Agenda

• FTTx Worldwide Key Trends

• Major Players Worldwide

• FTTH in Europe
• FTTH in LATAM
• FTTH in APAC
• FTTH in MENA
• ...and now in Sub Saharan AFRICA

• Lessons to be learned
  - Drivers for Fibre: The Gigabit Race, Short Latency and 4K / 8K !
  - Study cases: Google Fiber and New Zealand
FTTx Worldwide Key Trends
**FTTx Worldwide key trends**

> Superfast technologies\(^{(1)}\) represented nearly 47% of broadband access subscriptions at June-2016, 11 points more than one year before.

> FTTH/B is still the leading superfast broadband solution, far ahead of FTTx/D3.0, followed by VDSL

- FTTH/B represented 66% of FTTx subscriptions at June 2016. Growth of FTTH/B subscriptions will continue until 2021.
- FTTx/D3.0 represented at June 2016, 23% of FTTx subscriptions. After two years of significant growth, proportion of FTTx/D3.0 on Superfast Broadband is stable
- VDSL, for its part, lagged behind, representing 11% of subscriptions at June 2016. This proportion is quite stable.

> The regional breakdown is very heterogeneous

- No huge changes in the geographical predominance of APAC on the FTTH/B market.
- FTTH/B is also the main deployed technology in MENA. It was the case also in LATAM, but now it is meeting stronger competition from VDSL technologies in the region (Brazilian market).
- FTTx/D3.0 is still dominant in North America and is generally growing more rapidly than other technologies.
- There is considerable space for VDSL/G.Fast in Europe where incumbents still wish to optimise their copper networks.

\(^{(1)}\) For the definition of superfast platforms we have considered here three main architectures: FTTH/B, FTTN and FTTx/D3.0 deployed by cable operators
Breakdown of Superfast broadband technologies

Geographical breakdown of the three main superfast broadband architectures, at June 2016

**FTTH/B: 274 million subscribers**

- Middle East & Africa: 1%
- North America: 5%
- Latin America: 2%
- Europe: 15%
- Asia Pacific: 77%

**VDSL: 45.1 million subscribers**

- Europe: 48%
- North America: 39%
- Israel: 3%
- Latin America: 9%
- Asia Pacific: 1%

**FTTx/D3.0: 98.4 million subscribers**

- Europe: 31%
- North America: 62%
- Israel: 1%
- Middle East & Africa: 1%
- Asia Pacific: 4%

MEA = Middle East and Africa; LATAM = Latin America; APAC = Asia-Pacific; NA = North America; EUR = Western + Eastern Europe

Source: IDATE DigiWorld, World FTTx market, December 2016
Leading countries, by FTTx solutions at June 2016

> China, leader on worldwide FTTH/B market
- Until end-2012, Japan was the most advanced FTTH/B market in the world.
- Chinese players are more and more focused on FTTH/B and, as the largest country in the world, it will remain the leading market for the near future. The number of FTTH/B subscribers has already significantly increased in 2015.
- China and Japan are followed by Russia, which is ahead of South Korea, then the USA are ranked 5th worldwide.
- Elsewhere in the world, it is noticeable to indicate that FTTH/B is the only architecture deployed in Gulf Cooperation Countries (GCC).

> Strong competition from VDSL technologies in North America, in Europe, and now also in LATAM
- The promise of VDSL-based technologies has convinced several European incumbents to bet on the potential of their copper networks.
- However, these deployments will concern limited areas or smaller countries in terms of population, and therefore VDSL will not overtake the two other major FTTx architectures.
- It can also be noted that VDSL is the main architecture deployed in Brazil (16.6 million homes passed and 3.9 million subscribers) and in Israel (2.3 million homes passed and 1.5 million subscribers) the two only countries in their own region to deploy this solution on a large scale.

> FTTx/Docsis 3.0 is the technology implemented by MSOs
- The North American market is clearly ahead of any other in the world.
- Cablecos are implementing Docsis 3.0 and, most often, expanding fibre optic closer to homes into their infrastructure, in order to provide higher speed rates to end users. In general, cablecos do not plan to expand their geographical footprint (with a few exceptions for those who decide to deploy FTTH) in the next months, they will focus on updating their existing networks with Docsis 3.1.
- European MSOs have completed also the upgrade of their networks, thus entering the Top 5, with Netherlands in place of Japan.

