

Chapter 16

Eastern and Central Europe

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FUNDAMENTAL TRANSFORMATIONS

Central and Eastern Europe (CEE) is generally understood to include post-Communist Central European countries (Albania, Bosnia/Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Serbia and Montenegro, Slovakia, Slovenia and the Former Yugoslav Republic of Macedonia) and Eastern European countries which emerged out of the former Soviet Union (Armenia, Azerbaijan, Belarus, Estonia, Georgia, Latvia, Lithuania, the Republic of Moldova, Russia, Ukraine).

All CEE countries are undergoing a process of fundamental political and economic transformation that interacts with changes in social structure and, in many cases with the need to redefine territorial and cultural boundaries. Economic policy has focused on social, economic and labour problems resulting from the crises provoked by the collapse of the old system and the accompanying need to dismantle and/or modernize inefficient and unproductive industries. Consequently, little attention has been paid to promoting forward-looking policies in information and communications technology (ICT) and progress has been slow.

Central and Eastern European countries entered the 1990s with broadcasting and telecommunications infrastructures inherited from the communist era when they were underdeveloped and tightly controlled. Now, however, big changes are underway. The direction and the pace of change differ greatly from country to country, depending on the general political and economic context. In some of the more advanced countries, a dual system of private and public broadcasting is already operating in ways similar to the pattern prevailing in Western Europe. Elsewhere, the state monopoly of broadcasting has been preserved to all intents and purposes, with the old state broadcaster still operating and dominating the scene (see *The Development of the Audiovisual Landscape in Central Europe since 1989*, p. 386).

Due to the reluctance to privatize state monopolies and liberalize the telecommunications market in Central and Eastern Europe,

the region's telecommunications industry is still not up to the standard needed in a modern economy in at least two respects. First, teledensity (the number of telephone lines per 100 inhabitants) is too low. Even in the region's best markets, it stands at less than half the level found in Western Europe. Second, the system is not coping with the growing demand for data and information services which define the multimedia age (*Why Tortoises Won't Win*, 1998, p. 39).

A report prepared in May 1996 for the Central and East European Information Society Forum pointed to the following trend in selected Central European countries:

Analysis with respect to GDP per capita shows that the proportion of GDP spent on telecommunications equipment is almost a constant at 0.4%. By contrast, spending on information technology (IT) appears to be strongly correlated with gross domestic product (GDP) per capita, rising from 1% for a GDP per capita of 8,000 euros to 2.5% for 23,000 euros. These figures suggest that telecommunications investment is treated as . . . something indispensable, whereas IT expenditure is seen as something optional that is indulged only when funds permit. Company IT spending is often below 1% of revenue compared to much higher figures in the EU, where 6% or more is common (*Report of Panel A*, 1996, p. 9).

The situation may have changed somewhat since then, but much remains to be done in Central and Eastern European countries for the information society to become a reality.

Central and Eastern European countries represent a wide variety of social and political environments, as well as different levels of economic and technological advancement. Reliable data for some of them are very hard to obtain. The following overview, therefore, cannot claim to be complete. In some cases, data from several sources and for different years have been used to provide as full a description as possible.

More detailed information is generally available for Central European countries, and therefore much of the attention will be focused on them.

LEVELS OF ECONOMIC AND HUMAN DEVELOPMENT

Progress in new information and communication technologies is determined to a very large extent by the level of economic and technological development, as well as the size of the market and the purchasing power of the population. Therefore, discussion of ICTs in Central and Eastern Europe would be incomplete without at least a cursory examination of these structural factors.

Table 16.1 shows that CEE countries vary enormously in size of population and levels of human development and economic performance. Conditions for ICT development depend heavily on the service sector. The greater its role in economic activity, the more demand there is for information and communication services and, therefore, for ICT.

It is clear from Table 16.2 that countries with low per capita GDP and gross national product (GNP), where the contribution of the service sector to the GDP is also very low, are not capable of sustaining a high rate of ICT growth. This is confirmed by Table 16.3 which compares the volume of telecommunications investment and revenues among different countries of the region. In low-income countries, the volume is insignificant, indicating that telecommunications are not yet an important part of the economy. There are also clear differences in the level of telecommunications revenue and investment between more and less advanced countries in the other income brackets.

ICT INFRASTRUCTURE

Telecommunications

As noted above, Central and Eastern Europe lags behind Western Europe in terms of telecommunications development. This is clearly evident in

Table 16.1 → Trends in human development and economic growth in CEE countries, 1995

Country	Population in thousands	Human development index + per capita income		National income accounts		Trends in economic performance	
		HDI	GDP per capita (\$ 1995)	GDP (in thousands of millions of \$) 1995	Services as % of GDP 1995	GNP (in thousands of millions of \$) 1995	GNP per capita (\$ 1995)
High human development							
Czech Rep.	10,223	0.884	3,164	45	55	40	3,870
Hungary	9,930	0.857	2,334	44	59	42	4,120
Poland	38,754	0.851	1,701	118	54	108	2,790
Slovakia	5,360	0.875	3,054	17	61	16	2,950
Slovenia	1,920	0.887	na	19	57	16	8,200
Medium human development							
Albania	3,445	0.656	887	2	23	2	670
Armenia	3,645	0.674	587	2	20	3	730
Azerbaijan	7,864	0.623	355	3	41 ¹	4	480
Belarus	10,323	0.783	1,712	21	52	21	2,070
Bulgaria	8,387	0.789	2,605	12	53	11	1,330
Croatia	4,494	0.759	na	18	62	16	3,250
Estonia	1,442	0.758	2,530	4	64	6	2,860
Georgia	5,788	0.633	433	2	11	2	440
Latvia	2,448	0.704	1,912	6	60	6	2,270
Lithuania	2,131	0.750	1,683	7	53	7	1,900
Moldova	4,451	0.610	na	3	22	4	920
Romania	22,573	0.767	1,358	36	39	33	1,480
Russia	147,231	0.769	1,988	345	55 ¹	332	2,240
The Former Yugoslav Rep. of Macedonia	2,205	0.749	na	2	na	2	860
Ukraine	51,218	0.665	999	80	41	84	1,630

1. Data refer to a year other than the one specified in the column heading.

Source: Human Development Report 1998, UNDP, United Nations Population Division.

