

The Network as infrastructural commons

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Abstract

The discussion on the future shape of the Internet often deals with important principles on major social issues like free speech, privacy, IPR and pressure on them coming from TLC and media industries in search for revenues. The underlying dynamics of TLC industry are determined by evolutions in technology and in the regulatory framework. It is important to have an insight of their consequences in the marketplace and in the financial markets, in order to understand how these social issues fit in the evolution of the network. An open and neutral network is possible but it is likely to require a restructuring of the industry, something that can be desirable for the society as well as TLC companies shareholders.

1. Future growth

From an inner perspective, the individual needs are well represented by Maslow's "Hierarchy of Needs", that shows which are the needs individual have to satisfy in order to move from the bottom "Deficiency" part to the upper "Growth" part.

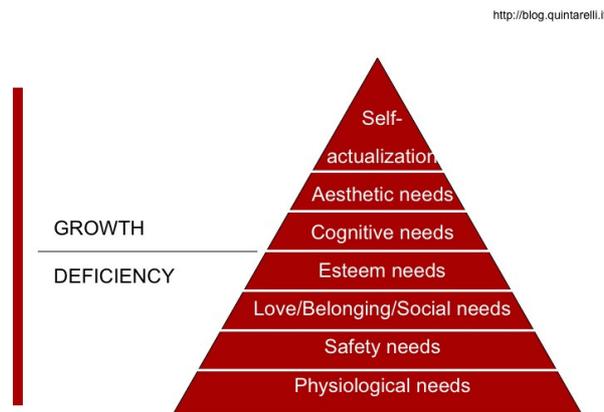


Figure 1 – Maslow's "Hierarchy of Needs"

Taking this framework as a reference, the future growth of knowledge and of sharing information, concerning:

- Directory;
- Applications and services

takes as for granted the "primary needs", those that represent the deficiency needs, namely:

- Facilities;
- Infrastructures;
- Access;
- Identity/Privacy;
- Device.

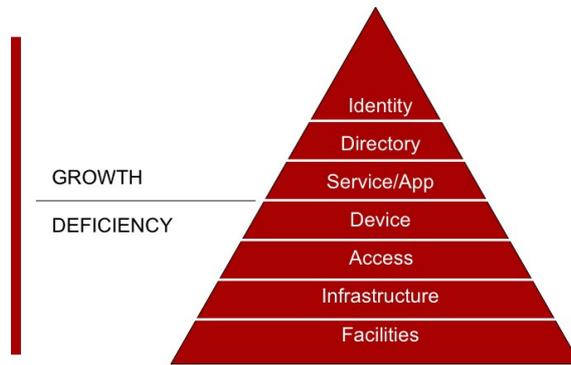


Figure 2: “Hierarchy of Needs” for Internet applications

No growth may occur if it misses solid basis.

2. Financial data

Sizing up the context, a couple of figures are worth to be mentioned, in order to understand that the bottom part is generally much larger and it has a significant and bigger impact on the upper part.

Size matters

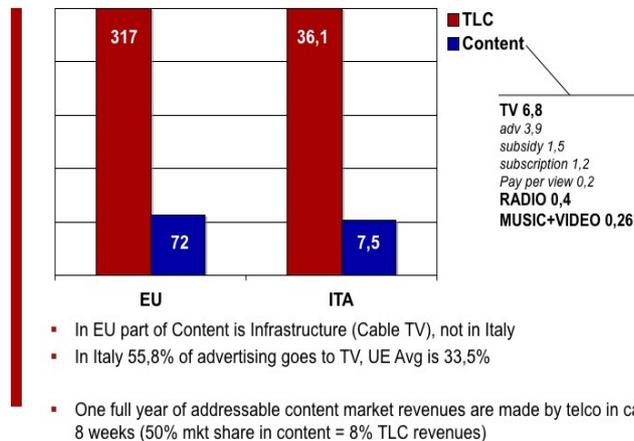


Figure 3: relative size of content and infrastructure industries

In Europe and in Italy, comparing the figures of the Telecommunication industry (red column) and the Media/Content industry (blue column), it is possible to notice a similar ratio (EU: TLC 317€ Bill, Content 72€ Bill/ IT: TLC 36,1€ Bill, Content 7,5€ Bill) roughly 1 to 4,5.

Still, the Italian infrastructure portion is significantly bigger and it has a stronger and larger lobby power in promoting certain actions respect others. Furthermore, in Europe part of the Content is in Infrastructure (for instance Cable TV), but not in Italy, where a great portion of Italian advertising is on TV roughly 55%, whilst the EU average is 33.5%.

Recent debates say that Telco operators need to become media companies or enter the media space in order to survive, overcoming the steady declining margins.

