Smart Solutions
Smart Communities

Strengths and weakness of networks: insight from a connected world

Pisa December 11th 2020

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Internet

Is the first thing that human kind created without knowing what is it. It is the biggest experiment of anarchy never experimented.

Eric Schmidt (Google Chairman)
What are telco operators facing?
Networks... telecommunication, water, power,...
Backbone Evolution
View from the market
Where we are and where we are going to

People spend more time on Facebook than any behaviour outside of family, work and sleep.

Facebook is the world’s biggest sellers of advertising display. Just five years ago it was Google. All is digital and in continuous transformation.

The youngest generations belief that ‘to be is to share’.

Source: The four – Scott Galloway
Some number
And how fast...

Chart of the Week

**HOW LONG DOES IT TAKE TO HIT 50 MILLION USERS?**
The impact of the shift to digital, and the power of network effects

In the digital age, companies can attract millions of users at an unprecedented rate. This is possible through network effects, instantaneous communication, and the nature of digital goods themselves.

- 2 users: 1 connection
- 4 users: 6 connections
- 8 users: 28 connections

**Reaching 50 million users**

The fastest speed to 50 million users was set by *Pokémon Go*, which did it in 19 days.

Could the next big thing do it in mere hours?
It took 75 years for the telephone to reach 100 million users ... and it took Candy Crush Saga 15 months
The data traffic continues to grow, reaching the level of **~174 Gbyte/month** per broadband line (period Jan-Sept 2020**)

**~9,1 Gbyte/month** is the average data consumption per sim card (June 2020*)

### Average monthly data traffic per broadband line (gigabyte/month)

<table>
<thead>
<tr>
<th>Year</th>
<th>Data (Gbyte/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>26</td>
</tr>
<tr>
<td>2014</td>
<td>36</td>
</tr>
<tr>
<td>2015</td>
<td>47</td>
</tr>
<tr>
<td>2016</td>
<td>66</td>
</tr>
<tr>
<td>2017</td>
<td>83</td>
</tr>
<tr>
<td>2018</td>
<td>105</td>
</tr>
<tr>
<td>2019</td>
<td>115</td>
</tr>
<tr>
<td>2020</td>
<td>174</td>
</tr>
</tbody>
</table>

### Long-term trend

- **2013**: 26 Gbyte
- **2014**: +31% increase to 36 Gbyte
- **2015**: +40% to 47 Gbyte
- **2016**: +26% to 66 Gbyte
- **2017**: +27% to 83 Gbyte
- **2018**: +9% to 105 Gbyte
- **2019**: +51% to 115 Gbyte
- **2020**: +51% increase to 174 Gbyte

### Average daily data traffic on Wi-Fi network

- **Jun-15**: 1.3 Gbyte
- **Jun-16**: +34% to 1.7 Gbyte
- **Jun-17**: +39% to 2.3 Gbyte
- **Jun-18**: +56% to 3.7 Gbyte
- **Jun-19**: +58% to 5.8 Gbyte
- **Jun-20**: +58% to 9.1 Gbyte

Source:
*AGCOM Osservatorio sulle comunicazioni N° 3/2020

**Average daily data traffic per broadband line 5.79 giga byte (Jan.-Sep. 2020) X 30 days, from AGCOM Osservatorio sulle comunicazioni - Monitoraggio Covid -19 n. 2/2020
And with the pandemic...

**2.2: FIXED AND MOBILE NETWORK: MONTHLY DATA TRAFFIC IN DOWNLOAD AND UPLOAD**

### FIXED NETWORK

<table>
<thead>
<tr>
<th>Period</th>
<th>Download</th>
<th>Upload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. – Mar.</td>
<td>5.28</td>
<td>0.61</td>
</tr>
<tr>
<td>Apr. – Jun.</td>
<td>5.52</td>
<td>0.63</td>
</tr>
<tr>
<td>Jul. – Sep.</td>
<td>5.51</td>
<td>0.63</td>
</tr>
</tbody>
</table>

- **Download**
  - Total traffic: 16.30 zettabyte (Year 2019)
  - Average monthly traffic: 1.81 zettabyte (Year 2019)
- **Upload**
  - Total traffic: 0.80 zettabyte (Year 2019)
  - Average monthly traffic: 0.20 zettabyte (Year 2019)