Table 16.2 → Telecommunications revenue and investment in CEE countries, 1996

	Telecommunications revenue			Telecommunications investment		
	Total, in millions of \$, 1996	Per inhabitant in \$, 1996	As % of GDP 1996	Total, in \$, 1996	Per inhabitant in \$, 1996	As % of GFCF, 1995 (gross fixed capital formation)
Low income countries						
Albania	36.5	9.9	1.3	5.1 ²	1.4	na
Armenia	29.6 ¹	7.9	na	2.7 ¹	0.7	na
Azerbaijan	43.8	5.8	1.3	1.4	0.2	na
Bosnia	0.4 ²	0.1	na	0.1 ²	na	na
Georgia	7.1 ¹	1.3	na	0.9 ¹	0.2	na
Lower middle income countries						
Belarus	225.1	22.0	2.0	118.3	11.5	1.5
Bulgaria	79.3	9.4	1.9	23.8	2.8	2.7
Estonia	147.9	100.6	2.9	65.5	44.6	5.0
Latvia	141.3	57.0	2.8	58.0	23.4	na
Lithuania	133.3	35.9	1.8	31.5	8.5	4.0
Moldova	38.0	9.0	1.5	16.0	3.8	8.5
Poland	2,538.4	65.7	1.8	886.2	23.0	4.4
Romania	559.8	24.8	1.2	197.4	8.7	3.0
Russia	5,259.8	35.6	1.0	1.2	na	1.4
Slovak Republic	476.2	88.6	2.1	279.8	52.1	3.7
The Former Yugoslav Rep. of Macedonia	80.5	37.2	2.5	87.0	40.2	na
Ukraine	1,100.8	21.5	15.4	199.5	3.9	2.1
Yugoslavia	413.9	39.1	1.5	99.4	9.4	10.2
Upper middle income countries						
Croatia	592.4	131.6	3.2	246.1	54.7	21.5
Czech Rep.	1,158.8	112.3	2.1	1,063.5	103.1	21.5
Hungary	1,287.2	126.0	1.8	544.4 ²	53.1	6.5
Slovenia	326.3	163.9	1.6	142.2	71.4	2.5

1. Data from 1994.

2. Data from 1995.

Source: World Telecommunication Indicators, ITU, 1998.

Table 16.3 → Telecommunications penetration in Western and Central Europe, 1996

	Main lines per 1,000 inhabitants (%)	Mobile subscribers (%)	CATV subscribers HH (%)	% of Digital per main lines
Western Europe	50.9	9.1	27.7	84.6
Central Europe ¹	22.6	1.54	21.2	37.1

1. Based on data for Bulgaria, Czech Rep., Hungary, Poland, Romania.

Source: EITO, 1998.

Table 16.4 → Main telephone lines, residential main lines, mobile telephones and fax machines, 1996

	Main telephone lines per 100 inhabitants	Residential main lines per 100 households	Cellular mobile subscribers				Estimated fax machines (000's)
			Total (000's)	Per 100 inhabitants	% digital	% of total telephone subscribers	
Low income countries							
Albania	1.74	5.8	2.3	0.06	na	3.5	na
Armenia	15.4	62.0	0.3	0.01	na	0.1	0.3
Azerbaijan	8.54	38.3	17.0	0.23	2.9	2.6	2.5
Bosnia	8.98	24.4	1.5	0.04	100	0.5	na
Georgia	10.49	33.5	2.3	0.04	100	0.4	0.5
Lower middle income countries							
Belarus	20.77	43.8	6.5	0.06	na	0.3	8.9
Bulgaria	31.26	65.1	26.6	0.31	47.0	1.0	15.0
Estonia	29.85	55.8	69.5	4.73	50.4	13.7	13.0
Latvia	29.81	66.0	28.5	1.15	64.6	3.7	0.9
Lithuania	26.78	64.7	51.0	1.37	77.2	4.9	5.6
Moldova	14.0	38.6	0.9	0.02	na	0.2	0.6
Poland	16.91	41.5	216.9	0.56	41.1	3.2	55.0
Romania	13.98	38.5	17.0	0.08	na	0.5	20.7
Russia	17.54	40.5	223.0	0.15	na	0.9	63.4
Slovak Rep.	23.19	48.5	28.7	0.53	na	2.2	55.4
The Former Yugoslav Rep. of Macedonia	16.98	59.6	1.1	0.05	100	0.3	2.6
Ukraine	18.09	39.2	30.0	0.06	na	0.3	0.1
Yugoslavia	19.69	54.2	na	na	na	na	14.5
Upper middle income countries							
Croatia	30.86	79.6	64.9	1.44	20.1	4.5	45.3
Czech Rep.	27.31	46.9	200.3	1.94	68.7	6.6	79.5
Hungary	26.06	55.6	473.1	4.63	86.7	15.1	45.0
Slovenia	33.33	90.8	40.0	2.01	na	5.7	17.7

Source: World Telecommunication Indicators, ITU, 1998.

