



***ASSESSMENT OF BEST PRACTICE OPTIONS FOR  
THE IMPLEMENTATION OF DEMAND  
STIMULATION FOR ELECTRONIC  
COMMUNICATIONS SERVICES IN RURAL UKRAINE***

***Final Report***

A study commissioned by the **Global ICT Department of the World Bank Group**  
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## Executive Summary

The rural areas in Ukraine are seriously lagging behind in terms of quality of life and economic development. ICT and broadband could improve the prospects of these areas both for households and businesses. However, as there is hardly any demand for this in rural areas, there is also no supply. This study aims to present best practice options for demand stimulation to close this gap and thus improve the prospects of rural Ukraine. The focus of the study is on ICT infrastructure, not on content or services.

### **Situation analysis**

In the rural areas, ICT is hardly present amongst businesses and consumers. There is not even a telephony service in many villages. PC's are too expensive, there is hardly any ICT-knowledge and thus there is no local content and applications. The central government has no plans for structural support, only ad-hoc in some schools where computers are now being introduced.

For the coming period funds can become available (f.i. from the EU), to fund ICT development in rural areas. One of the conditions to be met is a properly functioning regulatory authority and framework. On a national level, funds might become available from a Universal Service Fund (USF). Draft legislation indicates a 2% USF contribution on all telecommunications service revenues. We have not come across government plans for spending the USF funds.

### **Best practice options**

The situation in Ukraine is not unique. Other areas in Europe have dealt with similar problems. These cases show that there are practical solutions for these problems. These solutions usually are a combination of top down policies (creating the right market situation, stimulate infrastructure deployment, content development, combine policy areas such as sme-development and agricultural development etc.) and bottom-up policies (demand stimulation and bundling on the local level through for instance Local Action Groups). If there is political will to tackle the Rural ICT challenge, funds from USF and/or EU could be used for (a combination of) these policies. One of the main challenges is a good organization. This requires:

- A 'champion for Rural ICT' who is able to put the subject on the agenda
- A Strategic Action Plan, to be developed on the national level in partnership with local and regional actors, and

- A Central Coordination Office to ensure short and direct lines between the national and the regional level.

### **Example business cases**

For two example regions, Vinnytsia and Cherkasy, high-level business cases have been developed. An important assumption for these business cases is that the planned USF contribution of 2% is used exclusively for rural ICT infrastructure development. These business cases show that the projected USF contribution could allow for rural broadband services at a sustainable subscription level of less than \$10 per month.

### **Final conclusion**

This report provides a number of options for top-down (supply-oriented) and bottom-up (demand-oriented) policies that could be applied by the Ukrainian government to support the ICT infrastructure development of rural Ukraine. The report also shows that funds to support these policies could be made available for developing ICT infrastructures in rural Ukraine, e.g. via the projected USF or via the EU. Actual implementation of these policies are a matter of political will and organization, both on the national and on the regional/local level.

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# 1 Introduction

## 1.1 Objectives of the study

The primary objective of this consultancy is to assist the World Bank in the assessment of best practice options to address the disparities in demand (and consequent broadband access) in rural locations in Ukraine by demand stimulation.

Best practice options should, as far as possible, provide for a comprehensive, generally applicable and sustainable approach to the issue. The options should take account of the e-targets of Ukraine and the potential optimal role of donor funds to ensure their sustained viability. The best practice options will reflect the specifics of Ukraine but will also draw on the experiences of other countries.

Frequently, rural broadband policies are designed top-down. Such government policies are generally successful in establishing broadband networks into rural areas, however, the take-up of broadband services of top-down policies is typically low. These policies have a positive effect on the 'digital divide', but generally the effect is limited.

Bottom-up policies are now being developed and implemented. These involve demand stimulation or aggregation. Where top-down policies focus on infrastructure, demand stimulation focuses on services.

The focus of demand stimulation is to assist local groups to participate in the development of broadband and related services, thereby ensuring local 'ownership' of initiatives. Here the role of the Government is to provide technical assistance to local action groups.

Demand stimulation may involve:

- Creating critical user mass within the public sector (e.g. local authorities, post offices)
- Stimulating demand in types or 'clusters' of SMEs,
- Financing content, including e-government, particularly in local and regional government services,
- Raising the digital skills of the population (e.g. training)
- Demand stimulation through forms of voluntary co-operation between businesses and consumers and other forms of local participation.

This report is written with the assumption that the reader is convinced of the importance of ICT for rural development. It is not intended to convince the reader of the importance of ICT for rural development.

## **1.2 Approach and Methodology**

This research project for best practice options on demand stimulation for communications services in rural Ukraine has 4 main parts:

- (1) Situation Analysis**
- (2) Best Practice Options**
- (3) Example High Level Business Cases**
- (4) International Case Studies and Conclusions**

### **1.2.1 Situation Analysis**

The situation analysis is based on benchmarking of main economic indicators related to demand for electronic communications services in rural areas with countries that have comparable economic parameters.

Main inputs to this report are a desk research combined with on-site research through a fact finding mission of Conict experts in Ukraine accompanied by World Bank representatives. The main focus of this field finding mission has been on identifying local initiatives for demand stimulation in rural Ukraine or identifying which local organizations could facilitate demand stimulation mechanisms. Visits have been complemented by meetings with relevant government officials and private sector representatives.

This fact finding mission will be complemented by further desk-research on demand stimulation for Rural ICT development in comparable countries, e.g. the recent demand stimulation report for Lithuania<sup>1</sup>, as well as e-Readiness assessments of the UN and other international organizations.

### **1.2.2 Best Practice Options**

The second part of this report is on best practice options for demand stimulation. The main focus will be on deriving best practice options which provide for a

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<sup>1</sup> “Best practice options for the implementation of European Structural Funds for the stimulation of demand for electronic communications services in Lithuania”, March 2006, Conict Consultants, Ecorys, Close The Gap

comprehensive, generally applicable and sustainable approach for Ukraine. The report will also consider different co-financing opportunities of the Ukrainian Government as well as financing options from the EU.

The main objective of this report is an assessment of technologically neutral best practice options report regarding types of access to electronic communications infrastructure, potential sources of co-finance and associated ownership structures, and mechanisms for the optimal implementation in rural Ukraine.

### **1.2.3 Example Business Cases**

The third part of this project develops high-level business cases for two example regions: Vinnytsia and Cherkasy. The main focus of these business cases is on providing broadband services in rural areas of these two regions. The business cases make use of the latest WiMAX technology, which provides a very cost-effective means of providing broadband services on a fixed-wireless basis.

The main objective of these cases is to show the need for funding to provide broadband services at affordable rates. With monthly income levels in these regions below \$200 per month, cost-based pricing will not be feasible. The business cases show, how the use of funding for equipment expenditure could be used to subsidize the broadband services to bring monthly subscription prices below \$10 per month.

### **1.2.4 International Case Studies**

The final part of this document presents two international case studies with the purpose to illustrate the demand stimulation mechanisms introduced in the report.

## **PART I: SITUATION ANALYSIS**

## 2 Ukraine – Current Situation

Ukraine lags behind all neighboring countries that recently joined the European Union (EU) regarding most indicators of electronic communications development. For example, relative to population, Ukraine has the lowest number of Internet bandwidth, and the second lowest number of fixed phones. Mobile phone penetration has seen a major growth only during the last year. As a consequence of this among other factors, Ukraine ranks among the lowest countries in the region in terms of network readiness and global competitiveness. This chapter gives a brief overview of the main economic characteristics and ICT-specific indicators.

### 2.1 Economic data and indicators on Ukraine

Due to the difficult economic situation, Ukraine has seen a steady decline in its population over the past 15 years. The percentage of rural population as part of total population has remained relatively stable around 32%.

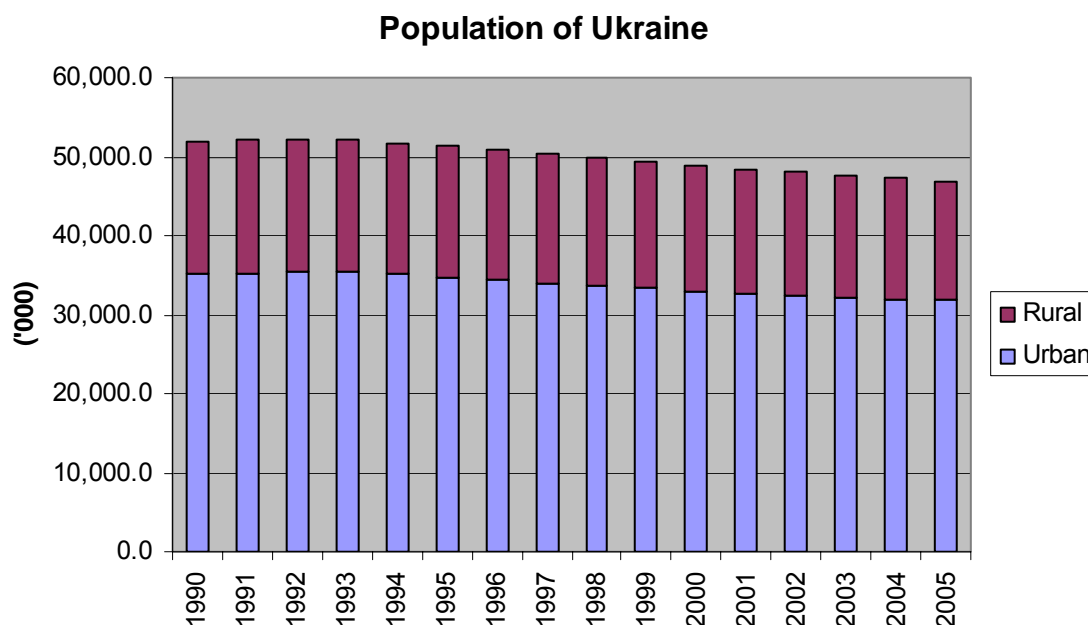


Figure 1: Rural and urban population in Ukraine (Source: Ukraine census, 2006)

Ukraine is divided into twenty-four oblasts (provinces) and one autonomous republic (avtonomna respublika), Crimea. Additionally, two cities (misto), Kiev and Sevastopol, have a special legal status. The oblasts are subdivided into 494 raions (districts). The following table shows the distribution of the population on the different provinces.

Province/Republic:	Total pop.	Urban	Rural	% rural
Crimea	1,979,864	1,246,231	733,633	37%
Vinnitsia region	1,693,101	811,407	881,694	52%
Volyn' region	1,039,295	528,002	511,293	49%
Dnipropetrovsk region	3,432,582	2,862,599	569,983	17%
Donetsk region	4,598,947	4,155,305	443,642	10%
Zhytomyr region	1,323,151	753,022	570,129	43%
Zakarpattia region	1,243,922	461,291	782,631	63%
Zaporizhzhia region	1,853,068	1,414,025	439,043	24%
Ivano-Frankivsk region	1,387,056	591,120	795,936	57%
Kyiv region	1,757,354	1,049,691	707,663	40%
Kirovohrad region	1,060,371	648,025	412,346	39%
Luhans'k region	2,394,748	2,069,262	325,486	14%
L'viv region	2,570,666	1,547,137	1,023,529	40%
Mykolaiv region	1,215,197	816,255	398,942	33%
Odesa region	2,393,383	1,581,457	811,926	34%
Poltava region	1,547,199	928,009	619,190	40%
Rivne region	1,154,965	546,026	608,939	53%
Sumy region	1,218,727	806,183	412,544	34%
Ternopil' region	1,108,284	475,701	632,583	57%
Kharkiv region	2,816,872	2,235,322	581,550	21%
Kherson region	1,121,396	678,629	442,767	39%
Khmel'nyts'kyi region	1,367,302	723,086	644,216	47%
Cherkasy region	1,334,694	735,326	599,368	45%
Chernivtsi region	906,451	372,846	533,605	59%
Chernihiv region	1,160,028	702,561	457,467	39%
The city of Kyiv	2,699,189	2,699,189	x	0%
Sevastopol' (city council)	378,806	356,293	22,513	6%
<b>Ukraine</b>	<b>46,756,618</b>	<b>31,794,000</b>	<b>14,962,618</b>	<b>32%</b>

Table 1: Population distribution in Ukraine (Source: Ukraine Census, 2006)

As Table 1 shows, there are 6 provinces with more than 50% rural population, 20 provinces are above average in terms of rural population (national average is 32%).

A similar picture can be drawn when looking at the monthly average wages by province – see following table.

<i>ave monthly wages in UAH</i>	<b>June</b>	<b>July</b>	<b>August</b>	<b>% of average</b>
Crimea	976.45	1001.69	1004.73	<b>94%</b>
Vinnitsya	815.66	836.25	839.27	<b>78%</b>
Volyn	806.68	814.89	795.94	<b>74%</b>
Dnipropetrovsk	1145.32	1183.88	1166.73	<b>109%</b>
Donetsk	1227.47	1225.06	1237.69	<b>115%</b>
Zhytomyr	844.08	835.76	809.43	<b>75%</b>
Zakarpattia	903.87	916.95	900.51	<b>84%</b>
Zaporizhzhya	1102.8	1124.51	1112.2	<b>104%</b>
Ivano-Frankivsk	949.4	977.43	985.79	<b>92%</b>
Kyiv	1071.97	1094.77	1113.22	<b>104%</b>
Kirovohrad	823.1	873.14	861	<b>80%</b>
Luhansk	1032.88	1055.03	1054.57	<b>98%</b>
Lviv	944.16	972.94	959.57	<b>89%</b>
Mykolayiv	965.25	1003.74	966.22	<b>90%</b>
Odesa	999.03	999.72	978.32	<b>91%</b>
Poltava	961.58	1004.98	1023.16	<b>95%</b>
Rivne	911.23	909.67	889.74	<b>83%</b>
Sumy	869.96	897.99	923.62	<b>86%</b>
Ternopil	818.04	731.16	723.12	<b>67%</b>
Kharkiv	993.52	1012.27	1018.1	<b>95%</b>
Kherson	838.1	843.48	812.08	<b>76%</b>
Khmelnyskiy	812.88	829.86	814.37	<b>76%</b>
Cherkasy	867.25	888.47	874.09	<b>81%</b>
Chernivtsi	839.82	848.48	860.68	<b>80%</b>
Chernihiv	813.95	836.46	833.81	<b>78%</b>
City of Kyiv	1784.64	1784.44	1763.74	<b>164%</b>
City of Sevastopol	1028.97	1031.02	1022.55	<b>95%</b>
<b>Ukraine</b>	<b>1063.59</b>	<b>1078.86</b>	<b>1073.1</b>	

*Table 2: Average monthly wages (2006, Ukraine Census data)*

Average wages show a clear correlation with the number of rural population: Urban areas have above average wages, whereas remote rural areas have wages as low as 2/3 of national average.

The map in Figure 3 illustrates the regional distribution of rural population. Especially, the western regions show a very high percentage of rural population (more than 50%), whereas the eastern regions are more developed and urbanized.

This map also shows, that the regions around the two largest cities (Kyiv and Sevastopol) still have above national average percentage of rural population.



Figure 2: Geographic distribution of rural population in Ukraine regions

## 2.2 ICT-specific indicators

Ukraine ranks near the bottom in terms of Internet-based opportunities worldwide. It is placed 61st out of 68, according to The Economist's e-readiness ratings for 2006. Within eastern Europe, Ukraine came in 12th out of the 14 countries covered, ahead of only Kazakhstan and Azerbaijan.

