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 questions
- Q 18/2 and Q 18-1/2
- MTG and GST
- Development of policy for transition
- Transition Paths to IMT-2000 Systems – Evolution and Migration
- Economics of Mobile Network Deployment
- Case study: IMT-2000 in Serbia

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

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 developed 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 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 and available on www.itu.int/imt2000

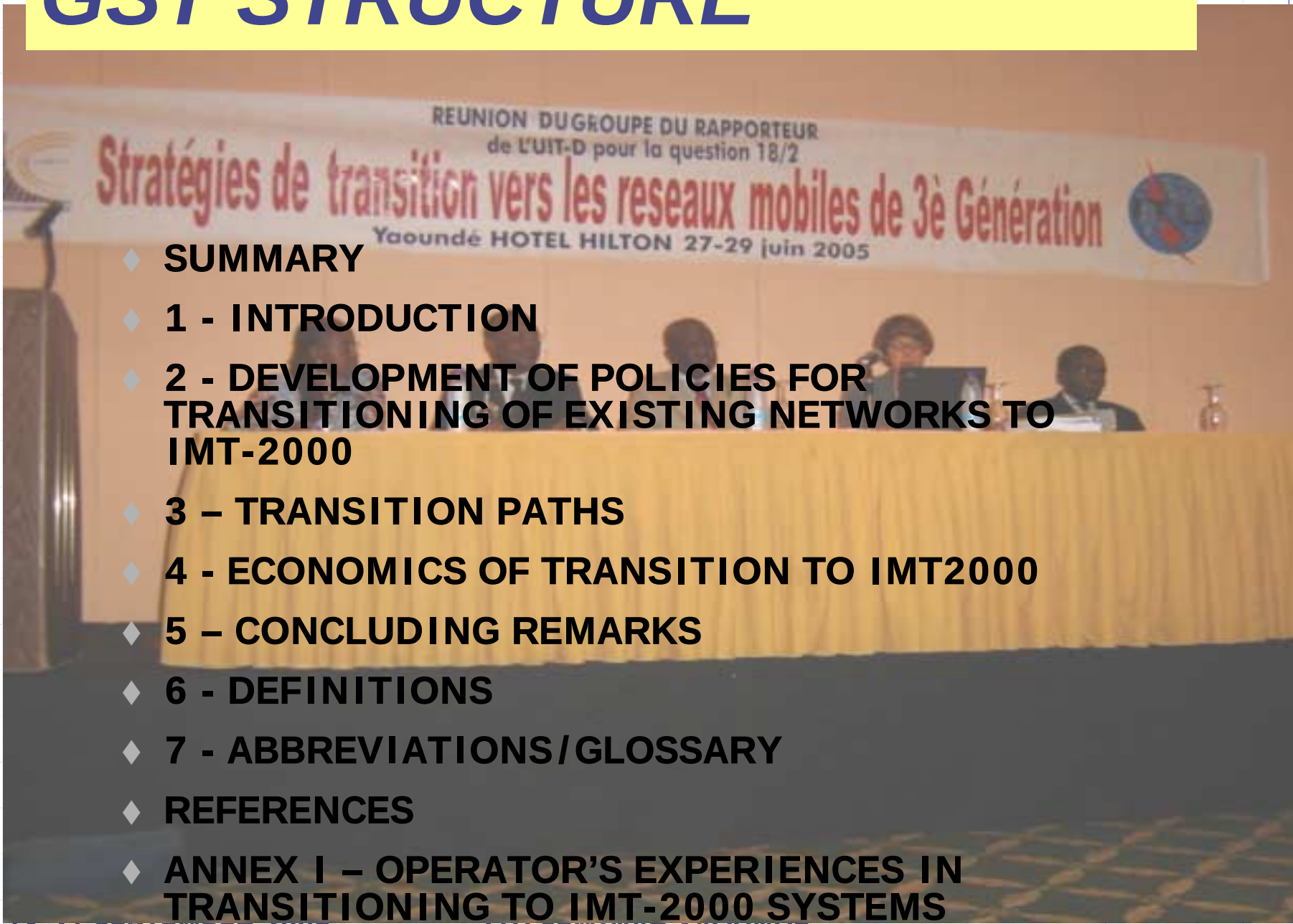
Q 18/2
OUTPUT RESULTS

- Guidelines for Smooth Transition of the Existing Mobile Networks to IMT-2000 (GST)
- Mid Term Guidelines for Smooth Transition of the Existing Mobile Networks to IMT-2000 (MTG)

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



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- 1 - INTRODUCTION
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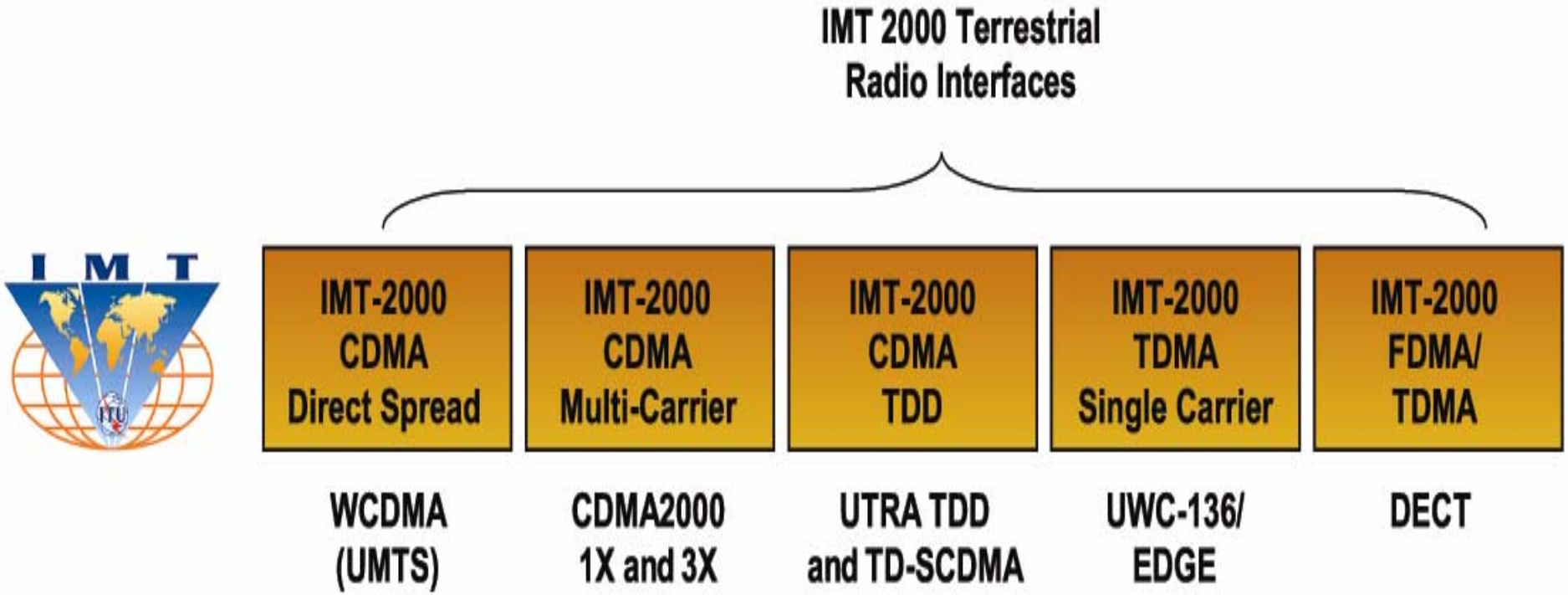
- ANNEX I – OPERATOR'S EXPERIENCES IN TRANSITIONING TO IMT-2000 SYSTEMS

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 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