### MOBILE NETWORK

<table>
<thead>
<tr>
<th>Period</th>
<th>Download</th>
<th>Upload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. – Mar.</td>
<td>0.80</td>
<td>0.08</td>
</tr>
<tr>
<td>Apr. – Jun.</td>
<td>1.32</td>
<td>0.08</td>
</tr>
<tr>
<td>Jul. – Sep.</td>
<td>1.46</td>
<td>0.13</td>
</tr>
</tbody>
</table>

- **Download**
  - Total traffic: 2.83 zettabyte (Year 2019)
  - Average monthly traffic: 0.31 zettabyte (Year 2019)
- **Upload**
  - Total traffic: 0.31 zettabyte (Year 2019)
  - Average monthly traffic: 0.03 zettabyte (Year 2019)
And with the pandemic...

2.3: FIXED AND MOBILE NETWORK: AVERAGE DAILY DATA TRAFFIC FOR BROADBAND LINE AND FOR "HUMAN" SIM CARD

AVERAGE DAILY DATA TRAFFIC PER BROADBAND LIINE

<table>
<thead>
<tr>
<th>Month</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan.</td>
<td>4.09</td>
<td>4.44</td>
</tr>
<tr>
<td>Feb.</td>
<td>4.22</td>
<td>4.77</td>
</tr>
<tr>
<td>Mar.</td>
<td>3.98</td>
<td>4.44</td>
</tr>
<tr>
<td>Apr.</td>
<td>4.15</td>
<td>4.26</td>
</tr>
<tr>
<td>May</td>
<td>5.52</td>
<td>5.15</td>
</tr>
<tr>
<td>Jun.</td>
<td>5.15</td>
<td>5.01</td>
</tr>
<tr>
<td>Jul.</td>
<td>5.01</td>
<td>5.77</td>
</tr>
<tr>
<td>Aug.</td>
<td>4.44</td>
<td>4.09</td>
</tr>
<tr>
<td>Sep.</td>
<td>4.44</td>
<td>4.22</td>
</tr>
</tbody>
</table>

AVERAGE DAILY DATA TRAFFIC PER «HUMAN» SIM CARD

<table>
<thead>
<tr>
<th>Month</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gen.</td>
<td>0.12</td>
<td>0.19</td>
</tr>
<tr>
<td>Feb.</td>
<td>0.13</td>
<td>0.14</td>
</tr>
<tr>
<td>Mar.</td>
<td>0.13</td>
<td>0.14</td>
</tr>
<tr>
<td>Apr.</td>
<td>0.21</td>
<td>0.26</td>
</tr>
<tr>
<td>Mag.</td>
<td>0.25</td>
<td>0.23</td>
</tr>
<tr>
<td>Giu.</td>
<td>0.26</td>
<td>0.24</td>
</tr>
<tr>
<td>Lug.</td>
<td>0.17</td>
<td>0.28</td>
</tr>
<tr>
<td>Ago.</td>
<td>0.18</td>
<td>0.27</td>
</tr>
<tr>
<td>Set.</td>
<td>0.18</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Average daily data traffic per broadband line:


2. (Jan. - Mar. 2019) 4.10 giga byte → (Gen. - Set. 2020) 5.68 giga byte, +51.8%


Average daily data traffic per «human» sim card:

1. (Jan. - Sep. 2019) 0.15 giga byte → (Jan. - Sep. 2020) 0.24 giga byte, +66.0%

2. (Jan. - Mar. 2019) 0.13 giga byte → (Apr. - Jun. 2020) 0.25 giga byte, +70.1%
The challenge... and the need

Maximum speed

- **ADSL 1 Mbit/s**
  - 1.6s
  - 18hrs
  - 89hrs

- **ADSL 6 Mbit/s**
  - 1.5s
  - 3hrs
  - 15hrs

- **Ethernet 100 Mbit/s**
  - 0.3s
  - 11min
  - 1hr

- **Gigabit ethernet 1000 Mbit/s**
  - 0.03s
  - 1min
  - 5min

- **3G Cellular 2 Mbit/s**
  - 16s
  - 9hrs
  - 44hrs

- **3.5G Cellular 14 Mbit/s**
  - 12s
  - 1hr
  - 6hrs

- **WLAN 108 Mbit/s**
  - 0.3s
  - 10min
  - 1hr

---7s = valuable time for person to wait

*Source: Intel.*
«We all are digital omnivorous» says State of the Media Democracy by Deloitte

