



**ITU-D Regional Development Forum  
for the Africa Region:  
“NGN and Broadband, Opportunities and Challenges”**

## **Session 7**

# **Case study on Economic impact of Broadband Implementation**

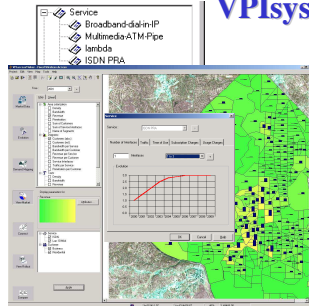
*Ignat Stanev  
ITC, Bulgaria*

### **Content of the presentation :**

- ❖ **Used for the case study planning tools**
- ❖ **Problem 1 – Economic Impact of Service bandwidth upgrade**
  - **on xDSL broadband access network**
  - **on FTTH broadband access network**
- ❖ **Problem 2 – Economic selection of broadband access technology**
  - **xDSL vs. FTTH for brownfield**
  - **FTTH vs. WiMAX for greenfield**
  - **xDSL vs. WiMAX for rural area**

## Case study tools

### VPIsystems OnePlan Access



Market definition

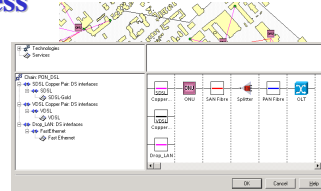
Evolution forecasting

Demand mapping

Technology modeling

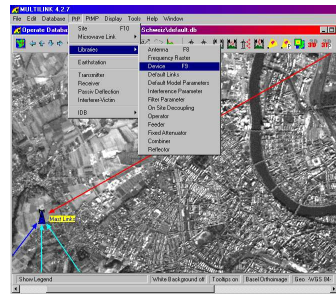
Network design optimization

Economy analysis



### LStelcom MULTiLink

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



## Problem 1 – “Service upgrade”

**There is a need to model the impact of upgrading the service bandwidth, the service take rate, and the service mix on the access network.**

**For a given market, the access network planners want to perform Bandwidth Upgrade Scenarios, Uptake Growth Scenarios, and Service Mix Scenarios**

**The access network planners have to dimension the required capacity of the access nodes, to optimize the access network and to calculate related costs to upgrade it.**

## Problem 1 – “service upgrade” – example I

**Normal**

Name: Data connectivity

Service Type: Elastic

Parameters:

- Access Link Data Rate: 10 Mbit/s
- Guaranteed Bandwidth: 8 Mbit/s

Service Data:

- Service Type: Elastic
- Average Bandwidth: 8 Mbit/s

Number of Lines: Erlang: 0.15

Name: IPTV

Service Type: Real Time CBR

Parameters:

- Bit Rate: 8 Mbit/s

Service Data:

- Service Type: Real Time CBR

Number of Lines: Erlang: 0.1

**Upgraded**

Name: Data connectivity upgrade

Service Type: Elastic

Parameters:

- Access Link Data Rate: 20 Mbit/s
- Guaranteed Bandwidth: 16 Mbit/s

Service Data:

- Service Type: Elastic
- Average Bandwidth: 16 Mbit/s

Number of Lines: Erlang: 0.3

Name: IPTV Upgrade x 2

Service Type: Real Time CBR

Parameters:

- Bit Rate: 16 Mbit/s

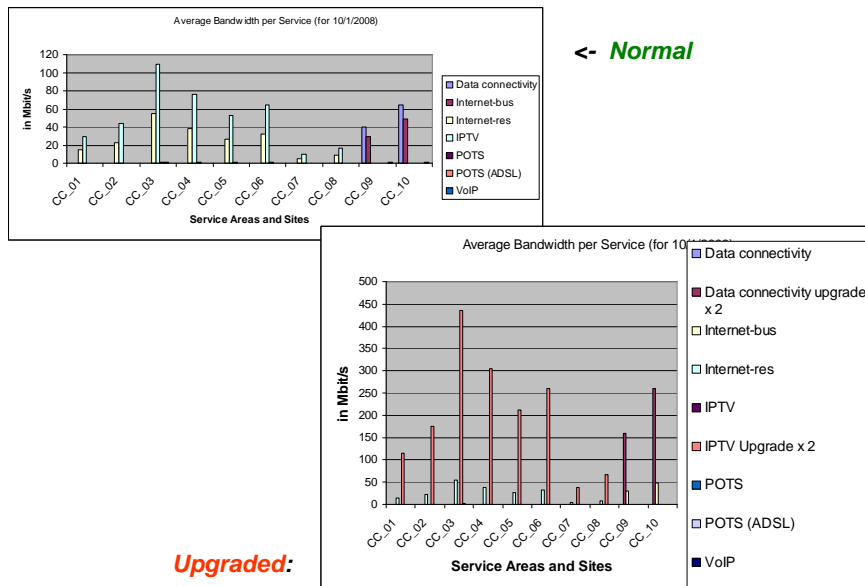
Service Data:

- Service Type: Real Time CBR

Number of Lines: Erlang: 0.2

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## Problem 1 – “service upgrade” – example I



## Problem 1 – “service upgrade” - example I

Service Areas and Sites	Data connectivity	Internet-bus	Internet-res	IPTV	POTS	POTS (ADSL)	VoIP
CC_01	0	0	14.4	28.8	0.306	0.153	0
CC_02	0	0	22	44	0.4675	0.23375	0
CC_03	0	0	54.4	108.8	1.156	0.578	0
CC_04	0	0	38	76	0.80325	0.40375	0
CC_05	0	0	26.4	52.8	0.561	0.2805	0
CC_06	0	0	32.4	64.8	0.6885	0.34425	0
CC_07	0	0	4.8	9.6	0.09775	0.051	0
CC_08	0	0	8.4	16.8	0.1785	0.08925	0
CC_09	39.6	29.7	0	0	0	0	0.561
CC_10	64.8	48.6	0	0	0	0	0.918
Total :	104.4	78.3	200.8	401.6	4.2585	2.1335	1.479

<- Normal

**Upgraded:**

Service Areas and Sites	Data connectivity upgrade x 2	Internet-bus	Internet-res	IPTV Upgrade x 2	POTS	POTS (ADSL)	VoIP
CC_01	0	0	14.4	115.2	0.306	0.153	0
CC_02	0	0	22	176	0.4675	0.23375	0
CC_03	0	0	54.4	435.2	1.156	0.578	0
CC_04	0	0	38	304	0.80325	0.40375	0
CC_05	0	0	26.4	211.2	0.561	0.2805	0
CC_06	0	0	32.4	259.2	0.6885	0.34425	0
CC_07	0	0	4.8	38.4	0.09775	0.051	0
CC_08	0	0	8.4	67.2	0.1785	0.08925	0
CC_09	178.2	29.7	0	0	0	0	0.561
CC_10	291.6	48.6	0	0	0	0	0.918
Total :	469.8	78.3	200.8	1606.4	4.2585	2.1335	1.479

**Difference:**

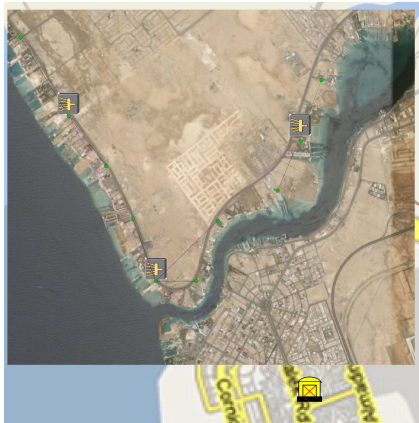
**298.0%**

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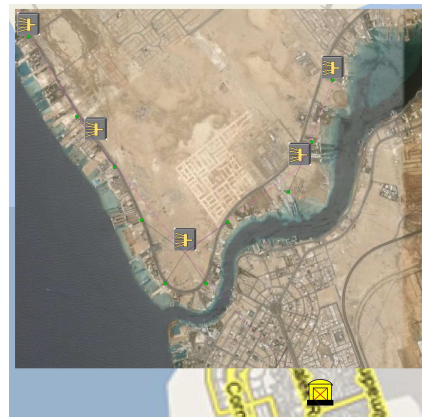
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## Problem 1 – “service upgrade” - example I



<- Normal  
(3 MSAN)



**Upgraded:**  
**(5 MSAN)**

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## Problem 1 – “service upgrade” – example I

