_telecom
_internet
_media

UltraBroadband Overview

UltraBroadband Seminar

Paris, 3 April 2008

Understanding the Digital World

IDATE
Consulting & Research

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Agenda

- **Consumers needs in the Future**
- **FTTH worldwide Status & Strategy**
  - Leaders: US & Asia
  - European detailed Situation
- **FTTN+VDSL vs FTTH: Key parameters – Countries**
- **FTTH Business Model**
  - General Structure of the Model
  - FTTH CAPEX variables
- **FTTH French Case**
  - Business model
  - End 2007 Picture
- **Conclusion – Dynamics for FTTH**

Consumers needs in the Future

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FTTH: What will be the drivers? Usages

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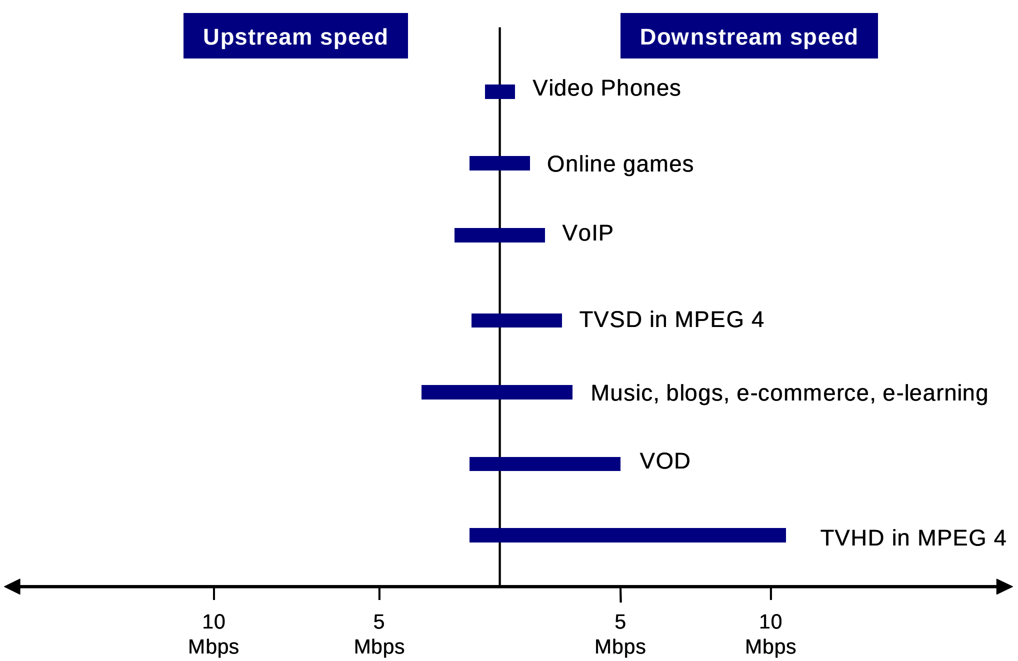
Residential market usages

- A few specific applications **needing more Bandwidth**: **HDTV**, video services, blogs, **personal content exchanges**,…
- A growth of the needs concerning Bandwidth but also **Symmetry** … this will be driven by **simultaneous usages** in the home that have already started with Triple Play

Minimum bandwidth requirements



Source: IDATE

services: faster, higher quality and simultaneous

high definition TV and VoD
with interactive programs on multiple TV sets and PCs

video games
on-line / download, sharper images

video blogs / on-line images
uploading digital pictures & videos

on-line storage & applications
resilience, shared applications, soho

powered by the Livebox(*)
simplicity, telephony (HD), convergence with GSM

By Addressing the Increasing Demand for Convergent Services… (neuf cegetel)

Increasing Demand for Convergent Services (Fixed+ Web Services, Mobile, Media)

Providing services that are usually "local" from inside the network

- E.g. iPBX, software suite in Neuf Pass, Neuf Giga storage, Neuf Sécurité

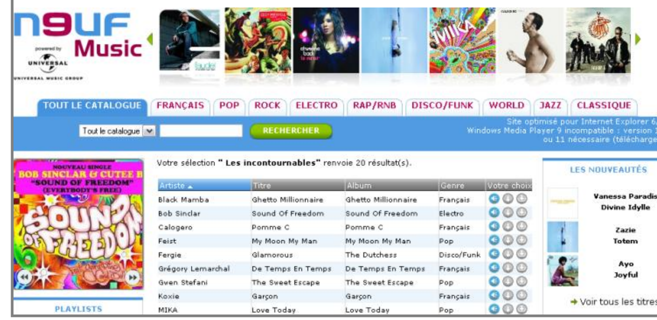
Distributing rich media content (video, music, software, games) with interactivity & personalization

- First free, legal and unlimited music download offer *Neuf Music*
- Premium channels in *Neuf TV HD*, *Neuf TV Sélection* & *Neuf TV Grand Spectacle*
- On-line game *Exalight*

Giving access to "fixed" services on mobile handsets, for a low price

- IP protocol well suited to providing cheap voice and mobile media services
- *TWIN™* phone with unlimited voice, emails, web browsing, access to Neuf TV, Neuf Music, Neuf Giga, etc.

Neuf Music



Leading channels added to Neuf TV HD

New TWIN handset

- HTC S710
- Hybrid GPRS/WiFi
- Windows mobile 6
- Fully multimedia
- Improved WiFi authentication

FTTH: Leaders Status & Strategies

FTTH: Worldwide Status & Strategies: leaders

Japan: the FTTH leader

- More new FTTH/B subscribers than new DSL subscribers since April 2005
- **10.5 Million FTTH/B subscribers at 3Q07** and still around 800 000 new FTTH subscribers each quarter (+ 818 K during 3Q 2008)
- At 3Q07 total Broadband subscribers reached 27.8 Million with DSL subscribers counting now less than 50% (48.5%) while **FTTH is representing 38%**
- Attractive prices, closing the gap with ADSL tariffs
- Government's proactive approach to FTTH deployment: 30 Million FTTH subscribers in 2010 as a ambitious objective…reality will be more 20 Million FTTH subscribers
- **But….**
  - **A few IPTV subscribers** in Japan
  - Rumors from MIC to force NTT to open up it's FTTH network at advantage prices for competitors

FTTH: Worldwide Status & Strategies: leaders

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- **USA: FTTH is the unique solution for RBOC's**
  - Power of Cable operators: Time Warner, Comcast, CableVision launching 30 or 50 Mbps offers
  - At end 2Q07 **Verizon has signed up its 1 millionth FiOS FTTH subscriber and has almost 500,000 FiOS TV subscribers!**
  - **During 3Q07**, Verizon's FTTH net additions exceeded DSL by more than 4 times
  - **At end 3Q07** Verizon has passed 8.5 M Homes, counts **1.3 Million FTTH subscribers** and among them **717,000 FiOS TV subscribers**
  - AT&T (more FTTN oriented) and Verizon launched Fibre access **for delivering HDTV & Triple Play**
  - **Churn is very low** for FiOS TV Subscribers

FTTH: European situation

Study Background for the FTTH Council Europe

Objectives, available results

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Background of the Study

- **IDATE has been commissioned by the FTTH Council Europe to provide a comprehensive overview of FTTH deployments in Europe (EU 27 + Norway, Iceland, Switzerland & Andorra) at end 2007 (4th edition)**

- **Methodology used**
  - Desk research
  - Direct contacts with FTTH players (questionnaires, phone interviews)
  - Information exchange with FTTH Council Europe members
  - Direct contacts with IDATE's partners in several European countries

- **Objectives: to provide a complete summary of the status of FTTx in Europe**
  - Identify new projects
  - Characterize each project: organization initiating the project, Key parameters& Figures (Homes and Buildings passed), Technical parameters, Financing & Business model
  - We distinguished FTTH/FTTB and FTTN+VDSL or FTTLA

Available results

► 201 projects described

Qualitative

Telekom Slovenije

Identification Operator/Organisation

Telekom Slovenije is the incumbent operator in Slovenia. Slovenia, situated east of Italy and south of Austria, has a population of 2 million people.

