



ITU-D Regional Development Forums 2010 on  
NGN and Broadband (ARB, EUR & CIS Regions):  
“NGN and Broadband, Opportunities and Challenges”

## Session 3

# Broadband Access Network Planning: Case Studies from the Region

*Ignat Stanev*  
*HCTP/ITC, Bulgaria*

ITU-D Forum

Chisinau (Moldova), 4-6 May 2010

Session 3-IS - 1

## Content of the presentation :

- ❖ Case studies and used planning tools
- ❖ Case study 1 – *Georgia (2007) for Administration :*
  - *Overall country BB market*
  - *BB access network for Tbilisi urban area*
  - *BB access network for suburban area*
- ❖ Case study 2 – *Tajikistan (2008) for Regulator :*
  - *Overall country BB market*
  - *BB access network for Dushanbe urban area*
  - *BB access network for Dushanbe suburban area*
- ❖ Case study 3 – *Moldova (2009) for Administration :*
  - *Overall country BB market*
  - *BB access network for the capital Chisinau*
  - *BB access network for Typical town*
  - *BB access network for typical rural area*

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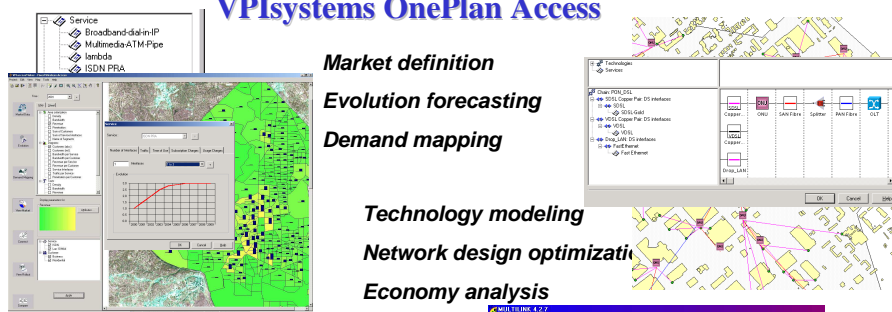
Session 3-IS - 2

## Case studies on broadband access network planning

- The case studies present the planning process that needs to be performed for planning of broadband access networks
- Planning process includes market definition, dimensioning and optimization of the access network elements, economic analysis and results.
- The case studies are from ITU projects on assisting of developing countries and are performed with professional NP tools, available through ITU partners

## Case study tools

### VPIsystems OnePlan Access



Service selection: Service, Broadband+Opt+IP, Multimed+ATM+Ppe, lambda, ISDN PRA

Market definition

Evolution forecasting

Demand mapping

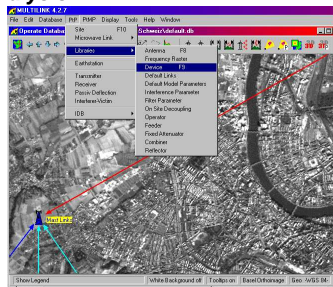
Technology modeling

Network design optimization

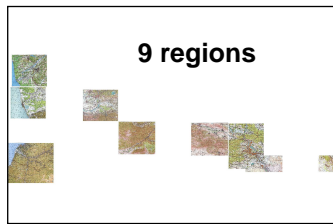
Economy analysis

### LStelcom MULTIlink

MULTIlink is a complete solution for fast microwave link engineering and designing of PMP/WLL/LMDS networks.



## Case Study Georgia - BB market

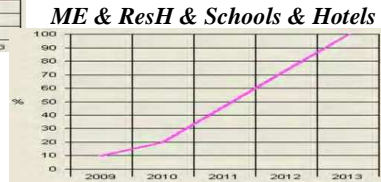
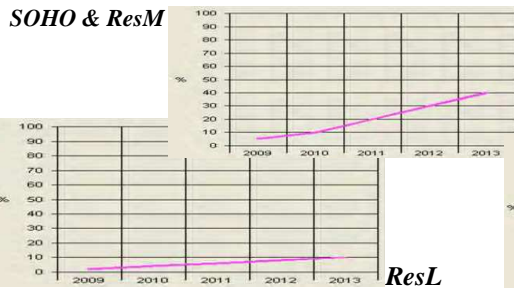


Evolution of population and business



### Penetration of broadband services

- Services:
- > Voice
  - > Fast Internet
  - > IPTV/Video on demand
  - > FTTO connection

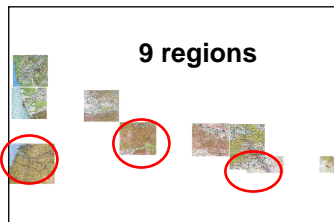


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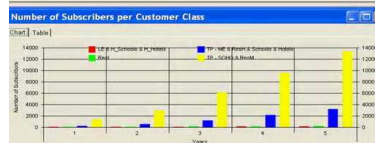
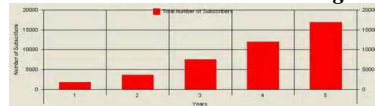
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Session 3-IS - 5

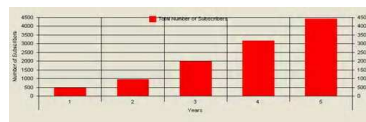
## Case study Georgia - BB market



Batumi region

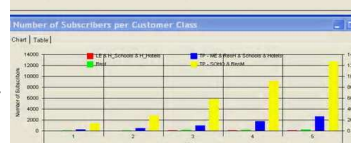


### Total number of customers and per customer class



Borjomi region

Rustavi region



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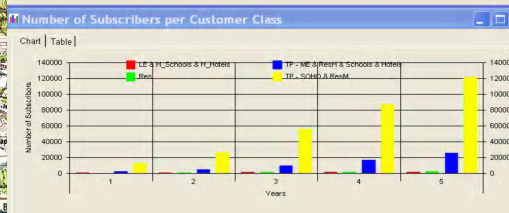
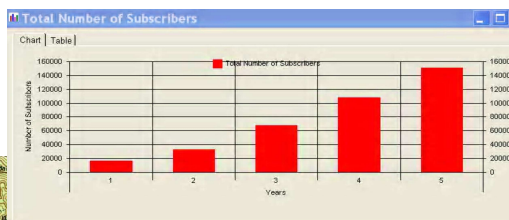
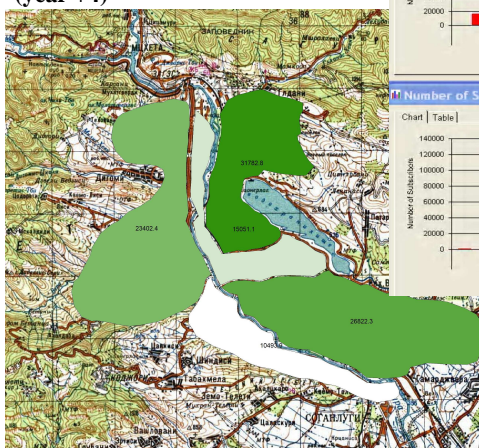
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## Case study Tbilisi – urban area :

