Managing Capex in the Telecom Industry

by

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Abstract

With the use of data and concrete examples, such as a mini-case study, and a focus on the top 20 global players, this thesis aims at tackling Capex issues in the telecom industry by covering:

- Uses, levels, inefficiencies in Capex management, notably via insider perspective, and their impacts on capital allocation
- Financing of Capex via debt and the recent development of asset monetization
- Specific trends (NSA, VNOs) and M&A in the telecom industry and their impacts on Capex, via the case study of the French SFR-Numericable transaction

Thesis Supervisor: Nathaniel A. Gregory, Senior Lecturer in Finance

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I. Introduction

In Telecom, the investment cycle appears to be repeating itself more frequently. Fast-moving and aggressive competitors are driving pressure on margins and capital expenditures. Technology seems to be driving a lot of the investment expenses in order to be able to cope with rival operators.

(II) *What does Capex really serve in telecom, and how does the future look for network investments? How do Telcos compare with players from other sectors in terms of Capex and profitability, and what do executives say about the return of their projects?*

(III) *How does debt finance Telcos' Capex needs? Is there any other solution?*

(IV) *How do sector-specific trends such as network sharing agreements and virtual operators impact market Capex? What can an M&A case tell us about potential achievable Capex synergies?*

This paper tries, relying as much as possible on data and concrete examples, to answer such questions. A large focus is given to the top 20 mobile players which, beyond brand names, are really concerned with Capex issues given their global size, array of offerings and more generally, appetite for market domination via technology and service superiority.

II. Capex in the Telecom Industry

A. Allocations of Capex: in service of an ever faster renewal of network

1. Capex serves network development…

Capex in the telecom industry is used primarily for the constitution of the network. A typical mobile operator will allocate its Capex on the following generic items:

- **Cell site**(s), defined as *"the entire set of equipment needed to receive and transmit radio signals for cellular voice and data transmission; typically includes transmitters, receivers, power amplifiers, combiners, filters, a digital signal processor, a power supply and network interface modules."*[1] – Together, cell sites and other **Base Stations** (for example, atop a building) form the **Radio Access Network**, enabling consumers to access the operator's network. A specific type of cell-site which combines 2G, 3G and 4G technologies is called a **Single RAN**.
- **Backhaul**, *"the terrestrial link between an earth station and a switching or data center."*[2] – This serves as the link between the Radio Access Network and the Core Network, enabling distribution of service to cell sites.
- **Backbone network**, or **Core network** the *"arrangement of [high-speed transmission] facilities, designed to interconnect lower-speed distribution channels or clusters of dispersed user devices."*[3] – It is the part of the network that connects the consumer to other consumers, whether serviced by another operator or not, as well as to the internet.

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[1] http://www.gartner.com/it-glossary/cell-site
[2] http://www.gartner.com/it-glossary/backhaul/
[3] http://www.gartner.com/it-glossary/backbone-network/

- **Maintenance and replacement Capex:** concerns all of the above categories. Examples are servers for core nodes, tower works, replacement of backhaul links and technological upgrades of current sites.

Figure 1 presents the network Capex for Vodafone's Spring plan to distance competition as forecasted in 2013.

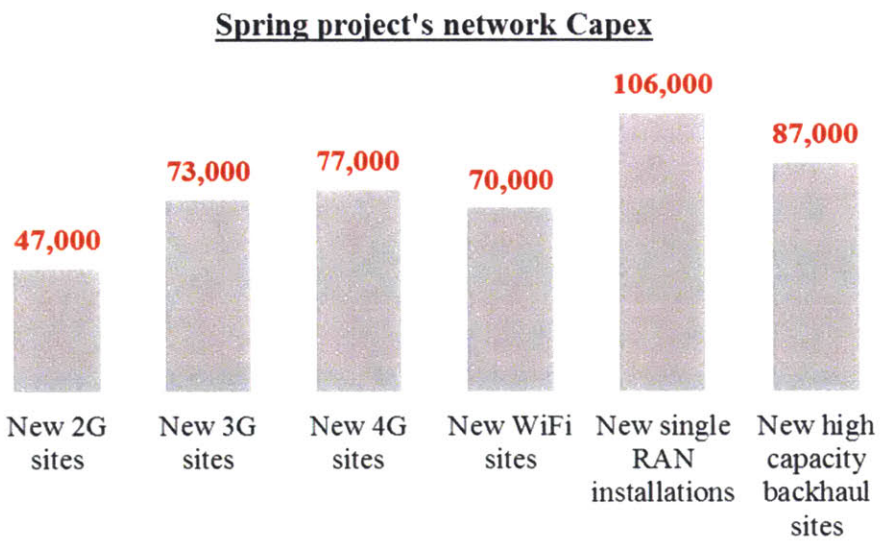

Figure 1 - Spring project's network Capex (source: Vodafone)

2. ...with large renewal requirements ahead

Such expenditures repeat regularly given evolutions in technology or market expansion, as well as general increase in consumption for single users: HD streaming, mobile gaming, live video calls, high resolution picture transfers, cloud storage. In addition, new forms of telecommunications are emerging, such as the Internet of Things, Machine-to-Machine, Vehicle-to-Vehicle among others. If it is hard if not impossible to predict the capacity unit cost in 2030 that will be served with unknown technology, it is within reach to produce forecasts of future subscriptions and consumption of data, based on current levels, penetration growth and data patterns. **Figure 2** presents the expected telecom subscriptions, accounting for M2M and mobile:

by 2030, over 100 billion devices are expected to be connected, which is more than ten times the expected world population at that point in time.

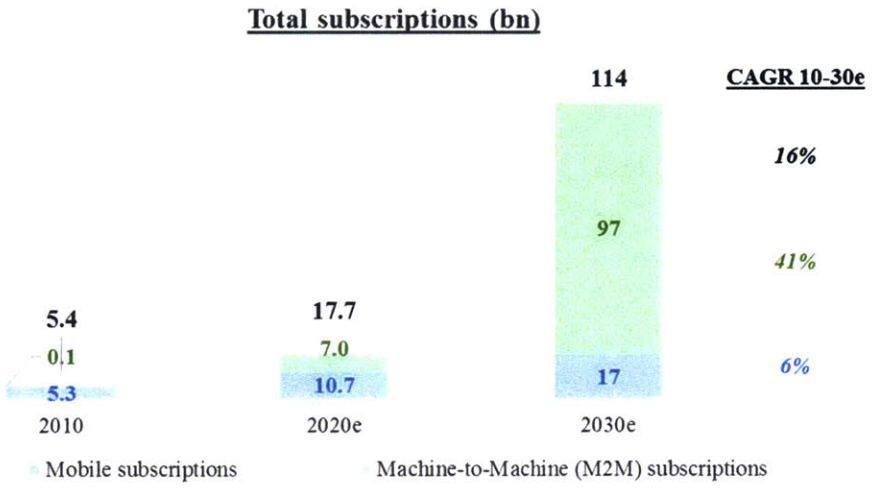

Figure 2 - Total subscriptions forecast (source: ITU)

Along this sharp increase in number of subscriptions, streaming services and other data-heavy consumption patterns will result in a dramatic increase of global traffic. **Figure 3** presents the evolution of monthly traffic from 2010 to 2030, predicting over 5,000 exabytes consumed each month in 2030. That is equivalent to one quadrillion (10^{15}) 4-minute songs per month.

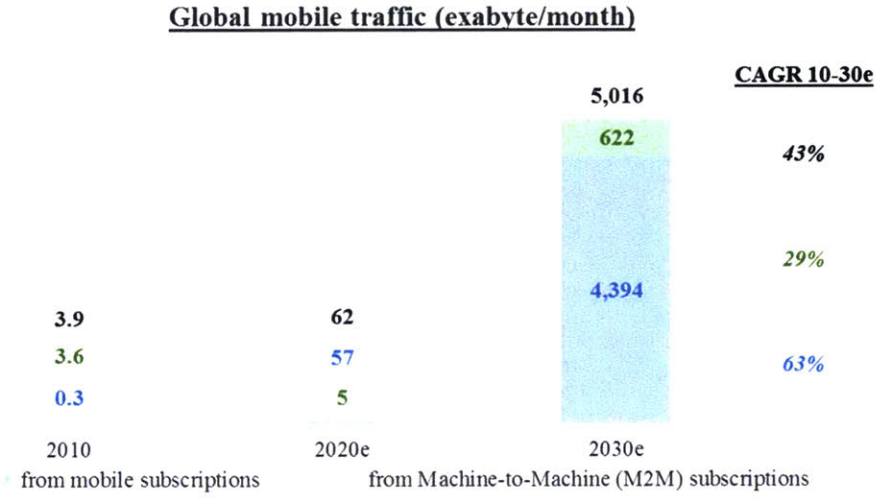

Figure 3 – Global mobile traffic forecast (source: ITU)

In proportion to total number of subscribers, this equates to a 54% CAGR over the 2010-2030 period as shown by **Figure 4**. The global average will then be of c. 257GB/sub/month, which represents 86 times what current plans offer in developed countries (3GB).

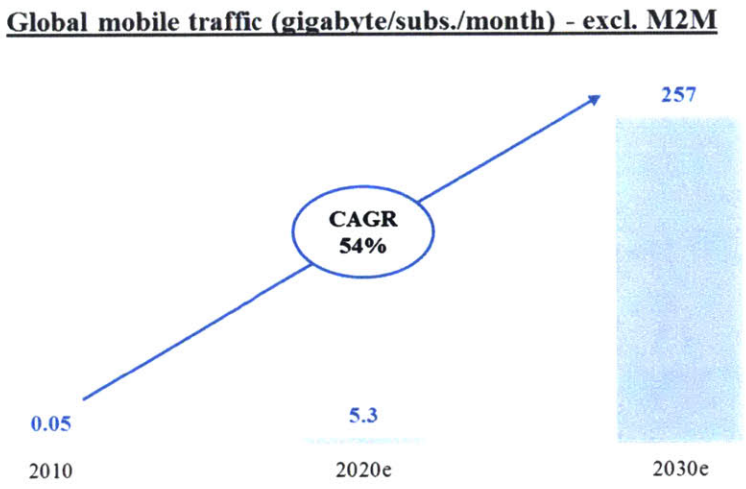

Figure 4 Global mobile traffic per user forecast (source: ITU)

As a matter of fact, future developments including 5G technology, expected by operators to be released around 2020[4], will require dramatic network changes along six main directions:

- **User experience data rate:** approximated by the speed at which one user can stream a video on his or her mobile phone
- **Connection density**: accounts for total devices connected in the area (including Machine-to-Machine, Vehicle-to-Vehicle)
- **Traffic volume density**: how much data can transit in a given area
- **Latency**: "lag" between emission and reception of data
- **Peak data rate**: general download and upload speed for data transfer
- **Mobility**: capacity of network to transmit data on highly mobile devices (trains, cars) without significant loss in quality

[4] Vodafone (2015) *Delivering 5G*, 1 October 2015. Vodafone.

Figure 5 presents the current situation of advanced networks vs. the expectations as formulated by the focus group International Mobile Telecommunications (IMT), a branch of the ITU, in its *IMT vision towards 2020 and beyond* presentation. It appears that the scale of efficiency that is expected in future years is gigantic, for example multiplying 10 to 100 times the peak data rate for users.