Table 16.5 → Key parameters on network development

	Fixed telephone main lines per 100 inhab.	Network digitization (%)	Average waiting time for fixed telephone	Mobile subscriptions (% of population)	% of population covered by mobile radio	Radio paging access (% of population)
Bulgaria	31.93 (1996)	5.5 (1997)	over one year	0.45	NMT, 80; GSM, 100	0.05
Czech Rep.	27 (1996)	n.a.	1.9 years	2.5	Eurotel, 74; Radiomobil, 40; Eurotel Prague, 96	99
Estonia	29.4 (1996)	n.a.	3.8 years (1996)	4 (1996)	EMT, 98; Radiolinja Eesti, 65; Ritabell, 60 (1997)	0.8 (1996)
Hungary	30	n.a.	4 years (1996)	7 (1997)	Westel 9000, 93 (1996)	0.13 (1997)
Latvia	31.2 (1996)	n.a.	2.7 years (1997)	2.7 (1997)	95 (1997)	1.1 (1997)
Lithuania	26.8	n.a.	3.5 years (1996)	1.3	5 (1997)	0.05 (1996)
Poland	17.6 (1997)	39 (1996)	2.9 years (1996)	2.1 (1997)	n.a.	0.14 (1996)
Romania	14	35	4 years	0.186 (1997)	70 (1996)	n.a.
Slovakia	25.88 (1997)	50.76 (1997)	10.2 months	3.75 (1997)	91 (1997)	0.044
Slovenia	36 (1998)	100 of transmission capacity	1 year	6 (1998)	98 (1997)	99 (1997)

Source: Phare Regulatory Observatory for Telecoms, Broadcasting and Posts, Central and Eastern European Country Reports, January 1998-June 1998.

Table 16.3 which compares the situation in the two regions. The five countries of Central Europe taken into account in the table display a relatively high level of telecommunications development, so in real terms the comparison would be even less favourable for the region as a whole.

To take one example, Lithuania is one of many CEE countries where the existing quality of local communications does not satisfy the users' requirements. Therefore, plans call for replacing analogue telephone centres with digital ones – to be completed by 2015 – and for setting up of a telephone subscriber information system, with the gradual introduction of special equipment, such as voice simulation, automatic system control, and communication with other countries' systems. By 2000, existing coin-box telephones will be replaced by card-operated ones; card telephone control and diagnostics centres will be established in all branches of Lithuanian Telecom.

Rapid development of the fibre-optic cable line network is planned. In 1996, a fibre-optic line from Kaunas to Klaipėda via Panevėpys and Diauliai was introduced, with digital 155 Mb/s multiplexing sys-

tems. Lithuanian telecommunications will be provided with a second international communication line via Latvia; it will be possible to connect twelve Lithuanian cities by means of a high-capacity transmission system. The same fibre-optic lines will be used for the setting up of a national public data network.

A fuller picture of telephony in CEE countries can be obtained from Tables 16.4 and 16.5.

At the 1996 Central and East European Information Society Forum it was pointed out that penetration targets for fixed telephone lines set for the year 2000 range from 18.9% for Romania to 50.0% for Latvia. To meet those targets, CEE telecommunications would need to install new lines that are at least 50% faster over the next five years. The total investment required in all ten CEE countries together to achieve those targets would be about \$20,000 million, or \$4,000 million per annum. Those targets are high compared with an annual investment rate of \$1,600 million for the four years up to 1995 during which the three International Financial Institutions (IFIs) provided at most \$440 million per annum. (Report of Panel A, 1996).

Media equipment

As Table 16.6 shows, radio and television reception is universal in most Central and Eastern European countries, although in some places access even to these basic technologies is not generally available.

Cable and satellite television, as well as video camera recorders (VCRs), display quite high levels of penetration in the Central European countries for which data are available; these are shown in Table 16.7.

Table 16.6 → Access to radio and television in Central and Eastern Europe, 1996

Country	Radios per 1,000 inhab.	Television sets per 1,000 inhab.
High human development		
Czech Rep.	806	534
Hungary	697	438
Poland	518	337
Slovakia	580	486
Slovenia	416	364
Medium human development		
Albania	235	118
Armenia	5	225
Azerbaijan	20	22
Belarus	290	242
Bulgaria	531	390
Croatia	333	267
Estonia	680	408
Georgia	553	470
Latvia	699	485
Lithuania	292	451
Moldova	720	281
Romania	317	231
Russia	344	405
The Former Yugoslav Rep. of Macedonia	184	230
Ukraine	872	230

Source: UNESCO Statistical Yearbook 1998, UNESCO, Paris, 1998.

In some countries, pay television is available and spreading. As with cable, reception of Direct to Home (DTH) satellite television and VCRs, the appearance and development of pay television is determined by the size of the market and living standards (including discretionary purchasing power) prevalent in a particular country. For this reason, pay television can be found mostly in Central European countries. According to data available in *Statistical Yearbook 1998* of the European Audiovisual Observatory, in 1997 there were 385,000 pay TV subscribers in the Czech Republic, 225,000 in Hungary, 386,600 in Poland, and 200,000 in Romania.

1998 saw the introduction of digital television in Poland, in the form of two competing satellite bouquets: Wizja TV (owned and operated by @Entertainment, an American company, which is also heavily involved in cable television in Poland) and Cyfra+, operated by Canal+ Polska (a licensed Polish broadcaster involving the French company Canal+), also offering a terrestrial pay TV channel. Canal+ Polska is also a partner in a newly created company Polska Platforma Cyfrowa (Polish Digital Platform), alongside with Polish Television Plc. (the public-service television broadcaster) and most other ranking licensed commercial stations.