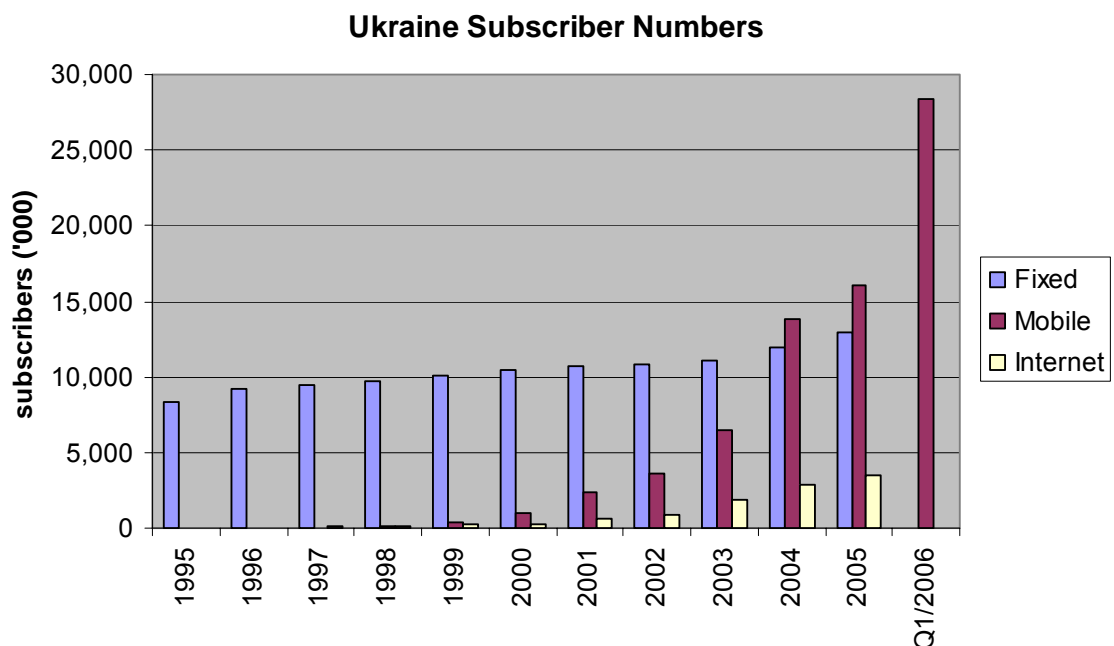
Ukraine's telecoms infrastructure remains underdeveloped, as a result of slow privatization progress and insufficient investment. The government's slow progress in privatizing Ukrtelecom, the state-owned former monopoly that still dominates the fixed-line sector, is the main reason for underinvestment in the fixed-line sector.

### 2.2.1 Subscriber and Penetration Numbers

Only recently, mobile telephony has grown rapidly, with penetration now above 60%. The relatively low number of fixed lines continues to hold back growth in the market

for Internet services. High call charges and low levels of ownership of PCs have also hampered expansion.

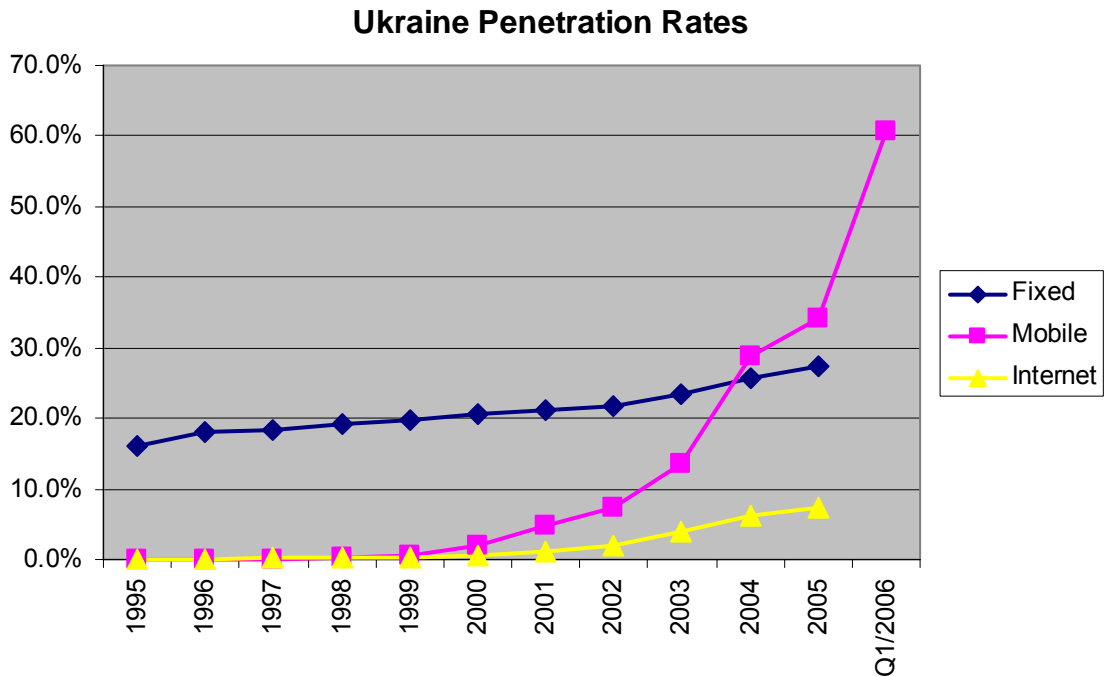
Only 30% of Ukraine's fixed networks are digital, and fixed-line penetration remains low, thus limiting the access to Internet or broadband services via xDSL.



*Figure 4: Ukraine Subscriber Numbers for fixed, mobile and Internet services*

According to Telas, the Ukrainian Network Operator Association, out of 48 million Ukrainians only approximately 5 million use Internet (10-12% penetration). 70% of all Internet access is based on dialup. Broadband access (based on DSL technology) is approximately 3 times more expensive than dialup. 50% of the Internet users are in the city of Kiev. The cheapest Internet package is 70 Hryvna per month (approximately US\$14) for a 128 kbps access line with a 500 MByte data limit.

There are 11M fixed line telephone and 2.7M Cable TV connections in Ukraine



*Figure 5: Ukraine Penetration rates: Only mobile penetration has recently been rapidly rising: Early 2006, mobile penetration exceeded 60% penetration. As of October, mobile penetration is close to 80%.*

According to the NCCR, the national regulator, there are currently 400 licensed operators. However, only a few have significant market share. The main mobile and fixed operators are introduced in the following sections.

## 2.2.2 Mobile Operators

Ukraine has five mobile operators, with Kyivstar and UMC being the two main national operators controlling about 90% of the mobile market. Penetration rates have significantly improved over the last year, reaching more than 60% in early 2006. Currently (Oct 2006) the number of subscribers is growing with 1 million per month (almost 2% penetration). The mobile operators have sold 40 million subscriptions by October 2006 (around 80% penetration), but since many have more than one subscription, the real penetration is believed to be around 55%.

Operators Rating: Top-5 by Subscriber Base				
	Operator	Subscribers in Ukraine, 2006/02/28	Share in Net Additions February 2006	Subscriber Base Growth, February 2006
1	Kyivstar	14 508 446	35,3%	1,40%
2	UMC	14 165 500	37,6%	1,54%
3	Astelit	2 750 000	26,3%	5,77%
4	WellCOM	270 811	0,8%	1,50%
5	Velton.Telecom	65 300	0,0%	0,46%
	Others	155 000	-4,0%	-11,0%

Table 3: Top-5 Mobile Operators in Ukraine (Source: iKS-Consulting)

### Kyivstar

National mobile operator Kyivstar provides a coverage of 97% of Ukraine's territory inhabited by 98% of Ukraine's population. Kyivstar network covers all large cities and towns, over 27 thousand settlements, all main national and regional highways, and the majority of sea and river coasts of Ukraine.

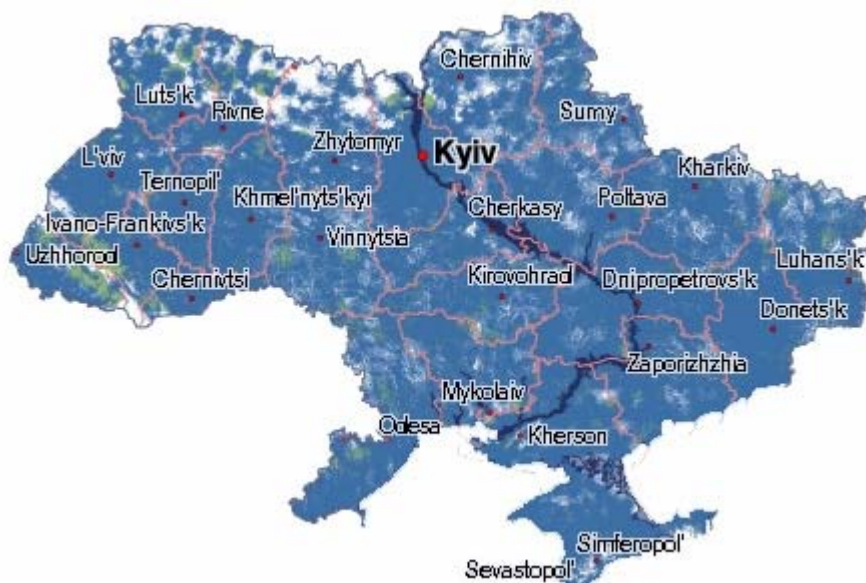
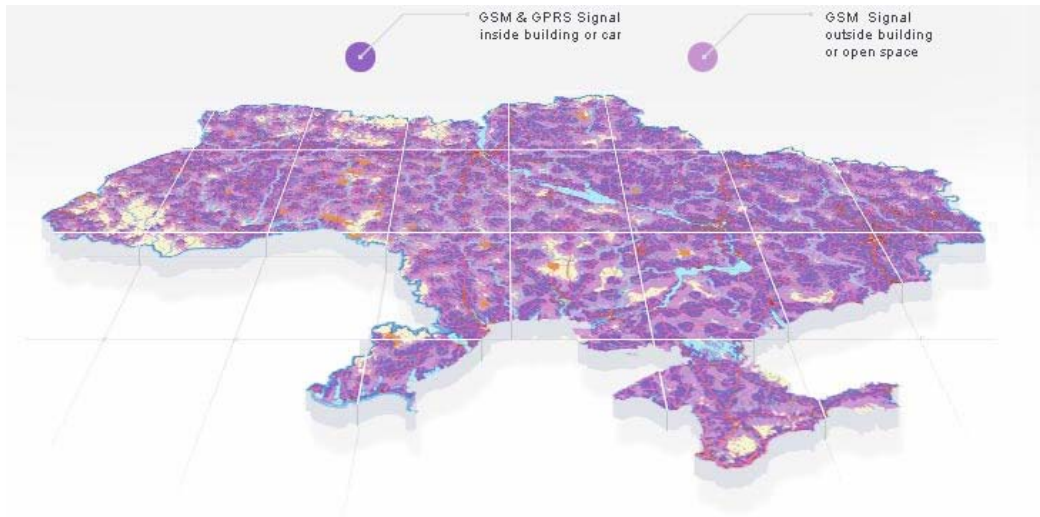


Figure 6: Kyivstar Coverage Map

### *UMC (Ukraine Mobile Communication)*

UMC claims a coverage of more than 91% of Ukrainian territory where 95% of population live. This means for most parts of the country, at least sufficient outdoor coverage is available (see Figure 7).



*Figure 7: Coverage Map of UMC*

The remaining mobile operators are Astelit, Golden Telecom and Ukrainian radiosystems, which all have very limited networks and focus only on the main cities in Ukraine.

### **2.2.3 Fixed Operators**

The main fixed-line operator in Ukraine is state-owned Ukrtelecom. The total market share of all private fixed-line operators was under 20% in 2002. Alternative operators include Golden Telecom, Optima, Farlep and a number of Fixed Wireless Access (FWA) operators. Optima and Farlep commenced operations in the Dnipropetrovsk and Odessa regions, respectively.

#### *Ukrtelecom*

Ukrtelecom was created in 1993 when the Ministry of Communications merged several telecom departments and regional PTTs into the Ukrainian State

Telecommunications Corporation (Ukrtelecom) and split telecoms from postal services. It was re-registered as a state enterprise in 1998 when the regional operators comprising Ukrtelecom were converted into affiliates. It was then transformed from a state enterprise into a joint stock company as a prerequisite of privatisation. The state owns a 92.86% stake.

Ukrtelecom owns all transmission facilities and administers the national fixed-line infrastructure. Interesting detail is that it offers voice services for free for people that cannot afford. It obtains around 85% of its revenue from long-distance telephony and is responsible for implementing the government's telecommunications strategy. During 2001 it moved to further expand its dominant position taking majority control of the second largest fixed-line operator, Utel, after purchasing the stakes held by AT&T and Deutsche Telekom AG

Various efforts to privatize Ukrtelecom have been continuously postponed or delayed and Ukrtelecom still remains under nearly full government ownership.

#### *Utel*

Utel is the long-distance fixed-line operator. In 2001 and 2002, Ukrtelecom bought back all foreign-owned shares in Utel. Utel had been established in 1992 as a joint stock company with ownership divided between KPN of the Netherlands with a 10% share, AT&T and Deutsche Telekom each with 19.5% and Ukrtelecom with 51%. With the major share of Ukraine's long-distance market, Utel has been very profitable. It holds a 15-year licence to offer long-distance and international telephony. It has two international exchanges, in Kiev and L'viv, and has direct connections with more than 50 international telephony operators in 45 countries. Utel carries nearly all international traffic.

#### *Golden Telecom*

Golden Telecom Inc became sole owner of Golden Telecom Ukraine in late 2002, paying US\$5.2 million to buy out its partners, Brig Telecom (with a 10.5% share) and Agat Telecom (with a 20.5% share). Golden Telecom Inc is a Russian alternative telecoms operator whose largest shareholder is the Alfa Group.

The Kiev-based telco commenced operations in January 1997. In late-2002, the company expanded its presence into Dnepropetrovsk, offering local access and prepaid VoIP services. In early 2003, local access, VoIP and dial-up Internet services were launched in Lviv and in Zaporizhya in early 2004.

In October 2006, Golden Telecom announced a major initiative to roll-out FMC (Fixed-Mobile-Convergence) services across Ukraine. According to a company statement, Golden Telecom will partner with Alcatel and Huawei for the network implementation. Alcatel will supply a new generation softswitch as well as an intellectual platform upon which the core of the FMC network will be constructed. Huawei will supply a system of base stations, as well as high-speed data transfer equipment required to construct the wireless component of the FMC network.

## 2.3 Rural ICT

In rural Ukraine the overall access to communications services is severely limited. According to the NCCR (national Ukrainian regulator), about 2,000 villages have no telephone lines at all, 15,000 villages have only 2 or 3 telephone lines. Internet access is only available in smaller rural cities, mostly based on dialup connections.

In smaller rural cities, people still have no broadband access and don't know what it is. In villages Internet access could be made available in schools and clubs (based on private initiatives). However, there are no teachers or trainers in rural areas who are knowledgeable in computers. Most people may have seen a computer only once or twice in their life and are far from adopting it. There are no initiatives for establishing PIAP's (Public Internet Access Points).

However, Ukrtelecom has been connecting 500 rural centers (85% of total) with fiber-optic links. These rural centers are therefore easily upgradeable to provide broadband, as only the "last mile" is still missing.

According to Telas, the association of Ukrainian operators, the main issues regarding Rural ICT are:

- Rural initiatives need financial support
- As a starting point for Rural ICT, Telas suggests to avoid the eastern (industrial) or western (rural) regions, but focus on the central regions in the middle of Ukraine
- Currently, the EU does not support Rural ICT initiatives
- Currently, the Government provides limited support: in some schools computers are being introduced.
- Option: bring second hand computers from businesses to rural areas

*Main findings on Rural ICT*

In summary, the main findings in the area of Rural ICT in Ukraine are:

- There is no telephony service in many rural villages.
- Computers are too expensive (One computer typically costs 5 monthly salaries in rural areas) and need to be shared
- ICT knowledge is very scarce in rural areas
- Local content and applications are absent
- The government does not seem to have a targeted policy on Rural ICT

## 3 ICT policy and Regulatory Regime

### 3.1 ICT policy

#### 3.1.1 General

During the fact finding mission for this study we found that ICT development is hardly on the political agenda in Ukraine. There are some initiatives, but there is not a real 'champion' within the government for this subject.

Rural ICT development is even further down on the political agenda. Initiatives from de-central governments are not very likely since the use of ICT and computers in rural governmental organizations is limited.

Even though the telecoms sector accounts for 10% of Ukrainian GDP and over 7% of all profits (Source: NCCR) there is no stand-alone Ministry for Communications. Communications is mainly governed by the Ministry of Transport and Communications. Regional Development is governed by the Ministry of Finance.

#### 3.1.2 Ministry of Finance

The Ministry of Finance currently works on a policy to introduce a more decentralized budget. Local counsels will set priorities on how and where to spend budgets, central government approves.

The total budget to be spent in 27 decentralized regions is 1 billion Hryvna (US\$200 million). In 2007, there will be a budget of an extra 100 million Hryvna (US\$20 million) to be spent on depressed regions.

Local government budgets are composed of:

- a. income taxes from natural persons, collected locally; plus
- b. decentralized budgets from the Ministry of Finance

#### 3.1.3 Ministry of Transport and Communications

The Ministry of Transport and Communications has started some initial work on Rural ICT: the National Program for Information (NPI). According to this Ministry, the main challenge of Rural ICT is to address overall spending power in rural areas, before initiating broadband access.

