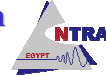




ITU-D Regional Development Forums 2010 on
NGN and Broadband *for the Arab Region*
“NGN and Broadband, Opportunities and Challenges”



Session 9

Case Study on Economic Impact of Broadband Implementation

Ignat Stanev
HCTP/ITC, Bulgaria

Content of the presentation :

- ❖ **Economic Impact of Broadband Implementation**
- ❖ **Problem 1 – Service bandwidth upgrade**
 - on FTTH broadband access network
 - on xDSL broadband access network
- ❖ **Problem 2 – Selection of broadband access technology**
 - xDSL vs. FTTH for urban brownfield area
 - FTTH vs. WiMAX for urban greenfield area
 - xDSL vs. WiMAX for rural area

Problem 1 – Service bandwidth upgrade

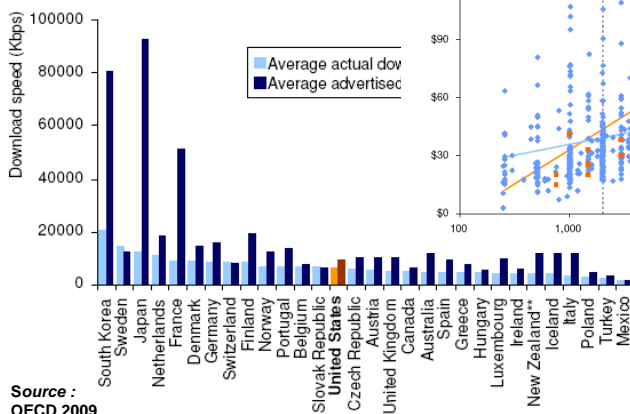
There is a need to model the impact of upgrading the service bandwidth, the service take rate and the service mix on the access network.

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.

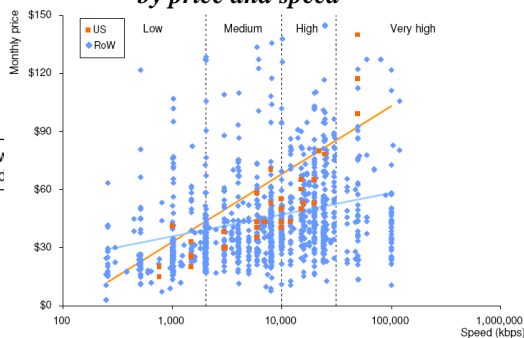
Speed and bandwidth statistics related to service upgrade

Average advertised vs. actual download speed



Source : OECD 2009

Offered broadband connection – by price and speed



Source : OECD, TeleGeography, Point Topic

Service bandwidth upgrade – example I

Name **Service:** FTTH-Bus Use Default Service
 Service Type: Permanent

Parameters
 Bandwidth: 20 Mbit/s
 Contention Ratio: 1

Normal :

Name **Service:** FTTH-Res Use Default Service
 Service Type: Permanent

Parameters
 Bandwidth: 15 Mbit/s
 Contention Ratio: 1

Service utilization is presented by the Contention Ratio

Name **Service:** FTTH-Bus Upgraded Use Default Service
 Service Type: Permanent

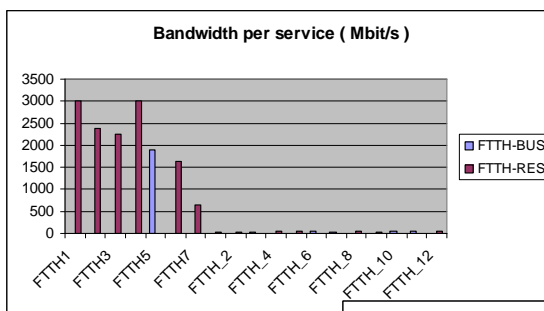
Parameters
 Bandwidth: 40 Mbit/s
 Contention Ratio: 1

Upgraded:

Name **Service:** FTTH-Res Upgraded Use Default Service
 Service Type: Permanent

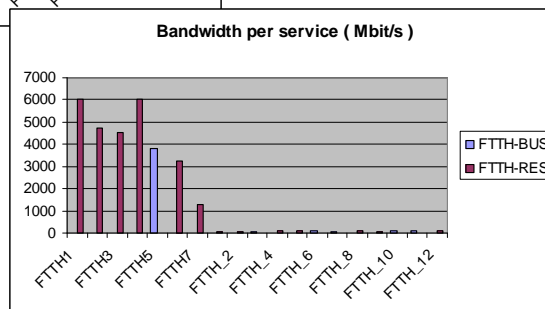
Parameters
 Bandwidth: 30 Mbit/s
 Contention Ratio: 1