Computer equipment and the Internet

As noted above, spending on information technologies in Central and Eastern Europe has grown remarkably over the past few years. However, both the relationship of IT expenditures to GDP and per capita IT spending reveal that expenditures are still much lower than in Western Europe. In 1996, the vast majority of Central and Eastern European countries spent less than 1.9% of GDP annually on information technology (Hungary, 1.89%; Poland, 1.19%; Russia, 0.79%; Slovakia, 1.91%). Only the Czech Republic exhibited spending levels (2.99% of GDP) which matched those of many Western European countries.

Table 16.7 → Television, cable and satellite TV households and VCR penetration (estimates for 1 January 1997)

	Total TV households (000's)	Total households having the possibility to link up to a cable network (000's)	Total households connected to cable (000's)	Satellite Master Antenna TV+Direct-to-home (000's)	Households having the possibility to link up to a cable network/ TV households	Households connected to cable/ TV households	Households connected to cable/ Households having the possibility to link up to a cable network	VCRs (% of TV households, 1996)
Bulgaria	2,820	165	35	100	1.2	1.2	21.2	49
Czech Rep.	4,022	2,400	750	400	59.7	18.6	31.2	–
Estonia	539	–	93	30	–	18	–	51
Hungary	3,849	–	1,905	500	–	50	–	46
Lithuania	1,438	–	197	40	–	14	–	18
Latvia	921	–	155	10	–	17.0	–	22
Poland	12,146	–	2,766	2,000	–	23	–	60
Romania	4,687	4,000	2,300	300	85.3	49.1	57.5	26
Russia	46,776	11,578	–	150	–	25	–	21
Slovakia	1,850	–	470	150	–	–	–	27
Slovenia	637	–	220	200	–	–	–	55 (1996)

Source: European Audiovisual Observatory, *Statistical Yearbook 1998*.

Table 16.8 provides a comparison between Western and Central and Eastern Europe in terms of IT hardware sales in 1998.

Spending on hardware, software and services is another important difference between the less and the more advanced countries. The country-level markets of Central and Eastern Europe remain heavily oriented towards personal computers and PC-related technologies. These accounted for the largest percentage of IT hardware spending during the 1996–1997 period. By contrast, in the Czech Republic, personal computers and related hardware represent less than 35% of IT spending, with the remainder being shifted to implementation services, networking applications, development and support. Elsewhere, the low-end office equipment market, local area network (LAN) hardware and the LAN server market have experienced considerable growth over the last several years. However, the computer systems segment (mainframes, servers, workstations) has stagnated in several countries due to reductions in funding for public IT projects.

Despite the overall predominance of hardware sales, software and services represent one of the fastest

growing sectors of the IT market. Particularly strong growth is being seen in the market for packaged software, such as PC applications software, enterprise resource planning (ERP) applications, and application tools for database development and management. Demand for basic services such as IT consulting, contract programming and software design is also strong. The regional value of the software and services market reached almost 2,000 million euros in 1997, up more than 13% over the previous year. Most growth in the software and services sector is derived from

Table 16.8 → IT hardware shipments (in units)

	Western Europe	Eastern Europe
Unix servers	129,316	7,641
NT servers	272,100	19,812
Other servers	369,251	67,431
Workstations	210,077	6,040
PCs	19,824,095	2,414,300
LAN cards	15,388,400	1,130,112

Source: EITO 1998.

large-scale projects in banking, financial services, government administration, telecommunications and industry. Local firms play a role of growing importance as system integrators, value-added resellers, software developers and training centres.

Table 16.9 illustrates the volume of the information technology market in selected CEE countries. Differences in spending on particular technologies are not commensurate with the great difference in size and population between Russia and the other four countries. This is as good an indication as any of the direct relationship between economic development and the successful penetration of information technology.

Table 16.10 shows the penetration of information technology (PCs and Internet access) in Central and Eastern European countries.

USE OF ICT IN THE REGION

New information and telecommunication technologies are gradually being introduced into all spheres of life in Central and Eastern Europe. In Estonia, for example, a national school computerization programme, known as 'Tiger Leap', has been launched. In 1997, 25% of all schools were connected to the Internet. By the year 2000, all the schools are scheduled to be on the Internet. A similar project, School-Net, was inaugurated in 1996 in Hungary, with a view to providing direct access to the Internet for about one thousand schools by 1 September 1998. As a result of this project, schools are being equipped with computer laboratories incorporating 6 to 18 multimedia computers per laboratory. A further

Table 16.9 → IT market value (millions of euros) in selected CEE countries (1999, estimated)

	Czech Rep.		Hungary		Poland		Russia		Slovakia	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Servers	136	147	89	107	159	178	354	462	51	57
Workstations	15	16	10	11	17	17	23	27	5	6
PCs	328	359	153	160	525	577	1,549	1,824	132	153
PC/workstation add-ons	116	127	85	97	153	166	328	360	40	46
Computer hardware	595	650	337	376	853	939	2,254	2,673	228	262
LAN hardware	75	86	32	37	87	100	143	161	29	34
Other data communications	17	18	15	16	26	28	62	65	3	3
Data communications hardware	92	104	47	52	113	128	205	227	32	37
IT hardware	765	838	441	489	1,057	1,188	2,889	3,301	290	331
Systems software	74	81	50	55	74	84	65	71	25	27
Application software	77	84	62	67	102	112	113	127	23	25
Software products	151	164	112	122	176	195	178	198	48	53
Consulting	91	98	59	63	49	59	35	41	8	10
Implementation	193	227	118	136	200	230	185	215	33	39
Operations management	77	90	40	45	40	45	44	50	8	9
Support services	101	112	63	67	94	100	129	147	13	15
Services	462	526	280	312	382	435	394	454	63	73
Software and services	613	691	392	433	558	630	572	652	110	126
Total IT market	1,377	1,529	832	923	1,633	1,818	3,461	3,953	400	457

Source: EITO, 1998.

