



THE RE-BIRTH OF THE TELECOM MONOPOLY

Is the industry broken and heading back to its monopolistic roots?

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RE-BIRTH OF THE TELECOM MONOPOLY

Is the industry broken and heading back to its monopolistic roots?

Kathleen Boyle, CFA
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Remember when speed dialing on your phone was only possible because you switched from a rotary dial phone to a push-button touch-tone phone? It was sometime in the late 1970s/early 1980s when a majority of customers in the US converted to push-button telephones and at just about the same time the first commercial cellular networks were launched in Japan and northern Europe and cable television moved from something only offered in remote communities to improve broadcast reception to PayTV services. It was also that start of the biggest change in the telecom industry model in at least 100 years.

In 1982, regulators in the US made a crucial decision to liberalize the telecom market and break up telecom monopoly AT&T based partly on new technologies with significant mass-market disruptive power (such as cable TV and wireless) but also on an awareness that the Internet was going to be the next big phenomenon which required the deployment of new communications technologies. This kicked off a global move toward telecom liberalization which fueled the TMT revolution.

Thirty-two years later, the global telecom industry looks shockingly different. Mobile phone penetration is approaching 100% globally and the Internet has become the backbone of the global economy, but the telecom industry looks to be broken. It is close to ex-growth; the pressure to invest into the next 'big thing' is growing while the likes of Skype and WhatsApp are eroding its entry barriers and pressing down its returns; and its current business model raises more questions than answers.

What happened? This report argues that liberalization, infrastructure competition and unrestricted equal access to any on-line information (net neutrality) have helped to connect the world incredibly fast. However, this policy combination has failed to produce a stable telecom business model suited for the future world, where all humans will be connected and many will rely on smart machines, robots or complex global systems not only for their work, pleasure and convenience, but also security, finances, health or even life.

Hesitation of most policymakers to acknowledge the need for fundamental overhaul of telecom policies and to outline the direction of upcoming changes has led to weak and excessively short-term focused telecom strategies, unstable business models, preservation of inefficiencies as well as a culture that is unsupportive of innovation at local level.

This report suggests the case for reviewing of the key policies on telecom competition and net neutrality is now stronger than ever. It proposes an alternative model based on pragmatic, reality-driven compromises and industry-vision. It advocates: 1) retaining infrastructure competition in areas where it is economically beneficial; 2) creation of structurally separated natural monopolies elsewhere; 3) creation of a viable wholesale market; and 4) conceptually non-neutral networks with regulation assuring basic services and avoiding potential abuse.

This new model would produce a range of TMT and diversified service companies with varied backgrounds, product offerings and geographical reach, competing with each other on a basis of innovation and differentiation. Meanwhile, telecom infrastructure would be accessible to such companies on a wholesale basis.

A Game of Monopoly

The *SECOND* chance for the communications industry?

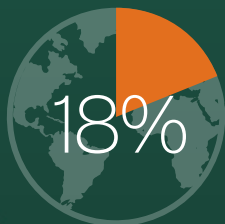
GLOBAL INTERNET PENETRATION IS LAGGING
MOBILE PENETRATION...



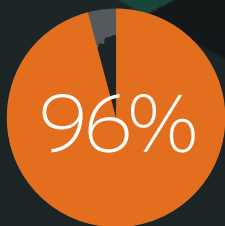
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2002



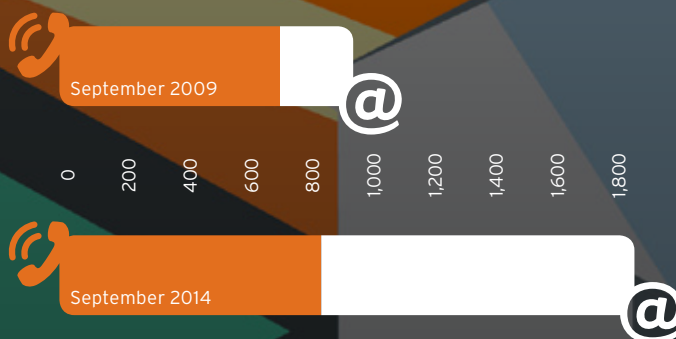
2013



Source: World Bank, www.themobileworld.com, Citi Research

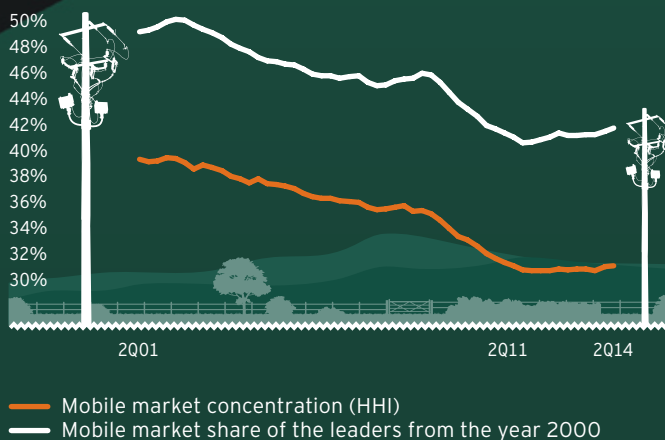
... WHILE TOP INTERNET FIRMS ARE GETTING LARGER
FASTER THAN TOP TELECOM COMPANIES

Market cap of the world's top 5 Internet and telecom
companies over past 5 years (\$bn)



Source: Bloomberg, Citi Research

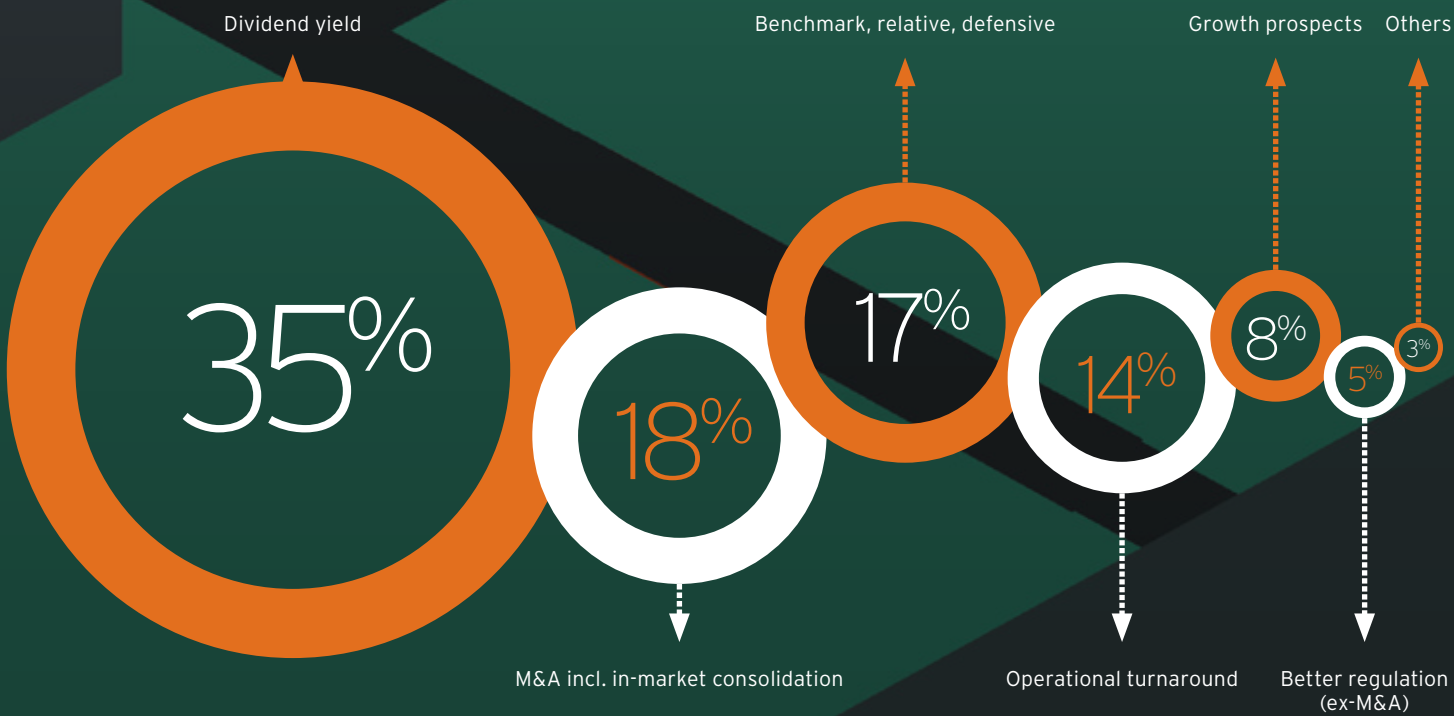
MOBILE MARKET SHARE OF THE LEADERS FROM THE
YEAR 2000 HAS DECLINED BUT IT HAS LEVELLED OFF
IN 2011 (TOP 25 COUNTRIES)



Source: www.themobileworld.com, Citi Research



THERE IS NO STRONG CONSENSUS AMONG INVESTORS ABOUT WHERE THE TELECOM INDUSTRY IS GOING
Reasons given by telecom investors as to why they invest in telecoms



Source: Citi Research

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Summary

Dalibor Vavruska

Head of CEEMEA Telecom Research

Twenty years ago telecom infrastructure was used to provide mostly basic voice and data communication services; today it is playing an essential part in the greatest innovation story of the current age while forming the backbone of the future economy. Telecoms had been run mostly as monopolies for over a century until the 1980-90s when new technologies such as cable TV, wireless, fiber and Internet Protocol (IP) became commercially viable. The notion that competitive use of these technologies could speed up the spread of wireless and Internet access, and hence bring competitive benefits to national economies, persuaded policymakers to liberalize their telecom markets. With this, telecom services gradually evolved from fixed-line voice and basic data to mobile broadband and IP television (IPTV), opening unprecedented innovation opportunities. The Telecom, Media & Technology (TMT) revolution that followed boosted global telecom revenue to \$2 trillion, created the world's most valuable company, Apple, as well as a brand new Internet industry with market capitalization of well over \$1 trillion, comparable to that of the world's top ten telecoms. Going forward we expect connectivity to play an even more prominent role in the global economy. The nature of new opportunities means that policies which worked in the past may not do so in the future. Given the current prominence of telecom and Internet, getting the policy decisions right is increasingly important not only for stakeholders of the telecom and TMT industries, but ultimately also for the global economy.

This report offers critical assessment of two of the most crucial and globally prevalent telecom policy concepts of the past three decades — infrastructure competition and net neutrality. Although these concepts have been instrumental in bringing wireless and Internet connectivity to current levels, we argue that their strong, rigid and concurrent enforcement across all parts of the telecom industry may prove counterproductive in the future. Industry leaders and the policy makers are both beginning to realize and respond to this. Recent globally spreading trends such as in-market consolidation, network sharing, tower outsourcing as well as selective discussions about or implementation of forced rural roaming (UK), potential long-term evolution (LTE) monopolies for certain frequencies (Mexico, Turkey, Poland), balanced net neutrality (US and Europe) and structural separation (Australia, New Zealand, Czech Republic) indicate the changing attitude. Mobile market competitiveness in key markets on balance ceased growing by the end of 2011. That said, cases of a conceptual overhaul of regulatory policies have so far been rare, although initiatives in the US, EU, Israel, Mexico and Australia could potentially offer interesting insights into the subject.

Stopping short of predicting future policies and business models for telecoms, we present our *SECOND* model, a practical compromise, which we believe responds to the future demands on the industry. The SElectively COmpetitive Net De-neutralized (*SECOND*) model provides: (1) infrastructure competition in cases where it brings demonstrable economic benefits and where it creates a viable wholesale market; (2) structurally separated infrastructure monopolies with regulated wholesale offers in the remaining cases; and (3) no enforcement of net neutrality as a principle, but regulation assuring basic service and avoiding potential abuses (e.g. operators attempting to monopolize the content market or discriminate against specific content providers without legitimate business reasons). This broadly means lowering of entry barriers into telecoms, which is happening anyway, combined with less intrusive regulation on infrastructure competition and net neutrality.

We expect that such a model would lead to the emergence of competing TMT and diversified service companies with varied backgrounds (some but not all originated from telecoms), product offerings and geographical reach, competing with each other on a basis of innovation and differentiation, offering communications services potentially bundled with equipment, Internet, media, social media, information, communication & technology (ICT) or even utilities and financial services. We do not expect telecoms to head back to their monopolistic roots and we found little support among industry insiders and investors for such view. However, we believe that the balance between the desire to promote competition by policymakers and optimizing scale economies for the industry will change, and this may lead to monopolization of certain parts of the telecom infrastructure.

We think that our *SECOND* model best addresses the envisaged future industry needs, as: (1) it creates dynamic TMT and service markets with more innovation at the national level than before; (2) allows the national telecoms and TMT industries to tackle new opportunities better and more creatively; (3) helps to address conceptual failings of the current policies, improving the industry's visibility and hence long-term access to capital; and (4) removes artificial entry barriers and inefficiencies from the telecom industry, but allows the industry to re-monopolize areas where doing so brings economic benefits.

We expect the current pro-competitive and pro-net neutrality policy concept, which originated in the 1980-90s, to be reformed for two main reasons:

- 1. New opportunities and challenges in TMT.** We see future telecom networks adding material new value to the economy in areas such as the Cloud, machine-to-machine (M2M), robotics and artificial intelligence applied across many industries including for example finance, health and education. This in our view creates three key new demands on telecoms: (a) guarantee and security of service (the more advanced the services become, the more important it will be for customers to buy well-functioning solutions as opposed to just bandwidth); (b) bandwidth capacity and quality upgrades in regions where competition from the existing infrastructure curtails returns; and (c) network rollout in regions with low population density or spending power. Meanwhile, the natural entry barriers, which historically protected telecoms against competition from other industries, are set to continue weakening due to phenomena such as over-the-top content (OTT), soft-SIM (recently launched concept by Apple) and regulatory moves against roaming. It is hard to argue that strong, rigid and concurrent enforcement of telecom competition and net neutrality is the best way to address these issues.
- 2. Shortcomings of the current concept.** Jean Tirole, laureate of the 2014 Nobel Prize in Economic Sciences, predicted in the late 1990s that application of an unregulated infrastructure competition-based model in telecoms might not be easy and that it might ultimately lead to oligopolies or unstable outcomes. Since then we have seen many practical examples endorsing this thesis. In this report we make two additional arguments. Firstly, we show that concurrent rigid enforcement of telecom competition and net neutrality in our view produces an unstable outcome. Secondly, we show that there is no straightforward link between competitiveness and network advancement for the major telecom markets.

Moreover, failure of most countries to transform telecom ex-monopolies into ordinary competitors, together with the absence of bankruptcies among the established telecoms, raises doubts about to what extent it has been possible to successfully implement the free market concept in telecoms. Dominance, oligopolies, artificial entry barriers and cartel-like arrangements (e.g. roaming) remain wide-spread. Finally, innovation by the global Internet/tech leaders (e.g. Apple, Google, Facebook) appears to be substantially rewarded, while the scope to innovate for the national telecoms has been relatively suppressed.

Three external expert contributors to this report, although coming from different backgrounds, all argue for some policy and industry model changes in favor of telecoms in the direction we discuss. Eden Bar Tal, the former Director General of the Communications Ministry in Israel and architect of the currently most competitive telecom market in the world, believes that regulators should review net neutrality and taxation policies and set a better balance between the interests of telecoms and OTTs. Andrew Davies, CFO of Vimpelcom and ex-CFO of Verizon Wireless, echoes the OTT point, while also arguing for balanced competitive policies without excessive spectrum and market share fragmentation, which he believes would hinder investment and innovation. Finally, Karim Nasr, CEO of hedge fund Digital World Capital, LLP with previous management experience at telecom companies owned by Naguib Sawiris, says that excessive promotion of infrastructure competition, for example through asymmetries and spectrum fragmentation, leads to 'sunk cost dilemma' and subsequent inefficient behavior of the operators.

Reform of competition and net neutrality policies may in our view take the shape of a clearly defined policy overhaul or a less formal change in priorities; what ultimately matters is a clarification of policies on the two subjects. Such clarification would allow the telecoms to find sounder long-term business models with positive implications in areas such as access to funding for long-term projects.

The industry's vested interests in our view make design and implementation of conceptual policy overhauls challenging, although successful precedents may help. It requires courage and vision for policy makers to approach the problem head on, including addressing questions such as: (1) Is telecom competition always more desirable than monopoly?; (2) Is private ownership of any monopoly telecom infrastructure always more desirable than public ownership?; (3) Is the current net neutrality based economic model for Internet access best suited for the future?; and (4) Are the national telecom operators best suited to remain the main vendors of communications services to the final customers in the future? Even debating the subject is not always straightforward, because vested interests often prevent industry insiders from challenging the current concepts outright. Talking about re-monopolization may for example expose policymakers' failures to liberalize, evoke regulatory risks for the operators as well as cause concern to some operators and Internet/content providers. Meanwhile, any outspoken denial of net neutrality while the key policies are still being formed would not only be seen as politically unpopular, but also potentially counterproductive, giving ammunition to the pro-neutrality camp.

We think that the lack of specific investor expectations about potential far-reaching changes in telecom policies and business models may create investment opportunities in the telecom industry. Although many industry insiders expect the telecom business model to fundamentally change, expert views presented in this report (three independent experts, six key Citi regional telecom teams and a survey of 60 fund managers) point to a lack of consensus about the direction and nature of the upcoming changes. Based on our survey, 52% of financial investors who hold telecoms are doing so for reasons other than expecting an industry specific investment story. They invest in telecoms for reasons such as attractive dividend yields, weight in benchmarks or lack of other investment opportunities. Only 8% invest based on growth expectations. Despite the natural risks of industry disruption during the transitional period, we believe potential policy and business model changes in the industry may open up investment opportunities in telecom stocks in the following areas:

1. Returns on new long-term infrastructure investment opportunities;
2. Benefits from weaker telecom competition;
3. Benefits from M&A including in market consolidation;
4. Benefits from further infrastructure sharing and outsourcing; and
5. Product diversification in an environment with more balanced net neutrality regulation.

The discussed changes could disrupt and materially alter the current business models of Internet firms such as Google, Netflix and Facebook, but also bring new opportunities for them, utilizing large scale and more reliable bandwidth. However, in this report we are not making predictions for the Internet industry.

Quotes for Thoughts

Liberalization & tech progress has brought great things...

There are 4 billion cell phones in use today. Many of them are in the hands of market vendors, rickshaw drivers, and others who've historically lacked access to education and opportunity. Information networks have become a great leveler, and we should use them together to help lift people out of poverty and give them a freedom from want.

Hilary Clinton, former US Secretary of State, US Senator and First Lady of US

Smart phones and social media expand our universe. We can connect with others or collect information easier and faster than ever.

Daniel Goleman, author, psychologist

By giving people the power to share, we're making the world more transparent.

Mark Zuckerberg, CEO and founder of Facebook

...but has everything gone right?

We have had the same voice service for 80 years. The voice quality you get when you make a call on the iPhone today is the same voice quality Bell Laboratories thought you should have in 1933. Shift forward 80 years, we're still using the same frequency response, 300 to 3,300Hz. (natural human voice goes up to 20,000Hz)

Daniel Berninger, founder of an all-IP startup VCXC

I had a better cellular coverage on a ship in the middle of the Mediterranean Sea than I have in many parts of the Silicon Valley.

Roger McNamee, US businessman, venture capitalist, musician

Cell phones, mobile e-mail, and all the other cool and slick gadgets can cause massive losses in our creative output and overall productivity.

Robin Sharma, author, leadership expert

Pioneers of liberalization stick to their view, but also recognize economic reality

My goal is not to criticize but to recognize that meaningful competition for high-speed wired broadband is lacking and Americans need more competitive choices for faster and better Internet connections . . . There is an inverse relationship between competition and the kind of broadband performance that consumers are increasingly demanding. This is not tolerable.

I know that achieving scale is good economics, and that there is a natural economic incentive to accrue ever increasing scale. We will continue to be skeptical of efforts to achieve that scale through the consolidation of major players.

Tom Wheeler, Federal Communication Commission Chairman

It is not the industry's fault that it leans to monopoly

We do not have a monopoly. We have market share. There is a difference.

Steve Balmer, ex-CEO of Microsoft

Our children will think going to a mobile conference is like going to a conference about electricity.

Juan Lopez-Valcarcel, Senior VP, Pearson, Barcelona 2014

Are telecoms being punished for what others are praised?

Domination and monopoly is the name of the game in the Web market place.

David Byrne, musician

In 2013, in Europe, we, the telcos, we invested EUR60 billion. We employed 1.5 million people; we pay EUR6 billion in spectrum, and we pay a lot of taxes. And our famous colleagues, the OTTs, invested in Europe EUR30 million versus EUR60 billion. They don't employ anybody; they don't pay any taxes; and they don't pay any spectrum. And the same numbers for Europe are in Latin America.

Cesar Alierta, Chairman of Telefonica Group

... and has it all been worth it?

Have I done the world good, or have I added a menace?

Gulielmo Marconi, inventor of wireless (radio) communications

I wish I was a teen in the 90s. They weren't completely consumed by technology and it seemed more fun.

unknown author*

* www.searchquotes.com

Telecom Business Model Under Siege

Usually we don't have a perfectly competitive market, so we use game theory, which describes situations with a small number of actors. And information economics, those are the tools. But then you go into the industries and try to think about the possible rules. It's not a one-line thing.

Jean Tirole, Economist, Laureate of the 2014 Nobel Prize for Economics

- We think that telecom business models were disrupted following the 1980-90s liberalization and remain unstable partially due to uncertainties about long-term competitive and net neutrality policies.
- The fact that most countries have failed to fully transform their former telecom monopolies into ordinary competitive entities is often used to justify continued heavy-handed and hard to predict regulatory interventions.
- Lack of visibility about future telecom products and about the role of the current telecom operators in the future TMT landscape makes it in our view hard for telecom operators to form sound long-term strategies.
- We think that the discussed uncertainties have additional negative implications for the telecom industry such as potentially creating incentives to preserve inefficiencies in access to capital, in exploring convergence opportunities, as well as lack of innovative culture in telecoms.
- We do not see a model that strongly, rigidly and concurrently promotes telecom competition and net neutrality as long-term stable and viable.

Distortions of the telecom business model

The 1990s tech/telecom stock market bubble provided a clear manifestation of the fact that post-liberalization telecom business models had flaws and were misunderstood by investors. It is quite extraordinary in our view that some of these flaws and misunderstandings may still be persisting today, two to three decades since the first telecom liberalizations. Industry insiders often explain this phenomenon by pointing to constant technological change. Although there is some validity in this argument, we think two major policy uncertainties are contributing to the situation in a major way.

– Uncertainties about pro-competition policies in telecom services.

Although virtually all countries in the world adopted some sort of liberalization policy in telecoms, emphasis on enforcement of competition substantially varies country by country. This indicates that no specific competitive model has yet proven successful enough to persuade a majority of the world's policymakers to adopt it. With a few exceptions such as Israel, France and Malaysia, telecom competition in the major markets has been broadly softening or at least not rising over the past two years. With the possible exceptions of Israel and Mexico, we do not see very aggressive pro-competitive agendas being applied in major markets either. It is possible to argue that efforts to bring infrastructure competition to fixed-line and mobile have succeeded only partially in the US, Europe and the rest of the world. Most households in developed countries have no more than one choice of fixed-line broadband infrastructure provider offering top speed. Many mobile

The persisting insecurity of telecom business models can, in our view, be attributed to uncertainties about competition and net neutrality

markets are effectively oligopolies and some are experiencing outright consolidation. Conceptual questions are therefore being raised about the success of pro-competitive policies. This fact is clearly boosting mid-term regulatory uncertainties.

- **Uncertainties about net neutrality policies.** Net neutrality is now highly relevant. While the net neutrality policy uncertainties last, telecom operators are constrained in their ability to reach deals with content providers, Internet companies and other parts of the TMT industry, which would for example contain quality guarantees of joined products. This also constrains the range of bundled services telecoms can offer to their final customers.

Figure 1. Two fundamental uncertainties affecting telecom business models



Source: Citi Research

Ten consequences of lasting policy uncertainties

These regulatory uncertainties have in our view significantly contributed to creation of the following challenges to the telecom service industry:

1. **Inability to find a sustainable product and business model.** As shown in Figure 84 the nature of the telecom services industry and the way the consumption of telecom services is measured has been changing dramatically, from minutes of fixed-line voice, through fixed-line broadband access and mobile bundles potentially to multi-media and Internet-of-things experience in the future. The current model where customers buy bundles of minutes and Gigabytes of data with certain speeds may not best reflect the customers' underlying needs for flawless functioning of particular products. High competition or threat of it forces telecoms to differentiate, but strict net neutrality enforcement may constrain their opportunity to do so. This is making it hard for telecoms to think long term, giving them basically two choices. Either, they can aim at preserving the current business models and revenue streams for as long as they can while maximizing their short-term returns, or they can try to take a view about future policy trends. Shortening product and investment cycles in the industry could be seen as evidence of the operators' caution about the latter option, which is obviously risky. The current business models are also making it hard for telecoms to approach investments rationally as explained in Karim Nasr's article *The great sunk cost dilemma in competitive telecom markets* later in this report.

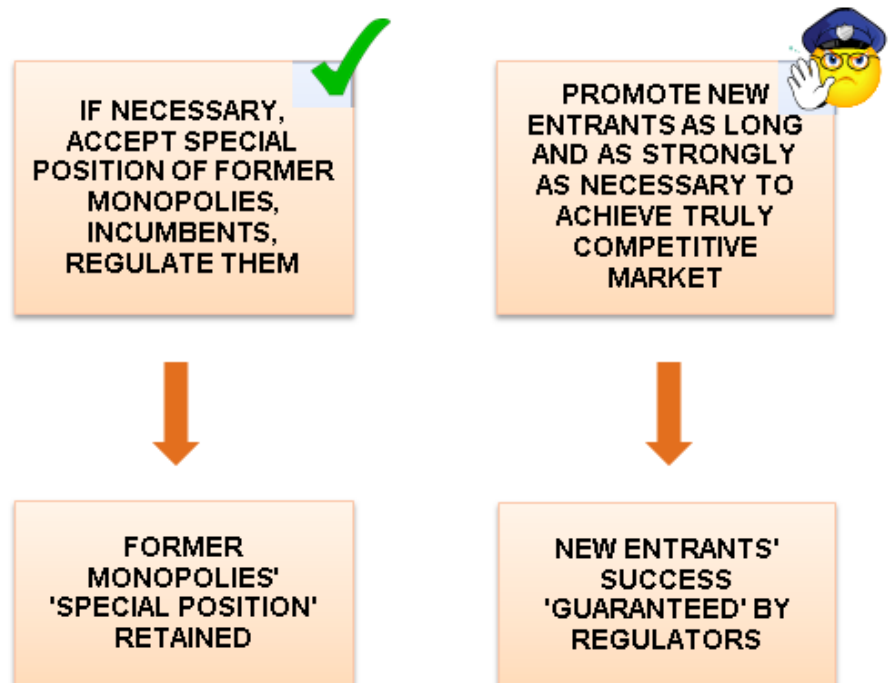
Figure 2. Strategic response of telecoms to the competitive and net neutrality uncertainty



Source: Citi Research

2. **Failure to transform former telecom monopolies into ordinary competitive entities and to create a market with sustainable competitive structure.** Most incumbent ex-monopolies have been reforming fairly slowly and in most regions they keep significant and in many cases dominant market share on local telecom markets. Regulators can either accept this situation or they can try to disrupt the incumbents, although efforts to do so often create 'protected' challengers. Free competition that genuinely rewards success and pushes inefficient competitors out of the market has been very rare, which is highlighted by the apparent absence of bankruptcies of major telecoms.

