

**Republic of Kazakhstan**

**Country Economic Memorandum**

**Getting Competitive, Staying Competitive:  
The Challenge of Managing Kazakhstan's Oil Boom\***

Background Paper No. 11:  
**Telecommunications: The Bottleneck to  
Sustainable Development**

February 2005

**Seminar on Electronic Communication and Sustainable Development,  
Astana, 17-18 February 2005**

**Summary comments and suggestions**

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\* This work is undertaken as part of the Joint Economic Research Program of the Ministry of Economy and Budget Planning of the RK and the World Bank.

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The following comments reflect the main conclusions raised during the wrap-up meeting. We have not had enough time to examine in detail the telecommunications sector reform program that is underway. Therefore we hesitate to offer firms views on some aspects, as questions that remain in our minds may well reflect our lack of knowledge of the program rather than any inadequacies of this program compared with international best practices. A few aspects, nonetheless, seem clear enough to offer specific comments.

The Broad Context

The Internet, and more broadly the Information and Communications Technologies (ICT) are changing radically economic and social organization. They have set in motion a new economic paradigm. The drivers of the new paradigm are the ICT and their impact on the micro-economic competitiveness of enterprises by bringing about a fundamental change in the costs of doing business. This cost shift has generated a sizeable improvement in productivity<sup>1</sup> and thereby the growth rates of firms. Where these firms are clustered in a single country, that country has experienced more rapid growth at the macroeconomic level.

The application of ICT and the use of the internet has brought about a massive shift in the organization of the “supply chain”<sup>2</sup>, in the relations between businesses, in customer relationship management and in the relationship between government and citizens. The physical transportation system has allowed for off shore “outsourcing” of manufacturing. The ICT allow for both the off shore outsourcing of non-personal services<sup>3</sup> and all the back office functions of businesses and even governments.

The consequences of this paradigm shift are more substantial and wide ranging than previous advances, like “electrification”, due to the speed and scope of the resulting changes. The adoption of the new paradigm is not optional, non-adoption entails effective exclusion from the unfolding new means of wealth creation, income generation and poverty reduction.

The ICT have a cross-cutting impact on *all* economic activities, sustainable development and diversification in all countries, they are associated with the Information Economy but

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<sup>1</sup> This is even the case in traditional industries such as agriculture and forestry.

<sup>2</sup> The supply chain involves many intermediaries from the supplier of natural resources and their successive transformation to intermediate and final goods and services until their delivery to the final or intermediate consumer.

<sup>3</sup> Services that do not involve a direct personal service to a customer, such as a hair cut.

are the ‘tool kit’ of both knowledge creation and diffusion and the global integration of economic activities.

Many countries including Russia, China, and the members of the European Union have given the ICT sector a very high priority role in the transformation of their economies. Countries promoting the adoption of the ICT will be widening their ‘competitiveness gap’ at an accelerating rate compared to slow adopters. Keeping pace with these developments will be a severe challenge to sustainable and diversified growth in Kazakhstan. There is no alternative to the widespread diffusion and application of ICT to all forms of business, civil and government activities, failure to do so is to be excluded from modernity.

The single most important element of ICT is the telecommunications (electronic communications) infrastructure providing the central networking function which links separate activities within Kazakhstan and the wider regional and global economy.

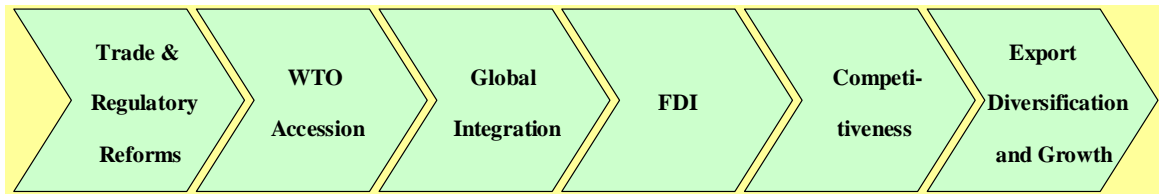
There is not enough “electronic communications infrastructure” in Kazakhstan and its quality is not adequate to fulfill the aspirations of the country. Kazakhstan substantially lags its peers and competitors in access to electronic communications infrastructure (see Annex 1). The performance of Kazakhtelecom is a bottleneck for sustainable development in Kazakhstan.

The challenge is to facilitate a major expansion and investment in the electronic communications infrastructure in terms of the density, coverage and quality of service of Kazakhtelecom and other players. The rapid introduction of competition could make a substantial contribution to expansion and investment in the sector. The telecommunications market has been liberalized but a level playing field has not been created thereby limiting expansion and investment.

