



Broadband Technology Trends and their Potential in CSEE Countries

Latest trends in telecom markets

Where do these trends lead with respect to evolution of technology and economy?

Latest trends in broadband technologies, networks and services and where do they lead?

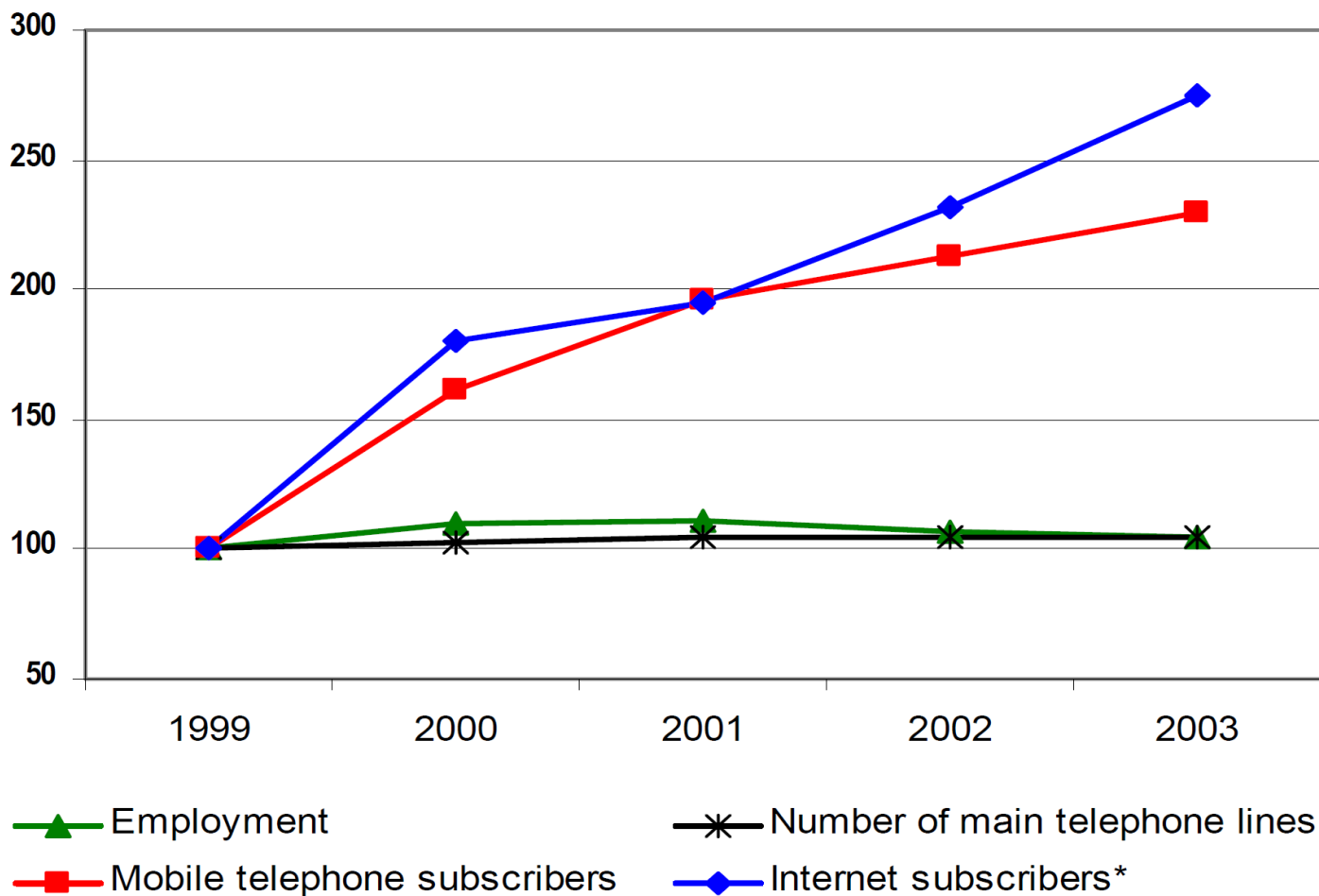
How will these trends impact the West Europe countries and what is their potential in CSEE?

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Recent development in the EU telecommunications sector



* on the basis of the following countries: BE, CZ, DK, DE, EL, ES, CY, HU, MT, AT, PT, SI, SK, SE.