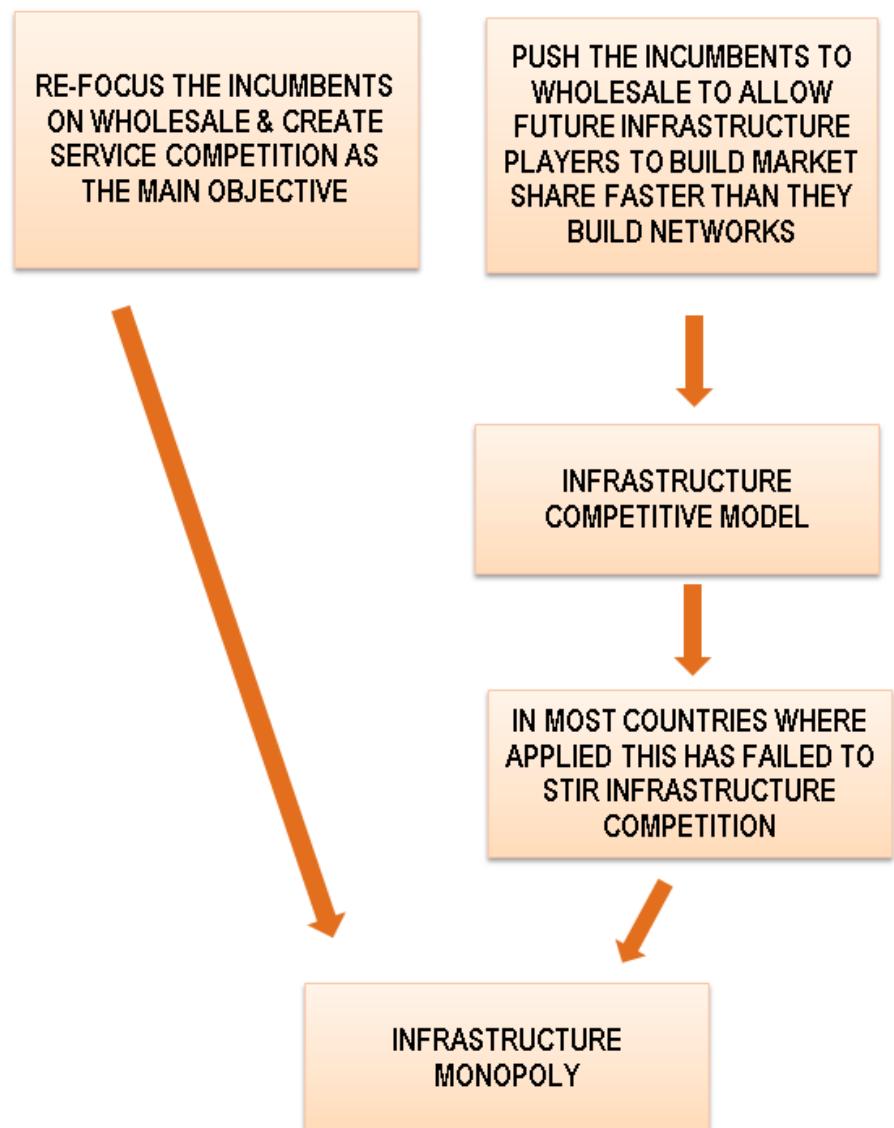
Figure 3. Two regulatory responses to the issue of former monopoly incumbents



Source: Citi Research

3. **Incentives of the major telecoms to preserve inefficiencies.** As discussed in the first point, many incumbents respond to policy uncertainties by focusing on short-term returns and trying to preserve legacy business models based on legacy infrastructure for as long as possible. This may involve efforts to protect voice and SMS (text) revenue, slow down a move toward 'all-IP' platforms, pressure to delay the rollout of new technologies (e.g. LTE) on a basis that they are not 'mature enough for particular markets' as well as network efficiency optimization at the expense of quality. Such short-term strategies also include maximum exploitation of non-competitive market niches such as roaming, and premium pricing of certain calls, which may not be sustainable in long-term. Potential inefficiencies resulting from regulatory uncertainties are however, not limited to the incumbents. Vested interests of the former monopolies and 'protected newcomers' are often strong enough to influence policies. This is also relevant for regulated cost calculations. Information asymmetry between the telecom operators and the regulators may for example give the former an incentive to present certain costs in an inflated or deflated manner.
4. **Lack of opportunity for telecoms to differentiate.** Telecoms are often criticized for their lack of differentiation; however their situation is not easy. Under their current business model, telecoms have far less opportunity for service quality differentiation compared to for example consumer goods companies. Low quality in telecoms essentially means unavailable or disrupted service, which is highly undesirable across all customer segments. Although the high-end naturally demands well-functioning networks with maximum coverage and minimum call drop rates, it has not proven to be particularly willing to pay for technologically-driven vastly superior voice quality. Meanwhile, if an operator succeeds in building clear network leadership, scale economies are likely to allow it to dominate profits in a particular market, which ultimately damages fee competition. The latest industry trends including Apple's recent launch of soft-SIM, point to risk of further commoditization of the telecom service.
5. **Unclear concept of the wholesale telecom market.** One of the concepts behind telecom liberalization is to establish a wholesale market for telecom capacity, allowing non-infrastructure owning new entrants (so called service or virtual operators) to offer telecom services. This concept, popular in Europe, is however not universally widespread around the world. Its ultimate purpose under a net neutral environment has not been straightforward either. Figure 4 shows that its implementation in fixed-line is justified either by a desire to create service competition without infrastructure competition or by stimulating service competition in order to encourage infrastructure competition in a later stage. The latter model has failed in most countries. We think that the wholesale model becomes conceptually stronger in a non-net neutral environment, when service operators gain more opportunities to differentiate.

Figure 4. Two reasons for forcing fixed-line former monopolies to provide wholesale offers

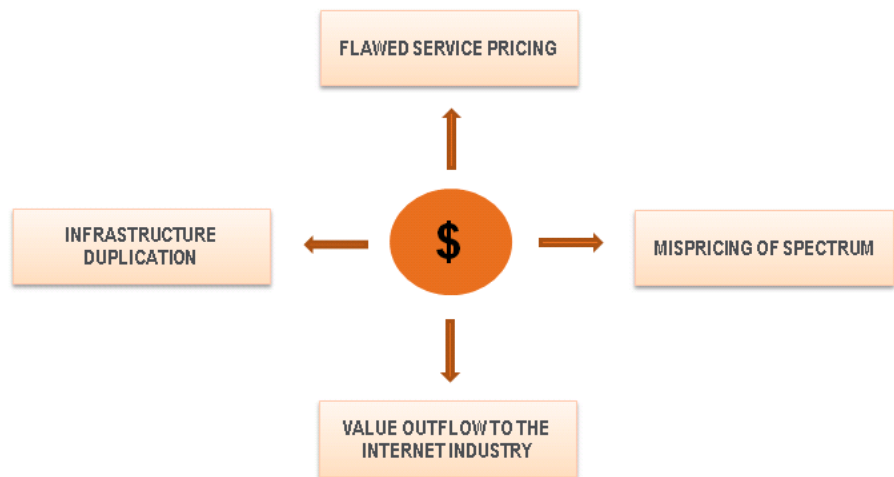


Source: Citi Research

6. **Uncertainties about telecom convergence products.** Fixed-line and mobile have been in most countries historically regulated as two separate markets. This is due to the fact that fixed-line was originally seen as a former monopoly that needed to be regulated while mobile was seen as a progressive market-driven industry. The bundling of mobile and fixed-line services was commercially unattractive because of fixed-line regulation, but also because of the commercial benefits of selling mobile as a standalone new product for both the incumbents and the newcomers. Maturing mobile markets together with growing mobile data demand, which makes wireless bandwidth scarce, are now however bringing fixed-line mobile convergence back into play. There is a similar trend in telecom media convergence, although this is constrained by net neutrality. Similarly to wholesale telecom services, there is no universally recognized concept for telecom convergence.

7. **Lack of progressive and innovative culture in telecoms.** The post liberalization telecoms in the late 1990s were usually full of vision, creativity and expansionary ambitions. Technology and strategy was the key focus at that time; some operators even had their own proprietary R&D. Following the stock market bubble disappointments after the year 2000, the culture in telecoms mostly shifted to that of consumer companies with a focus on marketing and sales. Selling existing products became a priority over inventing new ones. In recent years many large telecoms have been focused on efficiency, leading to deals with competitors or independent outsourcing companies (e.g. network sharing, tower outsourcing). Investors largely demand short-term returns and dividends from the telecoms, which has naturally impacted the way the companies are run, including their focus on short-term savings, short-term market share gains and deals with immediate impact. Not all telecoms are like this, of course, but given the above-mentioned regulatory uncertainties, those with long-term strategies are taking considerable risks.
8. **Frequent ad-hoc regulatory intervention.** Given the mixed success of some of the past regulatory concepts and the lack of conceptual responses by the policymakers so far, regulators often find it necessary to intervene with the telecom markets on an ad-hoc basis. Such interventions include for example assisting disruptive newcomers, regulating prices in markets deemed as inefficient or allowing in-market consolidation in order to prop up the financial health of the operators. Telecom is not the only long-term infrastructure investments driven industry, where liberalization caused detrimental policy uncertainties in the past 15 years. As Citi's European Utilities analyst Sofia Savvantidou argued in her report [Pan-European Utilities](#) from June 2013, the European utilities industry has also suffered from fluctuating, unpredictable and often politically biased regulatory environment.
9. **Struggle to contain falling ROIC amid falling entry barriers into telecom industry.** Figure 5 shows some sources of recent value leakage from telecoms, which are driving down industry return on invested capital (ROIC) (also see Figure 19). These include excessive infrastructure competition, flawed competitive behavior, flawed pricing of spectrum and, quite importantly, value leakage to the Internet industry. Citi's North American Telecom analyst Michael Rollins noted in his [Time for VoLTE to Speak Up](#) report from September 2014 that voice is a high-margin business, which still represents over 50% of operators' revenues around the globe. According to Ovum estimates OTT messaging and VoIP cost the global telecom industry nearly \$70 billion (or 6% of revenue) in 2013. Meanwhile, in his article *The end of telecom industry monopoly* later in this report, Andrew Davies quotes an Ovum estimate that the telecom industry will lose \$386 billion voice revenue due to OTT applications between 2012 and 2018. There have surely been cases of incumbents overreacting to competitive threats and newcomers using unrealistic targets to drive their strategies. We think, however, that the current policies and policy uncertainties have contributed to the pressures on telecom ROIC in a major way.

Figure 5. Selected causes of value losses in post-liberalization telecoms



Source: Citi Research

10. **Uncertainties about the telecom investment story.** In the late 1990s telecoms was an ideal industry for growth-seeking investors. Growth was driven mainly mobile telephony which demonstrably added value to the overall economy, particularly in emerging markets. After losing their growth appeal over the past ten years and the subsequent de-rating, telecoms became dividend yield stories, appealing to investors with their ability to achieve relatively high cash returns. The market response to the ultra-low interest rate environment in the past years has however suppressed the dividend yields, which themselves prove not to be always safe, especially when telecom competition is actively promoted. The future new investment story could in our view likely to be linked to clarifications in policies.

Why full scale competition and net neutrality are hard to co-exist

Competitive model cannot work without successful differentiation, but this may be difficult to achieve in a net neutral environment

As discussed above, the essence of the current problems with telecom business models is linked to policy uncertainties about competition and net neutrality. Both such policies are currently theoretically endorsed in most countries, but our analysis below and in Figure 6 shows that policies excessively focused on full-scale competition and net neutrality may find it hard to easily co-exist over the long-term. The core of our thesis is that the competitive model in telecom services is at risk of failing unless the competitors can successfully differentiate themselves in the long-term, but this may be difficult to achieve in a net neutral environment. We look at the following three scenarios:

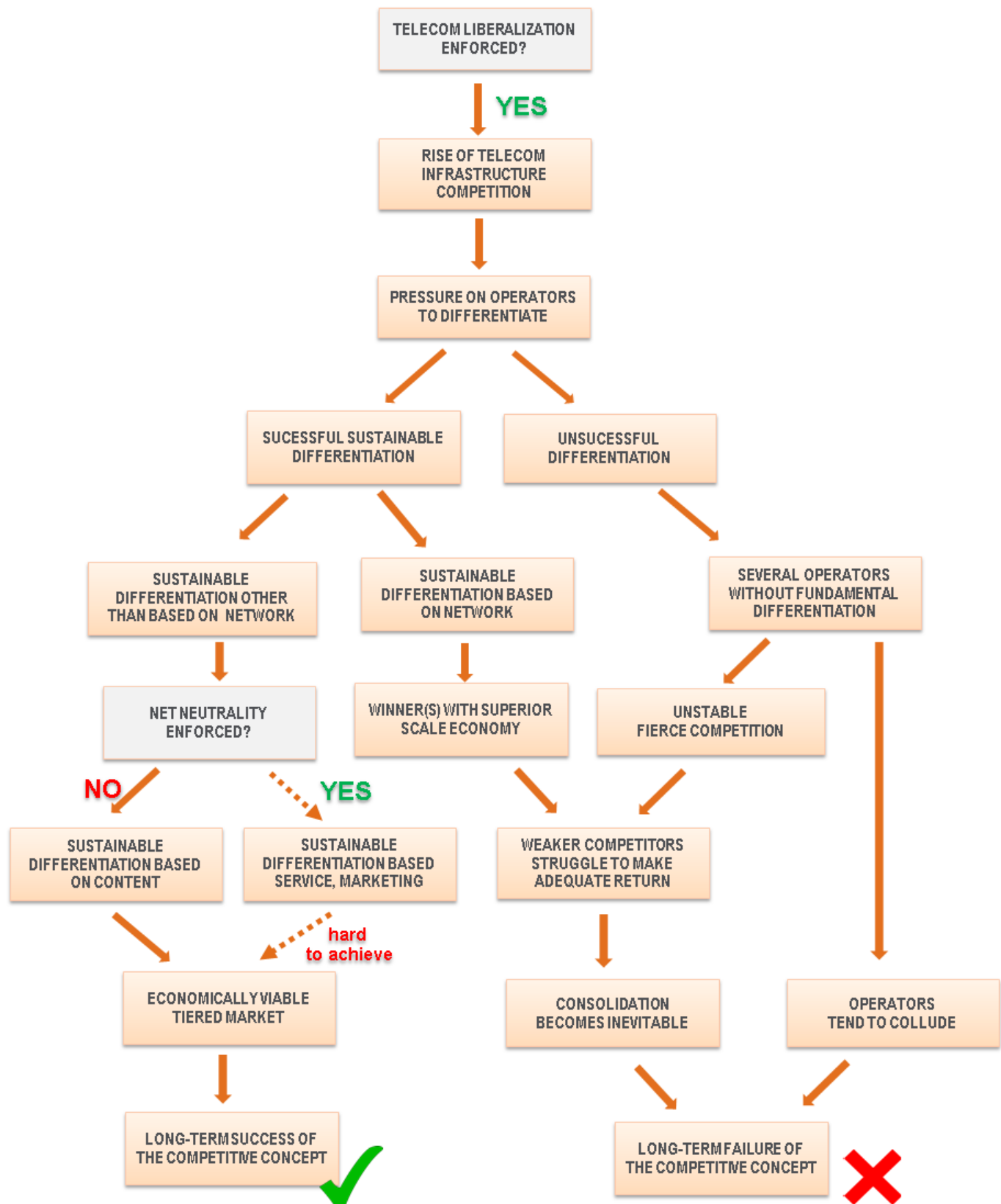
1. **Differentiation in network quality.** In this case, one operator or a group of colluding operators build a superior network infrastructure. Scale economies would encourage such operator(s) to pursue a market share expansive strategy while pricing at a premium but low enough not to harm market share expansion. If this is successful, the resulting market share advantage together with scale economies would allow such operator(s) to practically dominate profits in the industry. This outcome would eventually complicate access to funding by smaller operators and lead to consolidation and potentially failure of the competitive model. In other words, an operator with lasting substantial network advantage is actually a monopolist in certain areas of product parameter categories.

2. **Differentiation in service without differentiated network quality.**

Operators can differentiate by focusing on certain customer segments (high end, urban, etc.) and aiming to provide superior service to these segments (e.g. better tariff structures, call centers, customer care, equipment etc.). That said, the core of the telecom service is clearly in the network and non-network differentiation which, if successful, can be in our view relatively easily replicated. Differentiation strategies that may work are those, which bundle telecom services with potentially exclusive content rights, but this is in conflict with the concept of net neutrality. In other words in a net neutral environment we think that it may be difficult for operators with comparable networks to achieve sustainable differentiation.

3. **No differentiation.** When operators fail to differentiate, they either tend to collude or enter price/capex driven competition. Collusion means a failure of competition. In the latter case, operators become very responsive to their rivals' price and capex moves and tend to prevent the rivals from building any advantage. This is however likely to lead to a spiral of price cuts and potentially also capex spending, as described in Karim Nasr's article *The great sunk cost dilemma in competitive telecom markets* in this report. The weakest players are eventually forced to consolidate, which in essence also means failure of the competitive concept.

Figure 6. Competitive scenarios for the telecom industry



Source: Citi Research

Telecoms in an Investment Context

Know what you own, and know why you own it.

Peter Lynch, US businessman and stock investor

- Incumbent ex-monopolies' cash flows have so far been a crucial source of funding for telecom infrastructure investments, along with financial markets and private investors driven by specific industry stories.
- We see disparity between our long-term vision for the telecom industry's prospects and the way this is viewed by investors; based on our survey we estimate that 52% of financial investors who hold telecom stocks, do not see any 'industry story' in telecoms at all and only 8% see a growth story.
- We think that the foreseen regulatory and business model changes could unlock new investment opportunities in telecoms with a material positive impact on the real economy in new areas such as M2M, the Cloud, robotics etc.
- Assuming a successful strategic response and execution by the telecom industry, such opportunities could add value to telecom operators in the following areas: returns on new investments, weaker competition, M&A including in-market consolidation, infrastructure sharing and outsourcing and product diversification in an environment with more balanced net neutrality regulation.
- We see particularly good grounds for the above-mentioned stories in markets, which await positive regulatory developments (possibly Europe), advanced but not too highly competitive markets (e.g. developed Asia countries) and markets with high spectrum/spectrum ownership fragmentation and hence consolidation potential (e.g. India, Brazil, Poland or Russia).

Key investors into telecom infrastructure so far

A material part of today's telecom industry (and hence infrastructure investors) originated from highly cash-generative incumbent ex-monopolies, which have been able to fund their investments from internal free cash flows and debt. These ex-monopolies such as AT&T, NTT DoCoMo, Telefónica, Deutsche Telekom, Orange, China Telecom, etc., are usually stock-market listed entities, some of them still government owned and most of them owning leading mobile subsidiaries in their markets. The aggregate mobile market share of incumbent operators from our sample 25 countries is 42% (see Figure 23). Competition in individual markets often emerged as a result of these ex-monopolies entering each other's markets (e.g. Telefonica's investment in Latin America, Etisalat's entry to Egypt or Deutsche Telekom's entry to Poland). Cross-ownership between these ex-monopolies occurred for example in Eastern Europe (e.g. Orange controlling Orange Polska), but we would not call it a global phenomenon.

Stock market listed cash-generative incumbent ex-monopolies continue playing crucial role as telecom infrastructure investors

So far we have seen five main reasons for private investors entering telecoms

Despite the continued strong role of the incumbents, post liberalization telecoms have attracted significant external private investors mainly on the back of the following investment stories:

1. **Building new infrastructure in emerging markets, where incumbents were weak and underinvested.** Emerging markets with underdeveloped infrastructure attracted private investors, often with links to local markets, who saw attractive returns in building greenfield (mainly mobile) infrastructure. These include: Carlos Slim (América Móvil, Mexico), Sunil Mittal (Bharti, India), Anil and Mukesh Ambani (Reliance, India), Naguib Sawiris (Orascom Telecom, Egypt), Vladimir Yevtushenkov (Sistema Group, Russia), Mikhail Fridman (Alfa Group, Russia), Mehmet Karamehmet (Çukurova Group, Turkey) etc.
2. **Challenging the incumbents by building operationally more efficient new entrants.** This investment strategy is based on a notion that operators built from a scratch can be fundamentally more efficient than the incumbents, by using technologies more efficiently without being burdened with legacy technologies and systems. This strategy also largely relies on pro-competitive regulation compensating for the initial scale disadvantage compared to the incumbents. There is a range of examples, which include private equity sponsored new entrants, cable TV operators etc. The leading investors in this category are Masayoshi Son (Softbank, Japan) and Li Ka-shing (Hutchison Group, Hong Kong).
3. **Shared interests with the governments.** Examples of this can be found in countries, where private and public spheres are not sufficiently divided, such as those in the Middle East or Central Asia. That said, international expansion driven by private telecom investors in other countries may in some stages be seen as coinciding with the political interests of their home governments.
4. **Targeting the upcoming regulatory and structural changes in the industry.** In the past years we have seen telecom M&A activity by existing private investors (e.g. Masayoshi Son's Softbank expansion into the US and Carlos Slim's América Móvil expansion in Europe) as well as the acquisition of incumbent telecoms by new private investors such as Zygmunt Solorz-Zak (Cyfrowy Polsat, Poland) and Petr Kellner (PPF Group, Czech Republic). We think that these investments may be partially driven by the current industry opportunities discussed in this report.
5. **Non-telecom TMT companies entering telecoms.** In the past cable TV operators belonged to this category, although they may now be seen as telecoms. A more recent example is Google, which is selectively investing into fiber infrastructure, including local access.

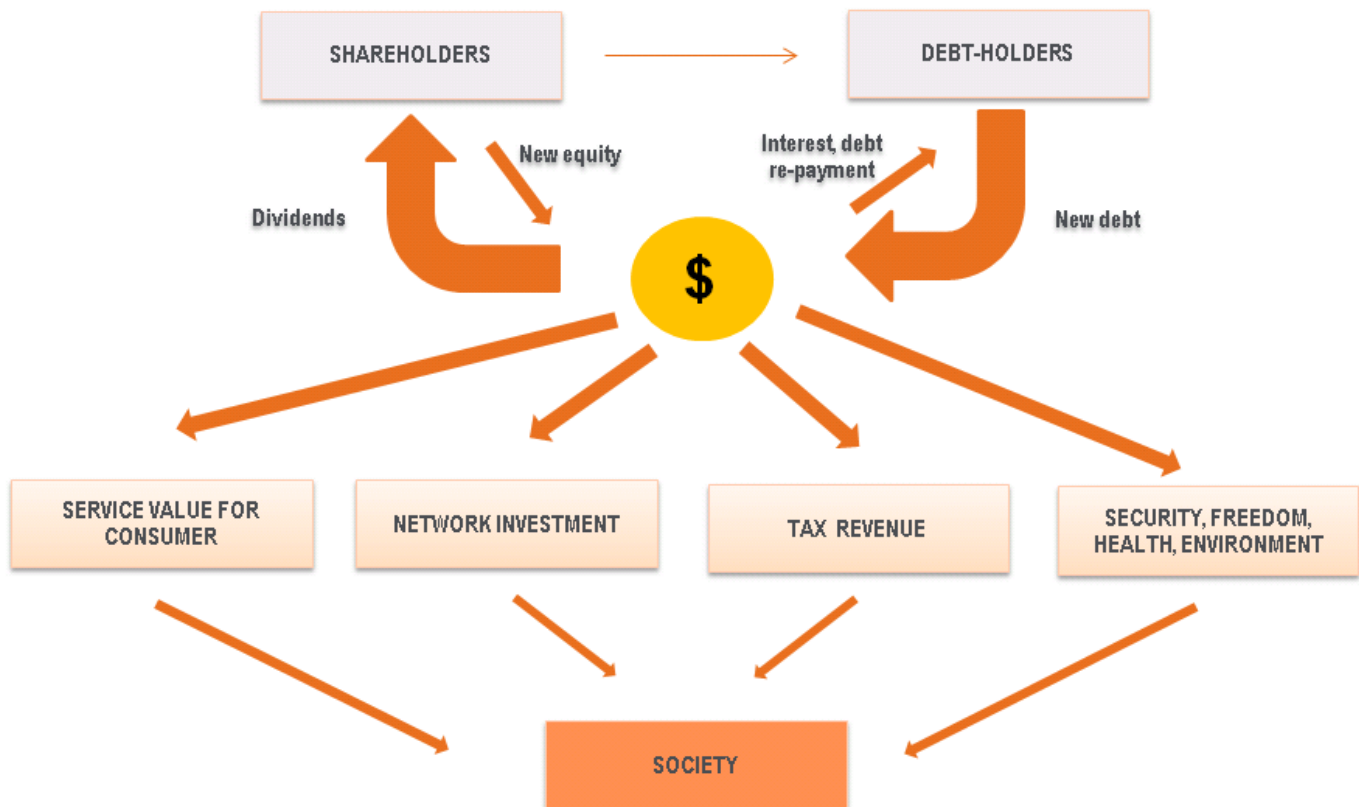
There have been examples of other industries, in particular utilities, trying to utilize synergy benefits by investing in telecoms as well, although this has not yet lead to major breakthroughs in the telecom industry. That said it is interesting to note that Vodafone, a leading telecom operator globally, originated from an electronics company, which expanded into mobile telecoms in the UK.

Industry investment priorities vs. investors' perceptions

Long-term network investment priorities are gaining relevance

Infrastructure investment is a key priority for most policymakers in telecoms. This is often contrasted with value for the customer (service pricing), although we now see a tendency to move to the former. Other priorities such as tax revenue extraction; security; freedom of information access; health protection; and environmental protection (see Figure 7) are relevant, but on balance still less important globally. Since broadband networks (both fixed-line and mobile) have been largely already rolled out in the main metropolitan areas, the industry's infrastructure investment priorities are moving in two directions, both of which have a longer-term nature of returns: (1) network upgrades in developed regions, where competition from the existing infrastructure may curtail returns; and (2) regions with low disposable income or low population density. Both of these require long-term capital investments with as predictable a regulatory framework as possible. We discuss this further later in the report.

Figure 7. Capital allocation in the telecom industry



Source: Citi Research

Some 52% of financial investors we surveyed hold telecoms for reasons other than believing into an industry story

Let's contrast the above-discussed long-term priorities with the current investor perception of the telecom industry. Due to wide-spread stock market listings of the major telecoms, perceptions of financial investors are in our view highly important. Figure 8 shows the result of our survey of 60 financial investors across the globe who hold telecom investments. A majority of those (52%) said that they are invested in telecoms due to the industry's attractive dividend yield, defensiveness, weighting in the benchmarks or lack of other investment alternatives, i.e. reasons unrelated to potential industry investment stories.

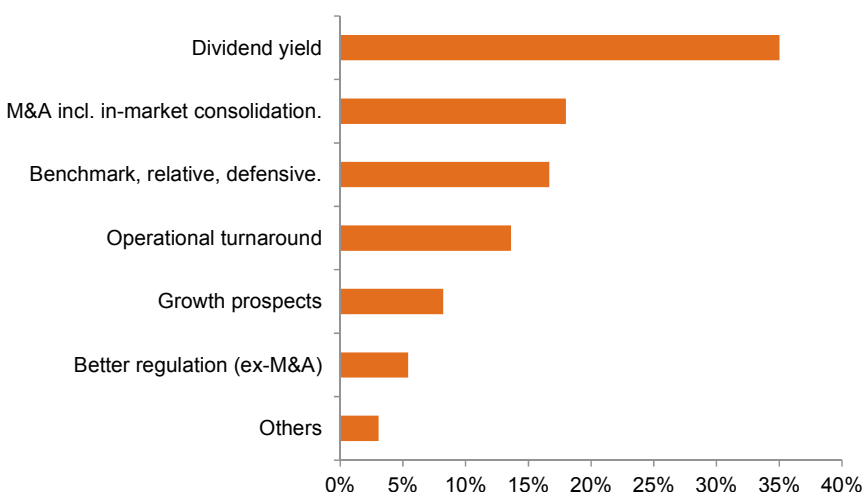
23% believe in in-market consolidation, M&A or improved regulation

There is no firm market consensus about the future strategic direction of telecoms

The remaining 48% see stories emerging in the telecom industry. The most popular stories are based on regulatory improvements, M&A and in-market consolidation (23% of our respondents hold telecom mainly for that reason); operational turnaround (14%); and growth (8%). Only 8% of telecom investors invest in the sector due to growth expectations.

The above results show that there is currently no firm consensus among financial investors about the future direction of telecoms. Assuming that investors, who currently do not hold telecoms, do not see a positive story in them, we can say that a decisive majority of all investors currently do not see positive industry-specific story in telecoms. That said most of investors, who see positive investment stories in telecoms, expect M&A (mainly in-market consolidation) and regulatory improvements, which is highly related to the main theme of this report.

Figure 8. Financial investors view about why do they invest into telecoms



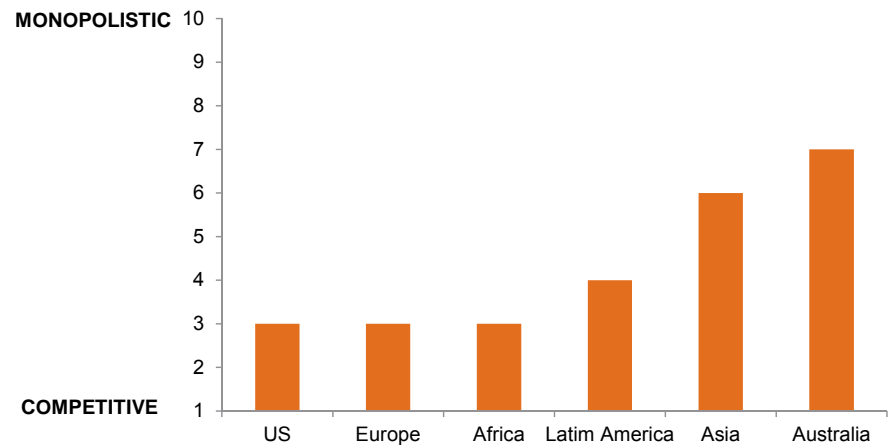
Note: This survey was conducted in the week of 29/9/14. We approached financial investors, who are Citi clients, across the world. The single question of the survey was why do investors hold telecom service operators' shares? Only investors, who are currently invested in telecom service operators were eligible to answer. Multiple choice was given. When presenting the results we merged 'in-market consolidation M&A' with 'other M&A' to make sure that the results are not affected by potential misunderstanding of the question. Each respondent could choose either one answer or they could choose multiple answers with or without weighting. If no weighting was provided we assumed equal weighting of the answers given. The presented result is based in 60 individual investor responses globally including investors from US, Europe, APAC, Latin America, South Africa etc. Each response has an equal weight irrespective of how many answers they selected, their assets under management etc.

Source: Citi Research

Differences in views of Citi regional telecom teams on the subject of competitiveness mirror the lack of consensus

Figure 9 and the detailed regional comments later in the report show the views of the Citi's regional telecom teams (for the US, Europe, Asia, Latin America, Africa and Australia) on the subject of competitiveness in telecom markets. Although some form of consolidation is discussed across most geographies, Citi's regional telecom teams do not share a single consensus view about where this process is ultimately heading in terms of long-term competitiveness of the industry. This is partially explained by different industry dynamics across different regions, but we also see this as yet another endorsement of our thesis about the lack of broader market consensus on the subject.

