

NEREC Conference on Electronics Communications

Investments in New Generation Access Networks: Real Options Assessments in Wholesale Markets

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Some key issues on investments in NGAN

- Return on investment is uncertain: high risk project
- Investment in NGAN may help to the countries with Information Society underdeveloped
- NGAN may drive the content industry, as well as IT industry
- Should the entrant carriers have access to the NGAN deployed by an investor operator?
- NGAN investment affects the cost of capital of the investor
- Financial markets does not assess very well the effort in investing in NGAN

Empirical study on the Spanish case

The empirical study is structured as follows:

1. Investment assessment (FTTH-GPON) for 10.000 passed households
 1. A) Without any real option
 1. B) Taking into account growth real option
2. What should be the rental price if an entrant wish to rent the NGAN as bitstream?
 2. A) Without any real option
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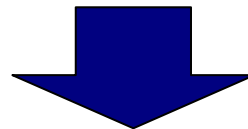
Basic Assumptions

Basic Assumptions related to the the deployment of a FTTH -GPON network

Variable	Assumption	Source	Variable	Assumption	Source
Lifespan	20 years	Authors´ assumption	Management and Maintenance	10%	Authors´ assumption based on COSTA model
Passed househols	10,000	Authors´ assumption	Depreciation	Lineal	Authors´ assumption
Unitary investment per household passed	330 €	COSTA model	Tax Rate	30%	Spanish Tax Rate
Unitary investment per household connected	480 €	COSTA model	WACC	12%	Authors´ assumption

Base Scenario

	Base Scenario
ARPU year 1	100€ per month
ARPU Growth annual rate	1%
Incremental ARPU (% on total ARPU)	40%
Households connected year 1	500
Growth on households connected	
Up to year 10	5 points every year
From year 10 to 20	0 points every year
Households connected year 10	5.000
Number of households passed	10.000



NPV = 1.498.560 €

IRR = 15,51%

Where is the return threshold?

Threshold: NPV=0 and IRR=WACC

Some scenarios in which NPV=0 or IRR=WACC

	Scenario 1	Scenario 2	Scenario 3
ARPU year 1	100 €/month	100 €/month	110 €/month
ARPU Growth annual rate	1%	1%	1%
Incremental ARPU (% on total ARPU)	40%	50%	40%
Households connected year 1	378	285	334
Growth on households connected			
Up to year 10	3,78 points every year	2,85 points every year	3,34 points every year
From year 10 to 20	0 points every year	0 points every year	0 points every year
Households connected year 10	3.782	2.846	3.342
Number of households passed	10.000		

Risk analysis: assumptions

	Base Scenario
ARPU year 1	100€ per month
ARPU Growth annual rate	1%
Incremental ARPU (% on total ARPU)	40%
Households connected year 1	500
Growth on households connected	
Up to year 10	5 points every year
From year 10 to 20	0 points every year
Households connected year 10	5.000
Number of households passed	10.000



Key variables

- ARPU year 1
- Incremental ARPU (% on total ARPU)
- Households connected up to year 10

ARPU year 1 defined as a Normal function

Minimum: 80

Maximum: 120

Mean: 100

Stand. Dev.: 10

ARPU incremental (% on total ARPU) defined as a Normal function

Minimum : 25%

Maximum : 55%

Mean: 40%

Stand. Dev : 10%

Growth on households connected (from year 1 to 10) defined as a Normal function

Minimum : 2,75 p.p.

Maximum : 7,5 p.p.

Mean: 5 p.p.

Stand. Dev : 1 p.p.