Ukrtelecom was set up in Soviet times, destined to provide rural telephony. In Western Europe, the incumbents were privatized after completion of national telephony rollout. In Ukraine rural rollout has not yet been completed. The Ministry therefore keeps questioning if it is wise to privatize Ukrtelecom now.

The Ministry co-operates closely with Ericsson in a pilot project in the city of Sumy (600,000 inhabitants) called “city of the future”. Aim of this pilot project, also called “Electronic Government” is to show the benefits of broadband to local government bodies. They apply Wimax and Wifi technologies. The pilot customers are libraries, schools, clubs and local governments. Ericsson is co-operating with the operator Adamant. The project operates within the framework of which a number of social services are supposed to be fulfilled

### 3.1.4 World Summit on Information Society

Ukraine was a participant in the World Summit on the Information Society in Tunis. Together with the Republic of Armenia, the Republic of Kazakhstan, the Kyrgyz Republic, the Russian Federation and the Republic of Tajikistan, Ukraine contributed a joint proposal<sup>2</sup> containing the following items:

#### **A Access to information and ICTs**

1 All persons must have equal opportunities to have access to information, worldwide information resources and ICTs, without distinction of sex, age, nationality, religious belief, social status or residence. All persons, wherever they are, should have an opportunity to participate in the global information society, and no one should be deprived of its benefits and services.

2 The right conditions must be created to ensure universal and affordable access to ICTs and development of ICT applications and services, particularly in urban, rural and remote areas; this being one of the biggest challenges in bridging the digital divide. Particular importance must be attached to satisfying the basic needs of developing countries and countries with economies in transition.

#### **B Social applications of ICTs**

1 At the heart of the concept of the information society is the human being, with the full range of his or her interests and needs. ICTs must become a significant factor in efforts to improve the quality of life of all citizens around the world and develop information services in socially relevant domains, in particular health, education and culture.

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<sup>2</sup> [http://www.itu.int/dms\\_pub/itu-s/md/03/wsispc2/c/S03-WSISPC2-C-0114!!MSW-E.doc](http://www.itu.int/dms_pub/itu-s/md/03/wsispc2/c/S03-WSISPC2-C-0114!!MSW-E.doc)

2 ICTs must be turned into catalysts for human development, professional training and the creation of new employment opportunities, primarily through improved access to education and training while fully respecting cultural and linguistic diversity.

### **C Security and ICTs**

1 It is necessary to deal with the potential for abuse of ICTs for purposes that are inconsistent with the objectives of maintaining international stability and security and may adversely affect the integrity of the infrastructure within States, to the detriment of their security in both civil and military fields. It is also necessary to prevent the use of information resources and technologies for criminal or terrorist purposes.

This proposal for the Draft Declaration clearly indicates that Ukraine sees the importance of ICT access for “all persons, wherever they are”.

## **3.2 Regulatory Environment**

### **3.2.1 Main Issues of Regulatory Environment**

A recent report by Frontier Economics<sup>3</sup> provides a detailed review of the current regulatory framework for telecommunications in Ukraine. The Frontier report examines the current situation in Ukraine against best practice principles. In this section we briefly highlight some main findings, which are relevant in the context of Rural ICT.

#### *Institutional Design*

The three best practice principles in institutional design for regulators are:

- Simplification and clarity of roles and responsibilities
- Adequate funding and resources that guarantee the independence of the regulator
- Rules for appointment and dismissal

Simplification and clarity of roles and responsibilities is a key element of a sound institutional framework, which should be based on a formal separation between policy making, regulation and operations. Currently, the Ukraine has a rather complex system with no clear separation between policy, regulation and operations.

The independence of the regulator can only be guaranteed by ensuring sufficient and independent sources of financing, which could e.g. come from industry fees.

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<sup>3</sup> Frontier Economics: Review of the regulatory framework for telecommunications in Ukraine, May 2006

Currently, the financing of the regulator is insufficient and financing comes directly from the State Budget. Also, salaries are low in comparison to industry averages, which makes it difficult to attract highly-qualified staff.

The independence of a regulator is supported by clear rules on appointment and dismissal, which minimize political interference.

According to the Frontier Economics report, Ukraine needs to empower NCCR to establish its dominance as an independent institution, improve the funding of NCCR and establish more open procedures for appointment and dismissal of commissioners.

#### *Regulatory framework*

The four best practice principles regarding the regulatory framework are:

- Regulation should be justified and limited to the necessary minimum
- Technology neutrality
- Transparency and public consultation
- Dispute resolution

In the area of regulatory framework, the situation in Ukraine is non-optimal. Regulation is mainly based on an ad-hoc basis, rather than based on clearly described processes for the assessment of markets and the design of regulatory remedies. While the principle of technology neutrality is contained in the legislations, service definitions and USO regulations do not fully promote this principle. Also the processes of public consultation and dispute resolution are not fully implemented in Ukraine.

The importance of having functioning regulatory institutions and well-defined frameworks in place is underlined by pre-conditions of international support programs. As discussed below in section 4.1.1, the EU has as pre-condition for approving and implementing its assistance programs, that a properly functioning regulatory authority and framework is in place.

### **3.2.2 Findings from NCCR Fact Finding Mission**

Many issues described in the previous section have been confirmed during a fact-finding mission to the NCCR. In addition, we have learnt that plans to create a Universal Service Fund (USF) are in draft and currently under revision at the Supreme Council. The draft plan proposes to add a 2% USF contribution to all end user telecommunications revenues.

During the fact finding mission we have asked the NCCR what issues the Regulator sees in the Ukraine market:

- 1) Currently the Regulator is not properly housed, understaffed and underpaid: urgent need for additional staff and housing
- 2) The Regulator would like to arrange for common access to telecoms services for all Ukrainians without exceptions. Currently, the regulator does not have the authority and tools to make this happen
- 3) Main problem for rural services: The Ukrainian market was liberalized before the infrastructure was fully developed. There are two powerful mobile players now operating without any obligations. Ukrtelecom has been left behind by this competition. Ukrtelecom has limited resources to invest in their old (70% analog) infrastructure.
- 4) Ukrtelecom owns the 'last mile' (i.e. copper lines to their end customers). They should have more funds and be modernized and restructured. They cannot deliver upon the USO. The regulator is strongly supporting privatization
- 5) With the absence of Local Loop Unbundling, Ukrtelecom might exploit their current monopoly position in providing DSL access services.
- 6) The Regulator and Ministry of Transport and Communications are discussing who should manage the Universal Service Fund.

As an external option to support Ukraine in overcoming these regulatory issues, the EU might be interested in supporting the set-up of proper regulatory functions. Also, twinning with a recently joined EU member might be helpful.

## 4 International Support for ICT Initiatives

### 4.1 EU Initiatives

#### 4.1.1 Overview

The EU and Ukraine have elaborated the e-Ukraine Action Plan<sup>4</sup> (see also section 4.1.4). This action plan deals mainly with improvements in the information sector. No actions have been taken yet, mainly because of the present political situation in Ukraine.

Under the new European Neighborhood Program (ENP) Sector Wide Assistance Programs (SWAP's) will be developed. The Information Society (IS) is one of these sectors. However, it should be regarded as a horizontal program, as it touches on almost all other sectors. The SWAP for IS has not yet been approved.

For the EU it is a pre-condition for approving the SWAP-IS and implementing actions, that the regulator will function properly. This means that laws on licensing and free market rules will have to be adopted by the Ukrainian government. Also a well functioning monitoring system has to be in place.

For the EU the development of the IS in rural areas is a very interesting and serious subject. Estonia may serve as a good example.

Counterparts for the EU are the Ministry of Transport, Ministry of Education, the Regulator, as well as third sector members (Telas, the Association of Ukrainian Telecommunications Operators).

Disbursement of the ENP budget will not be implemented before 2008. According to EU estimates, there can be a budget (depending on co-financing by Ukraine) of 100-300 mln. Euro for the 2007-2013 period.

Under the SWAP-regime it is possible to make combinations, for example, Agriculture and rural developments in combination with IS, or Education with IS.

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<sup>4</sup> <http://www.delukr.ec.europa.eu>

#### 4.1.2 Tacis Program

Launched by the EC in 1991, the Tacis program provides grant-financed technical assistance to 12 countries of Eastern Europe and Central Asia (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan), and mainly aims at enhancing the transition process in these countries. This project is still ongoing.

EC assistance to Ukraine 1991-2005 (in € million)\*

	1991 -1998	1999	2000	2001	2002	2003	2004	2005	Total
<b>TACIS National Program</b>	407**	38.6	48	43	47	50	70	88	<b>791.6</b>
<b>TACIS Nuclear Safety ( incl. Chernobyl Shelter Fund and UKR G7 Action Plan )***</b>	304.3	50.3	3.5	69.4	44	46.6	34.3	28.4	<b>580.8</b>
<b>TACIS Cross-border Co-operation****</b>		5.2	1	5.5	0.5	3	3	18	<b>36.2</b>
<b>TACIS Regional Program****</b>		3.7	6	9.1	10.5	6	6	8.7	<b>50</b>
<i>Fuel gap</i>		-	25	20	20				<b>65</b>
<i>ECHO (humanitarian assistance)</i>	12	6.3	1.3	0.9	0				<b>20.5</b>
<i>Macro-financial assistance (loan)</i>	565		-		110				<b>675</b>
<i>Contribution to STCU (Science and Technology Center)</i>		3	4.5	4	4	4	4	5.5	<b>29</b>
<b>Total</b>	<b>1288.3</b>	<b>107.1</b>	<b>89.3</b>	<b>151.9</b>	<b>236</b>	<b>109.6</b>	<b>117.3</b>	<b>148,6</b>	<b>2248.1</b>

\* Overall figure for technical assistance in 1991-98 (mostly Tacis)

\*\* Includes both national projects and estimated share of multi-country projects, 2005 Chernobyl allocation still subject to possible modifications

\*\*\* Estimated pro-rata share for Ukraine in regional programs

When Tacis was initiated, technical assistance was a stand-alone activity, whereas the program is now part of a complex and evolving relationship with each of the 12 countries concerned. politicians and officials from the partner countries and the EU meet now on a regular basis. Tacis more and more becomes a strategic instrument in the co-operation process between the EU and partner countries.

Under the **national Tacis program** assistance, over the period 2002-2006, has focused on three priority areas:

- i) support for institutional, legal and administrative reform
- ii) support to private sector and economic development
- iii) support in addressing the social consequences of transition.

The **regional assistance under the TACIS program** addresses in particular issues related to

- increased inter-state cooperation in transport
- energy and sustainable management of natural resources focusing mainly on water.
- In the area of Justice, Liberty and Security priorities include enhanced integrated border management, combating organized crime and international terrorism and improving migration and asylum management.

Support for **cross-border cooperation** focuses on economic and social development of border areas, efficient border management and people-to-people contacts.

However, no specific attention has been paid to ICT Development in Ukraine.

#### **4.1.3 European Neighborhood Policy (ENP)**

In the context of the European Neighborhood Policy (ENP), assistance will be provided under the new European Neighborhood and Partnership Instrument (ENPI) starting from 2007. ENPI will replace the current Tacis program as well as a number of thematic activities. Ongoing Tacis projects will of course continue to run until their planned dates of completion.

Under ENPI assistance will not be limited to Technical Assistance but cover a wider range of instruments and delivery mechanisms including Twinning and TAIEX:

***Twining:*** through twinning the European Commission is encouraging partnerships between the administrations of Member States and candidate countries to enable the latter to adopt the *acquis communautaire*.

***TAIEX*** (Technical Assistance Information Exchange Office) has been designed to provide five main services:

1. documentation, information and advice on Single Market Legislation
2. workshops and seminars
3. study visits to the European Commission and Member States
4. expertise to provide the beneficiary countries
5. the creation of databases on the deployment and results of technical assistance provided.

#### 4.1.4 EU – Ukraine Action Plan

The EU-Ukraine action plan states, that the enlargement of the European Union on 1 May 2004 has brought a historical shift for the Union and Ukraine in political, geographic and economic terms. The EU and Ukraine now share a border and, as direct neighbors, will reinforce their political and economic interdependence.

According to this plan, the enlargement offers the opportunity for the EU and Ukraine to develop an increasingly close relationship, going beyond co-operation, to gradual economic integration and a deepening of political cooperation. The European Union and Ukraine are determined to enhance their relations and to promote stability, security and well-being. The approach is founded on shared values, joint ownership and differentiation. It will contribute to the further stepping up of our strategic partnership.

The European Union and Ukraine are determined to work together, through the implementation of this European Neighborhood Action Plan, to help ensure that no new dividing lines are drawn in Europe.

The action plan contain one specific section regarding ICT policies towards the development of an Information Society:

##### *Accelerate progress in electronic communications policy and regulation*

- Adopt and start implementing the national concept for the development of electronic communications.
- Adopt regulations concerning licensing, interconnection, numbering and generally
- accessible telecommunications services in accordance with the Law of Ukraine on Telecommunications.
- Establish the National Communications Regulatory Commission in accordance with the Law of Ukraine on telecommunications.
- Ensure fair competition in the electronic communications markets.

##### *Accelerate progress in the development of Information Society services and in the integration of Ukraine into the IST research program*

- Adopt the State Program “e-Ukraine” for the development of the Information Society and explore possible support by the EU for its implementation.

- Promote the widespread use of the new technologies by business and administration, in particular in the health and the education sectors (e-commerce, e-government, e-health, e-learning), via the provision of advanced infrastructures, the development of local content and the introduction of pilot projects, e.g. for the mutual recognition of
- electronic signatures.
- Improve the use of Internet and online services by the citizens via computer training
- programs for the general public.
- Adopt a specific plan to promote the participation of Ukraine in the IST part of the 6th Framework Program.
- Develop EU – Ukraine co-operation regarding the preparation of the second phase of the World Summit on the Information Society in Tunisia in 2005.

#### **4.1.5 European Investment Bank (EIB)**

On 22 December 2004, the EU Council approved a new EIB mandate authorizing lending operations in Russia, Ukraine, Moldova and Belarus up to a ceiling of €500 million. The mandate covers the period 2005-06. Eligible sectors include those where the EIB is considered to have a “comparative advantage”: environment as well as transport, telecommunications and energy infrastructure, with priority given to the Trans-European network (“TEN”) axes having a cross-border aspect with the EU.

Furthermore, the GAERC conclusions of 21 February 2005 on Ukraine indicated that, in the framework of the implementation of EU-Ukraine ENP Action Plan, a share of up to €250 million of the total €500 million envelope could be earmarked for Ukraine.

On 23 May 2005 the Commission informed the EIB on the fulfillment by Ukraine of the political and economic conditionality provided for by the mandate. The EIB and Ukraine signed a framework agreement on 14 June 2005; this has now been ratified, thus enabling the EIB to start lending operations with Ukraine.

## 4.2 UNDP Projects and other International Initiatives

### 4.2.1 Innovations Springboard

The Innovations Springboard is an initiative focusing on “Leveraging Information and Communications Technologies for Ukraine’s Prosperity”<sup>5</sup>. This is already closed.