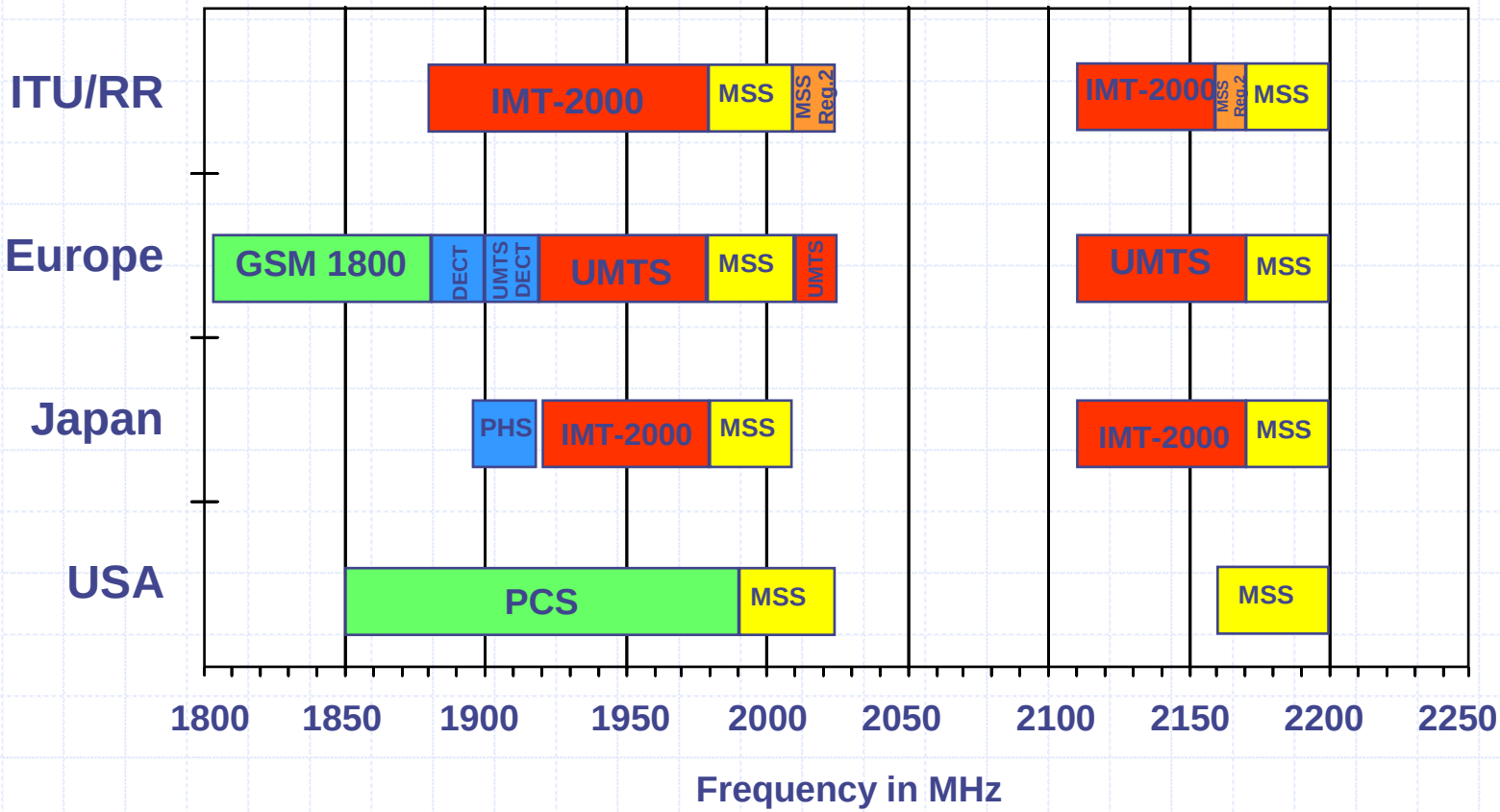
IMT-2000 CORE NETWORKS

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

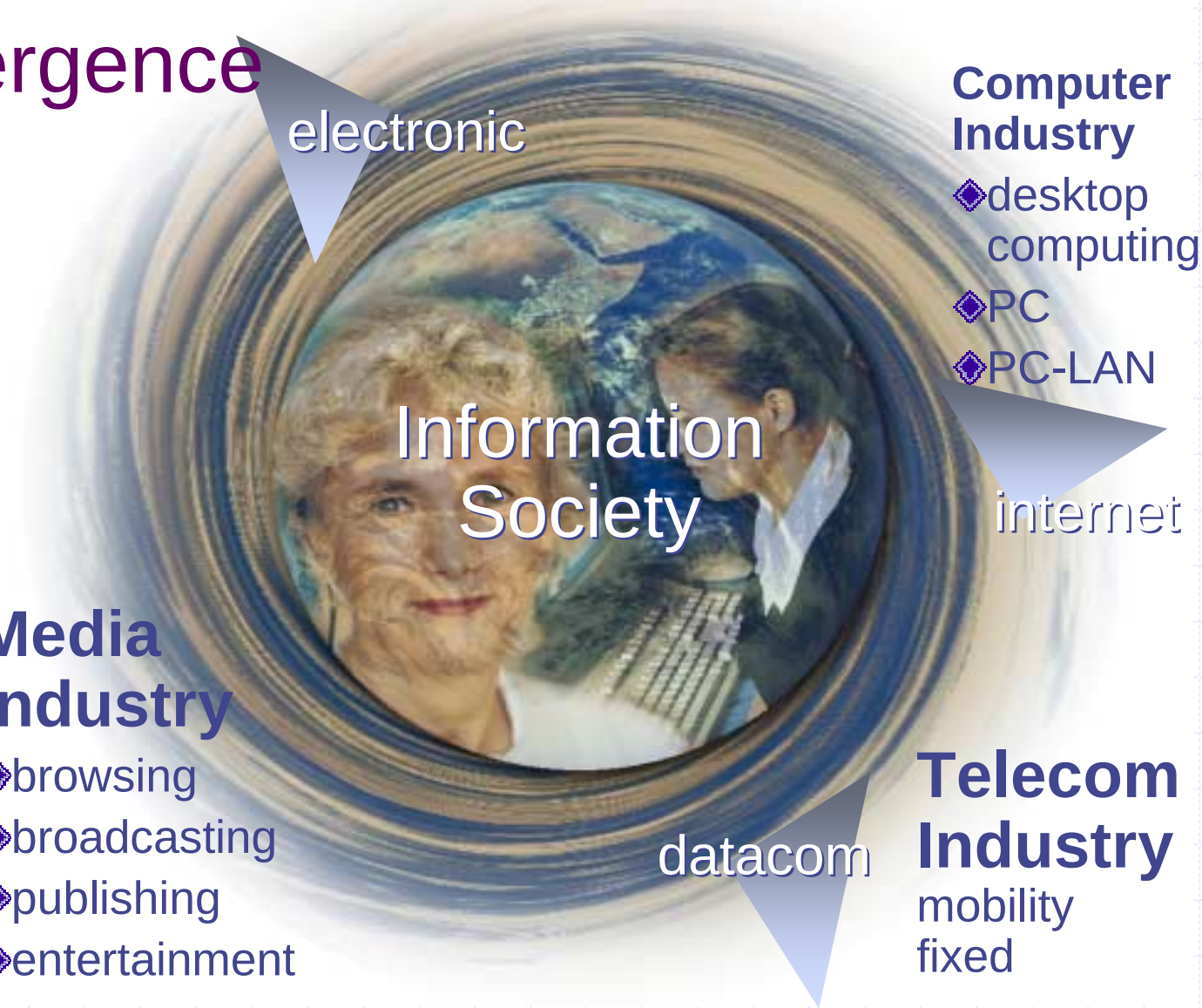
- **WARC-92**:
  - ***1885-2025 MHz i 2110-2200 MHz***
- **WRC-2000**:
  - ***806-960 MHz, 1710-1885 MHz and 2500-2690 MHz***

ALLOCATION OF SPECTRUM



WHAT ARE DRIVING FORCES WORLDWIDE?

Convergence



Computer Industry

- desktop computing
- PC
- PC-LAN

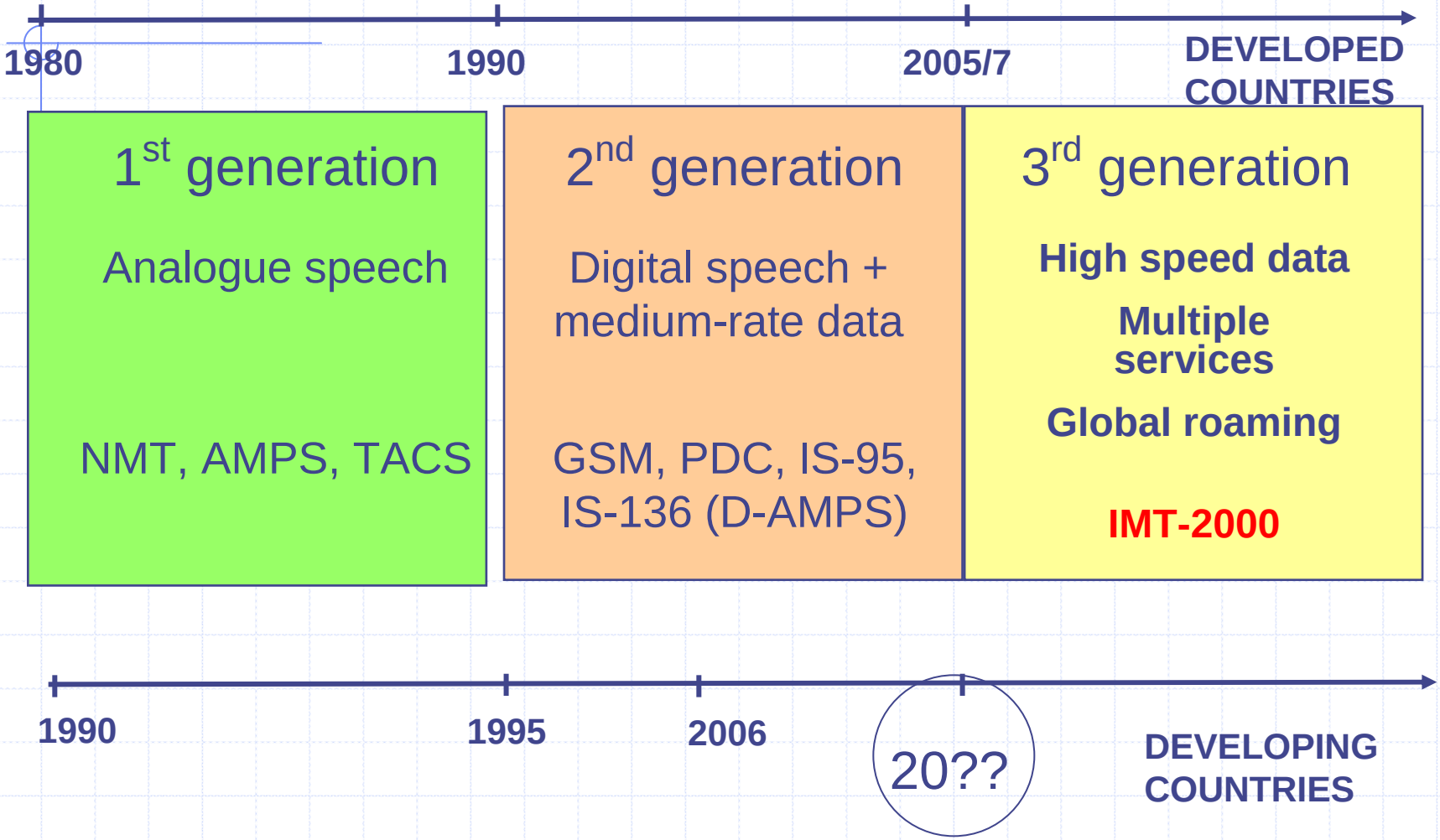
Media Industry

- browsing
- broadcasting
- publishing
- entertainment

Telecom Industry

mobility
fixed

WHERE ARE THE MOST OF DEVELOPING COUNTRIES?