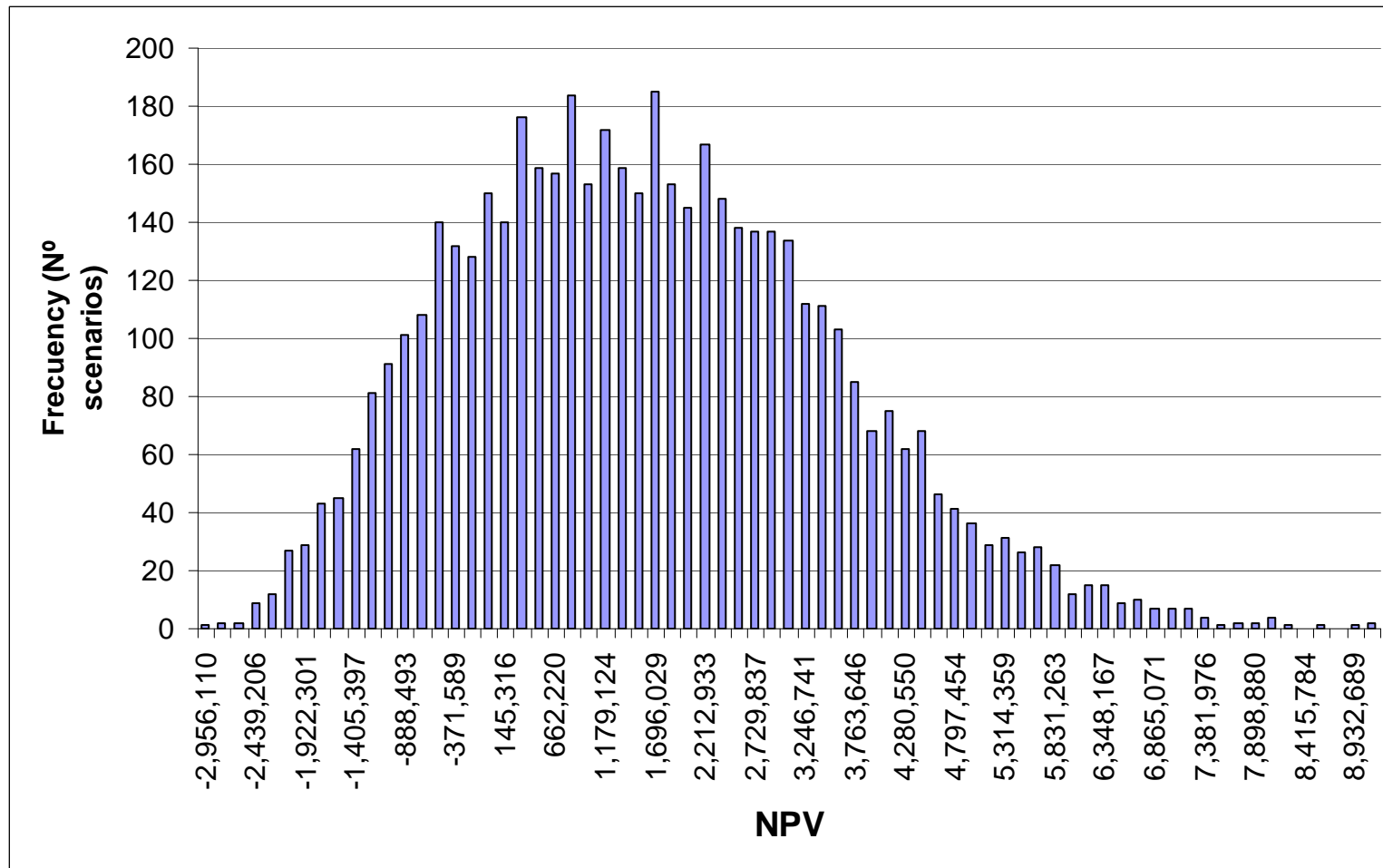
5.000 scenarios → 5.000 NPV

Risk analysis: Results

Number of scenarios: 5.000

Mean NPV = 1.517.213 €

Number of scenarios with negative NPV: 1.185 (23,7%)



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Growth Real Options: Assumptions

**On the base scenario, we assume
some new services would be consumed
by the households connected:**

- ARPU in year 4 is increased in 10€ for a part (10%) of the households connected already

Growth Real Options: Assumptions

New ARPU year 4 defined as a Normal function

Minimum: 7

Maximum: 13

Mean: 10

Stand. Dev.: 2

% of households connected in year 4 that engage new services defined as a Normal function

Minimum : 5%

Maximum : 55%

Mean: 10%

Stand. Dev : 4%

Growth on households already connected that are engaged in ner services (from year 1 to 10) defined as a Normal function

Minimum : 1 p.p.

Maximum : 3 p.p

Mean: 2 p.p.