✓ according to the survey almost 1/3 of Europeans can be considered *digital omnivorous*, users owning simultaneously a tablet, a smartphone and a PC

✓ Half of the sample would be willing to pay an increased fee to have a higher connectivity available

✓ While watching TV we surf on the web (26%), read emails (22%) or check social networks (20%)

devices and multitasking can request more bandwidth there is a general willingness to pay more for more (bandwidth)
Impossible not being online
Hundreds of millions of 4k TV screens already sold in the world ...
Global HDTV growth trend

Global Ultra HDTV (4K+8K) Households By Region
(Millions )

- Middle East and Africa
- Eastern Europe
- Western Europe
- Latin America
- North America
- Asia Pacific

Years: 2014 to 2023
Things too ... need connectivity
Digital life impact on the Smart City

From the City to the “Connected City” and from the Citizens to the “Connected (to the city) Citizens”

IoT and Capillary Networks

Mobility
- Integration of Public & Private Transportation
- Traffic Management
- Car Sharing
- Safety

Energy and Green
- Energy Efficiency
- Pollution Reduction
- Electric vehicles
- Water management
- Waste cycle optimization
- Smart Lighting
- Eco Buildings

Health
- Digital Health record
- Telemedicine
- Tele-rehabilitation
- Wellness-Fitness

Quality of Life
- Citizen participation and participatory sensing
- Smart Education
- Smart Government
- Safety
- Social & sharing
- Tourism
- Intelligent buildings
Capillary Network

A “new” communication layer for receiving/sending information from/to new types of sensors and actuators

- Utility Metering (Gas, Water, Electricity)
- Waste Management
- Pollution and traffic control
- Smart Lighting
- Heating Control in private and public building

Why?

- Traditional infrastructure too expensive and energy consuming
- Meters should work several years without battery changes
- Million devices/very limited traffic
- Standard approach to enable easier service applications development
And... No infrastructure... no cloud
The Equation is very simple

Data Centre + Unlimited Bandwidth = Cloud Based Services
Fiber access network is fundamental for country development

Impact on GDP of the Ultra Broadband network deployment

- **World Bank**: 1.38% GDP
- **MCKINSEY**: 1.4% GDP
- **BOOZ & COMPANY**: 1.5% GDP

+10% Ultra BroadBand
The question or dilemma is...
Network COSTS

Demand for services REVENUES
The Nielsen Law – 50% CAGR

More than 1G in 2022
There will always be a few super-users who have advanced equipment that runs really, really fast.

Nielsen's law addresses the more normal high-end user who is willing to pay a premium but still wants well-tested equipment that can be bought in a regular shop. This is the kind of user who may have had an ISDN line in 1998.

The vast masses of users are low-end and will lag 2–3 years behind the high-end users. **Bandwidth is one of the two most important elements in computing these days (together with screen quality)**, since computational speeds are almost always more than enough for non-engineering tasks.

We have to start now building appropriate networks.
The solution

From a **technical point of view** the answer is clear: Fiber for the backbone, fiber for backhauling and fiber for the access (FTTH)

From an **economical point of view** the answer/model is more complicated. Telco Operators are mainly private companies that are keen to invest only in areas where profits are assured. According to this logic the discrimination risk is very high.

The **Wholesale Only Neutral Model** used in Italy is becoming a benchmark

The debate is open in a lot of countries (in particular in Europe)
Access network
Access network architecture

- **ADSL**: Broadband with speeds of 20 Mb/s or 7 Mb/s.
- **FTTC**: Fiber to the curb with speeds of 100 Mb/s or 30 Mb/s.
- **FTTB**: Fiber to the building with speeds of 1 Gb/s or 100 Mb/s.
- **FTTH**: Fiber to the home with speeds of >1 Gb/s.