DEVELOPMENT OF POLICY FOR TRANSITION

SPECIAL NEEDS OF DEVELOPING COUNTRIES:

- GOVERNMENT POLICY FOR DEVELOPEMENT
- OPERATOR PERSPECTIVE
- REGULATOR PERSPECTIVE
- CONSUMER-USER PERSPECTIVE

GOVERNMENT DEVELOPMET 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 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;

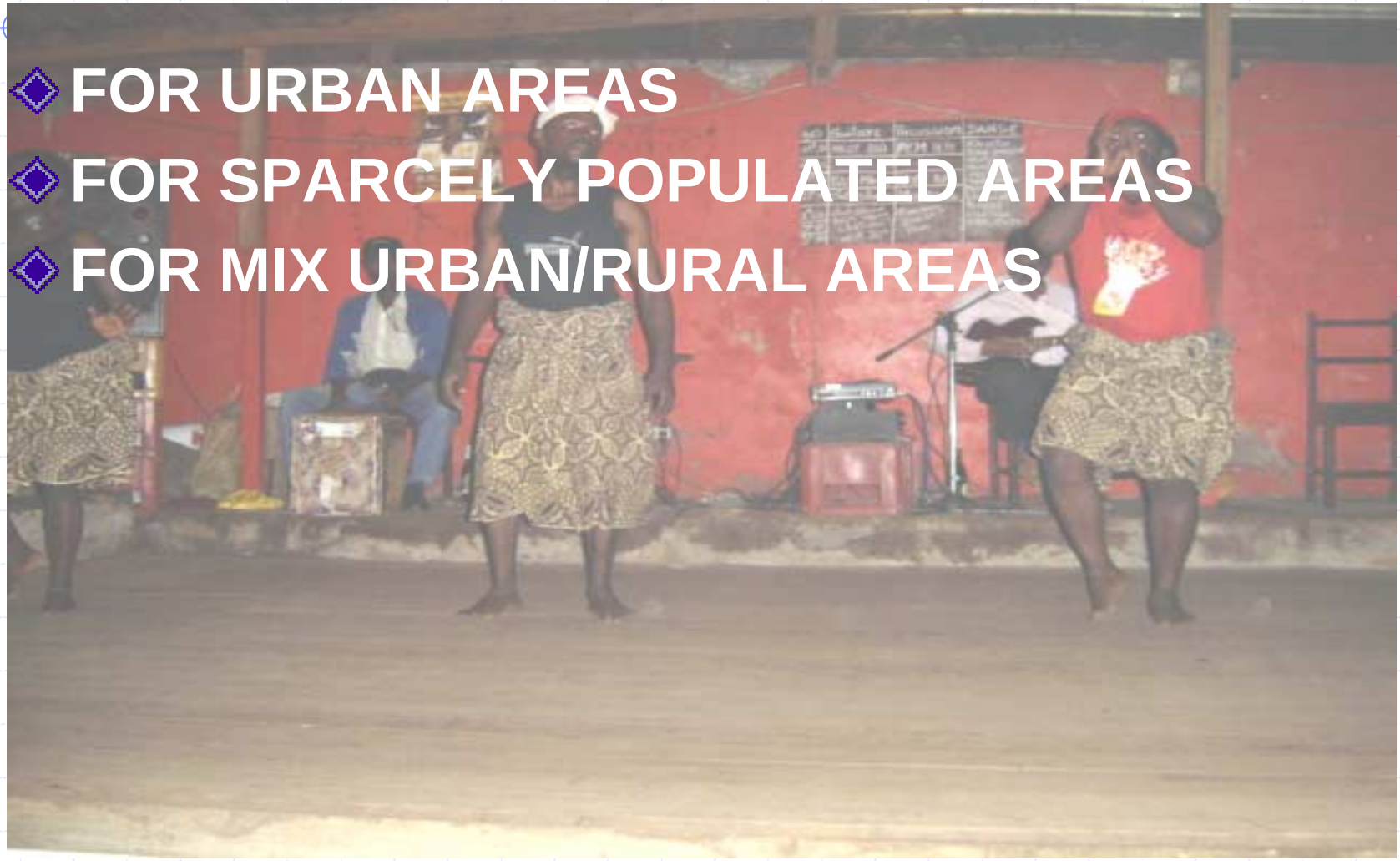
g) to adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances;

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 NEEDS FOR NII IN DEVELOPING COUNTRIES



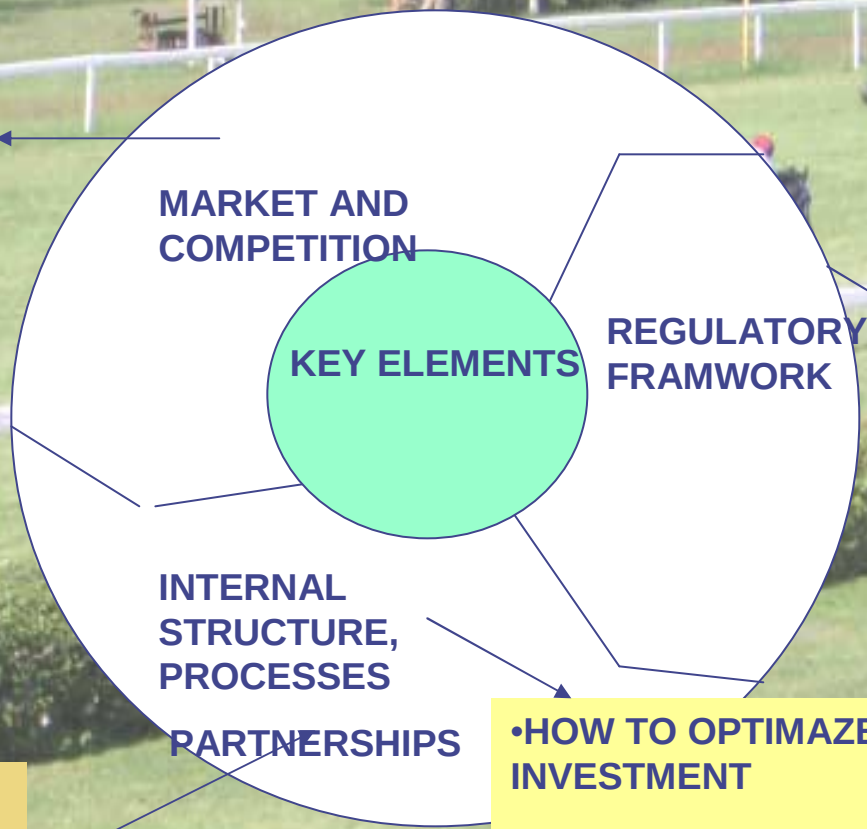
- FOR URBAN AREAS
- FOR SPARCELY POPULATED AREAS
- FOR MIX URBAN/RURAL AREAS

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

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



- STRATEGY TO MEET REGULATION REQUIREMENTS
- LICENSING CONDITIONS

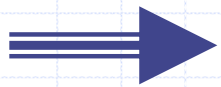
PARTNERSHIP WITH CONTENT'S PROVIDERS

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

MARKET SEGMENTS

DEVELOPED COUNTRIES:

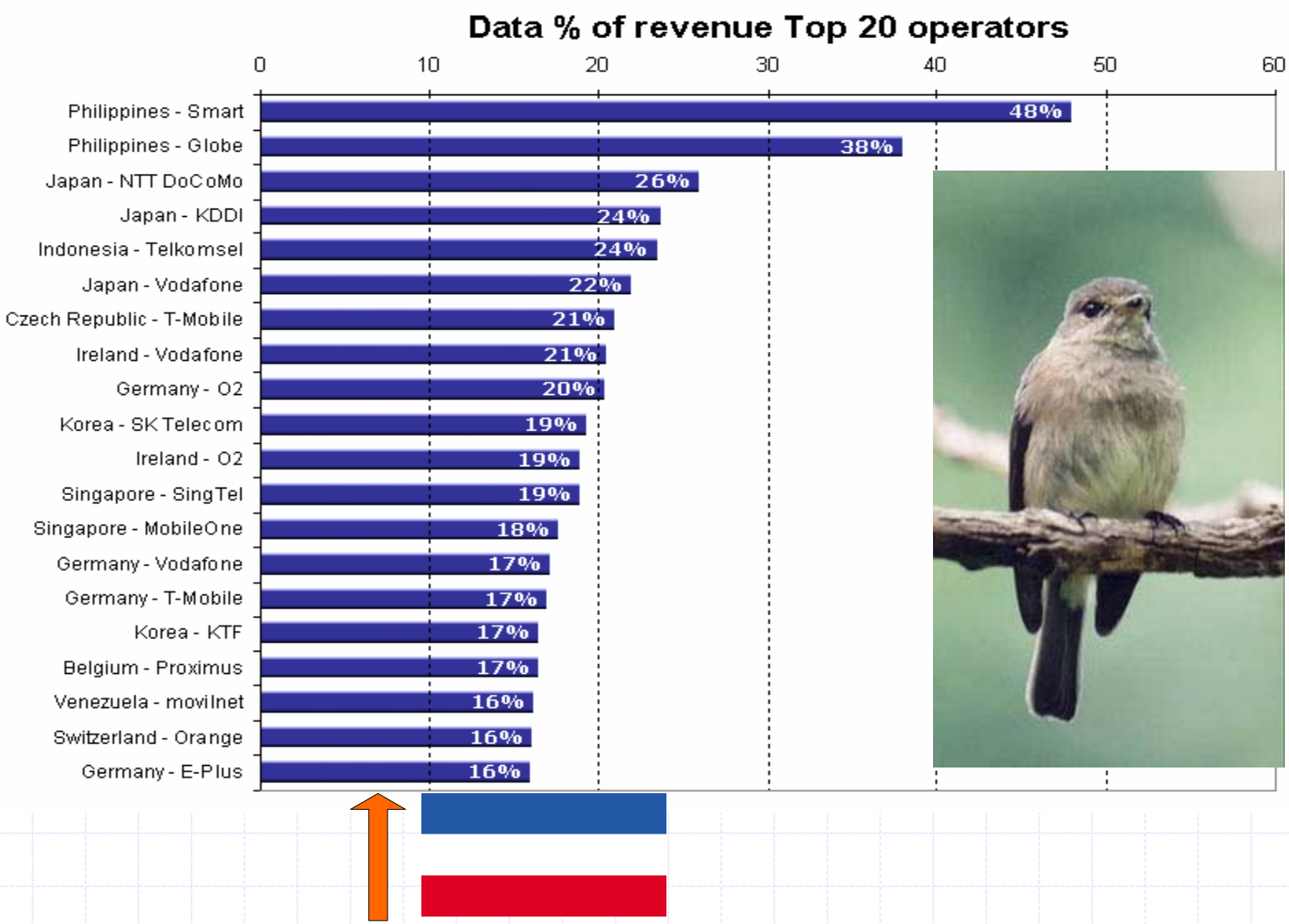
- I. EXAMPLE
  - business professional,
  - product managers,
  - young generation,
  - family,
  - senior citizens
- II. EXAMPLE
  - pioneers,
  - materialist,
  - sociables,
  - achivers and
  - traditionalist