The main focus has been on bringing ICT to schools and other educational institutes. The Innovations Springboard focused on the following results:

- Government services accessible on the Internet by the end of the program
- ICT being used on a regular basis to enhance civil society participation, governmental policy formulation and implementation
- State monopolies in ICT and communications sector privatized and restructured successfully in accordance with best international practice and standards
- National “e-readiness” assessment carried out (on connectivity, policy frameworks, and human and institutional capacity)
- The number and proportion of the population with access to the Internet, desegregated by gender and income, will have increased by 50%
- The number of, and employment in, small-scale enterprises in the ICT sector, desegregated by gender, will have increased by 50%
- Ukrainian educational sector actively uses ICT in its work, with an estimated number of distance learning programs available on-line being created
- Increase number of medical services (consultations) from the special centres available on-line

Means of achieving these results have been focusing on:

- Providing policy formulation and strategic advisory services aimed at assisting the Government and related Ukrainian institutions in making informed policy choices that stimulate entrepreneurship, boost human development, strengthen democratic governance, and broaden digital opportunities
- Enhancing and developing **access** to the Internet to link all areas of Ukraine through distance learning for educational purposes, rural network access for disadvantaged communities, and development of a Civic Internet Portal for civil society
- Developing, distributing, and exchanging **knowledge** through ICT technology, with the development of a University Innovation Center to provide business incubator-like facilities within higher learning institutions, a Model UN scheme for dialogue on ICT among the youth of Ukraine, an Early Warning Network for

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<sup>5</sup> <http://www.un.kiev.ua/en/projects/?pr=31>

environmental monitoring, and a National Research and Education Network to unify academic and research groups

- Enhancing social and economic opportunities for improved **wellbeing**, with the development of an online Tele-medicine system for medical information exchange purposes, and an ICT Business Incubator and Innovation Net to promote entrepreneurship and business development

The main partners in this initiative have been Ukrtelecom, Kyiv City Administration, National Academy of Science of Ukraine, Kyiv National Taras Shevchenko University and the International Renaissance Foundation

**Budget:** approx. U\$ 3 million

#### 4.2.2 ICTD in Ukraine

This initiative is also closed already. International ICTD Partners have been: UNESCO, ITU, WB, International Renaissance Foundation (Soros Network), Global Internet Policy Initiative (GIPI);

National partners have been: State Committee of Communications and Informatization, JSC “Ukrtelecom”, Kyiv National Taras Shevchenko University, National Academy of Science, Ministry of Education and Science of Ukraine, Ukrainian Association of Computer Clubs

ICTD Activities focused on:

- E-policy development: National Round Tables process, E-Readiness Assessment, “Green Paper: ICT in education,” Strategic advisory services to the Government of Ukraine and related Ukrainian institutions
- Equal country-wide access to ICT, especially in rural and depressed areas: Upgrade of the national ICT infrastructure, Network of public Internet access points, 'GEANT' connection and Ukrainian National Research and Education Network
- E-services support within the framework of strategic public-private partnership and sustainable business-driven environment: National Distance Learning Platform, Civic Internet Portal, National Electronic Network of Ukrainian Libraries, Regional Academy for Advanced Network Administration and Design (RAANAD), Regional Academy for Computer-Assisted Teaching and Learning (RACATAL)
- Total funding of the UNDP in Ukraine ICTD projects has been around: \$4mln

### 4.2.3 Pipeline Programs

Various other initiatives of UNDP in Ukraine are:

- Development of equal countrywide access through Public Internet Access Points: establish the PIAP on the basis of developing, testing and promoting packages, including case study, best practices, training materials, technical requirements and specifications, model budget and legal framework, as ready-to-use products for further replication; enhance increased capacity and awareness in ICT sector among the rural and low-income urban community and support increasing rural opportunities to use ICT potential (Tentative Budget: US\$ 3,000,000)
- Consultation and support for “e-Ukraine”: assist the Government of Ukraine to elaborate the national program in the sphere of ICTD on the basis of the results of the “E-Readiness Assessment of Ukraine”; adjust “e-Ukraine” with the government strategy on the Millennium Development Goals approved by Ukraine at the UN Millennium Summit to be achieved by 2015; to present to the wide public the draft of this program and to approve this document in the Parliament of Ukraine (Tentative Budget: US\$ 75,000)
- Policy and social-partnership development for information society: promote the development of effective mechanisms to be used by civil society; strengthen civil society for enhancing public involvement into the decision-making and policy process (Tentative Budget: US\$ 1,000,000)
- Privatization and restructuring of the biggest national telecommunication operator JSC “Ukrtelecom”: provide the Government of Ukraine with the relevant expertise and support the government in a national strategy and action plan elaborating of the demonopolization of state telecommunications monopoly; enhance the modifications in legislative base to implement the liberalization process (Tentative Budget: US\$ 50,000)

### 4.2.4 Transfer of IT Technology to Ukraine

The aim of the project is to answer the rapidly growing demand for qualified technology specialists in Ukraine by developing high-quality distance learning programs in computer science. This will be achieved by transferring to Ukraine the Japanese IT technology, and innovative expertise and successful experience acquired by the Polish-Japanese Institute of Information Technology (PJIIT). Because of the distance-based character, studies over the Internet will make it possible to develop joint high-quality study programs in computer science with universities from Japan, Ukraine and Poland. PJIIT has both the resources, in the form of its didactic and research staff, and necessary experience in running similar projects, to provide e-education to Ukraine in computer science.

Duration: 2004-2007

#### **4.2.5 US AID, Agricultural Marketing Program (agricultural marketing information web-site)**

The AMP (Agricultural Marketing Program)<sup>6</sup> is still ongoing. Its mechanism is pretty simple: A farmer calls a regional project operator and places a bid by phone. The operator puts it on the website, indicating not only the size and price of the bid, but also the farmer's contact information. Processors and wholesalers review the information online and get in touch with farmers. After the price and product quality issues are agreed upon, the contract is signed. In the first weeks after its launch, the website only had about 10 visitors per day. In six months, it has become the number one food and agricultural information source in Ukraine, attracting from 350 to 400 companies per day. Today [www.lol.org.ua](http://www.lol.org.ua) is well-known to all fruit & vegetable agribusinesses in Ukraine. More than 1,000 companies utilize it frequently updated, exclusive information on a daily basis, generating about 35,000 visits and 170,000 hits per month.

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<sup>6</sup> [http://www.usaid.gov/locations/europe\\_eurasia/press/success/farmer\\_produce\\_Internet.html](http://www.usaid.gov/locations/europe_eurasia/press/success/farmer_produce_Internet.html)

## **PART II: BEST PRACTICE OPTIONS**

## 5 Rural ICT Policy objectives

### 5.1 The importance of Rural ICT

ICT is more than just technology; It is becoming one of the main facilitators for the overall economy, local and international trade, healthcare, education, entertainment and so on. Therefore ICT should be an important agenda item for any modern Government, both on national as well as local levels.

The traditional pattern in emerging economies is that the ICT sector and services develop very quickly in urban areas, but is lagging behind or is even completely absent in rural areas. We see a similar pattern happening in Ukraine. This project aims at developing options for Rural ICT development.

We believe ICT should be very high on the Government agenda, but through our field research we became aware that it is not necessarily the case. To some extent this is understandable: it does not make sense to focus on ICT development projects in remote rural areas which still lack basic infrastructure such as running water or electricity.

The main focus of this study is on developing ICT options for rural areas. It does not provide a prioritization of ICT as compared to other development initiatives. The next paragraphs and chapters develop example objectives as well as a high-level roadmap for ICT policies and initiatives. It is up to the Government to determine the applicability of these objectives per region and prioritize them in combination with other non-ICT objectives.

ICT infrastructure and appropriate and relevant applications and content have to go hand in hand. Applications and content, which need to be applicable and relevant to local users are essential to have, but useless without infrastructure. This study therefore looks on both sides: how to stimulate and fund the roll-out of infrastructure (both for network and terminals) as well as the bottom-up development and stimulation of application and content creation and development.

During our work we have not come across something like a national agenda for ICT-development in rural areas. Actually, we have not come across anything like a plan for

rural area development in general. There are several projects on rural area development which sometimes include ICT, but these seem to be single incidents.

## 5.2 Rural ICT in Ukraine

In the situation of the Ukraine, a vast country with a wide variety of natural conditions, big differences in regional economic development (jobs, income, labor force etc.) and still in transition, one should keep a couple of things in mind:

- Connecting the whole country including small villages in remote areas to the Internet could take a long time taking into account that budgets are often limited. In Part III of this report, we show, how a cost-effective technology could be used to accelerate the roll-out of ICT services and what levels of investments would be required. The first priority is however a long term strategic action plan for IT-development in the rural areas;
- This strategic action plan should be a joint plan from all relevant ministries and institutions: Ministry of Transport/State Department of Communication and Information, Ministry of Agriculture, Ministry of Finance, Ministry of Education, Ministry of Health, Ministry of the Interior and the Regulator.
- Apart from the fact that joint actions will be more efficient, it is also about the 'bundling of budgets': a concentrated effort will produce faster and better results for less money per ministry. Regional authorities should be involved for their own regions. It is also recommended to involve international organizations and institutions (EU, World Bank, other financing sources), as there are also possibilities to gain economies of scale.
- The strategic action plan should also contain the phasing of the roll-out. Given the size of Ukraine and the dispersed location of the villages this roll-out should start from the already connected regional centers and spread out like waves into the region. This however should be decided region by region, based on specific regional characteristics.
- In order to build up experience it is recommended to start with one or two pilot regions. Part III provides a high-level business case for 2 selected regions.

General policy thus should mainly focus on:

- addressing the problem and the objective;
- developing a Rural ICT-strategy on the national level with all partners involved, thus ensuring the most efficient use of budgets:
  - setting priorities and measures;
  - attaching budgets from the appropriate sources to the measures;
  - describing responsibilities for each of the partners;

- a time table;
- a monitoring system.

### **5.3 Policy objectives**

This paragraph lists some example policies that may contribute to Rural ICT development. These policies are all interrelated and can stimulate each other. The next chapter provides some options for addressing these policy objectives.

#### **Lower thresholds for ICT access in rural areas**

Make sure that ICT comes within reach of the rural population. Not only by having the technology there and making this affordable, but also by creating awareness what ICT can do for the rural population.

#### **Educate people on ICT**

Teach and show people what they can do with ICT so they can start using their creativity and use ICT to their advantage.

#### **Stimulate the development of local applications and content**

ICT applications and content are readily available in the form of the Internet or standard office applications, but this is generally international content and standard applications. Next to this it is important to develop applications that help the rural population in their daily lives. These can be applications for education of children (e.g. e-learning, applications supporting the farmers community (e.g. an electronic market), but also e-Government applications supporting local governments.

#### **Stimulate infrastructure deployment (telecom networks/computers)**

An absolute necessity for people to reap the benefits of ICT is having infrastructure, i.e. computers (for example in Public Internet Access Points) and connectivity (telecom networks) in place.

#### **Stimulate SME development/start-ups etc.**

There is a large potential for new ICT businesses, also in rural areas. The Government may facilitate startup ICT companies (e.g. with the help of so-called ‘incubators’).

#### **Attract inward investments from the cities**

Good ICT infrastructure and a population that is well educated in ICT are the two main elements that ICT intensive companies need to start operations. If these two elements are present in (semi-)rural areas, this may attract businesses from the min cities.

## **5.4 A holistic approach**

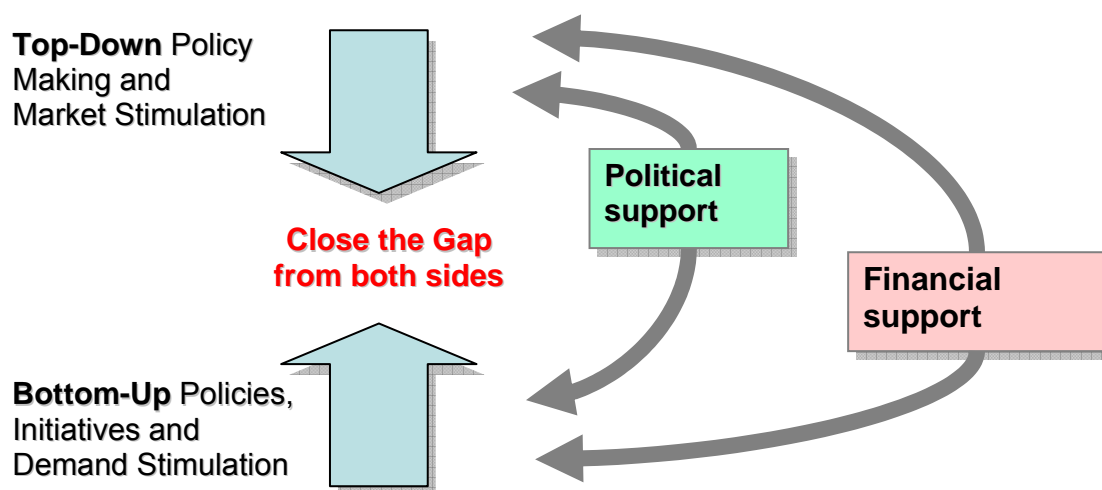
ICT is an important aspect of nearly all Government departments. It is one infrastructure that can support many services and can contribute to e.g. the overall economical situation and efficiency gains for the Government (local and national).

ICT policy therefore is something that should be a on the agenda of the whole Government and not be limited to one Ministry. The Government should develop a holistic view on what ICT can do for the country, its citizens and the government itself (e.g. efficiency improvements with eGovernment applications)

## 6 Government Policy Options

### 6.1 Combination of Top-Down and Bottom-Up Approach

The basic principle of best practice options in providing rural broadband services is a well coordinated combination of top-down policies with bottom-up initiatives for demand stimulation (see figure 8):



*Figure 8: Top-down and bottom-up initiatives*

Both top-down policies and bottom-up initiatives should be supported by national and international political support programs (e.g. from EU, UN or World Bank as mentioned in previous chapters) as well as financial support from national (e.g. USF) and international sources (e.g. EU, World Bank or private industry initiatives).

## **6.2 Top-down policy options**

This chapter deals with various Government Policy Options at the national levels. As it was shown before that connecting rural communities to broadband requires concerted actions top down and bottom up, in this chapter we will present a brief outline of the top down policy measures.

### **Lower thresholds for access to Rural ICT**

As stated before in chapter 6, there are several international examples to subsidize the uptake of IT-equipment in rural areas:

- subsidize ICT investments for farmers and SME's
- income tax reductions for inhabitants when purchasing a PC
- to pay for vocational training on the use of PC's and Internet
- to subsidize schools, libraries, health centers etc.

At present in the Ukraine however these options are not in use, with the exception of buying PC's for schools.

### **Decentralized budgets**

It is also possible for regional authorities to allocate budget (regionalized state budget) to IT-development. This depends on the priorities the regional authorities set. As far as we have seen, IT-development is not seen as such a priority up till now.

### **Stimulate rural income levels**

Actually this should be one of the overall objectives of rural development policy, for which IT-development is an instrument. But we are facing the old 'chicken and the egg' problem here: without sufficient income there's no demand for PC's etc., and without Internet connections it is more difficult to generate income. So there is a need for a more coherent rural development policy in order to stimulate economic development and thus incomes, parallel to IT-development. This means investing in a more attractive investment climate to attract economic activities, modernizing the agricultural sector, tax incentives etc.

### **Development of applications and content**

Demand for Internet connections will only increase if the advantages are obvious for the population: the possibility of more services or easier services. This means that content has to be developed, specifically for the situation in rural areas. This can be for education (distance learning), health (f.i. diagnosis and treatment from specialists), government (services, registration etc.), agriculture (organizing distribution of

products, sales), banking etc. This development of content could be subsidized from the national level.

### **Stimulate infrastructure deployment**

We have learned that the Government (through Ukrtelecom) has invested in connecting about 500 regional centers via a fiber-optic backbone. Since Ukrtelecom is controlled by the state this is the most obvious route for the Government to stimulate infrastructure deployment. However, this situation will not stimulate the private sector to invest in rural infrastructure.

Governments generally do not want to simulate infrastructure deployments directly, for example because they do not want to force a certain technology to be used and because direct interference on an infrastructural level might disturb the market. Therefore Governments generally use an indirect route. For example, by using intelligent subsidies: An operator is being contracted to offer a list of services for predefined price in a predefined region. The operator that makes the best offer to the Government (i.e. requests the lowest subsidy) receives the subsidy.

Other Governments decided to follow a different route. For example, the Government of Jordan is working on the National Broadband program connecting all 3000 schools in Jordan to the Internet. The infrastructure required for this network is leased from the private sector where available and built by the government where not available.

However, in many cases there will be insufficient demand for the private sector to invest. The next paragraph will address this issue.

### **SME and agricultural support and start ups**

In order to stimulate SME development and modernizing the agricultural sector and start-ups there are several ways to support these enterprises. The most common instruments are investment subsidies (f.i. for IT-investments) and/or tax incentives (f.i. no company tax in the first couple of years for start-ups).

### **Attract inward investments**

Examples from other countries learn that, once economic development in the cities picks up, growing companies suffer a lack of space for growth. This space can usually be found (and cheap) in the rural areas if the road infrastructure is well developed. These companies will also need IT-services and are able to pay for that. In order to make it more attractive for these companies to relocate into the more rural areas, the national government might consider the instrument of inward investment subsidies for companies.

This is not an exhaustive list of policy options. This list merely contains examples to show that there are various instruments on the national level to help boosting demand on the local level.

### **6.3 Bottom-up policy options or demand stimulation**

Bottom-up policy options are gaining momentum in stimulating ICT development in rural regions. Generally not as a replacement for top-down policies, but as a powerful addition in rural areas where there is insufficient demand for the private sector to invest. The main principle of bottom-up policies is that they directly support the local population so they work on the demand side of the market.