Service bandwidth upgrade – example I



<- Normal

FTTH – Home locations



Upgraded:

Service bandwidth upgrade - example I

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

Bandwidth per service (Mbit/s)

Bandwidth increase :

100 %

Upgraded:

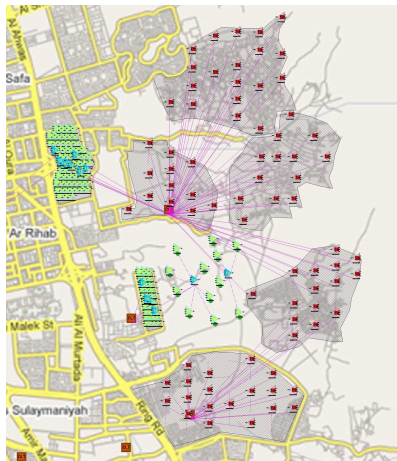
Service Areas and Sites	Data connectivity	FTTH-Bus Upgraded	FTTH-Res Upgraded
FTTH1	0	0	7500
FTTH2	0	0	5944
FTTH3	0	0	5638
FTTH4	0	0	7551
FTTH5	0	3800	0
FTTH6	0	0	4081
FTTH7	0	0	1609
FTTH_1	0	0	30
FTTH_2	0	0	60
FTTH_3	0	40	0
FTTH_4	0	0	90
FTTH_5	0	0	120
FTTH_6	0	80	0
FTTH_7	0	40	0
FTTH_8	0	0	120
FTTH_9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

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Service bandwidth upgrade - example I

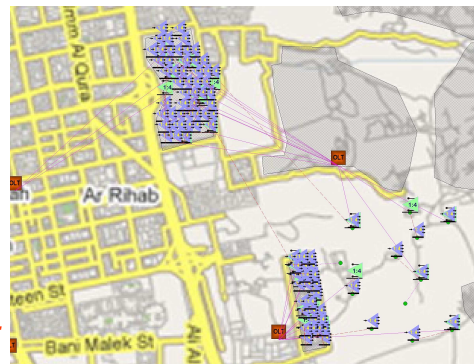


<- Normal

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

Access Network Dimensioning/Optimization

Upgraded:



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

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Service bandwidth upgrade – example I

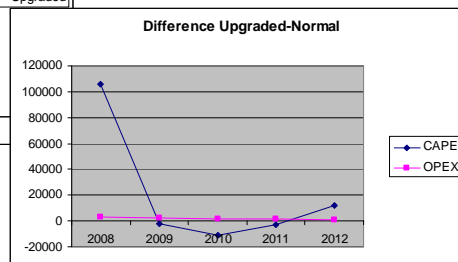
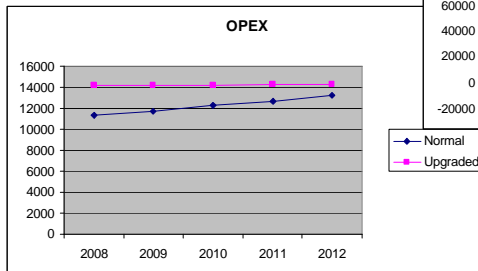
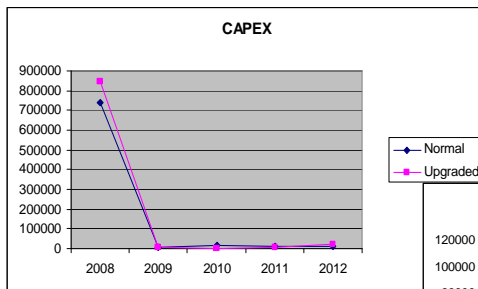
Costs :

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

Costs increase :
(relative to all costs) **1.16 %**

Service bandwidth upgrade – example I

Costs :