DEVELOPING COUNTRIES

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

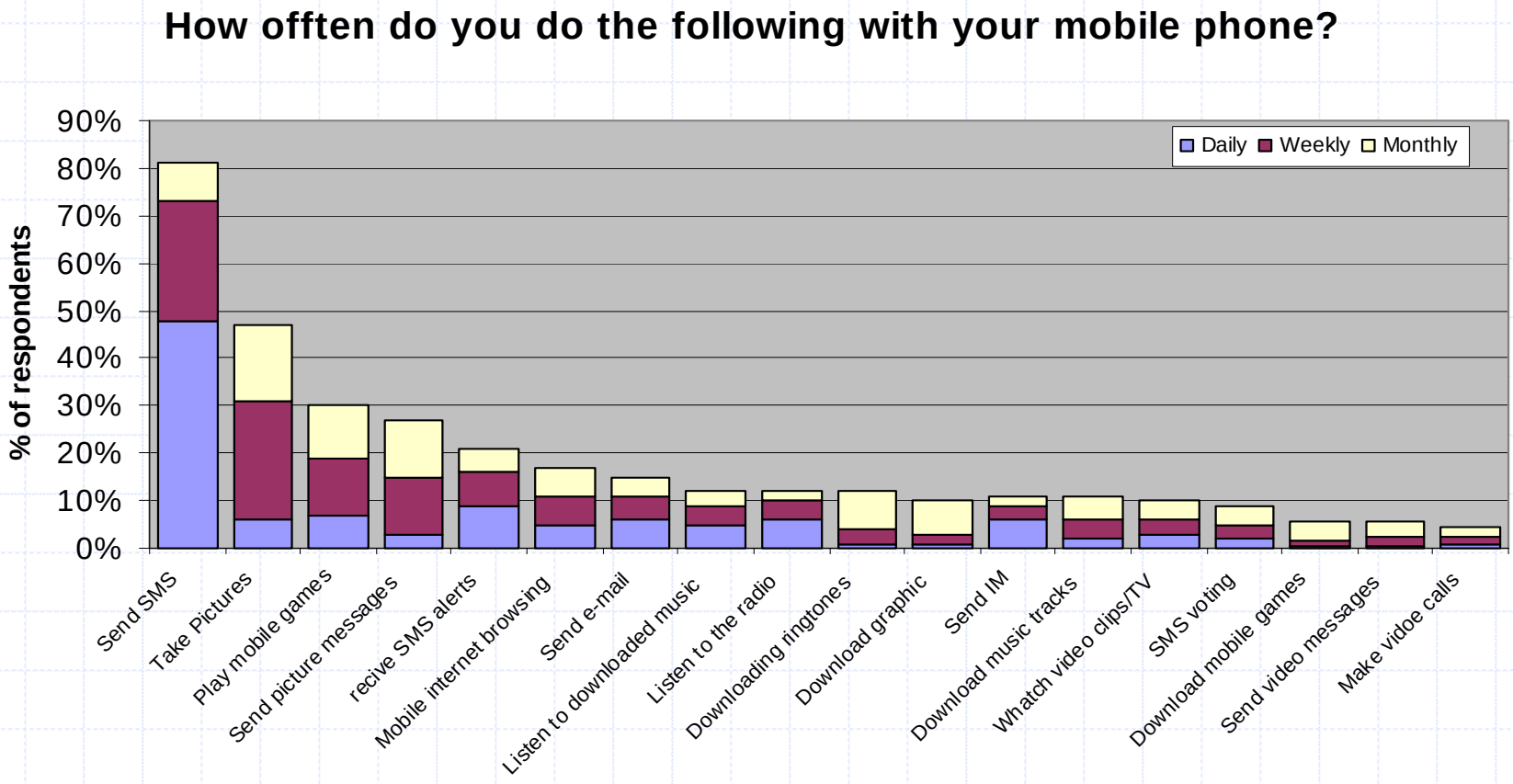
Mobile data revenues on the rise



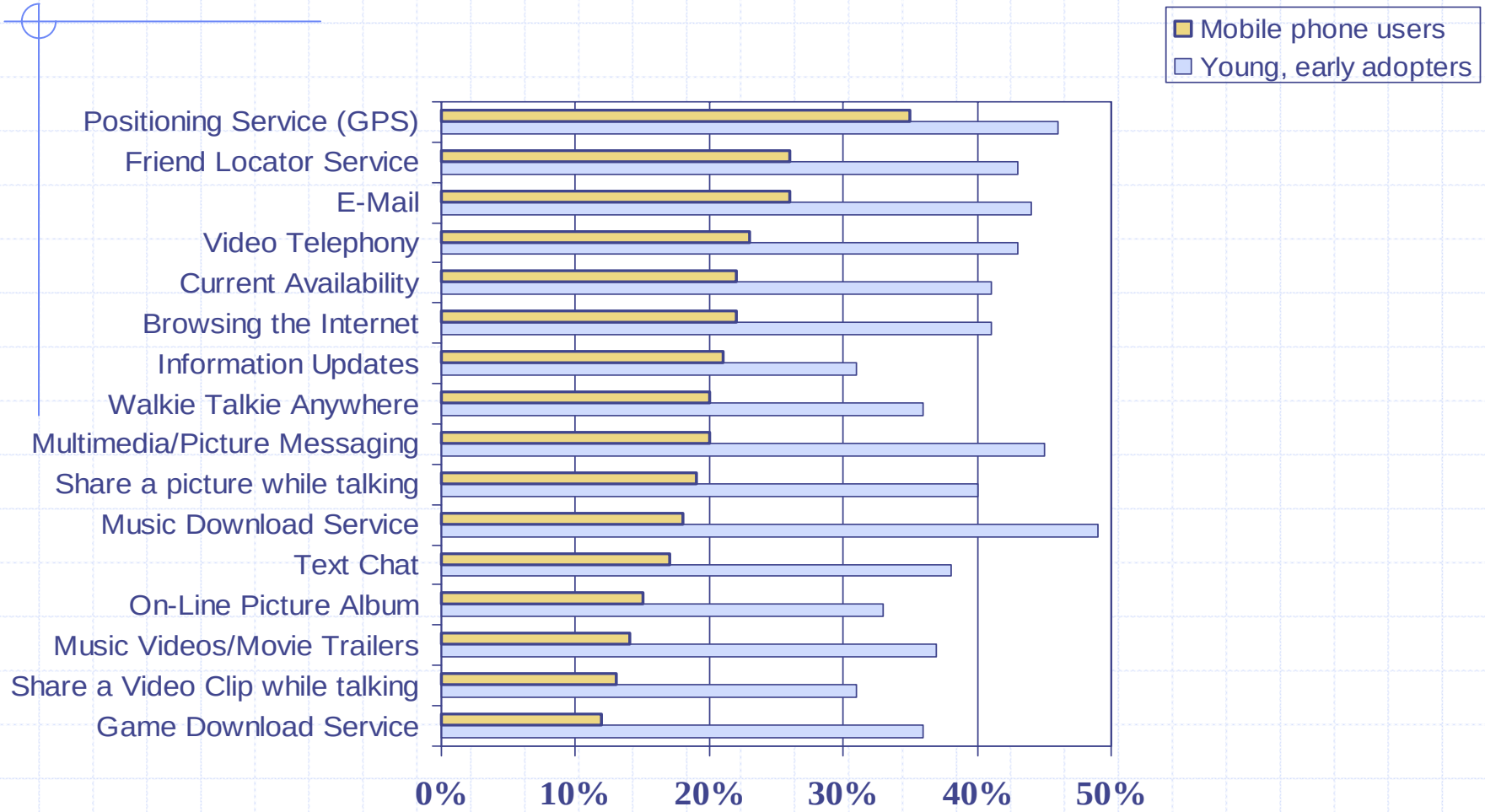
SOURCE ERICSSON 2005

Lots of mobile applications available! What's about local providers?