For instance, considering a 10% decrease in revenues of an operator (for instance 3,6€ Bill), to compensate it, the operator needs to reach about 50% of the addressable media/content market. (See figure 3)

Thus, problems in the TLC segment might lead to have much higher impacts on the country, compared to those in the media sector. This is simply due to market size reasons.

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(little bit of) Finance for non finance people

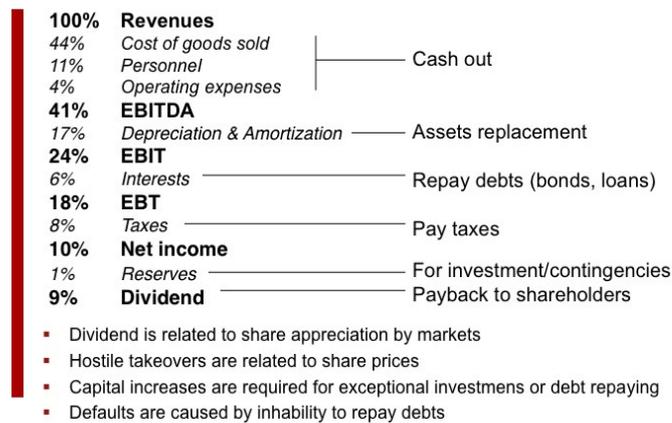


Figure 4: typical financial statement of a Telco

Figure 4 represents a likely typical financial data of a European Telco operator and their percentage on the overall balance.

Some figures that are worthy to notice:

- Depreciation & Amortization (17%): the amount of money sustained in assets replacement, for updating and for network maintenance.
- Interests (6%): the amount of money needed to repay the debts, issued in form of bonds in order to cover the loans required to finance the infrastructures.
- Reserves (1%): the amount of money saved for investing in businesses different from the core and for contingencies..
- Dividend (9%): shareholders payback.

Company's stock prices are related to dividends, thus implying that, if a lower than expected dividend is paid, the company might be subject to a profit warning with declining share price and to a possible hostile takeover.

In the latter scenario, the new owner, in order to be able to repay the incurred debts, will try to reduce personnel and/or maintenance, thus degrading the overall assets.

All these decisions and strategies might have severe impacts on the society (for instance concerning unemployment rates) and also on the overall economy of the country.

Indeed, in case of default (the inability to repay the debts) of a Telco company, investors might start to get worried, and this could lead to lower share price and also to possible hostile takeover (also by company not country related) that might easily reduce personnel, thus having a severe impact.

To sum up, the basis of the argument are:

- Little space left for doing different things.
- Low free-cash-flow for investments.
- Tight margins of manoeuvres related to the amount of debt.

3. Network Structure

a. Wired

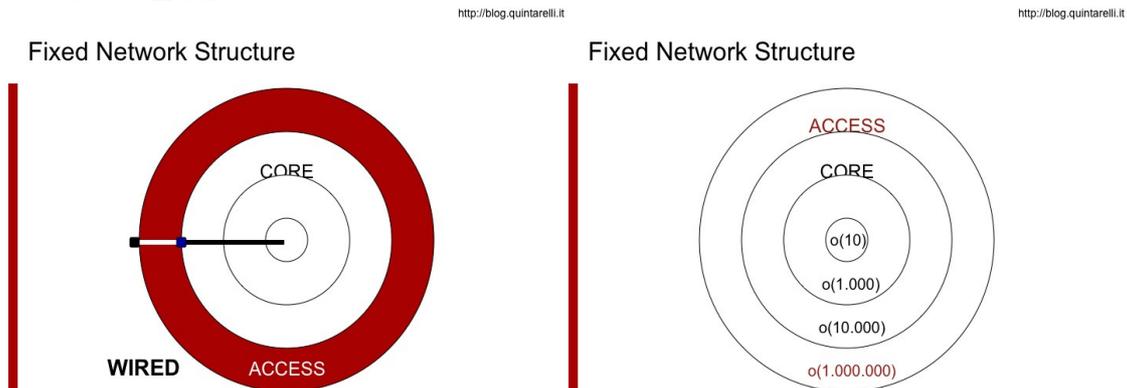


Figure 5: generalization of a fixed network structure

The network presents a structure divided in two portions:

- the core and
- the access,
generally with an architecture that joins the core network with different layers used for connecting internationally, regionally or to the metropolitan area and then there is the access that connects the houses (the “last mile”).

The number of telecom exchanges involved grows exponentially from order of magnitude of 10 (roughly the same throughout all Europe) in the centre of the core moving to order of thousands in the city, to order of tens of thousands in the local area and in the end to order of millions in the access to the various houses (in Italy there are more than 20 millions residential user lines).