## The Economic Trade-off

The figure below illustrates the linkage between trade and regulatory reform and diversification and growth

**Figure 1: The Reform Growth Linkage**



Appropriate trade and regulatory reform in the sector, in compliance with WTO requirements, will bring about accession and thereby the further integration of Kazakhstan with the global economy. This confidence building for investors will stimulate foreign direct investment (FDI) in the sector, improving quality, widening choice and reducing prices. Since the sector provides a basic input to all economic activities, these users will become more competitive thereby improving the relative position in global markets providing both greater export potential and diversification opportunities. Additionally, the sector will produce growing fiscal contributions to the state budget.

During the seminar it was explained that one of the objectives of the government was to ensure a strong Kazakhstani presence in the sector. To this end, a foreign ownership restriction of 49% has been introduced thereby guaranteeing local majority control of all operators in the sector. Such foreign ownership restrictions are not uncommon in WTO members.

However, the impact of this self imposed restriction is to limit investment. If the sector requires 100 units of investment but local participants only have the resources for 30 units then the maximum investment that can take place is 60 units (with foreign investors providing a matching 30 units). The short fall of 40 units will widen the 'competitiveness gap'. Given the differences in access to electronic infrastructure between Kazakhstan and its global competitors these self imposed restrictions may not serve the broader economic objectives of the country in terms of diversification and sustainable growth.

The restrictions will manifest themselves in lower quality, narrower choice and higher prices than would prevail in the absence of restrictions. The costs of these restrictions will be paid by the users of the services of the sector. The higher costs will impede the users' competitiveness, reducing export potential and diversification opportunities. Consequently, there is an economic trade-off between the perceived value of a guaranteed strong local presence in the sector and the measurable costs to the much broader user constituency and the lost revenues to the state budget. There is a clear need for cost benefit analysis of the trade-off.

### Competition

The introduction of competition is a means of attracting new investment to the sector, of 'sharing the burden'. Recently the market has been liberalized. New licenses for the provision of long distance and international services have been issued and others are being considered. However, these developments do not represent the start of effective competition.

Kazakhtelecom is the clear market leader in the fixed market and claims about 57% of the entire telecommunications market. 50% of the company is owned by the state. In turn Kazakhtelecom owns 49% of the mobile operator K-cell, 50% of Altel, another mobile operator, and 41.25% of Nursat, one of the biggest players in the data transmission market. Nursat has applied for a long distance and international license. From the perspective of a private investor, this level of cross ownership is disconcerting with the potential for anti-competitive behavior.

The major potential competitors in long distance and international services are KazTransCom and Transtelecom both of which are owned by the state, which also owns 50% of Kazakhtelecom. Again the level of cross ownership raises the possibility of coordinated and anti-competitive behavior which will deter private investors. The overall dominance of Kazakhtelecom in the market is a serious impediment to the development of competition. The issue of cross ownership is compounded by the role of the regulator (AIC) – see below.

Furthermore, there is comparatively little overlap between the networks of the 3 companies so that in any particular geographic location the possibilities of finding all 3 networks present and competing is low. Even where the companies compete, Kazakhtelecom controls the 'final mile' bottleneck of access to the customer. As a consequence Kazakhtelecom is in a position to strongly influence the business of its potential competitors.

Potentially, the mobile operators, particularly K-cell (overlooking any cross ownership issues) and K-mobile, could prove to be effective competitors in the market for long distance and international services given their coverage and customer base. In many countries mobile operators provide international services to all customers, including those of the fixed network operator. However in Kazakhstan, both operators are excluded from

providing these services because of regulatory requirements. Such services can only be provided by operators that are 51% Kazakh owned. K-cell is 51% owned by the foreign investment group Fintur and the majority of K-mobile is owned by a Russian company.

Regulatory requirements also distort the mobile market because any call from one mobile network to another must use the transit services of Kazakhtelecom and pay the price.

Some evidence of the absence of effective competition is provided by the EBITDA of Kazakhtelecom. At around 56% it is one of the best performers in the world. Such results are only obtained by super-efficient companies or those who have a very strong hold on the market and do not face effective competition.

One possible solution to promote competition and thereby reap the broader benefits, is to divest the assets of Kazakhtelecom and the state. Additionally, light touch licensing to stimulate market entry together with further regulatory reform, tariff re-balancing and the obligation to produce a standard interconnection offer (as discussed below) will make the overall objective of diversification and sustainable economy growth more achievable.

The telecommunications market has been liberalized but a level playing field has not been created thereby limiting expansion and investment. The development of a level playing field is an urgent matter for the achievement of the broader objectives of Kazakhstan.

### Regulation

There are 2 major issues related to the institutional aspect of the regulation of the sector one of which is common to all regulatory agencies and can be resolved fairly easily. The second is specific to Kazakhstan and will require more effort.

The specific issue concerns both the multiple functions performed by AIC and the multiple bodies involved in the regulation of the sector. AIC is the

- regulator (for certain matters) for the sector
- representative of the government on the boards of operators where there is a state holding of assets
- agency responsible for the implementation of the government's ICT and e-government strategies

These multiple functions give rise to serious potential conflicts of interest and damages the credibility of AIC in the market as an impartial disinterested agency for disputes resolution and sound decision making. Its role as 'manager' of state assets in the sector is not compliant with WTO requirements and this function must be transferred to another body prior to WTO membership. WTO requires that the regulator is 'independent' of operators. Where the regulator is a member of the board of state assets it is clearly not independent of operators.