Source: Eurostat



Number of main telephone lines (in 1000)

						Distribution among EU Member States (%)	Average annual increase (%)	change (%)	Main telephone lines per 100 inhabitants	
	1995	2000	2001	2002	2003	2003	2003/1995	2003/2002	1995	2003
EU-25	197 241.1	227 663.5	230 236.6	229 925.9	229 318.8	100	1.9	-0.3	44.2	50.3
EU-15	182 622.6	203 476.6	205 825.7	205 750.1	205 064.0	89.4	1.5	-0.3	49.2	53.7
BE	4 632.1	5 295.4	5 131.7	5 120.4	5 073.8	2.2	1.1	-0.9	45.7	49.0
CZ	2 398.1	3 871.5	3 860.8	3 675.5	3 626.3	1.6	5.3	-1.3	23.2	35.5
DK	3 202.5	3 809.4	3 864.8	3 700.9	3 612.8	1.6	1.5	-2.4	61.4	67.1
DE	42 000.0	50 220.0	52 450.0	53 780.0	54 350.0	23.7	3.3	1.1	51.5	65.8
EE	411.7	522.2	512.1	476.6	463.7	0.2	1.5	-2.7	28.4	34.2
EL	5 162.8	5 659.3	5 607.9	5 412.8	5 200.2	2.3	0.1	-3.9	48.7	47.2
ES	15 095.3	17 453.5	17 531.2	17 640.7	17 759.2	7.7	2.1	0.7	38.4	42.7
FR	32 400.0	33 987.0	34 074.0	34 124.0	33 905.4	14.8	0.6	-0.6	56.1	56.9
IE	1 310.0	1 590.0	1 860.0	1 975.0	1 955.0	0.9	5.1	-1.0	36.4	49.3
IT	24 845.0	27 153.0	27 303.0	27 142.0	26 596.0	11.6	0.9	-2.0	43.4	45.9
CY	347.3	440.1	435.0	427.4	446.5	0.2	3.2	4.5	53.8	62.4
LV	723.8	734.7	721.8	701.2	653.9	0.3	-1.3	-6.8	28.9	28.0
LT	941.0	1 180.1	1 144.5	929.6	827.8	0.4	-1.6	-11.0	25.8	23.9
LU	233.9	331.0	336.3	247.5	245.0	0.1	0.6	-1.0	57.7	54.7
HU	2 157.2	3 801.5	3 745.6	3 670.1	3 612.5	1.6	6.7	-1.6	20.9	35.6
MT	170.7	206.8	207.7	209.3	211.8	0.1	2.7	1.2	46.2	53.4
NL	8 124.0	9 879.0	10 003.0	10 004.0	10 004.0	4.4	2.6	0.0	52.7	61.8
AT	3 796.9	3 833.0	3 316.0	3 187.0	3 159.0	1.4	-2.3	-0.9	47.8	39.2
PL	5 728.5	10 946.7	11 427.4	11 871.9	12 303.7	5.4	10.0	3.6	14.8	32.2
PT	3 586.1	4 313.6	4 382.9	4 354.7	4 195.0	1.8	2.0	-3.7	35.8	40.3
SI	614.8	785.4	799.7	811.5	814.1	0.4	3.9	2.9	30.9	40.8
SK	1 125.4	1 698.0	1 556.3	1 402.7	1 294.6	0.6	1.8	-7.7	21.0	24.1
FI	2 810.0	2 849.0	2 806.0	2 725.6	2 567.6	1.1	-1.1	-5.8	55.1	49.3
SE	6 013.0	5 786.0	5 667.0	5 562.0	5 441.0	2.4	-1.2	-2.2	68.2	60.9
UK	29 411.0	31 317.4	31 492.0	30 773.4	:	13.5	0.6 *	:	50.3	:
IS	148.7	159.0	157.4	149.1	152.1		0.3	2.0	55.7	52.7
LI	19.6	:	:	19.9	:		0.2 *	:	64.1	:
NO	2 476.5	2 386.4	2 337.5	2 316.9	2 228.6		-1.3	-3.8	57.0	49.0
CH	4 480.0	5 235.7	5 383.5	5 387.6	5 336.6		2.2	-0.9	63.8	72.9
BG	2 562.9	2 881.8	2 922.0	2 906.1	2 856.1		1.4	-1.7	30.4	36.4
HR	:	1 721.1	1 780.2	1 678.8	1 684.0		:	0.3	:	37.4
RO	2 968.0	3 899.2	4 164.9	4 359.8	4 769.5		6.1	9.4	13.1	21.9
TR	13 227.7	18 395.2	18 904.5	18 914.9	18 916.7		4.6	0.0	:	:

* 1995-2002 ; Figures in italic: source: ITU.