<table>
<thead>
<tr>
<th>&quot;Top 5&quot; FTTH/B countries at June 2016 ('000 subscribers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTTH/B</td>
</tr>
<tr>
<td>China</td>
</tr>
<tr>
<td>Japan</td>
</tr>
<tr>
<td>Russia</td>
</tr>
<tr>
<td>South Korea</td>
</tr>
<tr>
<td>USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>&quot;Top 5&quot; VDSL countries at June 2016 ('000 subscribers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDSL</td>
</tr>
<tr>
<td>USA</td>
</tr>
<tr>
<td>UK</td>
</tr>
<tr>
<td>Germany</td>
</tr>
<tr>
<td>Brazil</td>
</tr>
<tr>
<td>Canada</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>&quot;Top 5&quot; FTTx/D3.0 countries at June 2016 ('000 subscribers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTTx/D3.0</td>
</tr>
<tr>
<td>USA</td>
</tr>
<tr>
<td>Germany</td>
</tr>
<tr>
<td>Canada</td>
</tr>
<tr>
<td>UK</td>
</tr>
<tr>
<td>Netherlands</td>
</tr>
</tbody>
</table>

Source: IDATE DigiWorld, World FTTx market, December 2016
Major players Worldwide
There are five Asian and four US players in the world Top Ten.
Only one player among them (AT&T) is involved in large FTTN+VDSL deployment, then there are two cablecos having upgraded their infrastructures to FTTx/D3.0 (Comcast and TWC Spectrum).
The two Chinese telcos (China Telecom and China Unicom) are leading this ranking with FTTH/B.

Top 10 worldwide players, at June 2016

- **#1** China Telecom (FTTH/B) - 17 M subscribers
- **#2** NTT (FTTH/B) - 19.5 M subscribers
- **#3** AT&T (FTTx/D3.0) - 23.9 M subscribers
- **#4** Spectrum (FTTH/B) - 23.9 M subscribers
- **#5** Verizon (FTTH) - 5.5 M subscribers
- **#6** China Mobile (FTTH/B) - 19.3 M subscribers
- **#7** KT (FTTH/B) - 7.5 M subscribers
- **#8** Rostelecom (FTTB) - 6.8 M subscribers
- **#9** Time Warner Cable (FTTH) - 5.7 M subscribers
- **#10** Comcast (FTTx/D3.0) - 5.5 M subscribers

Source: IDATE DigiWorld, *World FTTx market, December 2016*
Telcos vs. cablecos

- Cable operators have played an important role in fostering the superfast broadband market in the US and Europe
  - Competition from cablecos that have upgraded their infrastructure has pushed telcos to launch their own projects, either based on FTTH/B or FTTN+VDSL
  - Deploying a superfast broadband network based on fibre was the only way to compete with cablecos by providing faster connections and TV services (HD & multiscreen)

- Cable operators’ footprint in the US reaches 130M homes passed for FTTx+ Docsis 3.0
  - But not all American cablecos provide speeds of 100 Mbps, so there is huge potential for a strong increase in FTTx/D3.0 subscribers in the coming years.

- In Europe, FTTx + Docsis 3.0 is deployed mainly in the UK, Germany and Benelux
  - In the UK, Virgin Media (Liberty Global group) has already upgraded its entire network, representing 13.2M households.
  - In Spain, Ono, now part of Vodafone group, is the leading cableco with more than 1.9 M FTTx/D3.0 subscribers.
  - In Germany, Kabel Deutschland – which is also part of the Vodafone group – was reporting 3.1 million subscribers and 15.2 million homes passed as of June 2016.

- Docsis 3.1 is now selected by several MSOs
  - This is the case in Europe: TDC in Denmark plans to complete the Docsis 3.1 transformation of the entire network by the end of 2017, Virgin Media inside its Lightning Project is also considering Docsis 3.1
  - Outside Europe: Vodafone New Zealand is also involved in Docsis 3.1 as the solution to bring speeds of up to 1Gbps by mid-2016.
FTTH in Europe
There were more than 44.3 million FTTH/B subscribers and nearly 148 million FTTH/B Homes Passed in EU39 at September 2016.

- **EU 28**
  - Subscribers = 49%
  - Home passed = 52%

- **CIS**
  - Subscribers = 43%
  - Home passed = 36%
Historical data and growing trends

- Interesting dynamism of the European Union since 2013
- CIS countries: higher growth rates for subs than for HP between January and September 2016
- Globally: an increase of the growth rate during the first 9 months of 2016! Especially for EU28

Source: IDATE for FTTH Council Europe
Major projects / categories of players

- 400 analyzed FTTH/B projects in EU39 at September 2016:
  - There are less and less new projects from one year to another
  - All major operators are involved in each country, among which 35 incumbents at least
  - There will probably be more and more small players involved in local deployment in the coming years (Rural and Suburban)

- Incumbents now represent 43% of the total number of Homes Passed
  - This ratio was only 21% at end 2011
  - Alternative players, which promoted FTTH/B in most countries since 2008-2009, now represent 53% of the total number of HP; this ratio is increasing

- The market is clearly dominated by those two categories of players.