- **Copper** vs **Fiber**

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30
Point to point option

End users

Point of Presence
Point to Multi-Point option

PON (Passive Optical Network)

Point of Presence

Passive Optical Splitter

Passive Optical Splitter

Optical Network Unit (FTTB)
The key element – Optical Splitter

Optical Splitter

One fiber

N Fibers

Typical ratio
1:4 1:16 or 1:32
Downstream - Broadcast
Upstream - TDMA
Open Fiber access network architecture

**Definitions**

- **Cable Area**: House-Holds area served by the same cable.
- **Collection Area**: House-Holds area served by the same Primary Flexibility Point.
- **Binding area**: House-Holds area served by the same Secondary Flexibility Point.
In the Open Fiber network the SFP usually is an outdoor cabinet with 20 splitters 1:16 inside. This is due to the needed flexibility to easily provide a dedicated GPON to at least 5 different OLOs. The cabinet is also engineered to host:

- splitters for GPON connections.
- ODF for permutation.
- Area to perform junctions toward households.
- Area to perform junctions toward business buildings with P2P architecture.
Main network elements: SFP
The PFP is the node at which the first level of splitting occurs with a 1:4 ratio. It hosts 20 splitters. The PFP is usually housed in a manhole.
The Open Fiber POP is able to connect around 70,000 Households. There are two different types of POP:
- Outdoor, made using shelters or cabinets on concrete platforms.
- Indoor, set up in special rooms.

The Open Fiber POP includes two segregated areas:
- An area reserved for Open Fiber personnel, which contains optical distribution frames and active transport equipment
- An area dedicated to the housing of OLO devices (OLT)
Main network elements: PT

PT is the fiber termination point within the building.

During construction, for costs reduction, only one fiber is terminated for testing purposes. Subsequent connections will be made directly during delivery phase.
Main network elements: Vertical

The Vertical segment is realized, where possible, simultaneously during construction of the network.
**Open Fiber** access network is based on **FTTH** standard architecture. **GPON** solution is the first technological step that has been introduced so far. The next ones according to FTTH standard are **XG-PON, XGS-PON** and **NG-PON2**.

**Open Fiber** is currently providing download speed of up to **1 Gigabit per second**, enabling an optimal customer experience of digital services such as video streaming, gaming, domotic, storage, multimedia content and cloud applications.

As a **pioneer** in Italian ultra-broadband market, **XGS-PON** (10 Gbps, both UL and DL) has been successfully tested on Open Fiber production network in Milan at the beginning of 2019.

**Open Fiber** access network is multivendor, with advanced functionalities and perfectly positioned for evolving towards virtualization and for supporting the development of 5G networks in the near future.
Network Creation Process

1. On Field Survey
On-field data collection (existing infrastructures and reuse level).

2. Network Design
Detailed Construction Design in Physical Network Inventory (PNI) (civil and optical network) based on On field data collected and private and public permits.

3. Approval Design
Check list of main OF design criteria and standards. Verification of relevant cost analysis in line with planned cost target. Request of permits.

4. Network Creation
Construction of the approved FTTH design. ‘As-built’ design’ production.
• Collection of data of the owner/landlord of the building.
• Classification of the building: residential/business.
• Type of building: condominium or house.
• Number of different stairs and floors.
• Check of available vertical infrastructure. If not present check of better place where to realize the new one.
• PT position definition.
• Definition of the type of cable to be used.
• Check of available infrastructures on sidewalk and type of cable to be used.
• Check of saturation of available infrastructures.
• Collection of data related to surrounding roads (presence of railway etc.).
• Highlight of different levels.
• Highlight of obstacles not visible on maps.
• Highlight of area where it is not possible to dig.
• Indication of type of pavement and tarmac.
• Check of ‘no dig’ possibilities.
Design process starts from the definition of the location of the POP where households will be connected. Then HH Point of Termination will be positioned and the fiber path is defined.