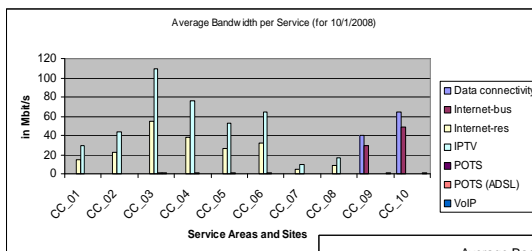


Service bandwidth upgrade – example II

The screenshot displays two sets of service configuration panels. The left set, labeled 'Normal', shows configurations for 'Data connectivity' (Elastic, 10 Mbit/s Access Link, 8 Mbit/s Guaranteed) and 'IPTV' (Real Time CBR, 8 Mbit/s Bit Rate). The right set, labeled 'Upgraded', shows configurations for 'Data connectivity upgrade' (Elastic, 20 Mbit/s Access Link, 16 Mbit/s Guaranteed) and 'IPTV Upgrade x 2' (Real Time CBR, 16 Mbit/s Bit Rate). Erlang values are also shown: 0.15 for Normal Data connectivity, 0.3 for Upgraded Data connectivity, 0.1 for Normal IPTV, and 0.2 for Upgraded IPTV. A red line connects the 'Normal' and 'Upgraded' panels, indicating the transition between states.

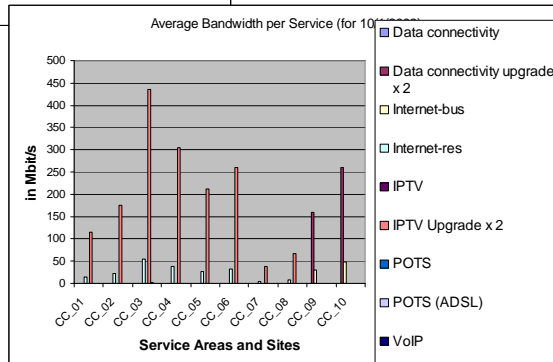
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Service bandwidth upgrade – example II



<- Normal

CC – Copper Cabinets



Upgraded:

Service bandwidth upgrade - example II

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

Bandwidth per service (Mbit/s)

Upgraded:

Bandwidth increase :

298.0%

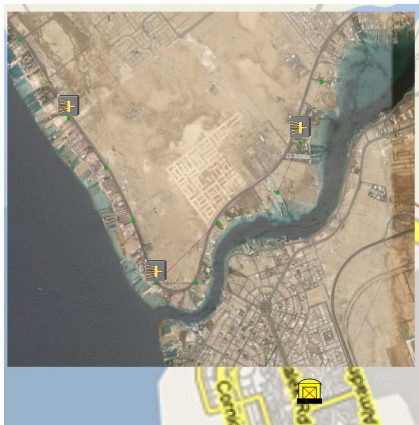
Service Areas and Sites	Data connectivity upgrade x 2	Internet-bus	Internet-res	IPTV Upgrade x 2	POTS	POTS (ADSL)	VoIP
CC_01	0	0	14.4	115.2	0.306	0.153	0
CC_02	0	0	22	176	0.4675	0.23375	0
CC_03	0	0	54.4	435.2	1.156	0.578	0
CC_04	0	0	38	304	0.80325	0.40375	0
CC_05	0	0	26.4	211.2	0.561	0.2805	0
CC_06	0	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

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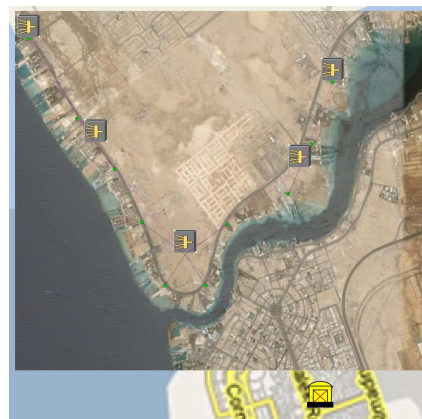
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Service bandwidth upgrade - example II



<- Normal
(3 MSAN)

Access Network Dimensioning/Optimization



Upgraded:
(5 MSAN)

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Service bandwidth upgrade – example II