Table 16.10 → Internet and PC penetration, 1996

	Internet				Estimated PCs	
	Hosts		Estimated number of users		Total (k) 1996	Per 100 inhabitants 1996
	Total 1998 ¹	Per 10,000 inhabitants, 1996	Total 1996	Per 10,000 inhabitants 1996		
Low income countries						
Albania	76	0.22	1,000	2.72	na	na
Armenia	482	0.47	3,000	0.09	na	na
Azerbaijan	348	0.04	500	0.66	na	na
Bosnia	348	0.10	500	1.38	na	na
Georgia	655	0.39	2,000	3.70	na	na
Lower middle income countries						
Belarus	648	0.25	735	0.72	na	na
Bulgaria	6,693	3.92	60,000	0.17	250	2.98
Estonia	19,856	54.29	5,000	34.01	10	0.67
Latvia	8,439	23.31	40,000	161.29	20	0.79
Lithuania	8,893	4.67	10,000	26.97	24	0.65
Moldova	370	0.01	200	0.47	11	0.26
Poland	106,663	13.68	480,000	124.23	1,400	3.62
Romania	22,359	3.46	50,000	22.12	120	0.53
Russia	137,178	3.93	600,000	40.61	3,500	2.37
Slovak Republic	14,805	14.77	100,000	186.08	na	na
The Former Yugoslav Rep. of Macedonia	407	0.89	1,500	6.93	na	na
Ukraine	16,278	1.29	50,000	9.79	290	0.56
Yugoslavia	5,416	2.40	20,000	18.91	na	na
Upper middle income countries						
Croatia	4,633 (1996)	10.29	40,000	88.78	100	2.09
Czech Rep.	72,120	39.60	200,000	193.89	700	6.79
Hungary	76,143	29.22	100,000	97.92	450	4.41
Slovenia	18,537	69.35	100,000	502.26	95	4.78

1. Figures for July 1998; source: Network Wizards (www.nw.com)

Source: World Telecommunication Indicators, ITU, 1998.

500 primary schools and 34 student hostels were to gain Internet access during the first stage of the project.

In Estonia, computer workplaces installed in national public administration authorities (PAAs) were expected to achieve an average of almost 90% by the end of 1997. Some branches were expected to reach 100%. Local area networks (LANs) are rapidly being adopted in Estonian PAAs. In 1993 there were only 15 networks in operation and 23 uninstalled network

kits; by the end of 1997 the estimated number of LANs was expected to reach 431. However, the LANs used in these administrations are usually not large. The average number of workstations connected into a public administration LAN is 14.5, including 56 in networks of supporting structures, 17 in ministry networks, 12 in national board networks, 6 in inspectorates and 15 in county government networks. About 30% of these networks – mainly in regional units of governmental agencies – operate without a specialized

server. The rest have 1.6 servers per network, with two servers in central apparatus networks. Only 8% of the servers are minicomputers, while 69.3% of them are equipped with uninterruptible power supplies (UPS).

The number of printers in public administrations totalled 3,393 by the end of 1996, which amounted to 48% of the total number of workplace computers. It was estimated that by the end of 1997, the number of printers would increase to 91.6% of the computer workplaces. Only a few public administrations own a plotter. The number of scanners increased by almost three times in 1996 compared to 1995. PAAs had 667 modems by the end of 1996, due to the explosive growth in the use of Internet and electronic mail.

In Lithuania, due to the limited funding available from the state budget in 1993–1995, only the most important technology projects were selected for investments. These included the integration of computer networks for public institutions, the state register system and geographical information systems, and networks for local authorities and customs. Altogether, 46 institutions were united into the Public Institutions Computer Network (VIKT): the Seimas (Parliament), the Government, the Ministries of Economics, Finance, Communications and Informatics, Foreign Affairs and Internal Affairs, the Customs and Statistics Departments, the Vilnius Municipal Office and similar bodies. They were also provided the opportunity of connecting to the Internet. LITNET, a Lithuanian science network, has been an official member of the Internet since 1994. LITNET allows the multimedia exchange of texts, graphs, signals, static and moving images among subscribers from 173 countries of the world. The network's services are used by 10 universities and academies, 14 research institutes, and about 140 other schools, libraries, public institutions, and healthcare establishments. LITNET consists of over 2,000 computers and the number of users exceeds 10,000 people. There is a coordinated effort to develop computerized information systems (IS) that help manage government depart-

ments like the Ministry of Internal Affairs (State Border Control IS), the State Control Department, the Ministry of Finance (Tax Administration IS, Treasury IS), and the Ministry of Social Security and Labour (State Social Security Board IS, State Employment Agency IS). An X.25-standard data communication network, Vilnius DATAPAK, with 240 connection ports, is operated by Lithuanian Telecom. It is used by the Customs IS and the Bank IS.

The examples of Estonia and Lithuania illustrate the increasing use of ICT in Central and Eastern European countries, where they are among the most developed in the region.