Figure 9. View of regional Citi research teams about whether the telecom industry is likely to move close to monopolistic or highly competitive model in long-term



Source: Citi Research

A new investment story for telecoms

Lack of clear investment story impacted the industry's ability to expand networks, which are crucial in the future economies

The best stories are based on telecom rollouts bringing significant benefits to overall economies

New telecom investment stories based on regulatory overhaul appear possible

Given the lack of consensus about the telecom industry outlook combined with the lack of clarity and predictability of regulatory policies, we believe that the telecom industry currently does not enjoy optimal access to capital. This is impacting its ability to invest and build infrastructure. The emergence of a new industry investment story may open up the industry to a wider range of investors and help address this problem.

The most powerful (and hence often value-accretive) investment stories in telecoms are those, where building telecom infrastructure leads to significant direct benefits to broader economies. This usually follows some regulatory or technological change, which opens up such investment opportunities. One example is the rollout of mobile infrastructure in emerging markets following the creation of competitive mobile markets.

Under the current policies it is in our view hard to see such strong investment stories in telecoms, apart from perhaps mobile data in emerging markets with underdeveloped Internet infrastructure. One of the challenges is that most demand for significant bandwidth has so far been coming from consumer use (e.g. consumer video such as YouTube, Netflix etc.), which does not generate significant economic value. This can in our view change when new concepts such as the Cloud, M2M, robotics and artificial intelligence become more prevalent. The creation of new business opportunities for telecoms based on these new uses may however require regulatory overhaul, the potential basis of which we outline in this report. Despite the natural risks for the industry associated with such a transition (including strategic response and execution risks), this may in our view bring new investment stories in the following areas:

1. Returns on new long-term infrastructure investment opportunities (this may lead to higher percentage than the current 8% of investors seeing telecoms as growth stories, which would in turn give management of the operators more incentive to invest);
2. Benefits from weaker telecom competition;

3. Benefits from M&A including in-market consolidation (especially in countries with fragmented mobile market share and spectrum ownership such as India, Brazil, Poland or Russia);
4. Benefits from infrastructure sharing and outsourcing (also note the above countries with fragmented mobile market share and spectrum ownership); and
5. Benefits from product diversification in an environment with more balanced net neutrality regulation.

We already see investment decisions driven by expectation of regulatory and industry overhaul

We believe that a growing number of investments are already driven by such stories. This is reflected in our survey, where 23% of our financial investors hold telecoms due to regulatory improvements, M&A and in-market consolidation. We also think that decisions of private investors, who have recently been involved in telecoms may have been driven by such envisaged changes. Finally, we have also already seen new, specialized investors getting involved in the industry based on new opportunities (i.e., the tower companies).

Current Trends in the Telecom Industry

So far, we have ensured that consumers benefit from the liberalisation of telecoms markets. From now on our actions must be more geared more toward allowing companies to make fair profits.

Guenther Oettinger, European Commissioner for Digital Economy

- With low-single digit US dollar-denominated revenue growth in both fixed-line and mobile, the global telecom industry is close to ex-growth under the current business model; the mobile industry lost its double digit growth in 2012.
- Despite a major rebalancing in telecoms from capital expenditures (capex) towards payouts over the past decade, global telecom capex is now rising again while revenue growth is declining, which is putting further pressure on already low returns; we think this adverse industry dynamics is unsustainable.
- Based on our analysis of our 25 selected leading countries, we observe that mobile market concentration already ceased falling and mobile market share of ex telecom monopoly incumbents bottomed at 41%, both by the end of 2011.
- Not all countries are equally focused on using spectrum fragmentation to enforce mobile competition; hence the level of spectrum concentration varies substantially country by country.
- Mobile network sharing activity has been picking up in the past three years.
- Although there are situations when competition demonstrably drives network advancement, this does not hold as a universal principle; data from our 24 selected countries do not show such strong link.

Financial trends for telecoms globally

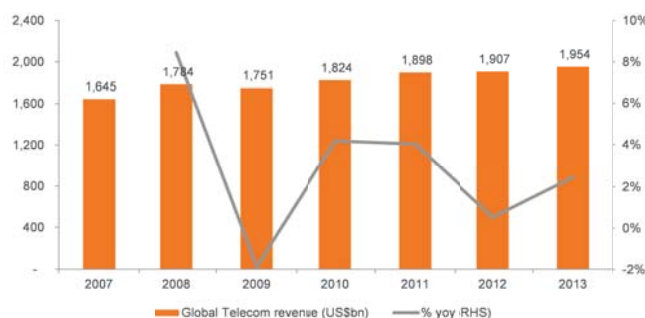
We look at aggregate global data and data for 25 selected leading countries

In this chapter we will summarize and quantify some key trends observable in telecoms globally. Where available (e.g. revenue, capex, etc.) we present global aggregate data. In other cases (e.g. profitability, ROIC) we used our models for the leading 25 countries. These include the world's top 20 countries by GDP as well as 5 countries added due to relevance of their stock market-listed telecom operators. When calculating aggregate numbers we used weighting by subscriber numbers. The top 20 countries by GDP include: the US, China, Japan, Germany, France, UK, Brazil, Russia, Italy, India, Canada, Australia, Spain, Mexico, Korea, Indonesia, Turkey, Netherlands, Saudi Arabia and Switzerland. The 5 countries we added include: Poland, Thailand, South Africa, Malaysia and Israel.

Global wireless industry lost its growth momentum in 2012

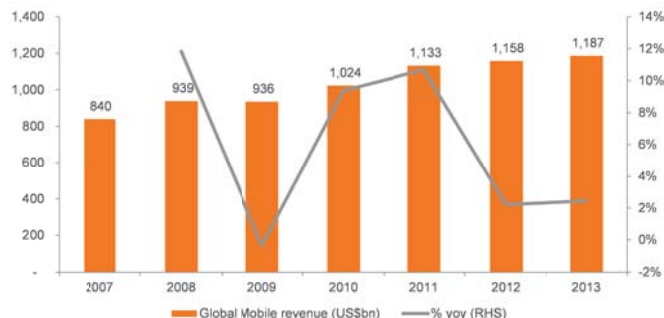
As shown in Figure 10 and Figure 11, global telecom revenue was almost \$2 trillion in 2013. Until 2011 global wireless revenue showed double digit growth (except for the global financial crisis year 2011). The share of wireless in total global telecom revenue grew until 2011, when it then stabilized at over 60%. Since then total global telecom revenue has been showing low single-digit growth.

Figure 10. Global telecom service revenue history



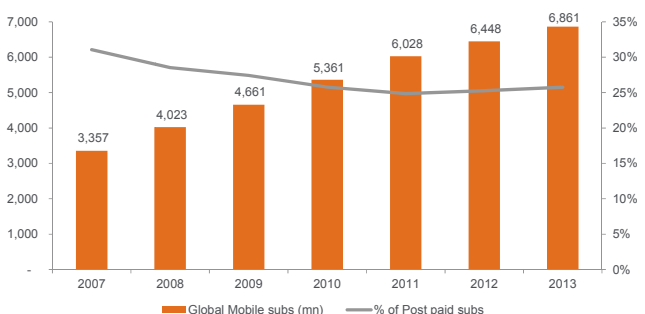
Source: www.themobileworld.com, Citi Research

Figure 11. Global mobile telecom service revenue history



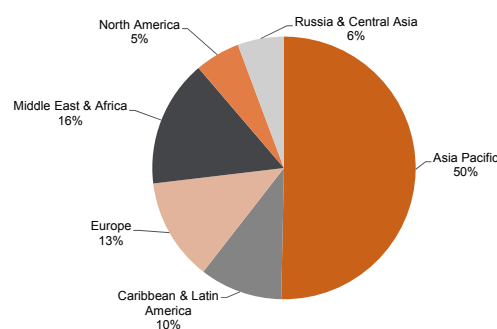
Source: www.themobileworld.com, Citi Research

Figure 12. Global mobile subscribers history



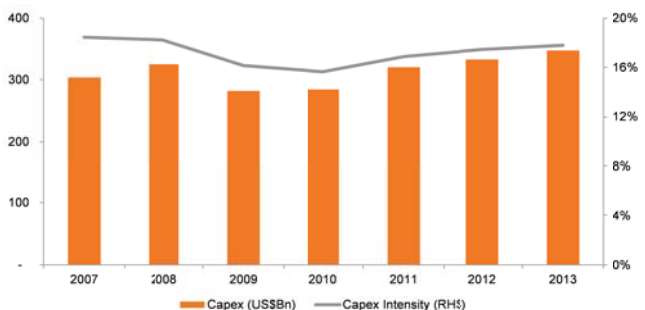
Source: www.themobileworld.com, Citi Research

Figure 13. Global mobile subscribers regional breakdown



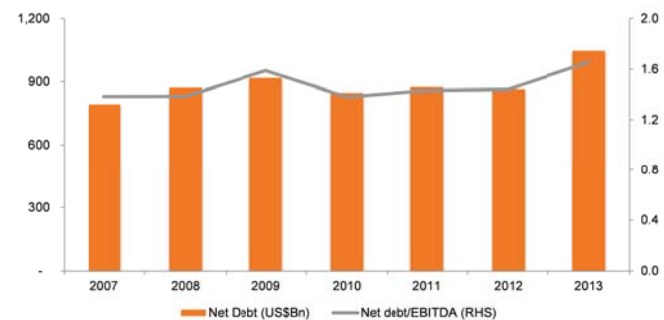
Source: www.themobileworld.com, Citi Research

Figure 14. Global telecom capex and capex intensity



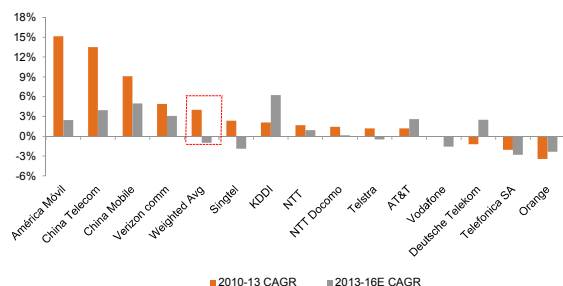
Source: www.themobileworld.com, Citi Research

Figure 15. Global telecom net debt and leverage



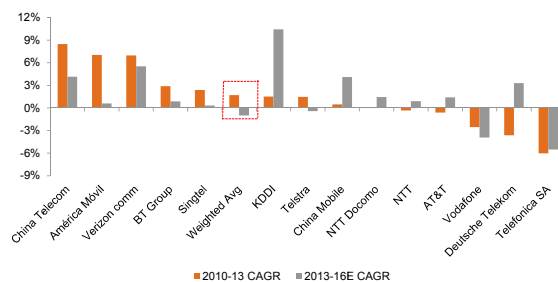
Source: www.themobileworld.com, Citi Research

Figure 16. Top 15 telecoms – Revenue growth



Source: Company Data, Citi Research

Figure 17. Top 15 Telecoms – EBITDA growth

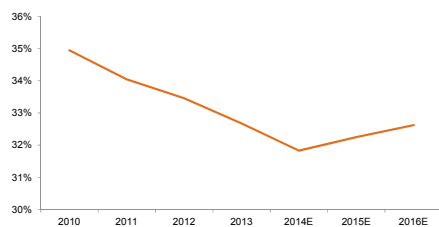


Source: Company Data, Citi Research

Revenue slowdown combined with higher investment has affected profitability and ROIC, this trend is not sustainable

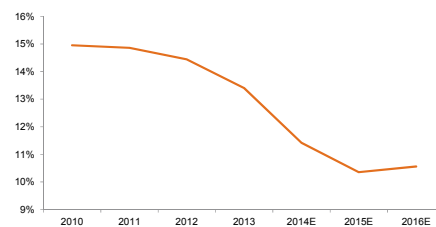
Figure 10, Figure 14, Figure 15 and Figure 20 show that despite recently low growth rates and substantial rebalancing from investments toward payouts relative to other industries, global telecoms increased their investments in 2011-13, largely funded by debt. Based on our models for the world's leading 15 telecom operators by market capitalization we observe that the 2012-13 revenue slowdown has negatively impacted profitability and ROIC. Figure 21 from Citi Global Strategist Robert Buckland's report [Global Equity Strategist – Capex versus Payouts](#) from March 2014 shows that telecoms have relatively low return on equity (ROE), but rising capex compared to other industries. We think that this adverse dynamics is not sustainable. We expect aggregate EBITDA margin for these operators to bottom in 2014 and return on invested capital (ROIC) to bottom in 2015.

Figure 18. World's leading Top 15 telecoms – aggregate EBITDA margin*



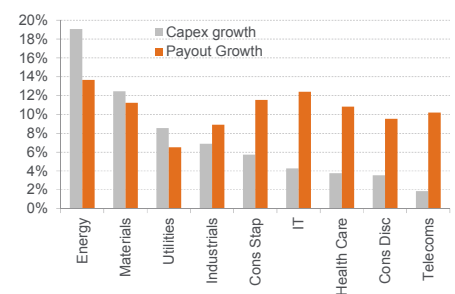
* leading telecoms by market capitalization
Source: Company data, Citi Research

Figure 19. World's leading Top 15 telecoms – Return on Capital Employed (ROCE)*



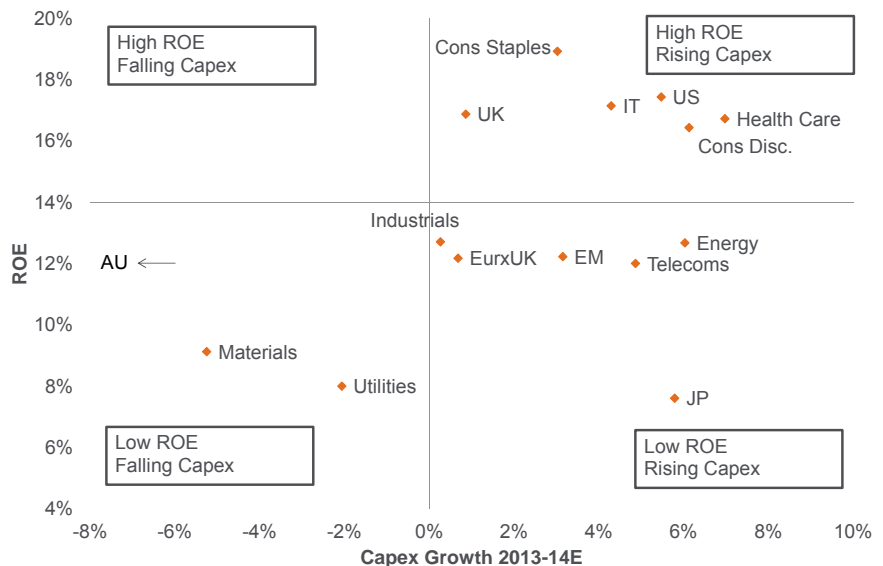
* leading telecoms by market capitalization
Source: Company data, Citi Research

Figure 20. Growth in capex and payout for different industries since 2000



Source: Citi Research, Factset

Figure 21. Current Capex vs ROE for different industries



Source: Citi Research, Factset, ex-financials

Competitiveness of mobile markets (HHI analysis)

We calculate HHI market concentration index for the mobile markets in the selected 25 countries

We look at HHI and HHI growth as criteria to assess competitiveness of markets

Growth in competitiveness of our selected 25 mobile markets came to a halt at the end of 2011

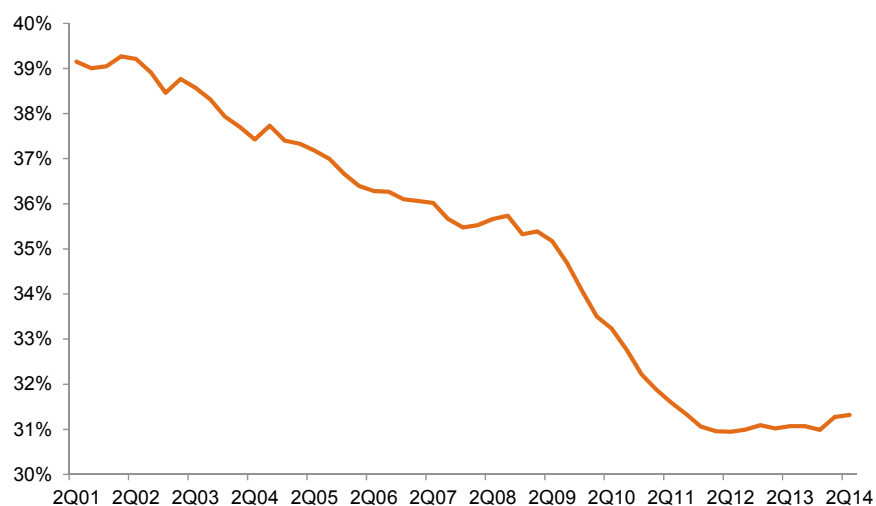
In the following section we analyze competitiveness trend of mobile markets in the selected 25 countries. We used subscriber data provided by www.themobileworld.com (adjusted where necessary) and the Herfindahl-Hirschman Index (HHI), which is commonly used to measure market concentration. HHI is defined as follows:

$$HHI = s_1^2 + s_2^2 + \dots + s_n^2$$

where s_1, s_2, \dots, s_n are market shares of the individual operators. HHI of a monopoly is 100%, while HHI of a market with very significant number of competitors with equally distributed market shares approaches 0%. Competitiveness of individual markets can be assessed by cross-comparing the HHI levels, but also by cross comparing the change in HHI over a certain period. Growing HHI points to not very competitive market, whereas falling HHI points to a potentially growing competition. When showing aggregate numbers such as the HHI index for multiple countries, we weighted the individual data points by subscriber numbers of the respective countries. Naturally, the HHI analysis of market competitiveness has its shortcomings. For example it is based on reported subscribers and different operators may use different subscriber definitions. It also does not take into account collusive behavior between operators. We do however believe that HHI is a relevant proxy of market competitiveness for our purposes.

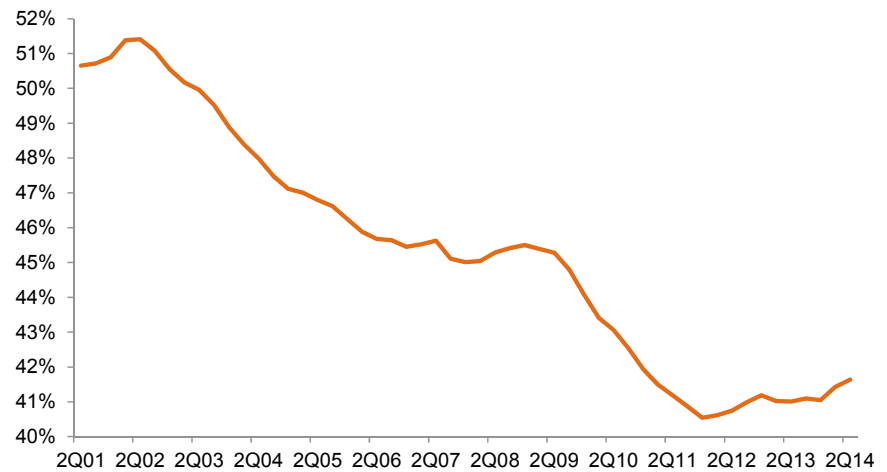
The following analysis shows the trend change in competitiveness of mobile markets in our selected 25 countries in the past five years. Figure 22 and Figure 23 show that in aggregate, competitiveness of such markets was growing and mobile market share of the incumbents was falling until the end of 2011, when the trend reversed.

Figure 22. Aggregated mobile market concentration index (HHI) for selected leading 25 countries*



* based on selected Top 25 countries, weighted by subscribers
Source: www.themobileworld.com, Citi Research

Figure 23. Aggregated mobile subscriber market share of the incumbent operators for selected leading 25 countries



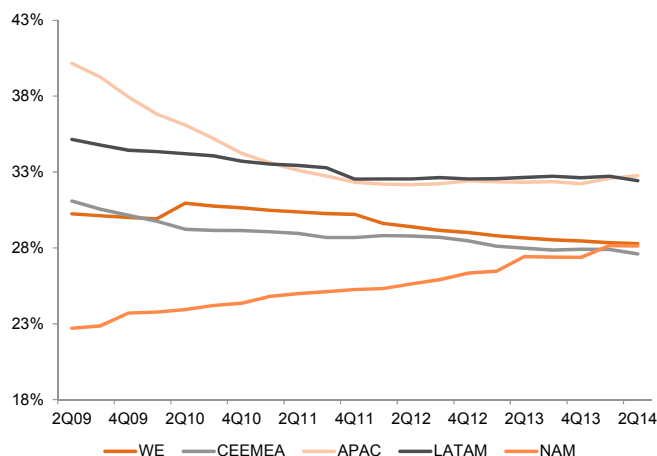
Note: The following top 25 incumbents included: AT&T (US), Bell Mobility (Canada), Deutsche Telekom (Germany), Orange SA (France), Vodafone (UK), Telecom Italia (Italy), Telefónica SA (Spain), KPN (Netherlands), Swisscom (Switzerland), MTS (Russia), Turkcell (Turkey), Saudi Telecom (Saudi Arabia), T-Mobile Poland (Poland), Vodacom (South Africa), Cellcom (Israel), Vivo (Brasil), América Móvil (Mexico), China Mobile (China), NTT Docomo (Japan), Bharti Airtel (India), Telstra (Australia), SK Telecom (Korea), Telkomsel (Indonesia), Advanced Info Service (Thailand), Axiata (Malaysia)

Source: www.themobileworld.com, Citi Research

Mobile competitiveness has been stable or declined in all regions ex-Europe in the past two years

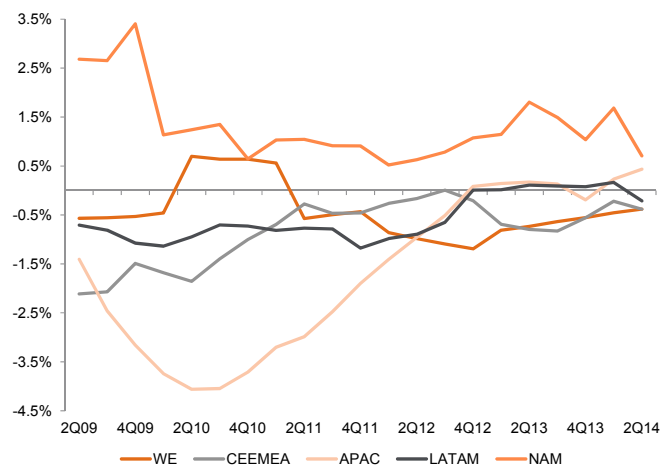
Figure 24 shows aggregated regional trends in mobile HHI for mobile markets based on data from the selected 25 countries. The most notable trends include an increase in competitiveness in APAC in 2009-12 from low levels; a gradual decline in competitiveness in North America over the past five years; and rather stable or slightly declining competitiveness in all regions (except for Western Europe) in the past two years.

Figure 24. Mobile market concentration index by region



* based on selected Top 25 countries, weighted by subscriber
Source: www.themobileworld.com, Citi Research

Figure 25. Mobile market concentration index by region (QoQ change)

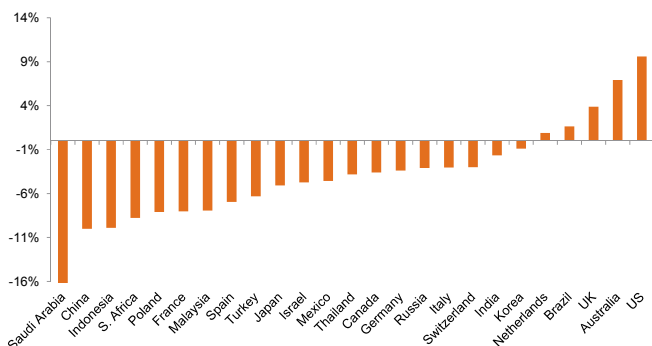


* based on selected Top 25 countries, weighted by subscriber
Source: www.themobileworld.com, Citi Research

Rate of growth in mobile competitiveness is falling; the level of competitiveness is also starting to fall in an increasing number of markets

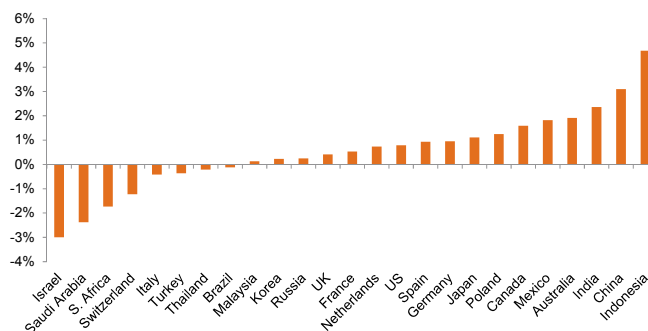
Figure 26 and Figure 27 show that although competitiveness of mobile markets in 20 of 25 selected leading markets has increased in the past seven years, the rate of such increase has slowed down considerably across the board in the past two years compared to two years prior. Such deceleration occurred for 17 of the 25 markets. Figure 28 and Figure 29 then show that a growing number of countries are experiencing a reversal of the trend and seeing the level of competitiveness of their mobile markets declining.

Figure 26. Mobile market concentration change 2Q07-2Q14



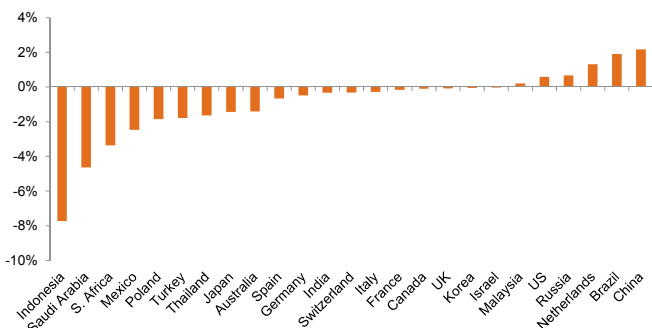
*based on selected Top 25 countries, weighted by subscribers
Source: www.themobileworld.com, Citi Research

Figure 27. Mobile market concentration growth (2Q12-2Q14) minus market concentration growth (2Q10-2Q12)



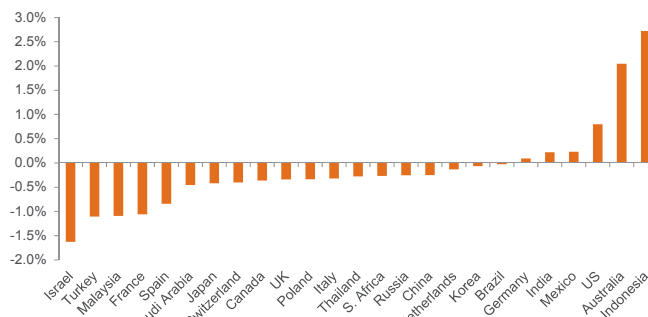
*based on selected Top 25 countries, weighted by subscribers
Source: www.themobileworld.com, Citi Research

Figure 28. Mobile market concentration change 2Q07-2Q08



*based on selected Top 25 countries, weighted by subscribers
Source: www.themobileworld.com, Citi Research

Figure 29. Mobile market concentration change 2Q13-2Q14



*based on selected Top 25 countries, weighted by subscribers
Source: www.themobileworld.com, Citi Research

Spectrum and asset concentration trends

Spectrum concentration is crucial for competitiveness of mobile markets

Spectrum is a crucial asset for mobile operators. Its ownership concentration is hence a key driver of competitiveness of such markets. Figure 30 – Figure 35 shows spectrum concentration measured by the HHI index in our selected 25 countries (excluding those where such data is not available) for the following frequencies 700MHz, 800MHz, 900MHz, 1,800MHz, 2,100MHz and 2,600MHz.

Japan, US, China and Australia have highly concentrated spectrum ownership . . .

High levels of spectrum concentration are particularly noticeable in the following countries:

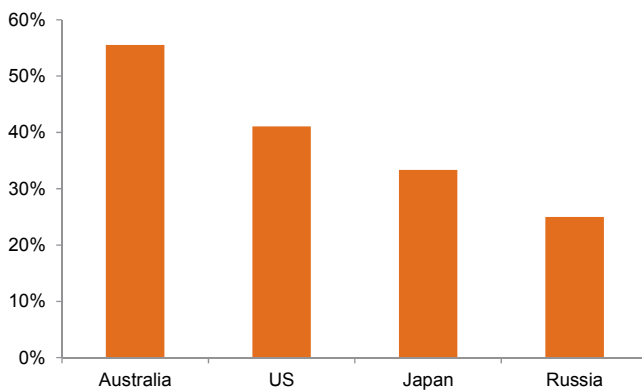
- Japan (among the top four countries from our sample with regard to spectrum concentration for all frequencies except for 2,100MHz, monopoly in 900MHz)

- US (top five most concentrated market from our sample in 800MHz, 2,100MHz and 2,600MHz, monopoly in the 2,600MHz)
- China (top five most concentrated market from our sample in 800MHz, 900MHz, 1,800MHz and 2,100MHz, monopoly in 800MHz)
- Australia (top four most concentrated market from our sample in 700MHz and 800MHz)

... this shows that emphasis on spectrum fragmentation varies country by country

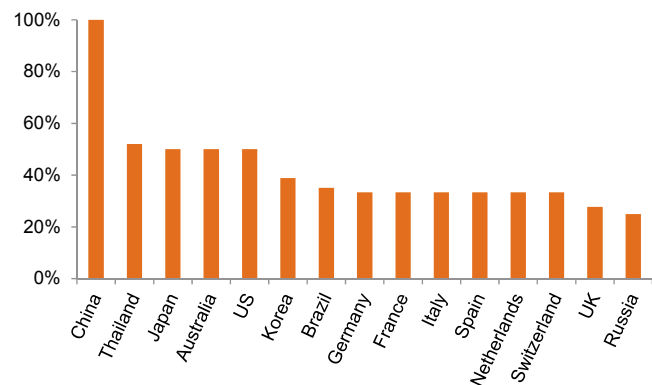
Although there is global coordination of spectrum use for certain technologies, spectrum allocation within countries is done on the country-level. The above examples show that some of the world's leading countries do not see fragmentation of spectrum as important as other countries do. That said some spectrum bands are interchangeable. This means for example that 800MHz and 900MHz monopoly ownership in China, Korea, Thailand and Japan does not directly imply monopoly on low-frequency LTE.