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

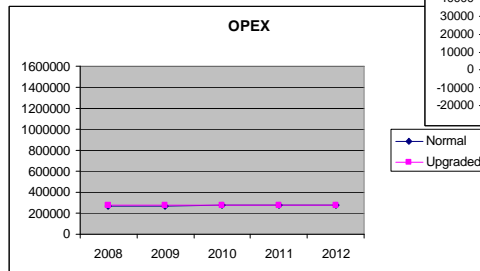
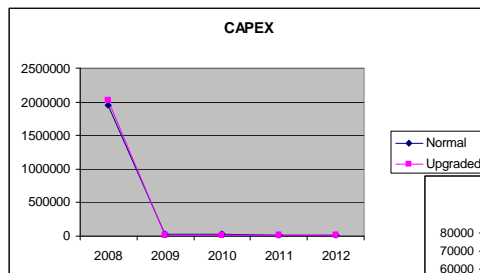
Costs increase :
(relative to all costs) **1.85 %**

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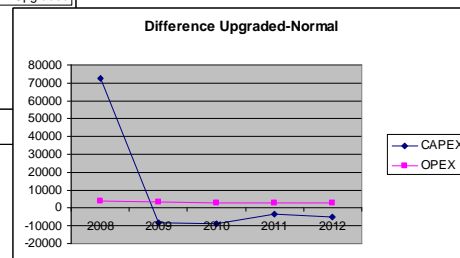
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Service bandwidth upgrade – example II



Costs :



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Extension of the service bandwidth upgrade studies

There is a need also to assess the cost for services in order to price products. Such study facilitates comparison of multiple service costing scenarios for strategic decisions on product pricing.

Additional parameters are:

- **price per service/bundle of services**
- **growth in customers from each service class**
- **growth in customers from each speed package**

The planner have to dimension the access network, to calculate all related costs and based on the expected revenue to providing insight into the Return-on-Investment and the profitability.

Problem 2 – Selection of Access Technology

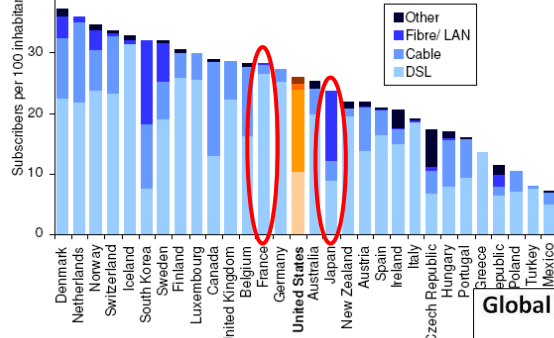
Aim is to investigate the techno-economical impact of various access technologies on the network for a given market

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

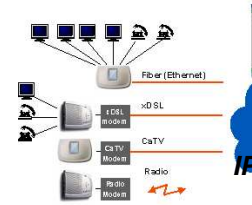
Selection is done by comparison of the economical parameters for each access technology

Broadband access technologies

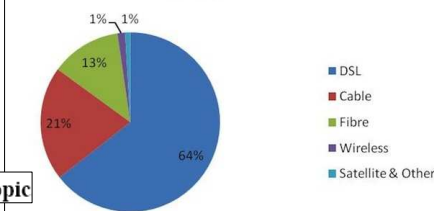
Application of different broadband technologies



Source : OESD 2008



Global technology market shares - Q209



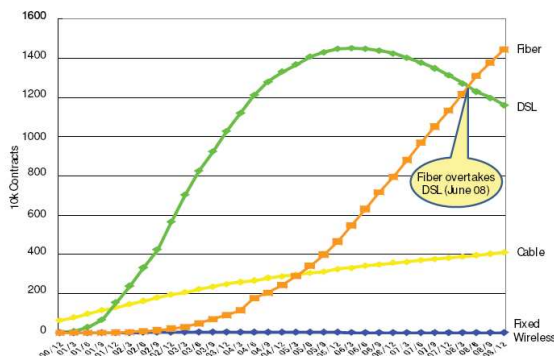
Source: PointTopic

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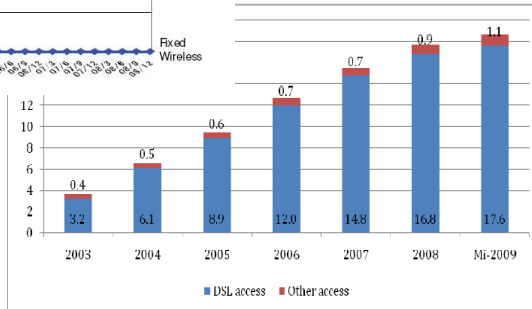
Broadband access – market share by technology