Most will never become mass market services (YankeeGroup 2006)



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

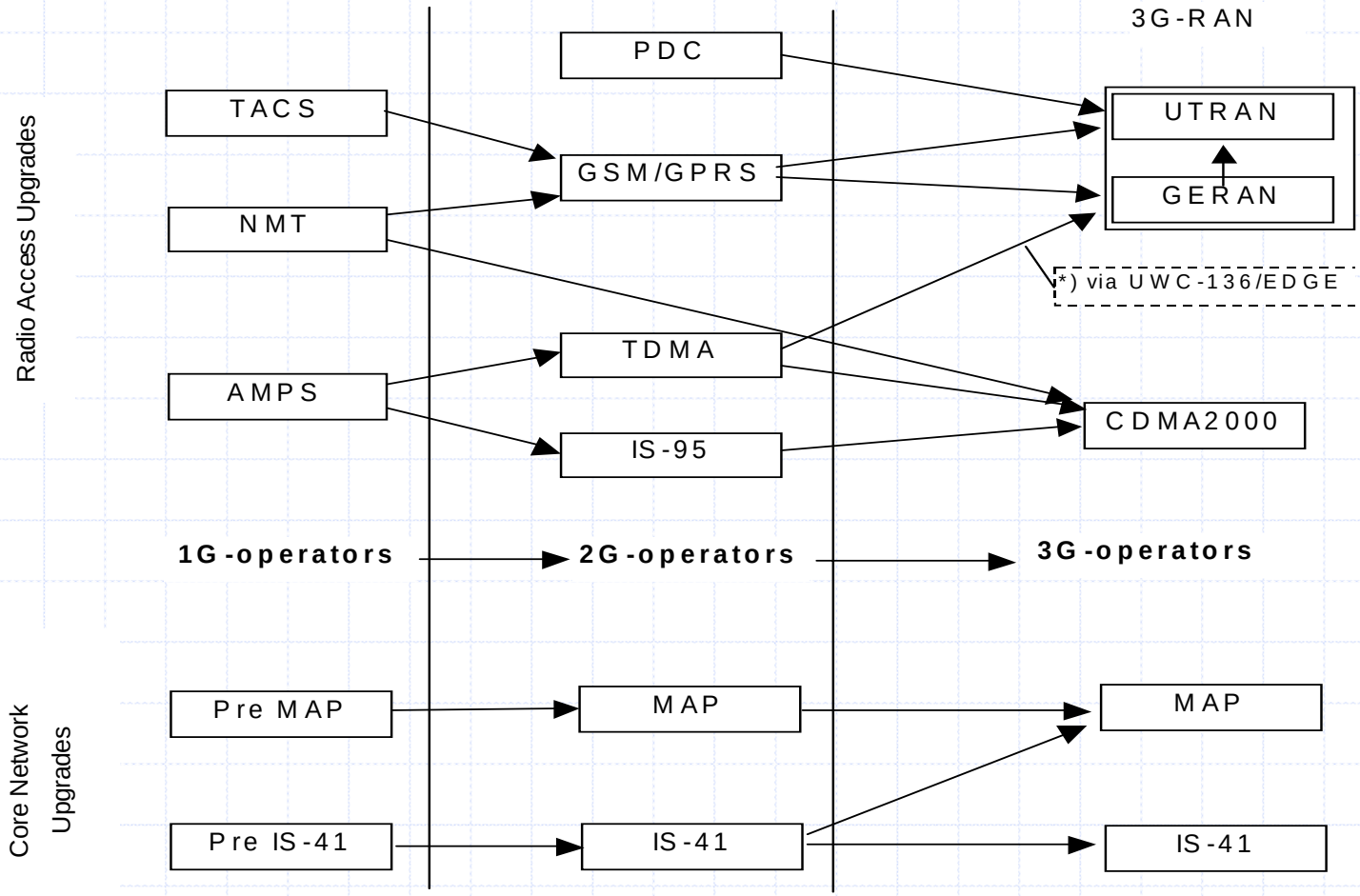
ITEMS	USER NEEDS AND RATIONALS
COST	User affordability for services and terminals. ◆Tariffs should be affordable to the end-users
TERMINALS	Ease of use and convenience of terminals. ◆The terminals should support local requirement in terms of language and must take into consideration the literacy level across the country.
EASY 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.

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"***

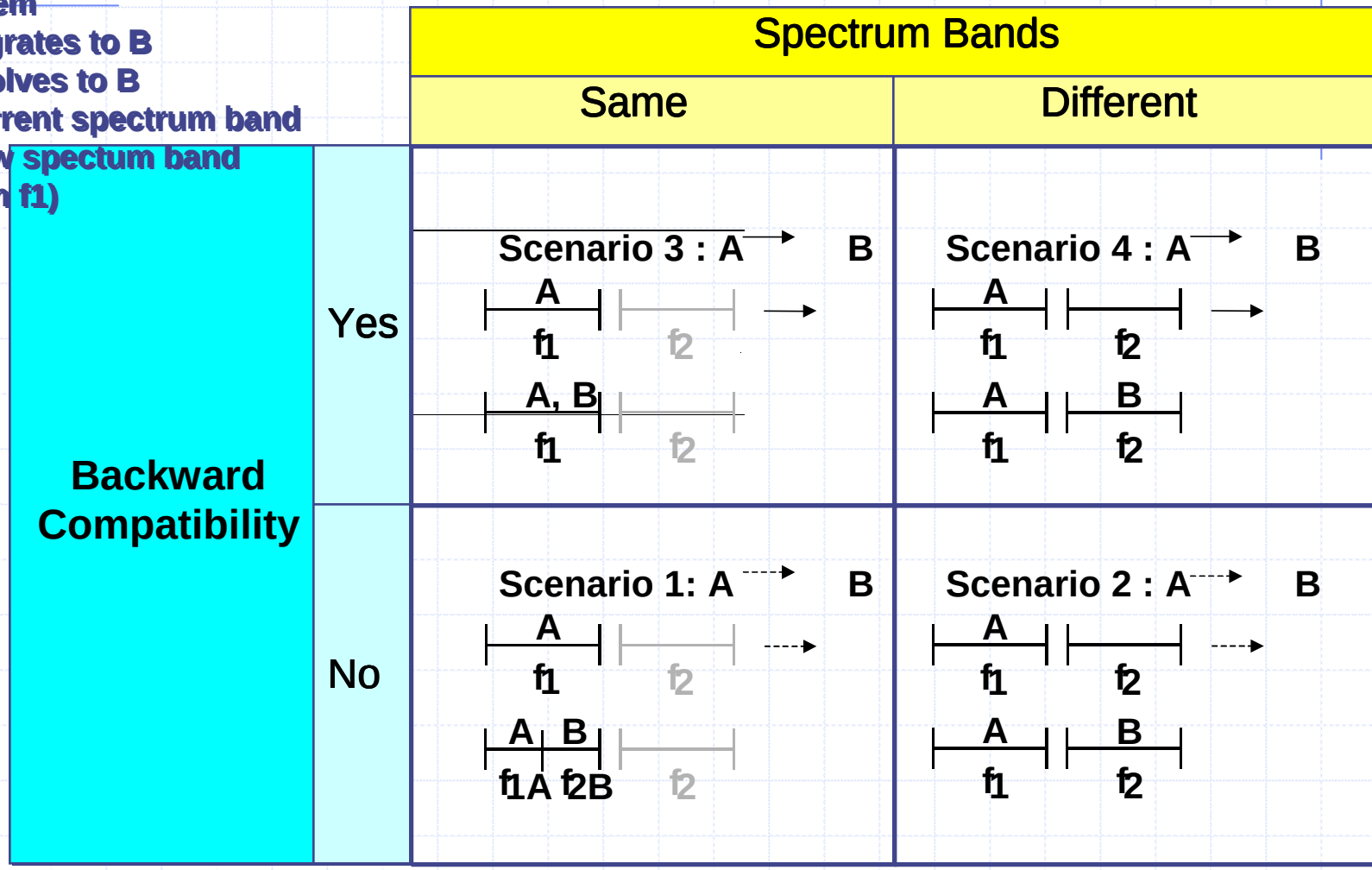
** ITU-R Recommendation M.1308*

Transition Paths to IMT-2000 Systems



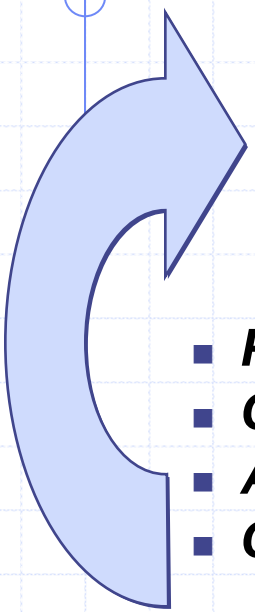
Transition Paths to IMT-2000 Systems -Spectrum Usage

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)



Economics of Mobile Network Deployment

- *The "business plan" methodology*

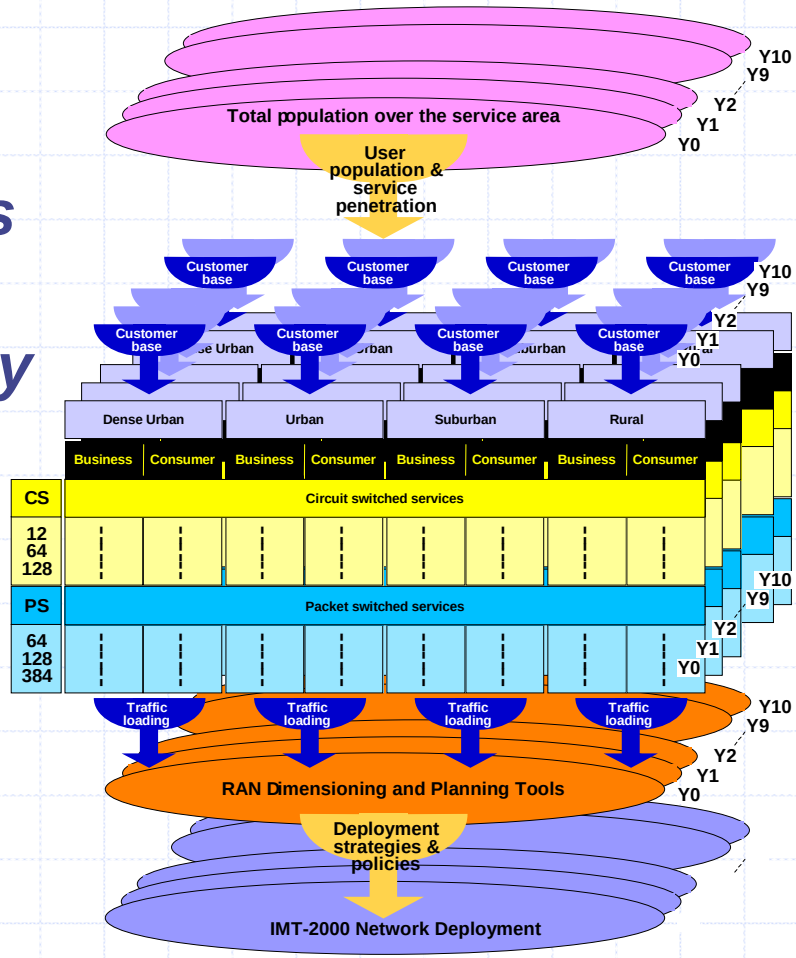


- ***Estimation of the year traffic demand***
  - ***Estimation of potential user population***
  - ***Estimation of service penetration***
  - ***Estimation of activity factor (per service type and class)***
  - ***Estimation of OPEX***
- ***RAN planning***
- ***Core Network planning***
- ***Assumption 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