RESTRUCTURING AND PRIVATIZING TELECOMMUNICATIONS AND MEDIA SECTORS

Broadcasting monopolies are a thing of the past in Central and Eastern Europe, but political and economic circumstances in individual countries have shaped broadcasting systems differently. In most Central European countries, a dual system of public and private broadcasting is operating at the national and also, in some cases, at the sub-national level. In the Commonwealth of Independent States (CIS), the situation is different. In these countries the private sector is non-existent: there are, in most cases, no independent or commercial stations at the national level, and 'authorities have retained control over important state-owned media. If they have not outlawed independent or opposition altogether . . . they have retained important levers: they may withdraw subsidies, increase the rent of editorial premises, refuse to print or distribute a paper, delay registration, deny a licence or frequency to a broadcaster, increase tariffs, restrict access to information or file libel suits' (Lange, 1997, p. 21).

Economic factors also weigh heavily on growth prospects for the media in most CEE countries. Larger or more buoyant markets attract foreign investors and

generate relatively high volumes of spending on advertising. On the other hand, underdeveloped and stagnant economies are not capable of sustaining extensive media growth: there is neither start-up capital, nor sufficient advertising to finance such activity.

Table 16.11 portrays the situation in selected Central European states resulting from the demonopolization of television at the national level.

Practically everywhere in CEE countries cable television is in private hands, with foreign companies sometimes holding a majority stake.

Progress is also being made, albeit at a slower pace in some countries, towards the liberalization of telecommunications. No doubt this is aided by the fact that many Central European states aspire to membership in the European Union (EU) which requires policies in harmony with those of the EU. In traditional telecommunications services, the market in many cases is still closed, or open only to limited competition. Even where telecommunication companies have been privatized, many of them have been given exclusive long-term licences. Full liberalization will come only when these licences have expired. As far as new services – Global System for Mobile Communication (GSM), Nordic Mobile Telephone System (NMT) 40, Digital Cellular System (DCS) 1800, satellite communications, radio paging, data transmission, Internet service provision – are concerned, the market is open in most cases and they have been launched from the start by private companies, many with significant foreign shareholders.

Bulgaria and Romania have yet to liberalize their telecommunications. Poland has begun a process of privatization of Polish Telecom (TP S.A.) by selling a part of its shares on the stock exchange. A strategic partner is to be chosen in 1999. Several countries have decided to choose international operators as strategic investors by partially privatizing their telephone companies. Several local telephone operators have been licensed. New services are provided by private companies, many with foreign shareholders.

The Estonian government sold 49% of Esti Telefon to a Scandinavian consortium. The private investors have been given management control with a 25-year concession to operate the national network, as well as an exclusivity period of eight years to provide long-distance service.

Hungary at first sold 30% of its national operator MATÁV to a consortium of Deutsche Telecom and Ameritech. MATÁV obtained the right to operate long-distance and international services as well as two-thirds of the local areas with an exclusivity period of eight years for public telephone services. Later, Hungary sold a further 37% of MATÁV's shares to Deutsche Telecom and Ameritech. The government's share holding is now down to 25% so that the foreign consortium has both majority ownership and full management control. The remaining local areas have been sold to several smaller operators under similar conditions. The private investors have management control with an 8-year concession.

Latvia sold a 49% stake of Lettelkom to a consortium led by Finland Telecom and Cable & Wireless, with a 10% equity stake bought by the International Finance Corporation. Lettelkom has a 20-year concession to provide domestic and international telecommunication services.

In Lithuania, the market is theoretically open, but in most areas there is only one operator, Lietuvos Telekomas (LT). It is foreseen that a new telecommunications law will grant LT exclusive right to provide some services until 2003.

The Czech government allowed SPT Telecom A/S to increase its capital by creating new shares which were sold to Tel Source. This consortium, which includes the Dutch telecommunication and postal group (KPN) and Swiss Telecom, owns 34% of SPT and has management control. The arrangement helps finance the company's modernization plans. The company has a monopoly over domestic and international network services until the year 2000, during which time it is required to double the number of tele-

Table 16.11 → State/public and commercial television in Central European countries (main channels)

Company	Channel	Distribution	Technical penetration (%)	Audience 1995 (%)	Revenue
Bulgaria					
BNT	Channel 1 (public)	Terr./cable	99	70	State budget/advertising
BNT	Efir 2 (public)	Terr./cable	89	22	State budget/advertising
Multimex	Nova TV (comm.)	Terr.	20 (Sofia)	n.a.	advertising
Dni Ltd.	7 dni (comm.)	Terr.	12.5 (Sofia)	n.a.	advertising
Czech Republic					
CT	CT-1 (public)	Terr.	98	22.5	Lic. fee/advertising
CT	CT-2 (public)	Terr.	81	3	Lic. fee /advertising
CET 21	Nova TV (comm.)	Terr.	98	70	Advertising
PTV Premiera	Prima TV (comm.)	Terr./sat.	70	2	Advertising
RTV Gemma	Galaxie (comm.)	Sat/cable	n.a.	n.a.	Advertising
Nethold	MultiChoice (comm.)	Sat/cable	n.a.	n.a.	Advertising
Estonia					
Eesti TV	ETV (public)	Terr.	97.5	23	Advertising/State Aid
Kanal Kaks	Kanal 2 (comm.)	Terr.	77.5	15	Advertising
TV1	TV1 (comm.)	Terr.	n.a.	n.a.	Advertising
TV3	TVS-2 (comm.)	Terr.	92	17	Advertising
Hungary					
MTV	MTV 1 (public)	Terr/cable	100	58.4	Lic. fee/advertising
MTV	MTV 2 (public)	Terr/cable	98.5	20.8	Lic. fee/advertising
MTM	MTM (comm.)	n.a.	n.a.	n.a.	Advertising
CLT	RTL-Klub (comm.)	n.a.	n.a.	n.a.	Advertising
Duna TV	Duna TV (public)	Sat/cable	45.3	2.5	Advertising
Budapest Communications	TV3 (comm.)	Sat/cable	40	n.a.	Advertising
Latvia					
Latvijas TV	LTV1 (public)	Terr.	97	23	State budget/advertising
Latvijas TV	LTV2 (public)	Terr.	96	7	State budget/advertising
A/S LNT	LNT (comm.)	Terr.	82	n.a.	Advertising
Baltkom	Baltkom (comm.)	Sat.	100	n.a.	Advertising
Lithuania					
Lietuvos RTV	LTV (public)	Terr.	99	30	State budget/advertising
LNK	LNK TV (comm.)	Terr.	98	27	Advertising
Tele3	Tele3 (comm.)	Terr.	92	20	Advertising
Baltijos TV	Baltijos TV (comm.)	Terr.	90	4	Advertising
Poland					
TVP S.A.	TVP1 (public)	Terr./cable	99	47 [96]	Lic. fee/advertising
TVP S.A.	TVP2 (public)	Terr./cable	98	21 [96]	Lic. fee/advertising
TVP S.A.	TV Polonia (public)	Sat/cable	32	2 [96]	Lic. fee/advertising
Polsat	Polsat (comm.)	Terr./sat.	81	20 [96]	Advertising
ITI Holdings	TVN	Terr./sat.	n.a.	7	Advertising
Polska Korp. Partycypacyjna	Canal+ Polska (comm.)	Terr/Sat./cable	6	n.a.	Pay-TV