Tbilisi city (5 districts)

Number of customers per district  
(year +4)



Number of customers per customer class

4 customer classes

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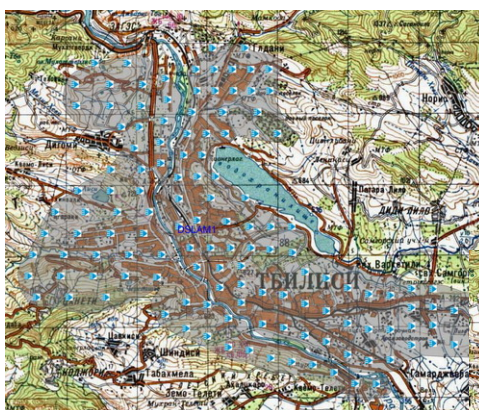
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Session 3-IS - 7

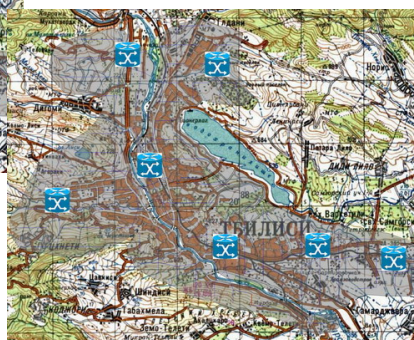
## Case study Tbilisi – access network for urban area :

Tbilisi city  
(5 districts)

Technical solution FTTO  
(7 Agg. Nodes)



Technical solution xDSL for VoIP,  
Fast Internet, IPTV/Video  
( 134 DSLAMs )

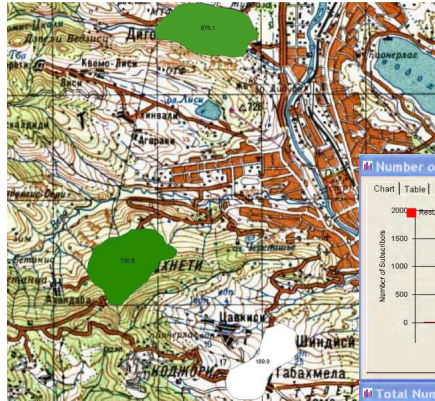


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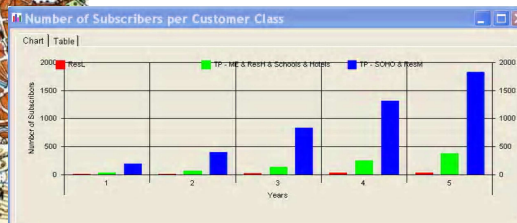
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## Case study Tbilisi – suburban area :



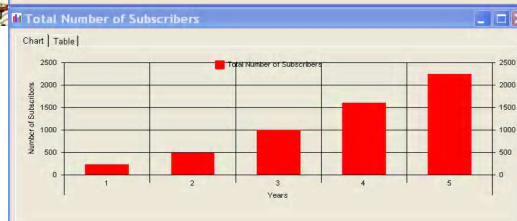
Tbilisi suburban region (Tskneti, Dighomi, Tabaxmela, Chindisi )

Number of customers per customer class



Number of customers per village (year +4)

3 customer classes



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## Case study Tbilisi suburbs - mountain rural area :

Wireline xDSL  
vs.  
Wireless WiMAX



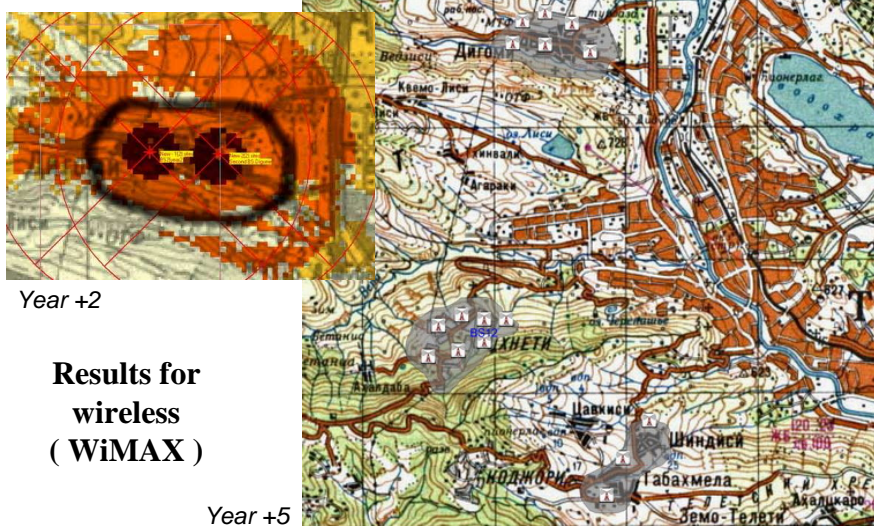
Results for xDSL

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## Case study Tbilisi suburbs – Wireless access network :



Year +2

Results for wireless (WiMAX)