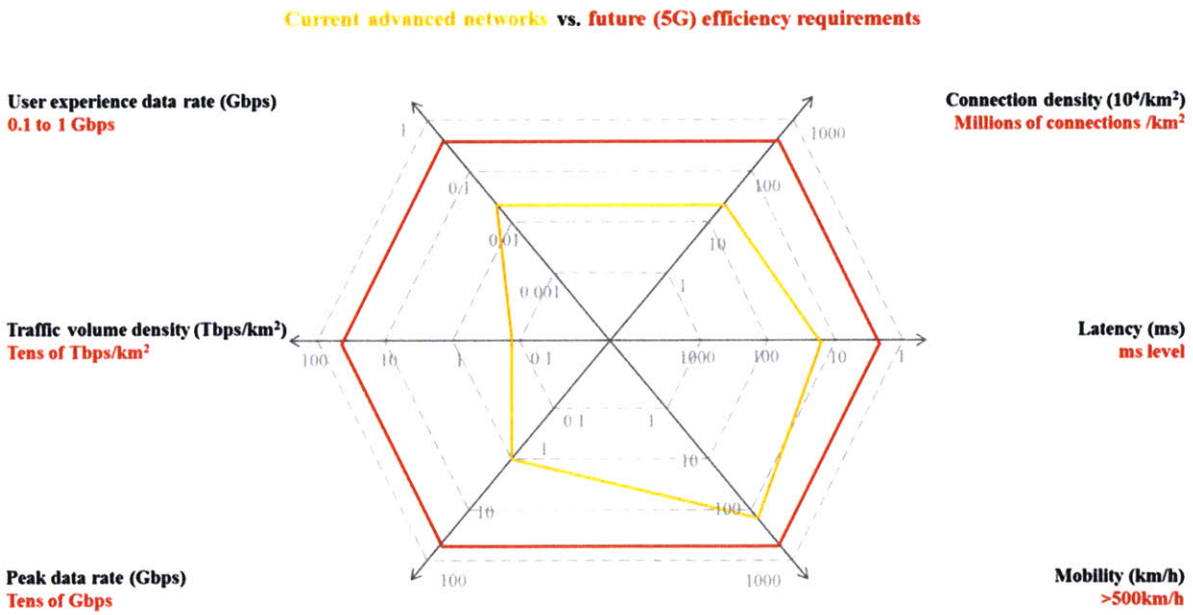

Figure 5 - Future efficiency requirements (source: IMT)

B. Levels of Capex: where do telcos stand?

Capex levels have recently picked up for European and American telcos, given the investment cycles implied with the development of 4G/LTE technology and the importance of data traffic, which forces network upgrades. This compares with emerging global players which have now consolidated their asset base and are seeing their Capex decline rapidly to mature levels from the tremendous mid-2000s when most efforts were put to build an extensive backbone. **Figure 6** presents the Top 20 global mobile operators and **Figure 7** Gross Capex spending for these players since 2005.

	Latest figures for subscribers, 2014 for financials	Country	Subscribers (MM)	EBITDA margin	Capex % of rev.
1	China Mobile	China	826	*37.0%*	*21.3%*
2	Vodafone	UK	450	*24.0%*	*15.6%*
3	Bharti Airtel	India	326	*34.0%*	*15.9%*
4	America Movil	Mexico	288	*31.4%*	*14.9%*
5	China Unicom	China	287	*33.0%*	*19.6%*
6	Axiata	Malaysia	260	*38.1%*	*20.0%*
7	Telefonica	Spain	254	*31.0%*	*18.0%*
8	MTN	South Africa	231	*42.8%*	*13.3%*
9	VimpelCom	Russia	213	*39.0%*	*22.9%*
10	China Telecom	China	198	*28.3%*	*19.8%*
11	Orange	France	190	*28.7%*	*10.7%*
12	Telenor	Norway	200	*33.9%*	*19.4%*
13	Etisalat	U.A.E.	173	*37.8%*	*14.1%*
14	Idea Cellular	India	164	*34.1%*	*13.4%*
15	STC	Saudi Arabia	161	*41.6%*	*13.3%*
16	T-Mobile	Germany	152	*23.6%*	*11.5%*
17	Verizon	U.S.A.	140	*28.4%*	*13.5%*
18	AT&T	U.S.A.	129	*23.1%*	*16.2%*
19	Reliance	India	110	*33.9%*	*11.3%*
20	Telecom Italia	Italy	105	*40.0%*	*21.4%*
	Average / Total		**4,857**	***33.2%***	***16.3%***
	Average / Total (EU+NA)		**2,121**	***30.3%***	***16.4%***
	Average / Total (Emerging)		**2,736**	***36.1%***	***16.2%***

Figure 6 - Top 20 telecom operators and key metrics (source: S&P Capital IQ, company reports)

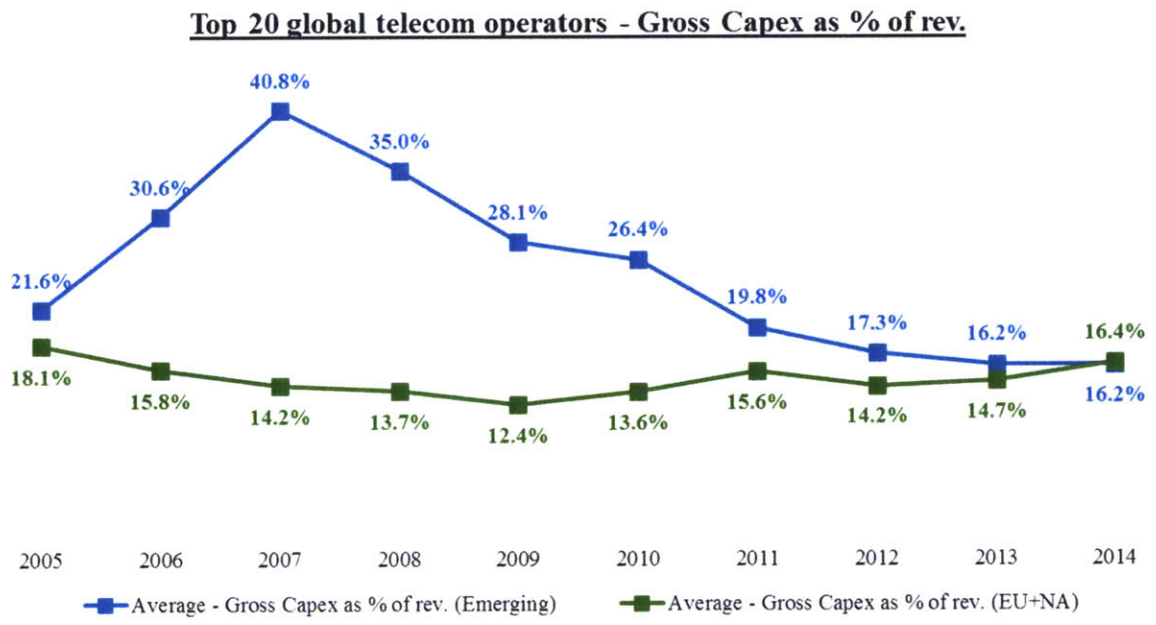

Figure 7 - Gross Capex for top 20 telcos (source: S&P Capital IQ)

Additionally to these already high levels of Capex in terms of % of revenues, the Telecom Industry is specific in that operators need also to purchase the spectrum on which to conduct their operations via radio signals. These "spectrum and license costs" come on top of

"regular" network capital expenditures, dragging cash flows down. A recent example are the $44.69 billion raised by the US Federal Communications Commission in January 2015 for the so-called AWS-3 airwaves sold to Verizon, AT&T, T-Mobile and DISH[5]. On average, such costs result in actual investments 12% than reported as Capex. **Figure 8** presents the evolution of License costs since 2005 for the top 20 players.

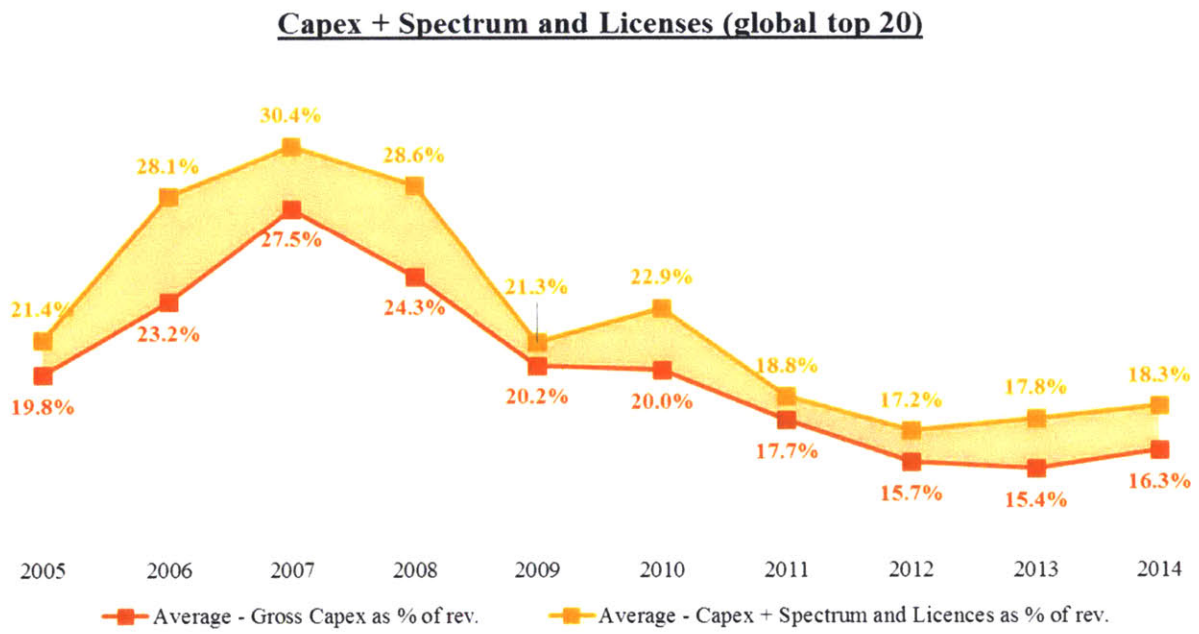

Figure 8 - Spectrum and licences of top 20 telcos (source: S&P Capital IQ)

Such high Capex levels have particularly reduced the ability of European and American telcos to generate cash flows, which, in the Telecom Industry, is often approached via an EBITDA-Capex proxy. Conversely, recent investment reductions in developing countries as market mature have enabled emerging telcos to boost their FCF generation. **Figure 9** presents the evolution of the proxy since 2005.

[5] http://www.reuters.com/article/us-usa-spectrum-auction-idUSKBN0L227B20150129

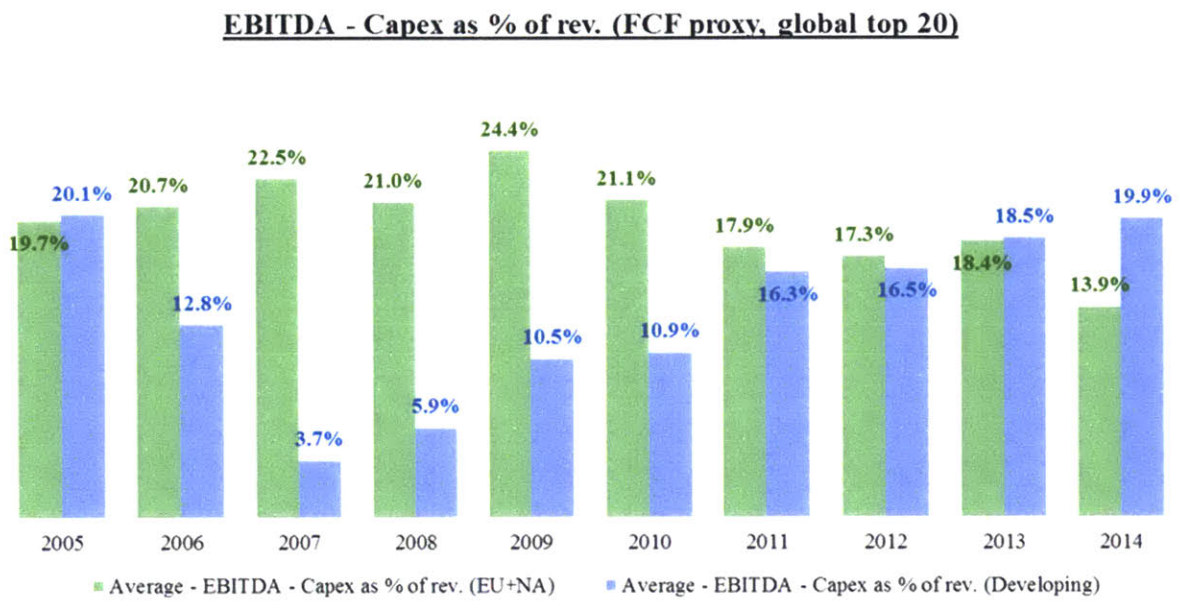

Figure 9 - FCF proxy for the global top 20 (source: S&P Capital IQ)

But how do Telecoms compare with other industries? For the purpose of comparison, **Figure 10** presents Net Capex, defined as Gross Capex – Depreciation, by sector and based on 41,240 firms (Source: Damodaran[6]). It clearly appears that Telecom Carriers are amongst the first companies concerned by Capex spending, after other investment-heavy industries such as Oil & Gas or Healthcare.

[6] http://pages.stern.nyu.edu/~adamodar/ database reclassified by thesis writer to reduce number of industries.