AIC's role as the implementer of state strategy also gives rise to potential conflicts of interest since it will be awarding contracts. In these circumstances the market may doubt the impartiality of the contract awarding process. Such functions are frequently assumed by the office of the Prime Minister.

Twenty five years ago in Europe there were no independent telecommunications regulators. The responsible ministry, the state owned telephone company, the standards and certifications bodies were largely indistinguishable and people moved from one department to another. The introduction of competition in the supply of services, equipment and infrastructure changed this system. New supply entrants required assurances that they would be treated impartially, that there would be no favoritism in purchases of the state owned company and that the new suppliers would not experience any discrimination. It is largely these concerns that have driven the development of independent telecommunications regulators.

The WTO requires that the telecommunications regulator is independent of the operator, which means where there is a state owned operator the regulator cannot report to or be accountable to the same ministry which supervises the state owned operator. However, the WTO requirement is the lowest common denominator – reflecting a consensus between a large number of countries with very different perspectives on competition, liberalization and independence.

The EU has gone much further and set the standard for independent telecommunications regulators. Commission Directive 88/301/EEC was the first EU Act (in 1988) requiring the establishment of independent regulators. It required Member States to set up an independent body for the granting of type-approvals for terminal equipment. The purpose here was to ensure that equipment suppliers were treated impartially in the “single market”. Later, Directives 90/387/EEC and 90/388/EEC required the establishment of independent bodies for the granting of licences to operate liberalised services and further extended this requirement regarding independence and effective regulation to promote market development.

Effective regulation requires some independence of the regulators from political influences, especially on a day-to-day or decision-by-decision basis. The agency must be an impartial, objective, nonpolitical enforcer of policies set forth in the controlling statutes, free of transitory political influences. Normally the salaries of the staff of the regulatory agency are not linked to normal civil service salaries.

Clearly, absolute independence of these regulatory agencies is neither possible nor really desirable. “Independent” telecommunications regulators are not out of control. The executive branch must ensure that the regulators it appoints implements the policy of the government. However, regulators need insulation from political intervention, so that the regulatory process is not politicized, its decisions are not discredited, and the policy of the government is implemented. Clearly, a balance is needed to ensure that the regulator is both independent and responsive to the broad policies of the elected government. Several formal safeguards can be implemented to achieve such a balance:

The issue of independence is related to both the multiple bodies concerned with the regulation of the sector and the issue that is common to all regulatory agencies and can be resolved fairly easily. Independence requires a clear separation of functions. The following table illustrates a possible realignment of regulatory responsibilities between the Ministry, AIC and other relevant agencies resulting from the reform process.

Table 2 Regulatory Responsibilities

Issue	Responsible Party/Role	
	Ministry/ Administration	Regulator
Policy (over all areas listed below)	X	
Technical & Economic Regulation Generally	X <sup>4</sup>	X
Competition Regulation		X
Interconnection Regulation		X
Scarce Resource Regulation		X
Frequency Plan Allocation	X <sup>5</sup>	
Frequency Assignment, Monitoring & Control		X <sup>6</sup>
Numbering Plan, assignment and control		X
Infrastructure Sharing		X
Licensing (Issuance, monitoring & control)	X <sup>7</sup>	X <sup>8</sup>
Dispute Resolution		X
Universal Service		X
Tariff Regulation		X
Inspection & investigation	X <sup>9</sup>	X <sup>10</sup>
Imposition of penalties, fines, sanctions and awarding damages; and general enforcement powers under the law		X
Standardization and Equipment Type approval	X <sup>11</sup>	X
Cooperation with other regulators (Competition, Broadcasting, etc.)		X
Relations with International Organizations (e.g., ITU, European Regulators Group)	X	X

<sup>4</sup> Ministry will have responsibility for setting standards on equipment and services.

<sup>5</sup> Together with other interested Ministries

<sup>6</sup> Refers and applies equally to AIC and other regulatory bodies with competence over frequencies.

<sup>7</sup> There are various models regarding licensing. For example, The Ministry could take sole responsibility for issuing all licenses, while the regulator ensures compliance etc of all licensees. Alternatively, the Ministry can decide when individual licenses should be issued and the regulator perform the duty of organizing the means of selecting candidates and issuing the licenses. Or the regulator can take sole responsibility for all license matters. EU rules do not allow the Ministry to be responsible for licensing where the same Ministry is the 'owner' of the telecommunications operator.

<sup>8</sup>. An integrated licensing regime, with one-stop shopping, should be invoked; *viz.* where an applicant for a license of a frequency based service receives one license authorizing the operator to provide the service, build and own the network and have access to the frequencies necessary to provide the service.