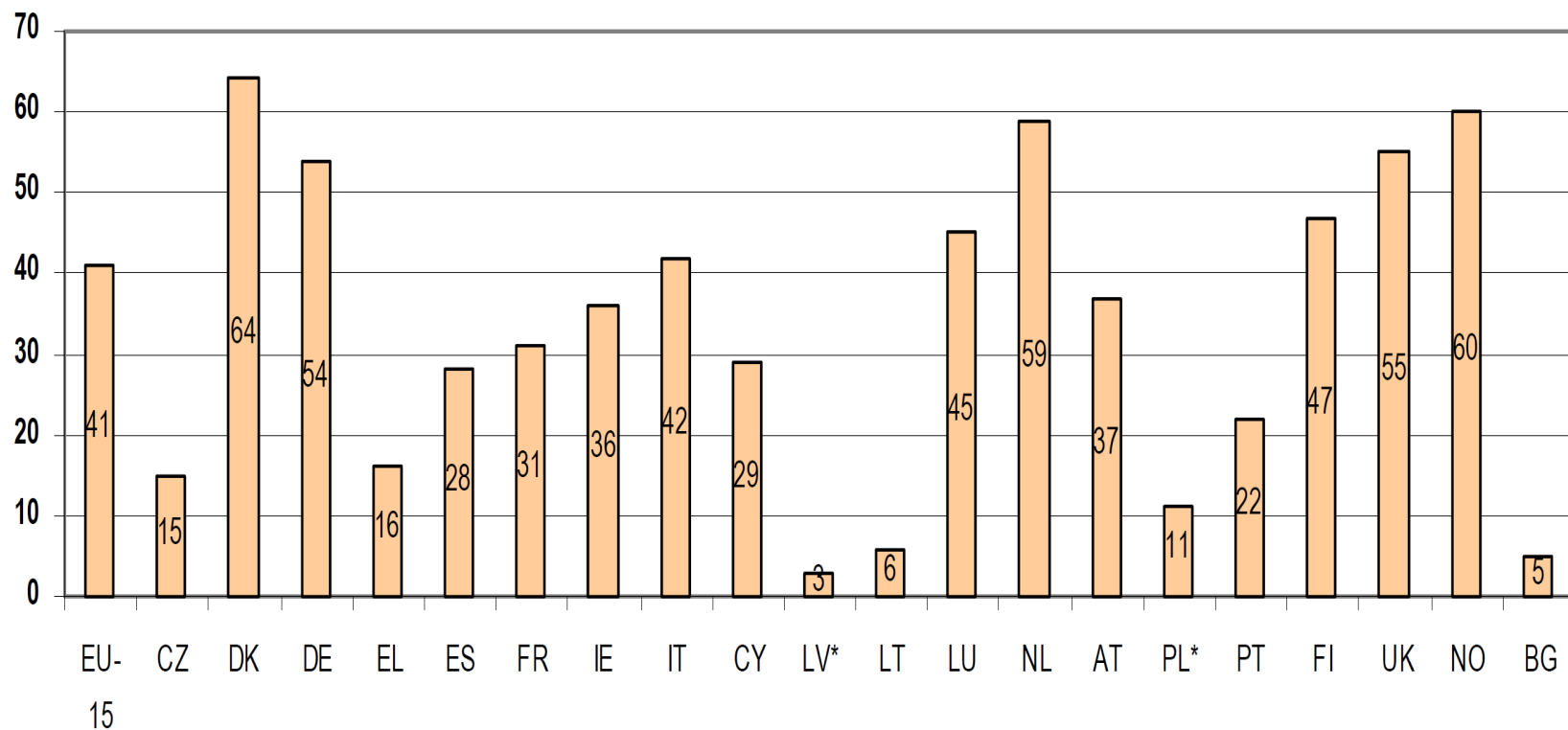
Number of mobile telephone subscriptions (in 1000)