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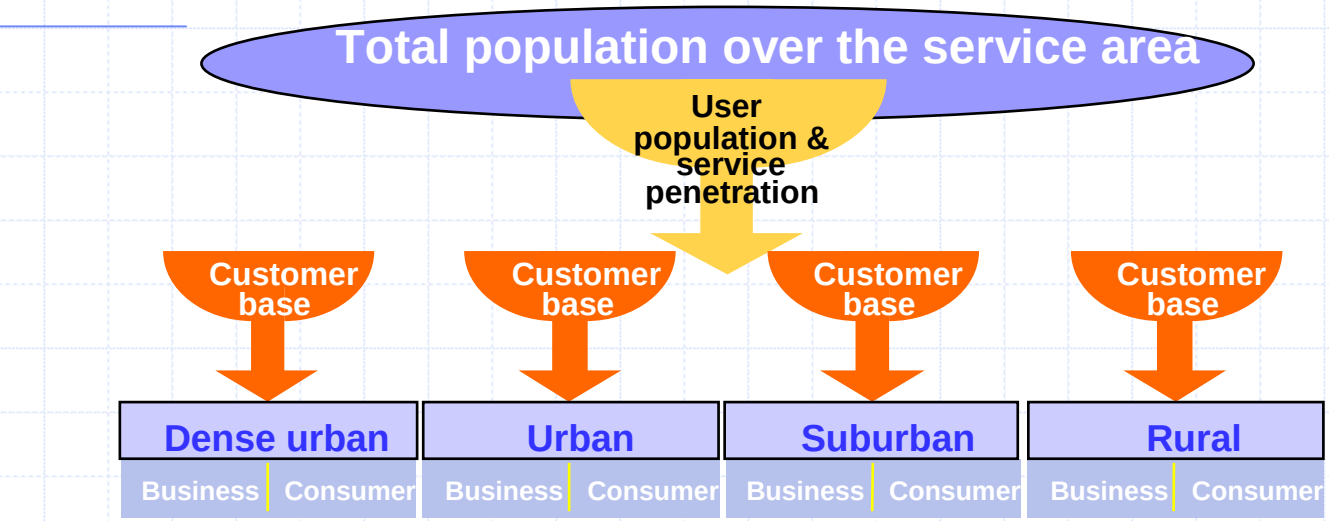

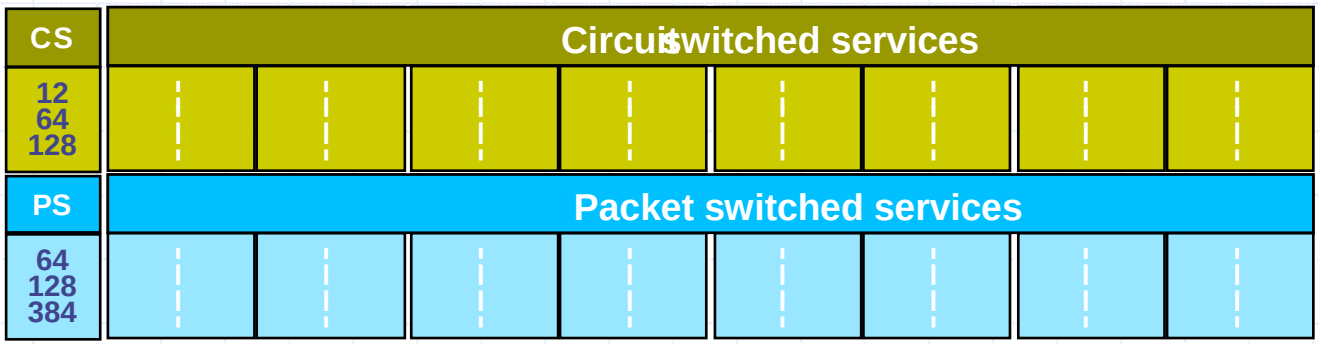

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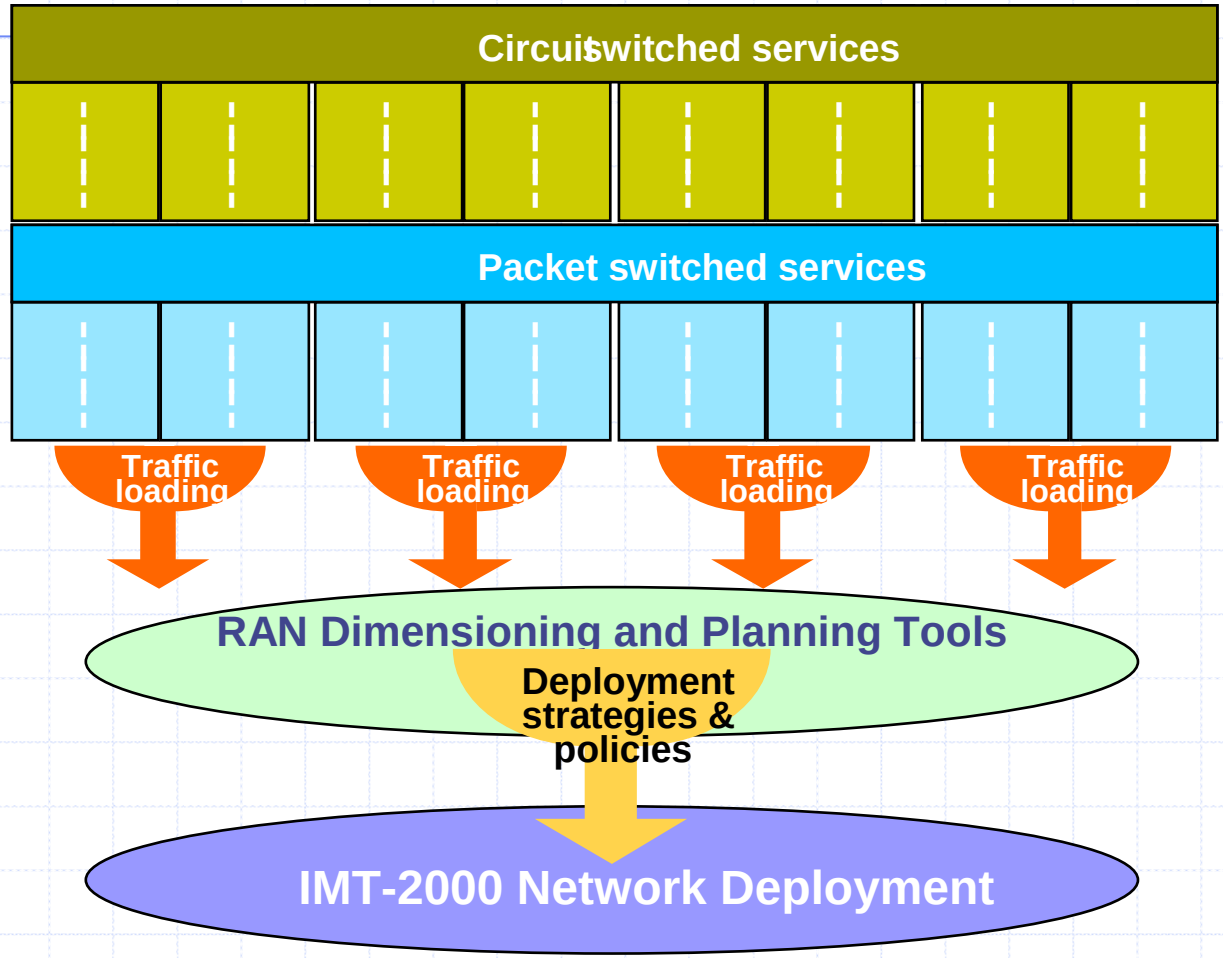