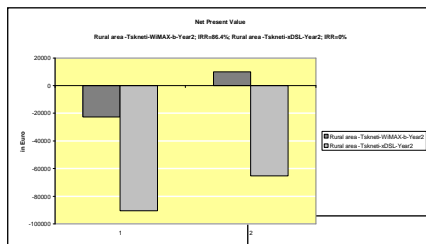
Year +5

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Session 3-IS - 11

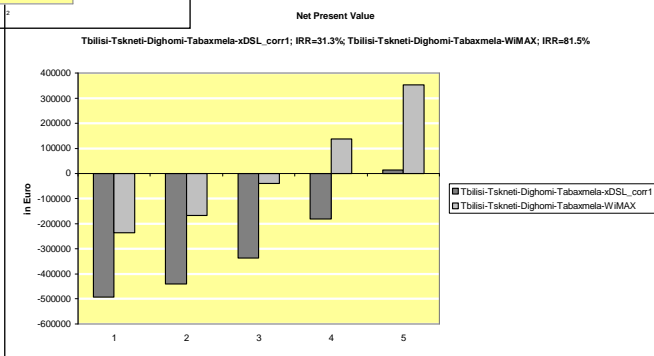
## Case study Tbilisi suburbs - Economic Analysis :



Results for 2 year period

NPN results :  
Wireline xDSL  
vs.  
Wireless  
WiMAX

Results for 5 year period



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## Case Study Georgia - reports



TECHNICAL REPORT  
FOR THE ITU ASSISTANCE  
ON PLANNING OF FUTURE ACCESS NETWORKS  
WITH COMPUTER TOOLS  
TO THE GEORGIAN ADMINISTRATION  
(MINISTRY OF ECONOMIC DEVELOPMENT OF  
GEORGIA)

ITU MISSION PERFORMED BY  
MR. IGNAT STANEV  
Senior Experts on Planning of Telecommunication  
Networks

(15 to 26 October 2007)

Tbilisi (Georgia)

Content	
1. INTRODUCTION.....	4
2. SERVICES AND CUSTOMERS.....	5
3. SERVICES AND CUSTOMERS.....	7
3.1 SERVICE TYPES.....	7
3.2 CUSTOMER CLASSES.....	9
3.3 CUSTOMER NUMBER AND DISTRIBUTION.....	11
4. MARKET STUDY.....	12
5. TECHNOLOGY STUDY.....	16
5.1 THE CITY STUDY.....	17
5.2 THE RURAL AREA STUDY.....	19
5.3 QUALITY OF SERVICE STUDY.....	21
6. ECONOMIC ANALYSIS.....	22
7. CONCLUSIONS AND RECOMMENDATIONS.....	23
7.1 RECOMMENDATIONS FROM THE STUDY.....	23
7.2 RECOMMENDATIONS FOR FURTHER STUDIES.....	24
ANNEX 8 - LIST OF THE NECESSARY INPUT DATA.....	25
ANNEX 9 - MAPS WITH SCALING AND GEO REFERENCING.....	26
A1.1. RAILWAY MAP OF TBILISI REGION.....	26
A1.2. RAILWAY MAP OF GURIA REGION.....	27
A1.3. RAILWAY MAP OF IMERETI REGION.....	28
A1.4. RAILWAY MAP OF POTAURI REGION.....	28
A1.5. RAILWAY MAP OF RATCHA REGION.....	29
A1.6. RAILWAY MAP OF RUSTAVI REGION.....	29
A1.7. RAILWAY MAP OF SAMEGURDIA REGION.....	30
A1.8. RAILWAY MAP OF SHID Kartli REGION.....	30
A1.9. RAILWAY MAP OF SHID Kartli REGION.....	30
ANNEX 2 - INPUT DATA FOR CUSTOMER.....	47
A2.1. GENERAL STATISTICS OF GEORGIA'S.....	48
A2.2. BUDGET DATA FOR CUSTOMERS PER CLAS.....	48
ANNEX 3 - MARKETING STUDY.....	49
A3.1. MARKETING STUDY FOR TBILISI.....	49
A3.2. MARKETING STUDY FOR GURIA.....	49
A3.3. MARKETING STUDY FOR IMERETI REGION.....	49
A3.4. MARKETING STUDY FOR POTAURI REGION.....	49
A3.5. MARKETING STUDY FOR RATCHA REGION.....	49
A3.6. MARKETING STUDY FOR RUSTAVI REGION.....	49
A3.7. MARKETING STUDY FOR SAMEGURDIA REGION.....	49
A3.8. MARKETING STUDY FOR SHID Kartli REGION.....	49
A3.9. MARKETING STUDY FOR SHID Kartli REGION.....	49
ANNEX 4 - GENERAL DESCRIPTION OF THE USED PLANNING TOOLS.....	48
A4.1. PLANNING TOOL FOR FIXED ACCESS PLANNING.....	48
A4.2. PLANNING TOOL FOR RATED ACCESS AND CORE PLANNING.....	49
ANNEX 5 - ACCESS NETWORK STUDY - TBILISI CITY.....	50
ANNEX 6 - ACCESS NETWORK STUDY - RURAL AREA OF TBILISI REGION.....	53
A6.1. TECHNOLOGY STUDY OF RURAL AREA OF TBILISI REGION, TAVISHI AND CHENOH.....	53
A6.2. DETAILED TECHNOLOGY STUDY FOR DZHOGE VILLAGE.....	56
ANNEX 7 - ACCESS NETWORK STUDY - GORI CITY AND SUBURBS.....	60
ANNEX 8 - ACCESS NETWORK STUDY - ECONOMIC ANALYSIS.....	64

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Session 3-IS - 13

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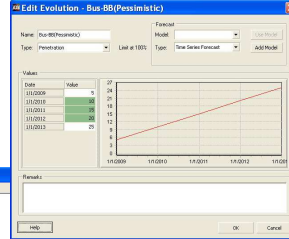
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Session 3-IS - 14

# Case Study Tajikistan - BB market

- Services:**
- Voice
  - Fast Internet
  - IPTV/Video on demand
  - Data connectivity

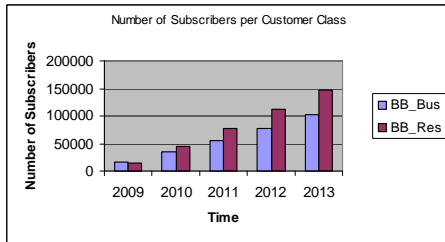
Population (2008)		<b>7215000</b>
HH	<b>HHSeze=5.3</b>	<b>1361321</b>
Residential	<b>80%</b>	<b>1360000</b>
Business	<b>20%</b>	<b>340000</b>