						Distribution among EU Member States (%)	Average annual increase (%)	change (%)	Mobile phone subscriptions per 100 inhabitants	
	1995	2000	2001	2002	2003	2003	1995-2003	2003/2002	1995	2003
EU-25	22 054.5	253 416.9	308 467.7	335 352.0	364 276.1	100	42.0	8.6	4.9	79.9
EU-15	21 511.8	235 199.4	280 375.4	297 368.7	318 394.2	87.5	40.1	7.1	5.8	83.4
BE	235.3	5 180.8	7 697.0	8 135.5	8 712.3	2.4	57.1	7.1	2.3	84.1
CZ	45.7	4 346.0	6 947.2	8 610.2	9 708.7	2.7	95.4	12.8	0.4	95.2
DK	822.3	3 363.6	3 960.2	4 477.8	4 767.3	1.3	24.6	6.5	15.8	88.6
DE	3 764.0	48 202.0	56 126.0	59 128.0	64 800.0	17.8	42.7	9.6	4.6	78.5
EE	30.5	557.4	738.7	882.3	1 050.2	0.3	55.7	19.0	2.1	77.4
EL	273.0	5 932.4	7 963.7	9 314.0	8 936.2	2.5	54.7	:	2.6	84.9*
ES	944.0	24 265.1	29 655.7	33 531.0	37 219.8	10.2	58.3	11.0	2.4	89.6
FR	1 302.0	29 681.0	36 997.4	38 592.8	41 683.1	11.4	54.2	8.0	2.3	69.9
IE	158.0	2 398.0	2 800.0	3 000.0	3 400.0	0.9	46.8	13.3	4.4	85.8
IT	3 923.0	42 246.0	51 246.0	53 003.0	55 918.0	15.4	39.4	5.5	6.9	96.4
CY	44.5	218.3	314.4	418.1	551.8	0.2	37.0	32.0	6.9	77.2
LV	15.0	401.3	625.2	917.2	1 219.6	0.3	73.3	33.0	0.6	52.3
LT	13.5	508.9	1 018.0	1 631.6	2 152.6	0.6	88.5	31.9	0.4	62.2
LU	26.8	303.3	409.1	473.0	539.0	0.1	45.5	14.0	6.6	120.2
HU	267.1	3 076.3	4 967.4	6 886.1	7 944.6	2.2	52.8	15.4	2.6	78.3
MT	10.8	113.4	220.5	276.9	290.0	0.1	50.9	4.7	2.9	73.0
NL	539.0	10 755.0	12 352.0	10 060.0	12 500.0	3.4	48.1	24.3	3.5	77.2
AT	383.5	6 117.0	6 541.0	6 736.0	7 095.0	1.9	44.0	5.3	4.8	87.9
PL	75.3	6 748.2	9 604.6	13 898.5	17 401.2	4.8	97.5	25.2	0.2	45.5
PT	340.8	6 665.0	8 355.8	8 530.4	9 354.0	2.6	51.3	9.7	3.4	89.9
SI	27.3	1 137.8	1 509.0	1 539.2	1 884.4	0.5	69.8	22.4	1.4	94.4
SK	13.1	1 109.9	2 147.3	2 923.4	3 678.8	1.0	102.4	25.8	0.2	68.4
FI	1 039.1	3 672.8	4 175.6	4 516.8	4 747.1	1.3	20.9	5.1	20.4	91.2
SE	2 025.0	6 369.0	7 177.0	7 949.0	8 801.0	2.4	20.2	10.7	23.0	98.4
UK	5 736.0	40 048.6	44 918.9	49 921.4	:	13.7	36.2 **	:	9.8	:
IS	30.9	214.9	248.1	260.4	279.7		31.7	7.4	11.6	96.9
LI	:	:	:	11.4	:		:	:	:	:
NO	981.3	3 367.8	3 766.4	3 911.1	4 163.4		19.8	6.4	22.6	91.5
CH	447.2	4 638.5	5 275.8	5 736.3	6 188.8		38.9	7.9	6.4	84.6
BG	16.4	738.0	1 615.4	2 500.0	3 533.5		95.8	41.3	0.2	45.0
HR	:	1 112.3	1 730.7	2 339.6	2 550.7		:	9.0	:	56.7
RO	0.0	2 018.7	4 594.8	5 099.1	7 040.0		:	38.1	:	32.3
TR	251.4	15 063.5	19 572.9	23 374.4	27 925.0		80.2	19.5	:	:

Note: Greece 2002-2003: break in series – Figures in italic: source: ITU; * 2002; ** 1995-2002



Households with Internet at home (in %)



2003 – All forms of internet are included



Number of broadband subscriptions (in % of population)

	2002	2003	2004
EU-25	:	:	6.5
EU-15	2.3	4.5	7.6
Belgium	6.7	10.1	14.0
Czech Republic	:	:	0.7
Denmark	7.4	10.4	15.6
Germany	3.2	4.8	6.7
Estonia	:	:	7.6
Greece	0.0	0.0	0.2
Spain	2.0	4.3	6.7
France	1.2	4.0	8.2
Ireland	0.0	0.2	1.7
Italy	1.0	2.8	6.1
Cyprus	:	:	2.0
Latvia	:	:	1.5
Lithuania	:	:	2.5
Luxembourg	0.0	2.3	5.7
Hungary	:	:	2.2
Malta	:	:	3.5
Netherlands	6.3	9.8	14.7
Austria	4.7	6.6	8.7
Poland	:	:	0.5
Portugal	1.5	3.6	6.4
Slovenia	:	:	3.8
Slovakia	:	:	0.4
Finland	3.0	6.6	11.0
Sweden	4.6	8.6	12.1
United Kingdom	1.6	3.7	7.4

Source: DG INFISO/National Regulatory Authorities



Technology evolution

Many countries (developed and developing) are seeing fixed line use reducing, even though penetration rates are not that high

Most countries are seeing mobile use increasing even though penetration is already high

Internet penetration is not that high but shows a rapidly growing trend

Broadband deployment is in its infancy but xDSL has a bright future



Economic evolution

Customers have been willing to spend more on communications, however, the increases are small (and certainly not in the fixed network)

Customer spending will not increase dramatically in future

Industry has to find a cheaper way to deliver information and communication services ...



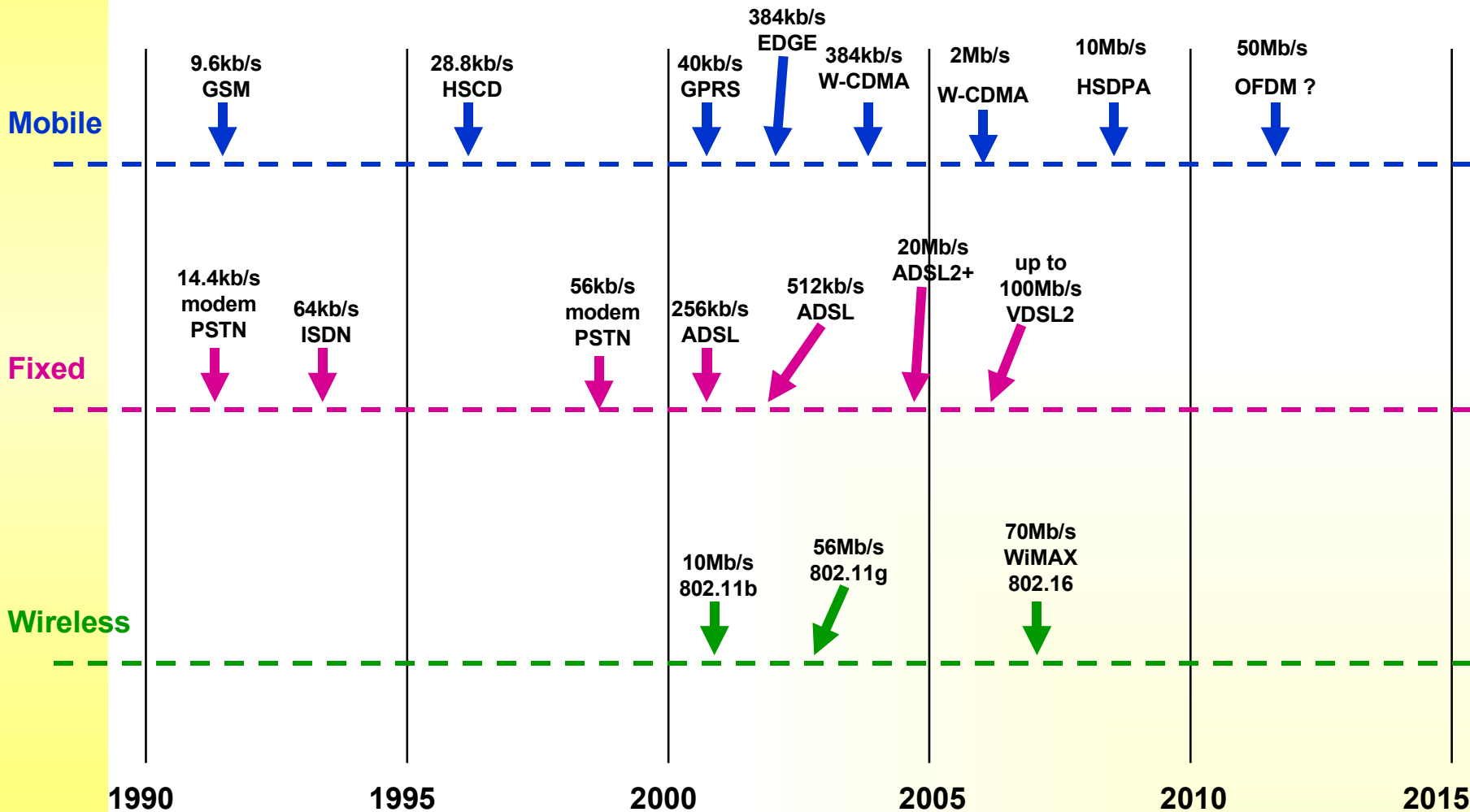
Customer expectations ...