Source : Japan MIC

Broadband subscriptions in Japan

Broadband subscriptions in France



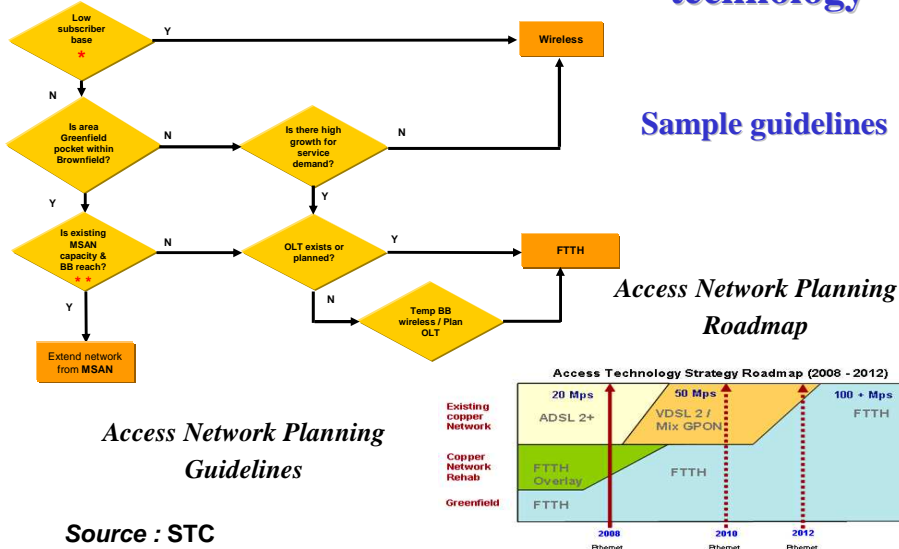
Source : ARCEP

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Planning guidelines for broadband access technology



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Example I – urban area brownfield

xDSL vs. FTTH brownfield

xDSL

xDSL

Edit Service - IPTV

Name: IPTV
 Service Type: Real Time CBR
 Parameters:
 Bit Rate: 8 Mbps

Remarks:

Extended Property:

Found New Hardware: Your new hardware is installed and ready to use.

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Example I – urban area brownfield

List of material :

FTTH

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

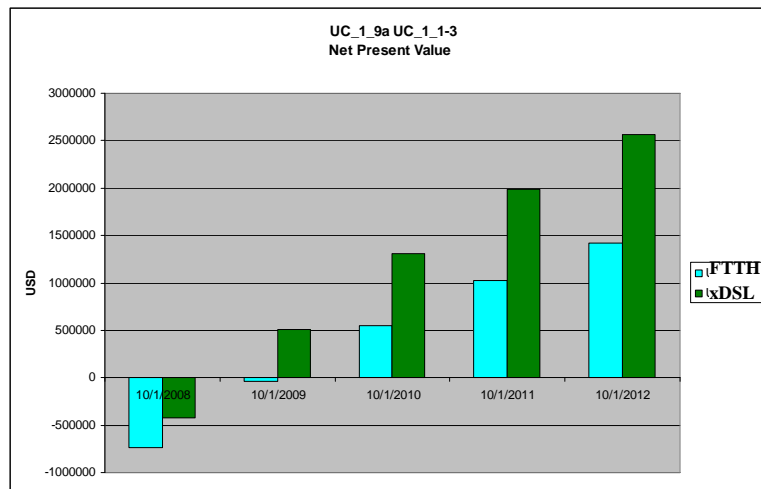
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Example I – urban area brownfield

xDSL vs. FTTH brownfield



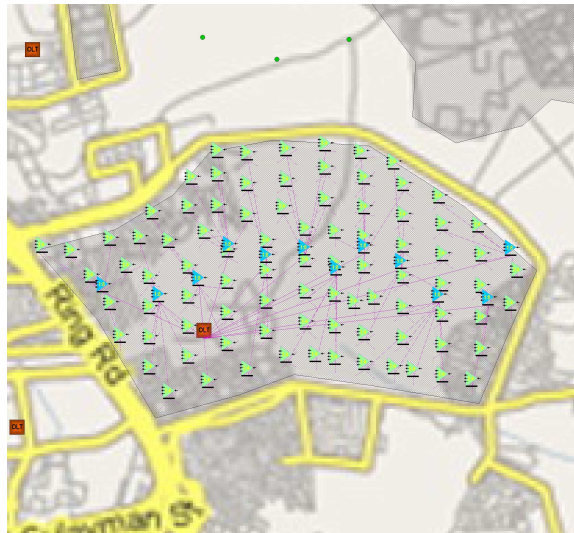
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Example II – urban area greenfield