Top-down policies are often geared towards tweaking government rules and regulations in such a way that the private sector starts acting as desired by the Government. The problem with these policies is that the implementation of these policies is often complex since there is a risk that the market is disturbed as an unwanted side effect.

Bottom-up policies enable the local population to get what they want. In general they can be very effective and there is less risk involved that the market is disturbed by Government rules, regulations and money.

#### **6.3.1 How does it work?**

In bottom-up policies the Government invests in communications campaigns to create awareness around a certain issue, in this case Rural ICT development. When these campaigns are successful, certain communities hopefully pick up the ideas around Rural ICT and form a Local Action Group<sup>7</sup>. This group develops a vision for ICT in their community and receives expert support from the government. This vision may lead to a plan of action and the central Government may provide funds and technical assistance to make this happen.

#### **An example**

Suppose the Government formulates a policy objective to have a PC and broadband access in every house in Ukraine. The Government would then start a promotional campaign across the whole country and explain to the population why the Government believes that this is important and what the Government can offer to the

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<sup>7</sup> The term 'Local Action Group' is widely used within Europe to define a local group of people that take up an idea and take the responsibility to take this idea further into the community

local population to make this happen. The latter is especially important since people should be aware that they can accomplish this if they want and not in ten years but in one or two. This should activate people in a Local Action Group and enable the local population to develop their own vision on the use of broadband in their daily life. The Government can support them in developing a vision and a plan. The plan should state how the Action Group intends to stimulate demand, what the costs and benefits of the plan are and what the gap in funding is. If the local population co-operates to make this happen and succeeds in stimulating and aggregating demand, the private sector might be interested to invest. The overall idea is that this might be a more cost-effective means to accomplish the policy objective than a top-down approach where the Government is driving a project.

### **6.3.2 The role of the Government**

When using the mechanism of demand stimulation for Rural ICT development, the central Government has three main roles:

- 1) Raising awareness
- 2) Providing technical assistance and/or funds
- 3) Stimulating/developing applications

#### **Raising awareness**

The population in most rural areas is likely not very familiar with ICT. The first step to be taken is to raise the awareness what ICT could do for them and the rural community. Explain how ICT could contribute to better education, healthcare, creating jobs and prevent the youth from moving into the cities or abroad.

More importantly, the population will have to be convinced that this is within their direct reach. Only then people will take action and that is what the Government needs to accomplish. After the Local Action Groups have been formed, they can be the leading force behind ICT development. The Government plays a supporting role from then onwards.

#### **Providing technical assistance and/or funds**

Local Action Groups will definitely need support in terms of expertise and funds. They will need to expertise to prepare a business plan and, after approval of this plan, funds to get this implemented. The idea is that the Government helps funding the plan, to the extent that a large part of population is able to use the services given their level of income.

### **Stimulating/developing applications**

Local applications and relevant local content are key to the success of any ICT development project. The Government can develop or stimulate relevant applications for rural communities, like access to governmental services, platforms for establishing virtual markets or e-learning platforms to be used by rural schools.

### **6.3.3 Implementation scenarios**

After a Local Action Group with a vision has been formed, they will produce a plan, and investigate whether the local population (or companies) are interested. The Local Action Group produces a proposition for the community and investigates and bundles the demand for this proposition. When this has been done, the following implementation scenario's could apply:

#### **Privately funded implementation scenario:**

If the Local Action Group is successful with their efforts to bundle demand, the number of potential customers might be sufficient basis for the private sector to invest in services for the rural community. In this case there is no need for the Government to fund the implementation part. For example: If a Local Action Group is successful in bundling enough demand for a broadband access service, they might be able to convince an operator with a Wimax license to invest in providing services in their community.

#### **Publicly funded scenario:**

If market parties do not respond to the levels of demand generated by the Local Action Group or if conditions are not acceptable, the Local Action Group needs to take more responsibility for realizing their vision. They might implement their own ICT infrastructure either by acquiring a license for delivering broadband services (when and where possible) or using options that are license exempt (e.g. WiFi). Obviously in this case the Local Action Group would need funding for the investments in equipment and licenses.

#### **Mixed scenario:**

There are many scenarios possible where public and private parties co-operate.

## 6.4 Funding of the ICT plans

One way or the other money has to be allocated for the funding of these ICT-ambitions. As the ICT sector generates around 10% of the total revenues in Ukraine, this has to be feasible. However, as far as we could see, no dedicated funds are available in the State Budget.

At the moment there is the initiative for an Universal Services Fund (USF) which could be used to support the further and wider development of ICT in Ukraine: ‘a connection for everybody’. This idea was first adopted in Russia. In Ukraine the fund will, according to the latest plans, be filled with the revenues of a 2% increase in the price of telecommunications services.

According to the Ukraine's State IT and Telecommunications Committee, revenues from telecommunications services in Ukraine rose 21.4% on the year to 24.1 bln UAH in January-September.

Extrapolated to the full year, this is would result in total annual revenues of 32.1 bln UAH for 2006. Around 79% of these revenues can be attributed to end-user services (mobile and fixed telephony). Table 4 provides a projection for the Universal Service Fund based on the following assumptions:

- Service fund contribution of 2% of revenues
- Exchange rate: 5.05 UAH/\$
- Net growth rate per year of 15% sliding down to 10%

		2006	2007	2008	2009	2010	2011
year-on-year growth:		21.4%	15.0%	12.5%	10.0%	10.0%	10.0%
<b>USF contribution:</b>	<b>mln\$</b>	101	116	131	144	158	174

*Table 4: Projected USF contribution*

These figures will be used in Part III as a comparison to overall investment requirements for the provision of broadband services in rural areas. Parts of the USF might be used as a source of subsidies to improve the viability of rural business cases at affordable subscription rates.

## 6.5 External funding

### EU-funding

In 2007 the new EU Neighborhood Policy will officially start. As the EU and Ukraine share borders since 2004, the EU and Ukraine can develop a closer cooperation with respect to various topics. The EU/Ukraine Action Plan forms the base for the further development of cooperation and support for the next three years. The Action Plan has been adopted, but is now waiting for implementation.

Under ENP sector wide assistance programs (SWAP's) will be developed. ICT is one of the sectors, be it that this is almost a horizontal 'objective'. However, before this program can be finally approved by the EC and thus put into action, some requirements will have to be met:

- regarding the position of the Regulator;
- regarding licensing and market rules;
- regarding monitoring.

Besides these specific requirements there are of course the general requirements from the EU regarding technology neutrality and open competition and the public procurement rules.

As it seems unlikely that these conditions will be met on a short term, the actual start of the program is not envisaged before 2008. The budget for the IT-SWAP will depend on the co-financing by Ukraine, but it should be somewhere between € 100 mln. and € 300 mln.

The EU is very much interested in the problems of the rural areas and the contribution of IT to solve (at least some of) these problems. As the IT-SWAP is very much horizontal (covering a lot of other SWAP's), there are possibilities to combine IT with other sectors. For instance: IT-budget can be used for supply on infrastructure in rural areas, whereas the Agricultural and Rural development SWAP can be used for subsidizing PC's for farmers and training of farmers.

## 6.6 Bringing it together

As discussed in previous chapters there are various ways to use all these funding possibilities and policy options. What is most important is that there is a direct

dialogue between the region and the national level. This requires coordination on both sides:

- On the regional local level, to bundle demand and specify the needs. This can be done through LAG's or local authorities who should actively be involved in the Strategic Action Plan;
- On the national level by coordinating the various policies (rural development, agriculture, e-Government, infrastructure, education, health, regional economic development, SME-policy, EU-funding). There should be one organization or institution appointed as a coordinating body.

A good and productive dialogue can only be achieved by direct contacts between the local/regional coordinator and the national coordinator. The national coordinator should have the overview of all funding possibilities as described above, where it is important to realize that a lot of funding on the local level will directly come from the EU- and/or national level. As far as we can judge, the challenge is not so much a lack of funding possibilities but much more a lack of communication between the national and the local/regional level. So, it is more an organizational question than a financial question: the gap can be closed only if there are short and direct lines (not only literally) between the actors on both levels. We'll show this in the next part of this report by going into more detail on the financial possibilities.

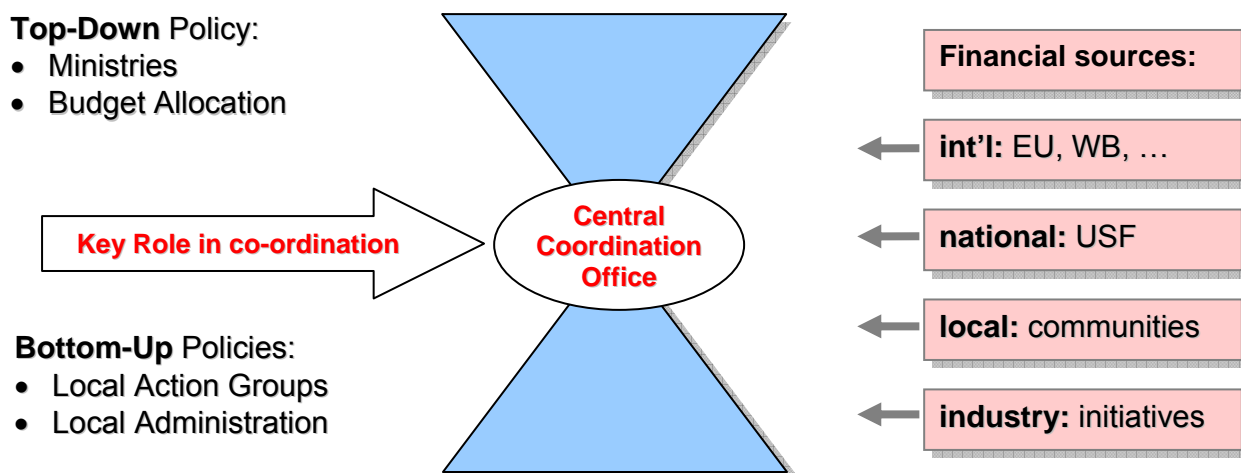


Figure 9: Organizational setup and financial sourcing

## 7 A Potential Vision and Roadmap for demand stimulation in rural areas

### 7.1 Introduction

In this chapter we develop a potential vision and Roadmap for using bottom-up policies like demand stimulation for Rural ICT development. We do this to illustrate how these bottom-up policies can be applied. As mentioned earlier, we have not prioritized ICT against other needs of people in rural areas. This is outside of the scope of this report.

### 7.2 Vision

Before being able to develop a Roadmap, we need to determine the destination: where are we going?

For this report we have chosen the vision **to have a connected PC in every household in Ukraine**. We have not determined by when this needs to be accomplished since this is not relevant for our purpose. This vision is used only to be able to produce a targeted Roadmap and is not necessarily the vision of the Ukrainian Government.

### 7.3 Starting points

There are several mechanisms already in place to enable connectivity in Rural ICT in Ukraine. Ukrtelecom has fiber-optic links to 500 regional centers. Also, the Regulator is issuing Wimax licences which enable connectivity in rural areas, but commercial operators will only cover areas where there is sufficient demand. Last but not least, the mobile operators are already providing connectivity in many rural areas. This means it is technically feasible to provide connectivity in many cases, but it does not mean that these services are affordable for potential users.

We have not come across Government policies that support the PC penetration in rural Ukraine, apart from individual schools initiatives.

## 7.4 Geography

We believe that 'ICT islands' do not work. We believe that it is logical that ICT development follows economic development. As is known from both regional economic development theory and practice, specially in a period of transition, economic growth starts in the urban areas, and spreads out to the more rural areas. Within the rural areas it is the regional centers that perform such an 'engine' role. Therefore it is logical to start the roll-out from there, as this is where demand is highest, and then follow the economic-geographical pattern of the region ( the 'hierarchy' of settlements). Of course it depends on the specific geographical order of each region what this will mean in reality.

## 7.5 Roadmap for demand stimulation

This paragraph provides a Roadmap for the process of demand stimulation. A graphical presentation is provided in figure 10.

### **Initiation**

The process of demand stimulation would normally start at State Level. The State initiates a Rural ICT development communications campaign because it believes that ICT is an important infrastructure for economic development. Demand stimulation can also be initiated by a group of individual citizens or companies that believe ICT development for their region or village is important.

The communication campaign of the Government would deliver two main messages to rural communities:

- 1) We believe an ICT infrastructure is important for the development of your region/village, its citizens and the businesses.
- 2) If you are convinced of this as well, the Government can help you to make this into a reality.

### **Establishment of the Local Action Group**

The Local Action Group is the local driver behind the ICT development process. A Local Action Group can consist of local citizens, business and local government representatives. After formation of this group, they develop an ICT vision for their region, test in their society whether the vision they developed is supported by the community and make the community enthusiastic for the vision. If this is done professionally, it may create a wave of enthusiasm and energy within the community and makes people want to participate. This is the actual demand stimulation process.

In parallel, the Local Action Group will have to develop a business plan and a funding plan to see whether they can get the vision funded. The idea is that the Government and maybe external organizations provide technical assistance for the business plan and funding plan, since this requires expertise that is generally not available within a local community.

The business plan is an essential document. It will make assumption (based on discussions with the community) on the number of people that want to join, what they will pay for the services they will receive, required investments and operational costs and, in many cases, the financial gap that needs to be filled. It will also describe (after discussions with potentially interested funding partners) which parties will contribute to filling the gap and under which conditions.

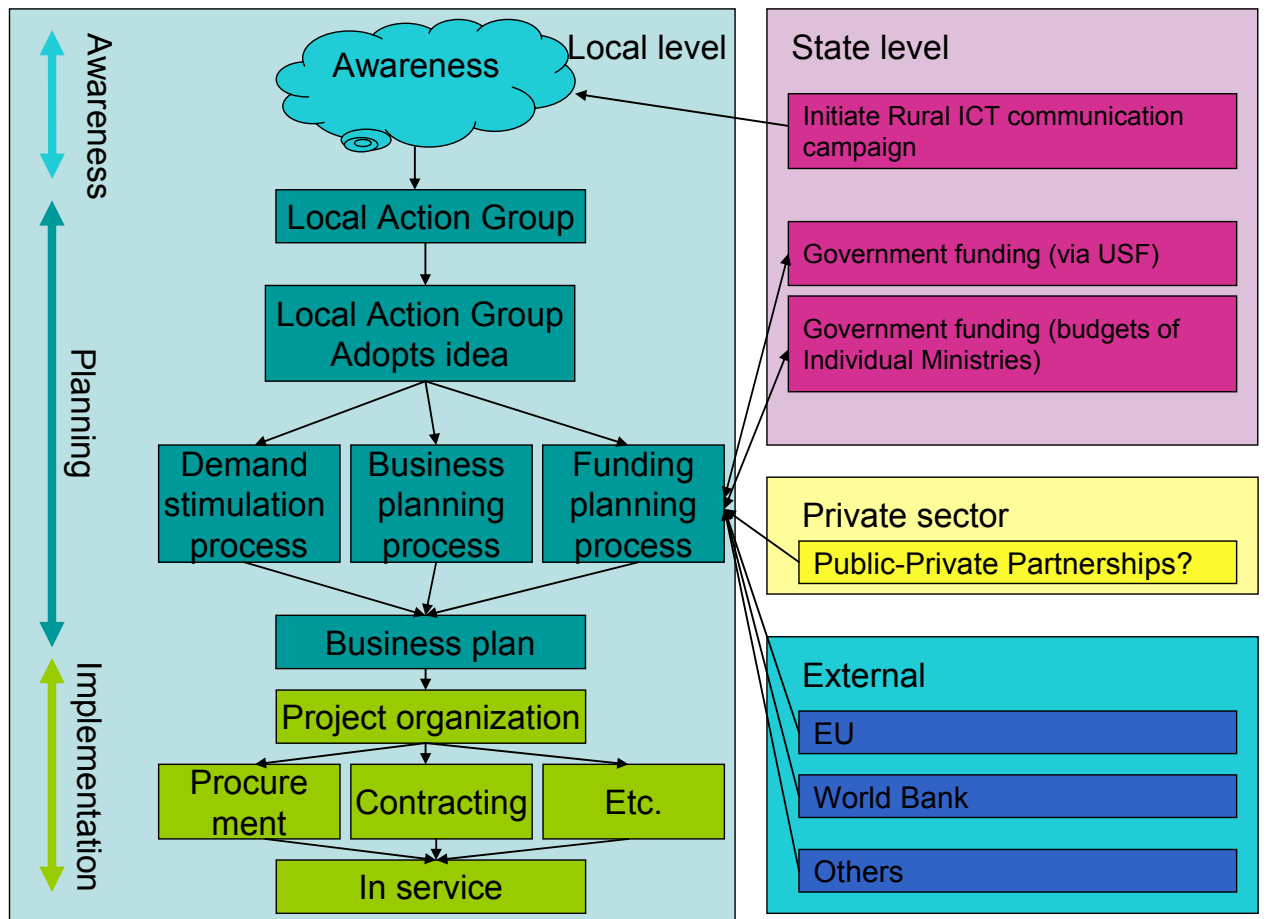


Figure 10: potential Roadmap for demand stimulation

The process of coming to a business plan needs a lot of interaction with both interested private sector companies and the central Government, given that most of the funds eventually provided by external sources will be channelled through the central Government.