Key parameters

European incumbent operator Telekom Slovenije plans to spend up to €450 million (US$620 million) until 2015 on a fiber-to-the-home (FTTH) rollout in an effort to deliver high-speed access capabilities to 70 percent of households in the small Eastern European country of Slovenia. Telekom Slovenije, which calls its FTTH project F2, plans to spend €50 million ($69 million) in 2007 taking fiber to 50,000 homes in Slovenia's main cities, running new cables through its extant ducts for the initial phase of the rollout.

The carrier's total planned capital expenditure budget for the year is €220 million ($303 million), so it is dedicating more than 20 percent of its 2007 capital outlay to F2.

By 2015, it plans to have fiber running to about 434,000 homes, or 70 percent of Slovenia's households. This, believes the carrier, will help boost the uptake of bandwidth-hungry services such as IPTV, video on demand (VOD), and interactive gaming. The carrier plans to invest €300 million ($414 million) in F2 by 2010, and €400 million to €450 million ($551 million to $620 million) by 2015.

Figures

Number of Households/Business Units passed	2,500 householes passed (June 2007) **41,000 households passed (end 2007)** **objective : 100,000 households passed (end 2008) and 300,000 households passed (end 2010)**
FTTx subscriber base	200 FTTH susbcribers (June 2007) **3,300 FTTH susbcribers (end 2007)**

Technical parameters

P2P Ethernet
The main vendor beneficiary from the FTTH rollout is Iskratel, which is supplying the Fiber Access version of its SI3000 multiservice access family of products. This is Iskratel's first major FTTH deal.

The network model used in the project continues the concept of the IP triple-play-enabled access-network architecture of Telekom Slovenije, based on Iskratel's SI3000 MSAP family of access products. Iskratel SI3000 Fiber Access, the chosen CO product for the project, is a member of Iskratel's SI3000 MSAP network-access product family and is designed on the same platform (same shelves, central Ethernet switch and management) as the SI3000 DSL Access, which is already widely deployed in the access network of Telekom Slovenije.

Source: IDATE

Quantitative

	December 2007 (1)	
	FTTx subscribers	Homes/Buidings passed
ELLA	3 500	5 000
Kvinnherad Breiband	1 400	2 500
Los	4 500	10 000
Lyse	86 432	110 000
Tromskraft	2 500	10 000
Alta Kraftslag	1 068	2 000
Telenor	na	na
Halfslund	1 000	5 000
Others (2)	20 500	55 000
Norway (*)	120 900	199 500
Norway (**)	120 900	199 500

FTTH in Europe

Overview

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FTTH in Europe - Overview: Projects

- IDATE has identified 201 FTTx projects in Europe of which 88 are new initiatives since mid 2005

- Some significant FTTH/B & VDSL European deployments at end 2007

Countries	Players		Home/Building passed (end 2007)
Denmark	**EnergiMidt**	Power utility	50 000
	DONG Energy	Power utility	100 000
France	**Iliad/free**	Alternative operator	241 000
	France Telecom/Orange	Incumbent	146 000
	Neuf Cegetel	Alternative operator	120 000
	Numericable	Cable operator FTTLA & FTTB	2 000 000
Iceland	**Reykjavik Energy**	Power utility	15 000
Italy	**Fastweb**	Alternative operator	2 000 000
Germany	**Deutsche Telekom**	Incumbent/VDSL	8 000 000
Switzerland	**Swisscom**	Incumbent/VDSL	1 800 000
Belgium	**Belgacom**	Incumbent/VDSL	1 800 000
Sweden	**B2**	Alternative operator	390 000
Norway	**Lyse**	Power utility	110 000
Netherlands	**KPN**	Incumbent/VDSL	500 000
	Regge Fiber	Civil Engineering	200 000

Source: IDATE

FTTH in Europe - Overview: Global Figures

- End 2007, 1 Million FTTH/B subscribers in the EU 31 and around 4.9 Million Homes Passed
- A growth of 23% in terms of subscribers and 79% in terms of Homes Passed compared to June 2006
- End of 2007, Deutsche Telekom covers 8 millions homes in Germany with FTTN + VDSL compared to 2.9 millions at mid 2006
- End 2007 around of 19.2 Million Homes Passed with FTTx including VDSL & FTTLA in Europe and 1.2 million FTTx subscribers

Europe	Subscribers		
	mid-2006	end-2007	Growth
Total without VDSL, FTTN/C/LA	816 118	1 005 402	23%
Total FTTx + VDSL + FTTLA	816 168	1 203 798	47%

Europe	Homes/Buildings passed		
	mid-2006	end-2007	growth 2007/2006
Total without VDSL, FTTN/C/LA	2 737 935	4 897 207	79%
Total FTTx +VDSL + FTTLA	6 237 985	19 209 572	208%

Source: IDATE

FTTH in Europe - Overview: Players

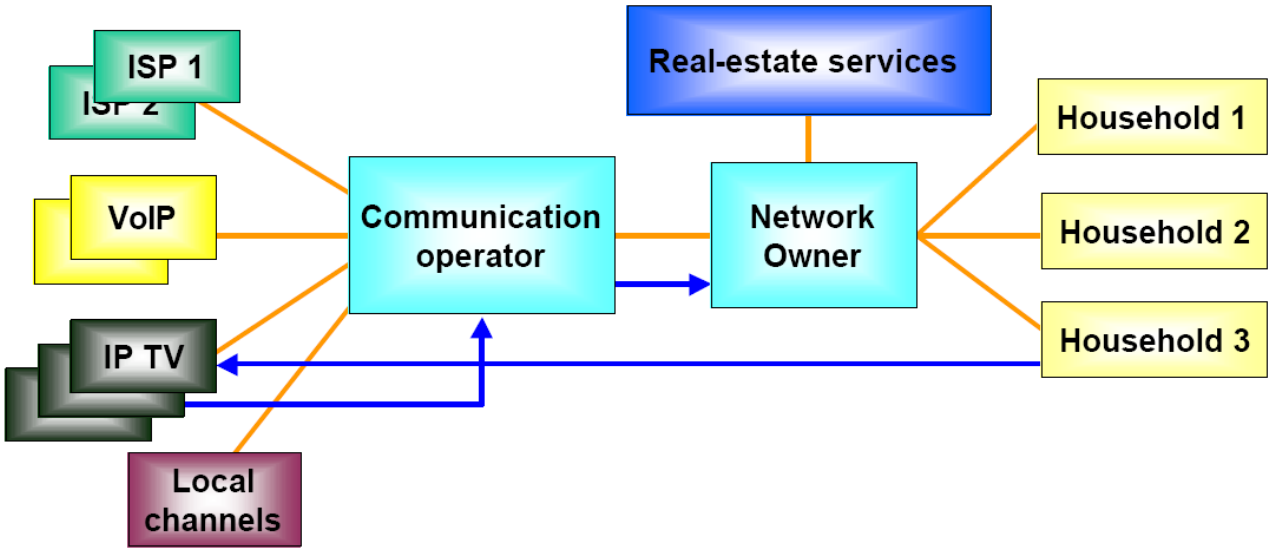
- ► Municipalities and Power utilities continued to initiate FTTx projects in 2007…
- ► … but significant deployments come now by alternative operators
- ► Adding Fastweb (Italy), B2 (Sweden), Illiad/Free & Neuf Cegetel (France) and T2 (Slovenia) FTTH subscribers at end 2007, we reach nearly 50% of the European FTTH subscribers base