- But municipalities/Local Authorities, along with utilities when appropriate, will remain those ones that will help ensure an exhaustive coverage at term

% of Homes Passed per category of player

Source: IDATE for FTTH Council Europe
General ranking: FTTH/B Homes Passed

- 17 countries with 2 M HP or more in EU39 (10 countries in EU28, in blue on the map)
- Most significant growth rates do not necessarily concern the largest market but this confirms that, even in countries where FTTH/B is not the leading NGA solution, the interest is growing (e.g. Bulgaria: +40%)

Countries with 2 M HP or more at Sept 2016 [Top 5 Growth rates for 9 first months 2016] (million)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>50.8</td>
<td>20.5</td>
<td>34.5</td>
<td>45.9</td>
<td>50.9</td>
</tr>
<tr>
<td>Spain</td>
<td>45.7</td>
<td>18.3</td>
<td>25.0</td>
<td>31.2</td>
<td>41.5</td>
</tr>
<tr>
<td>France</td>
<td>43.0</td>
<td>18.0</td>
<td>25.0</td>
<td>31.0</td>
<td>43.0</td>
</tr>
<tr>
<td>Ukraine</td>
<td>9.0</td>
<td>2.0</td>
<td>2.0</td>
<td>9.0</td>
<td>14.0</td>
</tr>
<tr>
<td>Turkey</td>
<td>2.5</td>
<td>2.0</td>
<td>3.0</td>
<td>5.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Romania</td>
<td>3.0</td>
<td>1.0</td>
<td>1.0</td>
<td>3.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Portugal</td>
<td>2.0</td>
<td>1.5</td>
<td>2.0</td>
<td>3.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Italy</td>
<td>4.0</td>
<td>3.0</td>
<td>3.0</td>
<td>5.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Switzerland</td>
<td>3.0</td>
<td>2.0</td>
<td>2.0</td>
<td>3.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Germany</td>
<td>5.0</td>
<td>3.0</td>
<td>3.5</td>
<td>5.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Belgium</td>
<td>4.0</td>
<td>2.0</td>
<td>2.5</td>
<td>4.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Switzerland</td>
<td>3.0</td>
<td>2.0</td>
<td>2.0</td>
<td>3.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Austria</td>
<td>2.0</td>
<td>1.5</td>
<td>2.0</td>
<td>3.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Sweden</td>
<td>1.5</td>
<td>1.0</td>
<td>1.0</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2.0</td>
<td>1.5</td>
<td>2.0</td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Germany</td>
<td>5.0</td>
<td>3.0</td>
<td>3.5</td>
<td>5.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Norway</td>
<td>2.0</td>
<td>1.5</td>
<td>2.0</td>
<td>3.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Lithuania</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Poland</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Source: IDATE for FTTH Council Europe
General ranking: FTTH/B Subscribers

- 9 countries with 1 M subscribers or more in EU39 (5 countries in EU28, in red on the map)
- Strong growth in Spain, Belarus, Finland and Portugal
- Dynamism to highlight in France and Italy

Countries with 200 K subs or more at Sept 2016 [Top 6 Growth rates for 9 first months 2016] (million)

Source: IDATE for FTTH Council Europe
General ranking: FTTH/B take-up rate

Average FTTH/B take up rate (*):
- EU39 → 30%
- EU28 → 28%

(*) Take up rate = number of subscribers / number of Homes Passed

Top 10 countries of more than 200 K subs in take-up rate at September 2016:
- Romania: 49%
- Sweden: 50%
- Norway: 39%
- Russia: 33%
- Belarus: 51%
- Finland: 67%
- Netherlands: 42%
- Slovakia: 33%
- Latvia: 38%
- Belgium: 51%

Source: IDATE for FTTH Council Europe
European ranking

The European Ranking includes countries of more than 200 K HH where the part of FTTH/B subs in the total number of HH is at least 1%
Only 12/31 European countries with a penetration rate > 20%

Penetration at Sept 2016

Source: IDATE for FTTH Council Europe

Mature markets

2 new entrants by Sept. 2016
Key conclusions

• There already 31 European countries that are part of the Global ranking … a positive sign even if the bottom line is only 1%.