More than 85% of the costs (both creation and maintenance costs) are related to access, as shown clearly by the figure.

b. Wireless

The evolution of the mobile network can be represented taking as a reference the previous figure 5 (however it is not completely correct due to the distance of the different elements, but it is useful to give a broad understanding of the improvements).

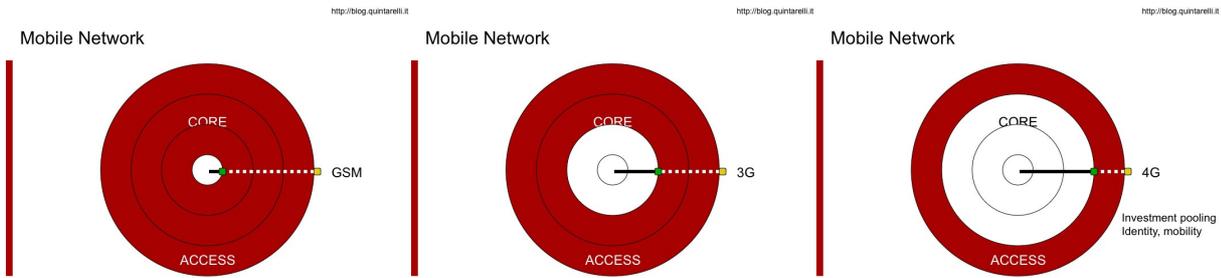


Figure 6: generalization of a “mobile” network structure

Mobile network started with GSM, that had very few base stations able to give GSM services. With 3G, the fixed part, that connects the base stations, increased going further deeper into the city, making shorter the wireless part. With the next-future 4G (HSPA, LTE “Long Term Evolution”), the wireless part will continue to be significantly smaller, roughly the same distance of the wired access portion; still with the presence of a fixed network required to connect the various base stations.

The level of investments in base stations required to give 4G connectivity (about 10/20 Mbit via wireless) is so big, that at present operators are moving toward gathering into investment pooling, taking advantage of the possibility of reducing and sharing the investments.

c. Evolution

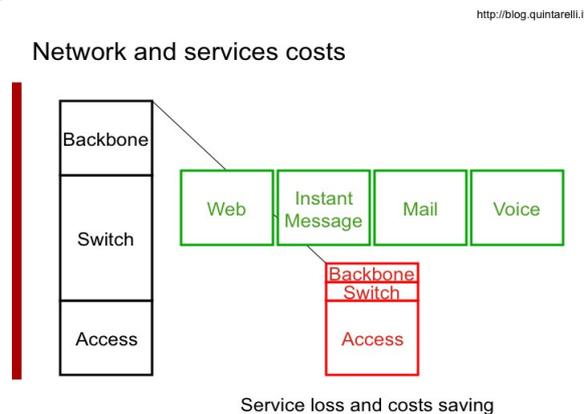


Figure 7: cost reduction in operations but services exiting the telco boundaries

In Europe, the Incumbents (the traditional operators) are obliged to provide the fixed access portion, since it is not replicable, to other operators (Altnets) on a wholesale basis. However the incumbents, owner of the networks, are the ones that bear the cost obligation of these regulations, that aim at increase competition.

The cost structure of the network is changing. At the beginning the switch part was the most significant one (represented by the ladies connecting the various wires); but now both the switch and the backbone parts are shrinking, thanks to the optical fibre. Instead, the cost of the access network is remained the same.

In the meanwhile, the range of services has increased, making operators not just focusing on voice telephony, but with all the new extending services introduced by Internet and IP technology.

d. “Fixed-Mobile” Substitution

Due to the advantages and the benefits of the mobility, an increasing number of users have little incentive to keep the fixed line anymore.

USA is recently experiencing this trend. AT&T suffered a big loss on the stock exchange after it announced that 3.9% of subscribers cancelled their contracts or failed to pay their bills for fixed telephony and fixed internet access.

In Italy, ISTAT announced that after 8 years from the launch of ADSL wired broadband, the number of its subscribers reached just 22% of the Italian households, thus implying that the remaining 78% has low or no interests in fixed broadband, but just in telephony; thus implying an high incentive/probability of canceling their fixed line subscription.

In this framework however the costs of the fixed network remain the same independently from the number of users. Moreover the situation is worsen since more and more uncompensated revenue losses are reported due to the missing balancing effect of the increase in services and to the reduced size of the Telcos' margins.

Mobile operators are trying to incentive this “switch” via clear promotional offer. Indeed mobile operators require more and more fixed networks in order to be able to connect the various base stations that provide mobile connectivity.

With some notable exceptions, such as densely populated areas and areas where already multiple infrastructure is present, the fixed and mobile players face the: Fixed-Mobile Tragedy of the Commons:

the marginal benefit for a user of “unplugging” from the fixed network and moving to a mobile is 1, and the marginal costs to the system, are $1/N$, where N is the population that will bear the ongoing cost of the fixed network, which, on the other hand, is essential to mobile operators to increase base stations density.