Players involved in FTTH/B (Number of players)	June 2005		December 2007	
Incumbents	8	7,1%	17	8,5%
Municipalities / Power Utilities	78	69,0%	123	61,2%
Alternative operators / ISPs	12	10,6%	43	21,4%
Housing companies & Other	15	13,3%	18	9,0%

Source: IDATE

- ► Open Network Models are often chosen by Municipalities

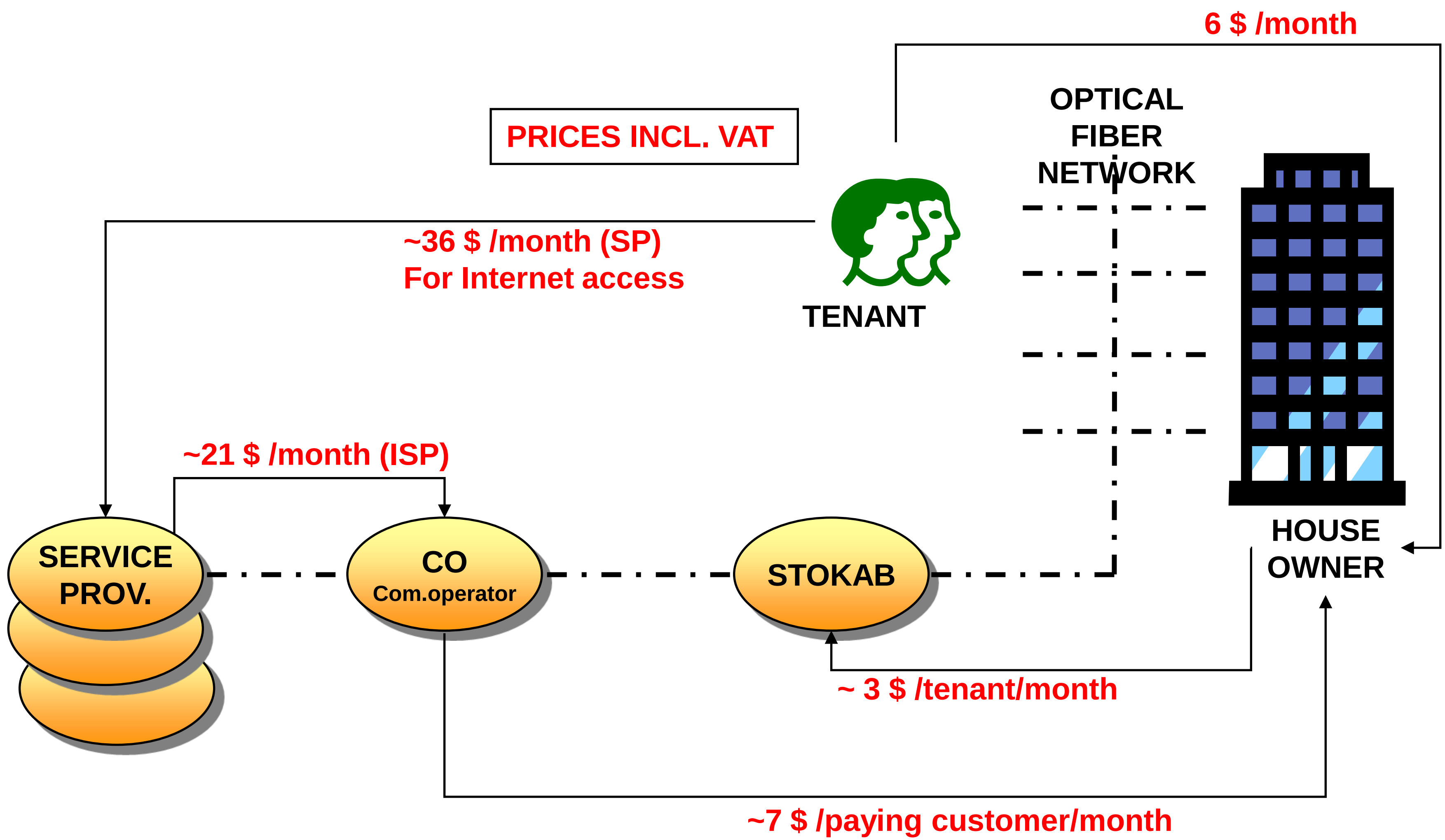
FTTH in Europe: Open Access Model - Sweden