<sup>9</sup> Ministry Will have authority on technical issues (*cf infra* note 12)

<sup>10</sup> AIC, State Inspectorate has authority in all other areas

<sup>11</sup> Ministry sets policies on standardization.

It is important that the body responsible for spectrum assignment, monitoring and control is not itself an interested party or user of spectrum since this would raise issues of conflict of interest and the risk of favoritism. Equally important is determining the appropriate body for tariff setting and maintaining competition in the industry. It is more effective for the telecommunications regulator to be responsible for these functions so that the process does not become entangled in broader issues, such as control over the rate of inflation.

Having decided on the distribution of functions the next task common to all regulators is to attain sufficient capacity and skill to fulfill these functions. This is a matter of skills acquisition, training, succession planning, exposure to best international practice and general human development for which specific tailored programs can be developed.

### Tariffs

Telecommunications tariffs are far way from relevant benchmarks as demonstrated by the table below.

**Table 2: Monthly Access fee and 3 minute local call charge June 30<sup>th</sup> 2003**

	<b>Monthly Access Charge Euro</b>	<b>3 Minute local call charge Euro-cents*</b>
<b>Kazakhtelecom</b>	2.48	Local calls are free
TPSA (Poland)	9.58	7.85
Matav (Hungary)	12.05	11.83
Slovak Telecom+	7.19	16.46
Czech Telecom+	9.47	13.30
EU 15 Average	14.20	13.50

Sources: Fourth Report On Monitoring EU Candidate Countries (Telecommunications Services Sector), European Commission 16 December, 2003; 8<sup>th</sup> Report of the Commission on Implementation of the Regulatory Package.

We understand from the discussion during the seminar that monthly fixed telephone charges are about one-fifth the figures prevailing in European Communities accession countries, local calls are free (i.e. the fixed charge allows an unlimited number of local calls), international calls are about three times the benchmarks, fixed-to-fixed and mobile-to-fixed interconnection charges 4-5 times, and fixed-to-mobile interconnection charges are about one-half.<sup>12</sup> These price distortions send wrong signals to potential investors. For example, a company seeking to provide local telephone service would face competition from Kazakhtelecom at retail prices far below cost yet has to pay well above

<sup>12</sup> Fixed-to-mobile charges are being hotly debated in Europe and other regions, and the tendency is to reduce them. High fixed-to-mobile charges contributed to rapid initial development of mobile services, but now that this market segment has matured and in several countries overtaken fixed telephone service in terms of numbers of customers, a more equitable treatment of termination in the fixed and mobile networks is being advocated.

cost to interconnect to its network, which would make it impossible for the new company to operate profitably.

The tariff rebalancing plan in place appears to point in the right direction but is too slow and the end result is indeterminate. Fixed telephone charges have been increased by 20 percent in 2004 and international call charges reduced also by 20 percent. Similar changes are planned for 2005. These changes do not go very far in correcting the major differences noted relative to comparators. The bulk of rebalancing, therefore, remains to be undertaken later. The timing and extent of these further adjustments of retail prices have not been announced. We did not discuss changes in interconnection charges.

There seems to be excessive reliance on cost accounting as a tool for price regulation. Since telecommunications has large fixed and joint costs, consistent calculation of costs requires detailed accounting rules, which should be approved by the regulatory authorities. This is a sizeable undertaking and is likely to take several years as well as being open to challenges by affected parties.

Neither tariff rebalancing nor further opening of the market to competition should be delayed until reliable results from cost accounts are in hand.<sup>13</sup> Rebalancing can be accelerated (and the regulatory burden on authorities and operators kept low) by setting prices by reference to benchmarks from relevant competitive markets in other countries. Comparators can be derived from European and other markets, if necessary adjusted to reflect differences in major inputs (e.g. costs of labor and capital). Given the huge imbalances in current tariffs, quickly setting prices roughly in line with comparators would be relatively easy and preferable to waiting several years to try to get more precise results.

An alternative to further price rebalancing through regulation would be to open up all market segments to competition and give Kazakhtelecom freedom to adjust its prices. In an effectively competitive market, the large monopoly rents from international service would be rapidly competed away, and Kazakhtelecom would find it necessary to increase fixed and local telephone charges to recover costs. The government already has in place a system of subsidies to help low-income households pay utility bills, which protects poor people from having to give up service as prices are rebalanced to commercial levels.<sup>14</sup>

Under a liberal price regime, the authorities would focus on monitoring and if necessary intervening to ensure fair competitive behavior. Interconnection is likely to require

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<sup>13</sup> Commercial operating companies develop cost accounting as a key management tool, but by themselves these accounts do not meet regulatory needs. Moreover, as markets become effectively competitive, few tariffs need to be regulated so the need for cost accounting as a regulatory tool declines.