### **Implementation**

When the business plan and its funding are agreed upon, the process of implementation can start. It will start with the setup of a project organization that is responsible for the implementation of the business plan.

## **PART III: HIGH-LEVEL BUSINESS CASES**

## 8 Developing Regional Business Cases

### 8.1 Objectives and Methodology

The main objective of the regional business cases is to illustrate the overall levels of funding requirements for providing broadband services to rural areas in Ukraine. The business model constructed for this purpose supports the following features:

- Separate projections of funding needs for network infrastructure and for computer hardware
- Sensitivity analysis for end user subscription prices based on different levels of infrastructure and hardware subsidies
- Sensitivity analysis for various cost parameters, such as sales, marketing and the costs of backhauling (monthly cost for linking up to the Internet)

As mentioned in Part I of this report, Ukraine is divided into twenty-four oblasts (regions) and one autonomous republic Crimea. The oblasts are subdivided into 494 raions (districts).

The approach for modeling the business cases is based on bottom-up regional data on the level of individual raions (districts). This was the smallest granularity of data available. Typically, each oblast has a certain number of urban districts and a larger number of rural districts. As this report's main focus is on the development of rural areas, the model only takes these rural raions into account. We assume that cities and towns will be adequately covered by commercially viable operations.

The business model is based on WiMAX technology for providing fixed-wireless broadband access services. This technology has been chosen for several reasons:

- Coverage of larger geographic areas (up to 50km radius) from one single basestation
- Relative low-cost compared to other technology (cost per basestation around \$20,000)
- Easily upgradeable to higher data rates and speeds, as required by customer demand

As discussed in previous chapters, the main drivers of service adoption has to be the availability of appropriate applications and relevant content. Such applications and

content however, will only be developed if access to service infrastructure is provided. The provision of such service infrastructure is the prerequisite for the development of local content and applications.

Currently, there are no reliable data on demand forecasting available. We therefore use a scenario-based approach using different parameter sets for the speed of service adoption by customers. These parameters as well as other main assumptions are discussed in the following section.

The overall methodology of the business cases is based on a Cash Flow analysis, projected for an operating company which rolls-out and operates a series of WiMAX basestations to provide broadband connectivity. The Cash Flow methodology allows for an easy assessment of the overall viability of the business cases: If the cumulative Cash Flow becomes positive after a certain period – we use a maximum of 5 years – then the overall project is economically viable.

To make the overall business cases viable, end user prices would need to be in the area of \$20 per month. This is however not realistic in rural areas, where monthly income levels are below \$200 per month. The business cases therefore examine the impact of different levels of subsidies for the network infrastructure (which could be up to 100% subsidized) to determine end-user price levels, which would still allow for a profitable business case.

One possible source of subsidies could be the contributions from the Universal Service Fund (USF). The potential volume of this fund has been estimated in Chapter 6.4. However, it is a political decision and prioritization on how to allocate this fund. The following chapters will use the projected size of the fund merely as comparison to illustrate the orders of magnitude necessary for subsidies to create viable business cases in rural Ukraine. Other sources of subsidies might be required and more appropriate to e.g. fund the necessary PC hardware needed to access broadband services.

## 8.2 Main Assumptions

### 8.2.1 Roll-out and Customer take-up

For each oblast we develop different rollout scenarios based on S-curves. As mentioned before, reliable data on demand forecasting is not available in Ukraine. We therefore use a scenario-based approach on different speeds of customer adoption. The S-curves for customer adoption used in the 4 different model scenarios are shown in Figure 11.

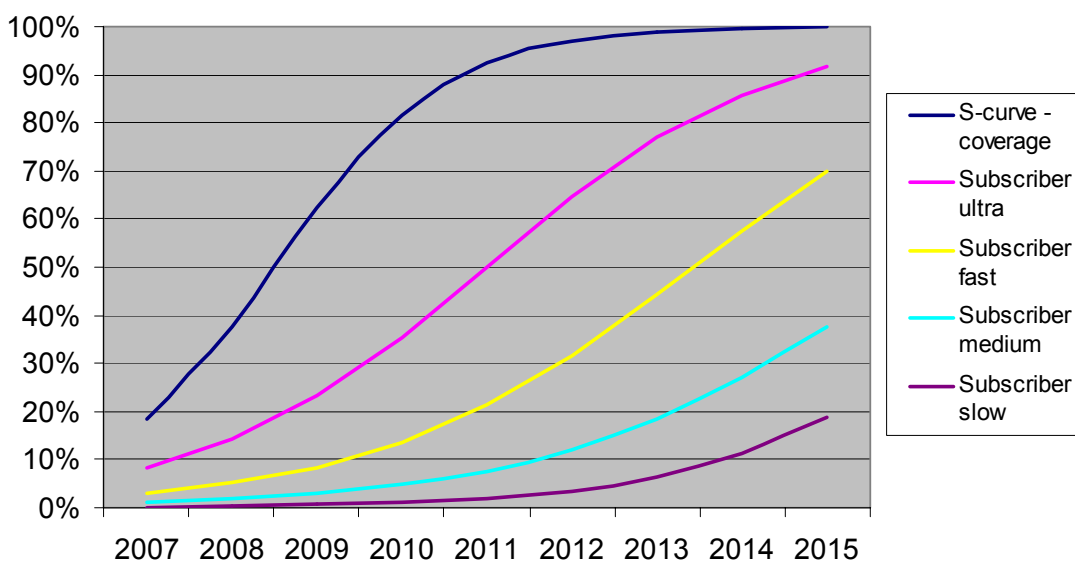


Figure 11: S-curve parameters for different subscriber adoption rates: slow, medium, fast, “ultra”

All curves in Figure 11 are projected for a 10 year period, whereas the business case will only cover a 5 year period. This is reasonable, as investments in ICT infrastructure should aim at a maximum 5-year pay-back period.

Figure 11 also shows the coverage roll-out curve. This growth curve shows a rapid coverage roll-out, which is achievable due to the relatively large coverage area of one WiMAX basestation. The growth curve parameters are based on a policy assumption, that 50% of rural areas should be covered within 2.5 years of operations.

## 8.2.2 Technical and Financial Assumptions

The following chart shows some basic WiMAX parameters as defined by Intel.

Range	< 4 miles	4-6 miles	> 6 miles
Base-station cost ('04 pricing)	\$5k - \$20k for WISP class \$20k+ for carrier	same	same
CPE price	< \$300	same	same
Adaptive modulation scheme	64 QAM	16 QAM	½ QPSK up to 16 QAM
Data throughput (20 MHz channel*)	75 Mbit/s	50 Mbit/s	17 Mbit/s to 50 Mbit/s depending on link quality
No. of business users (T1 level) 1	206	138	46 to 138
No. of residential users (512 kbit/s) 2	1,552	1,035	345 to 1,035

Source: Intel  
Assumes two 10MHz bands in the base station as benchmark for comparison purposes. Over-subscription rate is 5x for business and 12.5x for residential. Also takes into account overhead (efficiency), which for 802.16 is 85% independent of number of users.

Figure 12: Basic characteristics and cost assumptions for WiMAX systems

The main technical and financial parameters used in the model are summarized in the following table:

Cost Inputs and Assumptions		
	Unit	Cost
License Fee	\$	200,000
Basestation Cost	\$	20,000
Setup-cost for Backhaul	\$	250
Monthly Backhaul link (2Mbps)	\$/month	100
Customer Premises Equipment	\$	150
Cost per PC	\$	500
<b>OPEX is based on % of cumulative CAPEX (for operations and maintenance):</b>		
annual OPEX per Basestation		10%
annual OPEX per backhaul link		10%
annual OPEX per CPE		10%

<b>OPEX for marketing and sales is percentage of revenue:</b>		
Marketing percentage		10%
SG&A percentage		25%
<b>Dimensioning Parameters:</b>		
Max. customers per basestation		1,000
Reserved Bandwidth per user	kbps	64

*Table 5: Main financial and technical parameters used in the business model*

As shown in Table 5, we use a relatively low reserved bandwidth per user of 64kbps, combined with a relatively high number of subscribers per basestation (1,000) in order to keep overall investment needs as low as possible. We still consider these parameters sufficient to provide adequate services in the rural areas under research.

The monthly cost of a 2Mbps Internet uplink is based on the assumption, that the basestation will be close to one of Ukrtelecom's rural centers, which provide fiber-connectivity. The price of \$100 per months is based on a business-type of DSL connection, which should be sufficient for offering wireless-ISP-grade services.

For the roll-out of services, the model prioritizes raions based on their population density: Starting with the most densely populated areas and moving along the coverage S-curve to include lower density areas until all rural raions are covered. Due to very low population density, a few raions may not be covered within the projected 5 year business period.

In the covered areas, service adoption by customers will then follow the different scenario adoption curves shown in the previous section. In case of more rapid customer adoption, additional basestations will be added with required by capacity needs.

### **8.3 Selection of Regions**

As discussed in Part II, a test of bottom-up policy measures should be carried out in one or two selected oblasts. We have chosen Vinnytsia and Cherkasy, as both oblasts have a very large percentage of rural population and are characterized by a large number of raions with low population densities. If the roll-out model does work in these regions, it can easily be adopted in other oblasts of Ukraine.

The following figure shows a map of Ukraine with its division into oblasts and raions. The Vinnytsia region has number II, the Cherkasy region number XXIII.



Figure 10: Oblasts and raions of Ukraine

Detailed characteristics of the two selected regions are discussed together with the main results of the business case analysis in the next chapters.

#### 8.4 Allocation of Universal Service Fund

Table 4 in Part II of this report has projected the available resources for the Universal Service Fund (USF) based on a 2% share of ICT services revenues. This fund could be distributed among the different oblasts based on the share of total population.

The following table shows the rural population numbers for Vinnytsia and Cherkasy:

<b>Rural Population:</b>		in %
<b>Ukraine Total:</b>	<b>14,962,618</b>	
<b>Vinnysia</b>	881,694	5.9%
<b>Cherkasy</b>	599,368	4.0%

*Table 6: Shares of rural population*

Using these population figures, the Universal Service Fund could then be allocated to these two regions by their share of total rural population:

<b>Projected USF fund (in '000 \$)</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>Vinnysia</b>	6,847	7,703	8,474	9,321	10,253
<b>Cherkasy</b>	4,655	5,237	5,760	6,336	6,970

*Table 7: Projected USF fund for Vinnysia and Cherkasy*

These numbers will be used in the following chapters as a comparison to the projected requirements for overall subsidies.

## 9 Business Case: Vinnytsia Region

### 9.1 Some Characteristics

The Vinnytsia region covers an area of 26,500 km<sup>2</sup> with a population of approximately 1.7 million. The Vinnytsia area makes up 4.5% of Ukraine's territory. The oblast is located in the central part of the right bank Ukraine. In the southwest along the Dnister river Vinnytsia shares a 200km long boarder with Moldova.

Administratively the oblast's territory is divided into 27 rural raions and 6 town districts. As discussed in the previous chapter, only the rural raions are used for the business modeling as we assume, that the town districts are viable through coverage by commercial operators.

The following table lists the individual raions and the number of villages and rural settlements in the Vinnytsia region.

	2001 population ('000)			Settle- ments of urban type	Village councils	Rural settle- ments	Area sq. km	Pop density people/sq. km
	TOTAL	urban	rural					
<b>Districts:</b>								
Bar	<b>62.5</b>	18.8	43.7	1	27	92	1,102	53.6
Bershad'	<b>71.3</b>	13.3	58	0	28	44	1,286	52.0
Vinnytsia	<b>74.2</b>	16.8	57.4	3	29	48	919	75.9
Haisyn	<b>64.8</b>	25.6	39.2	0	26	62	1,102	55.9
Zhmerynka	<b>44.1</b>	5.2	38.9	1	28	71	1,171	35.1
Illintsi	<b>42.5</b>	15.4	27.1	1	22	52	915	44.1
Kalynivka	<b>65</b>	20	45	0	28	57	1,086	56.6
Koziatyn	<b>47.7</b>	6.3	41.4	3	32	71	1,131	39.4
Kryzhopil'	<b>40.9</b>	9.6	31.3	1	19	44	884	43.5
Lypovets'	<b>44.3</b>	16.4	27.9	1	25	57	969	43.4
Lityn	<b>42.3</b>	7.1	35.2	1	22	61	960	41.2
Mohyliv-Podil's'kyi	<b>40.1</b>	4.4	35.7	1	27	53	933	40.1
Murovani Kurylivtsi	<b>32.8</b>	6.2	26.6	1	24	59	886	34.7
Nemyriv	<b>59.5</b>	21	38.5	2	40	92	1,292	43.7
Orativ	<b>27.3</b>	3.3	24	1	27	54	874	29.1
Pishchanka	<b>25.1</b>	7	18.1	2	13	27	595	39.8
Pohrebyshche	<b>37.7</b>	10.7	27	0	26	62	1,200	29.6
Teplyk	<b>35.3</b>	6.9	28.4	1	25	47	809	40.9

Tyvriiv	<b>47.8</b>	24	23.8	2	25	53	882	51.9
Tomashpil'	<b>40.8</b>	14.9	25.9	2	22	32	778	49.8
Trostianets'	<b>42.6</b>	8.3	34.3	1	17	36	945	42.3
Tul'chyn	<b>65.1</b>	25.5	39.6	2	23	48	1,124	55.1
Khmil'nyk	<b>44.1</b>	0	44.1	0	30	80	1,253	32.5
Chernivtsi	<b>28.7</b>	3.2	25.5	1	13	39	592	45.2
Chechel'nyk	<b>27.2</b>	5.6	21.6	1	15	21	759	33.6
Sharhorod	<b>64.9</b>	7.1	57.8	0	31	61	1,137	53.2
Yampil'	<b>47.7</b>	11.8	35.9	0	18	38	788	57.0
<b>Cities:</b>								
Vinnytsia	<b>356.7</b>	356.7	0	0	0	0	61	5794.0
Zhmerynka	<b>37.3</b>	37.3	0	0	0	0	18	2053.3
Koziatyn	<b>27.6</b>	27.6	0	0	0	0	9	3038.6
Ladyzhyn	<b>23.5</b>	22.2	1.3	0	0	3	11	2109.0
Mohyliv-Podil's'kyi	<b>33.1</b>	32.8	0.3	0	0	2	22	1489.9
Khmil'nyk	<b>27.9</b>	27.9	0	0	0	0	20	1382.2
<b>Total</b>	<b>1,772.4</b>	<b>818.9</b>	<b>953.5</b>	<b>29</b>	<b>662</b>	<b>1,466</b>	<b>26,513</b>	<b>63.9</b>

Table 8: Raions of Vinnytsia

## 9.2 Projected Regional Rollout and Coverage

As described in the previous chapter, the rural rollout of WiMAX basestations will follow an S-curve with the 50% coverage point reached after 2.5 years. Considering the size of each raion area, this coverage goal can be reached with one WiMAX basestation placed near the center of each region. In case of faster service pick-up additional capacity and/or additional basestations will automatically be added in the business model. The business case assumes that uplink capacity is easily accessible through one of the rural centers of Ukrtelecom's fiber network.

The following table shows the rollout schedule for basestations in the different raions of Vinnytsia. Only 2 districts will not be covered within the 5 year projected timeframe, as their population density is extremely low.