Source: IDATE

Familje Bostader: Housing Company in Stockholm

Exemple of Open Network Business Model: Familje Bostader



Source: IDATE - FB

Europe’s FTTH leaders

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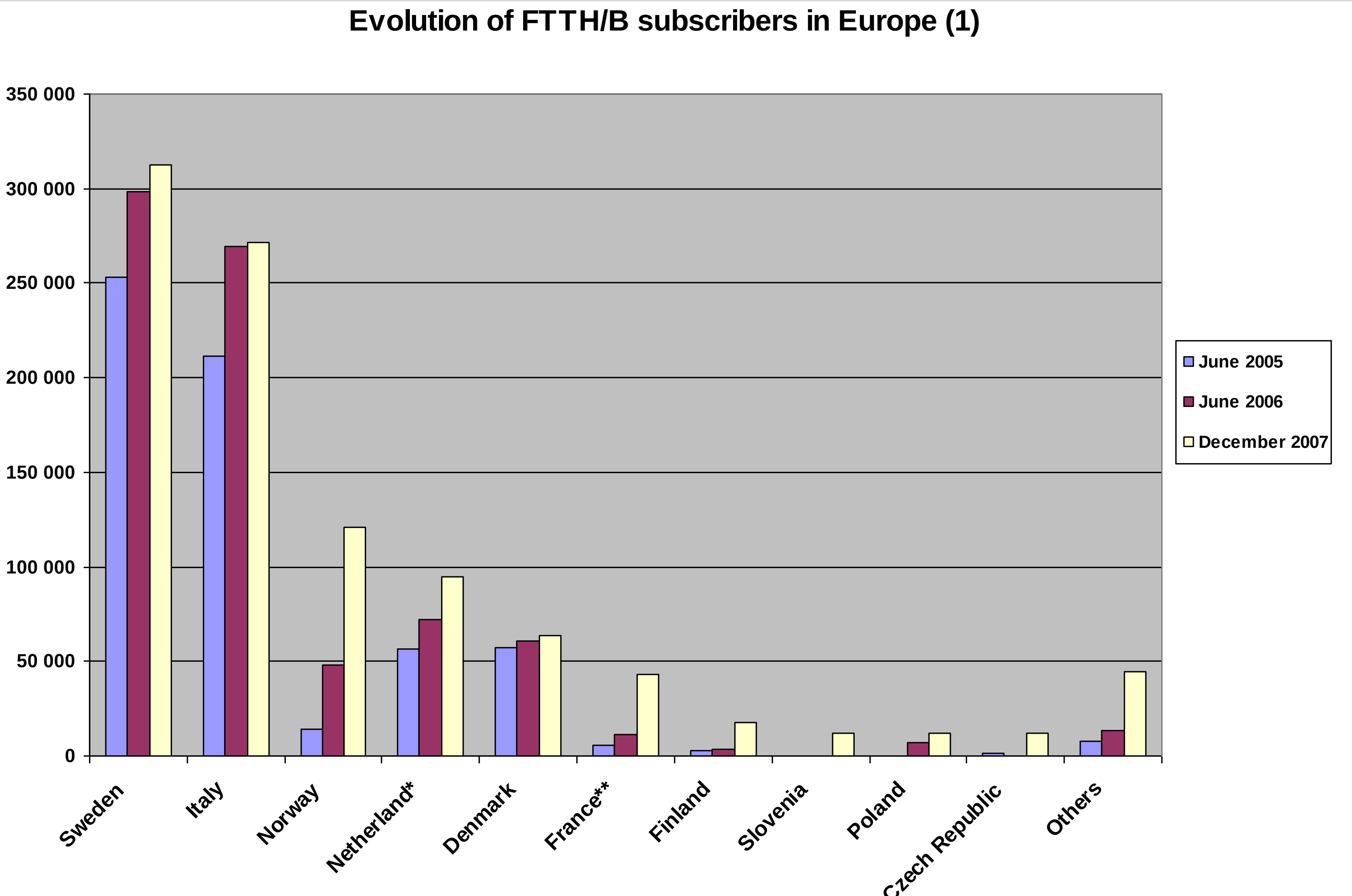
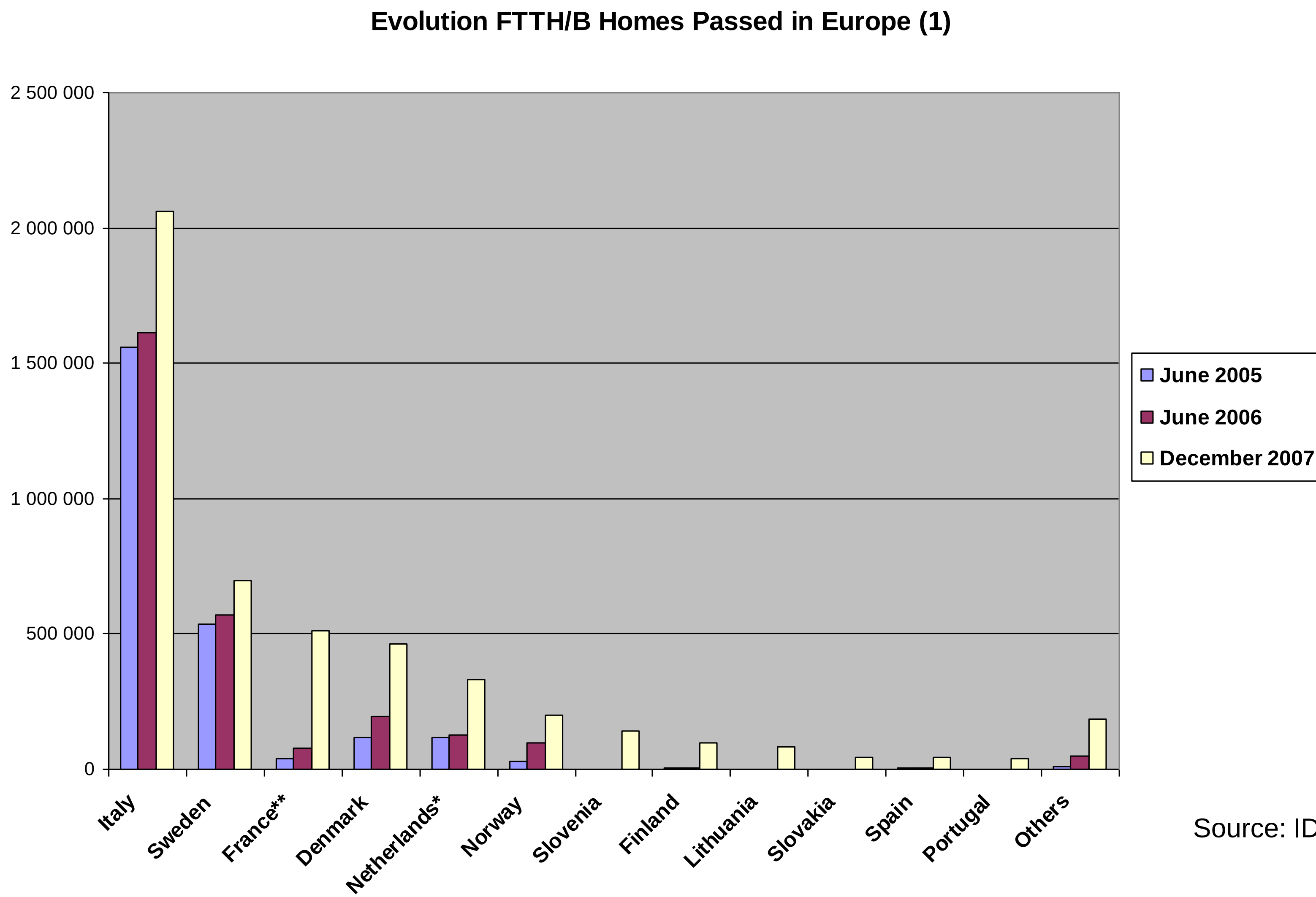
FTTH/B subscribers in Europe by country



(1) Here FTTx means Fiber-to-the-Home or Fiber-to-the-Building or Fiber-to-the-Office or Fiber-to-the-Dormitory
* Excluding VDSL / VDSL2, FTTC, FTTN deployments by incumbents
** Excluding FTTLA deployments

Source: IDATE

FTTH/B Home Passed in Europe by country



Source: IDATE

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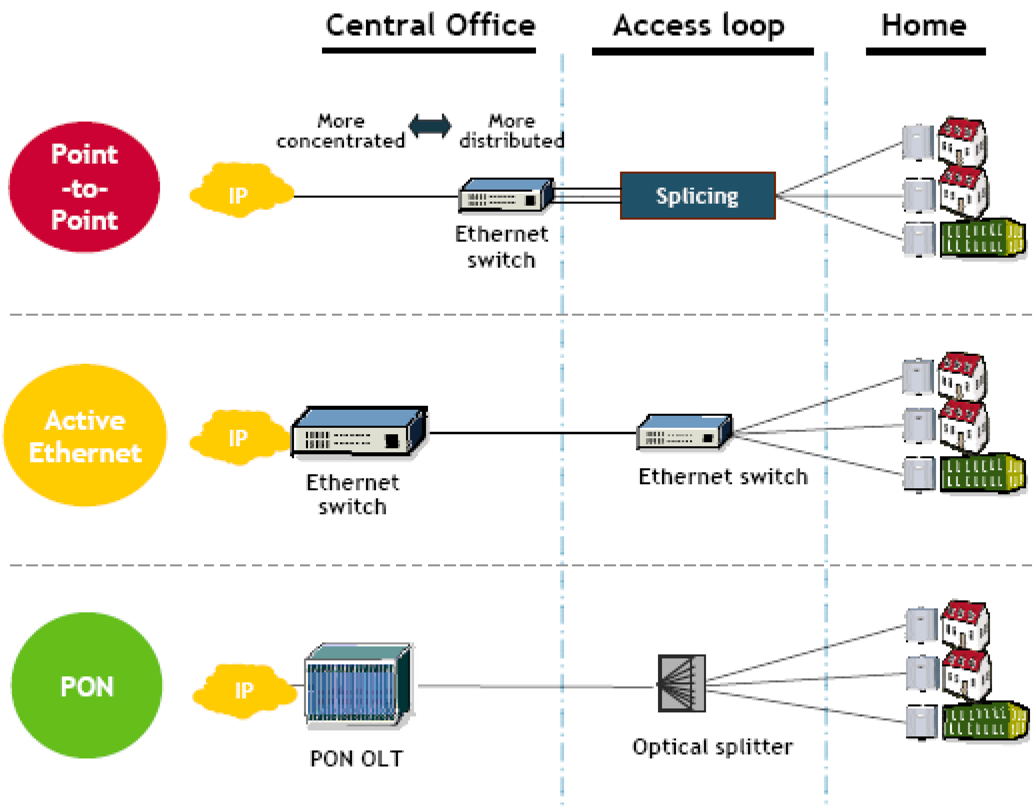
** Excluding FTTLA deployments

FTTH leadership in Europe: Technologies

► Technical solutions: PON vs E-P2P vs AON



Efficient Outside Plant

Passive OSP. No remote powering

Less maintenance, truck rolls,...

Deployment: Local FTTH networks

Cost-effective Feeder

Few fibers in feeder section

Distributed. Small Nodes

Deployment: FTTB/FTTN complements

Best of Both Worlds

Passive OSP & Cost-effective Feeder

Centralized → CO scalability & Consol.