### Costs :

Normal services :						
	10/1/2008	10/1/2009	10/1/2010	10/1/2011	10/1/2012	Total:
Acquisition	1906829	21110	23120	20110	17900	1989069
Installation	39797	2090	2300	1990	1780	47957
Maintenance	270064	271124	272294	273304	274214	1360998
Upgraded services :						
	10/1/2008	10/1/2009	10/1/2010	10/1/2011	10/1/2012	Total:
Acquisition	1971873	13720	15070	16860	13070	2030593
Installation	47283	1440	1570	1760	1370	53423
Maintenance	273807	274547	275347	276247	276947	1376893
Difference :						
	10/1/2008	10/1/2009	10/1/2010	10/1/2011	10/1/2012	Total:
Acquisition	65044	-7390	-8050	-3250	-4830	41524
Installation	7486	-650	-730	-230	-410	5466
Maintenance	3743	3423	3053	2943	2733	15895

Costs difference: 1.85 %

## Problem 1 – “service upgrade” – example II

Name: FTTH-Bus  Use Default Service

Service Type: Permanent

Parameters:

Bandwidth: 20 Mbit/s

Contention Ratio: 1

Normal :

Name: FTTH-Res  Use Default Service

Service Type: Permanent

Parameters:

Bandwidth: 15 Mbit/s

Contention Ratio: 1

Name: FTTH-Bus Upgraded  Use Default Service

Service Type: Permanent

Parameters:

Bandwidth: 40 Mbit/s

Contention Ratio: 1

Upgraded:

Name: FTTH-Res Upgraded  Use Default Service

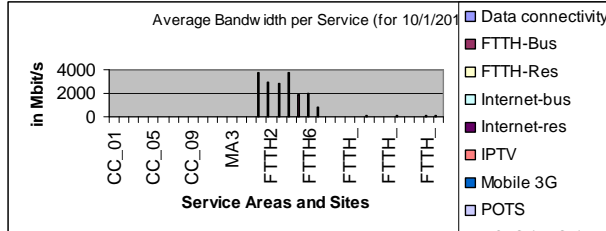
Service Type: Permanent

Parameters:

Bandwidth: 30 Mbit/s

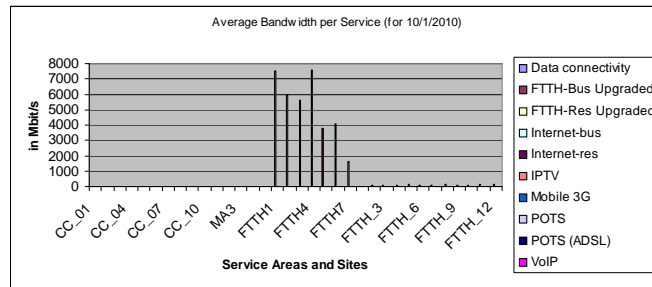
Contention Ratio: 1

## Problem 1 – “service upgrade” – example II



<- Normal

Upgraded:



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## Problem 1 – “service upgrade” - example II

Service Areas and Sites	Data connectivity	FTTH-Bus	FTTH-Res
FTTH1	0	0	3750
FTTH2	0	0	2972
FTTH3	0	0	2819
FTTH4	0	0	3775
FTTH5	0	1900	0
FTTH6	0	0	2041
FTTH7	0	0	805
FTTH_1	0	0	15
FTTH_2	0	0	30
FTTH_3	0	20	0
FTTH_4	0	0	45
FTTH_5	0	0	60
FTTH_6	0	40	0
FTTH_7	0	20	0
FTTH_8	0	0	60
FTTH_9	0	0	30
FTTH_10	0	40	0
FTTH_11	0	60	0
FTTH_12	0	0	60
		2080	16462

<- Normal

Difference:

100 %

Upgraded:

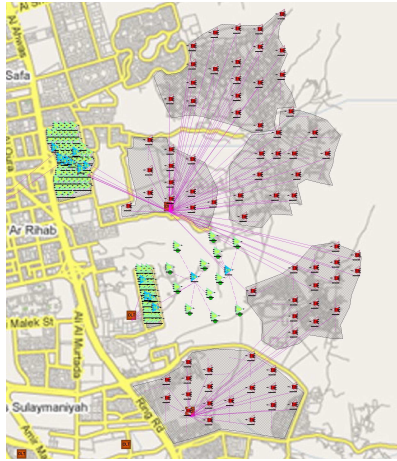
Service Areas and Sites	Data connectivity	FTTH-Bus Upgraded	FTTH-Res Upgraded
FTTH1	0	0	7500
FTTH2	0	0	5944
FTTH3	0	0	5638
FTTH4	0	0	7551
FTTH5	0	3800	0
FTTH6	0	0	4081
FTTH7	0	0	1609
FTTH_1	0	0	30
FTTH_2	0	0	60
FTTH_3	0	40	0
FTTH_4	0	0	90
FTTH_5	0	0	120
FTTH_6	0	80	0
FTTH_7	0	40	0
FTTH_8	0	0	120
FTTH_9	0	0	60
FTTH_10	0	80	0
FTTH_11	0	120	0
FTTH_12	0	0	120
		4160	32923