FTTH vs. WiMAX greenfield



FTTH

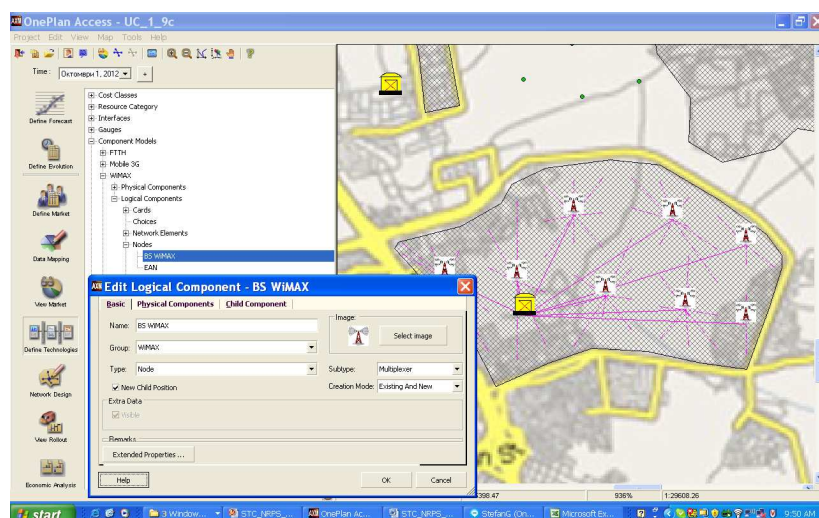
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Example II – urban area greenfield

WiMAX



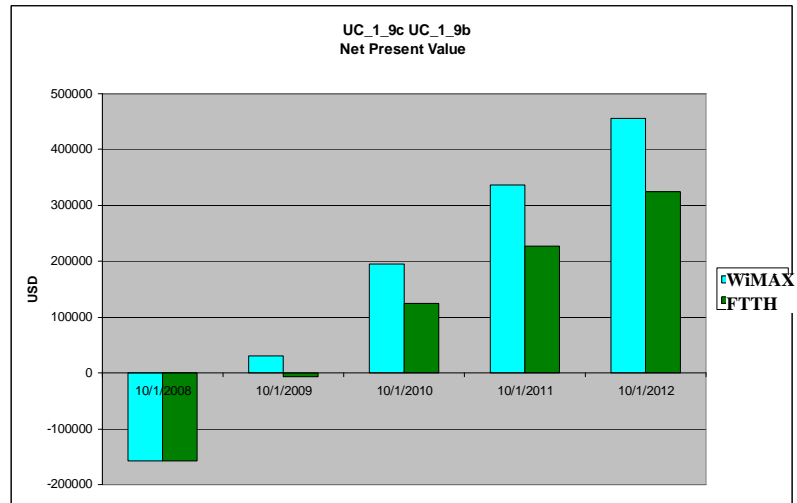
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Example II – urban area greenfield

FTTH vs. WiMAX greenfield



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Example III (a) – rural area

xDSL vs. WiMAX rural area



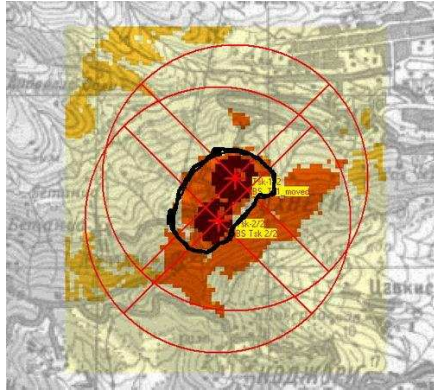
xDSL

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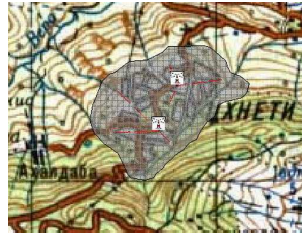
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Example III (a) – rural area