Deployment Global & Local FTTH & FTTB

Source: Alcatel Lucent

FTTH leadership in Europe: Technologies

- **Technical architecture of European FTTx deployments: at end 2007 Ethernet still dominates PON**
  - **Majority of the FTTH rollouts in the Nordics & the Netherlands**
  - **Significant projects based on Ethernet like Iliad/Free in France**
  - **In Eastern Europe, Telekom Slovenia also selected Ethernet**

- **But PON selected for several major projects is now deployed in Europe**
  - **in Spain, the government of Asturias has chosen an Open Access Network GPON for its infrastructure (33 000 Homes Passed)**
  - **EnergiMidt, a Danish power utility has also selected a BPON/GPON technology (50 000 Homes Passed). Also in Denmark SEF is deploying EPON (14 000 Homes Passed)**
  - **France Telecom after testing FTTH / GPON since June 2006, is now deploying (146 000 Homes Passed)**
  - **neuf cegetel in France is deploying both technologies: Ethernet for Paris & GPON elsewhere (120 000 Homes Passed)**
  - **Telenor, Telefonica have selected GPON recently (in a mixed VDSL2 architecture)**

Key points and FTTH Dynamics for Europe

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Key points: FTTx in Europe

- **The panorama of FTTx deployments in Europe at end 2007 shows that the FTTH market in Europe continues to grow**
  - Especially in terms of **Homes Passed** (+79%) reaching around 5 million
  - Subscribers shows a +23% growth but are concentrated in **5 countries**
  - Dynamism of countries like **Norway** (FTTH subscribers x 2.5 in 18 months)
  - Involvement of 4 leading Broadband players in **France** in deploying FTTH/B and key role played by the Government and ARCEP
  - **Dynamic Eastern Europe** countries like Slovenia (2 players involved), Slovakia, Czech Republic and Poland

- **Nevertheless**
  - With a little more than 1 million FTTH/B subscribers at end 2007, Europe is still largely lagging behind the US (2 million FTTH subscribers) and Japan (11 million FTTH/B subscribers)
  - **Strong Barriers remains in Europe**

    - Facilitate access to MDU for operators,
    - Mutualise Civil Engineering costs
    - The Business Case of FTTH outside Urban and Suburban areas?
    - Regulation: what *ex ante "remedies"* EU will propose? Role of the European Telecom Market Authority?

FTTH Dynamics for Europe

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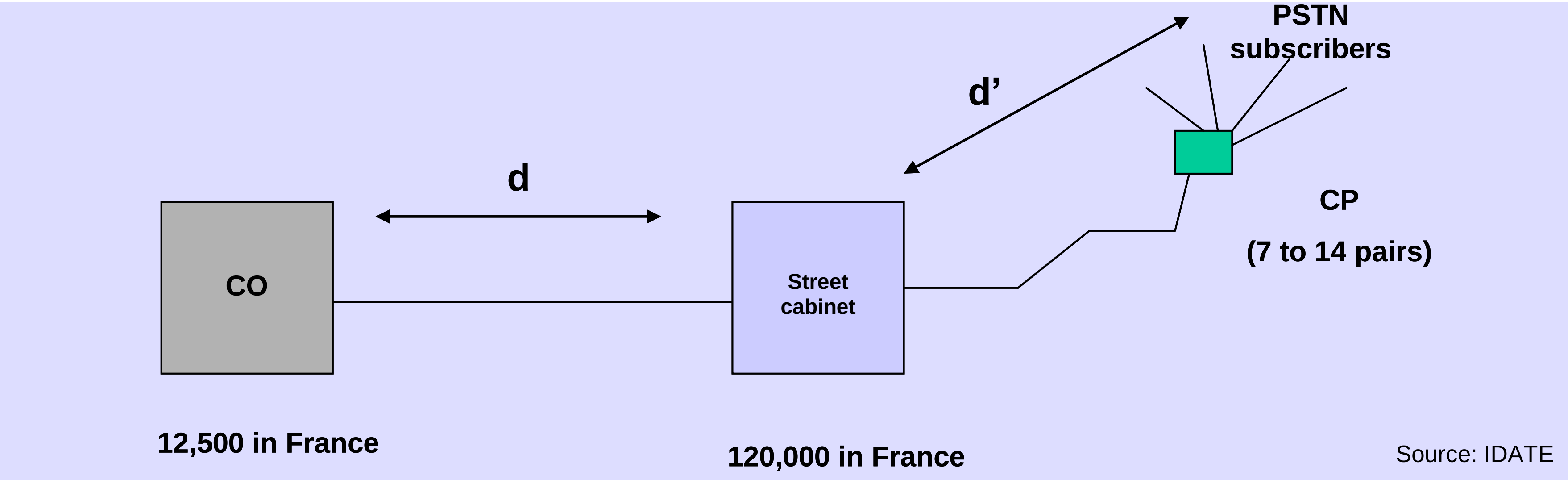
► We have seen encouraging signs in 2007 for the Future of FTTH in Europe

- In major European countries like **Germany** where three major City Networks announced ambitious FTTH rollouts (Munich, Hamburg, Cologne)
- In the **UK** where Government may intervene to promote the deployment of FTTH in front of the reluctance of the main British players
- **Large Incumbents** announcing that they will rollout FTTH in the near Future (Telefonica, Telenor) and others that first choose to deploy VDSL, are now launching FTTH deployments (KPN) or considering launches
- **Infrastructure companies** confirmed that they will also play a leading role in the future of FTTH deployments: ReggeFiber in the Netherlands or H20 networks in the UK
- Finally, 2007 confirmed the leading role played by **Municipalities and Utilities** especially in the Nordics and Benelux through **Open Access Model.** Local Bodies will be also be key players in order to **mutualise civil engineering** related costs

FTTH vs VDSL : Key parameters - Countries

FTTx Technology choice in France? Copper Loop

Copper Local Loop structure in France



► **Subscribers’ (d’) average distance from SC: 700 to 800 m; 300 m in Germany; 420 m in the UK**

► **Subscribers’ (d+d’) average distance from the local exchange:**

- ► 29% of lines at less than 1 Km
- ► 39% of lines at less than 1.5 Km
- ► 52% of lines at less than 2 Km