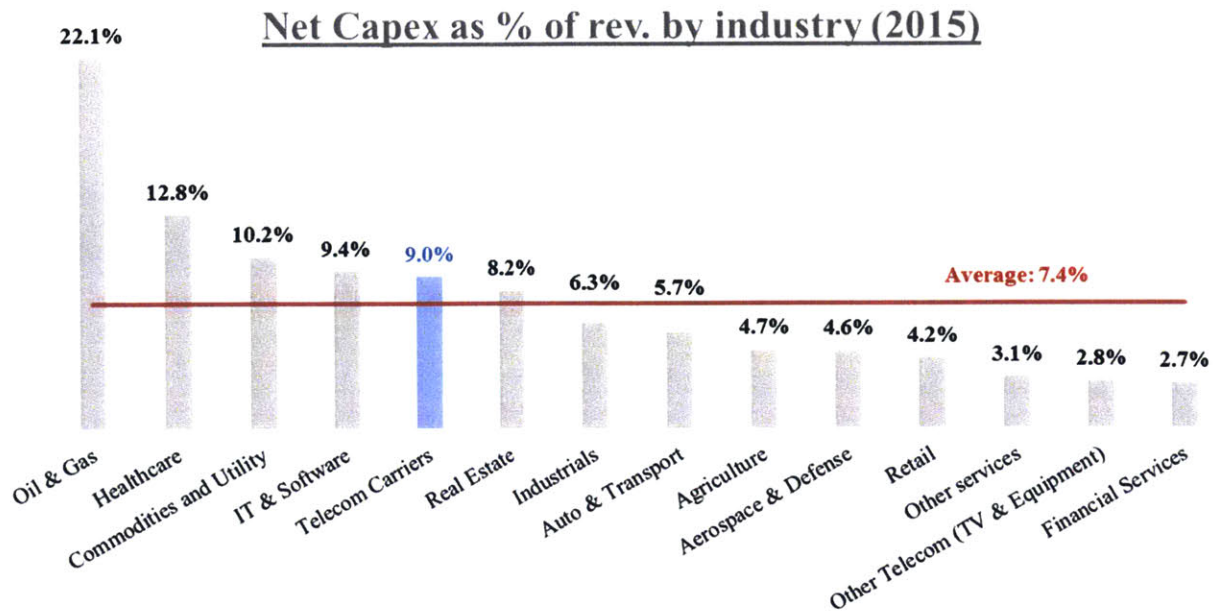

Figure 10 - Net Capex by industry (Source: Damodaran, reclassified by thesis writer)

C. Capital allocation and Capex mismanagement

1. A low-performing industry investing in projects not covering the cost of capital

Looking at dividend policy of Telcos (**Figure 11**), we see that on average, Telcos tend to give back more to shareholders than non-telecom industries. The proportion of cash returned on net income (as defined by share buybacks + dividends – stock issuances divided by earnings) to shareholders is almost thrice that of other industries.

2015	# of firms	Dividend yield	Cash returned as % of NI
Telecom carriers	110	3.6%	91.1%
Non-Telecom	41,779	2.3%	34.6%

Figure 11 - Dividend yield and cash returned by telcos (source: Damadoran)

This is usually indicative of a lack of internal value-creation of projects, with the reasoning that handing cash to shareholders will enable them to generate more value allocating that cash outside of the telco. This seems corroborated by the negative excess return of ROE to

Cost of Equity (**Figure 12**), which for the year 2015 reached -4%, on average 2.6pp lower than non-telecom companies. Telco operations tend to destroy value for shareholders under the CAPM assumption, because carriers are unable to cover their cost of equity.

2015	# of firms	ROE	Cost of Equity	Excess return
Telecom carriers	110	7.0%	10.9%	(4.0%)
Non-Telecom	41,779	9.2%	10.6%	(1.4%)

Figure 12 - ROE and cost of equity of telcos (Source: Damodaran)

But because ROE takes into account the financial structure of telcos, this may not indicate that telco operations are destroying economic value, as opposed to shareholder value. Calculating ROIC for 72 major telcos in 2015 (including the top 20 used in other analyses in this paper), we obtain a Return on Invested Capital of 7.3% for the year. **Figure 13** shows that carriers are unable to cover their cost of capital, which is estimated at around 8.2% for the industry.

2015	# of firms	ROIC	Cost of Capital	Excess return
Telecom carriers	110	7.3% *	8.2%	(1.0%)
Non-Telecom	41,779		8.5%	

** 72 companies (Source: S&P Capital IQ)*

Figure 13 - ROIC and cost of capital of telcos (Sources: Damodaran, S&P Capital IQ)

If Telecom companies tend to destroy economic value when comparing ROIC to their cost of capital, how does Capex come into the equation? Because network assets are among the largest Capex-incurring assets, and also form a large chunk of Invested Capital, surely do Capex projects have to do with this value destruction. PwC (2014) *Capex is king: a new playbook for telecom execs* presents the evolution of ROI of new projects from 2004 to 2013 in telecom companies. This is reproduced in **Figure 14**. As ROI is the financial equivalent of ROIC for a single project, it is the over-time accumulation of negative-value projects that results in the constitution of a ROIC below the cost of capital. Inversely, positive-value projects tend to build

up a ROIC delivering excess return. It appears that over the 10 years up to 2013, ROI of telecom projects fell consistently below the cost of capital. If the 9% arbitrary WACC value may be questioned, this remains largely coherent with the cost of capital of 8.2% found earlier adjusting for downward changes in interest rates during the whole period. This implies that on average, telecom projects destroy economic value.

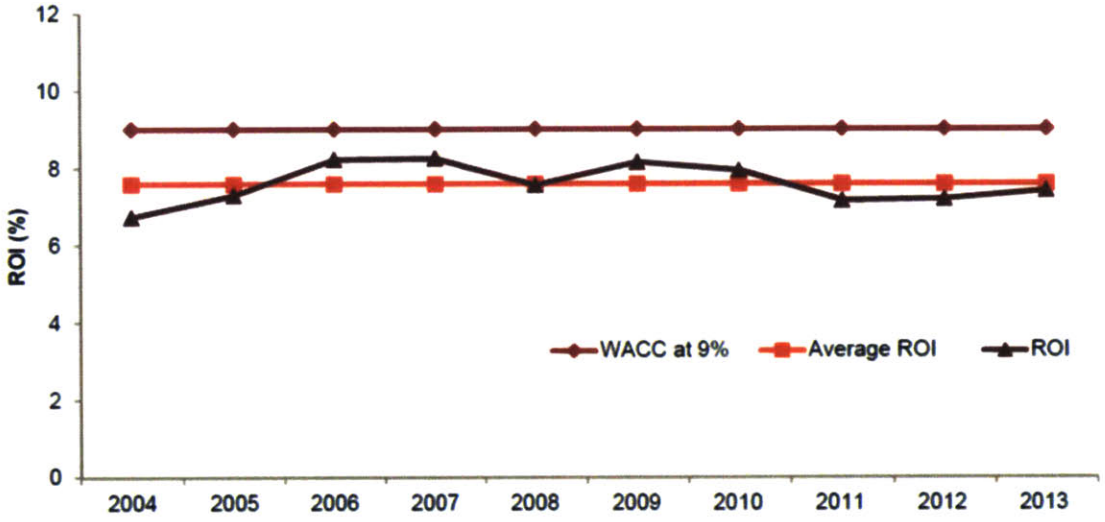

Figure 14 - ROI of telecom projects (Source: PwC)

2. The insiders' perspective: why is Capex management responsible?

Understanding why Capex contributes, on average, to value destruction (using ROI vs. WACC) for Telcos can help operators restore post-capital profitability. As it is unlikely that this is a seamless task, let's turn towards research shedding light on Capex management from an insider's perspective, which can tell us more about misallocation and common issues faced when dealing with investments. The following analysis is based on data gathered in PwC (2012) *We need to talk about Capex*, in which the firm led a qualitative survey of 22 senior telecom executives, as well as on data from KPMG (2015) *Building valuable connections*, in which the firm conducted a survey of 20 senior telecom executives.

Certain Capex renewals and "business-as-usual" investments are part of a general capex allocation, sometimes without the need for a business case (c. 74% of respondents, KPMG)

"No specific business cases are required." – as astounding as it appears, 3 out of 4 of the surveyed telcos do not systematically conduct stress-tests on business-as-usual Capex requests, which simply are approved in the budgeting phase without further examination. This means that companies may be funding old infrastructure upgrades without questioning either the financial or the strategic fit of such a decision with the current company business plan.

Capex is driven not by business objectives, whether operational or financial, but mostly by technology (c. 65% of respondents, PwC)

"There's still a bit of the 'build and customers will come' mentality, but those days are gone. If we build the wrong thing in the wrong place or at the wrong price, the customers won't follow.", a surveyed telco executive openly expressed. It appears that based on the strong customer and revenue or EBITDA forecasts produced by the strategy and market teams, Technology employees estimate Capex but usually end up with a budget they fail to believe in given the many iterations undergone. For many of the key operational inputs are not in their hands (e.g. traffic levels, subscriber expansion) but in those of business teams, it appears difficult to support will full adequacy the utilization of the network and therefore serve business outcomes as initially intended – all the more as forecasts usually end up different from the guidance that served as a base for the technological approach of the issue.

Capex issues lack accountability (c. 50% of respondents, PwC)

The study revealed that most of post-investment appraisal was dedicated to large projects only (38% of respondents) – but project Capex barely represents 20% to 30% of an operator's

total Capex according to the same respondents, who also declared that Capex committee focused 80% to 90% of its attention to project Capex. This means that part of project Capex and the remaining 70-80% of Capex ("business-as-usual") is hardly discussed: it is likely that 75% of Capex is decided without attention from senior executives. For example, RAN consolidation, core upgrades, and other tools to support an increase in traffic appear not to be highly scrutinized as it is assumed that the additional traffic is profitable per se, because the initial project investment validated the network planning.

Additionally, executives criticized that *"Marketing and product management aren't rewarded on Capex but on Revenue and EBITDA"*, arguing that *"Capex cases should be presented by marketing and sales people, not technology or engineering people."*- marketing propositions aiming at increasing revenues without consideration for Capex implications lead to ROI responsibility being diffused and not clearly accounted for.

Capex projects are insufficiently evaluated with lessons learned (c. 35% of respondents, PwC)

Because a project is not successful only because it comes on time and within budget, but because it enables the reaping of financial benefits, it appears that telecom companies still have weak mechanisms for being able to integrate past lessons and conduct efficient post-investment appraisals. Investments cases are not used to review and challenge basic business assumptions which tend to lead Capex proposals remaining largely unquestioned. Furthermore, because *"scrutiny at the back end is too late"*, telecom executives advocate for recycling assets, deferring investments and challenging proposals, refusing to acknowledge that an investment is automatically necessary because the network is congested as well as fetching as much information as possible from sometimes incomplete and unconnected databases.

These three factors lead to poor figures regarding the breakdown between efficient and misallocated Capex according to telco execs, as presented in **Figure 15**.

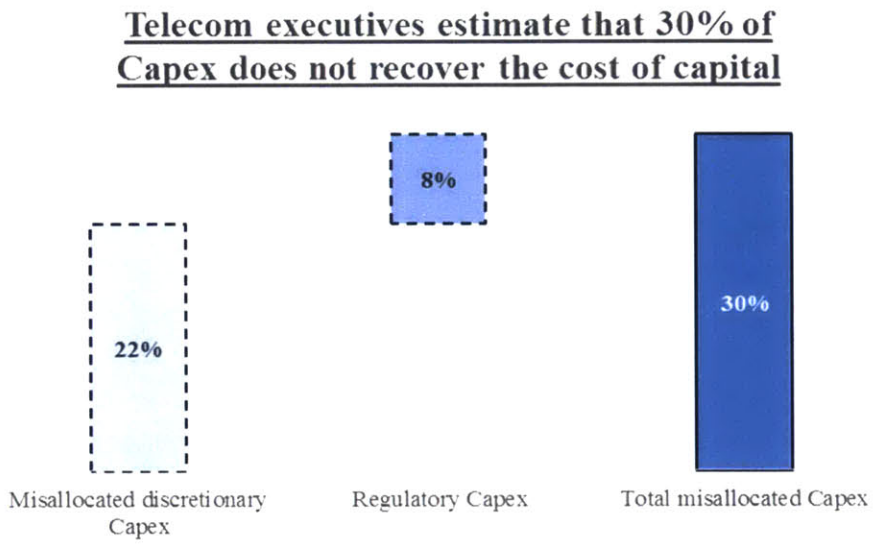

Figure 15 - Misallocation of Capex (source: PwC)

Compared with total industry Capex spending of c. $330 billion in 2015 (source: Damodaran[7]), this translates into c. $100 billion of suboptimal Capex last year.