Figure 30. 700 MHz spectrum ownership concentration (HHI)



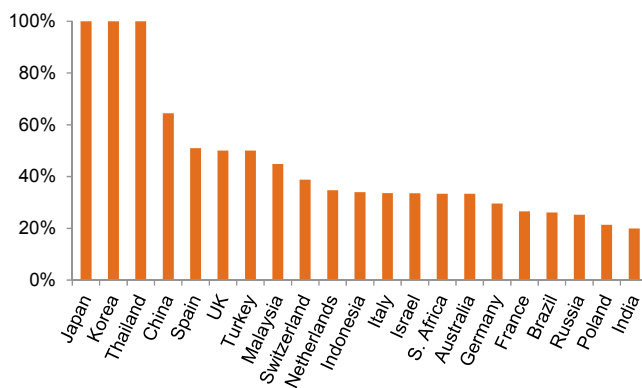
Note: For our selected 25 countries where data is available
Source: Industry data, Citi Research

Figure 31. 800 MHz spectrum ownership concentration (HHI)



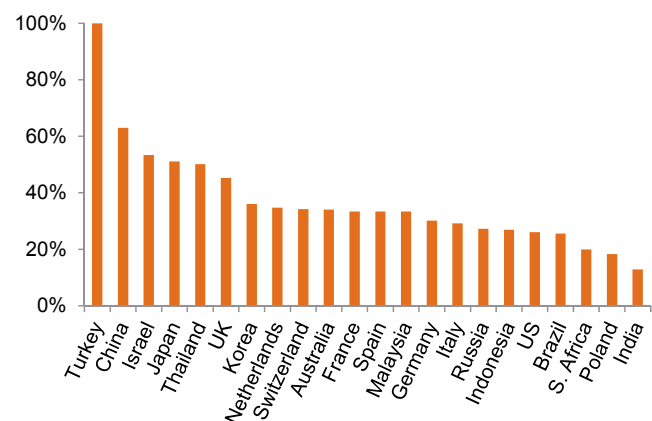
Note: For our selected 25 countries where data is available and 800MHz is so far used only for CDMA as opposed to LTE in China
Source: Industry data, Citi Research

Figure 32. 900 MHz spectrum ownership concentration (HHI)



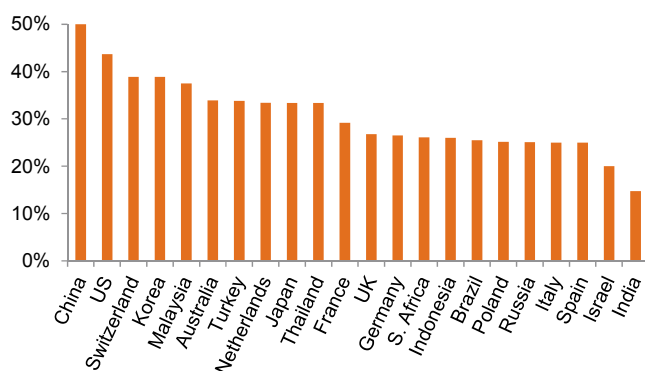
Note: For our selected 25 countries where data is available
Source: Industry data, Citi Research

Figure 33. 1,800 MHz spectrum ownership concentration (HHI)



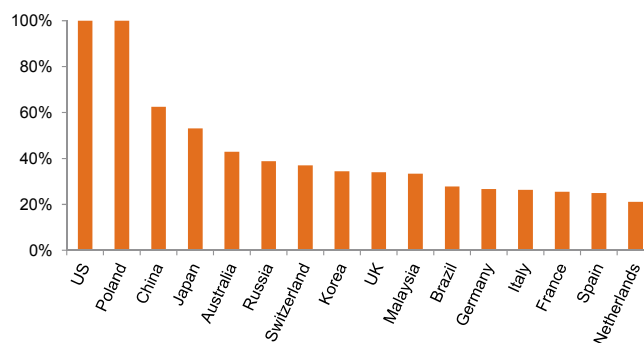
Note: For our selected 25 countries where data is available
Source: Industry data, Citi Research

Figure 34. 2,100 MHz spectrum ownership concentration (HHI)



Note: For our selected 25 countries where data is available
 Source: Industry data, Citi Research

Figure 35. 2,600 MHz spectrum ownership concentration (HHI)



Note: For our selected 25 countries where data is available
 Source: Industry data, Citi Research

There has been a clear rise in mobile network sharing activity in the past three years

Apart from market share and spectrum concentration it is also relevant to look at infrastructure concentration. In Figure 36 we show the rising number of network sharing deals since 2012 in the major countries. Our regional telecom market comments on at the end of this report broadly confirm this trend, which is also combined with outsourcing of infrastructure (mainly towers) to third party consolidators. Network sharing activity has been increasing globally including for example in Europe, Asia, Middle East and Latin America etc. Europe has led the way with active network sharing, when mobile operators not only share towers, but also frequencies and radio equipment, which essentially eliminates competitive differentiation.

Figure 36. Selected network and tower sharing deals globally

Year	Company 1	Company 2	Country	Network sharing terms
2001	Tele2	TeliaSonera	Sweden	JV to deploy 3G network
2001	T-Mobile	BT	Germany/UK	Sharing parts of 3G networks
2001	3 (Hutch)	Europolitan	Sweden	JV to deploy 3G network
2001	Telus	Bell Mobility	Canada	Network sharing in rural areas in Canada
2003	Telefonica	Yoigo (Teliasonera)	Spain	Mobile Towers & BTS sharing
2006	Vodafone	Orange	Spain	Sharing agreement rural areas
2007	Vodafone	Orange	UK	3G network sharing
2007	Vodafone	Telecom Italia	Italy	Mobile Towers & BTS sharing
2007	Vodafone (earlier Hutch)	Bharti Airtel & Idea Cellular	India	JV for Mobile tower sharing
2008	Telefonica	Yoigo (Teliasonera)	Spain	
2009	Vodafone	Telefonica	UK	2G/3G - network sharing
2009	Tele2	Telenor	Sweden	4G/LTE network sharing
2009	Vodafone	Telefonica	UK, Germany, Spain & Ireland	Mobile Towers & BTS sharing
2009	Telecom Italia	3 (Hutch)	Italy	Mobile Tower and Backhaul network sharing
2009	Telus	Bell Mobility	Canada	Completed JV for a national HSPA network
2011	Orange	T-Mobile	UK	3G network sharing
2011	Telefonica	Eircom	Ireland	JV to share both Tower & BTS
2011	Indosat	XL Axiata	Indonesia	Mobile Tower sharing agreement
2011	Maxis	U-mobile	Malaysia	3G network sharing in selected cities + roaming
2011	Celcom (Axiata)	Digi Telecom	Malaysia	Tower
2012	T-Mobile	Telefonica	Germany	Tower, BTS and Backhaul sharing
2012	Vodafone	Telefonica	UK	JV for 4G roll out
2012	Vodafone	KPN	Netherlands	Mobile Towers & BTS sharing
2012	Orange	Bouygues Telecom	France	Sharing of Fiber network
2012	Vodafone	3 (Hutch)	Ireland	2G/3G/4G - network sharing
2012	Telenor	TeliaSonera	Denmark	2G/3G/4G - network sharing
2012	Telefonica	Grupo Lusacell	Mexico	Tower and fiber sharing
2013	EE	3 (Hutch)	UK	4G - network sharing
2013	Vodafone	Orange	Spain	Sharing of fiber network
2013	Telefonica	Yoigo (Teliasonera)	Spain	2G/3G - network sharing
2013	SFR	Bouygues Telecom	France	2G/3G/4G - network sharing
2013	T-Mobile	Orange Polska	Poland	3G/4G - network sharing
2013	T-Mobile	Tele2	Netherlands	2G/3G/4G - network sharing
2013	T-Mobile	3 (Hutch)	Austria	2G/3G - network sharing
2013	Vodafone	Orange	Romania	2G/3G - network sharing
2013	T-Mobile	Verizon and AT&T	US	Agreement with US gov't to explore spectrum sharing
2013	Rogers	Videotron	Canada	4G/LTE - network sharing
2013	Vivo (Telefónica)	Claro (América Móvil)	Brazil	4G/LTE - network sharing
2013	TIM	Oi	Brazil	4G/LTE - network sharing
2013	Bharti Airtel	Reliance Jio	India	Mobile Tower and optical fiber sharing
2013	VHA (Vodafone & Hutch)	Optus (Singtel)	Australia	Network sharing in selected cities and roaming agreement
2014	T-Mobile	O2 Czech	Czech	2G/3G/4G - network sharing
2014	3 (Hutch)	Eircom	Ireland	Mobile towers & BTS sharing
2014	Telenor	Tele2/TeliaSonera	Norway	4G/LTE - network sharing
2014	Reliance Jio	Rcom	India	Mobile Tower and optical fiber sharing
2014	8 operators	Bharti Airtel, Etisalat, MTN , Ooredoo, and five others	Middle East and Africa	Infrastructure sharing
2014	All 3 operators	China Telecom, Chine Mobile & China Unicom	China	JV to share both Tower & BTS
2014	Cellcom	Pelephone	Israel	4G - network sharing
2014	Bakrie Telekom	Smartfren	Indonesia	Both active & passive network sharing

Note: This list shows selected deals for illustration purposes only and it may not be complete. The list does not include tower outsourcing deals with external parties, which are wide-spread around the world. Examples of such external companies include American Tower Corporation, Crown Castle and Global Tower Partners in the US, Indus Towers, Bharti Infratel, GTL Infra and Tower Bersama in Asia or IHS Towers and Helios Towers in Africa.

Source: Industry sources, Citi Research

We use a range of criteria to assess network advancement and market competitiveness

Link between competition and network advancement

Finally, we look at the potential link between the competitiveness of telecom markets and the level of advancement of their telecom infrastructure. We used the sample of 25 countries as in the previous analysis excluding Saudi Arabia, for which we lacked some network data. For the purpose of this exercise we defined the key criteria as follows:

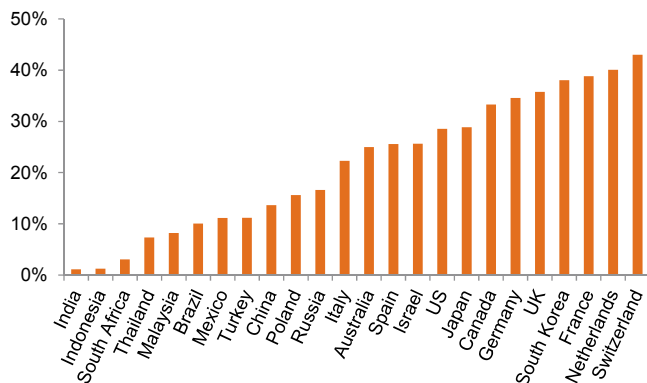
- **Network advancement.** We look at four, equally weighted criteria: (1) fixed-line broadband penetration; (2) mobile broadband penetration; (3) average fixed-line broadband speed; and (4) percentage of broadband connections with speed above 1Mbps. We believe that broadband related criteria are most relevant today. We did not include mobile SIM penetration as a criterion because of the high saturation of mobile markets globally as well as potentially significant differences in subscriber counting country by country.
- **Competitiveness.** We look at three equally weighted criteria: (1) mobile market HHI; (2) mobile market year-over-year HHI change in the second quarter of 2014; and (3) an assessment of the importance of (price) competition in the respective countries by Citi analyst covering those countries. For countries which came equal on the last criteria, we used our Citi analysts' views on factors other than competition and HHI to determine the final ranking. We did not include pricing as a criterion directly, because we believe that absolute pricing levels depend on a range of factors other than competition (e.g. spending power, geography, regulatory restrictions etc.) and it is challenging to obtain cross-comparable data about pricing.

Our assessment of network advancement and competitiveness is based on ranking of the individual countries on the selected criteria

As part of our methodology we ranked the countries from our sample on each of the criteria above, assigning them points from 1 to 24. For example, with its lowest fixed-line penetration India received score 1 for fixed-line broadband penetration while Switzerland, with its high penetration received a score of 24 (see Figure 37). We then aggregated the resulting rankings across all criteria to produce new rankings from network advancement and similarly for competitiveness. We believe that use of multiple criteria to assess network advancement and competitiveness helps to diversify out potential imperfections related to each of the criteria.

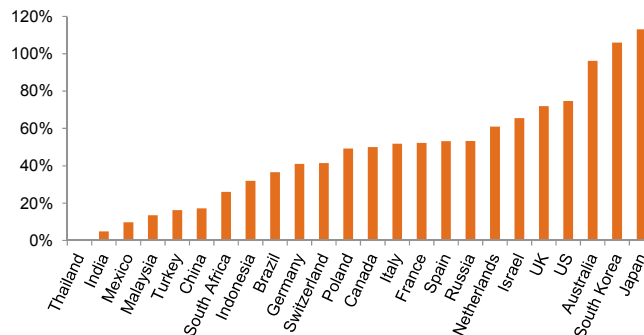
Network advancement criteria

Figure 37. Fixed-line broadband penetration 2013 (%)



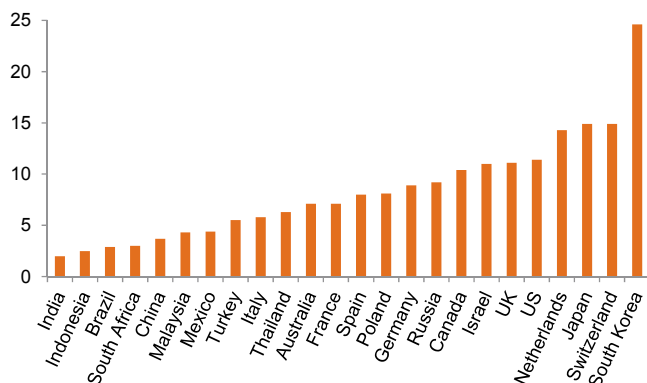
Source: ITU, Citi Research

Figure 38. Mobile broadband penetration 2012 (%)



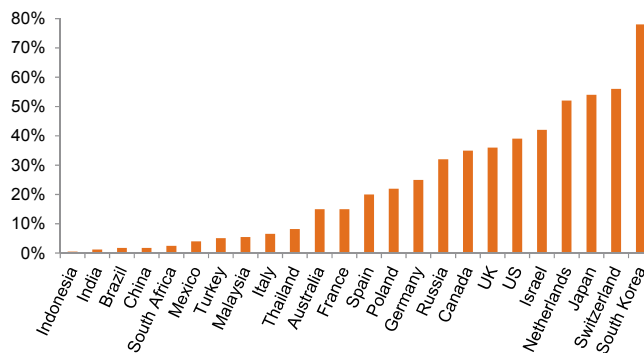
Source: ITU, Citi Research

Figure 39. Average fixed-line connection speed in 2014 (Mbps)



Source: Akamai, Citi Research

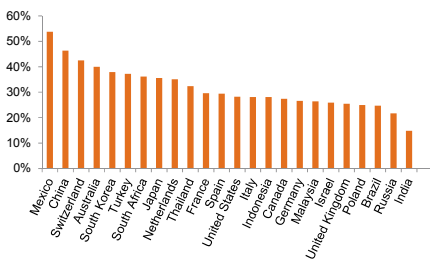
Figure 40. % of fixed-line BB connections over 10Mbps in 2014



Source: Akamai, Citi Research

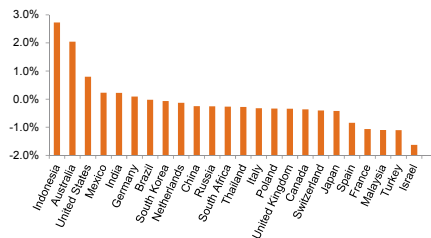
Competitiveness assessment criteria

Figure 41. Mobile market concentration (HHI)



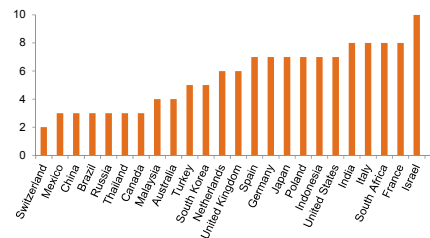
Source: www.themobileworld.com, Citi Research

Figure 42. Y-o-Y change in HHI in 2014



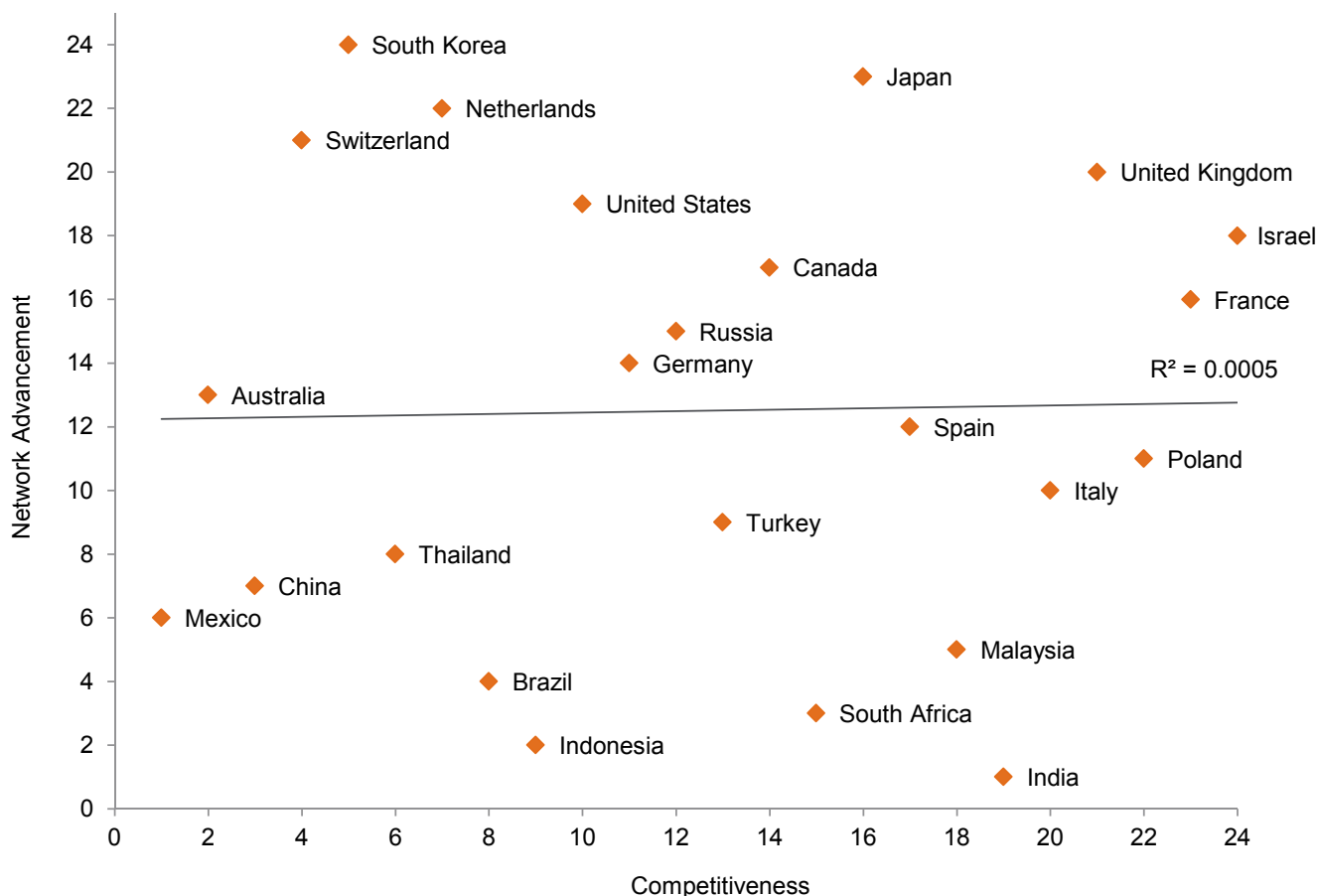
Source: www.themobileworld.com, Citi Research

Figure 43. Citi assessment of price competition



Source: Citi Research

Figure 44. Correlation between competitiveness and network advancement in the key telecom markets (R2 correct based on Excel)



Source: Citi Research

We could not find a meaningful correlation between competitiveness and network advancement

Figure 44 shows that we could not find a meaningful correlation between competitiveness of individual markets and the level of their network advancement. The world's most advanced telecom markets such as Japan and South Korea are not the most competitive ones. Relatively highly competitive markets such as India or Poland are not necessarily the most advanced, even within their peer groups. That said there is no negative correlation either.

Addressing potential issues of our methodology

There is no doubt that any model trying to find links between network advancement and competitiveness would contain a degree of subjectivity, not least because of the lack of clarity about what network advancement and competitiveness mean. This could raise questions about the methodology. Below we address some of such potential questions:

- Network advancement should be adjusted for GDP/capita.** There is no doubt that network advancement is positively correlated to the economic development of the respective countries. The most advanced networks are in the developed Asian and European countries or in the US, while the least advanced ones are in India and Africa. That said it is not obvious how exactly such GDP/capita adjustment would be constructed. It is also possible to name range of other criteria, which may demand similar adjustment (e.g. geographic or demographic trends). Making such adjustments would add significant complexity without guaranteeing a better result.

- **Network advancement depends on longer term competitive trends not captured by our criteria.** To assess competitiveness we look at the HHI index today and a year ago. We also look at the regulatory situation. It is possible to argue, for example, that the market grew to a very advanced form due to high competitiveness in the past, which has since subsided. This may theoretically happen, although practically we do not see this as a major distortion.
- **We assess network advancement mainly through fixed-line criteria and competitiveness mainly through mobile criteria.** Firstly, this is not exclusively true, as we use fixed-line and mobile criteria in both cases. Secondly, regulators usually apply a similar philosophy in both fixed-line and mobile, although there are exceptions.

Competition could drive network advancement at certain stages . . .

To summarize, although our general conclusion is that there is no strong correlation between the competitiveness of telecom markets and the advancement of their infrastructure in the major telecom markets today, this does not mean that competition has never driven network advancement. We believe that it does so especially in the two following situations:

- **Early stages of rollout of networks based on a new technology.** Wireless is a typical example, where several competing entities using the same technology (e.g. GSM), but expecting significant growth, drove network rollout faster than a monopoly entity would.
- **Rollout of networks using competing technologies before the 'winning technology' is established.** Competition has also proven a good tool to encourage infrastructure investments by allowing multiple technologies to compete against each other (e.g. cable TV, video digital library system (VDLS), fiber). However, this only works as long as all investors believe that their technology has some competitive edge against those used by rivals.

. . . but this depends on particular circumstances, particular country and particular point in time

Positive contribution of telecom competition to network rollouts depends on specifics of individual countries and stages of development of their telecom infrastructure. For example, our US TMT team argues in their Third Pipe reports that infrastructure competition in the US broadband market remains highly beneficial, pointing to the positive role of a combination of several new technologies such as satellite, fiber to the home, mobile broadband and fixed-wireless broadband. This reflects the geographical and current infrastructure situation in the US market. Meanwhile, the Australian authorities have chosen to pursue a strategy of creating a functionally separated monopoly National Broadband Network.

Competitive models that achieve their aims in short-term are not always sustainable in long-term

Based on our analysis and experience with competitive telecom models globally, we think that is important to make a distinction between momentary needs of individual markets and long-term sustainability of telecom business models. Competitive models that achieve their aims, in the short term are not always sustainable over the long term.

Conclusion: Are Telecoms Heading Back to the Monopolistic Roots?

If telecoms were transportation, insistence on competition and net neutrality would outlaw city buses, trains and airlines on a basis that they may not operate a competitive model or their networks may need to be managed.

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- As the role of communications networks in the global economy keeps growing, arguments against excessive telecom infrastructure competition and net neutrality are in our view gaining new relevance.
- Future technologies such as the Cloud, M2M, and artificial intelligence applied in healthcare, education, financial services and other industries strengthen the case for guaranteed quality of connectivity and the expansion of broadband to the so far unconnected population.
- Current policies focused on competition and net neutrality have not produced a stable outcome and the industry is drifting away from them; status quo is not an option, the current policies will either have to be reinforced or amended.
- We present our *SECOND* (SElectively COmpetitive Net De-neutralized) model for telecoms based on selective infrastructure competition in areas where it makes economic sense, a structural separation of the monopolies, a well-functioning wholesale market as well as compromised, but regulated, net neutrality. This would lead to the continued erosion of entry barriers into the telecom industry, but less intrusive regulation on infrastructure competition and net neutrality.
- Instead of heading back to its monopolistic roots, the telecom industry in our view faces a fundamental transformation, which will produce a range of TMT and diversified service companies with varied backgrounds (some but not all originating from telecoms), product offerings and geographic reach, competing with each other on a basis of innovation and differentiation.

Future TMT opportunities

Communications systems are increasingly becoming backbone of global economies

While the past twenty years was largely about the transition of telecoms from voice to broadband, for the future we see the following trends:

- **Backbone of global economies.** Internet is becoming a backbone of global economies. A material share of processes and transactions are already being managed on line and the ongoing expansion of mobile payments and financial services suggests that this trend is set to continue. Practically all sectors of the economy now rely on online solutions.
- **Human-like online interaction and entertainment.** With a rise of bandwidth, speech and picture recognition technologies, communication over the Internet is gradually becoming closer to personal interaction. This opens up a range of opportunities for efficiency savings (e.g. travel costs savings, office rental savings, remote provision of certain services, etc.) as well as entertainment (e.g. real time gaming).

- **Cloud solutions and Artificial intelligence.** During the first days of computing processing power was mostly centralized in large computer centers accessed by users through terminals. The arrival of PCs moved the processing power largely to the user terminals, i.e. PCs and later also smartphones and tablets. Today, Internet and the availability of reliable high speed broadband connections are reversing this trend as the move of data processing and storage to remote servers (i.e. Cloud solutions) is gaining economic efficiency. As the computing technology evolves, it is possible to imagine that the remotely provided services will be increasingly complex, data demanding and in fact converging to artificial intelligence.
- **Machine-to-machine (M2M) communication.** With the rise of 'intelligent' devices and technologies, including robots, machine-to-machine communication is set to become a major phenomenon. This includes for example driver-less cars, smart homes, drones or remotely controlled robots designed to perform certain tasks. Such machines will need to be able to respond to inputs such as sounds or images captured by their sensors. Future machines may also be able to enter transactions on behalf of their owners, for example a driver-less car buying its fuel.
- **Internet for everyone.** As online based technologies progress, assuring universal availability of Internet around the world, including in the less developed countries and harder-to-reach areas, is becoming more important than ever.

Strict application of the concepts of infrastructure telecom competition and net neutrality may not create the best model for the future TMT opportunities

We think that policy concept based on strict enforcement of competition and net neutrality is not ideally suited for the above-described TMT opportunities. This does not mean that the industry will move towards absolute monopolies without net neutrality or that we are advocating such move, but it does mean that there is a scope and in fact a need to review these essential policy concepts. Below we show some key shortcomings of competition and net neutrality in the current and envisaged future environment:

Arguments against excessive infrastructure competition

1. **Competition between technologies in some cases has viable winners; forceful promotion of alternatives and market fragmentation may be counterproductive.** Technologies ranging from light bulbs, car engines and airplanes to mobile telephony sometimes tend to converge on one winning technology, which at certain periods reaches a dominant or monopolistic position. The winners are usually determined not only by performance of the technologies, but also by scale economies of their rollout. Forceful promotion of competing technologies may therefore be sensible only at certain times, but it may become counterproductive if it undermines scale economies of technologies that would ultimately win. In telecoms this may apply to fiber, 'all-IP', and standardization of mobile technologies.
2. **The economic argument for successful competition between telecom networks is subject to a debate.** Jean Tirole, an economist and laureate of the 2014 Nobel Prize in Economic Sciences for his work on competition issues also in network industries, made a theoretical argument about infrastructure competition in telecoms already back in the last 1990s, before telecom liberalization in Europe. In a paper 'Competition between telecommunications operators' co-authored by Jean-Jacques Laffont and Patrick Rey in 1997, he analyzed different pricing scenarios for unregulated competition in interconnected networks both in the mature and transitional phases of the industry, essentially concluding the application of an

infrastructure competition-based model in telecoms may not be easy and it may ultimately lead to oligopolies or unstable outcomes. The paper also suggests that new market entrants have incentive to underinvest. We think that the actual experience in both fixed-line and mobile has confirmed validity of such concerns.