Customers expect:

- **Mobility**
- **Portability**
- **Value for money**
- **Personalized services (to have their preferred services and features irrespective of type of network and their geographical location)**
 - e.g. SMS/F-SMS, etc.

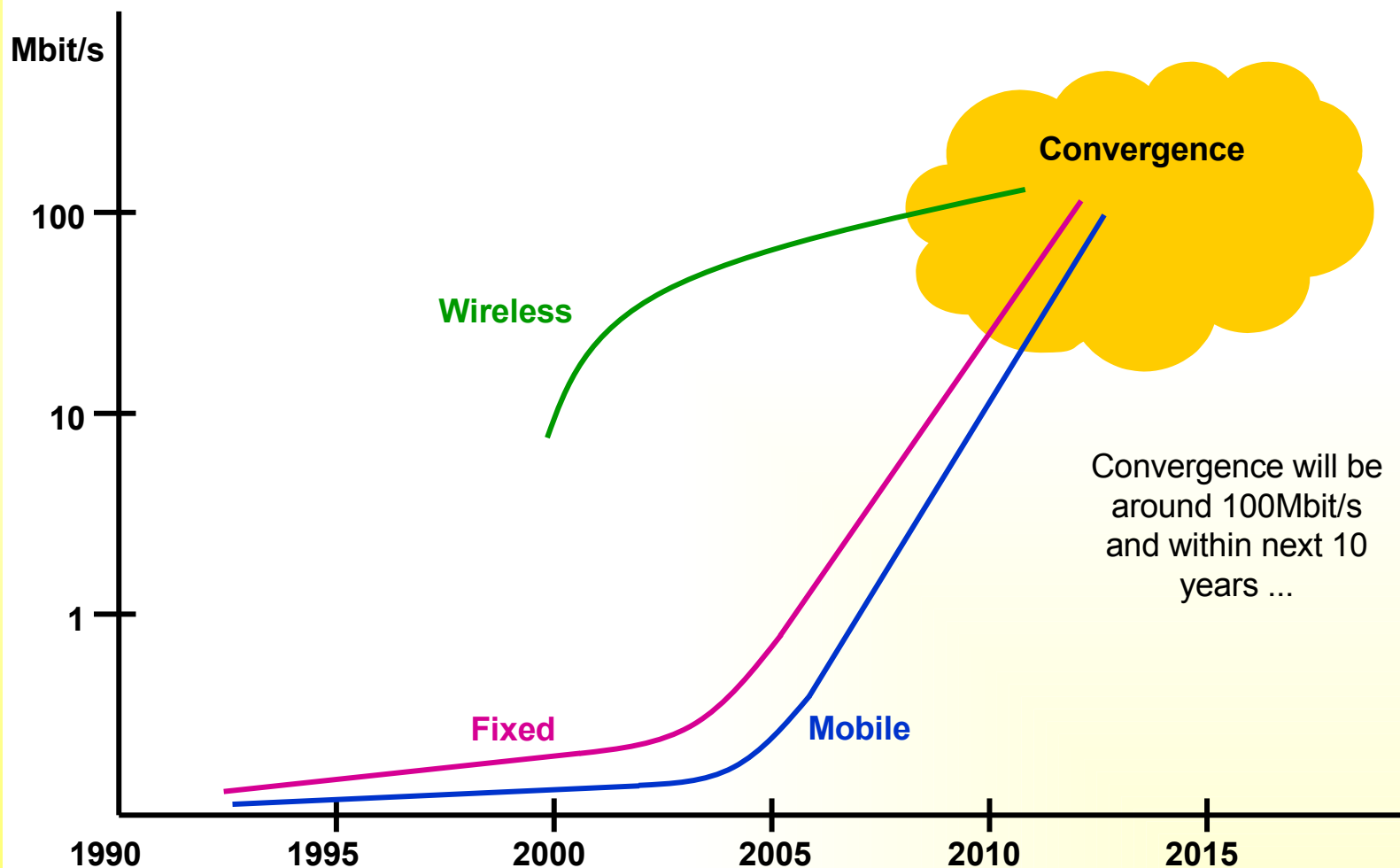


Data rates evolution





Data rates converging





Where does this lead ?

Fixed networks are not dominant anymore... ..

Mobile is a dominating technology

Mobile broadband is evolving rapidly

Different access technologies (wired and wireless) are on a market

Users are not interested in technology, but in services

Fixed telecoms have to accommodate ...

**Convergence fixed-mobile (or mobile-fixed?)
seems to be a solution**



NGN – the platform for convergence

ETSI (<http://www.etsi.org>) – is standardizing Next Generation Networks based on a real fixed-mobile convergence

3GPP (mobile) and ETSI TC TISPAN (fixed networks and NGN) are working closely together
Unified work plans, joint meetings and workshops, ...





ETSI NGN vision

A multi-service, multi-protocol, multi-access, IP based network - secure, reliable and trusted

An enabler for Service Providers to offer

- Real-time and non real-time communication services
- Between peers or in a client-server configuration

Nomadcity and Mobility

- Of both users and devices
- Intra- and inter-network domains, eventually between fixed and mobile networks