Although surely not the only explanation for relative under-profitability of Telecom companies and a capital allocation that favors giving back money to shareholders, these Capex issues need to be tackled with in order for Telcos to deliver shareholder and economic value.

[7] http://pages.stern.nyu.edu/~adamodar/

III. Funding CapEx requirements

A. Debt finances Capex

Having a look at European and American global telecom operators (**Figure 16**), we notice that peaks in Capex spending (notably 2011 and 2014, excluding 2008 given the financial crisis) were concurrent to sharp increases in leverage as measured by Net Debt to EBITDA.

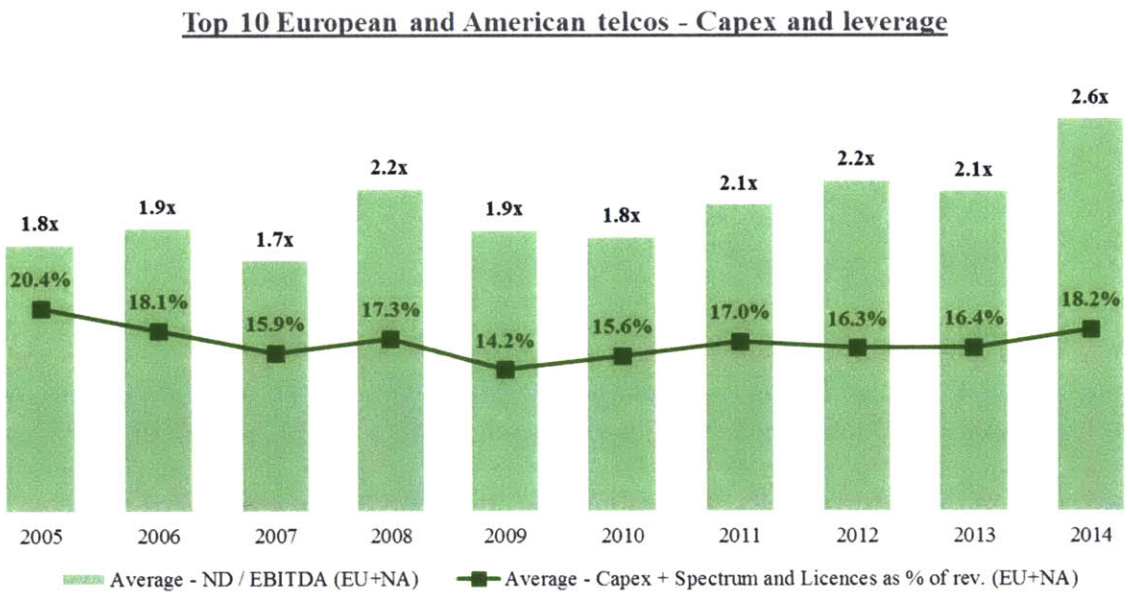

Figure 16 - Capex and leverage of top European and American telcos (source: S&P Capital IQ)

Conversely, Emerging telecom operators have seen their leverage decrease over the recent years, along with a stabilisation of their Capex spending. **Figure 17** shows that leverage increased gently when investments were high (over 45% in 2007) but started decreasing in 2011 when Capex spending reached a more mature level. Nonetheless, it is worth noting that overall, leverage seems less correlated with investments than it was for European and American counterparts, which are operating in markets both more advanced and more competitive.

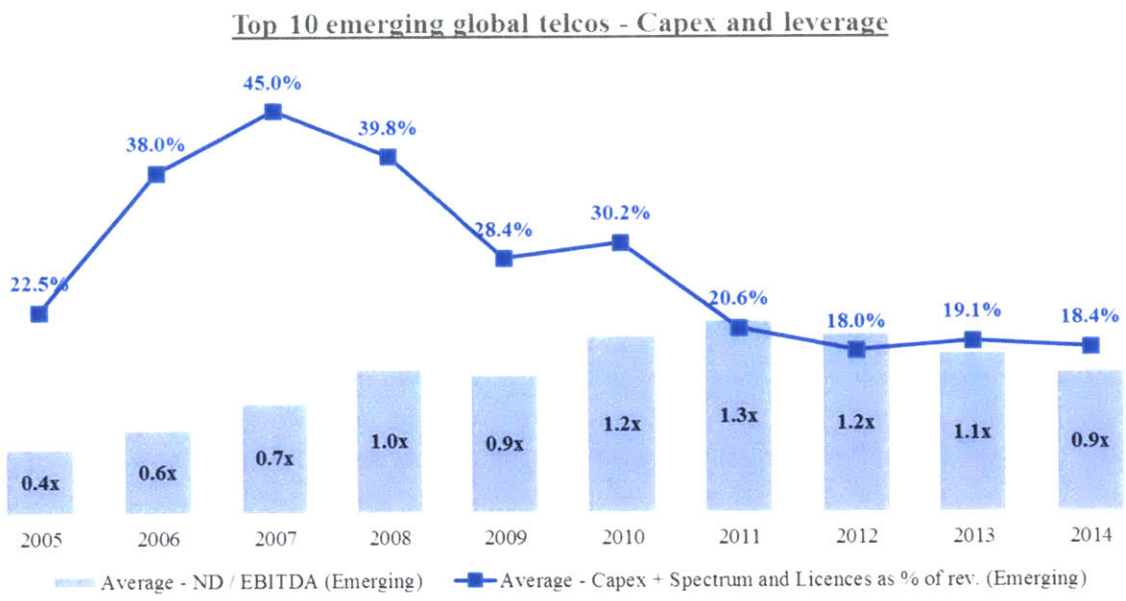

Figure 17 - Capex and leverage of top emerging telcos (source: S&P Capital IQ)

Capex spending is regularly quoted by rating agencies as a major driver of leverage. Business-as-usual Capex does not appear to be a source of concern: on 14 August 2015, Fitch affirmed Deutsche Telekom's rating *"Long-term Issuer Default Rating (IDR) at 'BBB+' with a Stable Outlook"*, arguing that if *"Capex drive[s] leverage higher, [...], substantial investments, consummated and ongoing, in the mobile spectrum and a faster fixed network including fibre will support DT's leading position in Germany."*

On the opposite, exceptional Capex such as large strategic shifts or overpaid spectrum auctions in developed countries tend to result in strong leverage increase and downgrades: on 2 February 2015, S&P lowered AT&T's credit rating after its winning bid in the gigantic spectrum auction for AWS-3 bands. S&P analyst Allyn Arden declared *"The rating downgrade is primarily based on the company's recent announcement that it will spend $18.2 billion, or about $2.88 per MHz-POP, on its winning bids in the recently concluded AWS-3 spectrum auction, which* ***we expect it will fund primarily with debt.*** *[...] Although we view the acquisition of*

spectrum as a positive for AT&T's wireless business, the amount was higher than our expectations of around $15 billion-$16 billion."[8]

A recent example of a large bond issuance to finance Capex for a major player was the €2 billion unsecured equity-linked bond issue from Telecom Italia on 20 March 2015, with the objective of *"see[ing] through its plans to invest €10 billion in its core business between [2015] and 2017, including a €500 million spen[t] on new FTTH and FTTC deployments."*[9]

B. Asset monetization: a recent and not widely adopted solution

Telecommunications companies, for most of them, are heavy infrastructure owners: land, offices, telecom network towers, connection nodes, data centers, satellite stations, submarine cables, ducts for telephony… and even metals from outdated network. They have at disposition assets from which they can potentially raise capital to further cover their CapEx requirements or increase their profitability. According to Liu, Garg and Bhagat (2014) in *Telecom Assets: Unlocking the Trillion-Dollar Treasure Chest*, 'the book value of the top 30 players' fixed assets is more than $2.4 trillion, of which $270 billion are locked away in real estate, an appreciating asset. The total book value of real estate is 33% of the total accumulated debt (more than $780 [billion]) of the top 30 operators.'

If asset operation is critical to the telecom services, it remains possible to optimize the value in these assets. This optimization has manifested over the last 20 years as infrastructure divestments, with the best example being towers. A large reconfiguration is happening, notably in Emerging Markets, with deals multiplying as shown in the below excerpt from *TowerXChange Issue 14* (2015) for Europe:

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[8] http://www.streetinsider.com/Credit+Ratings/AT%26T+(T)+Downgraded+to+BBB%2B+by+S%26P+Following+AWS-3+Purchase/10217128.html

[9] http://www.eurocomms.com/industry-news/10537-telecom-italia-issues-new-bonds-to-fund-capex-after-return-to-profit#

Year	Country	Towerco	Operator	#Towers	Deal terms	Deal value	Value per tower
2008	Netherlands	Open Tower Company	KPN	101	Sale & Leaseback (SLB)	Unavailable	NA
2010	Netherlands	Open Tower Company	KPN	500	SLB	Unavailable	NA
2012	Spain	Abertis	Telefonica	500	SLB	€45 million	€90,000
2012	Netherlands	Shere Group	KPN	460	SLB	€115 million	€250,000
2012	Netherlands	Protelindo	KPN	261	SLB	€75 million	€287,000
2012	Germany	American Tower	KPN	2031	SLB	€393 million	€193,500
2012	France	FTP	Bouygues Telecom	2166	SLB with 15% equity	€185 million	€100,400
2014	Spain	Abertis	Telefonica / Yoigo	4277	SLB	€385 million	€90,000
2015	Italy	Abertis	TowerCo	212 (plus 94 points in tunnels)	Trade sale	€94.6 million	€309,000 per site
2015	Italy	Abertis	Wind	7377	SLB with 10% equity	€693 million	€104,400

Figure 18 - Recent tower deals in Europe (Source: TowerXChange)

Nevertheless, it appeared that most of these moves were motivated by financial needs to either finance growth or pay down existing debt. Regarding the IPO of its Inwit tower business, Telecom Italia CEO Marco Patuano said *'[Telecom Italia will use the proceeds of the initial public offering of its domestic wireless-tower unit Inwit to partially pay down its debt and to invest in ultra-fast fixed and mobile broadband infrastructure.]'*[10] How to unlock value from these infrastructure assets? The potential benefits drawn depend on the operational category of the underlying asset:

[10] http://www.marketwatch.com/story/telecom-italia-to-use-inwit-ipo-take-to-pay-debt-2015-06-08

	Non-core assets	Core assets	
		Non-Strategic	Strategic
Definition	Limited use Fully depreciated Unnecessary for operations Not in core business	Necessary for business Limited competitive concern	Necessary for business No room for sharing Competitive concern
Example	Outdated or overlapping copper cabling	Regional network tower Submarine cable	Strategic tower (city center)
Potential benefit	High	Intermediate to High	Low
Example of action	Complete divestment	*Network Sharing Agreement*	*R.E.I.T.* / Dedicated subsidiary

Figure 19 - Types of telecom infrastructure assets by potential benefits

1. Wrong reasons not to monetize assets

Several reasons can explain why these deals remain limited in number:

- *Limited incentive regarding asset utilization:* infrastructure rationalization mostly remains a side issue, tackled in one-off initiatives. ROCE from assets, although essential in an infrastructure business, seems not to be a priority for telecom operators which focus on the service.
- *Convenient unknown asset value:* Infrastructure assets depreciate over time and the residual book value is not effective at determining the real value which can be extracted. Out of convenience, outdated networks or exchanges may be left as is. Nevertheless, there is a natural strong advantage in knowing the real value of the assets in order to embark on such optimization plans.
- *Traditional in-house ownership:* Unless it is demonstrated that transferring ownership or management has no impact on operations, it is understandable that such transfers are discarded. Competitive risks and know-how loss can also motivate a full in-house ownership.