• Even the “reluctant” countries are moving towards FTTH/B technologies. The historic trend shows this evolution and there are more countries reaching the 100% of coverage!

• End users are migrating to FTTH networks. But the switch to FTTH/B connection is not systematic yet and therefore there is still a large room for communication by operators.

• Governments and local authorities are entering the game and the Digital Agenda is one of the main important objectives to achieve.

  DAE’s main requirements are respected in all EU28 countries
  ➢ Local authorities are more dynamic in Scandinavian countries and in France: they should impulse a new dynamic to reach more rural areas and in countries where FTTH/B is lagging far behind other architectures
  ➢ “French Model” as an example for Europe?

• Highest take up rates in Northern and Eastern countries: still strong competition from other architectures elsewhere.

• Nearly all players, even if less involved in FTTH/B than other architectures, consider that FTTH is the end game! … and 5G will need Fibre!
FTTH in LATAM
Global FTTH figures for LATAM

FTTH/B is taking a bigger place in the LATAM Market due to a positive evolution in the deployment and user’s adoption...

- 4,552,698 FTTH/B subscribers by Sept. 2016 in LATAM (25% growth from 2015)
- 23,352,987 FTTH/B homes passed by Sept. 2016 in LATAM (18% growth from 2015)
- 19.5% FTTH/B take up rate by Sept. 2016 in LATAM (+1.4 points from December 2015)

Source: IDATE for FTTH Council LATAM Chapter
FTTH subscribers per countries for LATAM

... it can be also appreciated a good evolution in lower scale markets such as Jamaica, Trinidad, Barbados and Peru...

Source: IDATE for FTTH Council LATAM Chapter
While Mexico and Brazil are the leaders in homes passed, significant deployment are also performed in other smaller LATAM Markets…
FTTH in APAC
FTTH/B is taking a bigger place in the APAC Market due to a positive evolution in the deployment and specially in the user’s adoption...

297.8 million FTTH/B subscribers by Dec. 2016 in APAC

68% growth from 2015

436.5 million FTTH/B Homes Passed by Dec. 2016 in APAC

12.5% growth from 2015

68% FTTH/B Take up rate by Dec. 2016 in APAC

> + 20 points from December 2015

Take up rate = FTTH-B subs / Total FTTH-B Homes Passed

Source: IDATE for FTTH Council APAC
APAC FTTH/B leading countries
The Top-4: China is No. 1 by far due to the size of its market. Even though, countries like Japan, South Korea and Indonesia have reached 50 or more than 10 million homes passed with FTTH/B networks.

Also it can be observed 10 countries that have deployed FTTH/B networks passing more than 1 million homes.

Source: IDATE for FTTH Council APAC
While China has increased its fibre subscribers and is still the leading country...

... countries like Japan and South Korea also have more than 30 or 10 million FTTH/B subscribers....

... and it can be observed 8 countries that already passed 1 million of FTTH/B subscribers

Source: IDATE for FTTH Council APAC
FTTH in MENA
More nearly 48 FTTH/B projects in MENA at Sept 2016

Incumbents and Alternative operators are the main actors involved in FTTH/B rollout

National programs should boost FTTH/B market in MENA in the middle to long term

<table>
<thead>
<tr>
<th>Total FTTH/B Homes passed in MENA at September 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incumbents</td>
</tr>
<tr>
<td>4 546 776</td>
</tr>
<tr>
<td>79,2%</td>
</tr>
</tbody>
</table>

Source: IDATE for FTTH Council MENA
In September 2016

> 2.57 Million FTTH/B subscribers
> 5.73 Million FTTH/B Homes Passed

Average Penetration Rate: 44.8%
(from 39% at September 2015)

YoY growth
- Subscribers: +25.4%
- Homes Passed: +8.5%

Source: IDATE for FTTH Council MENA
Main trends in MENA’s FTTH/B market: subscribers

• UAE is the main FTTH/B market (1.52 million FTTH/B subs)
  - 2 players are involved in FTTH/B market
  - Etisalat is dominating the FTTH/B market:
    o with a growing market share of 87%
    o with a national coverage (the 2 main operators have a close 100% fiber network)
  - Good take up rate (subs/HP): 88.8%, which confirms the great commercial success of FTTH