3. **Unless strong long-term policies are in place, which is often practically hard to achieve, competition may lead to shortening of product and investment cycles and hold back desirable long-term investments.** This shortening of technology and product cycles in telecoms in the recent years is a well-known phenomenon, which contrasts with the long-term nature of the industry and upcoming investment opportunities. It is possible to argue that along with technological development, pro-competitive policy bias, together with uncertainties about net neutrality, are the key drivers causing a shortening of the industry's cycles.
4. **Unless strong long-term policies are in place, which is often practically hard to achieve, competition may in some cases lead to quality deterioration.** While the post-liberalization telecom boom has brought a broad range of positive developments, quality of voice telephony is not one of them. On the contrary, customers have often traded lower voice quality for mobility (wireless), cheaper price (VoIP) or video (e.g. Skype). Even in the data segment it is hard to argue that the most competitive markets offer the highest quality, especially in markets without pro-investment policies. It is possible to say that the described outcomes are a result of a free market. However, it could also be said that the building of outstanding transportation infrastructure, such as bridges and roads, usually does not always happen as a result of free market competition. In telecoms, free competition does not always give customers a choice to obtain quality for a reasonable price premium. Instead, free competition may lead to quality deterioration as the market pushes prices down. Although there are exceptions, quality improvements primarily driven by competition are usually limited to the most lucrative market segments such as the main metropolitan areas. Governments sometimes step in and force the industry to boost service quality due to infrastructure competition between countries, battling the digital divide or protecting certain standards for emergency calls.
5. **The key priority for building coverage globally has shifted from high-income and high population density areas to low-income low population density areas, which are more difficult to cover using a competitive model.** The competitive model has served well its purpose of encouraging growth in mobile and Internet penetration in densely populated, developed market areas with sufficient spending power to support investment into parallel networks. However, given the current level of mobile and Internet penetration globally, at around 100% and 40%, respectively, these areas are largely fully penetrated already. The focus is therefore shifting towards areas, which have so far failed to attract attention of telecom investors, i.e. low population density and possibly low income areas. Although a competitive approach can still be used in such areas (e.g. competition for state subsidies), scale economies usually do not favor infrastructure competition there. An unregulated free market could in fact fail to build coverage of these areas fast enough, which would lead to either digital divide or migration of population to the cities. Politically, this is high price to pay for rigid enforcement of excessively pro-competitive policies in telecoms across the board.

6. **Large scale retirement of obsolete technologies and a move to single platform all-IP technologies may be harder to accomplish in a highly competitive environment.** Successful infrastructure competition naturally leads to technological fragmentation of the infrastructure. This means the existence of multiple entities with potentially conflicting vested interests in regard to future technological developments. The complexity of such vested interests, as well as the technological complexity of networks which use multiple technologies, in our view, make it harder to manage the retirement of obsolete technologies and the rollout of new ones. Another issue is that in a competitive market, operators often focus on building (defensive) entry barriers (such as roaming, SIM cards, customer contracts, etc.) instead of moving fast to progressive technologies such as fiber, 'all-IP', etc.
7. **Free market competition should at some point lead to bankruptcies of operators, which may have a disruptive effect on the economy.** One of the main principles of a free market is that it rewards success with extra returns and punishes failure with bankruptcy. The fact that the current free market competition in telecoms has not yet produced any high profile bankruptcies of established infrastructure-owning operators indicates that the free market model may not yet be fully functioning in telecoms. The question is whether it is desirable to change this. Moreover, in the incumbent/newcomer environment, bankruptcy of any player may be attributed to policy, which may be seen as excessively pro-incumbent or pro-newcomer. Such a setup effectively forces the regulator to pro-actively balance the interests of the two sides, which can hardly be described as liberal.
8. **Natural monopoly argument, i.e. infrastructure competition, tends to produce negative externalities.** The case for natural telecom monopolies has been historically based on negative externalities coming from duplication and redundancy of parallel cable ducts, cables, towers or other infrastructure. The perceived benefits of competition in encouraging a quick spread of new technologies in the 1980s-90s made policymakers review their stance and conclude that accepting such negative externalities was a price worth paying. However, such logic may not last forever. Increasing network sharing and in-market consolidation activity globally already shows changing priorities.
9. **None of the peer industries has lately experienced as strong and deliberate the enforcement of competition and at the same time loss of entry barriers as telecoms have.** The closest peer industry to telecoms, utilities, in most countries remains regulated as a natural monopoly. Meanwhile, the two most important partner industries for telecoms, Internet and equipment vendors, are highly concentrated on a global scale. None of this has caused a pro-competitive regulatory response of the kind telecoms have often experienced. This is despite the fact that unlike their partner industries, telecoms are also experiencing major threats to the so far present entry barriers into the industry, which is manifested through the OTTs, recently launched Apple's soft-SIM, regulatory attacks against roaming etc. All these developments prompt a question about the fairness and practical benefits of targeting telecoms with pro-competitive policies more than their partner industries.

10. **Ideological moves, which reflect the changing economic and geopolitical reality.** Following the 2008-09 global financial crisis along with the rise in geopolitical tensions leading among others to risks of terrorist activity, ideological priorities in regulating strategically crucial industries have been changing. Given their constantly expanding role in the economy and society, telecoms and Internet are crucial industries for example in surveillance aimed at uncovering illegal activity as well as blocking communication between perpetrators of illegal activity. Due to the economic resilience of demand for telecom services, telecoms can also often be used as a base for generating special tax revenue. All this is done easier in consolidated as opposed to fragmented markets.

Figure 45. Selected benefits of telecom monopolies and competition

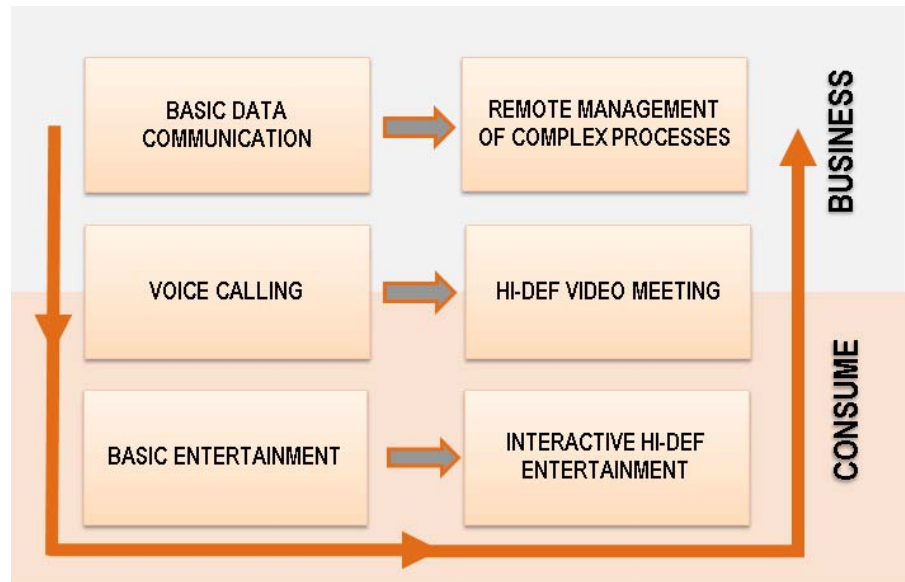
BENEFITS OF MONOPOLIES		BENEFITS OF COMPETITION	
1.	Potential better utilization of scale economies in network operations	1.	Potential lower pricing for the consumer
2.	Benefit of a single platform for customers and partners	2.	Potential better service differentiation
3.	More stability for customers and partners	3.	Better enforcement of management efficiency
4.	Easier enforcement of territorial coverage demands	4.	Better use of free market in testing of new technologies
5.	Easier enforcement of net neutrality principles	5.	Vested interests are less likely to hinder technological progress
6.	Less technology and spectrum fragmentation	6.	Better for promotion of consumer technologies such as handsets
7.	Fewer negative externalities related to building networks	7.	Pressure to use spectrum more efficiently
8.	No need to define and 'manage' competition	8.	Lower risk of strategic failure of a single company
9.	Easier attraction of long-term investors	9.	Potentially better for attracting growth investors

Source: Citi Research

Arguments against net neutrality

1. **Future TMT opportunities may require more security and reliability.** As we said earlier, we expect communications networks to enhance their contribution to future economies particularly through areas such as the Cloud, M2M, robotics, artificial intelligence, mobile financial services, etc. We expect that such services may require a more guaranteed quality of the communications service, as well as over time potentially substantial bandwidth. This may be hard to deliver in a net neutral environment. However, we do not have to look into the future to use this argument. Even today's services such as IP television (IPTV) and virtual private networks (VPN) may require some traffic management, which would be hard to provide under a strict interpretation of net neutrality.

Figure 46. Evolution path of telecom services

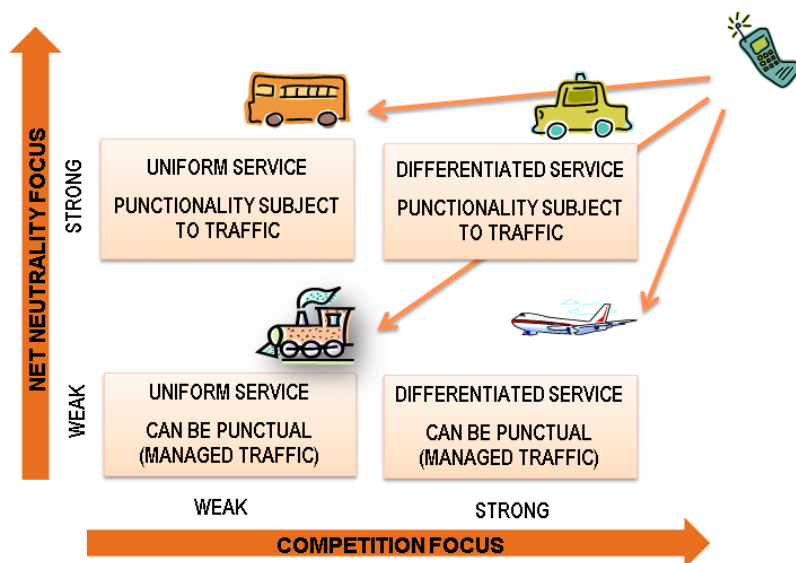


Source: Citi Research

2. **New telecom services may be increasingly B2B focused.** During the evolution process shown in Figure 46, the telecoms industry's focus initially shifted from business services (B2B) towards consumer services (B2C). We think that going forward this trend may start reversing. M2M, Cloud, mobile financial services, etc. may be offered to the end customers by non-telecom companies, which would buy the communications services from the telecoms on a B2B or wholesale basis. Such an arrangement, however, fundamentally weakens the case for enforcing net neutrality, which is primarily meant at protecting consumers from unfair constraints of access to content. For example, customers may buy products such as e-book readers, home security solutions, auto satellite navigation, etc., bundled with the bandwidth necessary for these products to function. There is no reason to require sellers of these products to offer general Internet access.
3. **Freedom to offer and demand communication service quality guarantees may become very important in the future TMT context.** With the increased diversity of use of communications services, the need for rights of the operators to offer and rights of customers to demand certain end-to-end service quality parameters is becoming increasingly obvious. The only way to guarantee end user experience is by managing the network and content together, which cannot be done under net neutrality. Figure 47 shows a parallel between this and the transportation industry. Competitive neutral networks correspond to a competitive market for taxis, which can offer differentiated service (e.g. different types of cars), but they are all subject to hard-to-predict street traffic. Some customers may choose to sacrifice the convenience and service differentiation of the taxis and instead use the public bus service, which is cheaper due to its monopoly-driven scale economies. Customers travelling to some destinations may prefer monopolistic high-speed trains, which run on their own rail tracks and hence they can guarantee much better punctuality than taxis and buses. Finally, customers travelling over long-distances may prefer to take scheduled flights, which offer service differentiation and have strictly managed traffic for security

reasons. Different transportation models simply fit different customer needs. We expect the competitive and net neutral model, which corresponds to the taxis in transportation, to become insufficient in catering for the increasingly complex needs of the future TMT industry.

Figure 47. Competition and net neutrality in telecoms vs. transportation industries



Source: Citi Research

4. **There is a need to encourage private investment into substantial bandwidth upgrades.** Developed markets often suffer from slow progress in rolling out very high speed connection technologies such as fiber to the home (FTTH). This is partially due to perceived low returns on such investments, which have to compete with already established infrastructure. A move away from net neutrality may allow telecoms to apply more creative models for pricing the service (e.g. pricing for one-off use of very high speed bandwidth bundled into the price of purchased movies). Models, where the customers clearly see the benefit of the communications services they buy may work well for both sides and hence encourage the telecoms to invest. The leading Internet companies, traditional supporters of net neutrality, may at some stage be ready for a compromise as well, among other reasons because their growth is also reliant on continued bandwidth expansion driven by telecom investments.
5. **Some value retention and increased innovation focus in the national TMT industries may be desirable.** In the past the telecoms' broadband businesses benefited from net neutrality, which led to faster development of global content and hence demand for broadband subscriptions. Now, broadband penetration in the economically attractive areas is approaching saturation and demand for bandwidth continues to grow, but a significant part of the value generated from it goes to the Internet industry. Meanwhile, the national telecom operators are often publicly listed in their countries, often representing the main TMT exposure of their local stock markets. Local governments interested in building a home-grown TMT industry may therefore have a reason to adjust policies in a way that moves some of the rewards for innovation from the global Internet industry back to the local telecoms.

6. **Creative (non-net neutral) models may help to spread the Internet in developing markets.** Covering 60% of world's population, which is not yet connected to Internet, is a geopolitical priority. These people are usually not connected to the Internet for at least one of the following three reasons: (a) cost of network rollouts in hard to reach areas is too high compared to the already covered areas; (b) ability of the offline population to pay market rate for Internet connection common in the already covered areas; and (c) value that the offline population sees in Internet connection. Creative non-net neutral solutions, where content providers or operators may for example partially or fully subsidize the cost of the end-user Internet connection in exchange for promoting or restricting certain types of content may, along with falling end-user equipment prices, help to accelerate Internet penetration growth in the developing world. The leading project in this area is the Facebook-sponsored Internet.org.

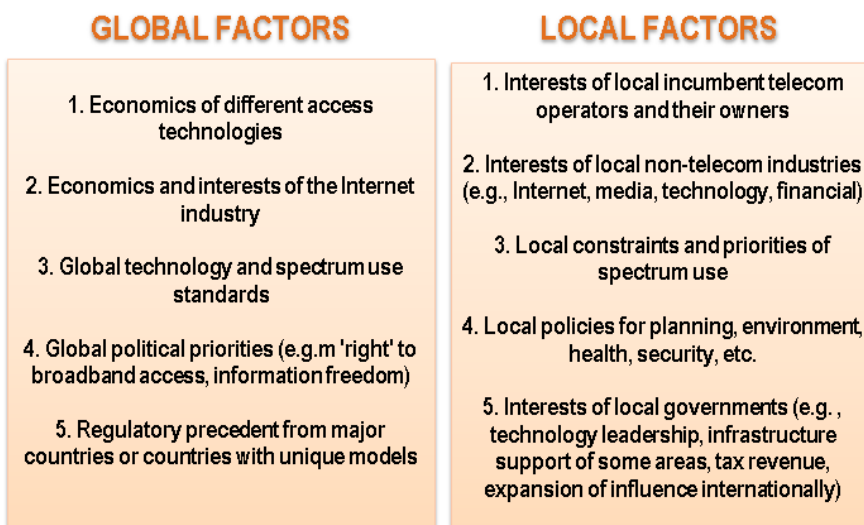
Dilemma of reinforcing or scrapping the strictest pro-competitive and pro-net neutrality concept

Policies to continue to be driven by conflicting factors

Before outlining possible future models for telecoms with regard to competition and net neutrality, let's summarize the current situation. Regulatory policies and the industry business model have always been driven by a mixture of global and local drivers (see Figure 48).

- **Global industry factors.** These include globally universal factors such as economies of the different technologies and the Internet industry, globally agreed technology and spectrum use standards, globally dominant political priorities (such as the desirability of broadband build-out and unrestricted access to information) or successful regulatory precedent from the major countries. Existence of such factors contributes to a certain level of globalization of telecom regulatory policies, for example for allocation of spectrum to certain technologies. The International Telecommunications Union (ITU) is leading global co-ordination efforts in telecoms and Internet.
- **Local interests and factors.** The leading telecom operators in each country are usually material for the local governments as employers, taxpayers, infrastructure investors and potentially also promoters of new technologies. In many countries telecoms are major or sole representatives of the local TMT industry, sometimes co-owned by the local governments, often playing an important role on the local stock markets. All this gives such operators some leverage when it comes to deciding about regulatory policies. That said local governments have also multiple reasons to regulate against the interests of the telecom industry, which among others include protecting the consumers and raising tax revenue. Local governments may also take into account interests of other local industries, which do not always coincide with those of the telecoms, especially in countries with strong domestic tech, Internet or financial industries.

Figure 48. Examples of drives of telecom policies in individual countries



Source: Citi Research

Substantial country-by-country telecom regulatory differences have so far been attributed to definition of the competition and net neutrality concepts rather than abandoning them . . .

. . . however such interpretation is proving harder and harder to sustain

Examples showing that telecom competition in the strictest sense not being enforced

Examples showing that net neutrality is not being applied in its strictest form

Most regulators continue to publicly endorse the concepts of telecom competition and net neutrality, which have been important drivers of the wireless and Internet growth of the past 2-3 decades. Despite this and the above-mentioned global drivers, telecom policies have evolved differently country-by-country. There is, in our view, a tendency to attribute country-by-country differences in the practical implementation of competition and net neutrality to definitions of these concepts as opposed to questioning their fundamental validity.

Although we see some sort of telecom competition in nearly each country and there have not been any high profile cases of telecoms as access providers blocking or threatening to block certain content in an effort to solicit payments from the content providers, we believe that it is increasingly hard to claim that the policy of telecom competition and net neutrality is currently universally enforced around the world.

Examples of the lack of actual or intended enforcement of competition in its strictest possible sense include the following:

- Structural separation of monopoly fixed-line businesses in Australia and New Zealand;
- Domestic roaming agreements or discussion in this direction among all domestic mobile network operators in the UK or the Czech Republic;
- Focus on infrastructure competition only (as opposed to service competition) for example in the US and Russia; and
- Tolerance of high mobile market share concentration in China, Australia and South Korea.

The following real examples could be interpreted as net neutrality breaches, although all these topics are sensitive and any assessment depends on the precise definition of net neutrality.

- The Comcast/Netflix deal in the US about Netflix traffic prioritization in parts of the Comcast network;

- Facebook's initiative leading to developing markets operators offering free connectivity specifically for Facebook access. This model has already been selectively used in multiple countries;
- VPN and IPTV offered on public telecom networks; and
- Cases discussed in the press when operators blocked content, which they may deem as harmful to their interests such as OTT, anti-operators or pro net neutrality blogs, etc.

Policymakers are facing dilemma whether to reinforce policy concepts, despite their shortcomings and the industry drifting away from them

If not pro-actively regulated, the telecom industry tends to lean away from the strictest concepts of competition and net neutrality. Given the fact that such process is already happening, as we also highlighted in the above examples, keeping the status quo is effectively not an option, at least from a global perspective. Policy makers have in our view three main options:

1. **Reinforce the concept of competition and net neutrality**, despite its shortcomings shown earlier in this chapter and in the chapter about Telecom business models under siege.
2. **Let the industry naturally drift away towards a different model without prescribing its principles.**
3. **Come out with a new model suitable for the future telecoms.**

Potential new models for telecoms

Time to move towards new industry concepts

We favor the third option, meaning we believe this is the right time to stop trying to explain the current regulatory trends by different definitions of competition and net neutrality and move away from rigidly endorsing such concepts altogether towards conceptually sound solutions for the future. Figure 49 shows eight theoretical options for future telecom models, determined by a combination of infrastructure competition, service competition and net neutrality.

Search for the right industry model for telecoms

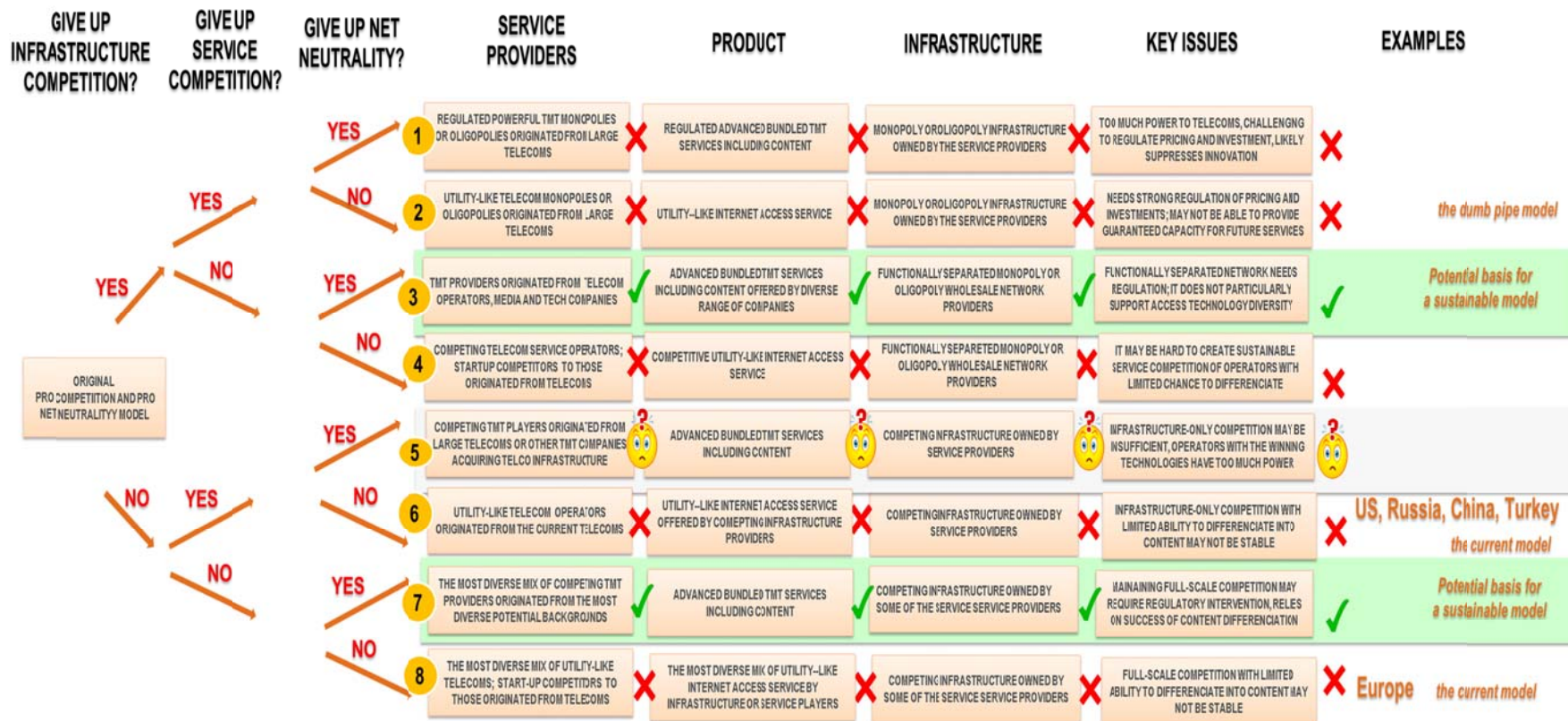
In a search for a new concept we rule out combining strong competition and net neutrality on a basis that such a combination leads to an unstable outcome (as explained in the chapter Telecom Business Models Under Siege). The opposite case, i.e., weak competition and no net neutrality, would arguably lead to excessively powerful (and hence long-term inefficient) TMT monopolies originated from the current telecoms. Such monopolies would likely hinder economic and technological progress in a long-term. Scenarios with limited competition and strongly neutral networks are likely to produce utility type operators, sometimes also called 'dumb pipes'. Such models in our view have several shortcomings, sometimes highlighted by the leading telecom operators themselves, including their lack of ability to guarantee service quality. Limited competition in such cases also triggers a need for substantial regulation to balance pricing and investments. Even strong regulation may not fully address the issues of monopoly-originated inefficiencies and encourage the best, innovative investment decisions. Meanwhile, attempts to boost competition in the 'dumb pipe' models are usually hard to accomplish, because of the lack of opportunity for competitors to differentiate in a strongly net neutral environment.

Three potential solutions are based on compromising net neutrality and potential adjustments in the competitive model for telecoms

After ruling out the other scenarios, the solution has to be based on a model which compromises net neutrality and some degree of competition in telecoms (see Figure 50). This narrows this down to three key models:

1. **Not fully net neutral, structural separation, service competition.** This model envisages turning the networks into monopolies and structurally separating them into standalone entities, which would provide capacity to service (virtual) operators based on a strictly regulated wholesale framework. The end-user product would then be provided solely by the service (virtual) operators, which may originate from or expand into the telecoms, Internet, media or technology industries. Although this model would likely produce a dynamic market for bundled TMT services, its main challenge is the need to regulate the structurally separated network companies and encourage them to invest the right amounts into the right technologies. Another challenge in most countries is how to evoke a consolidation of multiple infrastructure players to create the monopoly, which would subsequently be structurally separated. It may be interesting to follow developments in Mexico, where policymakers are contemplating such separation as an option, or Australia and New Zealand, where this has been implemented. Also see Citi's Australia & New Zealand Telecom Analyst Justin Diddams's article *Enacting structural separation in Australia* in this report.
2. **Not fully net neutral, infrastructure-only competition.** This appears to be a possible default model for countries such as the US, which formerly focused on infrastructure competition only and now have a tendency to drift away from strict net neutrality. Insignificance or absence of service (virtual) competitors in this case significantly increases barriers for non-telecom companies to enter the telecom market, preserving the role of the existing telecom operators as the leading providers of communication services to the end user. The absence of service competition however makes it harder to argue the case against net neutrality, which is being regularly challenged by politicians including the US President Barack Obama. Another challenge of this model is the efficiency of infrastructure-only competition in an environment, where certain technologies may have a tendency to dominate and arrangements based on competing operators with the same technology tend to lead to oligopolies or unstable outcomes. To make this model viable, regulators need to constantly and pro-actively encourage infrastructure competition. This contradicts with the ten points shown at the beginning of this chapter, which show potential shortcomings of such an approach.
3. **Not fully net neutral, full infrastructure and service competition.** This model allows the free market to drive investments. It also supports transition from the classical telecom services to broader bundled TMT offerings and it gives the service providers an opportunity to diversify into content. That said it has its shortcomings, largely based on the ten arguments against excessive infrastructure competition outlined earlier in this chapter. Israel is a good example of relatively successful implementation of this model. However, the Israeli experience may not be entirely transferrable to all other countries because of geographical, demographic and economic differences.

Figure 49. Potential models for the telecom industry



Source: Citi Research

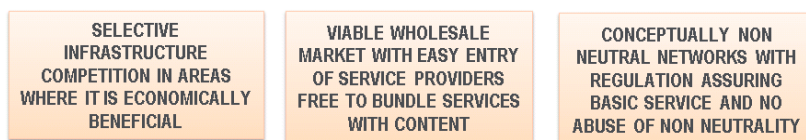
Our *SECOND* model for telecoms is based on pragmatic reality-driven compromises as opposed to rigid endorsement of the current concepts

Our *SECOND* model

So which of the models is the soundest? Our SElectively COMPetitive Net De-neutralized (*SECOND*) model, which we see as the theoretically and practically soundest one, contains attributes of all three above-shown models. It is essentially based on pragmatic, reality-driven as well as industry-vision driven compromises on competition and net neutrality. As shown in Figure 50 such model has the following attributes:

- **Infrastructure competition to be retained in areas where it is economically beneficial.** The ten arguments against excessive infrastructure competition are relevant and valid, although not exactly in the same way for all types of infrastructure. There are relatively clear cases for natural monopolies in areas such as passive fixed-line infrastructure (cable ducts), mobile towers as well as local access fixed-line or fiber networks in some regions. Meanwhile, there are cases where infrastructure competition clearly helps, especially where multiple technology choices exist and it is not obvious which of the technologies is superior in the long-term. Our *SECOND* model stipulates infrastructure competition in such cases.
- **Structural separation of natural monopoly infrastructure and viable wholesale market.** Our *SECOND* model would allow consolidation and re-monopolization in the cases which are prone to natural monopolies as explained above. It is however important in such cases to assure efficient functioning of the wholesale market to allow service (virtual) operators to freely offer services. Moreover, we would not accept infrastructure competition if it fails to create a similar wholesale market.
- **Conceptually non-neutral networks with regulation assuring basic service and no abuse.** Rather than sticking to the net neutrality principles, changing definitions and allowing exceptions, our *SECOND* model moves away from net neutrality, as a key principle, but regulates potential abuses. It allows all entities in the TMT market to freely structure their products, bundle different TMT products, demand and offer quality guarantees, etc. It does however regulate to guarantee the availability of a basic service (including for example emergency calls and possibly some basic voice and data service) as well as to avoid potential abuses (e.g. abuse of content/network dominance, discriminating against certain content providers without legitimate business reasons, etc.). The regulation would be ex-post assuring that competing TMT entities are free to do business with each other.

Figure 50. Attributes of the theoretically viable future model for telecoms



Source: Citi Research

Implementation challenges and long-term benefits of our *SECOND* model

No country has yet adopted the principles of our *SECOND* model in full

Although elements of the above-described *SECOND* model have been selectively implemented (e.g. functional separation in Australia and New Zealand and wholesale markets in the UK and other European countries), the key issues remain open, with extensive discussions taking place for example in the US (net neutrality) and Europe. No country has however adopted the *SECOND* model in full.

Implementation of the *SECOND* model requires overcoming of several practical challenges

We think that this is not so much due to its theoretical shortcomings, but rather practical challenges such as:

1. Risk that telecoms may cease to be the main providers of communications services to the end customers;
2. Risks to the business model of the Internet companies;
3. Practical challenge of managing the industry consolidation and structural separation process in markets, where some although possibly inefficient, infrastructure competition exists; and
4. Reluctance of policymakers to admit partial failings of the competitive and net neutrality policies.