2. Possible actions per asset category

Below are presented usual divestment strategies or operational efficiency considerations. Alternatively, one could think of ***Network Sharing Agreements***: they will be covered later in this paper.

a. Non-core assets

Outdated and overlapping assets are no longer required and can therefore be sold as is to a third party. Examples are copper networks now replaced by fiber rollouts, or excess towers after an acquisition. These can be fully divested:

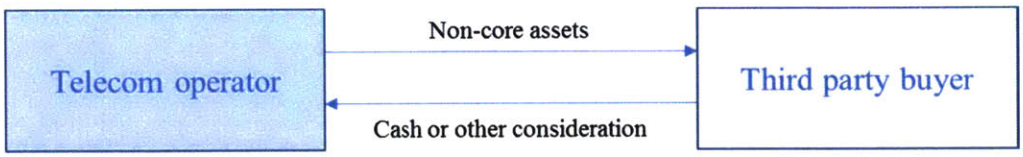

Figure 20 - Trade sale

b. Non-strategic core assets

Assets such as offices or regional network towers, albeit necessary for operations, do not represent a competitive risk and can therefore see their ownership transferred. The most convenient way to achieve this, as demonstrated in **Figure 21**, is a ***sale and leaseback***. Lease duration is usually fixed in time to guarantee an annuity to the asset buyer for a number of years. With the third party dedicated to asset optimization, the telecom company can now keep focusing on delivering service to customers. In the Income Statement, asset amortization is replaced by lease payment.

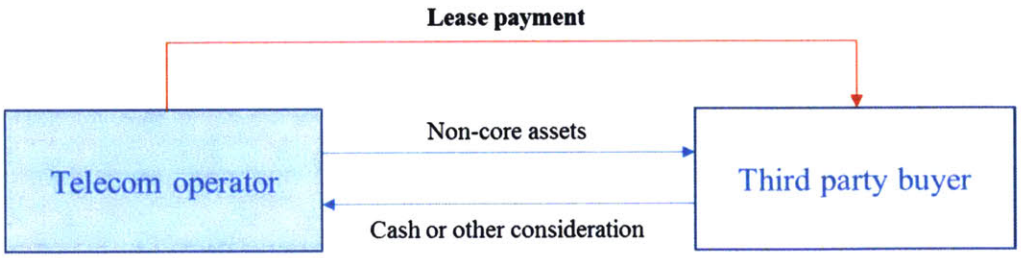

Figure 21 - Sale and leaseback

c. Strategic core assets

Network towers in city centers, for instance, are crucial for the course of business and cannot be either shared or transferred via leaseback, because of their highly competitive dimension. In that case, external investment is still viable but will require setting up a dedicated AssetCo company for the assets, in which the telecom company and the investor can share equity. Nonetheless, control must remain in the hands of the operator in order to carry out operations.

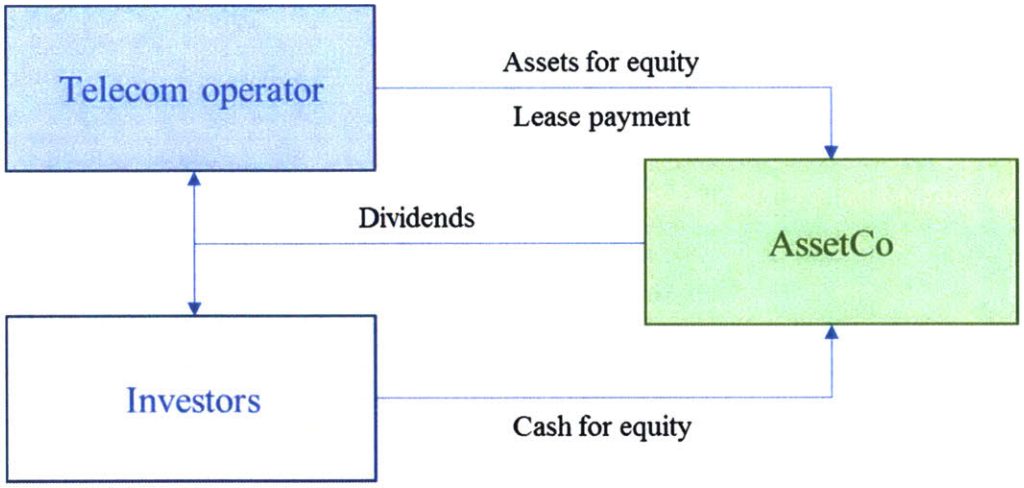

Figure 22 - External investment

d. Considerations regarding asset structuration

Several key points can help telecom operators deal with their assets:

- *Separate AssetCo:* Setting up a dedicated company for the management of assets enables optimization of such assets. The commercial nature of the new relationship between the assetco and the telco makes establishing objectives for the assets possible, with the assetco's management responsible for meeting KPIs. This new assetco provides the operator with some flexibility in terms of future potential monetization as presented above. In the previously mentioned *TowerXChange Issue 14*, we see that 73% of

European cell sites (i.e., over 440,000) remain captive and not set up in a dedicated towerco or infraco:

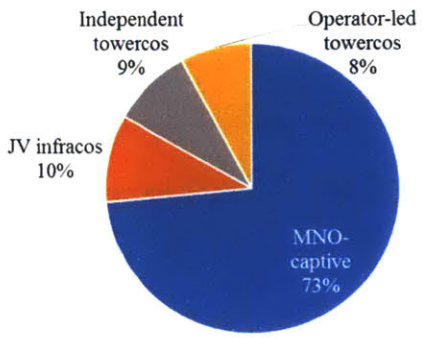

Figure 23 - 2015 ownership breakdown of European cell sites (Source: TowerXChange)

- *Divestment can be creative:* Asset expertise can help a telecom operator come up with appropriate divestment strategies that do not threaten operations but unlock value from infrastructure. It is possible to creatively optimize asset structure, both satisfying utilization needs and generating cash.

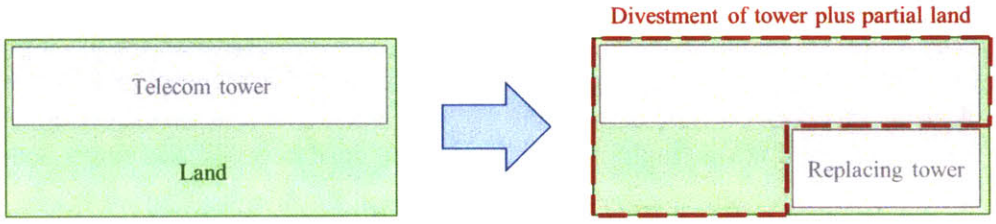

Figure 24 - Creative divestment example

IV. Recent trends in the industry and their impact on CapEx

A. Network Sharing Agreements

1. Pooling resources with competitors...

Be it the reduction by regulators of mobile termination rates, the willingness to enter a new market (regional or national), the exponential increase in data traffic, or limited spectrum availability, many drivers can lead telcos to consider network sharing as a viable option to establish or maintain their presence. For example, LTE (4G technology) starts as a cash drain for many operators: by requiring a major initial investment (spectrum, infrastructure and implied operating costs), it also leads, once taken up, to unprecedented level of pressure on network given data consumption. There may therefore be an advantage in pooling network resources wih rival operators.

Several types of agreements are possible, usually split in three categories as defined by Meddour, Rasheed and Gourhant in journal *Computer Networks: The International Journal of Computer and Telecommunications Networking* of May 2011: passive infrastructure sharing, active infrastructure sharing (including transmission, core network and radio access network) as well as roaming.

Passive infrastructure sharing:

- Masts, pylons, cables (electrical and/or fiber optic);
- General physical space such as towers, roofs and premises of the complex;
- General equipment such as alarms, power supply, air conditioning and access systems.

Operators can choose to enter into an agreement directly between themselves or, with the rise of towercos, use that third-party site to conduct their activity without a formal agreement between the two. This site sharing facilitates rollout especially in low-density areas, potentially

bringing mobile technology to new populations in the case of an emerging country. An additional benefit of passive infrastructure sharing resides in its flexibility to upgrade. Building a dedicated 4G network proves costly, while collocating in a network sharing agreement the necessary 4G equipment can facilitate the transition between two technologies.

The scope – ranging from one site to an entire network – and the reciprocity – unilateral, bilateral or more – of such agreements can vary depending on the country's situation and its regulation. For example, a regulator can force a 3G/4G incumbent to open the entirety of its sites to a new entrant in order to facilitate competition by enabling said entrant to save the site building costs. Alternatively, it would make sense for two operators with different geographical coverage to enter a bilateral regional network sharing agreement in order to give access to each other's sites for their own development.

Transmission sharing (active network sharing):

This level of sharing comes in addition to the previous passive sharing and concerns antennas for reception and transmission of telecommunications signals and other transmission equipment, such as base stations in the case of 3G and 4G networks, which are devices specific to these technologies. It is also possible to share the spectrum (i.e. the signal band used) although regulatory obstacles and competitive issues often prevent such deals. The additional savings versus simple passive sharing is limited given the relatively low cost of installing and maintaining antennas. If deals involve base station sharing, operators tend to have a specific operating module given their own spectrum.

Radio Access Network (RAN) sharing (active network sharing):

At this step, operators decide to merge their base station operating module physically while being able to retain the "logical" features of the base station to manage their network

independently. They still have under control the critical features and are therefore enabled to optimize radio allocation. Regulation requires that the equipment, albeit physically "single", retain functions relative to the quality of the network for a given operator, speed and coverage notably. Operators are responsible for an independent control of the equipment, whether conducted by themselves or the third-party owning the site, but in any case not joint with the partner operator. There is effectively a "Chinese wall" between the two operators' networks as defined at the International Telecommunication Union Summit 2008 in the *Breaking up is hard to do: the emergence of functional separation as a regulatory remedy* presentation.

Core Network sharing (active network sharing):

For this type of sharing, which includes previous types of sharing, operators pool their servers together, as well as their network switches and routers. This type of sharing remains rare as servers host major confidential information. It is therefore difficult to see rival network operators sharing networks. This type of agreement is generally adopted with VNOs (Virtual Network Operators) which do not otherwise possess equipment.

Roaming:

This type of network sharing is mostly known for its international dimension, as it represents the most convenient way to keep serving customers abroad, i.e. having left the geographical coverage of the national network. As evoked above, it also serves in case of entry of a new operator, allowing it to gain full coverage before it is able to compete with its own network. More rarely, it enables operators to use each other's network in a delimited area, without development of their own network on-site. Because of such applications, it is virtually impossible to compute possible Capex savings as this option entails a full-blown agreement not to develop one's network but instead use that of a competitor.

How prevalent are such agreements? Little unified data can be found on the topic, but press enables to form a picture where network sharing agreements appear as common practice given recent deals across Europe. At time of writing, the most recent transaction of that type concerned Telekom Romania and Orange which entered into two network-sharing deals in mid-February 2016 as reported in online telecom news aggregator *Telecompaper*[11]. The transaction is presented in **Figure 25**.

Simultaneous deals	Concerns	Outcome
Mobile	Orange's 4G LTE network	Grants Telekom Romania access to Orange's network, which covers **72% of the country's population and 96% of urban population**
Fiber optic (fixed)	Telekom Romania's urban fiber optic network	Grants Orange access to Telekom Romania's fixed network, enabling Orange to access the fixed market and to offer **fixed-mobile bundle offers**

Figure 25 - Telekom Romania / Orange network sharing deal (Source: Telecompaper)

But how much savings can be achieved through such network sharing agreements? In its presentation *Mobile Network Infrastructure Sharing* in February 2015, management consulting firm Coleago attempted to estimate average savings from the different deal formulations available as seen in **Figure 26**.

[11] http://www.telecompaper.com/news/telekom-romania-orange-confirm-network-sharing-deals--1128297

Deal model	Capex benefits	Capex savings	Opex benefits	Opex savings	Other benefits
Passive	Lower site building cost	**10-15%**	• Lower site lease cost • Less competition for sites reduces pressure on lease costs	10-15%	• Faster site acquisition and building process implies faster coverage roll-out • Reduced environmental impact
Transmission	Lower site building cost	**10-20%**	• Lower operating costs	10-20%	• Bring forward timing on fibre deployment
Radio Access Network	Lower equipment investment for same capacity	**25-40%**	• Lower operating and maintenance costs for same capacity	20-30%	• Bring forward introduction of new service features • Spectrum pooling: better service quality and bandwidth
Core Network	Lower equipment investment due to better use of capacity	**15-20%**	• Lower operating costs	20-25%	
National Roaming	Slower investment profile				• Faster coverage rollout

Figure 26 - Network sharing savings estimates (source: Coleago Consulting)

2. ...does not go without issues and sacrifices regarding Capex

Despite its apparent savings, it remains unclear whether network sharing manages to accomplish any sustainable profitability improvement for network operators. In its *Supercollider: European mobile consolidation is win-win for operators and citizens alike* note of February 2014, HSBC indicates that empirically, *'cost savings are immediately passed onto customers'*. It is therefore unlikely that operators are actually changing their behavior when it comes to network investment.