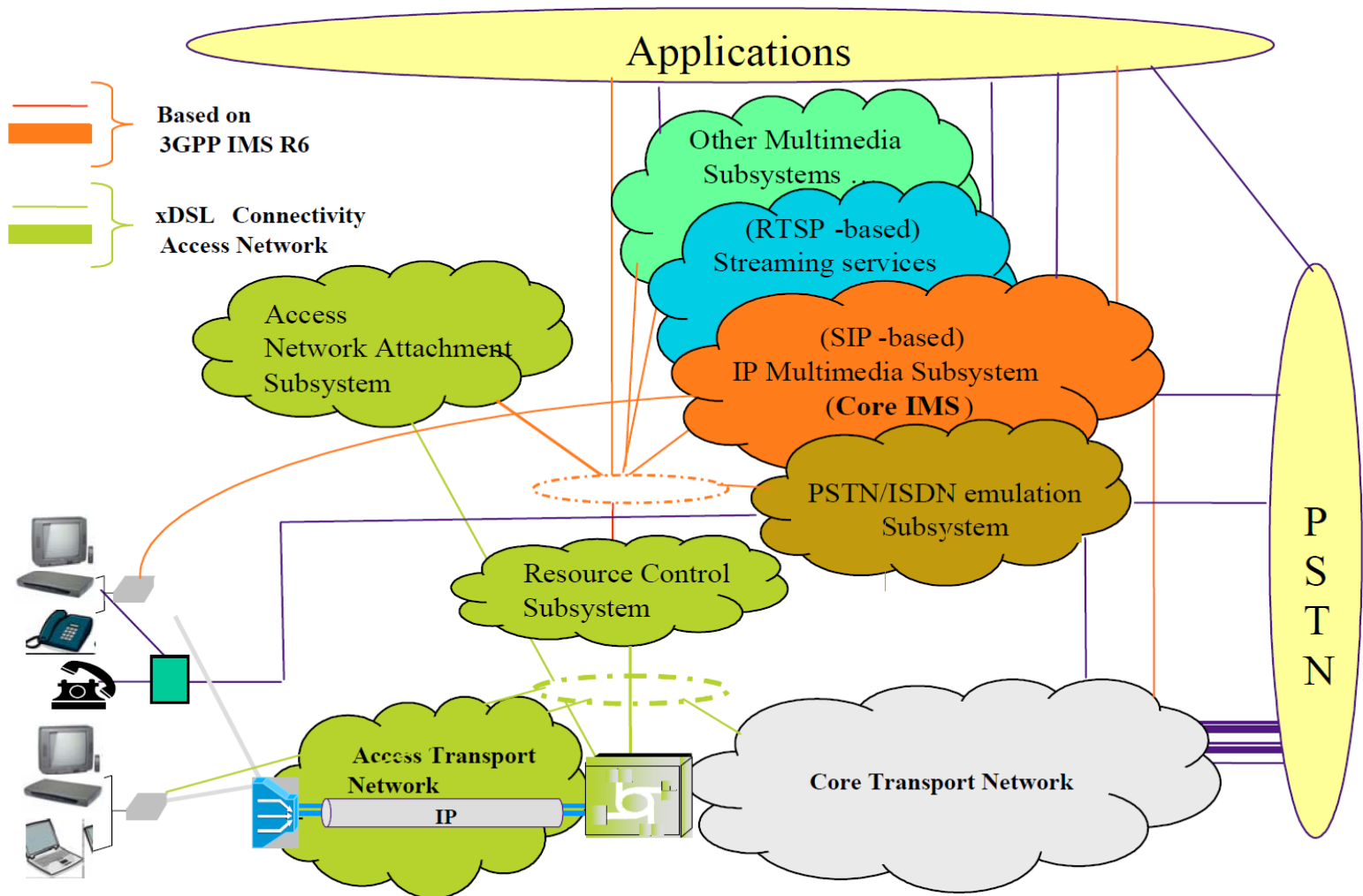
Regulatory compliance

- Lawfull Intercept, Number portability, Emergency call....

“My communications services” always reachable, everywhere, using any terminal.



ETSI NGN architecture





ETSI NGN is becoming a reality

Release 1 bringing multimedia services – ready by the end of 2005

- Nomadicity/user-controlled roaming
- xDSL access focus

Release 2 optimizing access resources usage

- According to user subscription profile and service use
- Corporate users specific requirements ...

Release 3 introducing full (inter-domain) nomadicity

- Inter-network domain nomadicity/user-controlled roaming
- Higher bandwidth access (VDSL, FTTH, Wi-max ...)



What about the impact ?

On developed countries ...

- Move towards NGN has been clearly identified
- Legacy investments have to be protected at the same time
- Huge PSTN customer base will have to be gradually migrated to broadband access (wireline, wireless, or both)
- More experienced population will evolve to high-speed technology for broadband access to NGN

On developing countries ...

- Move towards NGN inevitable as well
- Legacy investments might be much less an issues in some cases
- Move towards NGN may be even faster than in developed countries based on an experience from early adopters



Conclusions (1)

Migration to the converged networks appears inevitable, but ...

- **It may be quite long and rather complicated due co-existence requirements with traditional architectures**
- **It raises a number of issues depending on the type of operator, i.e., incumbents versus new entrants, fixed and/or mobile networks**
- **Over and above the advantages of multimedia services, the players are also taking into account the state of the existing infrastructure as well as acquisition and operational cost benefits; all within the constraints of rapid return on investment**



Conclusions (2)

In this new situation, role sharing between different players in a telecommunication market is changing ...

- **Role sharing and revenue redistribution between players will determine the success of next generation networks and the service evolution**
- **Operators will seek control over the data flows so that they can segment their offer and not be reduced to the status of “common” pipe suppliers**
- **Issues on the definition of the interfaces between the network operators and the service providers (control/service interfaces) have to be discussed**
- **Role of standardization organizations such as the ITU or ETSI would appear to be essential to coordinate this process**



**Thank you for your
attention ...**

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