<table>
<thead>
<tr>
<th>Description</th>
<th>U.M.</th>
<th>Q.TA'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuova infrastruttura</td>
<td>m</td>
<td>1,991</td>
</tr>
<tr>
<td>di cui Scavo Tradizionale</td>
<td>m</td>
<td>1,991</td>
</tr>
<tr>
<td>di cui scavo con Minitrinca</td>
<td>m</td>
<td>0,806</td>
</tr>
<tr>
<td>Infrastruttura esistente di Terzi</td>
<td>m</td>
<td>1,300</td>
</tr>
<tr>
<td>Pozzetti 125x80 e 90x70</td>
<td>n°</td>
<td>41</td>
</tr>
<tr>
<td>Pozzetti 40x80</td>
<td>n°</td>
<td>31</td>
</tr>
<tr>
<td>Fender n°5 minitubi 10/14mm direttamente interrato</td>
<td>m</td>
<td>2,616</td>
</tr>
<tr>
<td>Fender n°5 minitubi 10/12mm sottotubazione</td>
<td>m</td>
<td>1,752</td>
</tr>
<tr>
<td>Singolo minitubo 10/12mm sottotubazione</td>
<td>m</td>
<td>1,050</td>
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<tr>
<td>Sviluppo totale cavi fibra ottica</td>
<td>m</td>
<td>7,701</td>
</tr>
<tr>
<td>di cui minicavo da 12 fo</td>
<td>m</td>
<td>0,104</td>
</tr>
<tr>
<td>di cui minicavo da 24 fo</td>
<td>m</td>
<td>2,209</td>
</tr>
<tr>
<td>di cui minicavo da 48 fo</td>
<td>m</td>
<td>2,76</td>
</tr>
<tr>
<td>di cui minicavo da 144 fo</td>
<td>m</td>
<td>5,112</td>
</tr>
<tr>
<td>Muffole (CNO, Giunto di Linea, Giunto di Estrazione)</td>
<td>n°</td>
<td>14</td>
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<tr>
<td>Fibre ottiche terminate al POP</td>
<td>n°</td>
<td>1,152</td>
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<tr>
<td>ROE</td>
<td>n°</td>
<td>45</td>
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<tr>
<td>Box Terminazione (Top Client)</td>
<td>n°</td>
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<tr>
<td>Top Client</td>
<td>n°</td>
<td>11</td>
</tr>
<tr>
<td>Utenti Residenziali</td>
<td>n°</td>
<td>548</td>
</tr>
</tbody>
</table>
- Request of permits from owners of the HH/Buildings
- Request of permits from Public Administration
- Request of permits from third parties owner of existing infrastructures (IRUs)
- Request of permits from third parties owners of electrical networks, gas networks, water networks, railways, etc.
FTTH Network Construction

Civil works

Ducts and subducts

Laying and junctions activities
FTTH Network Construction

Point of Termination installation and Testing activities
Provisioning – ‘Characterization’

<table>
<thead>
<tr>
<th>ID</th>
<th>Type</th>
<th>Distance (m)</th>
<th>Loss (dB)</th>
<th>Return Loss (dB)</th>
<th>E2E Loss (dB)</th>
<th>Label Type</th>
<th>Label Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Reflection</td>
<td>2047.5</td>
<td>N/A</td>
<td>-40.75</td>
<td>21.93</td>
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<td>590952447696247609</td>
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<tr>
<td>20</td>
<td>Reflection</td>
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<td>-55.97</td>
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<td>Reflector</td>
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<tr>
<td>23</td>
<td>Extent</td>
<td>2083.1</td>
<td>N/A</td>
<td>-71.28</td>
<td>N/A</td>
<td>Reflector</td>
<td>6622851106853369764</td>
</tr>
</tbody>
</table>

**Test Conclusion:**

To be continued.

- Calculation of calibration:
  - Current Calibration Value: 4.608 dB
  - Site Acceptance Value: 3.029 dB
  - Source of Calibration Value: Online Calculation Value

- Online Calibration Change Threshold: 0.7 dB
- Maximum Online Calibration Threshold: 4.2 dB

**State:** Abnormal

**Reason:** Online calibration failed. The online calibration value exceeds the threshold.
And at the end Operation and Maintenance
Faults statistics
Open Fiber Transport Network has two main layers:

1. **Core Network – National Backbone** (National POPs): based on IP+WDM technology

2. **Aggregation Network** (Edge POPs): based on L2overWDM technology. It is be further divided into primary and secondary aggregation network.

