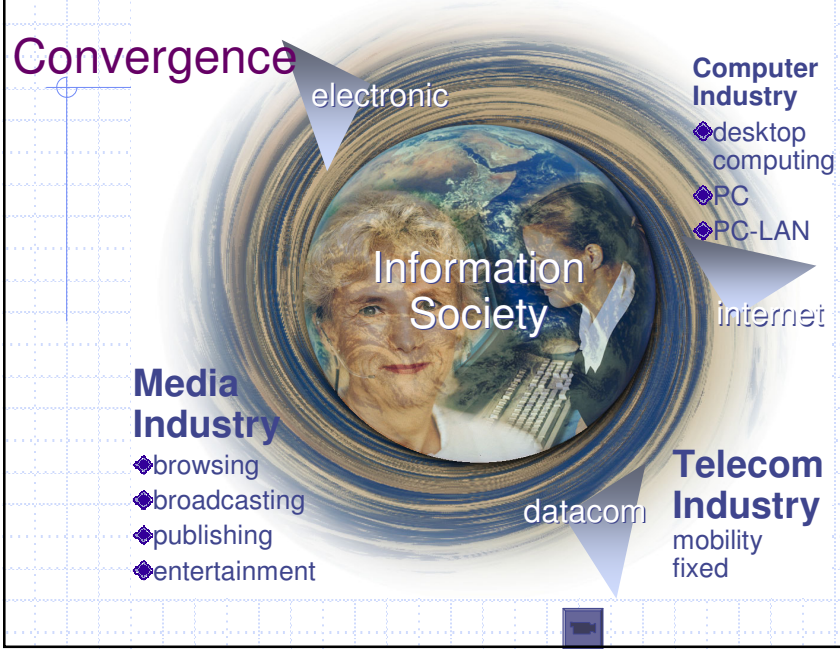
IDENTIFIED FREQUENCY BANDS

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

ALLOCATION OF SPECTRUM



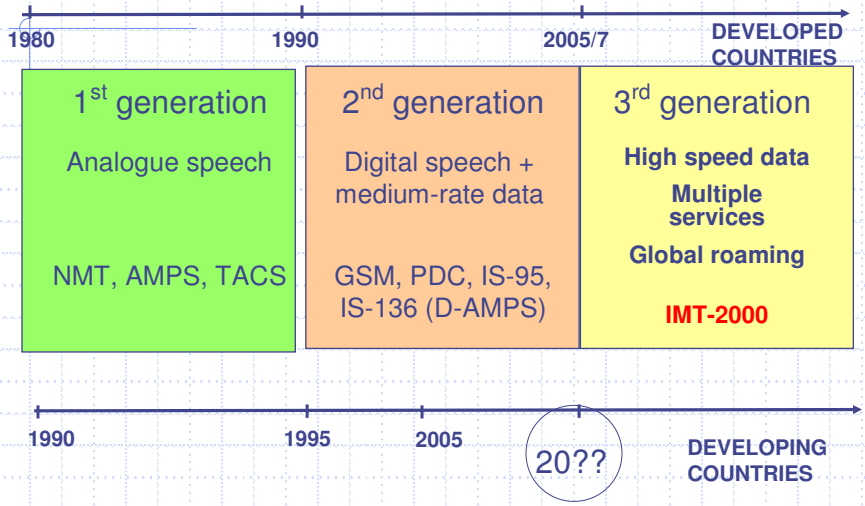
WHAT ARE DRIVING FORCES WORLDWIDE?



DRIVING FORCES

- From 1995 to 2002, the number of mobile lines has grown by 75% in Africa, 30% in the Americas, 52% in Asia, 50% in Europe and 29% in Oceania (ITU Database)
- Many developed markets are reaching their saturation point, which implies that future growth will be driven by the developing world
- By 2008, it is estimated that 90% of new subscribers will be from developing countries.
- IMT-2000 has important role to play in bridging the "digital divide" between regions and cultures.

WHERE ARE THE MOST OF DEVELOPING COUNTRIES?