District:	projected 2006 population ('000)			ROLLOUT SCHEDULE				
	TOTAL	urban	rural	2007	2008	2009	2010	2011
Bar	<b>59.0</b>	18.6	40.4		1	1	1	1
Bershad'	<b>66.8</b>	13.2	53.6		1	1	1	1
Vinnytsia	<b>69.7</b>	16.6	53.1	1	1	1	1	1
Haisyn	<b>61.6</b>	25.4	36.2	1	1	1	1	1
Zhmerynka	<b>41.1</b>	5.2	36.0				1	1
Illintsi	<b>40.3</b>	15.3	25.1			1	1	1

Kalynivka	61.4	19.8	41.6	1	1	1	1	1
Koziatyn	44.5	6.2	38.3				1	1
Kryzhopil'	38.5	9.5	28.9			1	1	1
Lypovets'	42.0	16.2	25.8			1	1	1
Lityn	39.6	7.0	32.5			1	1	1
Mohyliv-Podil's'kyi	37.4	4.4	33.0				1	1
Murovani Kurylivtsi	30.7	6.1	24.6				1	1
Nemyriv	56.4	20.8	35.6			1	1	1
Orativ	25.5	3.3	22.2					
Pishchanka	23.7	6.9	16.7				1	1
Pohrebyshche	35.6	10.6	25.0					
Teplyk	33.1	6.8	26.3				1	1
Tyvrviv	45.8	23.8	22.0		1	1	1	1
Tomashpil'	38.7	14.8	23.9		1	1	1	1
Trostianets'	39.9	8.2	31.7			1	1	1
Tul'chyn	61.9	25.3	36.6	1	1	1	1	1
Khmil'nyk	40.8	0.0	40.8					1
Chernivtsi	26.8	3.2	23.6		1	1	1	1
Chechel'nyk	25.5	5.5	20.0					1
Sharhorod	60.5	7.0	53.4		1	1	1	1
Yampil'	44.9	11.7	33.2	1	1	1	1	1
<b>TOTAL</b>	<b>1,191.7</b>	<b>311.5</b>	<b>880.2</b>					

Table 9: Rollout Schedule for raions of Vinnytsia

## 9.3 Main Results and Funding Needs

### 9.3.1 Example Scenario: Fast subscriber adoption

An example for one (of several different) viable scenarios is shown in table 10 below. These results are based on the following input parameters:

- Monthly end-user subscription fee: \$9
- Cost per end-user PC: \$500
- Level of network equipment and PC subsidy: 70%
- Penetration after 5 years: 8.5%
- Subscriber number after 5 years: 101,233

Here are the results for this scenario:

<b>all numbers in '000 \$</b>						
	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>TOTAL</b>
Revenues	1,277	2,799	4,946	8,009	11,970	
OPEX	1,172	2,497	4,245	6,432	9,235	
<b>CAPEX</b>	515	632	852	1,057	1,285	<b>4,341</b>
TOTAL Cost	1,687	3,128	5,097	7,489	10,520	
<b>CashFlow</b>	-386	-329	-120	531	1,531	
<b>Cumulative CF</b>	-386	-715	-835	-304	1,228	
<b>Network subsidy</b>	1,202	1,474	1,988	2,467	2,999	<b>10,130</b>
<b>PC subsidy</b>	2,921	4,473	6,456	9,284	12,297	<b>35,432</b>
<b>TOTAL subsidy</b>	<b>4,123</b>	<b>5,947</b>	<b>8,445</b>	<b>11,751</b>	<b>15,295</b>	<b>45,561</b>
<b>available from USF</b>	<b>6,847</b>	<b>7,703</b>	<b>8,474</b>	<b>9,321</b>	<b>10,253</b>	<b>42,598</b>
<b>Number of Basestations</b>	<b>10</b>	<b>25</b>	<b>51</b>	<b>77</b>	<b>114</b>	
<b>Subscriber Number</b>	<b>8,346</b>	<b>21,126</b>	<b>39,573</b>	<b>66,100</b>	<b>101,233</b>	
<b>Geographic coverage</b>	25%	50%	72%	89%	<b>95%</b>	
<b>Penetration</b>	0.70%	1.8%	3.3%	5.5%	<b>8.5%</b>	

Table 10: Main business case results

For this scenario, cumulative Cash Flow becomes positive after 5 years. Total subsidy requirements are \$45.5mln. The largest part of subsidies is needed for PC hardware – which could be reduced if alternative means (e.g. local initiatives) could be used for additional funding.

As a comparison, the allocation from the USF for Vinnytsia for the 5-year period is \$42.6mln, which is close to the overall subsidy need as projected by the model. Network subsidy requirements compare to approximately 24% of available USF.

### 9.3.2 Subsidy level and end-user pricing

To offer affordable end-user prices, network infrastructure and PC hardware will need to be subsidized in rural areas. The following charts illustrates, which monthly end-user prices are viable for which level of subsidy.

For a “slow” subscriber adoption rate, only 8,800 subscribers will use this service in Vinnytsia. In this case, the relation of monthly end-user price and subsidy levels looks like this:

	Subsidy percentage:									
	10	20	30	40	50	60	70	80	90	100
\$5	-1939	-1778	-1617	-1456	-1294	-1133	-972	-811	-650	-489
\$6	-1774	-1613	-1452	-1291	-1130	-969	-807	-646	-485	-324
\$7	-1609	-1448	-1287	-1126	-965	-804	-643	-482	-320	-159
\$8	-1445	-1284	-1122	-961	-800	-639	-478	-317	-156	-7
\$9	-1280	-1119	-958	-797	-635	-474	-320	-174	-28	117
\$10	-1115	-954	-793	-634	-487	-341	-195	-48	96	238
\$11	-950	-801	-655	-508	-362	-215	-70	74	217	358
\$12	-822	-675	-529	-382	-237	-92	53	196	338	478
\$13	-696	-550	-404	-259	-113	31	174	317	457	596
\$14	-571	-426	-281	-135	10	153	295	436	576	715
\$15	-448	-302	-157	-12	131	273	415	555	695	833
\$16	-324	-179	-34	109	251	393	535	674	813	951
\$17	-201	-56	87	229	372	514	653	793	932	1069
\$18	-78	65	208	350	492	632	772	912	1050	1187
\$19	44	186	328	470	612	751	891	1030	1168	1305
\$20	164	306	448	590	730	870	1010	1148	1286	1423

Table 11: Cumulative Cash Flow depending on subsidy percentage end monthly end-user price in “slow” scenario: negative numbers (red cells) indicate, that this combination is economically not viable.

In this scenario only a 100% equipment subsidy will allow for a monthly subscription price of less than \$10.

In the fast adoption scenario (100,000 subscribers after 5 years), the picture looks much more positive:

	Subsidy percentage:									
	10	20	30	40	50	60	70	80	90	100
\$5	-12046	-11069	-10095	-9120	-8146	-7171	-6196	-5222	-4247	-3273
\$6	-9880	-8891	-7902	-6927	-5953	-4978	-4004	-3029	-2055	-1080
\$7	-7688	-6695	-5736	-4797	-3861	-2937	-2013	-1089	-166	744
\$8	-5929	-5003	-4076	-3150	-2224	-1298	-372	542	1448	2343
\$9	-4307	-3381	-2455	-1529	-603	318	1228	2131	3029	3917
\$10	-2686	-1760	-834	91	1001	1911	2810	3707	4597	5482
\$11	-1065	-139	774	1684	2590	3488	4385	5275	6162	7045
\$12	547	1457	2367	3269	4167	5063	5953	6841	7725	8608

Table 12: Cumulative Cash Flow depending on subsidy percentage end monthly end-user price in “fast” scenario: negative numbers (red cells) indicate, that this combination is economically not viable.

In this “fast” scenario, end-user prices below \$10 per month are feasible as of 60% infrastructure subsidy.

## 10 Business Case: Cherkasy Region

### 10.1 Some Characteristics

Cherkasy is the 18th largest oblast of Ukraine, comprising about 3.5% of the area of the country. The south flowing Dnieper River with the hilly western bank and the plain eastern bank divides the oblast into two parts.

Administratively Cherkasy's territory is divided into 20 rural raions and 6 town districts. As discussed in chapter 8, only the rural raions are used for the business modeling as we assume, that the town districts are viable through coverage by commercial operators.

The following table lists the individual raions and the number of villages and rural settlements in the Cherkasy region.

	2001 population ('000)			Settlements of urban type	Village councils	Rural settlements	Area sq. km	Pop density people/sq.km
	TOTAL ('000)	urban	rural					
<b>Districts:</b>								
Horodyshe	<b>49.3</b>	20.6	28.7	2	17	29	866	<b>53.8</b>
Drabiv	<b>42.6</b>	10.4	32.2	2	31	49	1,161	<b>34.3</b>
Zhashkiv	<b>45.6</b>	15.8	29.8	0	32	37	964	<b>44.5</b>
Zvenyhorodka	<b>53.7</b>	19.9	33.8	0	27	39	1,010	<b>50.1</b>
Zolotonosha	<b>48.6</b>	0	48.6	0	34	60	1,493	<b>30.0</b>
Kam'yanka	<b>35.4</b>	15.1	20.3	0	18	29	725	<b>46.2</b>
Kaniv	<b>24.7</b>	0	24.7	0	29	60	1,283	<b>17.8</b>
Katerynopil'	<b>28.9</b>	10.8	18.1	2	22	31	672	<b>40.5</b>
Korsun'-Shevchenkivs'kyi	<b>50</b>	23.3	26.7	1	23	52	896	<b>52.9</b>
Lysianka	<b>28.7</b>	8.2	20.5	1	27	38	746	<b>36.1</b>
Man'kivka	<b>33.1</b>	10.9	22.2	2	21	29	765	<b>40.7</b>
Monastyryshche	<b>40.6</b>	13.4	27.2	1	28	39	719	<b>53.1</b>
Smila	<b>38.2</b>	0	38.2	0	23	37	934	<b>37.8</b>
Tal'ne	<b>43.6</b>	16.4	27.2	0	27	42	917	<b>44.8</b>
Uman'	<b>51.5</b>	2.6	48.9	1	49	52	1,400	<b>34.1</b>
Khrystynivka	<b>39.2</b>	15.9	23.3	1	21	33	632	<b>58.6</b>
Cherkasy	<b>79.1</b>	1	78.1	1	22	38	1,609	<b>45.4</b>
Chornobai	<b>49.7</b>	8.4	41.3	0	18	36	1,217	<b>38.1</b>

Chyhyryn	<b>36.1</b>	12	24.1	1	29	52	1,554	<b>21.9</b>
Shpola	<b>52.1</b>	19.4	32.7	0	27	36	1,105	<b>44.4</b>
<b>Towns:</b>								
Cherkasy*	<b>296.2</b>	295.4	0.8	0	0	1	78	<b>3705</b>
Vatutine*	<b>21</b>	20.2	0.8	0	0	1	11	<b>1859</b>
Kaniv	<b>26.7</b>	26.7	0	0	0	0	17	<b>1533</b>
Zolotonosha*	<b>29.9</b>	28.8	1.1	0	0	3	45	<b>647</b>
Smila*	<b>69.7</b>	69.7	0	0	0	1	40	<b>1700</b>
Uman'	<b>88.7</b>	88.7	0	0	0	0	41	<b>2111</b>

Table 13: Raions of Cherkasy

## 10.2 Projected Regional Rollout and Coverage

As described in the previous chapter, the rural rollout of WiMAX basestations will follow an S-curve with the 50% coverage point reached after 2.5 years. Considering the size of each raion area, this coverage goal can be reached with one WiMAX basestation placed near the center of each region. In case of faster service pick-up additional capacity and/or additional basestations will automatically be added in the business model. The business case assumes that uplink capacity is easily accessible through one of the rural centers of Ukrtelecom's fiber network.

The following table shows the rollout schedule for basestations in the different raions of Cherkasy. Only 1 district (Kaniv) will not be covered within the 5 year projected timeframe, as its population density is extremely low.

District:	projected 2006 population ('000)			ROLLOUT SCHEDULE				
	TOTAL	urban	rural	2007	2008	2009	2010	2011
Horodyshe	<b>46.6</b>	20.1	26.5	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Drabiv	<b>39.9</b>	10.1	29.7				<b>1</b>	<b>1</b>
Zhashkiv	<b>42.9</b>	15.4	27.5			<b>1</b>	<b>1</b>	<b>1</b>
Zvenyhorodka	<b>50.6</b>	19.4	31.2		<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Zolotonosha	<b>44.9</b>	0.0	44.9					<b>1</b>
Kam'yanka	<b>33.5</b>	14.7	18.7		<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Kaniv	<b>22.8</b>	0.0	22.8					
Katerynopil'	<b>27.2</b>	10.5	16.7			<b>1</b>	<b>1</b>	<b>1</b>
Korsun'-Shevchenkivs'kyi	<b>47.4</b>	22.7	24.6	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Lysianka	<b>26.9</b>	8.0	18.9				<b>1</b>	<b>1</b>
Man'kivka	<b>31.1</b>	10.6	20.5			<b>1</b>	<b>1</b>	<b>1</b>
Monastyryshche	<b>38.2</b>	13.1	25.1	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Smila	<b>35.3</b>	0.0	35.3				<b>1</b>	<b>1</b>

Tal'ne	41.1	16.0	25.1		1	1	1	1
Uman'	47.7	2.5	45.1				1	1
Khrystynivka	37.0	15.5	21.5	1	1	1	1	1
Cherkasy	73.1	1.0	72.1		1	1	1	1
Chornobai	46.3	8.2	38.1			1	1	1
Chyhyryn	34.0	11.7	22.2					1
Shpola	49.1	18.9	30.2			1	1	1
<b>TOTAL</b>	<b>815.5</b>	<b>218.7</b>	<b>596.9</b>					

Table 14: Rollout schedule for raions of Cherkasy

The following chart shows the number of projected subscribers per raion in the “fast” adoption scenario.

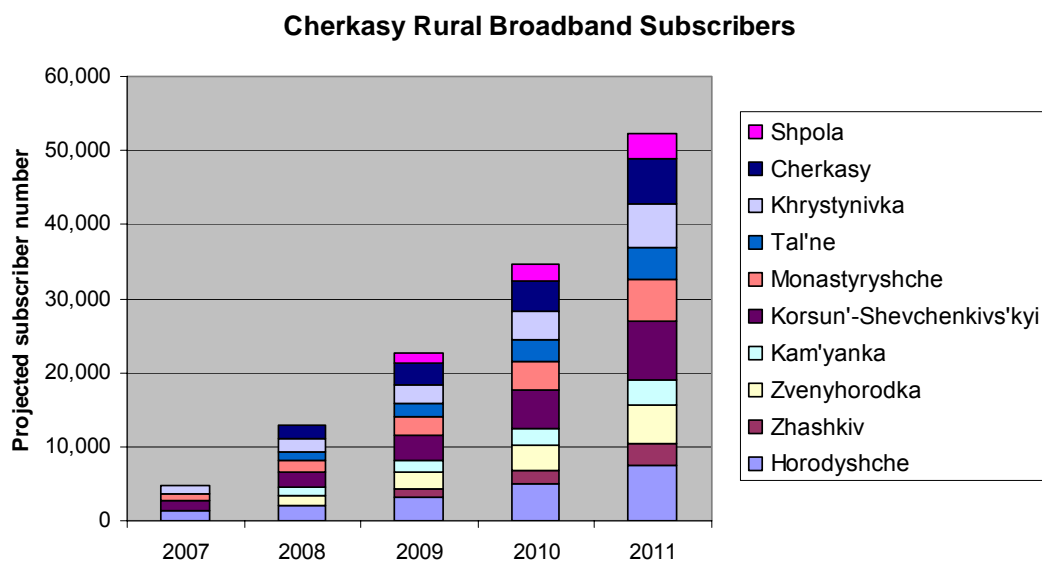


Figure 11: Subscriber projection for Cherkasy in “fast” adoption scenario

## 10.3 Main Results and Funding Needs

### 10.3.1 Example Scenario: Fast subscriber adoption

An example for one (of several different) viable scenarios is shown in table 15 below. These results are based on the following input parameters:

- Monthly end-user subscription fee: \$9
- Cost per end-user PC: \$500
- Level of network equipment and PC subsidy: 70%
- Penetration after 5 years: 8.3%
- Subscriber number after 5 years: 67,000

Here are the results for this scenario:

<b>all numbers in '000 \$</b>						
	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>TOTAL</b>
Revenues	730	1,729	3,208	5,238	7,983	
OPEX	727	1,583	2,779	4,203	6,148	
<b>CAPEX</b>	334	400	565	712	882	<b>2,893</b>
TOTAL Cost	1,061	1,984	3,344	4,915	7,030	
<b>CashFlow</b>	-306	-255	-131	307	978	
<b>Cumulative CF</b>	-306	-561	-692	-385	593	
<b>Network subsidy</b>	780	934	1,317	1,662	2,058	<b>6,751</b>
<b>PC subsidy</b>	1,671	2,859	4,386	6,181	8,461	<b>23,557</b>
<b>TOTAL subsidy</b>	<b>2,450</b>	<b>3,793</b>	<b>5,703</b>	<b>7,843</b>	<b>10,519</b>	<b>30,309</b>
<b>available from USF</b>	<b>4,655</b>	<b>5,237</b>	<b>5,760</b>	<b>6,336</b>	<b>6,970</b>	<b>28,958</b>
<b>Number of Basestations</b>	<b>8</b>	<b>17</b>	<b>32</b>	<b>51</b>	<b>76</b>	
<b>Subscriber Number</b>	<b>4,774</b>	<b>12,943</b>	<b>25,475</b>	<b>43,134</b>	<b>67,307</b>	
<b>Geographic coverage</b>	<b>21%</b>	<b>45%</b>	<b>69%</b>	<b>88%</b>	<b>97%</b>	
<b>Penetration</b>	<b>0.59%</b>	<b>1.6%</b>	<b>3.1%</b>	<b>5.3%</b>	<b>8.3%</b>	

Table 15: Main business case results

For this scenario, cumulative Cash Flow becomes positive after 5 years. Total subsidy requirements are \$30.3mln. The larger part of the funding will actually be used for subsidizing PC hardware – this subsidy could be reduced if alternative means (e.g. local initiatives) could be used for additional funding. The projected subsidy for network infrastructure is \$6.75mln. As comparison, the projected allocation from the USF for Cherkasy is \$29mln for the 5-year period.