Economics of IMT-2000 Deployment –Share of Investments

	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		

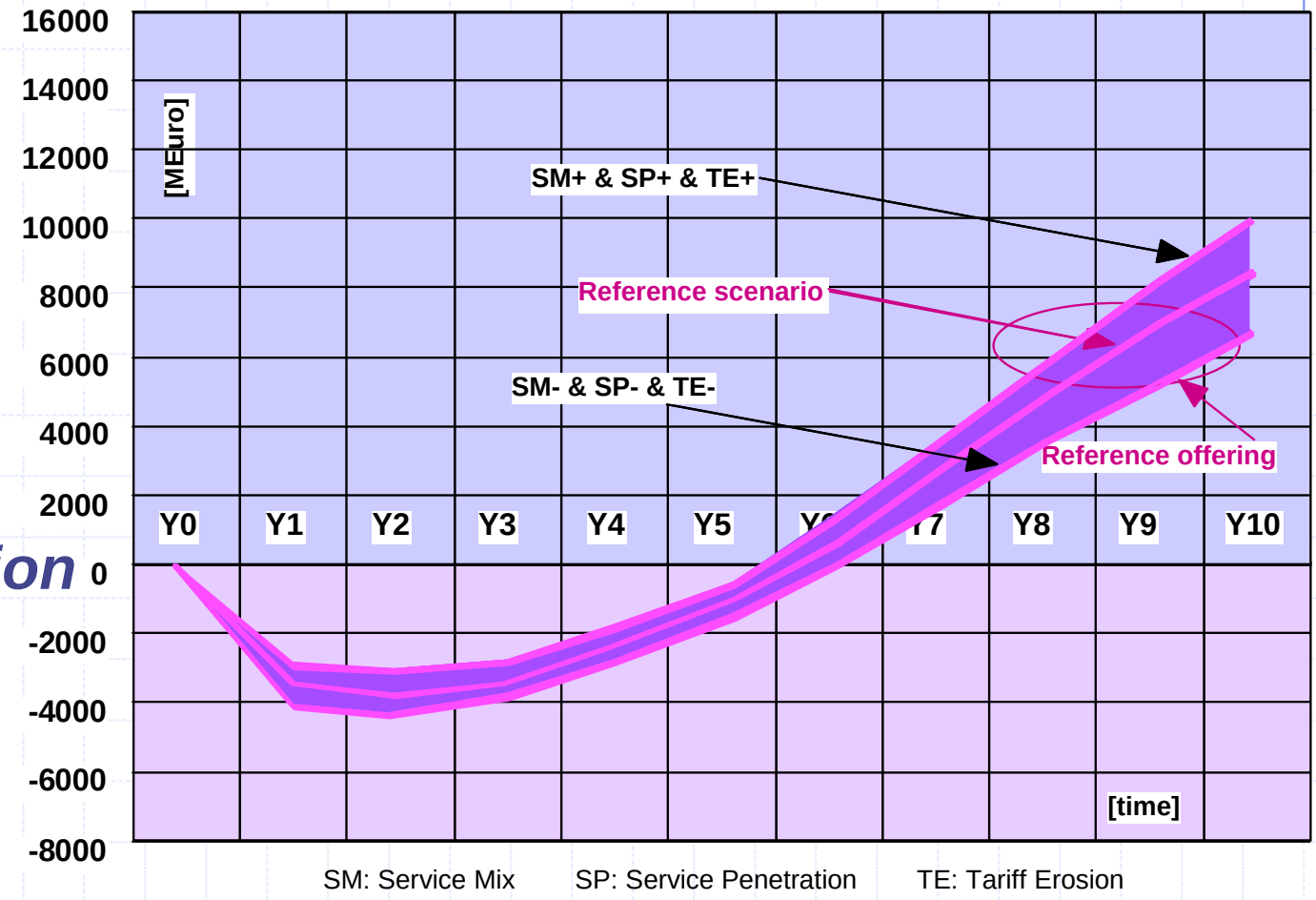
Economics of Mobile Network Deployment – Sensitivity Analysis -

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

Economics of Mobile Network Deployment

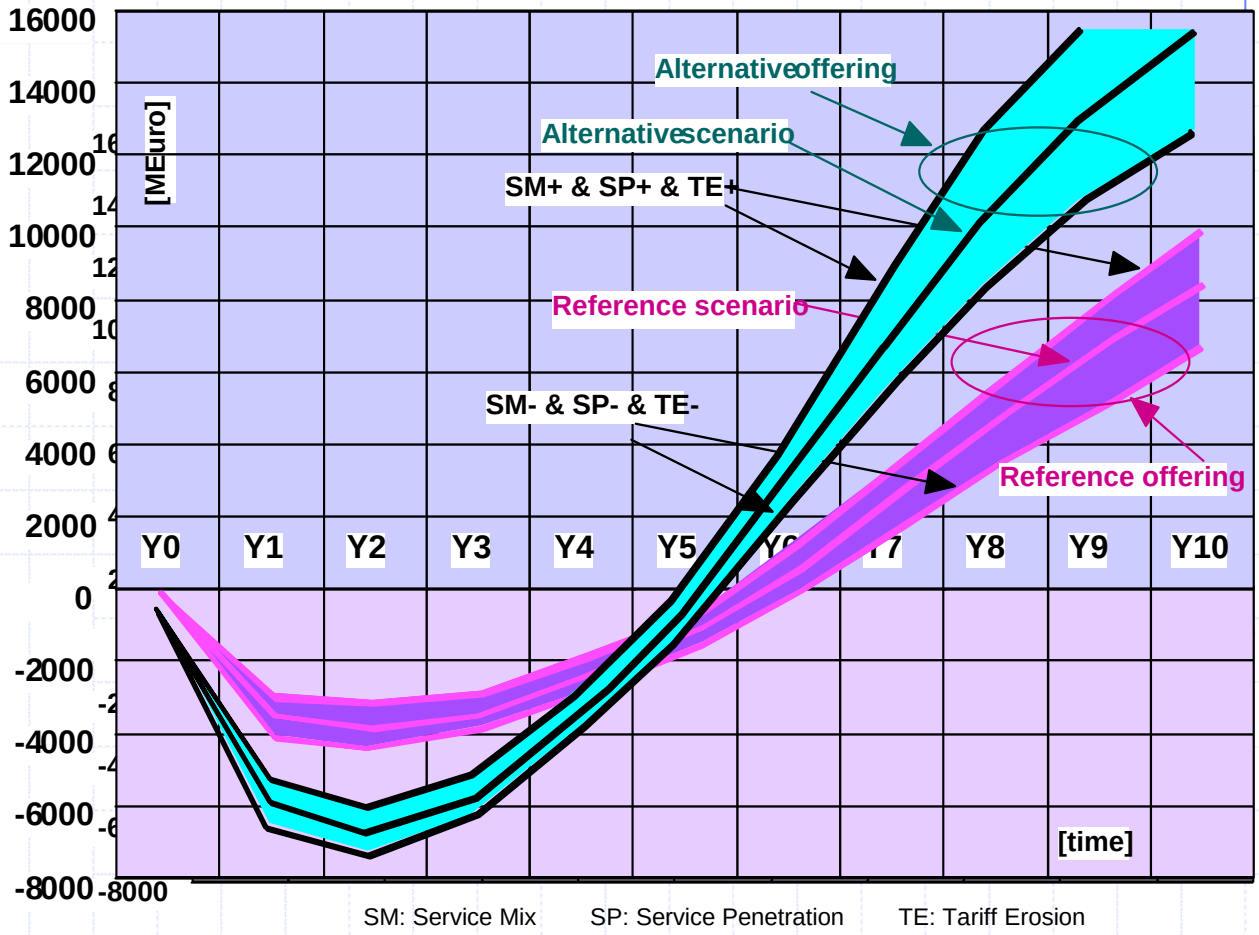
- **NPV analysis**
  - Traffic demand
  - Service penetration
  - Tariff erosion
  - Service offering



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

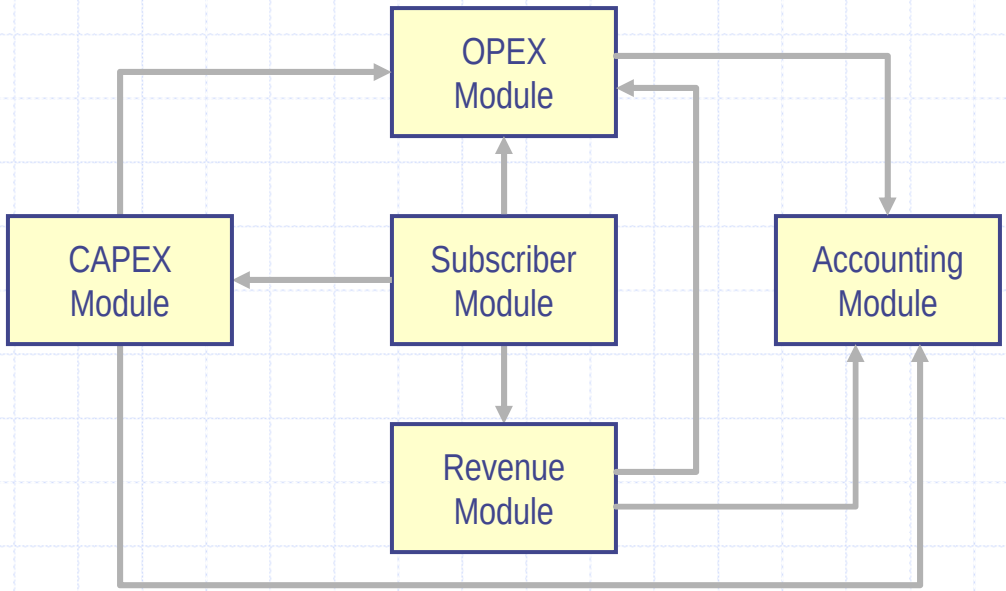
Economics of Mobile Network Deployment

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



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

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



From market share growth to:

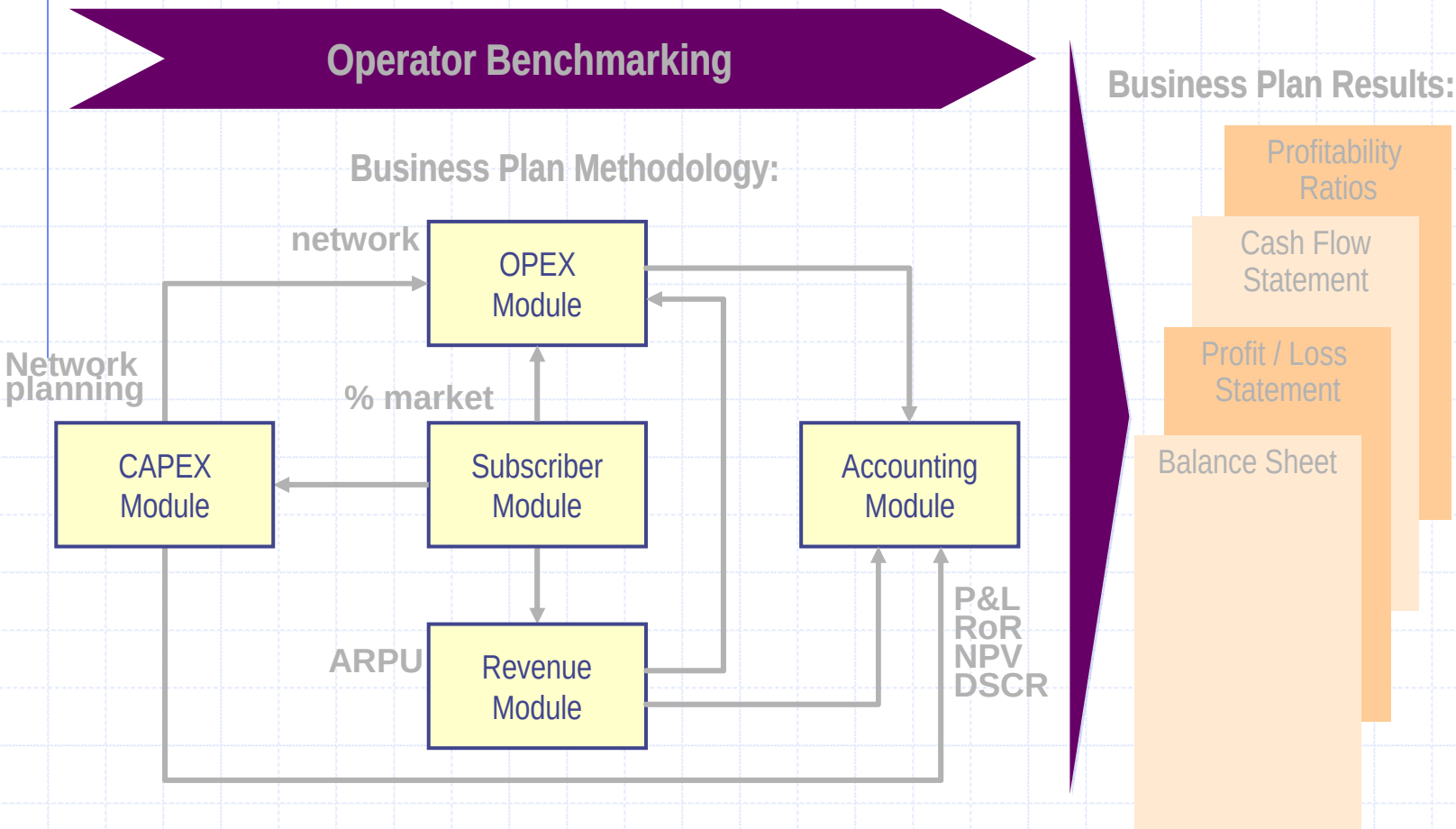
- **Reduce Churn**
- **Increase ARPU**
- **Increase use of services**
- **Affordable new services**

Considerations:

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

Business Plan

The market and revenue simulations are the key modules of business plan tool.



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)

CASE STUDY: IMT 2000 IN SERBIA

- SERBIA IS DEVELOPING COUNTRY with 8 million inhabitants
- TELECOM SECTOR STRUCTURE
  - MINISTRY FOR CAPITAL INVESTMENT
  - NATIONAL REGULATORY AGENCY-RATEL
  - OPERATORS
- TELECOM DEVELOPMENT:
  - 2,6 Million fixed subscribers
  - 5 Million mobile subscribers
  - One fixed operator
  - Two mobile operators,
  - 38 ISPs, >20 Cable Distribution Syste

Some key questions for 3G evolution/migration

- Licensing
- 2GHz frequency band occupied
- Transmission network evolution both for core and access network to meet requirements for increased flexibility, capacity and availability
- Terminals availability covering GSM/GPRS/EDGE/WCDMA (handsets and PCMCI cards)
- Readiness of operator's organizations for 3G (resources, competencies...)
- Evolution vs. migration
- CS & PS handovers
- Role of IMT-2000 in Corporate Social Responsibility:
- The responsibility of the state/government, vendors, operators and regulators in support of the new technologies
- Readiness for the Information Society
- Pilot 3G Networks are implemented at both operators: TELENOR and Telekom Srbija

UMTS AND FWA LICENCES

- **TWO BY GOVERNMENT DECISION, THIRD WILL BE ISSUED IF**
  - **ONE LICENCE IS ISSUED DURING THE PROCESS OF SELLING GOVERNMENT SHARE IN MOBI 63 NETWORK (70%) FOR 1,5 BILLIONS EUROS**
  - **NEW OWNER (TELENOR) PAID € 320 MIL. FOR GSM LICENCE WITH ASSOCIATED UMTS LICENCE**
  - **SECOND LICENCE WITH UMTS IS GRANTED FREE OF CHARGE TO TELEKOM SRBIJA AS INCUMBENT OPERATOR OPERATING FIXED AND GSM NETWORK**
- **HIBRID METHOD APPLIED**
  - **EXPRESSION OF INTEREST FOR COMPANIES FULFILLING REQUIREMENTS (GOVERNMENT AND CONSULTING COMPANY)**
  - **SELECTION**
  - **OFFERS**
  - **AUCTION**
- **12 FREQUENCIES** IN 3,5 GHZ, TECHNOLOGY NUTRAL ARE GRANTED TO TELEKOM SRBIJA FOR FWA TO SPEED UP BROADBAND UNIVERSAL ACCESS
- **OTHER FREQUENCIES** IN 3,5 WILL BE AUCTIONED FOR ISPs

Pre-commercial WCDMA/UMTS Systems

- Both operator
- One operator (TELENOR) has UMTS system from one vendor (Ericsson) installed only in capital city
- Other operator (TELEKOM SRBIJA) has four locations with UMTS systems in four largest cities from four vendors (Ericsson, Alcatel, Siemens and Huawai)

Purpose of the pre-commercial WCDMA/UMTS Systems

- Use of WCDMA/UMTS pre-commercial trial for different traffics (European Basketball Championship)
- Perform interoperability testing in order to prepare the operator's network for the fast 3G launch
- To give the opportunity to operators to:
  - Build up competence and get hands on experience of IMT-2000 networks and services
  - Implement and test end-to-end solution for a 3G system in compliance with 3GPP R99 specs
  - Look into integration issues, e.g. billing and customer care
  - Prepare for an early IMT-2000 launch - immediate transition to commercially ready-for-launch network
  - Hold market events

WCDMA/UMTS Trial

Responsibilities:

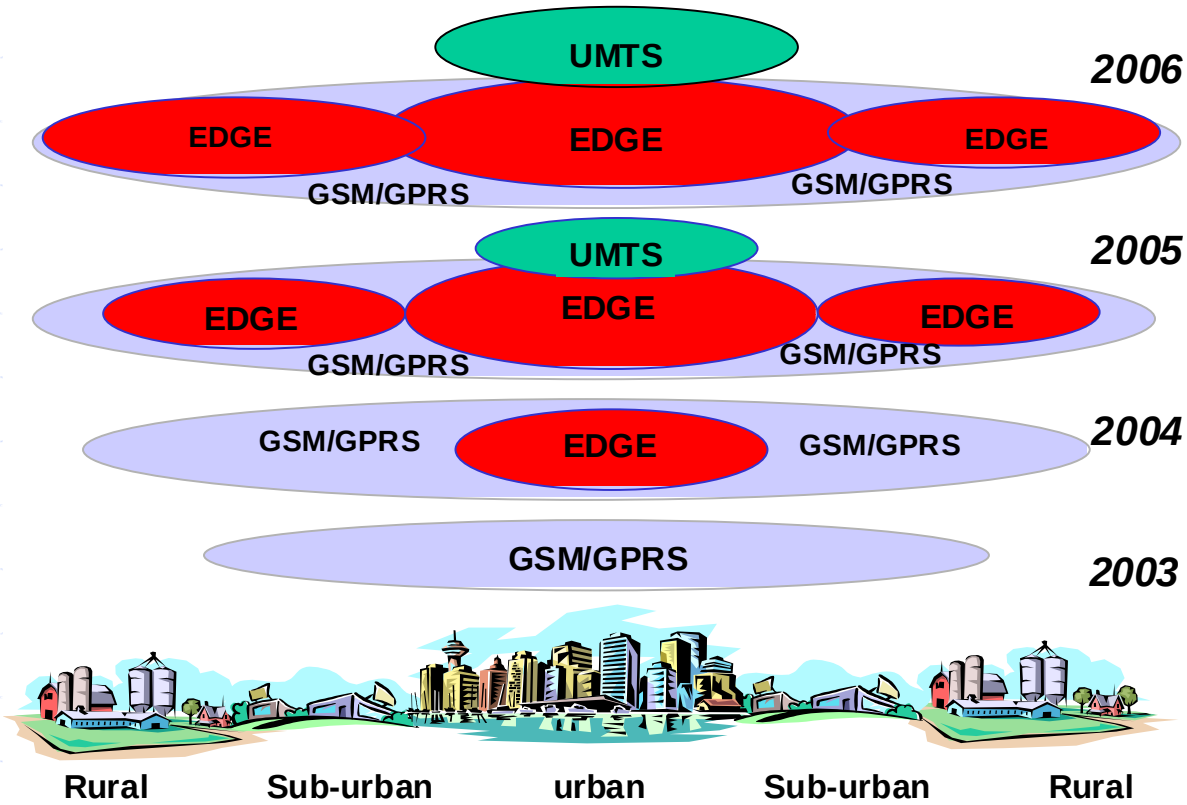
Vendor

- 3G System:
  - ❖Hardware
  - ❖ Software
  - ❖ Implementation services
  - ❖ Operation & Maintenance
  - ❖ Support

Operators:

- Licenses
- USIMs
- Terminals
- Transmission
- Floor Space
- Power Supply (except for RBSs)

Operators' Business Plans with Gradual Introduction of the UMTS Relative to the GSM/EDGE



- EDGE used as a complement to WCDMA
- Service Continuity
- Seamless Network
- Business aspects for rural areas

End-user services that could be offered

Basic Services	Voice
	SMS
	MMS
	Browsing
	Gaming
Video Services	Video/Music Streaming
	Mobile TV
	Video Download
Videocall	
“Rich Call” *	

* Possibility to use multimedia services during a voice call

COMMERICAL START UP

- BOTH OPERATOR ARE IN TENDER PROCEDURE FOR PURCHESING UMTS FOR NATIONAL COVERAGE
- COMMERCAL UMTS IN FIRST HALF 2007

SUMMARY

- ITU-D ACTIVITIES ON IMT-2000
- Mid Term Guidelines & Guidelines for Smooth Transition from the existing network to IMT-2000 for developing countries
- Government, operator, regulator transition policy
- User perspective
- Economics in transition
- Serbia case in transitioning towards IMT-2000

THANK YOU FOR YOUR ATTENTION!

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