DEVELOPMENT OF POLICY FOR TRANSITION

- **SPECIAL NEEDS OF DEVELOPING COUNTRIES:**
  - GOVERNMENT DEVELOPEMENT POLICY
  - OPERATOR PERSPECTIVE
  - REGULATOR PERSPECTIVE
  - CONSUMER-USER PERSPECTIVE

GOVERNMENT DEVELOPMET 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 ACCOMODATES SPECIAL NEEDS

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 requirements

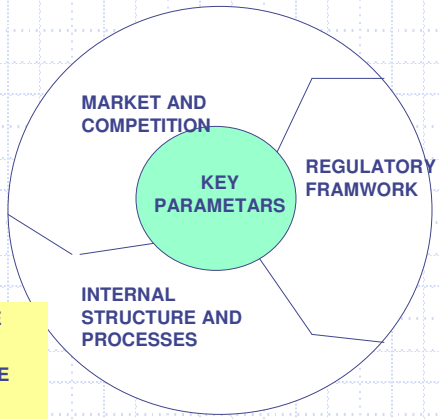
Costs	Transition costs should be minimized as much as possible because vast majority of population has little discretionary budget for telecommunications/entertainment.
Fixed wireless access	Some operators may provide fixed wireless access for IMT-2000 services in urban areas.
Coverage and deployment obligations	Target coverage/service penetration and roll-out schedule set by regulators in some cases. Roll-out obligations must be set keeping in view the business case of the operator and the user's interest.
Transition time	Time frame for transition from existing "mobile"/"fixed" towards IMT-2000. Operators should have maximum flexibility in determining and finalizing the transition.
Mass application	Applications such as tele-education, tele-medicine, e-government may require IMT-2000 technologies.
Government support	Role of government subsidy for infrastructure and/or advanced applications (not for infrastructure but for affordability of services by all including universal service obligations).

Operator requirements

Value depreciation	Possible obsolescence of new infrastructure investments while waiting for IMT-2000 demand.
IMT-2000 bands	Access to appropriate frequency bands and adequate spectrum is required. Use of frequencies below 1GHz and allocation of future frequency bands as per WRC/WARC may be advantageous in providing cost-efficient coverage.
Technical and administrative conditions	Conditions for use of spectrum (licensing / roaming / coverage / other operator obligations)
Infrastructure sharing	Sharing of (radio / network) resources for rapid rollout and coverage (VNO) can be encouraged to facilitate speedy deployment of new technologies and lower the costs to operators.
Satellite component	Usage of satellite component of IMT-2000.
Services and applications	Low entry fees. Use of IMT-2000 for access to education in remote villages, rural economic development, access to Internet at affordable price.

OPERATOR'S BUSINESS POSITION TOWARDS IMT-2000

- MARKET DEVELOPMENT
- WHO ARE COMPETITORS AND IN WHICH MARKET SEGMENTS?
- DEVELOPMENT OF MARKETING STRATEGY



- STRATEGY TO MEET REGULATION REQUIREMENTS
- LICENSING CONDITIONS

- HOW TO OPTIMAZE INVESTMENT
- HOW TO DECREASE OPEX
- HOW TO PREPARE ORGANIZATION FOR NEW TECHNOLOGY
- PARTNERSHIPS

MARKET SEGMENTS

DEVELOPED COUNTRIES:

- I. EXAMPLE
  - business professional,
  - product managers,
  - young generation,
  - family,
  - senior citizens
- II. EXAMPLE
  - pioneers,
  - materialist,
  - sociables,
  - achivers and
  - traditionalist

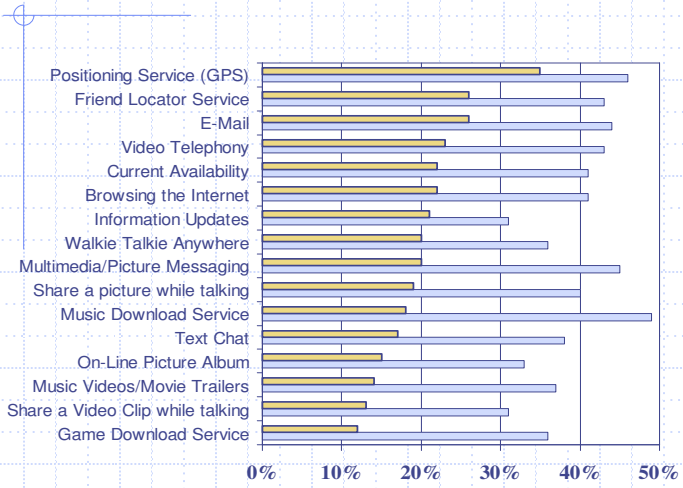
DEVELOPING COUNTRIES

- LESS DIFFERENTIATIONS
- EXAMPLE:
  - **Business professional**
  - **SME**
  - **Young generation???**
  - **Solutions for universal access**

Mobile data revenues on the rise

SOURCE ERICSSON 2005

INTEREST FOR RANGE OF SERVICES



SOURCE ERICSSON 2005

REGULATOR'S PERSPECIVE

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.