FTTx Technology choice in France? Copper Loop

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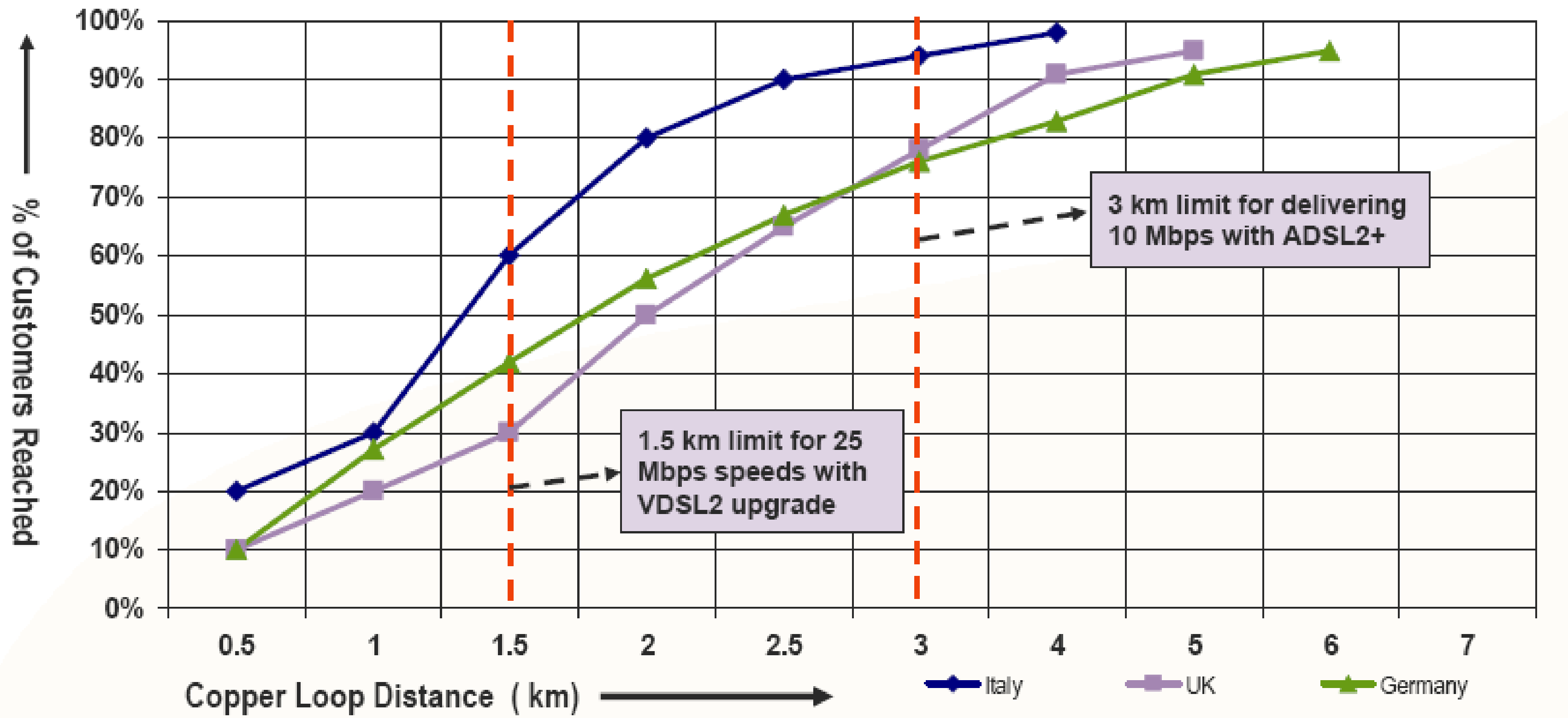
Performances of the French copper network

- **If all the Central Office (CO) are equipped with ADSL2+: 50% of the population eligible at 10 Mbps**
- **If all the CO are equipped with VDSL2: less than 10% of the population eligible at 50 Mbps**
- **If all the Street Cabinet (SC) are equipped with VDSL2: less than 20% of the population eligible at 50 Mbps**

► The SC is not the right place of arrival for Fibre in a VDSL approach in France; the « Curb » or the « Building » is better

FTTH vs VDSL – Italian VDSL particularity



Source: Telecom Italia

Average copper loop length boost VDSL potential in Italy

International benchmark – Dwelling Type in Europe

In Europe, countries like Spain, Italy, Germany are well positioned for FTTH

It will be more expansive to deploy FTTH in the UK for example

FTTx Business Model

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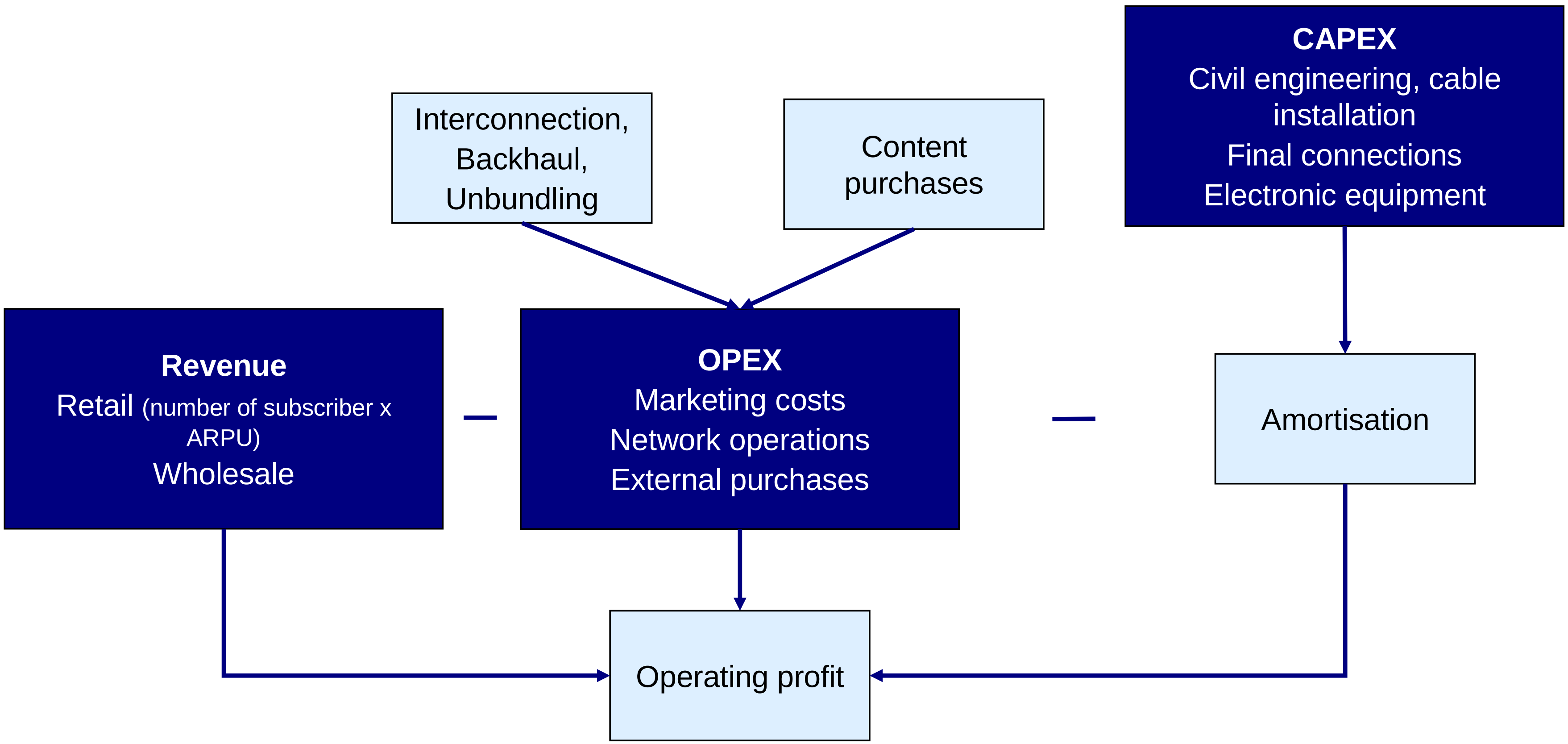
General structure of the model