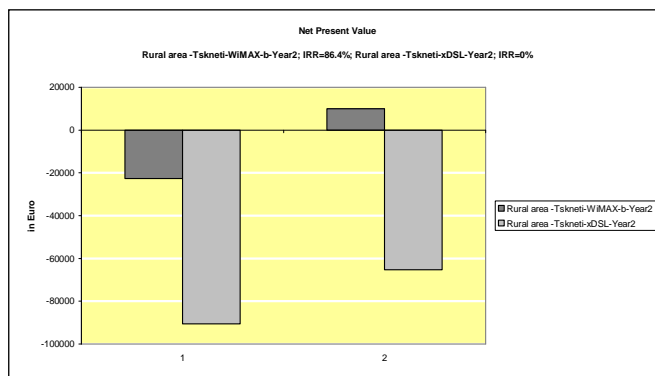


WiMAX



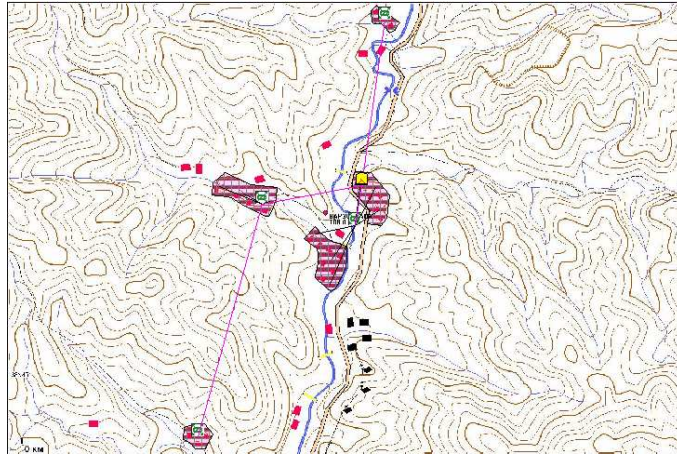
Example III (a) – rural area

**xDSL vs.
WiMAX
rural area**



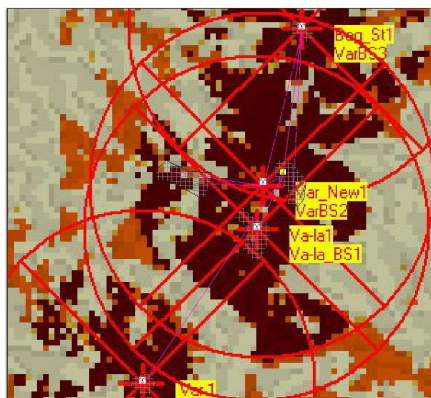
Example III (b) – rural area

xDSL vs. WiMAX rural area

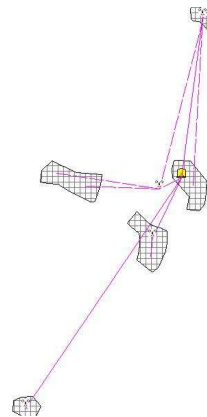


xDSL

Example III (b) – rural area

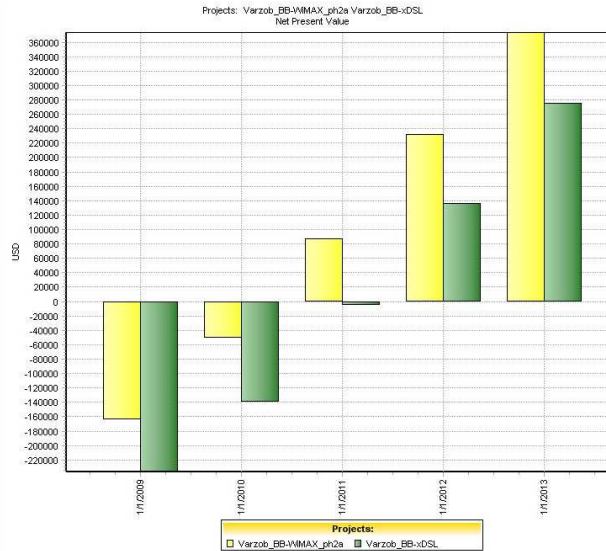


WiMAX



Example III (b) – rural area

*xDSL vs.
WiMAX
rural area*



Improvement of the selection of access technology studies

Present core network portion in the network expenses :

- as additional average cost per customer
- as total additional cost, related to the uppermost access network node

Present additional costs related to running the business (marketing of services, customer care, etc.) :

- as additional average cost per customer
- as total additional cost, related to the uppermost access network node