<sup>14</sup> In most markets, tariff rebalancing overall does not result in higher bills to any class of users. In Kazakhstan, however, as in other parts of the former USSR where residential telephones were assigned without regard to commercial viability, there may be a significant number of households that cannot afford commercial prices and would be forced to disconnect. Providing some support to such households may make sense, provided it is narrowly focused on target population groups and, preferably, covers only a basic service package. The decision whether to opt for a subsidized minimum service package or full service at regular commercial prices would be left to each household rather than the authorities.

regulatory intervention from the outset, requiring Kazakhtelecom to publish a standard interconnection offer approved by the authorities that is automatically available to all interconnecting parties, and establishing a process for processing and resolving interconnection disputes. Since Kazakhtelecom's telephone network is for the time being almost the only means through which Internet service providers can reach households and small businesses, the authorities may need to also consider mandatory unbundling and price regulation of the local loop.<sup>15</sup>

### Universal service

The universal service program described to us has some valuable features. In particular, subsidies to low-income households to help them pay rising telephone bills as tariffs are rebalanced towards full cost recovery is attractive in that it reaches the beneficiaries through broader demand support mechanisms already in place to assist target population groups. Some other aspects, however, strike us as inconsistent with best practices.

Subsidies to compensate for recurrent service losses are not in line with good practices for infrastructure services.<sup>16</sup> First, subsidies may be justified to help overcome initial obstacles to launching a market but not to maintain these markets alive year to year. Investments that are unlikely to become commercially sustainable on their own after limited initial support are rarely undertaken. Subsidies typically meet part of the investment cost and perhaps initial operating losses but do not support running expenses.<sup>17</sup> Second, recurrent subsidies, especially when financed through the national budget, are subject to the uncertainties of annual approvals. Operators counting on these funds face a substantial financing risk, which discourages investment in facilities that typically take several years to recover.

Universal service programs should be technologically neutral. A particular technical solution, such as extending cellular telephone networks, may be the least-cost solution to meet given service objectives under some circumstances, but this decision should be left to the operators bidding for the subsidies, not taken *ex-ante* by the authorities. Knowledge of the costs of various solutions helps the authorities estimate the maximum subsidy they might offer for a particular service, but it would be wrong to second-guess the operators by limiting bids to those using a particular solution.

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<sup>15</sup> The jury is still out on the merits of mandatory unbundling of the local loop. See, for example, B. Wellenius, C. Rossotto, and A. Lewin, "Morocco: Developing Competition in Telecommunications", World Bank, December 2004, available online at <http://wbln0018.worldbank.org/ict/resources.nsf/InfoResources/6F57DDC475BC56F985256F89006748CF>

<sup>16</sup> B. Wellenius, V. Foster, and C. Malmberg Calvo, "Private Provision of Rural Infrastructure Services: Competing for Subsidies", World Bank Policy Research Working Paper No. 3365, August 2004, available online on [http://econ.worldbank.org/working\\_papers/37701](http://econ.worldbank.org/working_papers/37701)

<sup>17</sup> Users are expected to pay at least as much as needed to cover operation and maintenance expenses. This is the case in other infrastructure services, such as water supply and electricity, usually regarded as socially more important than telecommunications. Moreover, where consumption is subsidized recurrently, this is typically limited to a minimum consumption block. The subsidy to households is often a better tool to achieve this than recurrent subsidies to suppliers.

A key success factor of competition among firms for universal service subsidies is that there is a sufficient number of firms able and willing to bid.<sup>18</sup> The government is rightly concerned that so far only Kazakhtelecom has bid for subsidies. In the absence of effective competition, the amount of subsidy is determined by the authorities' calculus of costs and benefits, not by the market. This is likely to increase substantially the amount of subsidy needed to meet a particular service objective.

Given our limited knowledge of the program underway, we are not in a position to determine why no other operators have bid for subsidies, but from the discussions several possible explanations come to mind. First, new entrants face major regulatory risks as the rules of the game are still being developed. For example, since tariff rebalancing is only in its early stages and the end remains undefined, it is virtually impossible for a competitive operator to forecast cash flows and hence assess how much subsidy it would need to render the investments profitable. In particular, interconnection with Kazakhtelecom is a major determinant of financial viability. When the high cost of terminating calls in rural areas compared with large urban networks is recognized, termination charges may account for a large proportion of operating revenues in rural areas.<sup>19</sup> Second, it may be that timely access to the necessary radio frequencies and numbering blocks is not assured, adding uncertainty and delay. We understand that numbering blocks are still administered by Kazakhtelecom, not the authorities, and that the authorities have been unable to make spectrum available for a mobile service that had been committed in the operating license<sup>20</sup>. Third, as discussed earlier, recurrent subsidies subject to annual approvals are unreliable and new entrants without the benefit of ongoing cross-subsidies cannot reasonably be expected to rely on such sources for financing. Lastly, it may well be that given the risks and uncertainties involved, the subsidy available is too low. This goes back to the basic condition for success of universal service programs: these programs should complement and follow economic and sector reforms, not be used to offset defects of the legal and regulatory environment and general business climate. The first step towards universal service is to make the market work well. Only then does it make sense to use subsidies to extend service beyond what companies are prepared to do on their own. Our sense is that this condition has not yet been met in Kazakhstan.