The effect could actually go beyond that. If in fact, network sharing translates into lower topline revenues given the immediate effect on price charged to customers, we could see capital withdrawal looming on the horizon for it would dissuade new capital commitments. If network sharing virtuously enables operators not simply to save on capex, but to spend its 'network money' with more efficiency, we should see additions in capacity where network sharing is a prevalent strategy – which, as evoked earlier, would lead to decreasing unit prices over time, in much stronger proportions than a direct rebate to customers. Or, the less shiny alternative of a

capital intensity reduction… But how significant is that effect of network sharing on price evolution in Europe? As shown below in **Figure 27**, it seems that the effect of network sharing in the evolution of data prices is very limited (R2 of 12%)

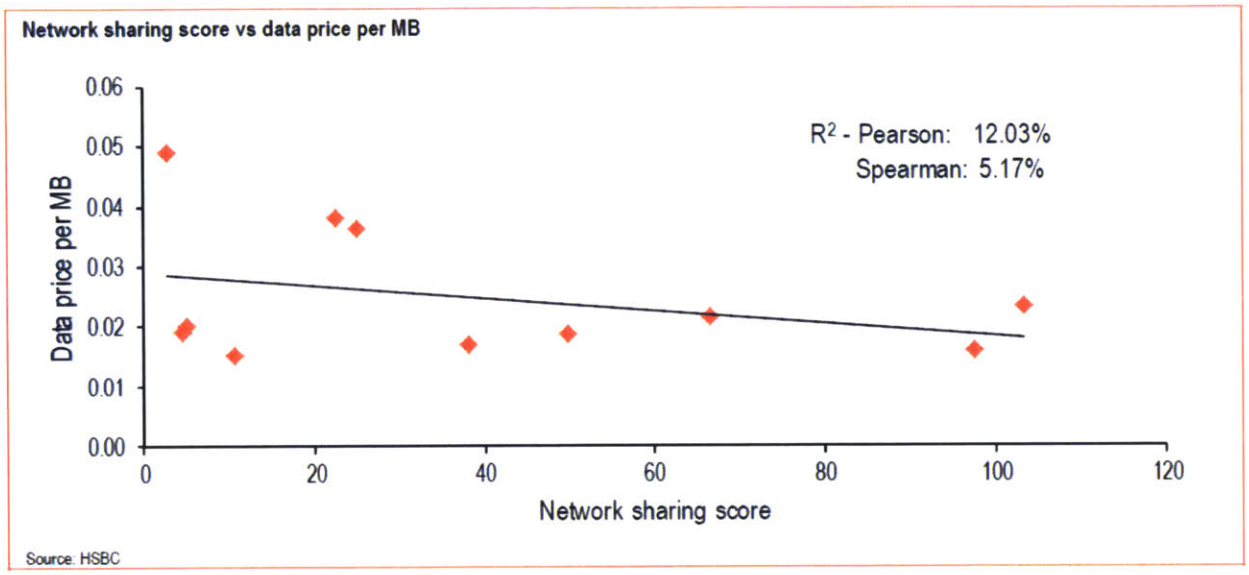

Figure 27 - Impact of network sharing on data prices (source: HSBC broker)

Additionally, we could argue that networking sharing participates in the undermining of network differentiation. If rival operators share the same network, how could network be a possible source of competitive advantage that could be used as a marketing argument? Indeed, the operators' ability to differentiate themselves from competitors via their networks is probably an important element in the innovation and the infrastructure development pursued by telcos.

Recently, the OECD also recognized the utility of differentiation of networks between players. In the *Wireless Market Structures and Network Sharing* from January 2015, it declared that '*a degree of asymmetry may actually be beneficial. The fact that some of them have more spectrum of one type and less of another, as compared with their competitors, may have the potential to increase competition, as it is likely to require the different MNOs to adopt different*

commercial strategies to compete in the market, creating the potential for greater innovation and differentiated competition'.

Finally, network sharing, which could be thought, infrastructure-wise, as a substitute for mergers or acquisitions, appears much less effective: through pooling, companies miss the opportunity of realizing synergies they could achieve through an effective merger or acquisition. They also commit themselves to effectively "sharing" and cooperation, notions that lose their meaning if a merger or an acquisition takes place, for both operators would be combined. The lack of control over a player that is both an economic partner and an economic rival is largely inferior to the benefits a full-blown merger entails.

B. The asset-light approach: *Virtual Network Operators*

1. Customers without a network

Mobile Virtual Network Operators – defined as non-network operators – developed in the late 1990s back when the only service was voice. The first successful MVNO to be launched was Virgin Mobile, initially in the UK on November 11, 1999, and subsequently in the US. With prepaid tariffs largely dominating the market, such new players attempted to trade on their brand and deliver basic services at a lower cost, advertising a *"simplified tariff structure"*[12].

Over time, MVNOs managed to conquer small pockets of the market by offering differentiated bundles, for example focusing only on certain parts of the population, notably Diasporas, enabling them to call foreign destinations at large discounts – These MVNOs are nicknamed "ethnic MVNOs": on its website, Lebara declares *"Our ambition is to continue to care for the migrant community"*[13].

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[12] http://www.theregister.co.uk/1999/11/11/virgin_shakes_up_mobile_market/
[13] https://www.lebara.com/us/en/who-is-lebara/vision

Today, MVNOs represent large chunks of mobile markets in most developed countries, controlling between 10% and 40% of market shares as of late 2013, as shown in **Figure 28**. We see, nonetheless, that the MVNO presence is highly granular with no presented country with less than 11 MVNOs competing on its national market.

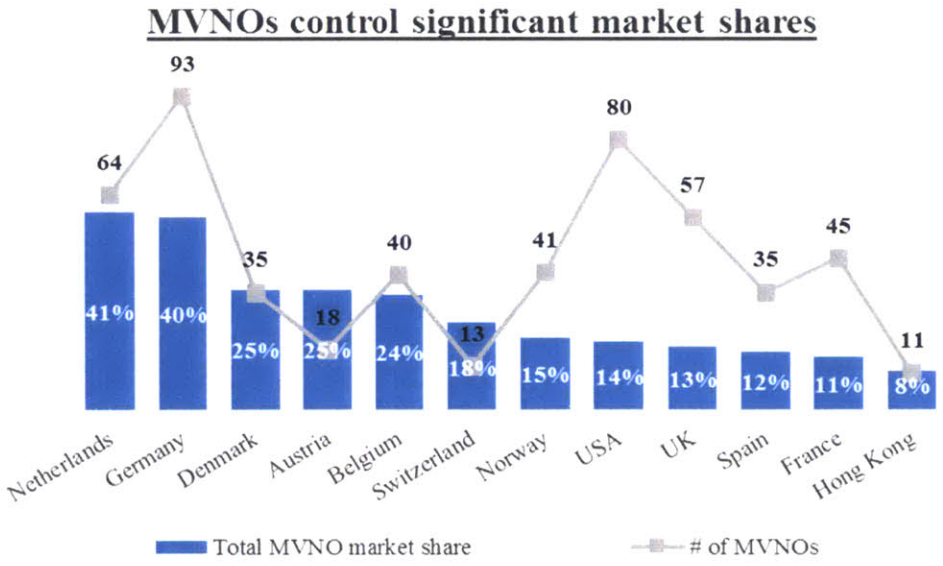

Figure 28 - MVNOs market shares in developed countries (Sources: Pyramid, McKinsey)

But what type of cost structure do those MVNOs opt for? Different models are available, as defined by Telecom consulting firm NEREO in its *MVNO Business Essentials* (No date): Branded reseller, service provider and "full MVNO".

Branded reseller

In this model, the MVNO owns no asset: no ownership of the client, the infrastructure or the SIM cards. They are also unable to fix retail pricing which is decided by the network operator. The MVNO has access to the profits realized while operating under its brand and is responsible for the distribution of revenue to the MNO. Additionally, the MVNO has to incur all costs relative to marketing and sales. Usually, profits come from commissions for gross adds (new client acquisition) as well as a % of gross margin of the revenues generated from the clients

who opted for the branded reseller. All other revenues (e.g. interconnection from another operator, or incoming revenues) and costs (network, billing, traffic management) are the responsibility of the network operator. **Figure 29** depicts margin extraction for a branded reseller. (Note: ARPU refers to Average Revenue Per User)

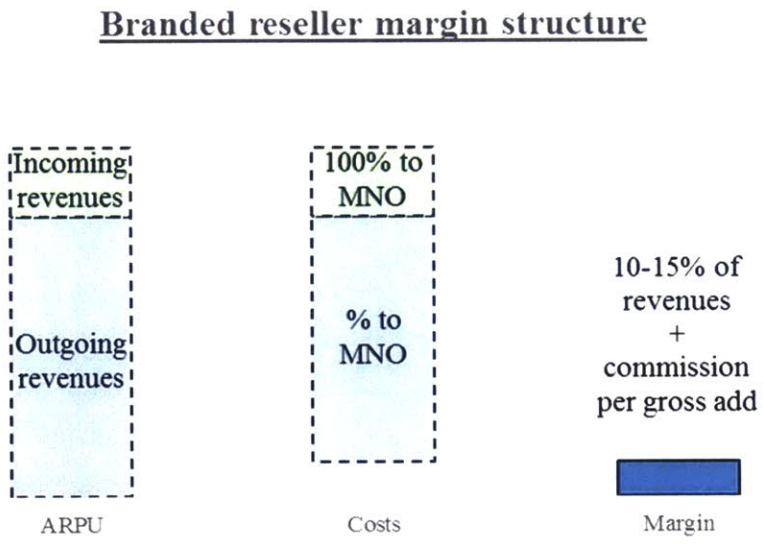

Figure 29 - Branded reseller margin structure

Service provider

Under this agreement, the MVNO has the power to set its own retail prices and owns its clients, and possibly the SIM cards, but no infrastructure whatsoever. It generates its revenues directly from outbound calls, and usually transfer to the Host-MNO only the wholesale charges. This freedom to set prices is the source of an on-average slightly higher margin. All other costs incurred in the branded seller model are the responsibility of the MVNO, with the addition of the IT platforms owned for billing systems and customer care. Once again, all incoming revenues are owed to the Host-MNO as owner of the assets receiving incoming calls. **Figure 30** presents the typical margin structure for service providers.

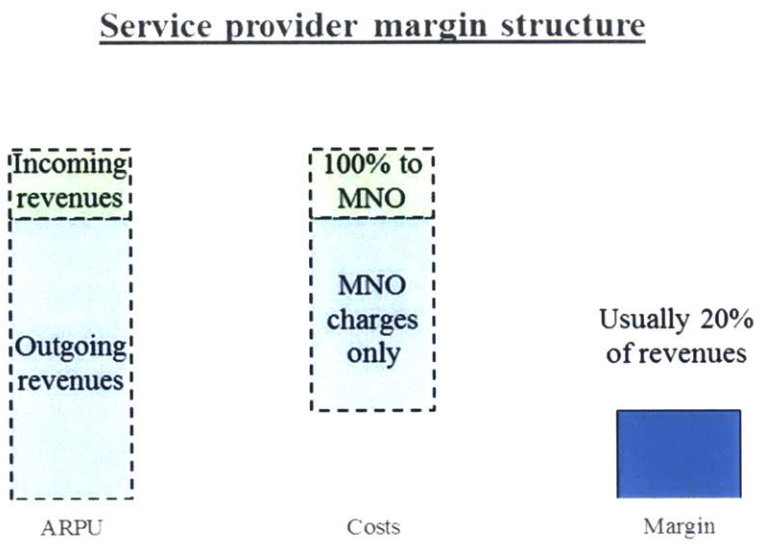

Figure 30 - Service provider margin structure

Full MVNO

Finally, a "full MVNO" operates in all ways like a network operator, with partial ownership of infrastructure with the exception of the radio access network. In that sense, the MVNO is entitled a portion of both incoming and outgoing revenues. This is the only model where a MVNO is faced with network Capex. Because it receives the benefits from owning parts of the assets, and the freedom that goes along, the MVNO also incurs network costs. In this model, the MVNO is responsible for all revenues and costs except those specifically tied to the radio access network. The MVNO is therefore owner of the clients, the SIM cards, the infrastructure, and is enabled to control traffic as well as offer value-added services and customer provisioning. **Figure 31** presents the margin structure for calls of a full MVNO, therefore excluding other revenues as mentioned in the previous sentence.