Table 16.11 (continued)

Company	Channel	Distribution	Technical penetration (%)	Audience 1995 (%)	Revenue
Romania					
TVR	TVR 1 (public)	Terr./cable	100	73.6	State budget/advertising
TVR	TVR 2 (public)	Terr./cable	50	7.4	State budget/advertising
TVR	TVR Int'l (public)	Sat./cable	n.a.	n.a.	State budget/advertising
Pro TV	PRO TV (comm.)	Terr./cable/sat	45	3.9	Advertising
Amerom/Prima	Amerom (comm.)	Terr./cable/sat	10	n.a.	Advertising
TELE7 abc	TELE7abc (comm.)	Terr./cable/sat	40	1.2	Advertising
Slovakia					
Slovak TV	STV-1 (public)	Terr./cable	99	59	State budget/advertising
Slovak TV	STV-2 (public)	Terr./cable	99	26.6	State budget/advertising
Markiza Slovakia	TV Markiza (comm.)	Terr./cable	82.5	65.2	Advertising
Vasa Televizia	VTV	Sat./cable	53.7	10.2	Advertising
Slovenia					
RTV Slovenia	TVS-1 (public)	Terr./cable/MMDS	95	62	Lic. fee/advertising
RTV Slovenia	TVS-2 (public)	Terr./cable/MMDS	95	19	Lic. fee/advertising
CME/MMTV/Tele 59	POPTV (comm.)	Terr./cable	80	36	Advertising
Kanal A	Kanal A (comm.)	Terr./cable/MMDS	80	9	Advertising
TV3	TV3 (comm.)	Terr./cable	75	2	Advertising

phone lines. Meanwhile, a number of local telephony operators have been licensed, providing competition for SPT.

In Slovakia, liberalization of basic voice telephony services will start in the year 2003, at the latest. Most other areas are theoretically open.

In Slovenia, the public telecommunications network and voice telephony are operated by Telekom Slovenije under monopoly until the end of 2000. Most other areas are open to competition, which is, however, limited by the size of the country.

INTERNATIONAL AND REGIONAL CO-OPERATION AND DEVELOPMENT ASSISTANCE

Central and Eastern European countries which are associated with the European Union have been able to benefit from the Phare Fund. This Fund is available for upgrading the knowledge and practical experience of staff who handle the operational and regulatory aspects of improved telecommunications systems.

Other projects have concentrated on facilitating investments, on providing aid for setting up independent telecommunications regulatory authorities and on developing licensing guidelines and expanding services.

Additional funding has been earmarked for restructuring the transport, energy and telecommunications sectors in CEE countries to help them play a larger role in a market economy. For example, assistance has gone towards eliminating bottlenecks at some of the important border crossings and towards developing a more rational and efficient use of resources. The old system's artificially low prices for energy had encouraged inefficient production techniques and high consumption, which in turn led to serious environmental degradation. To address these problems, the European Union has supported the setting up of commercial companies to manage energy production, telecommunications services, privatization of road transport, restructuring of rail companies and the preparation of a regulatory framework for both the telecommunications and transport systems.

Since 1995, the European Commission has organized annual European Union/Central and Eastern European countries (EU/CEEC) Information Society forums whose goal is to integrate candidate CEE countries into European and international efforts towards the Global Information Society. Policies and strategies for implementation have been developed through a series of meetings. In 1996 the second Forum created four panels which dealt with strategy and policy formulation for the Information Society; implementation of demonstrations, pilot projects and other actions; education and training for the Information Society; and the application of information and communications technologies in public administration.

At the same Forum, an Action Plan for Information Society pilot projects in CEE countries was adopted. It was based on the conviction that 'for the CEE countries, the information society is a top priority in order to improve competitiveness and enhance the efficiency of public administration. Even though some important political decisions have yet to be made, and the financial resources available are severely limited, it is still crucial to send positive signals about the information society in order to raise public awareness. For this reason, this set of ideas has been put forward in the form of an action plan. . . . The action plan has identified thirty themes covering the areas where pilot projects will be particularly effective.' (EU-CEEC Forum on the Information Society, Panel on the Implementation of the Action Plan, www.mzt.si/med./peco002.html).