We were asked during the discussion who should contribute to the universal service fund. To the extent that providing services beyond the market aims at meeting social and economic development objectives that benefit the population at large, the first choice is for such services to be funded by general tax revenue. A second-best option is to finance universal service through contributions from all operating companies, i.e. all current users. New entrants may be exempted from contributing until they reach a certain market share or size, and perhaps companies that provide services that are not part of the

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<sup>18</sup> See Wellenius, Foster, and Malmberg Calvo, *op. cit.*

<sup>19</sup> A. Dymond: "Telecommunications Challenges in Developing Countries: Asymmetric Interconnection Charges for Rural Areas", World Bank, March 2004.

<sup>20</sup> It should be mentioned that confidentiality and security concerns could be addressed these days through encryption and other technologies and, thus, such concerns should not be a deterrent to freeing up spectrum for civilian uses.

universal service objective should not contribute at all. Companies that cannot realistically bid to provide universal services are unlikely to be willing to pay into the fund. As discussed above, for the time being, the universal service program is essentially a contribution to the bottom line of Kazakhtelecom, not a tool to promote new service provision.

A more definitive answer to these concerns would follow from systematic exploration of the key questions on universal service that we raised during the discussion.<sup>21</sup>

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<sup>21</sup> What services? Who should benefit? At what cost? Who should provide the services? Who should pay? How should funds be allocated? Best-practice answers are discussed in one of the papers distributed to the seminar participants. B. Wellenius, "Extending Telecommunications beyond the Market: Towards Universal Telecommunications Service in Competitive Environments", World Bank, Private Sector Viewpoint No. 206, March 2000, available online on <http://rru.worldbank.org/PublicPolicyJournal/Summary.aspx?id=206>

## Annex 1

1) The following illustrates the extent of access to ICT in Europe and Central Asia (ECA) where a selection of indicators were compiled into one index. The indicators below were transformed into a value between zero and 1, that is “normalized”, so that they could be added or averaged. “Goalposts” (i.e. minimum and maximum values that may be achieved) were used to normalize each country’s data. A single index value was then computed for each of the categories, and each category received the same weight in the final calculation of the DAI.

### Digital Access Index 2003

Economy	Sub. lines p. 100 inhab.	Mobile sub. p. 100 inhab.	Internet tariff as% of GNI	Int'l Internet bandwidth p. 100 inhab.	Broadband subscribers p. 100 inhab.	Internet users p. 100 inhab.	INFRASTRUCTURE	AFFORDABILITY	QUALITY	USAGE	DAI	DAI Rank
Sweden	65.20	88.90	1.10	10611.2	8.00	57.30	0.94	0.99	0.64	0.67	0.85	1
Slovenia	44.00	83.50	3.10	539.70	2.80	37.60	0.78	0.97	0.44	0.44	0.72	24
Estonia	35.10	65.00	3.90	409.60	3.40	32.80	0.62	0.96	0.44	0.39	0.67	28
Czech Republic	33.40	84.90	4.50	2189.10	0.20	25.60	0.70	0.96	0.45	0.30	0.66	31
Hungary	32.60	67.60	4.10	1048.30	1.10	15.80	0.61	0.96	0.44	0.19	0.63	36
Poland	29.50	36.30	4.10	163.60	0.00	23.00	0.43	0.96	0.35	0.27	0.59	40
Slovak Republic	26.80	54.40	6.30	1516.00	0.00	16.00	6.00	0.94	0.43	0.19	0.59	41
Croatia	39.00	53.50	4.40	41.20	0.30	18.00	0.59	0.96	0.31	0.21	0.59	42
Lithuania	26.40	47.60	11.20	94.80	0.60	14.50	0.46	0.89	0.34	0.17	0.56	47
Latvia	30.10	39.40	20.00	181.60	0.40	13.30	0.45	0.95	0.36	0.16	0.54	50
Bulgaria	36.80	33.30	8.30	10.10	0.10	8.10	0.47	0.92	0.25	0.10	0.53	56
Russia	23.90	12.00	5.60	61.20	0.00	4.10	0.26	0.94	0.32	0.05	0.50	63
Belarus	29.90	4.70	11.30	4.40	0.00	8.20	0.27	0.89	0.22	0.10	0.49	66
Romania	18.70	22.90	16.40	87.20	0.10	8.10	0.27	0.84	0.33	0.09	0.48	69
Turkey	26.90	33.60	9.50	10.60	0.00	7.00	0.39	0.25	0.25	0.08	0.48	70
Macedonia	27.10	17.70	13.30	24.20	0.00	4.80	0.31	0.87	0.28	0.06	0.48	71
Ukraine	21.60	8.40	26.00	6.30	0.00	1.80	0.22	0.74	0.23	0.02	0.43	88
Kazakhstan	13.00	6.40	27.40	4.30	0.00	1.60	0.14	0.73	0.22	0.02	0.41	97
Albania	7.10	25.90	24.80	3.90	0.00	0.40	0.19	0.75	0.22	0.00	0.39	100
Turkmenistan	7.70	0.20	20.00	0.10	0.00	0.20	0.07	98.00	0.06	0.00	0.37	111
Georgia	13.10	10.20	46.40	6.10	0.00	1.50	0.16	0.54	0.23	0.02	0.37	112
Moldova	17.00	7.70	49.60	7.70	0.00	3.40	0.18	0.86	0.24	0.04	0.37	114
Kyrgyzstan	7.90	1.10	54.00	0.20	0.00	3.00	0.07	0.46	0.91	0.04	0.32	120
Uzbekistan	6.60	0.70	53.80	0.20	0.00	1.10	0.06	0.46	0.11	0.01	0.31	121