**Evolution of BB/Optimistic**  
**Bus: 20-60%**  
**Res: 2-20%**

# Case study Tajikistan - BB market

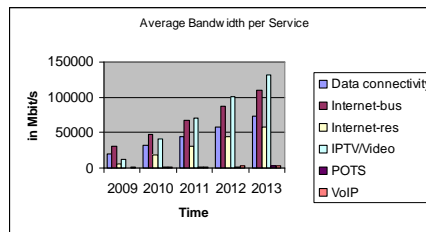
**Number of BB customers (pessimistic)**



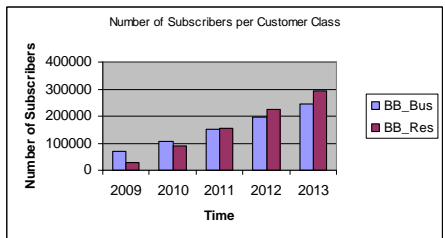
**Target av. access speed:**

- RES : 1,5 Mbit/s
- BUS : 2 Mbit/s

**Estimated bandwidth requirements (optimistic)**

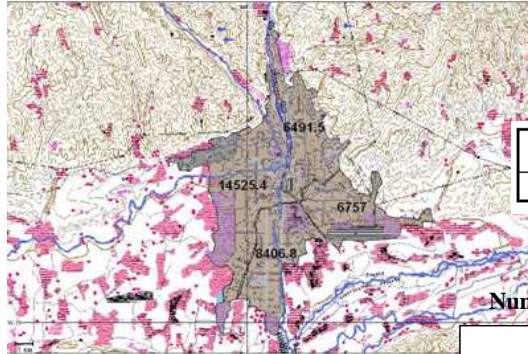


**Number of BB customers (optimistic)**





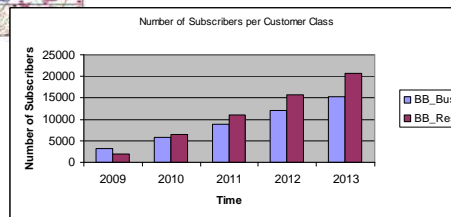
## Case study Dushanbe – urban and suburban area :



Dushanbe urban  
(4 districts)

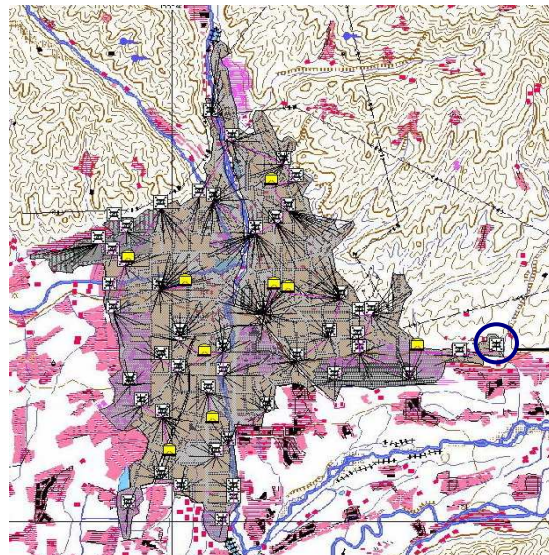
Year	Total Number of Customers	Class 1 : Residential	Class 2 : Business
5	36181	20785	15396

Number of customers per customer class



Number of customers per district (year +5)

## Case study Dushanbe – access network for urban area :



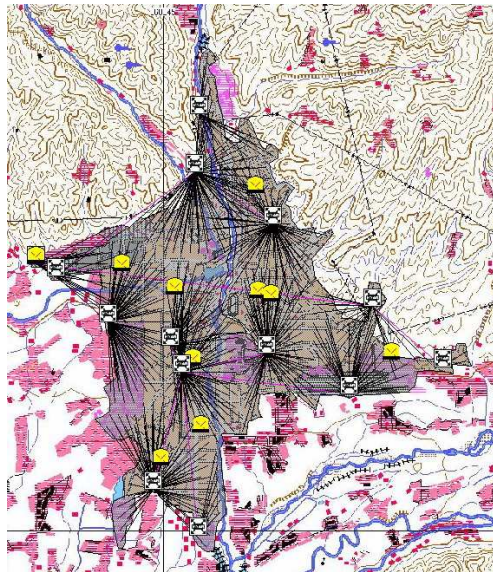
Dushanbe city  
(4 districts)

Wireline xDSL -  
Target solution  
(year +5)

MSAN

Technical solution xDSL  
for VoIP, Data, Internet,  
IPTV/Video  
( 49 MSANs and 9 EANs)

## Case study Dushanbe – access network for urban area :



Dushanbe city  
(4 districts)

**Wireline xDSL -  
Initial solution  
(year +1)**

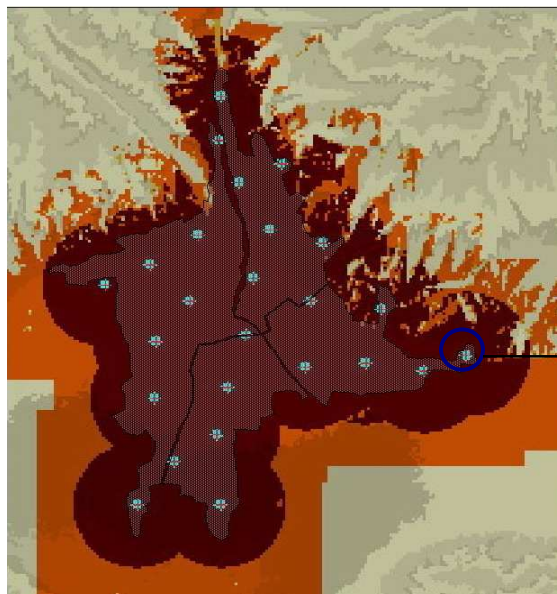
**Technical solution  
xDSL for VoIP, Data,  
Internet, IPTV/Video  
( 14 MSANs)**

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## Case study Dushanbe – access network for urban area :



Dushanbe city  
(4 districts)

**WiMAX overlay**

BS

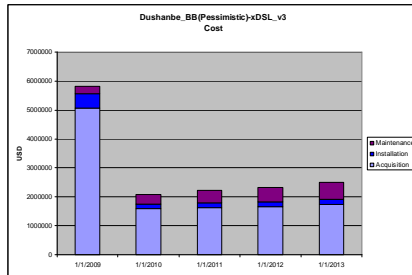
**Technical solution  
WiMAX for VoIP,  
Data, Internet,  
IPTV/Video  
( 25 BSs)**