At the third EU/CEEC Information and Society Forum (Brussels, 9-10 October 1997), the European Commission was invited to:

→ Fund the extension of the European Survey on the Information Society to CEECs and, in particular, to identify and analyse regional disparities in terms of basic telecommunications services, information infrastructures and applications.

- Support the use of Phare funds, in co-operation with International Financial Institutions, to facilitate investment in the information infrastructure.
- Strengthen and refocus the indicative objectives expressed in national and multi-country PHARE programmes to support the integration of information and communication related technologies into education.
- Support the provision of the necessary co-funding support to allow partners in CEECs to participate in EU TEN-Telecom projects, and in TEN-34.
- Establish opportunities for EU funding for Information Society activities and for co-financing CEEC participation in EU Information Society related programmes, like INFO2000 and the Multi-lingual Information Society programme, in order to develop the full scope of the Information Society.
- Support improvement of intra- and inter-administration communication in the CEECs, and between them and EU administrations, by enabling their participation in appropriate projects for data interchange between administrations (IDA), such as the *Système d'information sur les marchés publics (SIMAP)*, which has the objective of harmonizing legal and payment principles of data exchange regarding public procurement. The electronic posting of public calls for tender should be introduced throughout the CEECs.
- Continue to provide advice on the alignment of Information Society related legislation in the CEECs with the *acquis communautaire*, notably the data protection directive (95/46/EC) and on the implementation of such legislation, paying particular attention to the creation in each CEEC of an independent supervisory body in the field of data protection.
- Draw the attention of the European Parliament

to the advantages to be gained from the establishment of electronic interconnections between the parliaments of the EU, the member states and CEECs.

- Take action to facilitate the involvement of the CEE and EU business communities in projects by shorter decision making and payment times.

MOVING TOWARDS THE INFORMATION SOCIETY: REGIONAL PROSPECTS

The 'informatization' of Central and Eastern European societies has been both a top-down and a bottom-up process. It began only after 1989 when political and administrative constraints on access to, and use of, information and telecommunication technologies were lifted. Considering these inauspicious beginnings, CEE societies have indeed made great strides in the past decade.

Nevertheless, it is clear that Central and Eastern European countries are only at the beginning of their journey towards the Information Society. In 1996, Panel A, Financing of Infrastructure, of the Central and East European Information Society Forum, concluded that 'in most cases, the governments of CEECs are not organized in such a way as to enable them to monitor the evolution of the "Information Society" as an economic sector [and] specific new responsibilities are needed. To be effective, such responsibilities would have to operate across the boundaries of existing government ministries and other agencies' (Report of Panel A, 1996). Even more importantly, many of those governments have yet to focus fully on the issue of the Information Society, preoccupied as they are with the job of creating a market economy and dismantling the legacy of the centralized economic system. For many, economic underdevelopment and crisis/stagnation have created immediate and pressing challenges which direct attention away from the promise of the Information Society.

Nevertheless, a number of countries have adopted action programmes oriented towards laying the groundwork for the creation of the Information Society. In Hungary, a National Information Infrastructure Development Programme had been operating for more than ten years in 1997. Hungary has established a Governmental Committee on Information and Telecommunication Technology and has developed a 'National Informatics Strategy'.

In Lithuania, the task of the Ministry of Communications and Informatics is to form and to implement the Lithuanian communications and informatics strategy, to organize postal, telecommunications and informatics activities, and to co-ordinate the operation of public telegraph, telephone, data transmission, information, radio and television facilities and networks belonging to enterprises, institutions, organizations and individuals. The Ministry of Communications and Informatics co-ordinates the development of the national data transmission networks and state databases, registers and information systems.

In Estonia, a development plan for Estonian informatics has been adopted. It includes a package of documents describing Estonia's information policy: 'Fundamentals of the Estonian Information Policy', an 'Action Plan' and 'Proposals to the Government of the Republic'. Similar documents developed in the past have had little impact.

The Romanian Government's National Commission for Informatics has adopted a plan which calls for:

- setting up a national information infrastructure as a backbone for the informatization of central and local public administration (as far as municipalities are concerned);
- developing a national ICT industry, especially a software industry;
- creating favourable conditions for large scale use of ICT in industry, trade, agriculture, defence, tourism, health, environmental protection,

education, research and culture, to comply with the European Union regulations.

By the year 2005, the plan calls for extending the information infrastructure to the countryside and for advancing informatics in Romania to the level required for integration into the European information society.

The Polish government has adopted a 'Telecommunications Development Policy' and has before it a number of draft documents concerning ways of moving towards the Information Society.

The third EU/CEEC Information Society Forum (1997) invited CEE governments to ensure that their national Information Society strategy and related action plan contain chapters specifically devoted to such important areas as national budgetary provision, the pro-active role of government, protection of personal data, information security and cryptography, education for the Information Society, promotion of cultural and linguistic diversity and international co-operation in statistics. On the basis of the *acquis communautaire* in these areas, CEE governments were also invited:

- to stimulate investment by business by creating an appropriate environment, including further progress in liberalizing telecommunications;
- to build confidence in electronic commerce between business and consumers and encourage them to adopt electronic commerce and develop digital content by establishing a clear and predictable legal framework;
- to set up a national advisory body on Information Society strategy;
- to create a national office to co-ordinate the implementation of the national action plan and contribute to awareness-raising.

The basic nature of these proposals confirms that much work still remains to be done, even in the most advanced CEE countries, in order to move towards the Information Society.

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