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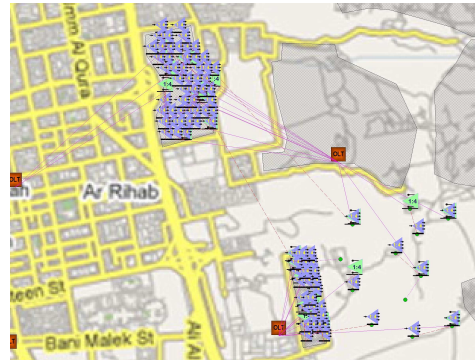
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## Problem 1 – “service upgrade” - example II



<- Normal

(3 OLT, 17 Splitter 1:8 , 89 Splitter 1:4)



Upgraded:

(3 OLT, 28 Splitter 1:8, 93 Splitter 1:4)

## Problem 1 – “service upgrade” – example II

Costs :

	10/1/2008	10/1/2009	10/1/2010	10/1/2011	10/1/2012
<i>Normal services :</i>					
Acquisition	714006	6851	12354	7825	10450
Installation	27001	685	1235	783	1045
Maintenance	11364	11704	12320	12709	13230
<i>Upgraded services :</i>					
Acquisition	814089	5072	2165	5437	23187
Installation	32651	56	25	100	74
Maintenance	14172	14198	14208	14256	14293
<i>Difference :</i>					
Acquisition	100082	-1779	-10189	-2388	12737
Installation	5650	-629	-1210	-682	-971
Maintenance	2809	2494	1888	1547	1063

Costs difference: 1.16 %

## Problem 2 – Techno-economical Access Study

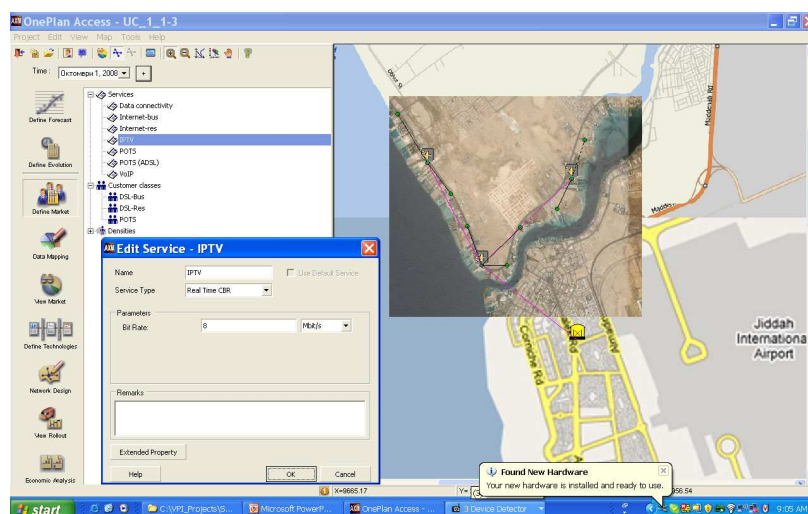
**Aim is to investigate the techno-economical impact of various access technologies on the network for a given market**

**Multiple techno-economical studies are carried out for the purpose to determine the optimum access technology for the network**

**Selection is done by comparison of the economical parameters for each access technology**

## Problem 2 – selection of access technology – example I

**xDSL**





## Problem 2 – selection of access technology – example I

Node Name	Node Description	Part Number	Description	Total Number New	Total Number Existing	Total New Cost	Date
CO_Ubhur		OLT		1		1922600	October 01,2008
				0		250400	October 01,2009
				0		250400	October 01,2010
				0		250400	October 01,2011
				0		250400	October 01,2012
Splitter 1:32_1		Splitter 1:32 cost		2		1220	October 01,2008
				0		60	October 01,2009
				0		60	October 01,2010
				0		60	October 01,2011
				0		60	October 01,2012
Splitter 1:32_2		Splitter 1:32 cost		2		1220	October 01,2008
				0		60	October 01,2009
				1		670	October 01,2010
				0		90	October 01,2011
				0		90	October 01,2012
Splitter 1:32_3		Splitter 1:32 cost		5		3050	October 01,2008
				0		150	October 01,2009
				1		760	October 01,2010
				0		180	October 01,2011
				1		790	October 01,2012