Long-term benefits of implementation of the *SECOND* model

That said we think that some of the above-risks may be worth taking. Risk scenarios do not automatically mean negative outcomes for the involved industries. We think that implementation of the *SECOND* model would bring significant long-term benefits, which may cause likelihood for its implementation to rise in long-term. These benefits include:

1. It better enables telecoms and the TMT industry to address new opportunities such as the Cloud, M2M, robotics, artificial intelligence, mobile finance etc.;
2. Through flexible and creative pricing structures it helps to grow broadband penetration in areas with underdeveloped infrastructure, including developing countries or to upgrade bandwidth in competitive metropolitan areas;
3. It helps to address conceptual failings of the current policies and vested interests of telecoms and other industries concepts head on;
4. It improves the telecom industry's ability to plan long-term and access to long-term capital by better defining long-term policy framework;
5. It should support re-monopolization processes (e.g. consolidation, infrastructure sharing, etc.) in areas where it makes economic sense;
6. It removes some of the inefficiencies and artificially created entry barriers from the telecom industry such as lack of wholesale market;
7. It creates more dynamic and diverse TMT markets also at the national level (we think that ability to bundle connectivity into products such as smartphones, tablets, movies, security systems, etc., could actually boost demand for such products); and
8. It creates room for innovation at the national level.

Are telecoms heading back to their monopolistic roots?

The industry says overwhelmingly 'no'

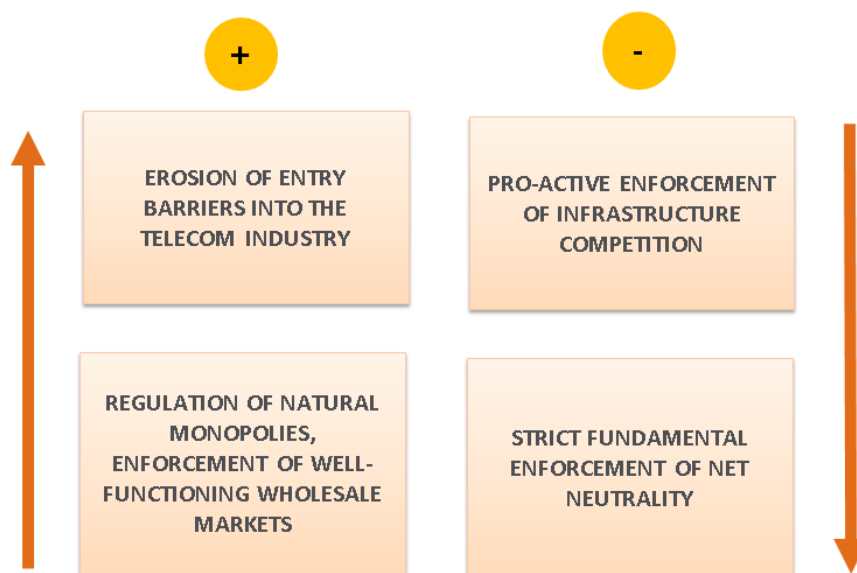
We expect future communications services to be provided by a competitive TMT companies, part of the network infrastructure may be re-monopolized

We believe that due to their vested interests (not to get regulated), the telecom operators have a strong incentive to answer 'no'. The tech, Internet and media companies should all appreciate telecom service competition as well, because monopolization of access to the final customer potentially weakens all of their business models.

Our answer is:

Instead of heading back to its monopolistic roots, the telecom industry in our view, faces a fundamental and possibly in some cases disruptive transformation in the upcoming years. We think that entry barriers into the telecom business may be lowered, but so may be regulatory pressures to enforce infrastructure competition and net neutrality. This may produce a range of TMT and diversified service companies with varied backgrounds, product offerings and geographical reach, competing with each other on a basis of innovation and differentiation, offering communications services potentially bundled with equipment, Internet, media, social media, information, communication & technology (ICT) or even utilities and financial services. Such companies may or may not originate from the current telecom operators. They will use telecom infrastructure, part of which may be provided by structurally separated and regulated infrastructure monopolies. Finally, such companies will also need to be scrutinized by regulators to enforce future balanced approach on net neutrality, i.e. assure basic service and avoid potential abuses (e.g. operators attempting to monopolize the content market or discriminate against specific content providers without legitimate business reasons).

Figure 51. Shift in priorities under our *SECOND* model



Source: Citi Research



Insights from Industry Experts

The end of a telecom industry monopoly?

Andrew Davies

Chief Financial Officer, VimpelCom Ltd.

Country or Region of Expertise? EMEA, US & Japan

Opinion about Competitive Outlook for Telecoms [scale of 1 (rising competitiveness) to 10 (heading towards monopolies)] = 2

- **The global telecom industry will never return to its monopolistic roots.** The optimal number of telecom operators in each market may be subject to a debate, but the overall contribution of competition to the development of cutting edge innovation and its benefits for the consumer are undisputable. Telecom operators face much more dynamic competitive challenges than before and their strategies to combat these forces will shape the industry for years to come.
- **That said, excessive spectrum and market share fragmentation may hinder investments and innovation.** Network quality is becoming less of a differentiating factor, which is creating opportunities to enhance value by network and asset sharing. To achieve satisfactory investment and innovation, telecoms need minimum critical mass to generate certain returns. This can be achieved for example by lighter touch regulation or longer-term shareholders demanding lower returns.
- While telecoms themselves are often subject to a high degree of pro-competitive regulation, the industry itself is currently being challenged by a number of peer industries, some of which enjoy more monopolistic protection. One example is the banks, which have, particularly in the developed markets, effectively blocked the entry of telecom operators into the mobile financial services (MFS) area. Meanwhile, OTTs represent significant risk for telecom revenue, including voice. One of the telecom strategies to tackle this is to partner with the financial and OTT industries, although the current regulatory framework could make it difficult to do this on equal terms.

The global telecoms industry will never return to its monopolistic roots. Competition in the market has bred cutting-edge development and innovation and it is clear to regulatory authorities that competition provides benefits for the consumer. The optimal number of telecom operators that it takes to provide a competitive operating environment is still a matter for debate and regulatory authorities need to be able to balance consumer protection with providing a framework that enables the entire economy by incentivizing investment and innovation in high quality, high speed data networks.

With new challenges presenting themselves in the form of rival industries and over-the-top (OTT) players, nearly all monopolistic tendencies previously prevalent in the telecoms industry will never be seen again.

From a luxury to a necessity

The evolution of mobile services is unlike any other consumer product or service. The shift from luxury to necessity has been exponential, particularly when compared, for example, to the penetration of cars or televisions. The growth in and absolute number of mobile subscribers globally has been extraordinary: estimates from The International Telecommunication Union (May 2014) identified seven billion mobile subscriptions worldwide, equivalent to 95.5 percent of the world population.

Original fixed-line incumbents, operating as monopolies with in-built inefficiency and complacency, were slow to deliver cutting-edge services, lacked price competition and did not have the impetus to attack costs. As operators struggle to deal with price regulation, near 100 percent penetration and technological innovation, consolidation is seen as a timely and appropriate option.

Testing out various business models

Over the past 30 years, the mobile services industry has tested a number of different business models to increase average revenue per user (ARPU) and overall revenue. This included mobile virtual network enablers (MVNOs), walled-garden Internet services, content provision and social media services, amongst others.

Most recently we have seen the emergence of network or asset sharing. This shift in maturity demonstrates how the industry sees its priorities; in most countries differentiation through network quality is diminishing (particularly in high-density population areas) and customer service excellence and product differentiation are becoming the key tools for customer retention.

It is now clear that with initiatives such as Mobile Number Portability (MNP), regulation of Mobile Termination Rates (MTR) and roaming prices that the last vestiges of any monopolistic tendencies are being eradicated.

Virtually every country around the world started their mobile telecom industry by issuing licenses to multiple mobile network operators (MNOs) to meet demand. Ultimately, the past 25 years has arguably seen too many licenses distributed around the world which is partly a function of governments being too narrow in their thinking and viewing the telecoms industry as a solution to their fiscal deficits through (sometimes extortionate) spectrum and licensing fees. In some instances this has restricted investment and has also stunted growth and innovation as operators struggled to achieve a return on capital commensurate with their investment hurdles.

In this context, it is surely no coincidence that the most advanced and innovative telecoms companies are based in countries with a lighter-touch regulatory environment (e.g. the US) or where shareholders have a lower expectation of and longer-term view of returns (e.g. Asia). However, in the last several years the entire mobile value chain has experienced significant disruption from almost all angles and a potentially more pertinent issue is the changing face and nature of the industry, and the competition it faces from non-traditional sources.

Telecoms limitations set by rival industries

Regulation is not the only factor to have helped move the sector away from monopolies. Growing competition within the ecosystem of the telecoms industry has pressed MNOs to innovate and the development of increasingly sophisticated technologies has seen the rise of new services such as the mobile financial services (MFS) sector.

The MFS allows customers to transfer money domestically and internationally with costs that reflect actual delivery charges, along with making payments for utilities and other similar services. In some instances, these transactions can be made simply by sending a text message (SMS). According to the GSMA, an estimated 2.5 billion people in lower to middle income countries are unbanked and MFS provides them with access to the financial services they need.

The nature of this activity lends itself to the telecoms industry, which is primed with the infrastructure to offer financial services on a secure and safe basis to consumers. Furthermore, in certain markets MNOs have double the penetration of the banking sector, and therefore the telecoms industry presents a natural channel for this convenient payment method.

However, the MFS market demonstrates far more of a monopolistic trend: the banking sector in many parts of the world regards MFS as their territory, resulting in legislation which restricts or prevents mobile operators from even providing the most basic services to customers. As a result, simple money transfer systems such as Vodafone's M-Pesa (which highlighted to the world the demand for MFS), have taken years to arrive in Europe from its original launch country of Kenya, in no small part due to monopolistic attitudes within the banking sector. The rapid assimilation of MFS by the MNOs, and willingness to compete and innovate, highlight the change in attitude within the sector away from monopolism and toward a free market attitude in products and services which are now enabled by the mobile Internet.

The fact that only 15 percent of peer-to-peer transactions worldwide are conducted electronically highlights the immaturity of the MFS market. With the extremely high penetration of mobile networks, the telecoms industry has the potential to bring this very convenient service to people everywhere. This will not happen until Governments legislate to prevent the stalling tactics of some members of the banking sector and enable the MNOs to rapidly penetrate the market. There is no logic to the expectation that MNOs should purchase a bank to deliver such services; this is analogous to expecting that ownership of a travel company should be required before customers are permitted to book an airline flight utilizing their smartphone.

The new reality for telecom operators

Although tightened regulation has helped decrease the likelihood of monopolies presenting themselves again, a change has also occurred in the perceived role of the mobile operators. With extraordinary speed, a metamorphosis is taking place as telecoms operators reinvent themselves again as technology-savvy Internet access providers.

Network quality and access to fast data speeds are critical to the delivery of appropriate service levels and it is an accepted fact that the delivery of mobile Internet services provides substantial economic benefits. This does not advocate lighter regulation but it suggests that competition is taking place on a different level, with a different set of service providers.

The rise of OTT players such as eBay, Facebook, Google and WhatsApp has seen them become essential elements of the Internet age for customers. According to the London-based research and analytics firm Ovum, the global telecommunications industry will lose a combined value of \$386 billion between 2012 and 2018, just from customers using OTT voice applications. This cannot be fought: customers demand access to OTT services anywhere at any time, and the Internet has provided operators with a whole new level of competition.

Traditional operators were never equipped or set up to produce rival services, so instead, operators such as VimpelCom have formed partnerships with these newly identified rivals. Research firm Northstream found that operators can potentially generate €2 billion in profits annually from effectively partnering with Internet players. Even though this may be the case, the debate still rages as to who pays for what, and it has highlighted the need for a different operating model, with a lower number of operators/networks, asset sharing, and differentiation by service quality and price.

This illustrates the new reality for operators: services such as WhatsApp are what customers want. With extraordinary speed, SMS revenues are disappearing and operators have new competitors even in their core markets. The new reality is those who are the most responsive to customers will win and competition is more intensive than ever, but from a different direction.

Conclusion

Technological advancements have diminished the importance of traditional telecom services while opening up opportunities to participate in formerly adjacent markets that have consolidated due to this change. The old fashioned "Telco" is gone; the communications market is much broader and scarier for those who aren't prepared to adapt.

In summary, monopolistic behavior can never exist for long and with new competitors and tighter regulation a return to the singular industry domination of old will not be seen again. Rather, telecoms operators face much more dynamic challenges and the changes implemented to combat these forces will shape the industry for years to come.

Infrastructure competition is the best model for telecoms — Israel is proof

Eden Bar Tal

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Country or Region of Expertise? Israel

Opinion about Competitive Outlook for Telecoms [scale of 1 (rising competitiveness) to 10 (heading towards monopolies)] = 1

- **The current tendency in some parts of the world to go back towards telecom monopolies or oligopolies is wrong;** a model based on infrastructure competition is superior. Only in a situation where a "Natural Monopoly" exists should governmental measures such as quotas, price fixing, etc., be considered and balanced against their counterproductive side effects. Such heavily regulated markets lead to decreasing quality of expensive services with very slow development. Lack of competition and asymmetric information owned by the service providers vs. the regulator contribute to the poor outcome of such policies and measures. Only well-functioning competition resolves the problem and ultimately brings more value to customers and the overall economy. Investment and technological progress do not happen because of increasing profits and margins but solely because of: (1) Competition pressure created by a competitor with better technology and a better value proposition; (2) Opex saving opportunities; and (3) New or additional revenues.
- **The 'free riders'/OTT challenge should not be addressed by relaxing the current low level of competition.** Instead, telecom operators and cellular carriers should expand their services beyond traditional services and bundle of telephony, Internet connectivity and media, leveraging their huge customer base, emerging new technologies, new on-line services, and new business models, including collaboration with other service providers, plus balanced net neutrality and new tax policies. Governments could use their control over local tax jurisdictions and networks to achieve a level-playing field between the 'free riders'/OTTs and the telecom operators and carriers who are required to invest constantly in technologies for delivering the immense quantities of data, which grow exponentially every second.
- **Israeli telecommunication market represents a globally unique example of the success of a pro-competition model.** During the years 2009-2013, dramatic reforms were introduced with substantial impacts. As a result, the number of mobile carriers went up from 3 MNO's to 5 MNO's and 5 MVNO's, MTR was reduced in 1 day by 75%, all the barriers for free transfer of customer from one carrier to another in less than 30 minutes were abolished, and in addition to 2 fixed line universal networks (the incumbent and the cable company) a new privately funded FTTH network has started deployment.

Current tendencies to relax the competition and go back to oligopolies or monopolies are wrong

Due to shrinking revenues and margins of operators and carriers on one hand and the growing need to upgrade the networks on the other hand, lead unfortunately the regulators and government to accept the demand for relaxing competition in a number of countries around the world, showing tendencies toward the unwinding of its competitive market structure and a move back to its original oligopolistic and monopolistic setup. This is manifested through the increased occurrence of in-market consolidation and infrastructure sharing. The reason is because of growing pressure from the incumbent telecom operators, which themselves have been suffering from the effect of the so called 'free riders'/OTTs (i.e., Internet companies or over the top services such as Skype, WhatsApp, Google, Facebook, Amazon, Netflix, Hulu, etc.) who use the telecom infrastructure without paying for it. Instead

of leveraging their customer relationships and competing with the OTT companies at the service level, the incumbents demand more protection from competition in the traditional telecom services, which they say would allow them to invest and upgrade their networks.

Telecom infrastructure competition brings both value to the customer and investment

The Israeli Ministry of Communications (i.e. the Israeli regulator) during my tenure as its Director General under Minister Moshe Kahlon, believed that reducing the level of competition, as demanded by the industry, would have been a flawed approach and instead, increasing the level of infrastructure competition was in our view the best way to bring value to both the customer and to the state economy. Meanwhile, we believed that telecom investments and hence technological progress in the telecom area are driven solely by the following reasons:

1. Competitive pressure;
2. Operating expense savings; and
3. Additional / new sources of revenue

In other words, an increased level of infrastructure competition brings more advanced technologies and new services, which monopolies or oligopolies would fail to produce due to lack of interest and /or need. Such technologies facilitate overall better and new services for the customer and additional source of revenues to the providers. We believed that telecom operators and carriers are not natural monopolies. Thus the only effective way to improve the customers' conditions, the technological advancement and the state economy, would derive solely from a competitive environment and not from measures designed to address status of natural monopoly. Moreover, we knew that enhancing completion only through adding MVNO's would not bring the desired outcome due to its limited effect. For a real competitive environment one must have an infrastructure competition. Only in a limited segment of the market with challenging economies of network rollouts (e.g. parts of remote and large rural areas) the regulator may consider to allow less competitive measures.

'Free rider'/OTT challenge needs to be tackled with a focus on telecom services expansion, new business models, as well as balanced tax and net neutrality policy.

Clearly the old business model doesn't work anymore. OTT players are making huge profits and margins while traditional operators struggle and have little reason to actively invest in upgrading constantly their networks. But relaxing competition should not be the answer. Our solution to the 'free rider'/OTT challenge is that instead of trying to limit infrastructure competition, telecom operators must find a new and better business model, which leverages their connectivity and huge customer base, and offers customers a wider range of existing and new on-line services such as media, cloud services, data storage, security, privacy, health, education services, etc. By doing so, telecoms would utilize their customer relationships and networks while bundling their traditional services with new offerings in a way that makes them both profitable and attractive to the end customer. Service differentiation would be a natural outcome, although not a purpose, of such strategies. Additional expansion should derive from a new cooperation model with governments. In Israel, we initiated a new policy for the government to leverage the next generation networks of the operators for providing the government's traditional services and new ones, on-line (e.g. education, health, welfare services etc.). The implementation of the new policy is managed by a new entity at the prime-minister office.

In order for this model to work, the right balance needs to be reached between the 'free riders'/OTTs and the telecom industry's interests. Governments have a range of tools at their disposal to help achieve such a balance. First, they can abandon their often dogmatic stance towards net neutrality, while protecting certain level of net neutrality, allowing a mechanism where operators could charge content providers for delivering heavy-duty data services. This may be necessary to fund network upgrades. Today, customers essentially pay for the current quality of connectivity. It may well be more efficient for the OTT providers rather than customers to pay for upgrading the networks for delivering new premium connectivity services and content. Second, local governments can use their control of the local economies and networks to impose royalties and taxes / exemptions to give telecom operators a level-playing field as well as providing tax incentives for investments in upgrading networks.

The infrastructure component in telecom competition is key

Infrastructure sharing brings cost benefits and therefore has its merit. However, a major distinction needs to be made between passive and active infrastructure sharing. The former allows the telecom industry to capture a very significant part of the benefits without limiting competition, which makes it less dangerous to jeopardize competition. The latter, on the other hand, would severely limit competition and hence I do not believe it should be allowed by regulators. As we said before, infrastructure competition is crucial for supporting technological progress. A MVNO is merely a retail competition with a wholesale oligopoly that does not fulfill such objectives. Owners of the oligopolistic infrastructure will always have an information advantage compared to their regulators, which reduces the latter's ability to use wholesale price regulation to achieve similar effects as infrastructure competition would provide. Moreover, the wholeseller controls any future upgrade the retailer scope of services.

Israel is a globally unique market, which shows that the concept of telecom infrastructure competition works

The discussed thesis about telecom service competition has been successfully applied in Israel in the past years. The Israeli mobile market, initially with three MNOs, now has five MNOs and five additional MVNOs. Since its launch, the 3 original MNOs have seen EBITDA margins fall from over 40%+ to around 25% currently. Moreover, the government introduced a new privately-funded wholesale-only FTTH operator to compete with the established fixed-line incumbent and the cable operator. The Israeli experience may serve as a guide to other markets.

The great sunk cost dilemma in competitive telecom markets

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Country or Region of Expertise? EMEA

Opinion about Competitive Outlook for Telecoms [scale of 1 (rising competitiveness) to 10 (heading towards monopolies)] = 6

- **Telecom operators in competitive markets have a tendency to invest inefficiently.** Most investments are driven by competition-related commercial pressures. Financial models used to justify investment decisions are often based on commercial trends without taking into account significant future changes in market dynamics. Top managers of operators are often biased to support investments.
- **Going into new capex cycles operators have a tendency to see past investments as sunk costs.** The operators' budgeting process usually takes a long time during which the competitive and industry landscape may change, rendering many of the assumptions obsolete in the implementation stage. Given the nature of telecom investments, namely impossibility to divest, operators often consider cost of their previous investments as sunk when entering new investment cycles.
- **Policies promoting excessive infrastructure competition are one of the key reasons for the mentioned inefficient investment behavior of telecom operators.** This includes for example policies aimed at enforcing spectrum ownership fragmentation or regulatory asymmetries to promote new market entrants.

In the following paper, we argue that as long as there are imbalances in a given telecom market, the internal dynamics of telecom operators' budgeting and planning cycles favor both capex investment and a reduction in prices as competitive responses, and what seems uneconomical decisions.

Motives for telecom operators to invest

- **Overall motives to invest.** Changes in capex spending patterns at operators are often made as a result of commercial needs or as a response to commercial pressure. Very often, the motive for a significant capex expansion program is the desire to either breakaway from competition and commoditization (trying to differentiate through quality or new offerings – 4G for instance), which is a typical behavior for the leading operator in crowded / competitive markets, or the desire to catch-up with competition (on quality or products) for weaker competitors.
- **Financial motives to invest.** The financial rationale of capex programs is always measured on the basis of projections that typically span several years. In our experience, these projections typically use commercial assumptions that don't assume significant changes to the current situation (price drops, product cannibalization, etc.), but project small variations of the status quo / known trajectories over significant periods of time. In fact there is always a set of projections (including market share gains / protection) that will make the investment decision profitable.
- **Internal motives to invest.** Chief Commercial Officers will always argue that their performance (especially if lower than competitors) is due to a lack of investment / subpar network or distribution, etc. Chief Technical Officers are always happy to invest, noting that the results are always predicated on achieving certain commercial assumptions they are not responsible for. The Chief Financial Officer, who should act as a referee can only judge the investment proposal or project on the basis of the commercial assumptions / projections supplied by the commercial team. In my experience, unless the CFO has absolute control (i.e., constrained balance sheets), decisions always favor investing as a response to commercial problems.

The sunk cost temptation

- **Timing:** Typically, investment decisions will be made primarily around budget time, and will take more than a year to allocate (planning, selection of vendors, etc.) and deploy (availability of contractors, site commissioning constraints).
- **Changing parameters:** By the time the capex project is under way, as commercial strategies unfold (typically within the first few months of the year) and operators react to each other's offerings, the competitive landscape changes (prices dropping, other operators making the same type of investment, commoditizing new products), rendering many of the assumptions made in the business plan obsolete. In our experience however, there is almost never any challenge to ongoing capex spending or re-evaluation of the commercial assumptions on which an already committed program was based upon.
- **The sunk cost temptation in the next cycle.** At the next budgeting / planning cycle, additional capacity will be considered as a given (whether in terms of additional traffic capacity, better quality and / or additional product offering). It is unclear how operators factor the cost of this capacity in their looking forward projections (in our experience they don't), and we therefore believe that the investment becomes a sunk cost. The danger there is that if the capacity (now considered as "free") is not filled within the previous commercial assumptions, it is always tempting to drop prices / offer more as it has become a sunk cost.

Long-term nature of telecom investments

Although this seems highly irrational, it can be explained by the nature of the investments. Telecom capex is a long lead investment, which has to be implemented before it can be sold. As networks are not commodities, unused capacity cannot be easily divested (half the investment is in civil works), so the temptation will always be to fill unused capacity at a profitable marginal price. Even in contexts where capacity is either scarce or unit demand is growing (US wireless, emerging markets GSM growth), increased traffic / product demand outweighs falling unit prices, but, we can still see per unit prices falling going hand with significant investments. On the other hand, where we can see examples where competition is balanced and investments are less chunky and more linked to demand (UK broadband, US cable) we can often see increasing prices.

Concerns about excessive infrastructure competition

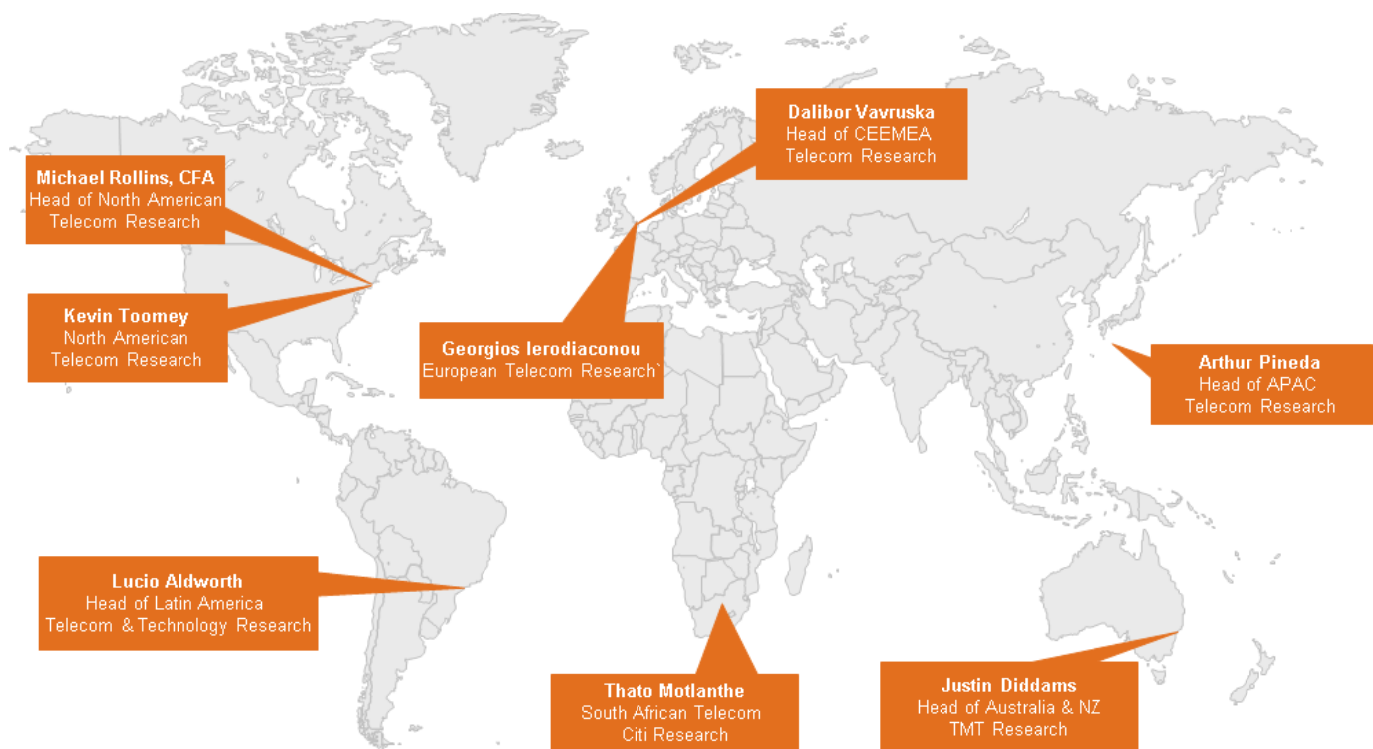
The difference between the relatively rational markets and irrational ones is based on excessive infrastructure competition without enough opportunity to differentiate. The US cable and UK broadband industries have had relatively well balanced competition structures (all operators have viable market shares), nationwide in the UK, regionally in the US. Moreover both groups have been offering TV products which feature highly sought after premium content. In both cases, the operators benefit from an established infrastructure, and in the case of the UK, from access to shared infrastructure (Open Reach). This has allowed both of them to pass tariff increases to the consumers on a yearly basis (counterbalancing the impact of cord sharing).

Meanwhile, Europe suffers from its spectrum allocation structure and regulatory policies. Regulators have focused on providing spectrum to new entrants as a tool to increase competition. As spectrum cannot be resold, it has no value unless utilized once paid for. This leads operators with smaller market shares to consider spectrum as a sunk cost, where a marginal subscriber is always welcome, no matter what its profitability is. In the US by contrast, spectrum was traditionally auctioned to the highest bidder irrespective of the intended use, and has a market value (can be re-sold). Operators will therefore be able to arbitrate between the spectrum value and its marginal profitability.



Insights from Citi Analysts in Key Regions

Figure 52. Citi Research analysts from key regions



Source: Citi Research

North American Telecom: Reality Bites

Michael Rollins

Head of North America Telecom Research
Citi Research

Kevin Toomey

North America Telecom Research

Country of Region Covered? US

Opinion about Competitive Outlook for Telecoms [scale of 1 (rising competitiveness) to 10 (heading towards monopolies)] = 3

- **Competition is well established in the North America** – Competition is significant and likely to continue, because the traditional phone and cable providers generate substantial cash flow from their networks. Previously, competition was segmented by application: voice, video, broadband, and wireless. Now, the lines of competition are blurred by advancements in technology and the ubiquity of wireless coverage.
- **Technology & investment are disruptive** – Emerging technologies and continued investments are increasing competition within each product and customer category in both the cable and telecom sectors. The network providers are investing to increase their broadband capabilities, while bundling and over-the-top services are deflating gross margins, especially for voice and video. The ability for IP to disintermediate traditional network services into network-agnostic applications has created even more competition between companies traditionally labeled as cable, telecom, and satellite video providers.
- **Regulatory battle lines have been drawn** – Going forward, we believe consolidation in the telecom and cable categories over the next 3-5 years will be significantly more difficult than in the previous decade. Our view is that regulators within the U.S. and Canada may constrain the level of consolidation to encourage facilities-based competition for broadband and wireless services.