### 10.3.2 Subsidy level and end-user pricing

To offer affordable end-user prices, network infrastructure and PC hardware will need to be subsidized in rural areas. The following charts illustrate, which monthly end-user prices are viable for which level of subsidy.

For a “slow” subscriber adoption rate, only 5,700 subscribers will use this service in Cherkasy. In this case, the relation of monthly end-user price and subsidy levels looks like this:

	Subsidy percentage:									
	10	20	30	40	50	60	70	80	90	100
\$5	-1509	-1384	-1260	-1135	-1010	-885	-760	-635	-511	-386
\$6	-1404	-1279	-1155	-1030	-905	-780	-655	-531	-406	-281
\$7	-1299	-1174	-1050	-925	-800	-675	-550	-426	-301	-176
\$8	-1194	-1070	-945	-820	-695	-570	-445	-321	-196	-71
\$9	-1089	-965	-840	-715	-590	-465	-340	-216	-95	17
\$10	-984	-860	-735	-610	-485	-360	-240	-127	-15	96
\$11	-879	-755	-630	-505	-385	-272	-160	-47	64	174
\$12	-775	-650	-530	-417	-305	-192	-80	32	141	250
\$13	-674	-562	-450	-337	-225	-112	-1	109	219	327
\$14	-594	-482	-369	-257	-145	-33	77	186	295	403
\$15	-514	-402	-290	-178	-66	44	154	264	372	479
\$16	-434	-322	-211	-99	12	122	232	340	448	554
\$17	-355	-244	-132	-20	90	199	308	416	524	630
\$18	-277	-165	-53	57	167	276	385	492	600	706
\$19	-198	-86	25	134	244	353	461	568	675	781
\$20	-119	-7	102	211	320	429	537	644	751	856

Table 16: Cumulative Cash Flow depending on subsidy percentage end monthly end-user price in “slow” scenario: negative numbers (red cells) indicate, that this combination is economically not viable.

As table 16 shows, in this scenario only a 100% equipment subsidy will allow for a monthly subscription price of less than \$10 in rural Cherkasy.

In the fast adoption scenario (67,000 subscribers after 5 years), the picture looks much more positive:

	Subsidy percentage:									
	10	20	30	40	50	60	70	80	90	100
\$5	-8182	-7527	-6873	-6218	-5564	-4909	-4254	-3600	-2945	-2290
\$6	-6766	-6112	-5457	-4802	-4148	-3493	-2838	-2184	-1529	-874
\$7	-5350	-4696	-4041	-3386	-2761	-2139	-1516	-894	-272	345
\$8	-4181	-3558	-2935	-2313	-1691	-1070	-448	171	781	1385
\$9	-3134	-2511	-1888	-1264	-641	-19	593	1204	1808	2408
\$10	-2086	-1463	-840	-217	399	1011	1620	2224	2825	3423
\$11	-1039	-416	204	816	1428	2035	2639	3241	3839	4435
\$12	9	621	1233	1845	2449	3053	3655	4254	4851	5446
\$13	1038	1650	2259	2863	3468	4070	4668	5266	5861	6456

Table 17: Cumulative Cash Flow depending on subsidy percentage end monthly end-user price in “fast” scenario: negative numbers (red cells) indicate, that this combination is economically not viable.

In this “fast” scenario, end-user prices below \$10 per month are feasible as of 70% infrastructure subsidy.

## **PART IV: INTERNATIONAL CASE STUDIES AND CONCLUSIONS**

## 11 International Case Studies

This chapter provides some case studies where demand stimulation was successfully applied in rural situations.

### 11.1 Nuenen (The Netherlands)

Nuenen is a rural village in The Netherlands. Although a rural situation in The Netherlands is incomparable with rural Ukraine, this case study is of interest because of the process that the citizens of this village went through.

The demand stimulation process in Nuenen was started by the director of the local housing corporation and some local entrepreneurs (hereafter referred to as the Local Action Group LAG). Although there was enough supply of telecommunications services and sufficient spending power, the LAG believed that ICT could bring more benefits to their society than it did at that point in time. But existing market players were just not providing the services that the community wanted.

One of the main issues in Nuenen is the aging population. The LAG envisioned that elderly could benefit much more from ICT. But in general this generation does not have and does not want to have a PC and Internet. So the LAG started a communication campaign with special focus on the elderly. They involved the whole community i.e. the mayor, priest, schools, sports clubs and developed some services specific for their community and appealing to the elderly, e.g.:

- Broadcasts of church masses to people don't have to go to the church
- E-health services by the local doctor
- A personal video communication service to communicate with family
- Community TV to see what is going on in the village
- Etcetera

Furthermore, the business plan was completed and it was decided that the organizational structure was having the form of a co-operation which means that the subscribers to the service are also the owners of the infrastructure.

In parallel the LAG started raising funds. Both the Netherlands Government and some private investors have provided funding, based on the expectation in the plans that the LAG could reach 40% penetration in Nuenen. After the funding was

arranged, network construction started. The LAG chose for an advanced optical fiber-to-the-home solution.

The network in Nueneu has been operating for two years now. Some highlights of the current situation:

- The penetration is over 90% now, which means that the financial situation of the co-operation is very healthy and subscriber costs could be lowered
- Many elderly people have been educated on using a PC and the Internet and are getting the benefits of ICT
- Existing market players are forced to rethink their strategies and better serve the community
- Nueneu has become an international hotspot and test bed for many ICT and broadband services

## 11.2 Västerbotten (Sweden)

Västerbotten is in the northern part of Sweden. It covers 66,500 square kilometers and has 256,000 people. They have a regional network called AC Net that has 50,000 users so far. Västerbotten wasn't exactly a target market for service providers until the municipality put the network in place and in essence, "aggregated" demand. Today every community in Västerbotten has access to the fiber network. A homeowner who wants a fiber connection has to pay a one-time installation fee of 2000 SKr (€ 212 or \$255) to cover equipment plus labor, and a 250 SKr (€ 27 or \$32) monthly fee. The homeowner can deduct the installation fee on his tax return. For some parts of the network, volunteers contributed in the network construction which reduced the fees.

Much of the fiber to the home deployments in sparsely populated areas in Sweden are done by the local energy utility, which is owned by the municipality. Although many fiber projects are supported by public funds, there are strict rules imposed by the European Union governing the use of the publicly funded networks. Access has to be wholesaled to commercial service providers on an open, non-discriminatory basis. This guarantees that there will be private companies participating in the exploitation of the network and also ensures that there is competition. The Governments' goal is simply to deploy an open network and seed the market. This seems to be the preferred public-private partnership model in Sweden, in large part because of strict EU rules governing the use of public funds for broadband infrastructure.

## **12 Conclusions and recommendations**

### **12.1 Conclusions**

In terms of ICT, the rural and mountainous regions of Ukraine are seriously underdeveloped. PC's and Internet-access for households and business communities could improve the possibilities for economic development: jobs and growth. ICT could also support applications for everyday life or business in rural areas.

At this moment rural development in general and, more specific, ICT-development in rural areas, is hardly on the political agenda in Ukraine.

If the Universal Service Fund is established according to the current plans (2% of telecommunications operators revenues), this could be applied for Rural ICT development subsidies. Business modeling for two rural regions of Ukraine illustrates that subsidies could enable broadband services to end users in these regions at a sustainable subscription level of less than \$10 per month.

### **12.2 Recommendations**

The Ukraine Government needs to establish a 'champion' for (rural) ICT development, who is able to put ICT higher on the political agenda.

If the Government wants to further develop Rural ICT it needs to develop a Strategic Action Plan for this subject. This needs to be done in partnership with the local/regional Government levels. Both the EU and the World Bank have the expertise and intention to help.

The Strategic Action Plan could contain a combination of top-down and bottom-up (demand stimulation and aggregation) policies as listed in part II of this report.

The next thing to do is to set up an organization to implement the action plan. A 'champion' from the national level has to coordinate with the 'champions' from the regional/local levels.

# **ANNEX**

**Copy of Data Request and List of Received and Reviewed Documents**

**Ukraine Rural ICT Demand Stimulation – First Data Request  
STATUS as of 13 Oct 2006**

**(A) Macro-economic indicators and data**

Item:	available English	available Ukrainian	already received
1. Population numbers and GDP per capita figures by region (smallest possible administrative unit)	<a href="http://www.ukrstat.gov.ua">http://www.ukrstat.gov.ua</a>		ok
2. Household size and income by region (smallest available administrative unit)			ok
3. Education levels of population by region	<a href="http://www.ukrcensus.gov.ua">http://www.ukrcensus.gov.ua</a>		
4. Ethnic groups by region	N/A		
5. Number of companies by size, region and turnover; split by company size should cover at least 3 categories: <ul style="list-style-type: none"> <li>o Entrepreneurs (e.g. home office workers)</li> <li>o SME (small and medium sized companies)</li> <li>o Large corporations</li> </ul>	different format, split by 5 regions		

**(B) Indicators of ICT sector**

Item:	available English	available Ukrainian	already received
1. Coverage numbers for fixed, mobile and broadband service; if possible, specified by region (urban vs. rural)			some in Sasktel report
2. Current and historic penetration numbers (past 5 years) for fixed lines, mobile phone, and broadband access; if possible, specified by region (urban vs. rural)			Epsicom up to 2003
3. Current and historic spend numbers for fixed, mobile and broadband services (e.g. average spend per month per user or household; spend per business user)			Credit Suisse mobile only
4. Indicators for broadband access: bandwidth per population, subscription prices, ...	expected		
5. List of fixed and mobile telecom operators with subscriber numbers and annual turnover figures			Epsicom 2003/04

6. Number of Internet Service Providers by size (number of subscribers); list of top 10 providers			<b>Paul Budde</b> 2004
7. "Computer literacy": access to computer training and/or Internet facilities	<b>expected</b>		

### (C) Policies and funding programs

<b>Item:</b>	<b>available English</b>	<b>available Ukrainian</b>	<b>already received</b>
1. Overall legal framework and regulatory policies covering ICT services in general and broadband access in particular			<b>ok</b>
2. List of government (national, regional and local) initiatives and programs for promoting ICT services	<b>Partially</b>		
3. Funding programs and budgets of public and private initiatives for developments in the ICT sectors (including conditions)	<b>N/A</b>	<b>N/A</b>	
4. Funding programs and amounts of subsidies for development programs in other infrastructure sectors with focus on rural areas (e.g. road, water, electricity, ...)	<b>N/A</b>	<b>N/A</b>	
5. Policies stimulating regional/rural development	<b>N/A</b>	<b>N/A</b>	
6. Relationships between public and private programs	<b>N/A</b>	<b>N/A</b>	

### (D) International support and investments

<b>Item:</b>	<b>available English</b>	<b>available Ukrainian</b>	<b>already received</b>
1. List of international initiatives and programs (public and private) for promoting ICT and other infrastructure services	<b>N/A</b>	<b>N/A</b>	
2. List of international companies active in the ICT sector (focus: infrastructure and service provisioning); levels of foreign investments	<b>Expected</b>		
3. other			

## List of Received Documents

### Set 1 – received by 3 Oct. 2006

Title:	refers to request #	Ukrainian	English
Overview (Text-Doc. with numbers from 2002)	<b>A1</b> (no region)		x
SEPTEMBER_2006_ECA_Regional_Tables_(final)(1).xls	<b>A1</b> for ECA		x
annual2004_en.pdf – Ukrtelecom Annual Report	<b>B</b> (Ukrtel)		x

### Set 2 – received by 6 Oct. 2006

Title:	refers to request #	Ukrainian	English
doc_pdf_pc=UA&doc_id=86265207.pdf 2005, Paul Budde Communication Pty Ltd: Ukraine – Telecoms Market Overview & Statistics	<b>B6</b>		x
doc_pdf_pc=UA&doc_id=89209473.pdf June 2005, Espicom Business Intelligence: Ukraine	<b>B1, 2, 5</b>		x
doc_pdf_pc=UA&doc_id=111322303.pdf Paul Budde Communication Pty Ltd: Europe (Eastern) – Telecoms, Mobile & Broadband, Overview and Analysis 2005	int'l bench- marking		x
investext-11456562.pdf Credit Suisse, 2006, Ukrainian Mobile Revenue Observation	<b>B3</b> (mobile)		x
ukr_ict.pdf WorldBank, ICT at a Glance: Ukraine, 2004	<b>B3</b> (basket)		x
Ukraine.doc ISI Emerging Markets – <a href="http://www.securities.com">www.securities.com</a> – Ukraine	market cap Ukrtel		x
“Canadian” 2004-05-21 Final Report V9.doc SaskTel 2004, Rural ICT in Ukraine	some rural numbers		x

### Set 3 – received by 10 Oct. 2006

Title:	refers to request #	Ukrainian	English
Household_expense.xls, Wages by region.xls Statistics from UkrStat.gov.ua	<b>A2</b>		x
natl-str_N04e.doc National Strategy of Telecommunications Sector Development for the Period Till 2010 [Cabinet of Ministers, 2004]	<b>C1</b>		x

Presentation for World Bank 23062005-2.ppt Rural Communication, Balazs Wieszt, Kyivstar GSM	<b>B</b> (mobile)		<b>x</b>
Chapter 2.pdf: World Bank Report, Chapter II: Growth, Employment and Regional Dynamics	<b>A1, A2</b>		<b>x</b>
appC.pdf: World Bank Report, DISTRIBUTION OF FIRMS IN FIVE SECTIONS OF UKRAINE	<b>A5</b>		<b>x</b>
2004-06 Ukraine Rural ICT Study Results.ppt Increasing access to ICT in Rural and Mountainous Ukraine, SaskTel 2004 – Final Presentation	<b>B</b> (partial)		<b>x</b>

#### Set 4 – received by 13 Oct. 2006

<b>Title:</b>	<b>refers to request #</b>	<b>Ukrainian</b>	<b>English</b>
Cellular Ukraine.doc Updated mobile figures, Feb 2006 from iKS-Consulting	<b>B2</b>		<b>x</b>
E-readiness24 Aug 2006.doc Report from Economist Intelligence Unit (2005)	<b>B1, B2</b>		<b>x</b>
GoldenTelecom FMC press release 10 Oct 06.doc	<b>B</b>		<b>x</b>
Software market in Ukraine.doc			<b>x</b>
Ukrtelecom Networks.ppt Charts of country-wide fiber network of Ukrtelecom			<b>x</b>

## **List of interviewees during the Fact Finding Mission**

<b>Organization</b>	<b>Interviewed representatives</b>
Ukraine Telecommunications Association TELAS	Yuriy Solovyov, Head of Council
Ministry of Finance, Regional Policy	Galina Karp, Director of Department
Ministry of Transport and Communications	Petro Yatsuk, Deputy Director
Telenor Kiev Office	Sigmund Ekhougen, Head Oleg Yakymchuk, Deputy Head
NCCR (Regulator)	Olga
EU, Delegation of European Commission	Sergiy Ladnyy, Project Manager Border Crossings, Information Society