**FTTH**

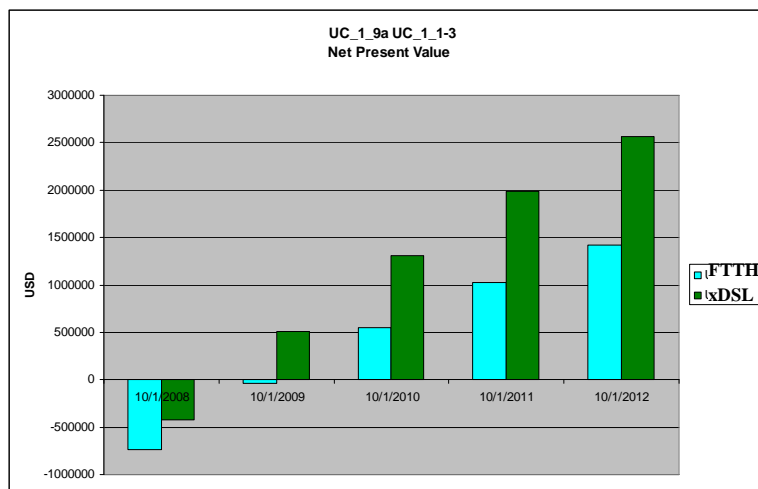
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## Problem 2 – selection of access technology – example I

### xDSL vs. FTTH brownfield

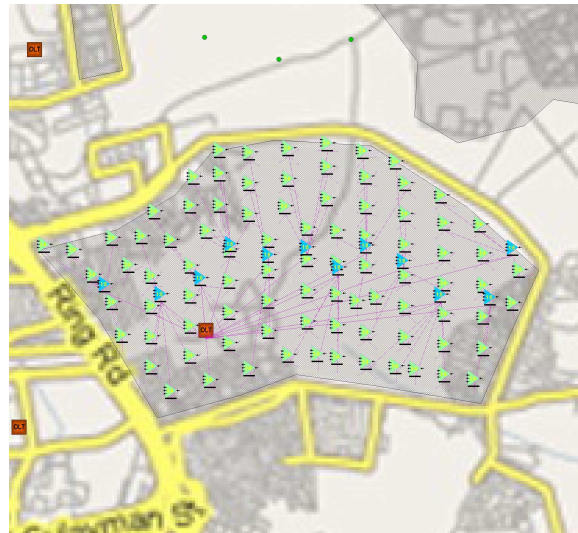


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## Problem 2 – selection of access technology – example II



**FTTH**

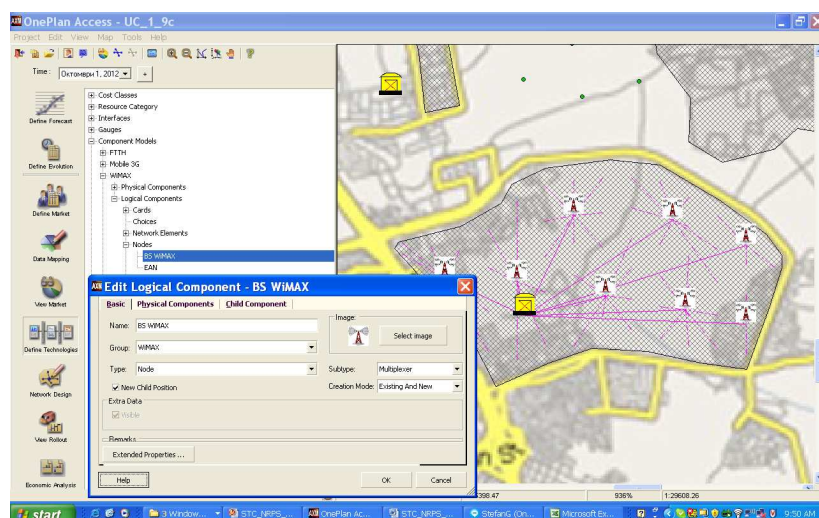
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## Problem 2 – selection of access technology – example II