FTTH CAPEX variables

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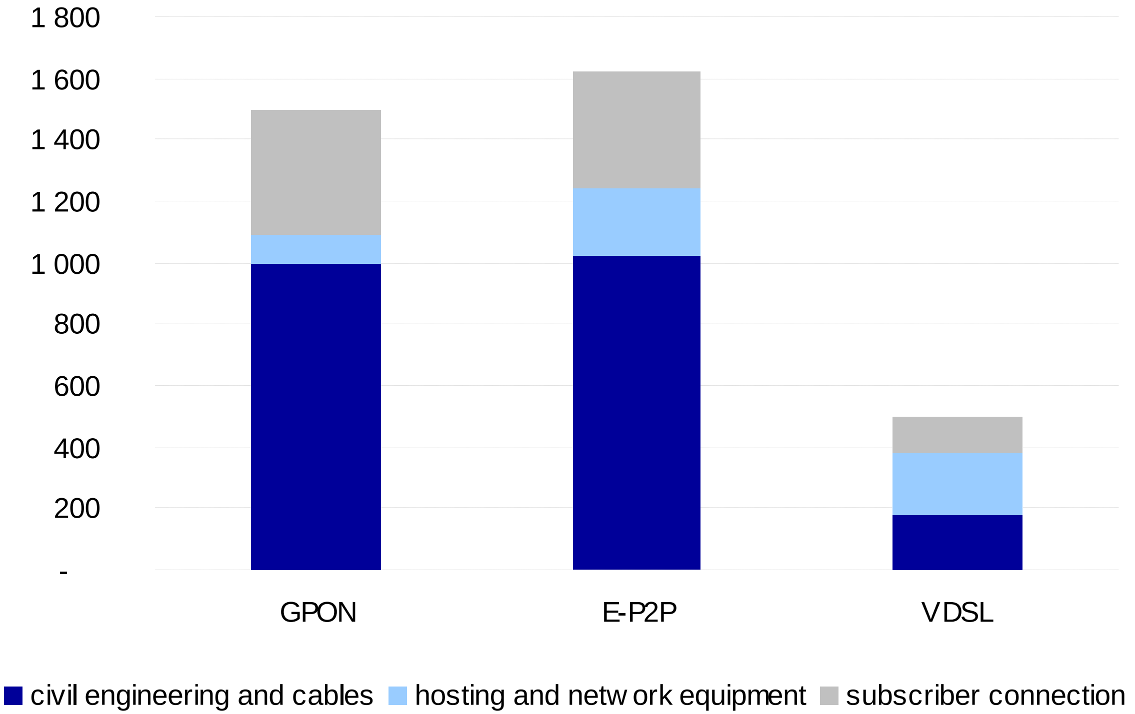
Costs of different FTTH solutions are close

FTTN + VDSL can present substantial savings (up to 70%) due to already existing copper sub-loop

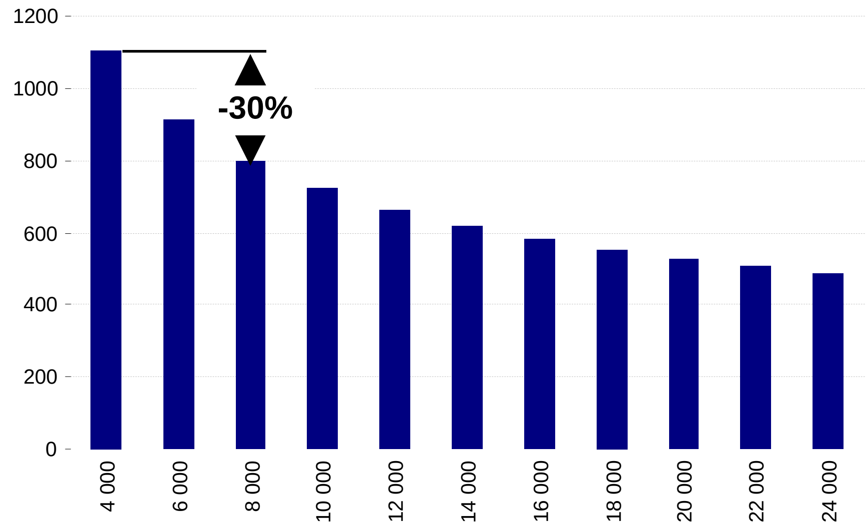


Cost per connected outlet
by architectural type
in the urban context
Greenfield deployment
(in €)

Source: IDATE

Dwelling-unit type

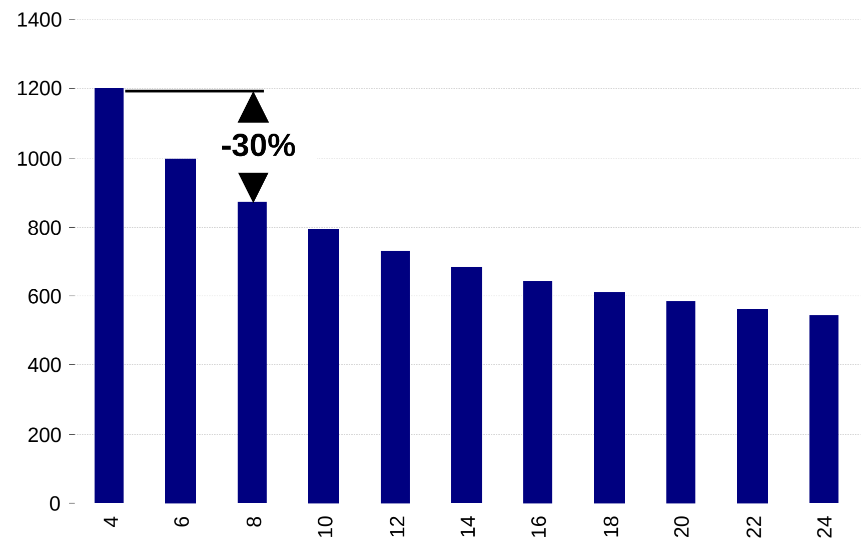
Density



Civil engineering and cable costs
based on population density
for GPON technology
(€ per outlet)

Source : IDATE

Vertical structures



Civil engineering and cable costs
based on average number of apartments per building
for GPON technology
(€ per outlet)

Source: IDATE

FTTH cost model: French case

FTTH cost model: French case – Base option

▶ Base option : Greenfield deployments main cities then residential areas

Amortization of network component

Civil Engineering (trenching)	40 years
Fibre	20 years
rooms, Air conditioning	10 years
Electronic equipment	5 years

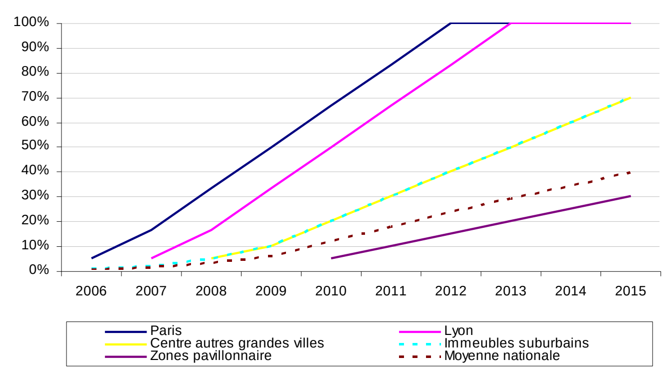
Number of Homes + SME/SoHo (million units)

Paris	1.100
Lyon	0.210
Others main cities (downtown) (1)	1.200
Suburban buildings	9.900
Residential areas	9.400
Total (2)	**21.810**

(1) Cities of more than 200 K inhabitants

(2) Total for France: 30 million units

- ▶ **Technologies : GPON and Ethernet P2P**
- ▶ **Deployment : 2006 to 2015 for a coverage of <u>40% of the population</u>**
- ▶ **In 2015 : 11.9 million homes passed and 5.3 subscribers representing a penetration of 17.8%**