The US telecom industry has gone through a significant metamorphosis over the last twenty years, but industry revenue growth is still underwhelming and margins are likely to fall under pressure over time. We find the telecom business continues to provide customers with greater usage and utility, but the industry has generally grown revenue at or below the level of nominal GDP within the U.S. over the last 10-years, on average.

We continue to see a competitive telecom industry and do not believe the telecom sector in the US or Canada is heading back to monopolistic roots. A few thoughts:

1. Facilities-based competition is here to stay
2. Technology investments to augment competition
3. IP disintermediation adds competitive pressure
4. US regulators seem to prefer facilities-based competition

With a meaningful number of companies competing in key customer verticals and industry revenue growth slowing, we believe competition for the customers' incremental dollar will increase. Thus, our approach to investing in the telecom sector remains focused on restructuring opportunities, revenue momentum for businesses that can add dollars at high-incremental margins, and in M&A as a source of option value. However, we believe that M&A to consolidate capacity within the U.S. and Canadian markets is going to get tougher and could force telecoms to extend their offerings to over-the-top services targeted at both the business and residential segments.

Facilities-based competition is here to stay

The US market for communication services is competitive and is likely to remain competitive, in our view. Previously, competition was segmented by application: voice, video, broadband, and wireless. Now, the lines of competition are blurred by advancements in technology and the ubiquity of wireless coverage. The ability for IP to disintermediate traditional network services into network-agnostic applications has created even more competition between companies traditionally labeled as cable, telecom, and satellite video providers. For example, the widespread availability of reliable wireless service has already led to over 40% of homes giving up their landline in favor of dedicated wireless voice communications.

Competition is significant and likely to continue, because the traditional phone and cable providers generate substantial cash flow from their networks. We believe the intensity of consumer usage for phone, broadband, and video services has facilitated higher customer spending levels for their communication needs that has supported the emergence of the current broadband duopoly within the US. According to the Federal Communications Commission (FCC), roughly 94% of homes have a choice between two broadband providers and 65% of homes have a choice of three or more broadband providers. We have heard from Vodafone, for example, that triple-play and quad-play packages in the US are significantly more expensive than similar offerings in Europe. The favorable US pricing for communication bundles may keep the door open for new entrants, as well.

If communication networks were being built from scratch today, the most efficient network design would be to provide a single fiber connection to each home where economically viable to do so, much like an electric or gas utility service. However, the cable and telecom ecosystems generate too much cash flow to simply deviate from the status-quo and fold into a more efficient network structure. In fact, defense of current cash flow yields is likely to prompt each side to continue investment. Telecom networks that have not deployed fiber to the home or node are in need of more significant investments to keep up with their cable competitors.

Within the US wireless market, there are four national carriers. We do estimate that each carrier has a minimum efficient scale to break-even on a free cash flow basis and remain a viable competitor within the US in current form. We also expect the wireless industry to remain competitive, especially since two of the carriers have significantly less market share and are incentivized to use discounting as a tool to gain customers.

Within Canada, there are three relatively equally-sized large national wireless carriers competing with several regional carriers and smaller new entrants. Despite consumers having at least three wireless options in each region, the regulators have been focused on finding a fourth national wireless competitor. Our view is the recent sale of Wind is a modest positive for the three nationals with respect to the prospects for a tougher regulatory backdrop, because the regulators get a fourth facilities-based provider in most regions.

The Canadian government already requires the incumbent carriers to share their towers with the new entrants, and the regulation of wholesale roaming rates could be the next step in lowering wireless pricing for the industry. However, the Canadian government has historically been a proponent of the facilities-based wireless carriers versus a mobile virtual network operator (MVNO) model. The presence of a fourth competitor should take the pressure off of the Canadian regulators to use extreme policy to stimulate competition with respect to regulating wholesale wireless roaming rates. Therefore, we believe that the likelihood for significant cuts to wholesale roaming rates in early 2015 seem less likely.

We expect the Canadian oligopoly to remain intact over the next few years given the expansive nature of the Canadian landscape that would require significant investment for a national network build-out by a potential fourth competitor. We believe the sizeable capital investment and extensive time to build would lead to a constrained operator that would likely not want to further dilute cash flow by competing with heavily discounted pricing. While it remains unclear what the strategic objectives of Wind's investors are, we believe the investors in Wind are likely more financially- versus strategically-motivated and are looking to generate profitable returns. As recent history has shown, new entrants typically struggle to compete on price and remain profitable, and providing wireless service is a capital intensive business which could further dilute cash flow in a competitive environment.

As wireless revenue growth from smartphone adoption slows, carriers are going to look for new avenues for growth. We believe carriers may selectively promote broadband substitution for lower-usage customers or in areas where there is more spectrum available per household. AT&T has recently announced plans to deploy fixed wireless solutions to help facilitate broader coverage for broadband in rural areas, in association with its pending acquisition of DirecTV. Sprint is trialing fixed wireless services with DISH in Corpus Christie, Texas on its potentially disruptive 2.5 GHz spectrum band.

Technology investments to augment competition

Emerging technologies and continued investments are increasing competition within each product and customer category in both the cable and telecom sectors. The network providers are investing to increase their broadband capabilities, while bundling and over-the-top services are deflating gross margins, especially for voice and video. Legacy voice and video revenues are increasingly at risk for incumbent service providers with the emergence of over-the-top applications and use of service bundling. Carriers will need to respond by investing further in their networks to increase the ability to charge for data connections and data consumption.

The most popular over-the-top applications (OTT) are Voice over IP (VoIP) and video streaming. With low customer acquisition costs relative to those that build and maintain networks, OTT providers can take a lower gross margin from the services offered and make it up with volume and national (and sometimes global) scale.

The use of OTT applications has also broadened the ability for competitors to bundle. The concept of bundling is nothing more than assembling a group of services together at a discount to the sum of the prices if purchased separately. With the innovation of voice over IP, cable companies were able to add voice into the bundle and offer significant value to the customer. For example, the purchase of phone, entry-level cable, and entry-level broadband may have been \$120 if purchased separately, but offered together as a triple-play bundle at \$99.99. Hence, the customer is able to extract a meaningful discount. Meanwhile, the cable company is merely protecting the revenue and gross profit from its core broadband and video service, while offering the phone service at or above its marginal cost. As OTT applications increase the number of services that can be bundled on top of broadband infrastructure, we believe bundling of applications could become a significant competitive response and possible differentiator if the content or application becomes exclusive in some form.

With the exception of those markets with telecom fiber-to-the-home (FTTH), cable emerged with a leading position to provide broadband services within the U.S. with the ability to provide very fast downstream speeds. We estimate cable companies

have roughly 60% of the residential broadband market and are trying to leverage their network resources to enter into the small and medium-sized business market, as well. In response, telecom companies are investing to augment their broadband capabilities to residential and business users.

AT&T is two years into its Project VIP through which it will extend broadband to 57 million customer locations with planned downstream data speeds of up to 100 mbps. Even regional wireline telecoms, such as CenturyLink and Frontier, have been investing to augment the data speeds offered to customers. We believe the race for broadband speeds is creating an upward bias of capital spending within the wireline networks and is leading those telecoms to extend fiber closer to the homes whenever it is economically viable.

In our 'Third Pipe' Series we analyzed four emerging technologies that may further pressure incumbent cable and telecom companies. Our analysis illustrates just how fluid and competitive the broadband landscape could become. While satellite broadband does not seem to be a viable option for a third pipe across many homes, we believe fiber-to-the-home could be viable if a competitor were willing to accept break-even economics on cash flow from just the broadband service. If bundled with other services or used to support the core business model, a company could theoretically justify building fiber broadband to roughly 55% of homes that do not already have access to fiber service, such as Verizon's FiOS, and are not within rural markets with low household density.

IP disintermediation adds competitive pressure

We believe another area injecting competition into the communications arena is the impact from IP technology and the associated disintermediation of services into applications. We first saw this impact in the voice world in which customers in the pre-2004 era would buy their phone services from the local phone provider. As cable and phone providers offered broadband, customers' choices for voice services widened considerably. In addition to continuing to buy phone service from their local telephone company, customers could also buy a bundled IP phone service from their cable provider. Additionally, customers could buy broadband and then buy a voice service from a number of competing companies, including Vonage, Skype, and MagicJack. Each offered varying value propositions, device experiences, service quality, and customer care.

Video services drive exponentially greater consumption of data bits than voice and because broadband speeds have improved substantially, these video based services can now effectively be delivered over the Internet. OTT video offerings are still in an early stage of development, and have been more of a compliment to cable and satellite subscriptions than a substitute. For example, most sports and live programming strictly over-the-top are not widely available. However, appetite for OTT is large with US Netflix subscribers topping 36 million as of September 30, 2014, or roughly 43% of US households with broadband Internet access. At the same time, the cost of video programming and labor continue to rise for traditional players and these linear video providers do not seem able to pass-through these price increases on a one-for-one basis to the end users.

As such, we believe the disintermediation of video will add further pressure on cable and phone companies to invest in broadband in order to offer and maintain network connections that can be monetized for the growing consumption of data traffic.

US regulators seem to prefer facilities-based competition

The US market for telecommunications has consistently gravitated back towards a national market for communications. In 1984, AT&T was broken up into eight regional phone companies in addition to a number of local phone providers in smaller and rural markets. Wireless service was initially licensed into 734 regions covering the 50 states (plus some territories such as Puerto Rico). Cable services also began on a local and regional level. These product verticals within the cable and telecom industries have experienced significant consolidation over the last 30 years from local to regional, regional to national in some cases, and even some consolidation of national providers within the wireless arena.

AT&T has nationalized its wireless business and is now trying to nationalize its video business with the pending acquisition of DirecTV. When AT&T tried to further consolidate the wireless business with the bid to purchase T-Mobile USA, regulators pushed back on the pre-existing competitive concentration within the industry and AT&T walked away. More recently, we saw a similar regulatory dynamic in Sprint's pursuit of T-Mobile USA. Sprint faced tremendous difficulty convincing regulators that a three-carrier United States would be better for consumers and ultimately pulled out of negotiations.

Going forward, we believe consolidation in the telecom and cable categories over the next 3-5 years will be significantly more difficult than in the previous decade. Our view is that regulators within the US may constrain the level of consolidation to encourage facilities-based competition for broadband services. In our view, regulators believe this type of competition will lead to continued innovation and greater affordability of faster broadband access. We offer our interpretation on the regulatory backdrop for deals that have happened and those that haven't:

1. **Facilities Matter** – We believe Federal US regulators prefer facilities-based competition over resellers and the kinder term, virtual-network operators. Our understanding from discussions with the FCC and industry contacts is that facilities-based providers are price-setters and resellers are price takers. Resellers can greatly benefit in periods of excess supply, but resellers are unlikely to have a long-term permanent impact on pricing in the absence of regulatory support and heavy oversight. We do believe resellers and mobile virtual network operators (MVNOs), especially in wireless, can play important roles at marketing services to under-served and under-appreciated customer segments and they can add to the competitive dynamic.
2. **The Power of Four in Wireless** – The combination of AT&T's failed attempt to buy T-Mobile USA and comments from regulators (in the press and in filings) have suggested a comfort with four national wireless carriers in the US. While carriers in some European markets and in Canada have consolidated to three national carriers, we find regulators in those countries are very focused for their country to get back to four competitors through a combination of merger conditions and spectrum policy. Given that the four national carriers in the US already tip the scale of concentration as defined by both the Department of Justice (DoJ) and the FCC, we believe carrier consolidation will be difficult in the current Administration and may not get better in future Administrations. We also believe that the FCC and DoJ are implicitly referencing their comfort with four facilities-based providers rather than allowing two MVNOs to simply share a network (although this example may be more amenable than an outright merger).

We do believe investors feel that the regulatory backdrop is significantly influenced by the President's party affiliation and that a Republican Administration may take a looser view on industry consolidation than the current one. We cannot dismiss this possibility, and believe that industry participants may test this theory after November 2016. However, we believe the most significant opportunity for wireless consolidation may depend on a failure of one of the two smaller national carriers and for the merging parties to invoke a "failing firm" argument.

3. **More Broadband Is Better** – The FCC is making a big push for enhanced broadband services, including possibly lifting the definition for what speed qualifies as a broadband service. The FCC Chairman recently spoke on the need for more broadband infrastructure and the importance of affordable broadband to the American economy. We believe broadband service capabilities and reach are going to be key considerations for the FCC in any future merger review of network operators and the FCC is likely to be more open to innovative ways in which broadband competition can be advanced.
4. **Limited Market Definition** – We find the FCC has generally retained a narrow definition of the relevant product market. For example, wireless mergers have been viewed within the context of the wireless industry, rather than considering that wireless has been a proven competitor of residential wireline voice. We believe the narrow definition of the "relevant product market" has led to higher measures of concentration in the absence of considering the broader telecom and cable markets as an alternative denominator to the calculation. Even though we view the category as the larger ecosystem, we do not expect regulators in their reviews to change quickly based on their historical approach.
5. **Keep the Internet Open** – We expect the FCC to retain a focus on the Open Internet (net neutrality), although the definition as to what constitutes an Open Internet can vary meaningfully between the various, interested parties. While the debate on the Open Internet has historically revolved around what carriers do with the traffic is within their networks, the larger issue may, in fact, be how traffic is handled at the point of exchange. The points of traffic exchange are becoming congested with the rapid growth of downstream video services at the request of customers on broadband ISP networks, including FiOS, U-Verse, and Cablevision. Broadband ISPs want to apply the longstanding, unwritten rules of traffic peering that for years allowed transit and longhaul providers to compensate each other for substantial imbalance of network traffic to avoid the free rider problem. In the absence of getting paid, some large broadband ISPs are not upgrading exchange port capacity fast enough that is contributing to network congestion and unfavorable experiences for some over-the-top video viewing, based on our understanding from some of the Transit and OTT video providers. We believe the absence of greater broadband competition could amplify the FCC's focus on this issue and any restrictions on ISPs monetizing asymmetric downstream access could further encourage OTT competition within the market.

Is Mobile Consolidation a Panacea for European Telecoms?

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Country of Region Covered? Western Europe

Opinion about Competitive Outlook for Telecoms [scale of 1 (rising competitiveness) to 10 (heading towards monopolies)] = 3

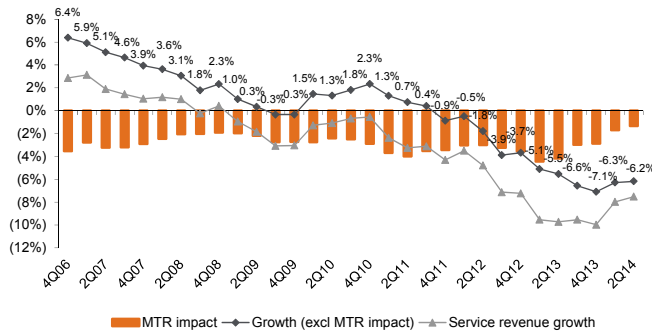
- **Mobile consolidation in Europe is perceived to be the solution to mobile revenue and margin pressure.** By moving from four mobile network operators (MNOs) to three in the most competitive markets, the pressure from the smaller subscale operators should in principle ease. After Austria in 2012, Germany and Ireland followed suit, while other major mobile markets are set to follow.
- **We believe the remedies that are being imposed by the EU authorities to allow consolidation limit scope for market repair near term as the European competition authorities aim to protect the consumer from price increases by introducing competition from the wholesale side.** Having failed to stop pricing from rising in Austria, the remedy packages imposed in Ireland and Germany are different in that capacity MVNOs have been introduced. These MVNOs have to pre commit to purchase a set (usually 20%) capacity of the network in advance and therefore are heavily incentivized to gain market share thereafter. We expect the competitive pressure from the capacity MVNO to replace a fourth operator's for 2-4 years while it fills its contracted capacity, before the other operators will likely see benefits from easing of price competition and potentially less pressure on spectrum auctions.
- **We currently do not see consolidation as the panacea for European telecoms.** We see significant upside to mobile data as a mitigating factor but expect to see three player markets benefit disproportionately vs four player markets (including those that are in the process of consolidation). The latest remedy packages mean that MVNOs will have the same incentive as a new entrant and the scale economics of the host network. It has to be considered on a case by case basis, but on balance we see limited repair and in some cases the market may even become more competitive.

Some regulatory sympathy for European mobiles after years of pressure

European mobile revenues have been coming under pressure for the past ten years through a combination of a) mobile termination rate (MTR) cuts impact on incoming revenues and roaming regulation on international revenues; b) price pressure on voice triggered partly by the MTR cuts, c) SMS (text) cannibalization from data including via OTT player services, d) lower uptake of data vs other developed regions and in most markets (e) weak macro conditions. In addition, once again, in most EU countries, operators were forced to participate in competitive spectrum auction often designed to maximize proceeds rather than encourage investment. LTE came later and on balance at a higher cost than other regions.

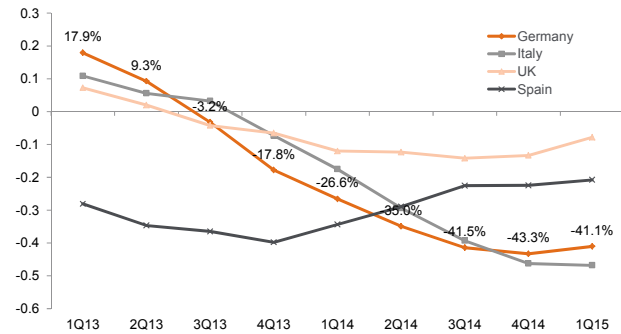
In short, European mobile revenues, profitability and returns have declined materially, especially in the most competitive markets (with typically more than three operators), where the smallest players are still subscale and are pushing for market share gains. The solution has been a push towards consolidation with operators arguing that Europe has about 100 MNOs and that the markets are very fragmented. Politicians and Eurocrats, after years of what we would characterize as persecuting the industry, started to show some sympathy and support for the mobile industry; though not as clear as for fixed (where clear regulatory changes have been pushed through in order to achieve the 2020 targets for superfast broadband).

Figure 53. European mobile service revenue growth, % yoy



Source: Company reports, Citi Research estimates

Figure 54. Vodafone text messaging volume growth, % yoy



Source: Company reports, Citi Research estimates

Is mobile consolidation a panacea?

We believe the path for mobile consolidation is set for many markets in Europe: Austria, Germany and Ireland have already moved to three players in the past 24 months, while Italy, Denmark, Spain and perhaps France are reportedly about to follow. Consolidation has to be considered on a case by case basis, as the impact and remedies could vary. We expect that in most cases, the investigation and approval for consolidation will lie with the European Commission (EC's) competition authority (DG-COMP), as has been the case so far.

We believe that having approved consolidation in Austria with weak remedies that have proved ineffective and led to higher prices/ lower subsidies and heavy criticism from national competition authorities and pro-competition (consumer) groups, DG-COMP has been more focused on the remedy packages proposed in Germany and Ireland and expect to see limited market repair and reduction in competition in the near to medium term. We therefore do not see mobile consolidation as the panacea that will return the industry to excess returns delivered in the past.

In future European mobile consolidation cases we expect the following:

- **No outright rejection.** Having already given clearance to Austria, Ireland and Germany, we do not expect DG-COMP will outright reject consolidation proposals as long as the concentration levels are reasonable (i.e., the top two operators are unlikely to be allowed to merge/ the two smaller operators will probably find it easier/ anything in the middle will depend on case by case basis).
- **But with (tough remedies) remedies.** The process followed by DG-COMP involves a broad consultation process with different parties involved (competitors, challengers, consumer groups and regulators). The process involved market testing, where DG-COMP evaluates the impact of concentration to pricing and typically asks the acquiring entity to propose remedies that could satisfy these concerns. If DG-COMP considers these remedies sufficient, then it will issue conditional approval and then the merged entity will need to implement its proposed remedies.
- **Pressure on DG-COMP to get balance right.** The extent of the demand from the authorities has changed. In 2007, DG-COMP allowed Orange and T-Mobile Netherlands to merge with no remedies and the market to consolidate to three players. But the Dutch market became less competitive and pricing levels diverged materially versus the rest of Europe, prompting the Dutch authorities to reserve LTE spectrum for a new entrant in 2012. In Austria, the consolidation

process was approved in 2012 and prices have risen materially in the next 18 months, prompting complaints by various competition authorities and Austria's BWB to start an investigation into the market in the summer of 2014. We believe that these cases have led to more targeted remedies in the Irish and German consolidation cases which, if more effective, will likely be the blueprints for remedies demanded for future consolidation cases in Europe.

Example of Austrian remedies and subsequent prices increases

A number of mobile in-market consolidation cases preceded the deal in Austria between Hutchison and Orange, but these took place many years ago (Greece in 2005, Netherlands in 2007) and had different characteristics, while others (like Orange and T-Mobile UK) were from five to four players that had limited benefit in competitive dynamics. The first of the new round of consolidation cases was the mergers of Hutchison and Orange Austria, which was agreed in February 2012 and received approval in December 2012. The deal closed in early 2013. DG-COMP approved the merger, despite opposition from the Austrian competition authority (BWB). The BWB expressed concerns around the effectiveness of the remedies at the time and warned of potential price increases post consolidation. DG-COMP believed that the remedies could be sufficient to allow for consolidation. These were:

- **Reference offer for MVNOs:** The UK's H3G undertook to offer up to 30% of the network capacity to up to 16 MVNOs, but had to sign at least one. Dutch UPC agreed terms based on the reference offer terms outlined below. H3G had yet to launch 4G at the time, so the data speeds and prices set were for 3G (with 4G prices determined depending on the premium of retail pricing).

Figure 55. H3G's MVNO reference offer in Austria

	Billing Unit	Charge Range (€c)
Mobile voice origination	Second	1 per minute
Mobile voice termination	Second	1 per minute
SMS Origination	SMS	0.4
SMS Termination	SMS	0.4
Data up to 30 Mbps	KB	0.2 per MB

Source: RTR report

- **Spectrum reserved for new entrant:** The Austrian telecom regulator reserved 2 blocks of 800MHz spectrum for a new entrant. The reserve price, coverage conditions and exceedingly attractive wholesale alternative (Figure 55) were such that no operator showed interest and therefore a new entrant did not emerge as part of the process.

Comparing the increase in prices from the start to the end of the process, we conclude that A1 in its new tariff structure has increased the entry level offer for a decent quantity of data by about €15/month, while it lowered the subsidy levels by about €150 for the iPhone 16GB, with similar price increases in other segments and even a €250 reduction (about \$315 in subsidy for the higher end offer. The increase in the effective prices for some of these offers is >100% if one adjusts for the lower contribution of handset repayment (i.e., separating what the customer pays for telecom usage vs repaying the handset). In the meantime, the speed on data has been lowered in order to incentivize the migration to the higher offers.

As of the third quarter of 2014, almost two years since approval has been granted, no MVNO has launched in Austria, but we expect that to change in the coming quarters.

Figure 56. Austria mobile tariffs before and after Hutch/Orange merger

Operator	Offer/Brand	Minutes	SMS	Data Volume	Data speed	Price (€)	iPhone 16Gb Price (€)
Before							
TKA	A1 Smart1	1000	500	Unlimited	42Mbit/s	19.9	399
TKA	A1 Smart2	2000	1000	Unlimited	42Mbit/s	29.9	199
TKA	A1 Smart 3	3000	1000	Unlimited	42Mbit/s	39.9	0
After							
TKA	A1 basic	1000 mins or SMS		100MB	4Mbit/s	19.9	549
TKA	A1Go! S	unlimited	unlimited	1 GB	4Mbit/s	34.9	449
TKA	A1Go! M	unlimited	unlimited	3 GB	21Mbit/s	44.9	299
TKA	A1Go! L	unlimited	unlimited	5 GB	42Mbit/s	54.9	249

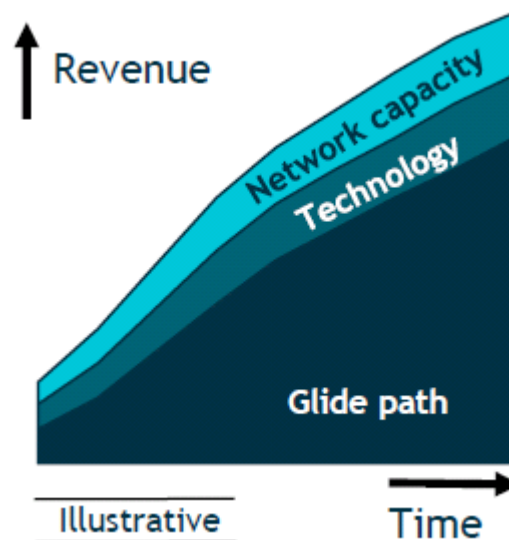
Source: Company website

Different framework for Ireland and Germany

Following the failure of remedies in Austria to limit price increases, DG-COMP came under heavy criticism from European competition authorities. The remedies imposed for Ireland and Germany had a different framework to ensure the following for the MVNOs:

- **Commitment to sign up two MVNOs who would have access to 30% of its capacity;** in both cases, similarly to Austria, the combined entity had to make available up to 30% of the capacity of the new network to MVNOs. In Ireland, at least one MVNO has to be signed up before H3G can proceed with the acquisition of O2 (the day after, UPC was confirmed as the counterparty that will take the MVNO contract but terms have not been made public)
- **The MVNOs will need to commit to a minimum amount of capacity** for a five-year period with an option to extend up to ten years. In Ireland, it was based on a fixed cost payment basis (i.e., incentivizing them to build volume). In Germany, Drillisch committed to pay for at least 20% of the capacity by year five, in a frontloaded glide-path. The capacity committed would be sufficient to service c.7% of the German mobile market. Though this pre-commitment, DG-COMP ensures that the MVNO is incentivized to win significant market share as its payment is fixed regardless whether the capacity is utilized or not.

Figure 57. TEF DE's illustration of revenue phasing of the Drillisch contract. Front end loaded revenues imply even more front end loaded capacity



Source: Company presentation

- **Spectrum to be divested to a new entrant, if one emerges.** In Ireland, H3G will divest five 2x5MHz blocks of spectrum in the 900, 1800 and 2100MHz spectrum bands from 1 January 2016 for ten years to create a path for the MVNOs to become MNOs. In Germany, the spectrum available was more limited as the bulk of the 900/1800MHz spectrum that Telefónica/E-Plus controlled was due to expire in 2016.
- **In Ireland, H3G also committed to host Eircom** as part of the network sharing agreement currently in place with O2. It will also divest five 2x5MHz blocks of spectrum in the 900, 1800 and 2100MHz spectrum bands from 1 January 2016 for ten years to create a path for the MVNOs to become MNOs.

As MVNOs commit to minimum capacity, the incentive is for them to ensure that the terms are sufficiently attractive in order to utilize the contract. In effect, these hybrid MVNOs have the same incentives as a new entrant with the network economics of an established MNO with sufficient scale. We see the following implications from the German and Irish cases:

- **Every G is included?** The MVNO contract does not only grant access to the latest technology (4G), but also any future upgrades of the network in terms of technology and capacity growth.
- **And contract can run for longer:** The contract with Drillisch in Germany for example had to be extended beyond the initial 10 years, which is the minimum envisaged by DG-COMP. In effect, the potential MVNO will only agree to sign a contract if the terms are sufficient in terms of all parameters to provide a profitable and long lasting contract. The merged MNOs cannot merge unless the agreed remedies are met and are naturally in a weaker negotiating position, especially in where there is limited choice of prospective MVNOs.

- **Is in nationwide or not?** Effectively yes. The capacity being purchased in Ireland will be based on a percentage of "a number" - Hutchison's total nationwide network capacity. Data will be calculated in gigabits per second and voice and text calculated in Erlangs. The MVNO can effectively choose where it wishes to take the capacity as the one pipe that the Commission envisages does not split down geographically. However, we expect there to be protection for the network owner against an MVNO with a traffic pattern that is extremely skewed.
- **Do MVNOs have to commit to enough capacity?** We believe there is a relatively high hurdle in terms of the capacity that the MVNOs need to commit to. However, the commitment is progressive. The MVNOs must initially accept the capacity commitment that complies with the EC's objective but beyond that capacity can continue to step up regularly to pre-agreed maximums. In other words the MVNO does not have to take delivery and pay for its targeted capacity upfront, but rather in stages. That limits the working capital absorption for the MVNO and allows for medium term progressive market share gains being committed to the EC. The hurdle (minimum capacity commitment) is not known for Ireland, but some Bloomberg reports may have suggested that it is 7% for each of the MVNOs in Germany (discussed later).
- **Is it 30% of total network capacity or of utilized capacity?** it is the former, though the MNO is in charge of managing the capacity on its network. In principle the MVNOs may exceed 30% of utilized capacity as no operator will be willing to take the network to its limits.
- **Market repair or market destruction?** We believe these remedies clearly aim at creating the economics of a new entrant rather than a traditional MVNO. The MVNO needs to come close to filling that capacity, while it will have to anticipate the change in pricing that would have occurred naturally over time and still come close to reach its target. The terms have to be attractive enough for the MVNO to reach its customer base, which secures the capacity is almost utilized, while the terms have to be attractive enough to: (1) take the business risk with targets set over many years, (2) offset the idle capacity in parts of the network, and (3) make a return. We therefore expect the terms to be extremely generous and the MVNOs to see significant market share gains after signing up to the terms. We believe that Vodafone's concerns around the remedies imposed by the EC to a large extent reflect that. We expect the market to become more not less competitive as a result and see the EC as more focused on pricing than investment (which it sees as something operators will do anyway, while competition is central to innovation).