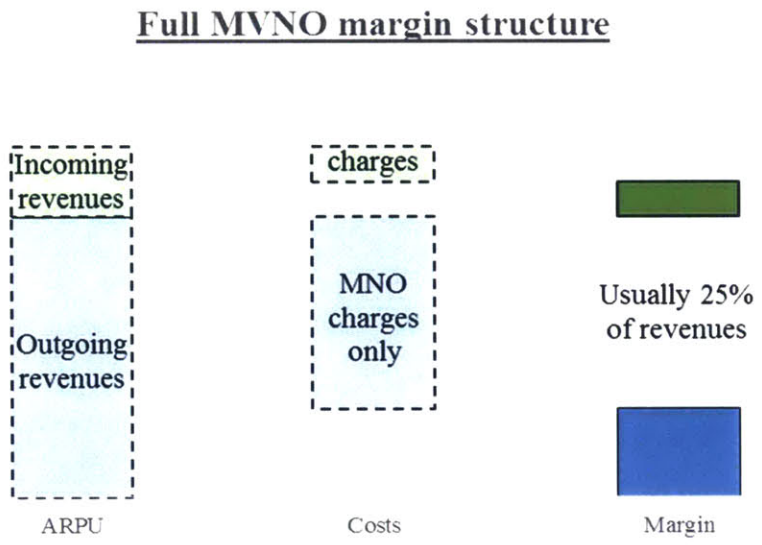

Figure 31 - Full MVNO margin structure

2. Impacts of VNOs on market Capex

MVNOs are a margin-compressing competition force. More MVNOs would most likely mean that all operators have to accept lower margins (as measured by EBITDA) than they would otherwise have done without such new players, with a risk of churn that could lead their customers to sign up with the new MVNOs. For instance, **Figure 32** shows the impact on French players' profitability when Iliad-owned Free entered the market in January 2012 as a MVNO developing its own network over time. Orange was not as impacted as SFR or Bouygues thanks to its heavy B2B presence, a segment not entered by Iliad at launch. Immediately, cash flows were sucked out from operators through drastic price cuts. However, the bigger question regarding MVNOs and their potential benefit to the end-customer depends on their impact on capex.

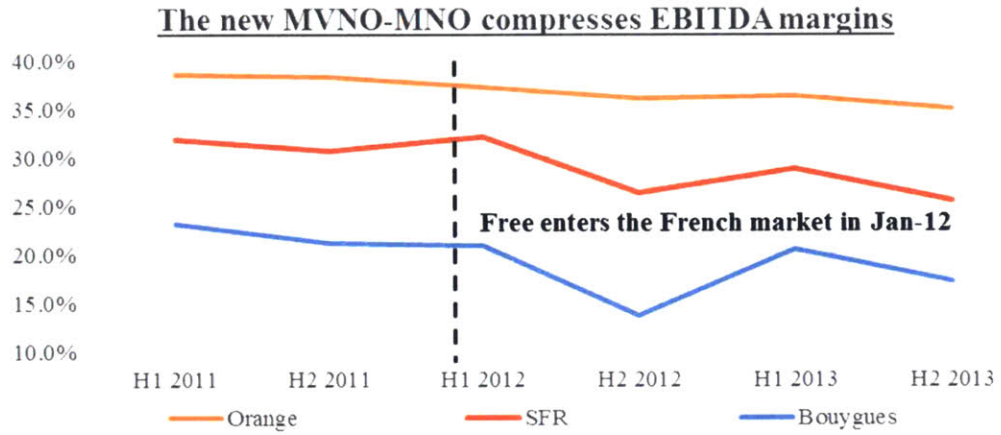

Figure 32 – Impact of Iliad-Free's entry on competitors' EBITDA margin (source: company reports)

Only the competition between network owners can spur investment – because the reward for pulling ahead via one's assets, or the fear of falling behind in network quality and technology, both power the investments engaged in. Issue is, a MVNO has, by definition, no network: it is therefore impossible for competition between a network operator (MNO) and a MVNO to stimulate Capex.

MVNOs do not contribute to network competition, but are likely to depress margins and thus cash flows: what important consequence can we draw? If one effect of an MVNO's entry is the promise of lower future returns in the industry, given non capex-led slash in prices, MNOs should naturally tend to have a lower appetite to invest – since they know it will not enable them to compete more favorably with the MVNOs using their network or a competitor's, competitor who faces the same issue. Therefore, it appears that MVNOs reduce the financial capabilities of MNOs to engage into network investments.

As phrased by HSBC in its 2015 *Supersonic: European telecom mergers will boost Capex, driving prices lower and speeds higher* study, *"MVNOs represent margin compression without capex, or even margin compression at the price of capex. In aggregate, this makes their merits somewhat dubious, and certainly a legitimate area of further analytical enquiry."*

Oddly enough, recent merger control cases have required MVNO remedies. One example is the acquisition of Orange Austria by Hutchison 3G in 2012. In its *REGULATION (EC) No 139/2004 MERGER PROCEDURE Case No COMP/M.6497 – HUTCHISON 3G AUSTRIA / ORANGE AUSTRIA*, the European Commission required H3G *"not to complete the acquisition of Orange Austria before entering into an MVNO agreement based on the Reference Offer with one MVNO, subject to prior approval by the Commission"*, arguing for more competition. But as developed above, this type of competition cannot stimulate investment, but only reduce profitability of operators, therefore diluting their ability to commit to network investments. This non Capex-based competition brought forward by the authorities is actually what a regulator should avoid, for making sure end-customers are treated fairly in terms of price and capacity access via MVNO push is a subpar way of achieving this, especially in the long term.

C. Mergers & Acquisitions: a case study

Lastly, Mergers and Acquisitions represent an alternative to direct CapEx spending because, via the synergies they can represent, they often enable players to save on their capital expenditure bill through network consolidation and rationalization. Prior to the financial crisis that started in 2008, the telecom sector generated over 300 deals per year across the globe as shown in **Figure 33**. Since then, after a severe backdrop from 2008 until 2012, transactions have started picking up to now reach their pre-crisis level in terms of deal value, averaging €206 billion over the last three years. It is notable that the number of transactions remains much lower than pre-crisis, with approx. 210 deals per year vs. over 300 pre-crisis. This translates into much bigger deals across telecom markets.

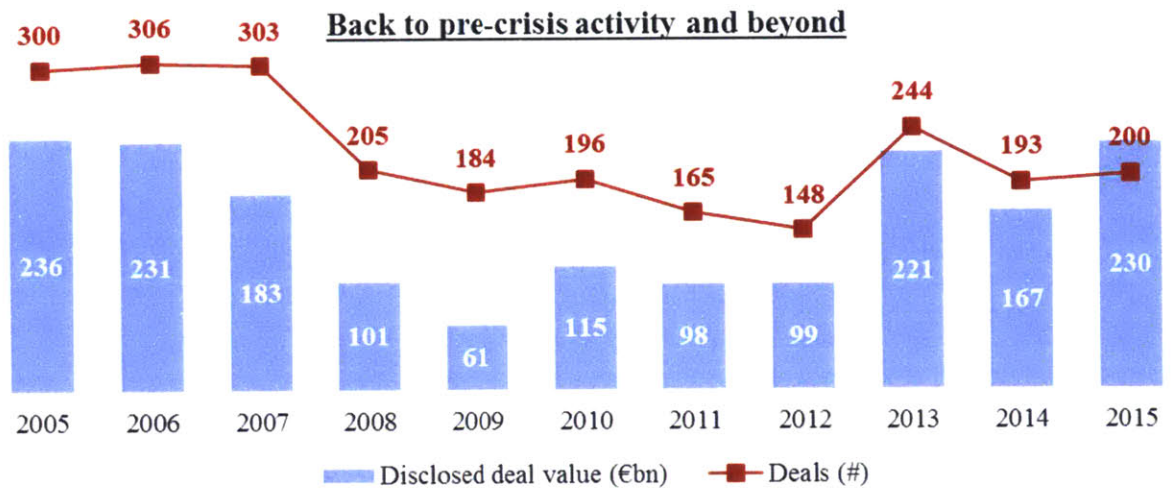

Figure 33 – Global M&A activity since 2005 for Telcos (source: MergerMarket)

The *SFR-Numericable* transaction: Capex savings case study

On March 17, 2014, Numericable (owned by Patrick Drahi's Altice) announced its planned merger with SFR (*Société Française de Radiotéléphonie*) advancing potential synergies in excess of €10bn, of which 35-40% in Capex. Let us first understand what could have been the rationale behind this combination.

Originally created in 2007, Numericable was arguably a dwarf in the French telecom market: with almost no presence in the mobile market, Numericable was not on top of the charts in the broadband sector either, with barely 4% in market share. What undoubtedly set Numericable apart from other players was its focus on fiber network development which made it a strong leader in the segment. Therefore, it seems that this acquisition of SFR was a way of gaining in visibility through the second mobile and third broadband player in the country. Additional details regarding respective networks as at late 2013 are provided in **Figure 34** - Brief summary of NUM and SFR activities at the end of 2013 (source: companies).

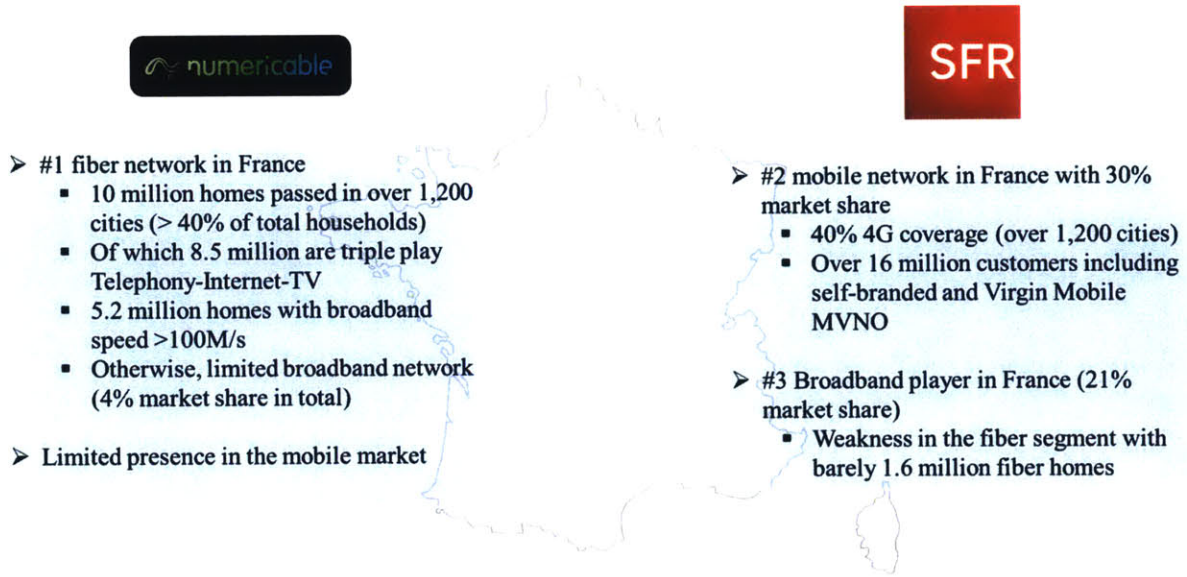

Figure 34 - Brief summary of NUM and SFR activities at the end of 2013 (source: companies)

For example, such a combination would turn the combined entity into the broadband challenger, now trumping Iliad's Free but still behind national incumbent Orange. **Figure 35** - broadband market share evolution after SFR-NUM deal (source: companies) presents French market shares pre- and post-deal based on December 2013 figures. As a matter of fact, no remedies were expected and none were demanded by the French authorities as part of the deal validation.