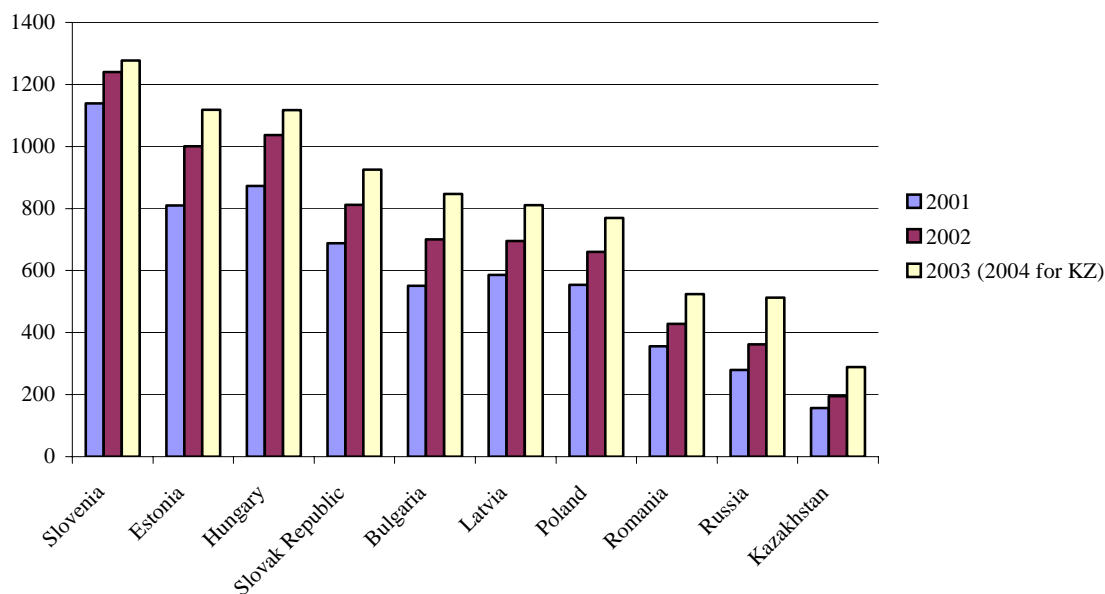
### Digital Access Index 2003 (cont'd)

Economy	Sub. lines p. 100 inhab.	Mobile sub. p. 100 inhab.	Internet tariff as% of GNI	Int'l Internet bandwidth p. 100 inhab.	Broad-band subscribers p. 100 inhab.	Internet users p. 100 inhab.	INFRASTRUCTURE	AFFORDABILITY	QUALITY	USAGE	DAI	DAI Rank
Armenia	14.30	1.90	68.00	2.10	0.00	1.60	0.13	0.32	0.19	0.02	0.30	123
Azerbaijan	12.20	10.70	183.00	0.30	0.00	3.70	0.15	0.04	0.12	0.04	0.24	131
Tajikistan	3.70	0.20	362.30	0.30	0.00	0.10	0.03	0.00	0.12	0.00	0.21	133
Niger	0.20	0.10	683.60	0.00	0.00	0.10	0.00	0.00	0.05	0.00	0.04	179

Source: World Telecommunication Development Report: Access Indicators for the Information Society, International Telecommunication Union, 2003. See: <http://www.itu.int/ITU-D/ict/>

2) Below is the evolution in the number of telephone lines (fixed and mobile) between 2001 and 2003 for the selected countries of Europe and Central Asia. Note that in terms of number of lines per 1000 inhabitants Kazakhstan was in 2004 where Russia was in 2001.