• ... followed by Saudi Arabia (more than 684K FTTH/B subs)
  - Market dynamism confirmed from one year to another (+3.9% subscribers growth between Sept 15 and Sept 16) with 2 players involved in national rollouts
  - This dynamism has to be confirmed on the commercial side
  - STC is the leader among FTTH/B players:
    o with a growing market share of 68% => followed by Mobily that owns 25% of the market.
    o the largest coverage

• FTTH/B market is growing in Qatar (279K FTTH/B subs)
  - Ambitious objective from incumbent Ooredoo:
    o National FTTH coverage: reached in 2014!
  - A positive growth in the number of subscribers (+13% sep15-16) and in the number of homes passed (+9% - Sep15-16)
    o Ooredoo is pushing its end users to switch to FTTH
Main trends in MENA’s FTTH/B market: Homes Passed

> 2 countries with significant rollouts, more than 1 million Homes Passed and this year it reached 3 million in KSA

Source: IDATE for FTTH Council MENA Chapter
FTTH in Sub Saharan AFRICA
Context

- A lack of investment in fixed copper networks, still mainly owned by governments; the number of fixed lines is declining.

- Therefore a rather low adoption of fixed BB: 3% of households in 2015 in SSA.

- Generally speaking, a lack of regulation towards fair competition and network openness (LLU), so leading private players to bypass incumbent’s fixed network (FTTH).

- Leapfrog to wireless network: mainly cellular (4G is commercially launched in 24 countries in SSA), but also FWA and Wimax, as well as Satellite in the low density areas.

- The deployment of submarine cables has lowered international bandwidth prices (formerly via satellite). But the access is limited to countries with a sea frontage. Landlocked countries need to be connected via transnational backbones.
FTTH leading countries in Africa

- South Africa is the leader, with nearly half a million subscribers.
- Two other countries in the Top 3: Kenya and Mauritius
- Then 4 other territory and countries follow: La Réunion, Zimbabwe, Nigeria and Madagascar.
- Other countries follow such as Mozambique, Angola, Cameroon, Zambia, Gabon and Tanzania

FTTH/B subscribers by country (June 2016)

- South Africa: 570,000
- Kenya: 131,000
- Mauritius: 110,000
- Reunion: 27,000
- Zimbabwe: 20,000
- Nigeria: 9,000
- Madagascar: 3,000

Source: IDATE

Copyright © IDATE 2017
Africa is already in the global ranking

- Close to 1 million FTTH/B subscribers at June 2016
- Two countries entering global ranking (Number of residential subscribers / number of households) at June 2016:
  - South Africa: 2.9%
  - Mauritius: 26.7%
- Kenya should join quickly: 0.8% ranking at June 2016

FTTH/B subscribers in Africa (SSA)

953 000 FTTH/B subscribers at June 2016

Source: IDATE

Household Penetration of countries* with more than 1% household penetration

*Economies with at least 200,000 households

Source: IDATE for FTTH Council Europe, February 2016
Drivers for Fibre: The Gigabit Race, Short Latency and 4K TV!!
Since 2013, Providing Gigabit access has become a goal in itself. The momentum has been largely influenced by Google’s initiatives, since followed by private sector operators and especially a number of cities.

At the federal level, the Government and the FCC have announced new measures in support of city-led rollouts.

The Digital Agenda (DAE) sets Europe’s connectivity targets: 30 Mbps for all, and 100 Mbps connections or more for at least 50% of European households by 2020.

These appear very modest targets when compared to current technological possibilities, and the accelerated pace of the Gigabit race, which more and more ISPs seem willing to join.

In Asia, selling Gigabit-speed access is a strategic choice for private sector operators.

In Latin America and the Middle East, just providing the entire population with broadband access is already a challenge, so Gigabit access is not really on the table as yet. But a few ISPs do offer ultra-fast plans, aimed at a very specific clientele.
- **1 Gbps for** schools, universities, research centres, transport hubs, all providers of public services such as hospitals and administrations, and enterprises relying on digital technologies,

- **All European households**, rural or urban, should have access to connectivity offering **a download speed of at least 100 Mbps**, which can be upgraded to 1 Gbps,

- **All urban areas as well as major roads and railways** should have **uninterrupted 5G coverage**. As an interim target, 5G should be commercially available in **at least one major city in each EU Member State by 2020**
Status of 1 Gbps plans around the world

Where are 1 Gbps plans available?

Availability of 1 Gbps plans

Strong initiative from local authorities in support of Gb access

Source: IDATE, The Gigabit Race
China Telecom Sichuan: FTTH first then successful 4KTV !!!