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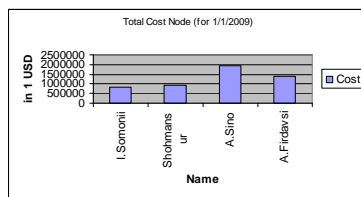
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## Case study Dushanbe urban - Economic Results :

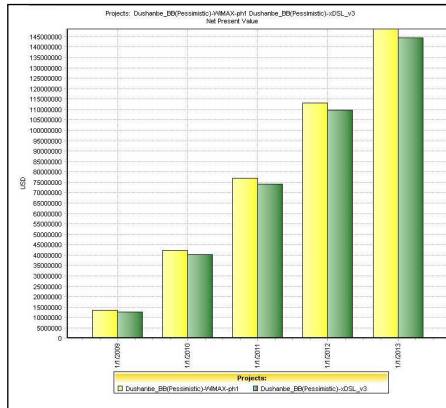


Costs for the 5 year period



Costs for the first year

### NPN for xDSL and WiMAX solutions



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Session 3-IS - 21

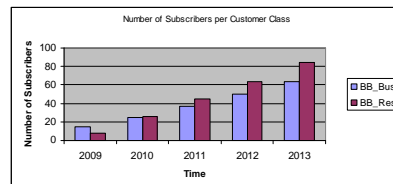
## Case study Dushanbe –suburban area :



Number of customers per village (year +5)

### Dushanbe suburban (sample with 5 villages)

Year	Total Number of Customers	Class 1 : Residential	Class 2 : Business
5	148	84	64



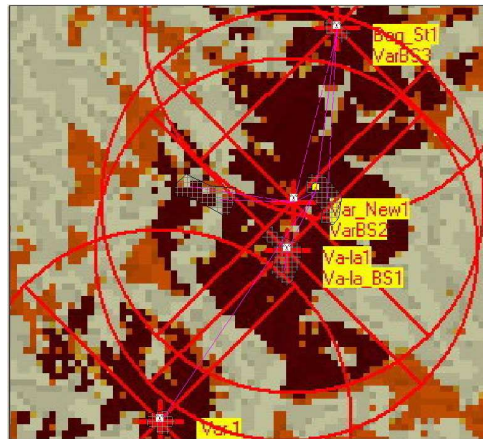
Number of customers per customer class

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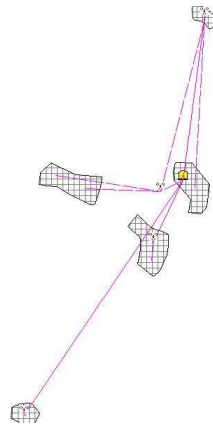
Session 3-IS - 22

## Case study Dushanbe suburban – wireless access network :

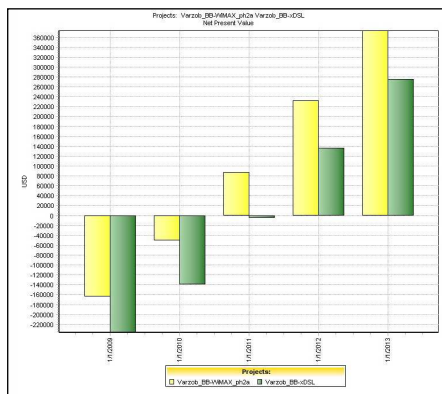


Results for wireless ( 3 BS - WiMAX )

Dushanbe suburban  
(sample with 5 villages)

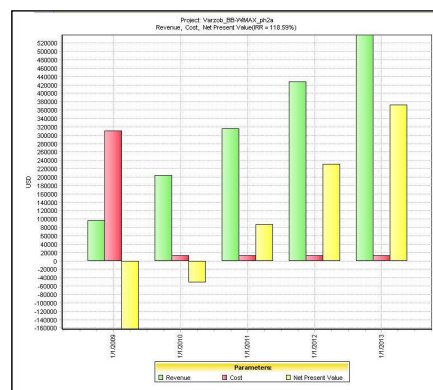


## Case study Dushanbe suburban- Economic Results :



WiMAX vs. xDSL – NPV results

Revenues, Costs, NPN for WiMAX



## Case Study Tajikistan - reports



DRAFT

**TECHNICAL REPORT  
FOR THE ITU ASSISTANCE  
ON PLANNING OF BROADBAND NETWORKS  
WITH NGN ELEMENTS  
TO THE TAJIKISTAN ADMINISTRATION (STATE  
SERVICE TO SUPERVISION AND REGULATION  
IN THE FIELD OF COMMUNICATION AND  
INFORMATION)**

**SUMMARY**

ITU MISSION PERFORMED BY  
MR. IGNAT STANEV  
*Senior Experts on Planning of Telecommunication  
Networks*

(13 to 27 November 2008)  
Dushanbe (Tajikistan)

Content	
1. INTRODUCTION.....	3
1. OBJECTIVES.....	4
2. DATA COLLECTED.....	6
2.1 SERVICE TYPES.....	6
2.2 CUSTOMER CLASSES.....	7
2.3 CUSTOMERS NUMBER AND DISTRIBUTION.....	11
2.4 MAPS.....	12
2.5 TECHNOLOGY DEFINITION.....	14
3. ACTIVITIES.....	15
4. OUTPUTS.....	16
4.1 TARIFFS IN MARKET STUDY.....	16
4.2 DUSHANBE CITY MARKET STUDY.....	17
4.3 VAJZOR AREA MARKET STUDY.....	19
4.4 DUSHANBE CITY TECHNOLOGY STUDY.....	20
4.5 VAJZOR REGIONAL AREA TECHNOLOGY STUDY.....	22
4.6 RESULT OF ECONOMIC ANALYSIS FOR DUSHANBE.....	23
4.7 RESULT OF ECONOMIC ANALYSIS FOR THE REGION OF VAJZOR.....	25
5. NETWORK PLANNING MASTER PLAN.....	28
5.1 CAPITAL AND BIG CITIES CASE - DUSHANBE.....	28
Long term plan - Year +5.....	29
Short term plan - Year +1.....	33
Medium term plan - Year +3.....	37
5.2 SIMILARLY POPULATED BROADBAND AREAS - VAJZOR AREA.....	40
Long term plan - Year +5.....	41
Short term plan - Year +1.....	45
Medium term plan - Year +3.....	47
6. RECOMMENDATIONS.....	49
6.1 RECOMMENDATIONS FROM THE STUDY.....	49
6.2 RECOMMENDATIONS FOR FURTHER STUDIES.....	49
ANNEX I - LIST OF THE NECESSARY INPUT DATA.....	51