Coverage evolution

FTTH cost model: French case – Base option

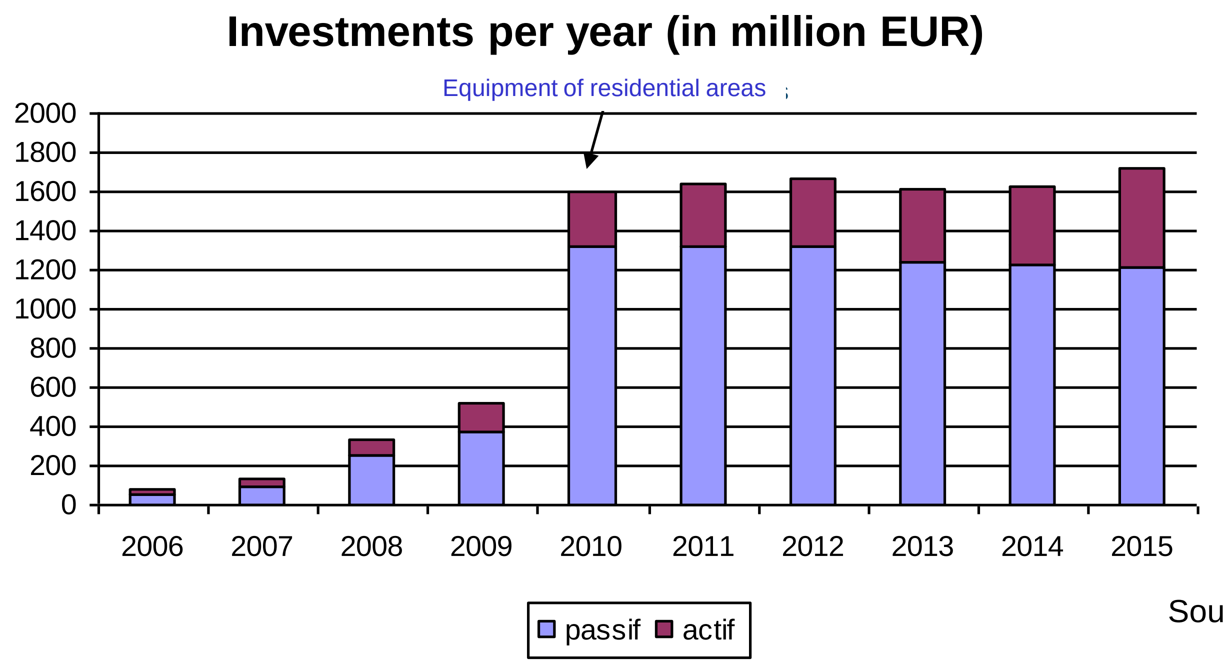
<u>Results Base Option</u> : For an ARPU of 50 EUR / month incl. VAT

- **Total investments between 10.4 billions EUR (GPON) and 11.3 billions EUR (Ethernet P2P) over 10 years**

- **On the 10 year period cost :**
  - per Home Passed: 879 EUR for GPON and 950 EUR for E-P2P
  - per subscriber: 1 958 EUR for GPON and 2 118 for E-P2P

- **Civil Engineering represents 70% of the costs**

FTTH cost model: French case – Base option



Source: IDATE

Entering in residential areas in 2010 with individual homes has a strong impact in deployment costs:

- ►**Investment during 4 first years is 1 billion EUR to cover 1.7 million HP and 500 K subs.**
- ►**Next year you need to invest 1.6 billion EUR to double HP and subs. Base !**

- ►**Per Home Passed the cost <u>in residential areas</u> is between 1.5 and 2.5 times more expensive than in Urban areas or Suburban Building areas**
- ►**The renewal of ONT every 5 years (starting in 2011) does not impact cost**

FTTH cost model: French case – Options

- ► <u>Option 1</u> : <u>Paris</u> with usage of passive existing infrastructure (Paris sewer)

At 1€/m/year it allows <u>an economy of 30%</u> compared to the Greenfield case

In 2015 : 1.1 million homes passed and 0.5 million subscribers

Investment needed is 500 million EUR instead of 700 million EUR

- ► <u>Option 2</u> : <u>France</u> (40% of the population) with usage of already existing ducts

At 2€/m/year it allows <u>an economy of 50%</u> compared to the Greenfield case

In 2015 : 9.1 million homes passed and 2.6 million subscribers

<u>Sharing of passive infrastructures (ducts, trenching,…) will be key !!</u>

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FTTH French case: picture

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FTTH: French picture end 2007

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	December 2007 (1)	
	FTTx subscribers	Homes/Buidings passed
Castres-Mazamet	na	na
France Telecom (3)	7 268	146 000
Gonfreville	na	na
Iliad-Free (4)	1 200	241 000
Maurienne	na	na
Neuf Cegetel	19 000	120 000
Sipperec	na	na
Sicoval	na	na
Cite Vision	0	0
Other*	1 000	3 000
Numericable - Noos(2)	15 000	0
France (**)	43 468	510 000
Numericable - Noos(2)	0	2 000 000
France (***)	43 468	2 510 000

Source: IDATE

- **Numericable: the leader in terms of Homes Passed**
  - 2 Millions Homes Passed in FTTH at end 2007, 4 M end 2008, 8 M end 2010
  - 2 Q08: launching of ADSL offer (using Completel backbone)
- **Free: 20% Market share end 2007 in ADSL (2.9 M subscribers)**
  - Investment: 33.3 Millions EUR in FTTH in 2007
  - Planned investments: between 300 et 400 Millions EUR in 2008 + 2009
- **Neuf Cegetel: 22% Market share end 2007 in ADSL (3.2 M subscribers)**
  - Planned investments: 300 Millions EUR in 2007 + 2008 + 2009
  - Probably more when fusion completed with SFR
  - “For more than 5 M Homes Passed wholesale needed by FT, For more than 10 M Homes Passed role of Local Bodies will be key”

France Telecom announcements: 2006 to now

- **France Telecom finally announced on Dec.15, 2006 a first FTTH deployment**
  - Target at end 2008: 150 to 200 K subscribers and 1 M Home Passed
  - Started in March 2007 in Paris then by June 2007 Lille, Lyon, Marseille, Poitiers and Toulouse. Around 10 cities covered at end 2008
  - Investment 2007 + 2008: 270 Million Euros
  - To prepare a massive roll out in 2009/2010
  - In 2009: 20 to 30% of French Homes equipped with HD TV
  - Will allow France Telecom to secure regulatory fair conditions
- **The pilot in Paris + 6 suburbs Cities (92)**
  - End 2006: 500 subscribers and 11 500 Home Passed at 70 Euros monthly for 100 Mbps
  - Penetration of 4.3%
- **1Q07: France Telecom launched a pre commercial Service**
  - Launching of FTTH service in March 2007
  - 47.90 Euros for 100 Mbps downlink and 10 Mbps uplink
- **Recently, France Telecom gave FTTH investments estimates**
  - To reach 4 Million FTTH subscribers in 2012 (Government objective)
  - A total investment between 3 and 4.5 billion EUR up to 2012
  - A direct market share of 50% on FTTH subscribers and 75% counting network renting

France Telecom Orange FTTH offer

new offer starting march 1st 2007

la fibre
une expérience du très haut débit

€44.90/month*

* 12 month subscription

Internet 100Mb
up to 100mbps download
& up to 10mbps upload

Web 2.0 portal,
TV on PC

Orange TV

free access to 45 French and international channels

unlimited voice

to fixed numbers in mainland France

fiber optics livebox

€3/month

options

multi screen TV in order to watch different channels on 2 TV sets — €7/month

HD time control in order to control live TV, record one's preferred programs, watch them anytime and enjoy high definition programming — €7/month

symmetrical 100mbps, a throughput of up to 100 mbps for upload and download, in order to send one's photos, or videos even more faster — €20/month

services

optical connection fees offered until june 2007, including installation of the optical plug and optical network termination

Included TV decoder and optical line termination

free technical and commercial **hotline** (0800 10 75 75)

domestic network installation on sale for €1 until june 2007 (Internet, TV, Phone)

combining entry level pricing, premium options and strong customer support

Conclusion

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Conclusion – Dynamics for FTTH

- **Competition**
  - Platforms competition Cable vs DSL is a dynamic factor
  - TV players & content providers will play a leading role
- **Governments & Regulators roles will be essential**
- **Maturity of technologies**
  - VDSL2 is now being deployed
  - PON technologies are deployed: Asia, US, Europe
  - Dynamics/Complexity of the Digital Home
- **FTTx: ARPU potential & New players**
  - New players will come: Housing companies, developers, Civil Engineering companies,…
  - VOD, SVOD, HDTV.. First services to leverage the ARPU… others to be invented … for Residential as well as for SMEs

_telecom
_internet
_media

Thank You!

Understanding the Digital World

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