REGULATORY FLEXIBILITY

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

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 ROAMING	◆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.

GENDER PERSPECTIVE

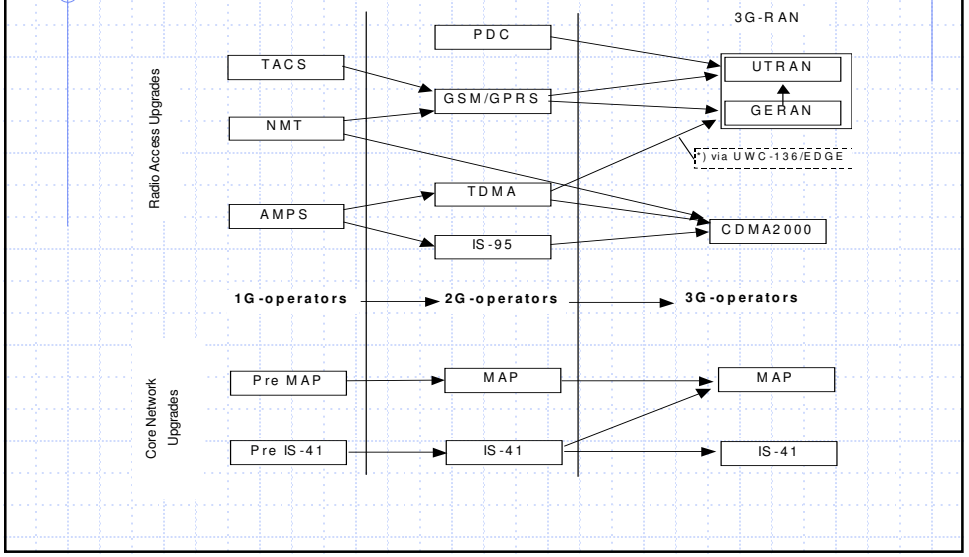
Female users make up a large proportion of the mobile market that requires special consideration regarding services and applications. Wireless communications technologies can be exploited by women in order to considerably improve their social status, specifically in the areas of employment, health, and education

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



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)

Backward Compatibility	Spectrum Bands: Same	Spectrum Bands: Different
Yes	Scenario 3 : A → B A (f1) A, B (f1)	Scenario 4 : A → B A (f1) A (f1), B (f2)
No	Scenario 1: A - - → B A (f1) A (f1), B (f2)	Scenario 2 : A - - → B A (f1) A (f1), B (f2)

Economics of Mobile Network Deployment

- *The "business plan" methodology*
  - *Estimation of the year traffic demand*
    - *Estimation of potential user population*
    - *Estimation of service penetration*
    - *Estimation of activity factor (per service type and class)*
    - *Estimation of OPEX*
  - *RAN planning*
  - *Core Network planning*
  - *Assumption on revenue structure for offered services*
  - *Computation of NPV*

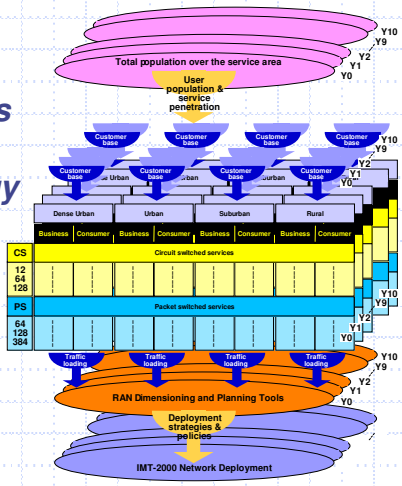
Net Present Value (NPV):