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Session 3-IS - 25

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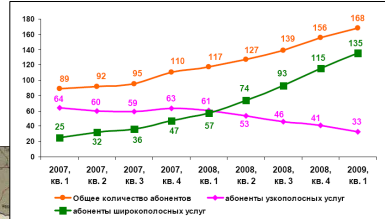
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Session 3-IS - 26

# Case Study Moldova - BB market

## BB Customer data 2009

- Services:
- Voice
  - Fast Internet
  - IPTV/Video on demand
  - Data connectivity



Customer Class	Evolution	Penetration	Total number of Subscriber
BB_Sps	constant	100%	117382
BB_Bus	constant	100%	17618

BB Customers (2009)	135000
Residential	117382
Business	17618

*MID strategy is of 20% BB customer penetration in 5 years*

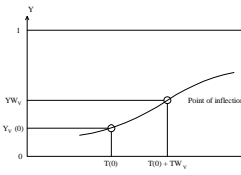
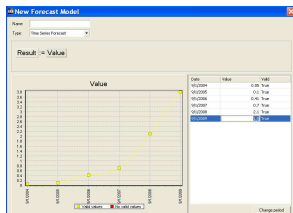
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Session 3-IS - 27

# Case study Moldova - BB market

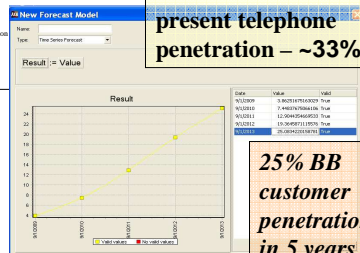
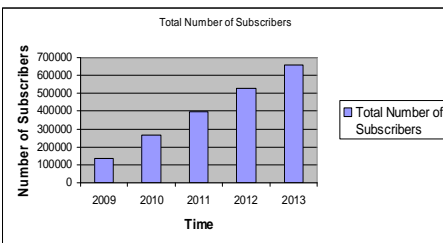
## BB Customer forecast



Saturation of BB customers related to present telephone penetration – ~33%

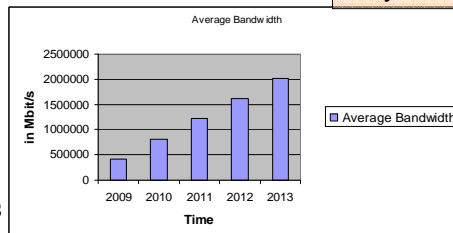
Logistic model

Total number of BB customers



25% BB customer penetration in 5 years

Estimated bandwidth requirements



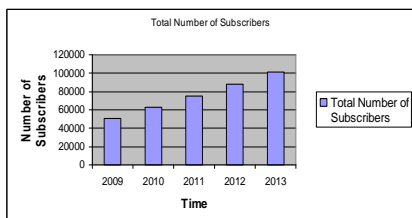
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## Case study for capital Chisinau - BB market :

### ➤ Pessimistic scenario (20%)

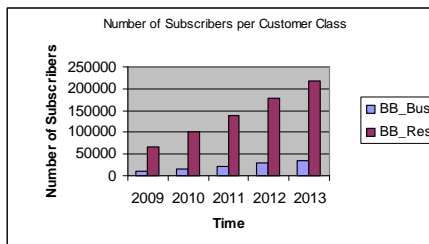


#### Estimated market segment

year	xDSL	WiMAX	FTTB	LAN+CATV
2009	67.4%	0.1%	17.4%	15.1%
2009	50916	76	13144	11407
2013	70%	2%	23%	5%
2013	101238	2893	33264	7231
Difference	50322	2817	20119	-4176

### ➤ Optimistic scenario (35%)

Estimated market segment				
year	xDSL	WiMAX	FTTB	LAN+CATV
2009	67.4%	0.1%	17.4%	15.1%
2009	50916	76	13144	11407
2013	70%	2%	23%	5%
2013	177167	5062	58212	12655
Difference	126251	4986	45064	1248

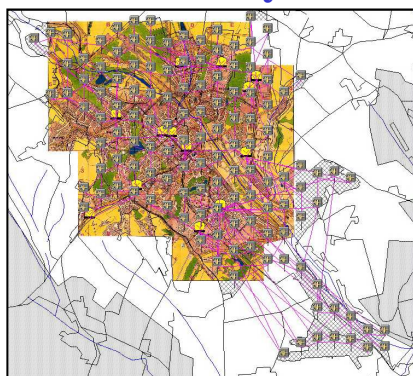


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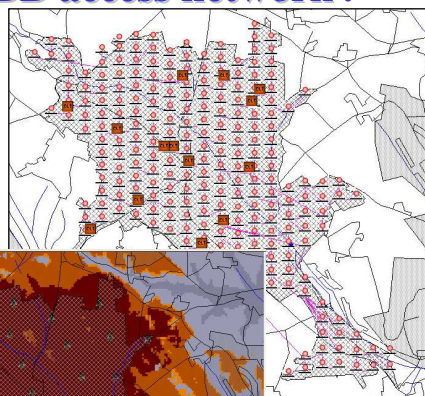
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## Case study Chisinau - BB access network :