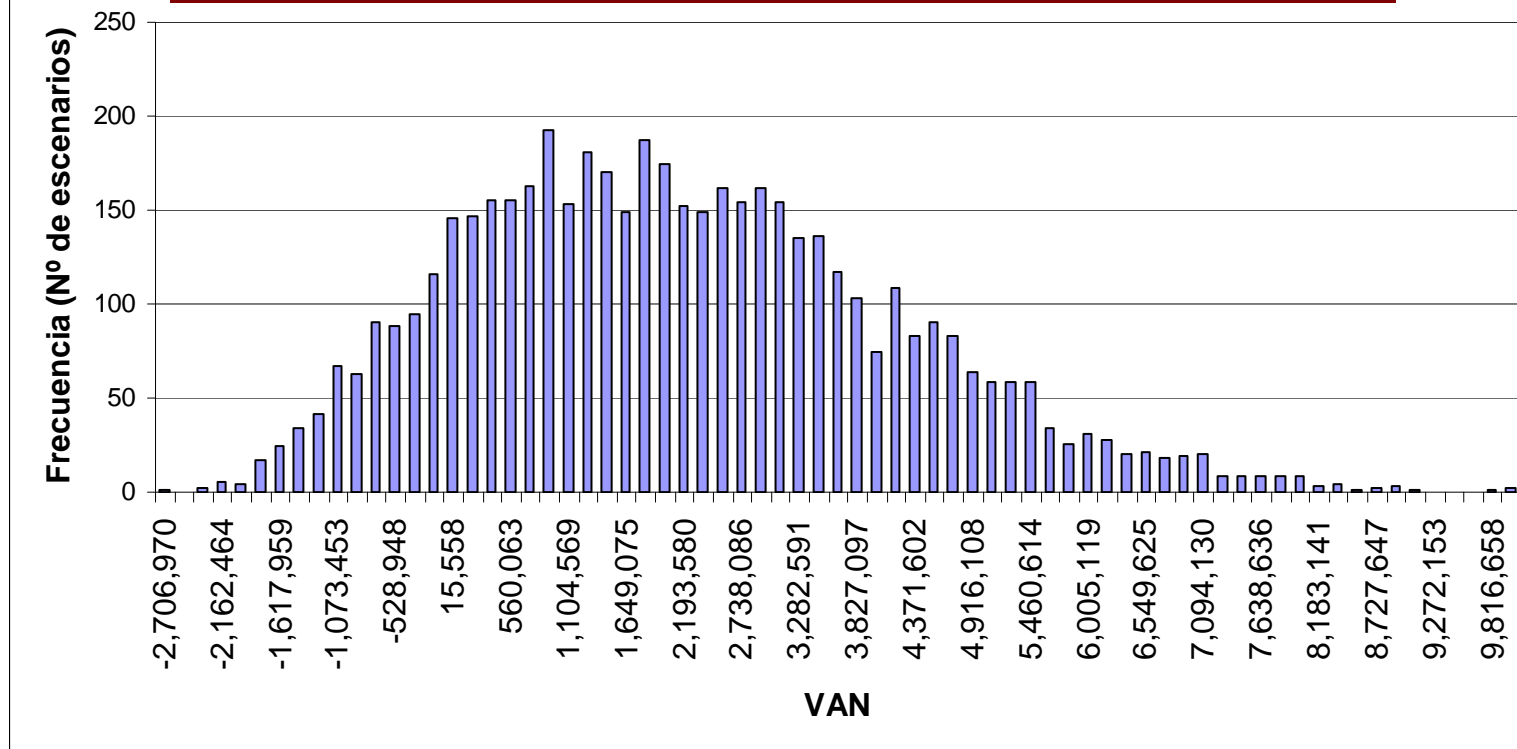
Stand. Dev : 0,5 p.p.

Growth Real Options: Results

Number of scenarios: 5.000

Mean NPV = 2.065.686 €

Nº of scenarios with negative VAN = 777 (15,5%)



Growth Real Options: Results

Without growth real options

Number of scenarios: 5.000

Mean NPV = 1.517.213 €

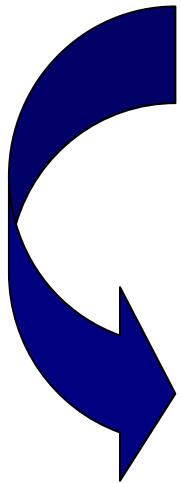
Nº of scenarios with negative NPV = 1.185 (23,7%)

With growth real options

Number of scenarios: 5.000

Mean NPV = 2.065.686 €

Nº of scenarios with negative NPV = 777 (15,5%)



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Regulatory issues

- Controversial issues:
 - Obligation of making available the network to the competitors?
 - At what rental prices?

Monthly rental price

Assumptions	
CAPEX per passed and connected household	809,68
Maintenance and management costs	10%
Households which are passed but not connected	70%
WACC	12%
Life time of the investment	20 años
Rental price (euros per month)	
Costs without Real Options	18,51
CAPEX per passed and connected household	9,03
Cost due to the idle capacity	8,58
Maintenance and management costs	0,90

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1. Investment assessment (FTTH-GPON) for 10.000 passed households

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2. A) Without any real option

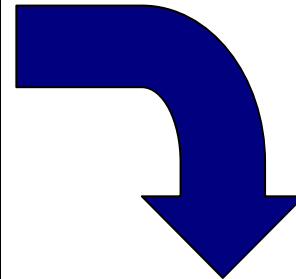
2. B) Taking into account real options

Renting vs. Investing

- First assumptions: the cost of deployment a NGAN is the same for all the firms.
- What are the advantages of renting instead of investing?
 - No cash out flow due to CAPEX as well as benefits due to the externalization of an activity.
 - The firm enjoys a free Abandon Option, which is based in the sunk costs committed if the firm had invested.
 - Learning Real Options
 - The firm may takes advantages of growth real options that not requires improvement in the network.

Precios TELRIC en las NGAN con opciones reales

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CAPEX per passed and connected household	809,68
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Assumptions	
CAPEX per passed and connected household	809,68
Maintenance and management costs	10%
Households which are passed but not connected	70%
WACC	12%
Life time of the investment	20 años
Abandon option (% on TELRIC)	13,5%
Growth Option (% on TELRIC)	17,4%
Rental price (euros per month)	24,23
Costs without Real Options	18,51
CAPEX per passed and connected household	9,03
Cost due to the idle capacity	8,58
Maintenance and management costs	0,90
Real Options Costs	5,72
Abandon Option	2,50
Growth Option	3,22