**WiMAX**



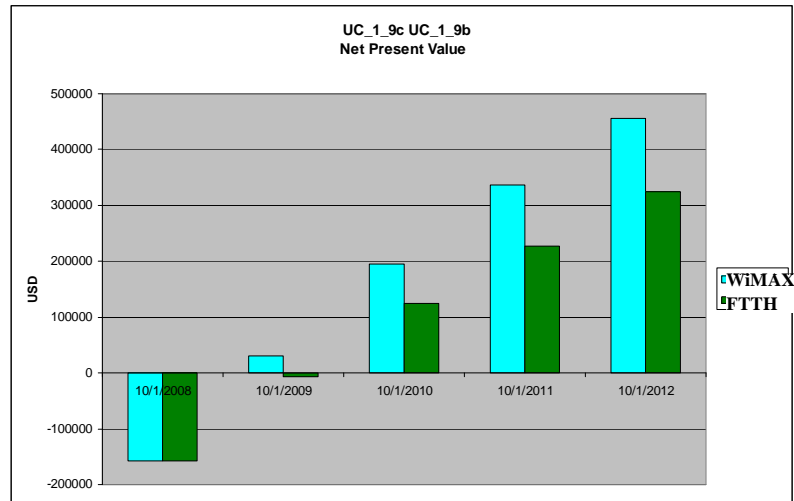
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## Problem 2 – selection of access technology – example II

### FTTH vs. WiMAX greenfield



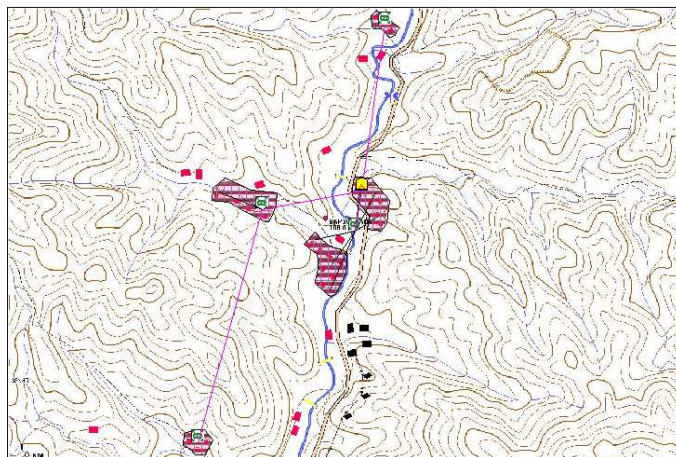
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## Problem 2 – selection of access technology – example III

xDSL

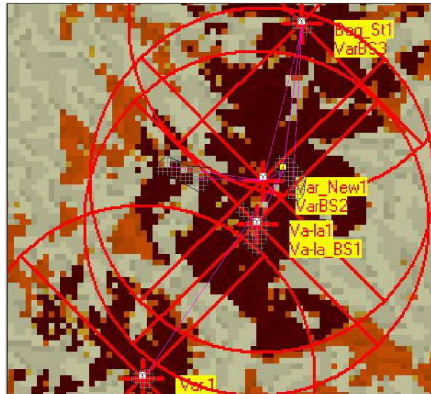


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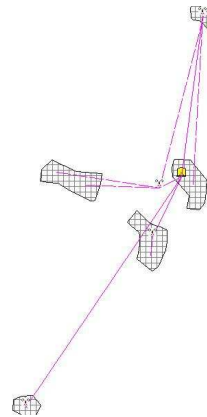
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## Problem 2 – selection of access technology – example III



**WiMAX**



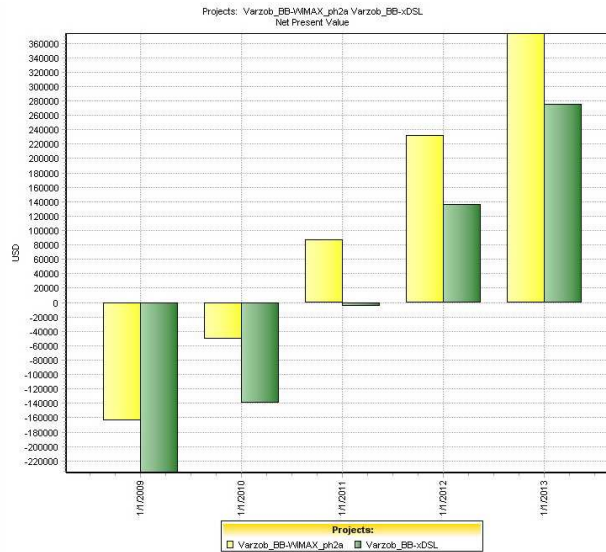
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## Problem 2 – selection of access technology – example III

**xDSL vs.  
WiMAX  
rural area**



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