Cumulative discounted cash-flow generated to date, or less formally

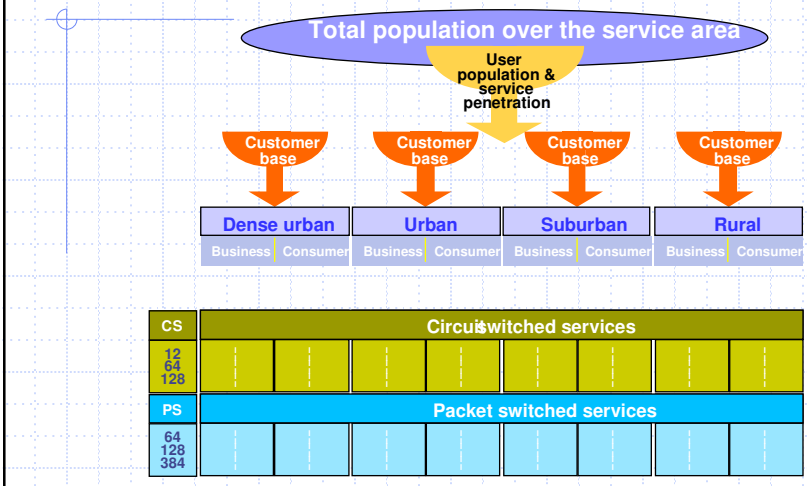
The profitability of a business, as appreciated a Year 0, over a span of N years - N ranging from 1 to the economic life of the system

Economics of IMT-2000 Deployment

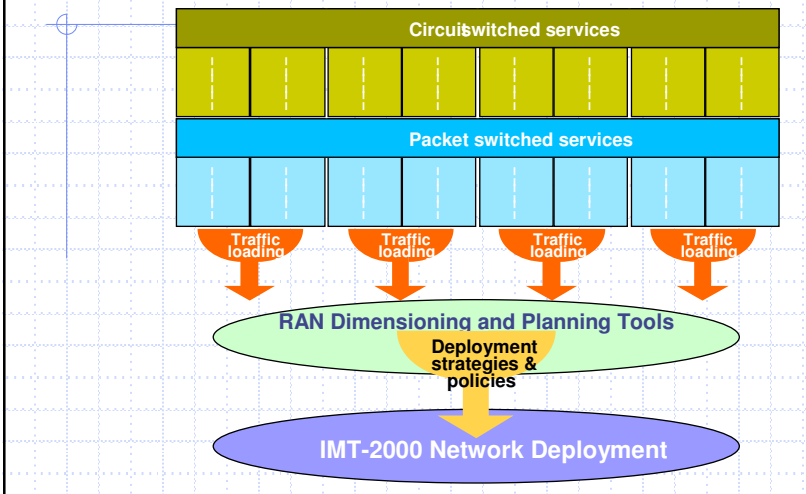
The "business plan" methodology



Economics of Mobile Network Deployment



Economics of Mobile Network Deployment



Economics of IMT-2000 Deployment –Share of Investments

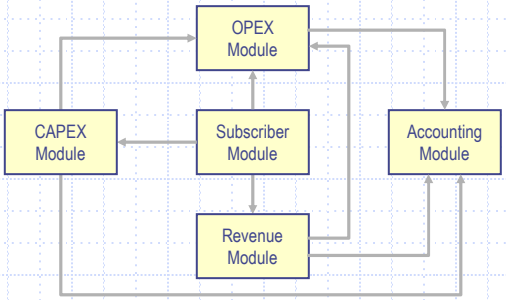
	Year 0	Year 3	Year 4 to Year 10
	Rel-99	from Rel-99 to Rel-5	Capacity increases
RAN			
- Node Bs	55%	55%	60%
- RNCs	30%	35%	30%
- UTRAN transport infrastructure	15%	10%	10%
Core Network			
- MSCs & MSC servers	50%	0%	0%
- SGSNs & GGSNs	35%	60%	65%
- MGWs	0%	10%	10%
- CSCFs, MGCFs, T-SGWs, MRFs	0%	20%	15%
- Core network transport infrastructure	15%	10%	10%
Service Market Segment	**Year 0**	**Year 3**	**Year 4 to Year 10**
- Business	65%	60%	50%
- Consumer	35%	40%	50%
Tariffs	3% yearly reduction in over the whole economic life cycle		

Economics of Mobile Network Deployment – Sensitivity Analysis -

Deviation from assumed service mix	SM+ ⇒ Y3: +10%, Y10: +25% SM- ⇒ Y3: -10%, Y10: -25%		
Deviation from assumed service penetration	SP+ ⇒ Y3: +10%, Y10: +25% SM- ⇒ Y3: -10%, Y10: -25%		
Yearly deviation from tariff erosion	TE+ ⇒ +10% TE- ⇒ -10%		
Alternative scenario	**Year 0**	**Year 3**	**Year 4 to Year 10**
Service Market Segment - Business - Consumer	65% 35%	60% 40%	50% 50%

SM: Service Mix SP: Service Penetration TE: Tariff Erosion

Structure of the Business Plan Model
(in MTG discussed in more details)