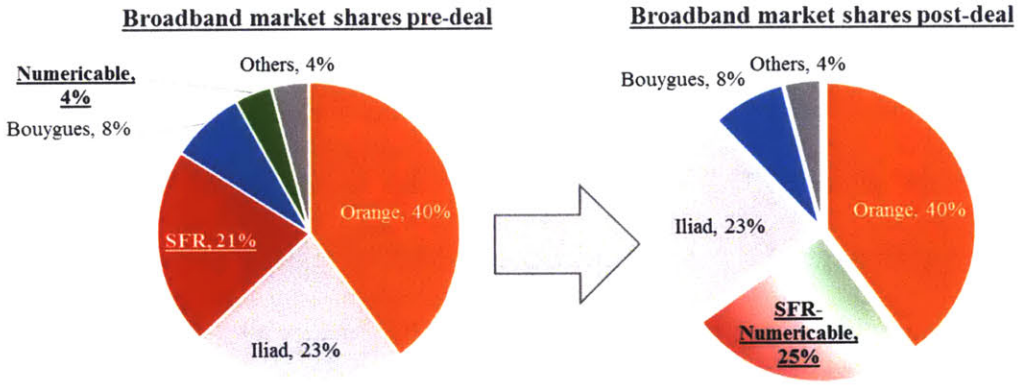

Figure 35 - broadband market share evolution after SFR-NUM deal (source: companies)

With now the second broadband network in France, and barely no mobile network synergies given the quasi-absence of Numericable in wireless pre-deal, it is essential to have a look at a telecom metric called 'homes passed' defined by NielsenMedia as *'households with the ability to receive a particular cable service, and which may opt to subscribe.'*[14] As mentioned in **Figure 34**, SFR had developed a fiber network of approximately 1.6 million French households. Numericable's footprint was actually severely overlapping the entire SFR fiber network, which gave rise to huge synergies in case of acquisition, because the state of Numericable's network could service those areas in which SFR had begun installing fiber. Figure 36 presents how, post-merger, the entire SFR fiber network could be progressively replaced and/or discontinued by the combined entity.

Fiber homes passed (B2C)	**2013**	**2014E**	**2015E**	**2016E**	**2017E**	**2018E**	**2019E**	**2020E**
SFR standalone	**1,600**	2,200	3,100	4,000	4,800	5,700	6,600	7,500
Numericable standalone	9,940	9,990	10,000	10,010	10,020	10,030	10,040	10,050
Total inc. overlap		**12,190**	**13,100**	**14,010**	**14,820**	**15,730**	**16,640**	**17,550**
Total exc. overlap		10,590	11,500	12,410	13,220	14,130	15,040	15,950
Estimated overlap		**1,600**	**1,600**	**1,600**	**1,600**	**1,600**	**1,600**	**1,600**
Overlap as % of target network		*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

Figure 36 - Homes passed overlap for NUM-SFR (source: companies, broker estimates)

Numericable put forward many Capex synergies for its combination with SFR, ranging from transfer of SFR customers on Numericable's fiber network to IT simplification. The network synergies still represent the bulk of the expected savings with circa 45% of total Capex synergies. **Figure 37** presents the whole Capex synergies split as determined by Numericable. It is interesting that expected synergies encompass a strategy of focus on VHS (Very High Speed) at the expense of the slower yet still prevalent DSL technology.

[14] http://www.nielsenmedia.com/glossary/terms/H/H.html

Type	Expected Capex synergies	% total Capex synergies
B2C	Transfer of 20-30% of SFR's DSL customers onto Numericable network	~20%
	Focus on Very High Speed broadband footprint	
Network	Optimisation of SFR backhaul on Numericable network	~45%
	Optimisation of Completel and SFR DSL networks	
	Optimisation of SFR fiber rollout plan	
IT	Optimisation of IT through simplification of processes and offerings	~35%

Figure 37 - Capex synergies split by type in the Numericable-SFR deal (Source: Altice company presentation)

Broker research regarding possible Capex synergies one year after the deal was announced enabled the construction of a synergies calculation model to determine whether NUM-SFR was on track regarding its forecast of over €10bn in synergies, with 35-40% in Capex. In the telecom industry, these savings as expressed in *% of the combined base* (pre-deal). Results are gathered in **Figure 38**, which ranges up to 2020 – this can serve as a terminal year regarding synergies creation. Interestingly, brokers qualified such savings as particularly aggressive, giving credit to Patrick Drahi's track record of cost-cutting.

CAPEX SAVINGS AS % OF COMBINED BASE								
Broker	**Date**	**Selected**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Deutsche Bank	06/03/2015	1	*2.0%*	*7.5%*	*12.8%*	*15.7%*	*17.6%*	*17.6%*
Natixis	06/03/2015	1	*6.0%*	*3.5%*	*9.4%*	*14.0%*	*18.7%*	*18.7%*
Societe Generale	18/02/2015	1	*2.5%*	*5.0%*	*12.6%*	*16.0%*	*16.0%*	*16.0%*
Credit Suisse	12/02/2015	1	*10.7%*	*14.2%*	*19.0%*	*19.9%*	*20.0%*	*20.0%*
Kepler Chevreux	13/01/2015	1	*5.3%*	*7.8%*	*10.2%*	*12.6%*	*15.0%*	*15.0%*
Barclays	18/05/2015	1	*6.0%*	*7.3%*	*12.9%*	*16.0%*	*18.5%*	*18.3%*
Average			***5.4%***	***7.5%***	***12.8%***	***15.7%***	***17.6%***	***17.6%***

Figure 38 - Broker estimates of Capex savings as % of combined base in the Numericable-SFR deal

Gathering some additional information regarding current Capex levels and integration costs which are forecast to burden the synergies until 2016, we obtain a sustainable Capex

synergy runrate of €350m. Detailed calculations are presented in **Figure 39**. This is in line with figures put forward by Numericable initially.

€m - Capex synergies estimates	2015E	2016E	2017E	2018E	2019E	2020E	Terminal
WACC ***8.2%***							
Terminal growth rate ***0.3%***							
Capex pre-synergies	1,939	1,916	1,946	1,973	2,007	1,980	1,987
Estimated Capex savings as % of combined base	*5.4%*	*7.5%*	*12.8%*	*15.7%*	*17.6%*	*17.6%*	*17.6%*
Capex post-synergies	1,834	1,772	1,697	1,663	1,652	1,632	1,637
Capex synergies ex. Integration costs	**105**	**145**	**249**	**310**	**354**	**349**	**350**
Integration costs	(100)	(100)	-	-	-	-	-
Capex as % of total synergies	*34%*	*34%*	*34%*	*34%*	*34%*	*34%*	*34%*
Integration costs attributed to Capex	(34)	(34)	-	-	-	-	-
Capex synergies	**71**	**111**	**249**	**310**	**354**	**349**	**350**
% terminal runrate	*20%*	*32%*	*71%*	*89%*	*101%*	*100%*	*100%*
Discount factor	*100%*	*92%*	*85%*	*79%*	*73%*	*67%*	
Discounted synergies	71	102	213	245	258	235	

Figure 39 - Capex synergies forecasts in the Numericable-SFR deal (Source: broker estimates)

Using broker assumptions regarding terminal growth and cost of capital for the merged entity, it is now possible to compare results with the initial figure of Numericable. With Capex synergies in excess of €4.1 billion, it appears that Numericable is bound to outperform company forecasts. At time of broker estimate, Capex synergies only represented over 12% of the combined entity pro forma enterprise value, as presented in **Figure 40**, which turned this deal into a highly synergetic move.

€m - Synergies NPV	
2015E-2025E synergies NPV	1,124
Terminal value of synergies	2,999
Capex synergies NPV	**4,123**
Pro forma EV broker estimate	34,404
Capex synergies as % of PF EV	*12.0%*

Figure 40 - Capex synergies NPV in the Numericable-SFR deal

Assuming no revenue synergies in the deal, it is also possible to measure the magnitude of Capex savings relative to revenues generated. Using projections exhibited above, **Figure 41** presents that the Numericable-SFR transaction enabled savings of 3.0% of total revenues.

Capex as % of rev.	
Capex pre-synergies / Revenue	17.0%
Capex post-synergies / Revenue	14.0%
Capex savings / Revenue	**3.0%**

Figure 41 - Capex savings / Revenue in the Numericable-SFR deal

But how will this decline in Capex / Revenue impact performance of the Numericable network? If Numericable represented a state-of-the-art network pre-deal, it is of course hasty to draw conclusions as of February 2016 since, less than two years after merger announcement, the transaction is still being implemented, at least as far as networks and Capex are concerned. Nonetheless, a metric is available to try and answer the question of network performance.

As defined by British Telecom, *'Throughput speed or download speed, is your actual speed transferring data over your broadband service. Throughput speed can be affected by the individual speeds of websites you visit, the number of other people currently using that website, and whether you're accessing at peak times (similar to rush hour on the roads).'*[15]

Below in **Figure 42** is gathered from Google M-Lab – Google's open internet measurement database – the median download throughput of the five major broadband players in France, comparing their levels pre-deal and at the end of 2015. For the purpose of pre-deal / post-deal comparisons, Numericable and SFR are not blended.

Median download throughput (Mbps)	**Dec-13**	**Dec-15**
Bouygues	7.2	8.9
Orange	8.3	8.5
Iliad	4.5	6.5
SFR	1.9	5.5
Average ex. Numericable	**5.5**	**7.3**
Numericable	**19.6**	**26.0**
Delta to average	*+14.1*	*+18.6*

Figure 42 - Median download throughput for broadband connections (source: Google M-Lab)

[15] http://btbusiness.custhelp.com/app/answers/detail/a_id/11652/~/what-is-the-difference-between-line-speed-and-throughput-speed%3F

Despite the current integration of both networks which could have been thought to dampen the performance, Numericable remains arguably the best fiber broadband provider in France in terms of throughput. Furthermore, it also reinforced its dominance over its competitors with a nominal growth thrice as fast in added mbps: the average Numericable performance represents three times the median throughput of other Internet Service Providers. It is worth noting that Numericable also seems to have dramatically improved the performance of SFR's service, the speed of which almost tripled in two years.

V. Conclusion

(II) First, by having a look at the current state of Capex, it appeared that:

Current network performances are ten to a hundred times below what is expected to be the norm during the 2020s, suggesting that gigantic efforts will be needed to upgrade installations with cutting edge technology. This implies significant Capex spending in the near future, for all players, with a 54% CAGR in gigabytes consumption per subscriber over the 2010-2030 period putting a strain on capacity.

Recent Capex levels have degraded cash flow generation for telcos, notably because of the increasing costs related to licensing and spectrum acquisition. Among the top industries for high levels of investments, Telecom companies present different profiles: emerging operators benefit from margin improvements which puts them largely ahead of their developed economies counterparts suffering from intense competition.

Telecom projects, on average, destroy economic and shareholder value. Undermined by Capex mismanagement such as a lack of accountability, evaluation of strategic fit, such projects tend to produce a ROI below the cost of capital, which may be one of the reasons for telcos to hand back money to shareholders, either via serving high dividend yields, share buybacks and reduced stock issuances.

(III) Then, focusing on how telcos manage to fund their Capex requirements, it emerged that:

Remaining the favored means of raising capital, debt has largely supported Capex expansion of the last decade, which, in turn, impacted strongly the leverage of operators from developed economies, where competitive pressure remains high. On the other end of the

spectrum, after significant investments in the 2000s, emerging operators now enjoy eased requirements and low leverages, which will enable them to invest aggressively in the future.

Slowly but surely gaining in popularity, asset monetization opens new possibilities for telcos by enabling them to unlock the value in their network assets, notably with the expanding business of tower sales and leasebacks. Creativity in divestment strategies and structures starts appealing to telecom executives, once unaware of possible treasures hidden by depreciated book values, low incentives to optimize asset utilization and passive in-house ownership.

(IV) Finally, addressing current trends in the telecom industry and conducting a Capex case study, it was possible to determine that:

Although they enable drastic Capex savings by enabling operators to pool their financial capabilities, Network Sharing Agreements do not empirically favor profitability improvements as most gains are transferred to customers. Largely suboptimal versus straight Mergers & Acquisitions, NSAs diminish independence, prevent actual Capex synergies realization and do not allow for network differentiation between associated operators, which reduces marketing power.

Despite being advocated by regulators as a solution to a supposedly unhealthy competition unfair towards customers, MVNOs tend to reduce the financial capabilities of MNOs to engage into network investments by cutting margins. This type of competition cannot foster network differentiation, but only reduce profitability of operators, therefore diluting their ability to commit to Capex and ultimately degrading service and limiting reduction in capacity unit price for end-consumers. MVNOs therefore seem not to serve the objectives that motivated their creation.

Picking up to reach unprecedented levels in the telecom industry, Mergers & Acquisitions appear to be the best weapon to cope with Capex requirements; in the case of SFR and Numericable, Patrick Drahi managed to implement aggressive Capex synergies representing more than 12% of the merged company's Enterprise Value, being able to obtain the same business outcomes with a Capex over Revenue down to 14% from 17%. Through a careful yet rigorous selection of cuts and network choices (focus on Very High Speed and optimization of the combined network backhaul), he even outperformed initial targets and most broker estimates: he turned the aging SFR player into part of a cutting-edge telecom company, delivering high-speed broadband with technology ready for the future of telecoms in France.

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