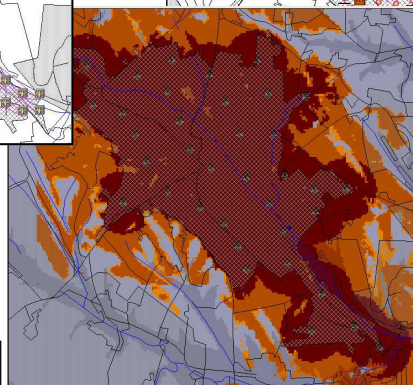
xDSL



FTTB

Target access speed:  
➤ 8 Mbit/s

WiMAX



Modulation:  
➤ QPSK 2/3  
Speed -DL TDD:  
➤ 4.3 Mbps

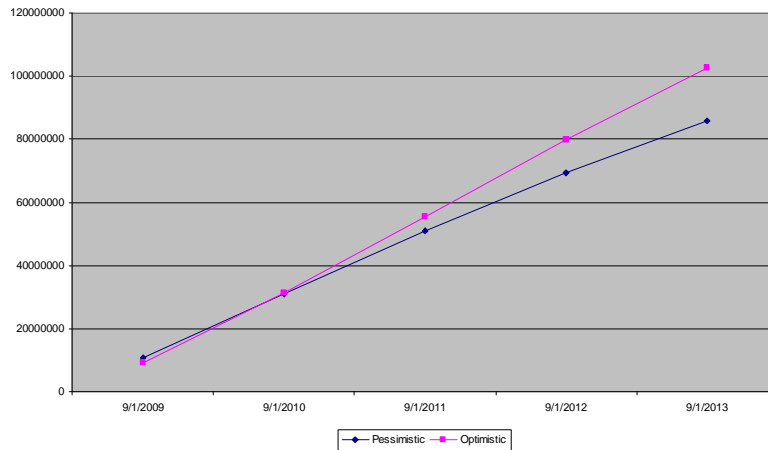
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## Case study Chisinau – economic results

Chisinau - NPV



**Results for NPV : xDSL+ WiMAX + FTTB**

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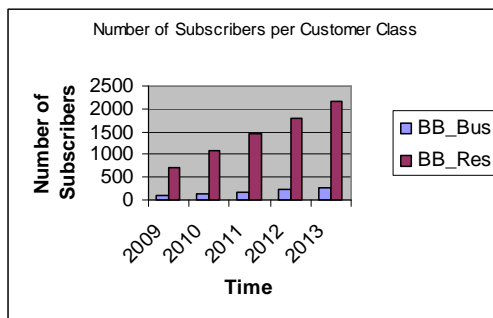
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## Case study for typical town - BB market :

### BB Customers

	Target of BB penetration (2013)	BB penetration (2009)	% BB residential	% BB business
Nisporeni	20%	6.7%	89%	11%



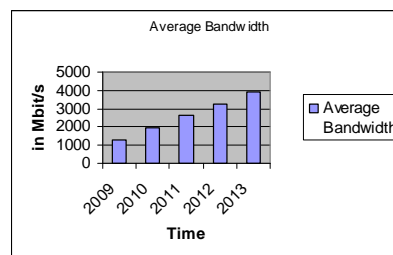
### Market segment xDSL –

- 2009 – 100%
- 2013 - 70%

### Market segment WiMAX –

- 2009 – 0%
- 2013 - 30%

### Bandwidth requirements



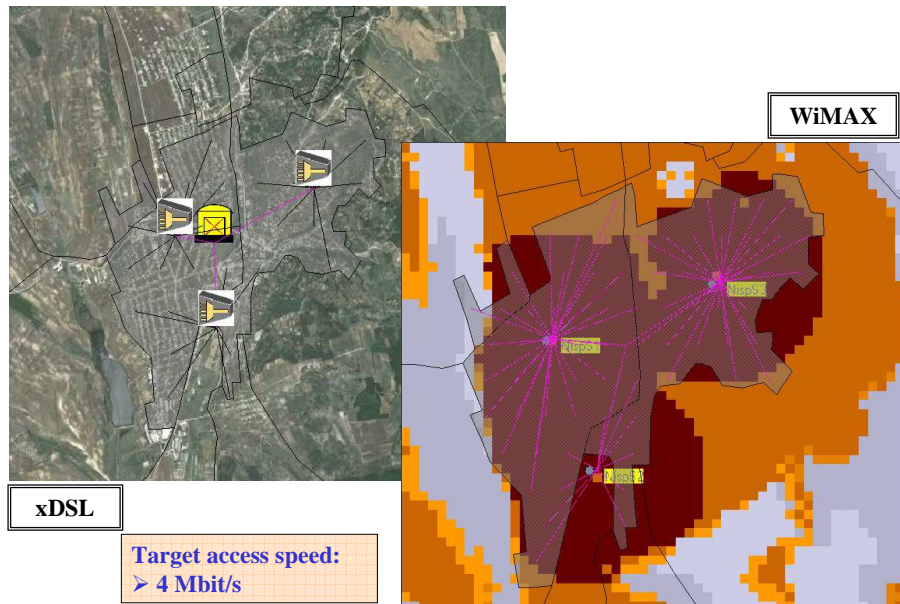
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## Case study town - BB access network :

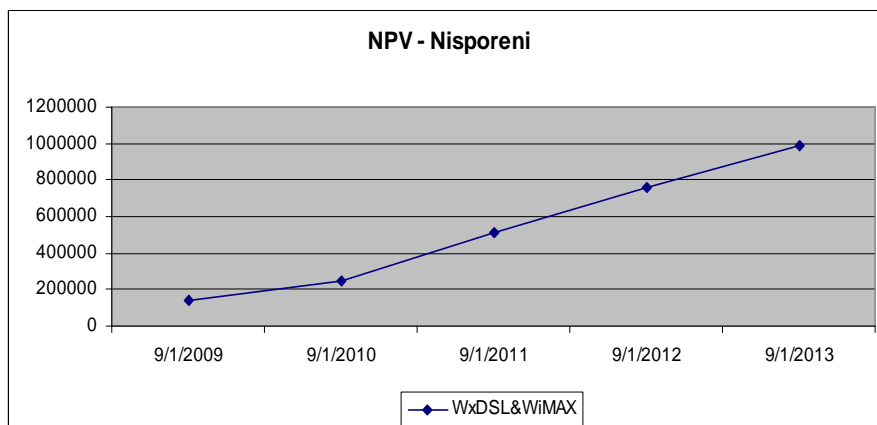


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## Case study town – economic results