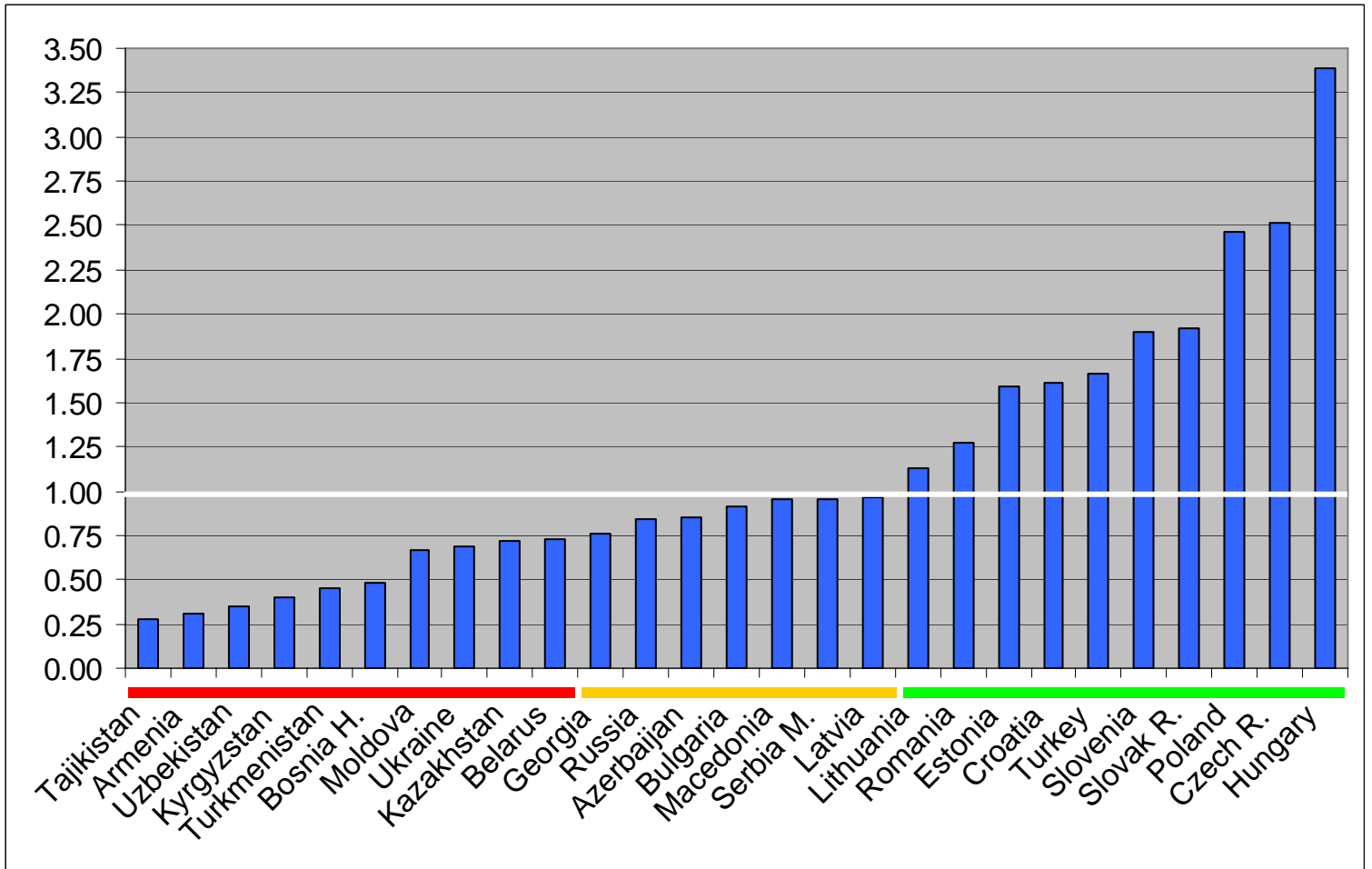
**Fixed and Mobile Lines, per 1000 people in Selected Countries, 2001-2003\***



\* It should be mentioned that the graph includes 2004 numbers for Kazakhstan and compares with other countries in 2003. The data for Kazakhstan was not provided officially, but orally during the Seminar.

## Annex 2

Total Penetration Rate Growth in ECA Related to EU (1990/2002)



**Method:**

- Compare the ratio between a country's penetration rate vs EU benchmark for 2002 and 1990, and then, calculate the relative growth of the ratio between 2002 and 1990
- Identify country's growth related to EU, to see how they progressed
- simple measure aiming at having an overall view for discussion purposes
- 2002 Fixed penetration rates were not available for some countries, so 2001 data were used for these countries instead. Due to the slow growth or stagnation of main line telephone growth, impact is deemed as insignificant.

**Notes:**

- Albania, with a related ratio of 6.66 has been excluded from the slide, to make it more readable
- Overall, Central Asian countries clearly regress, CIS countries still lag but are catching up, and Accession countries are really catching up. Compared to the 2001/1990 chart of the ECA Telecom Sector Paper, which clearly showed the 3 group of countries (central Asia, CIS and accession countries), improvements in some countries have blurred the borders of these groupings.
- Chart shows that reforms are helping
- There are exceptions (e.g. Albania)