From market share growth to:
- **Reduce Churn**
- **Increase ARPU**
- **Increase use of services**
- **Affordable new services**

Considerations:
- **Regulations (old & new)**
- **Purchasing Power (pre-paid)**
- **GDP and major trade partners**
- **Virtual Home Environment**

ANNEX I: OPERATOR'S EXPERIANCES

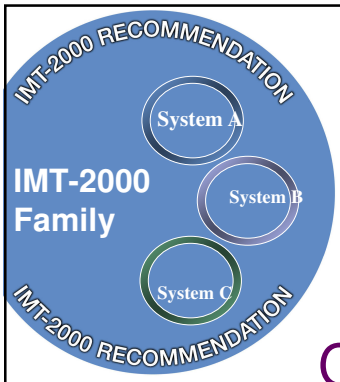
- CHILE
- JAPAN
- HONG KONG
- THAILAND
- RUSSIAN FEDERATION
- HUNGARY
- VENEZUELA

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)

PROPOSED NEW Q 18/2:"Implementation aspect of IMT 2000 and systems beyond IMT-2000 for developing countries"

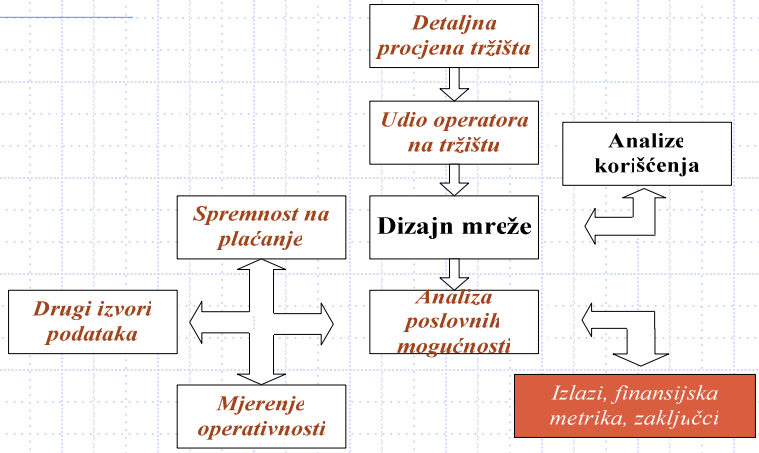
- Identify the ways to implement IMT-2000, using satellites, for some countries and regions
- Provide information on IP Multi-media Subsystem (IMS) and IP based transport over mobile systems for IMT-2000 and systems beyond IMT-2000
- Provide information on convergence between terrestrial IMT-2000 and digital broadcasting
- Provide technical information on the implementation of IMT-2000 and enhancements to IMT-2000 in relation to systems beyond IMT-2000 and other broadband wireless access technologies,
- Propose appropriate content for the development of training modules by the ITU-D for users of IMT-2000 services and applications,
- Provide information on the specific impact of the implementation of IMT-2000 on women, youth, and indigenous people



CONCLUSIONS

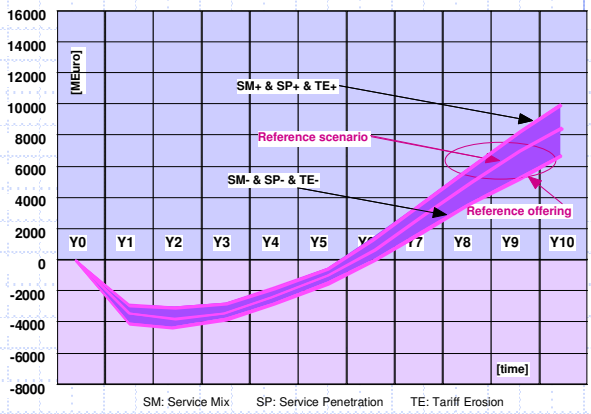
- *GUIDELINES OFFER DIFFERENT SCENARIOS*
- *IDENTIFICATION OF TRANSITION POLICY TO IMT 2000 SHOULD BE BASED ON THE ANALYSIS OF KEY ASPECTS, THAT IMPACT DEMAND, INVESTMENT AND REVENUES FOR EACH COUNTRY AND EACH OPERATOR*

MODEL BIZNIS PLANA



Economics of Mobile Network Deployment

- **NPV analysis**
  - Traffic demand
  - Service penetration
  - Tariff erosion
  - Service offering



Economics of Mobile Network Deployment

- Sensitivity analysis
  - Traffic demand
  - Service penetration
  - Tariff erosion
  - Service offering