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### The Network Architecture – main figures

- **~7.000km** of Fiber for Core Network with high-capacity optical channels (up to 400G - first to market)
- **~15.500 km** of Fiber for all Primary Aggregation Network – 100G optical rings
- 15 National POPs
  - More than **1.000 Aggregation POPs**
Backhauling and Backbone layers

10G Aggregation – LA2

100G Aggregation – LA1

200G Backbone
Open Fiber Project
Open Fiber at a glance

STRONG SHAREHOLDERS

ENEL
*The largest Italian energy company*

Cassa Depositi e Prestiti
*The Italian governmental investment bank*

7 Bln € of total investments

3,5 Bln € of project financing

INNOVATIVE BUSINESS MODEL

The Italian *wholesale only* operator that is deploying a fiber-only state-of-the-art new neutral network and provides all telco operators with best-in-class FTTH access and FTTB transmission services dedicated to Consumers, SMEs, Large enterprises, Data Centers and Internet Providers, ensuring fair conditions and non-discriminatory access.
The biggest-ever project financing deal for a fiber optic network in the EMEA region

€7 bln investments, 19 Mln dwellings, 271 major cities, 7,000+ medium and small towns.

Big cities

December 2020

176

Target (2023)

271

Medium/Small towns

1,4K

7,5 K

Investments

~ € 3 bln

€ 7 bln

Dwellings

~ 10 Mln

19 Mln

More than 180 operators have already chosen Open Fiber
Open Fiber design, build, own and operate full-fiber networks across Italy

**Vision**
- Full fiber is a must for Italian economy to compete
- Italian infrastructure shall be innovated
- One network to serve all: whole-city approach is optimal

**Mission**
- Largest Italian full-fiber Network
- Competitive catalyst for widespread upgrade of the Italian infrastructure
- Committed builders of whole city, future-proof digital infrastructure

**Services**
- Open access, wholesale-only model
- PON, P2P, Ethernet, Wavelength and Direct Internet Access services
- Access to full-fiber connections serving 19 million dwellings by 2023

Transforming public sector services
Driving economic growth
Delivering gigabit speeds to homes
Unleashing business potential
Enabling 5G & IoT innovation
Open Fiber: FTTH Cluster «A&B» Roadmap

- Available Coverage -
  - More than **103** cities open for sale
  - **>5Mln** of connected HH

- Coverage Plan A&B -
  - **271** City
  - **9,5 Mln** of connected HH

Milano, Torino e Bologna
Open Fiber has been awarded three Infratel tenders for the construction and management of a public ultrabroadband network.

7,6K Municipalities
19 Regions in addition to the province of Trento
14.2 million citizens
9.6 million HH
500 thousand business locations and P.A.
Simple and Modular Product Portfolio

- **Dark Fiber**: 1
- **Wavelength Services**: 2
- **Ethernet Services**: 3
- **Direct Internet Access**: 4

**OF Customers**
- Big Telcos
- ISP/OTT
- Mobile Network Operators
- Utilities
- Public Sector
- International Carriers
«Only3clicks»: the new Open Fiber pre-sales tool to get a price

1. Select an address/building (B-End)

2. Select a Point of Interest, OF PoP or Address (A-End)

3. Check Ethernet Feasibility

Non Binding ROM

<table>
<thead>
<tr>
<th>Feasibility results</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Binding Rough Order ROM quotation</td>
<td></td>
</tr>
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<td>- Max. latency</td>
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<td>- Contract duration</td>
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<td>- Total cost</td>
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<tr>
<td>- Additional note</td>
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</table>

Check Ethernet Feasibility

Select a Point of Interest, OF PoP or Address (A-End)
Scenario
What’s next... Have a look at the past

The interaction between countries/people generates financial flows

Financial flows and economic growth generate infrastructure demand

Infrastructure enable and stimulate more interaction and financial flows

Virtuous Loop
Main interactions in the Mediterranean basin
Source: Telegeography
Europe is still an important hub/gateway
Terrestrial cable and IX map 2020. The real internet backbone
Countries are not anymore defined by borders but are defined by data flows and connectivity.

Megacities are defining the new geography

When a remote site can have a high level bandwidth connectivity its geographical position starts changing

Only one submarine cable put Kenya in an advanced position determining the birth of «Silicon Savannah» where, today, Google, IBM, Mastercard and others companies established their R&D departments.

Submarine cables are defining a new cyberspace that modify geography in which we are used to live
Recent and new projects – OTT in Telcos Arena

MAREA: connecting USA and Europe. (May 2018)

Participants: Facebook, Microsoft and Telxius
Recent and new projects - OTT in Telcos Arena

2Africa: connecting Africa and Europe. (RFS 2023)

Participants: Facebook, Vodafone, MTN, China mobile, WIOCC, Orange, Telecom Egypt, STC
Single point of failure (SPOF)
Thanks for Your Attention!

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