- China Telecom Sichuan (CTS) covers a Territory 90 M inhabitants
- End 2015, CTS announced having rolled out FTTH infrastructure to all of the 21 province’s cities, and its main villages and towns
  - First Province in China to be 100% FTTH covered in 3 years only!

- 9M FTTH subscribers and more than 8M IPTV 4K subscribers !!
Study cases: Google Fiber and New Zealand
Google Fiber: not to easy to play a telco role!

✓ Google Fiber isn't dead yet but in October 2016, Google Fiber CEO stepped down, and it was announced that the program would be pausing operations in potential Fiber cities plus 50% cut on the staff.

✓ Both the internet and video services offered by Google Fiber haven't attracted enough subscribers yet.

✓ Several reasons
  - **Marketing**: Aggressiveness of competitors such as AT&T Gigapower and MSOs such as Comcast
  - **Price**: Google Fiber cost $70 / month for fiber internet service, with an additional cost for television service. Now, the company has added a cheap, $50 per month option for 100 Mbps service
  - **Partnerships**: In both Louisville and Nashville, Google faced lawsuits from incumbents over the use of existing infrastructure like utility poles
  - **Quality of Service**: In fall 2015, Google Fiber experienced an outage during the Baseball World Series leaving many without service for two hours

✓ Nevertheless Google Fiber played a leading role. Google is clearly a catalyst for improving the speeds offered by its rivals!

Source: Google Fiber Kansas City
New Zealand Crown Fiber Holding: Success

June 2016: 241 K FTTH subscribers and 1M Homes Passed

- **Fibre coverage:**
  - **2011:**
    - Population: 0%
    - Schools*: <10%
    - Urban Businesses: <10%
  - **End 2016:**
    - Population: 62%
    - Schools*: 99.7%
    - Urban Businesses: 97%

- **Rural broadband:**
  - 20% of lines
  - 86% of lines >5Mbps

Source: IDATE and Crown Fiber Holding
## FTTx & Gigabit

**Prices are in EUR excl. taxes and for single department licences (1-5 users).**

Stream subscriptions include unmetered analyst support & 3-hour customized research.

### FTTx & Gigabit - 2017 and prior publications

<table>
<thead>
<tr>
<th>Format</th>
<th>Type Deliverable</th>
<th>Title</th>
<th>Publication Date</th>
<th>Pages</th>
<th>Unit Price (EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>World FTTx Market - data &amp; forecasts up to 2021</td>
<td>2Q/4Q 2017</td>
<td>n.r.</td>
<td>6 000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>State of World FTTx market</td>
<td>2Q/4Q 2017</td>
<td>40-80</td>
<td>3 000</td>
</tr>
<tr>
<td></td>
<td>Dataset + Report</td>
<td>World FTTx Market - data &amp; forecasts up to 2020</td>
<td>26/12/2016</td>
<td>43</td>
<td>5 000</td>
</tr>
<tr>
<td></td>
<td>Report</td>
<td>Gigabit Offerings</td>
<td>1Q 2017</td>
<td>20-40</td>
<td>2 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>Fiber monetisation</td>
<td>2Q 2017</td>
<td>40-80</td>
<td>3 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>SDN/NFV: virtualization &amp; slicing</td>
<td>2Q 2017</td>
<td>40-80</td>
<td>3 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>FTTH for emerging countries</td>
<td>2Q 2017</td>
<td>40-80</td>
<td>3 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>G.Fast</td>
<td>3Q 2017</td>
<td>40-80</td>
<td>3 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>Broadcast/Broadband</td>
<td>4Q 2017</td>
<td>40-80</td>
<td>3 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>Connected Cities</td>
<td>02/12/2016</td>
<td>29</td>
<td>2 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>Ultrafast access technologies</td>
<td>01/12/2016</td>
<td>37</td>
<td>2 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>FTTx Vendors</td>
<td>02/10/2016</td>
<td>19</td>
<td>2 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>Digital Agenda Europe</td>
<td>20/07/2016</td>
<td>25</td>
<td>2 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>Public Policies for ultra-fast broadband</td>
<td>03/06/2016</td>
<td>96</td>
<td>3 000</td>
</tr>
<tr>
<td>doc + ppt</td>
<td>Report</td>
<td>LTE vs Fiber</td>
<td>18/12/2015</td>
<td>48</td>
<td>3 000</td>
</tr>
</tbody>
</table>

14 000 (streamrate) M 9'750

Titles and scheduling of upcoming publications are indicative – details for available publications can be accessed online.