Based on the current user demand, the “Fixed-Mobile Substitutions” is eroding the sustainability of the fixed network, which “Mobile Operators” are increasingly depending upon in order to offer their services.

4. Major pressure trends on fixed network and on market structure

The future of the fixed network will be determined by a series of pressure trends, namely:

- Flat rate telephone service plus the increasing usage of Voice Over IP technology that puts pressure on telephony rates;
- Flat rate Internet ARPU (Average Revenue Per User) which is much smaller than Telephone ARPU;
- The previous quoted “Fixed-Mobile substitutions”;
- Future technology developments and Regulations.

Possible points of reflections for future debates are:

Which are the strategies to remunerate decreasing revenues?

Which are the impact on employment and on debt?

Can we take for granted the present “Flat rate – low cost – reliable – broadband Internet – PC paradigm?”

All these questions reflect how the structure of the market is facing significant pressures.

In order to overcome those difficulties and to innovate, operators have been going through a series of revenue increasing myths, such as:

- eCommerce for every businesses;
- WiFi hotspots everywhere;
- Security guaranteed for everyone;
- Unified messaging system everywhere;
- NGN (“New Generation Network”) and IPTV;
- Fixed-Mobile convergence;

However, the forecasted scenarios did not materialize, thus placing more pressure on operators.

5. Net Neutrality

Another important issue for operators is the one related to net neutrality, meaning a neutral network free of restrictions and not under the influence and the control of the commercial interests of telcos.

Operators adopt strategies related to net neutrality, possibly :

- introducing discriminatory pricing based on usage and on geographic, with the latter that might determine political issue as digital inclusion (also known as digital divide).
- Using “walled garden”, thus keeping customers under operators sphere of actions (confronting of course Antitrust regulations).
- Charging more those customers that require higher QoS (Quality of Service). In this case, as is the case in Europe, if the incumbent operator has an obligation to provide wholesale to another operators, there will always be an operator that will target those customers who do not require QoS, thus making the price lower.
- Filtering to avoid certain communications (impacting Civil rights).
- Trying to impose closed devices (such as locked set-top boxes or phones) in order to get control of the revenues of the customers, but at the same time giving a big incentive to consumer electronics producers in collaboration with service producers (such as Google) to produce open devices in order to limit telcos’ control.

6. Conclusions

The guidelines of the network infrastructure development are clearly matter of public interests, being part of economic development policy. In this regard, EU Commissioner Miss Redding reminds that 50% of the contribution of the growth of the European GDP comes from ICT.

Yet, infrastructure-based competition amongst vertically integrated operators leads to The Tragedy of The Fixed Network Common.

The question then is: *What fixed network for tomorrow and how to remunerate it?*

Network Infrastructure: a Natural Monopoly

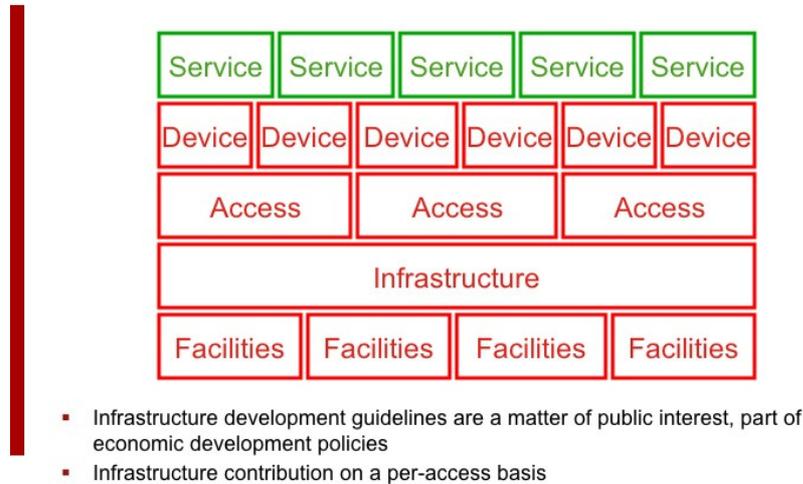


Figure 8: a possible market structure

The network infrastructure in a specific geographic area tends to a natural monopoly. Recognizing it as an infrastructural commons, its evolution in the next future could be based on different facilities (either cables or towers etc.), and different access provider which buy, at a wholesale level, the access to the infrastructure in order to sell their services to the customers via open devices.

Regulators in some areas of the world (Australia, New Zealand, Singapore, etc.) are slowly starting to recognize this fact and move in this direction. In our view this move is welcome in order to ensure infrastructure development, retail market competition and network neutrality.