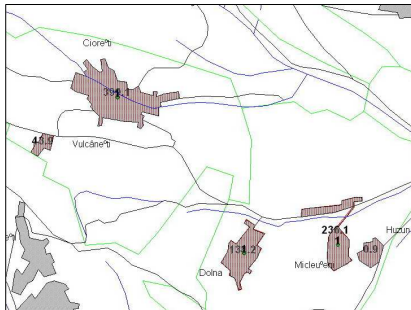
### Results for NPV : xDSL + WiMAX

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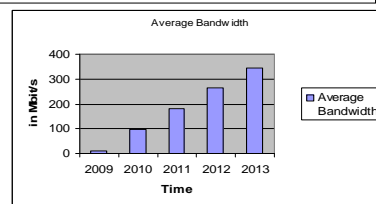
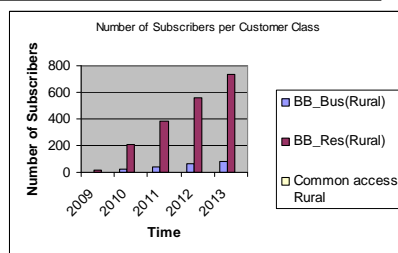
## Case study for typical rural area - BB market :



Village	Households	telephones	BB total	BB residential	BB business
Cioresti	1273	752	19	17	2
Vulcanesti	140				
Dolna	428	279			
Micleuseni	753	347			
Huzun	30				

### Evolution of the xDSL customers :

- 10% penetration goal
- 90% residential; 10% business
- 1 common access point per village
- market segment
  - if xDSL exists -70% of the market
  - if only telephones -50% of the market

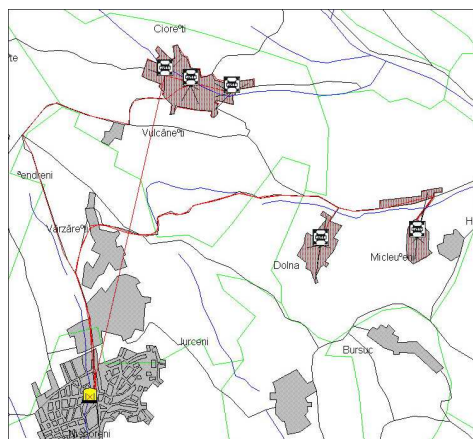


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## Case study rural - BB access network :



xDSL

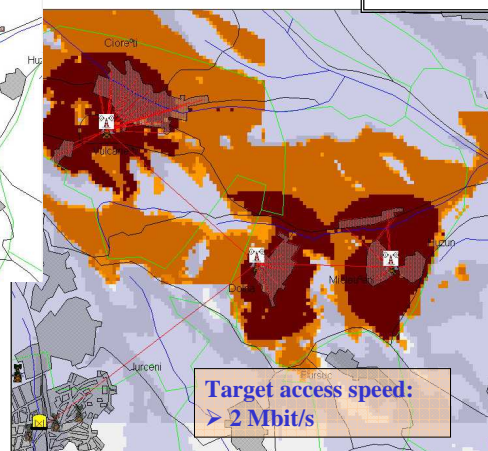
### Market segment of xDSL :

- if xDSL exists -70% of the market
- if only telephones -50% of the market

### Market segment of WiMAX :

- if xDSL exists -30% of the market
- if only telephones -50% of the market
- if nothing -100% of the market

WiMAX



Target access speed:  
➢ 2 Mbit/s

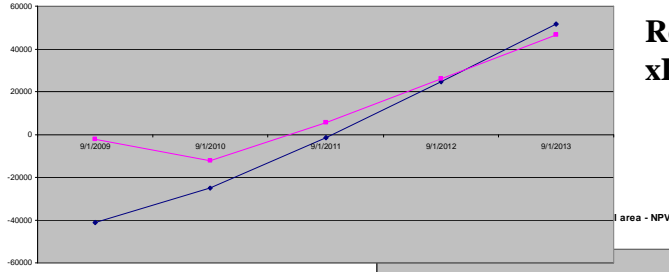
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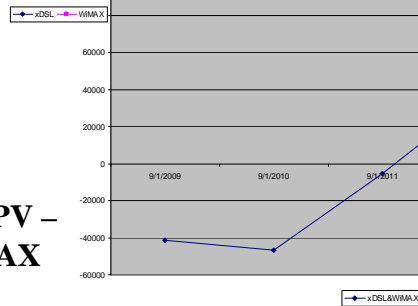
## Case study rural – economic results

Nisporeni-Rural



Results for NPV –  
xDSL & WiMAX

Results for NPV –  
xDSL + WiMAX



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## Case Study Moldova - reports



TECHNICAL REPORT  
FOR THE ITU ASSISTANCE  
ON BROADBAND NETWORK PLANNING  
TO THE MOLDOVA ADMINISTRATION  
(MINISTRY OF INFORMATION DEVELOPMENT  
OF THE REPUBLIC OF MOLDOVA)

SUMMARY

ITU MISSION PERFORMED BY  
MR. IGNAT STANEV  
*Senior Experts on Planning of Telecommunication  
Networks*

(9 to 27 August 2009)  
Chisinau (Moldova)

### Content

1. OBJECTIVES .....	3
2. DATA COLLECTED .....	5
2.1 SERVICE TYPES .....	5
2.2 CUSTOMER CLASSES .....	7
2.3 CUSTOMER NUMBER AND DISTRIBUTION .....	8
2.4 MAPS .....	9
2.5 TECHNOLOGY DISTRIBUTION .....	11
3. ACTIVITIES .....	13
4. OUTPUTS .....	14
4.1 MOLDOVA MARKET STUDY .....	14
4.2 CHISINAU CITY MARKET STUDY .....	16
4.3 NISPORENI TOWN MARKET STUDY .....	19
4.4 NISPORENI RURAL AREA MARKET STUDY .....	20
4.5 TECHNOLOGY STUDY FOR CAPITAL CHERNOVI, NISPORENI TOWN AND NISPORENI RURAL AREA .....	23
4.6 ECONOMIC ANALYSIS FOR THE CAPITAL CHERNOVI .....	25
4.7 ECONOMIC ANALYSIS FOR THE TOWN OF NISPORENI .....	28
4.8 ECONOMIC ANALYSIS FOR THE RURAL AREA OF NISPORENI .....	30
5. RECOMMENDATIONS .....	33
5.1 RECOMMENDATIONS FROM THE STUDY .....	33
5.2 RECOMMENDATIONS FOR FURTHER STUDIES .....	33

ANNEX - NETWORK PLANNING MASTER PLAN

TECHNICAL REPORT FOR THE ITU ASSISTANCE  
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ANNEX

NETWORK PLANNING MASTER PLAN

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Session 3-IS - 38