Is Pricing Power Returning for Asian Telecoms Given Consolidation?

Arthur Pineda

Head of Pan-Asian Telecom Research
Citi Research

Country of Region Covered? Asia

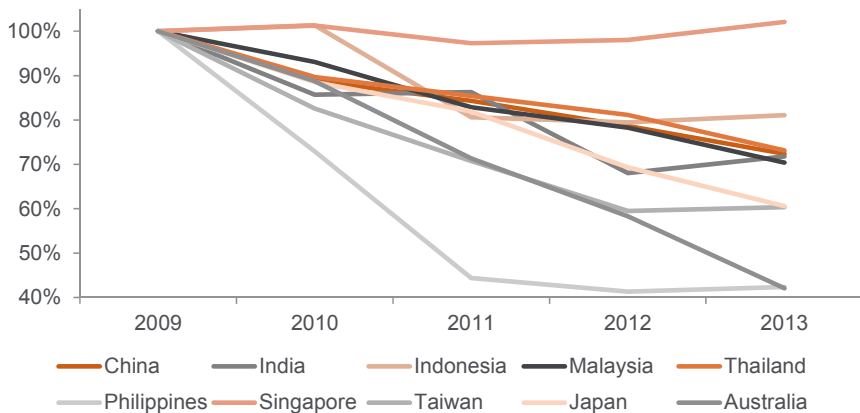
Opinion about Competitive Outlook for Telecoms [scale of 1 (rising competitiveness) to 10 (heading towards monopolies)] = 6

- **Asian mobile consolidation is helping curb supply growth** – Pricing has declined significantly over the years given excess network supply and industry fragmentation; this is now starting to reverse given consolidation and market exits. Industry consolidation has helped curb excess network supply which drives down pricing.
- **Rising network demand further augers positively on pricing** – While supply growth is slowing driven by absence of additional licensing and network consolidation, demand growth is rising with data demand starting to pick up especially in the Asian emerging markets where smartphone penetration remains low. Network utilization from data is far more intense vs. voice, thereby raising the demand curve.
- **Re-pricing already happening** – As a consequence of the improved supply-demand imbalance, pricing is already improving for some of the Asian names, albeit centered so far on the post-paid markets such as HK, Singapore, Korea, Japan and Australia via price increases or tiered pricing introduction. EM markets are starting to see similar trends with Indonesia and India facing rising price points as well.

Pricing power returning selectively with consolidation and complemented by rising network demand

We've seen Asian telecoms face significant pricing pressure across multiple markets over the last 5 years with a significant collapse in voice and data price points. This was linked to overly active licensing initiatives and network fragmentation which translated to excessive network supply, especially for the emerging Asian markets. As the supply growth had initially outpaced demand growth, pricing had fallen under pressure for most of the Asian markets. Industry consolidation however is now starting to materialize with significant moves towards M&A in markets like India, Indonesia and the Philippines. This serves to limit excessive network supply which had impacted pricing. On the demand side, we are also starting to see significant increases in network demand linked to improving smartphone penetration where most Asian markets are still in early stage development. As device penetration increases, propensity to raise network demand/utilization level rises significantly, further tipping the supply-demand curve balance in favor of more rational pricing.

Figure 58. Asia voice RPM trend (Rebased to 100%)



Source: Citi Research

Consolidation is changing the market dynamics

One of the key drivers to pricing pressure in the past was the highly fragmented markets with a number of Asian regulators too liberal in handing out spectrum and licenses. The highly fragmented markets across Asia (Indonesia/India) and significant capacity build-outs by new/smaller players (Philippines/Thailand) had resulted in significant capacity additions which in turn had resulted in declining industry price points. This trend however is changing as the market moves away from excessive fragmentation to consolidation. We've seen increasing trends towards consolidation – Philippines had seen a move to a 2 player market (PLDT buying Digitel). Indonesia saw the #2 player XL acquire the #5 player, Axiata in addition to Smartfren discussing network integration with Bakrie as per Reuters. India, which is another fragmented market, had seen bouts of consolidation with 1) Bharti taking over Loop mobile, 2) market exit by new players such as Videocon and Etisalat, 3) Uninor restricting its operations to selected circles. As per media reports (Times of India), even mid-size players such as Aircel, Tata teleservices are looking to either consolidate or exit the market. This is mainly driven by their inability to attain scale while the road ahead remains uncertain given their network challenges.

These moves point to a more contained network supply growth scenario which in turn creates pricing benefits. Propensity for industry cooperation also increases with a less fragmented market. There are of course exceptions to this scenario of improving rates – Taiwan had issued 2 additional licenses and Malaysia faces additional network build-out from 2 relatively new entrants as well. In these cases, network supply will likely expand which in turn challenge pricing levels.

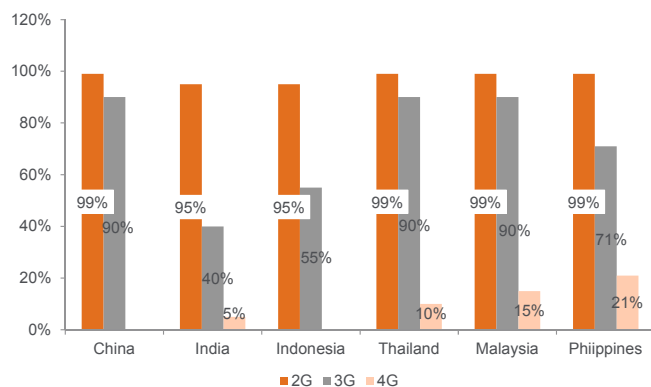
Industry network capacity increase is slowing

On top of the more active market consolidation exercises in the industry, we find that overall network supply growth will be slowing as: (1) technology upgrades to 3G/4G had been mostly completed across Asia; (2) capex cycles have been on the downturn thereby limiting network densification which drives capacity; and (3) additional spectrum issuances are now very limited.

Limited technology upgrade plans tempers capacity growth

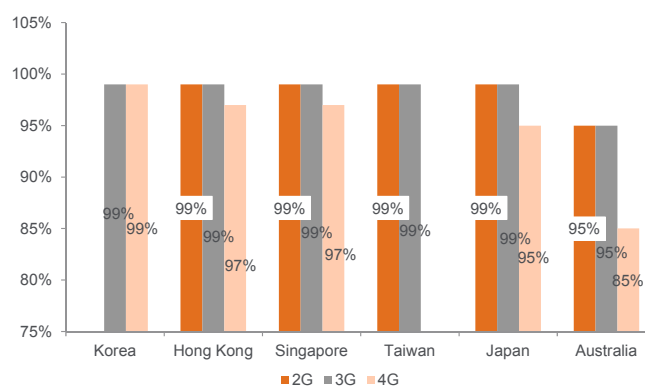
Among the more developed Asian markets, even 4G network roll-out had matured to north of 90% population coverage on average, indicating that most of the technology-led capacity expansion (which could negatively impact pricing) is done. Asian emerging market (EM) names on the other hand had already migrated to 3G networks with the exception of India and Indonesia which still lags behind given their more challenging land mass and build-out requirements. Urgency in upgrading to 4G technology for the EM names is low with network build-outs being gradual on account of the still soft 4G device (and even 3G) penetration for most of the emerging Asian markets.

Figure 59. EM Asia – network coverage (% population covered)



Source: Citi Research

Figure 60. DM Asia – network coverage (% population covered)

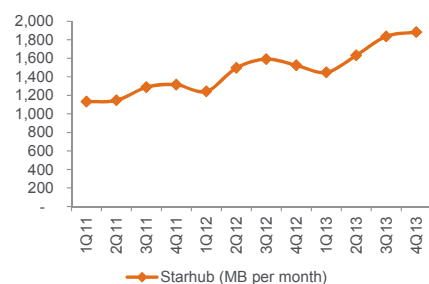


Source: Citi Research

Rising data services raise network demand which help pricing power

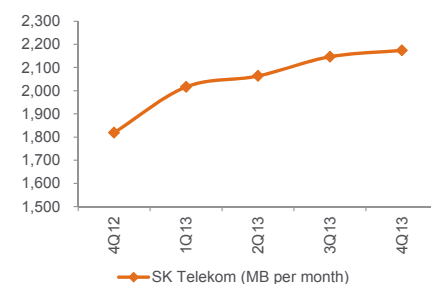
Further driving the return of pricing power to the telecom is the rising use/penetration of data services. Asia is still in the early stages of smartphone/connected device build-out and increasing penetration from these devices will result in tightening network capacity. Data is after all far more taxing from a network perspective with 1 minute of video use equivalent to 33 minutes of voice from a network throughput perspective. As data penetration rises in Asia, network demand growth will rise significantly and potentially outpace network supply growth. Evidence of rising data usage with device adoption can be seen with earlier movers such as Japan, Korea and Singapore where we saw ballooning data usage per subscriber over time, mirroring the adoption of smartphones.

Figure 61. Singapore data usage per sub trend



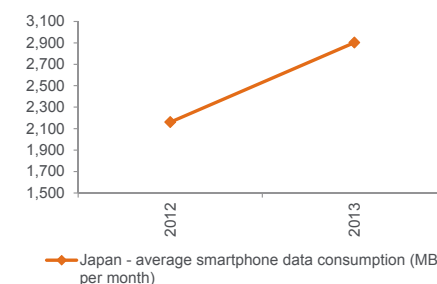
Source: Citi Research, Company data

Figure 62. Korea data usage per sub trend



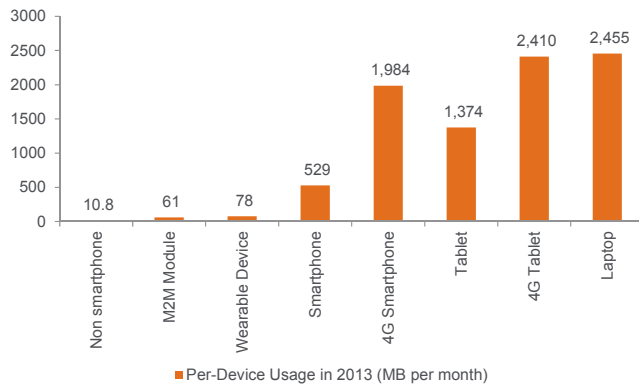
Source: Citi Research, Company data

Figure 63. Japan data usage per sub trend



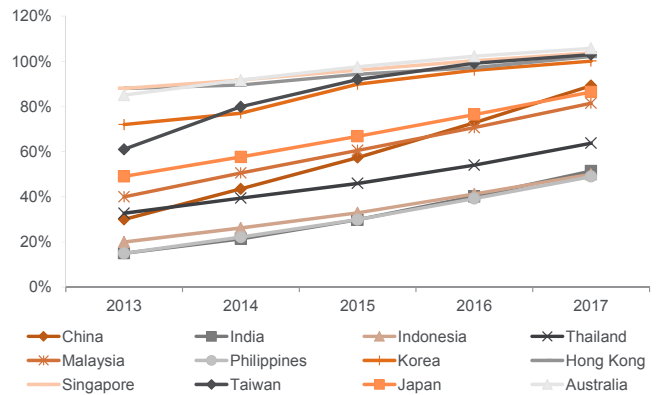
Source: Citi Research, Company data

Figure 64. Average monthly data use per device type



Source: Citi Research, Cisco

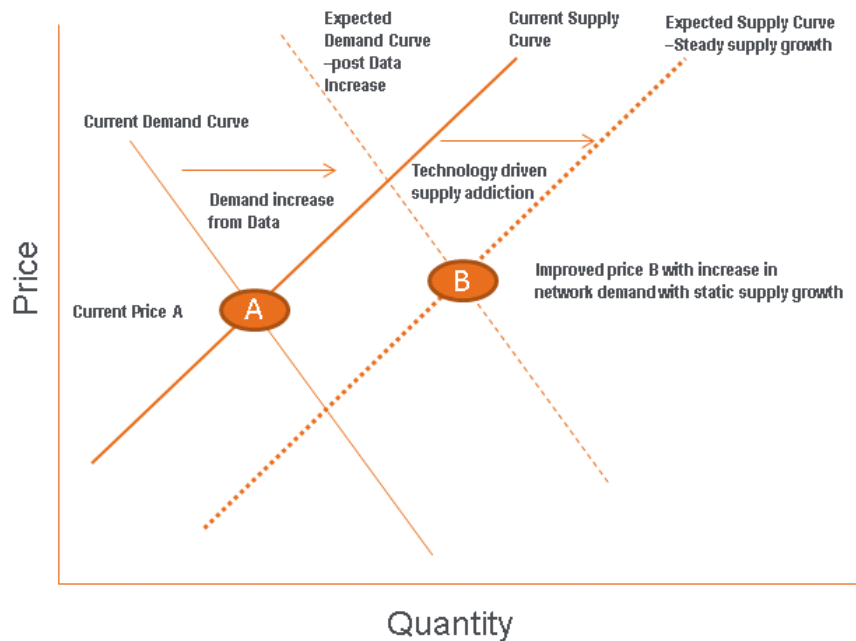
Figure 65. Asia - Smartphone penetration by Market



Source: Citi Research

Supply-demand balance favors pricing power. Based on simple supply-demand economics, if demand growth outpaces supply growth, pricing power should increase. This is the case for Asian markets especially for Singapore, HK, Korea, Philippines and Indonesia. Propensity for price repair and pricing power moving back to the telecoms away from consumers will be elevated. Exceptions to this would be Taiwan and Malaysia, where there is potential for network capacity expansion which could be disruptive for industry pricing.

Figure 66. Pricing improvements when demand growth outstrips supply growth



Source: Citi Research

Limited MVNO opportunities/risk

MVNO models had admittedly been highly disruptive for the European telecoms given their dilutive effects on pricing. European telecoms had mispriced their network wholesale rates and this had resulted in sufficient room for the MVNOs to undercut the retail pricing for the incumbent operators. Asia however had been able to sidestep the mistakes made by European counterparts with more sensible wholesale pricing which in turn limit the ability of MVNOs to undercut the operators. Among the Asian markets, we see little MVNO traction/disruption. Most markets had offered MVNOs (HK, Singapore, Thailand, Malaysia for instance), but success hasn't been seen anywhere.

Regulators are also assisting on returning pricing power in some markets

In addition the consolidation bias with the industry. Some Asian telecoms are benefitting from improvements in the pricing power owing to surprisingly favorable rulings from the regulator. The Korean and Chinese governments have, perhaps surprisingly, been active in tempering aggressive competition which would have pushed value to the consumers in the near-term — albeit arguably sacrificing longer-term industry benefit. The Korean government has pushed for greater transparency on handset subsidies and moved to actively penalize companies from taking on new subscribers if they are found to be irrationally disruptive in grabbing market share. China has also mandated marketing spend reductions for the largest operator, China Mobile which in turn allows for trickle down effects for the smaller names, allowing them to raise overall profitability.

Re-pricing is already happening

We are now seeing semblances of improving price points given better supply-demand balances as well as in-market consolidation. Within the EM space, Indonesia and India have seen sustained improvements revenue per minute (RPM) levels on more stable competition. Within the developed market (DM) space, we've seen more active data re-pricing initiatives: Korea had priced up on LTE packages vs. 3G, Singapore and Hong Kong had been introducing tiered plans and progressively raising re-contracted monthly service fees. Japan and Australia had been moving towards reducing data allowances, thereby allowing the telecoms to generate more revenues based on consumer usage. In this sense, the more developed Asian markets have moved ahead in pricing upwards, mainly on account of its more advanced data usage stage and post-paid centricity which makes subscribers more sticky.

Pre-paid EM markets however will likely see similar upward bias on tariffs over time as data demand takes-off with data device penetration. In the near-term however, EM re-pricing strategies had focused on voice services which still account for majority of their mobile revenues. In Asia's case, pricing will be driven by more favorable supply-demand bias rather than industry consolidation in itself.

To Consolidate or Not to Consolidate: The Latin American Telecom Conundrum

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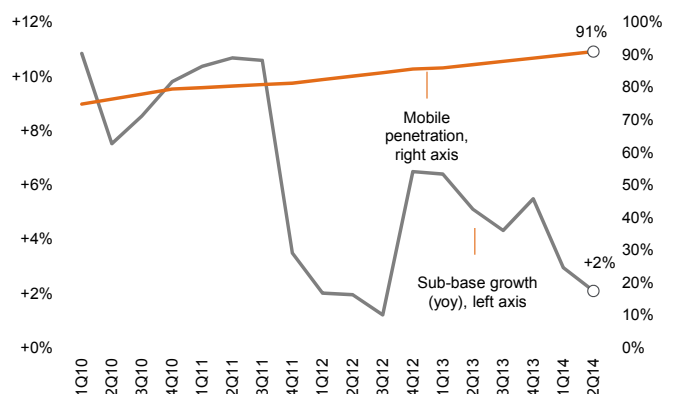
Country of Region Covered? Latin
America

Opinion about Competitive Outlook for Telecoms [scale of 1 (rising competitiveness) to 10 (heading towards monopolies)] = 4

- **Consolidation seems like a natural exit for LatAm telecoms** – With the pace of growth stalling among telecoms in Latin America, regional operators are all pursuing alternative means to improve cash flow generation.
- **Brazil trying to consolidate, but not in the near future** – While there is inherent interest for in-market consolidation in Brazil – given implied gains from operating synergies and the elimination of competitors — we expect many difficulties for the execution of this plan in the short- to medium-term. Mobile operators will have to minimize regulatory, anti-trust and legal problems. In addition, we see difficulties for the consortium of Vivo, Claro and Oi in purchasing TIM due to: leverage problems at Oi; Vivo may be distracted in digesting GVT until the third quarter of 2015; and América Móvil is also working on a complex asset divestment plan in Mexico
- **Mexico going the opposite direction; but consolidation may still happen** - Secondary laws are intended to reduce América Móvil's participation in Mexico's mobile and fixed-line markets. Among the terms announced, América Móvil intends to sell parts of its operations and spin off its mobile towers there. With that, América Móvil hopes to not be considered a preponderant company anymore and therefore not be subject to the harsh regulation – such as asymmetric interconnection – that will be applied to companies with more than 50% of the country's telecom market share. In the meantime, AT&T recently announced the acquisition of Iusacell, which has about 9% of the country's mobile users. With AT&T's stated plans to enhance/ improve Iusacell's network and (at least a temporary) interconnection advantage, we think the competitive landscape will be dramatically different in a few years, with increased competition and perhaps more operators.

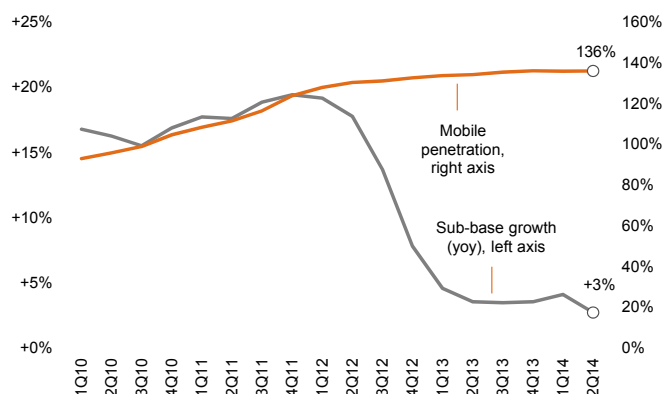
With the pace of growth stalling among telecoms in Latin America, regional operators are all pursuing alternative means to maximize cash flows. Consolidation seems like a natural exit, as companies aim to improve cash flow generation via: (1) synergies from M&A activity; and (2) the elimination of competitors. As of the second quarter of 2014, 91% of Mexico's inhabitants had a mobile account and the base there has grown just 2% YoY (Figure 67). In Brazil, growth was just 3%, but the market is more saturated than in Mexico, with 1.34 mobile accounts / inhabitant (Figure 68).

Figure 67. Mobile-base growth stalls in Brazil...



Source: Anatel, Citi Research

Figure 68. ...and Mexico

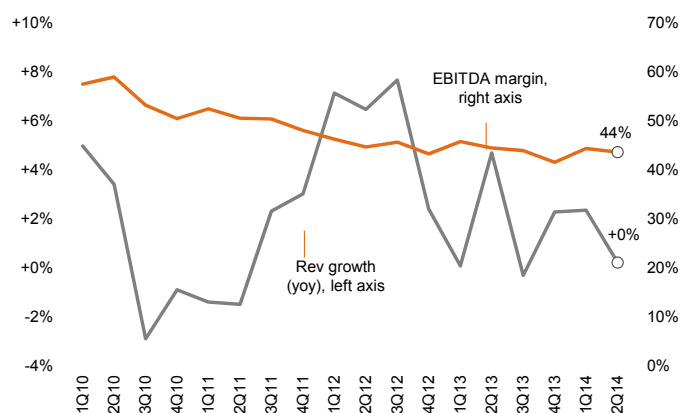


Source: Cofetel, Citi Research

More importantly, operators are now all experiencing a substantially slower pace of revenue growth (+1% in Brazil, vs. +5% on average since 2010) and Mexico (Figure 69 and Figure 70). On top of that, margins have been systematically eroding on a combination of lower mobile-termination rates (MTRs), competition, and greater difficulties in diluting fixed costs as inflation outpaces top-line growth.

Figure 69. No growth, lower margins in Brazil...

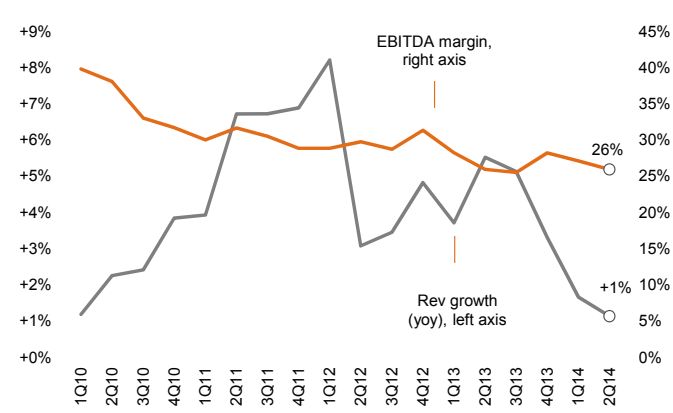
Revenue growth (YoY), EBITDA margin



Source: Company data, Citi Research

Figure 70. ...and Mexico

Revenue growth (YoY), EBITDA margin



Source: Company data, Citi Research

Brazil trying to consolidate...

With the backdrop of softening fundamentals – sharp deceleration of growth rates, pressured margins and erosion in rates of return – the consolidation theme has gained traction. Oi announced recently that it had hired investment bank BTG to act as an intermediary in an attempted purchase of TIM. The idea would be to split TIM into pieces and then sell them to the three other surviving mobile operators in Brazil – Claro (wholly-owned subsidiary of América Móvil), Vivo and Oi itself. With this, this consortium would attempt to minimize market-share concentration to expedite regulatory approval.

In addition, the CEOs of both Telecom Italia (TI) and TIM Brazil noted recently Telecom Italia's desire to maintain its operations in Brazil, and that TI wishes to be a protagonist in Brazil's telecom space, including a consolidation scenario. In the meantime, the Telecom Italia board has given CEO Marco Patuano the

Inherent interest for in-market consolidation in Brazil...

authorization to analyze strategic options in Brazil, which we think includes the potential to combine operations with Oi.

While there is inherent interest for in-market consolidation (América Móvil has itself tried to buy TIM before, and TEF seems interested in additional scale and/or synergies in Brazil), we see many difficulties for the execution of this plan in the short to medium term. Please see: “*Where there is a will, there is a way*”, of November 1, 2013.

Firstly, the three operators seem focused on other issues at the moment. América Móvil is struggling with unfavorable regulation in its home market and announced intentions to sell a sizeable portion of its business in Mexico to avoid asymmetric regulation. Meanwhile, TEF has recently announced the acquisition of GVT in Brazil, and we think it could take its subsidiary Vivo at least a year and a half to fully integrate operations with the fiber-optics operator. Lastly, Oi itself is highly levered, which we think limits its ability to participate in a sizeable acquisition, even if it successfully sells Portugal Telecom.

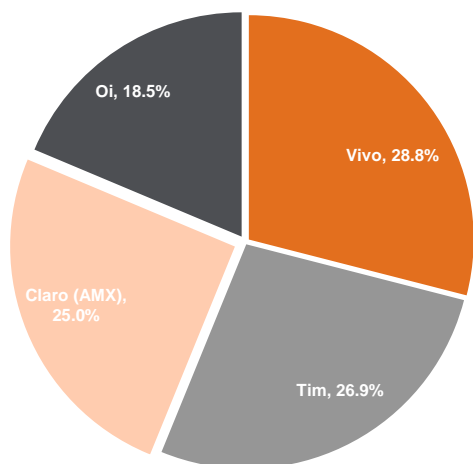
Secondly, each operator has a license to operate mobile services, and the current regulation prevents an operator from having overlapping licenses. In addition, mobile operators in Brazil are already at the top of the regulator-established spectrum caps. With this, a sale of TIM to any other company that already has a license in Brazil would require a return of the license and spectrum to the regulator. In our view, this could have a few potential problems.

1. **It could be technically difficult to accommodate all of TIM’s subscribers into that of the other operators without jeopardizing user experience, with no changes to current spectrum cap.** Anatel (the Brazilian regulator) shifted focus on network-service quality in 2012, and such a combination could lead to higher levels of dropped calls, latency rates and/or slower mobile-broadband speeds, due to congestion.
2. **Migrating TIM’s subs to a different frequency could be costly.** A total of 84% of TIM’s subs are pre-paid and as such these generate low ARPU’s and presumably have low incomes. That said, not all have the high-end handsets that are capable of operating seamlessly between TIM’s and Vivo’s (or another operator’s) many frequencies. It is likely that these subs would need a new device if TIM’s spectrum were to be returned to the regulator. In that case, we find it unlikely that the regulator – typically seen as pro-consumer – would allow subscribers to be charged for the handsets.
3. **Reduced competition.** TIM has introduced innovative mobile voice plans in the last few years and has been a driver of competition – and lower mobile pricing. As such, we think that Anatel views TIM as strategically important – from a competitive point of view – and the elimination of a competitive operator does not seem to be in the consumers’ best interest.

Having said that, the government sponsored a deep legal/regulatory change to allow Telemar to buy Brasil Telecom in 2008 and become what is now Oi. At that time, it was illegal for one concessionaire to own another, but the government wanted to create a larger incumbent that would be able to compete more effectively with foreigners. In addition, this “National Champion” would have enough scale to invest abroad. While these legal/regulatory challenges are still in place, the question seems to be centered on the government’s motivation to allow in-market consolidation in Brazil.

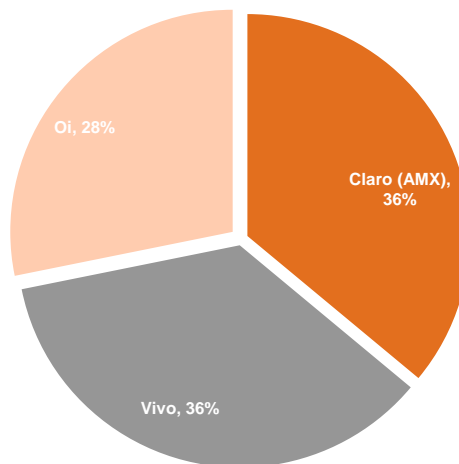
We think that competition would be jeopardized with fewer mobile operators in Brazil and that government support for in-market consolidation would be unpopular. With that, we find it unlikely that the recently re-elected administration sponsors this type of legal/regulatory change – given other priorities – which suggests that in-market mobile consolidation in Brazil is unlikely in the near future.

Figure 71. Today an evenly-balanced four-player market in Brazil
Subscriber market share, July 2014



Source: Anatel, Citi Research

Figure 72. Post consolidation market share split in Brazil
Subscriber market share (forecast)



Source: Anatel, Citi Research

...but many difficulties

At this point, the question seems to be centered on the government's motivation to allow any operator to buy TIM. This would inevitably remove the protagonist in mobile pricing reductions in Brazil, and could be viewed as unfriendly to customers and would be especially intriguing in a year of presidential elections. We think this combination suggests that in-market mobile consolidation in Brazil is unlikely in the near future.

...Mexico going the opposite direction

Regulation to fragment Mexico's mobile market

Mexico, on the other hand, seems to be going in the opposite direction. Regulation recently enacted there penalizes companies with more than 50% market share. With that, América Móvil (AMX) – whose Telcel mobile subsidiary has about 70% of national subscribers – is looking for alternatives to minimize the impacts of regulation.

Among the measures announced by AMX, LatAm's largest telecom is considering selling a portion of its operations to an outsider to avoid asymmetric regulation in its biggest market. According to the new regulation, companies with a market share greater than 50% are subject to zero interconnection rates on incoming calls, but they still have to pay P\$0.34/minute for every call one of its subscriber makes to another carrier. This new MTR regime was enacted in mid-August, so it has partially impacted reported financials thus far (3Q14).

In addition, AMX is also considering spinning off its mobile towers in Mexico. We calculate that this will barely move the needle for AMX's financials (please see "*The new AMX meets regulatory & M&A challenges*", of August 4, 2014), but think that it can appease the regulator.

In the meantime, Televisa has recently sold its 50% stake in Iusacell to Grupo Salinas (please see: "*Sale of Iusacell, TV now a simpler story*", of September 10, 2014), so that the mobile market in Mexico has remained unaltered, at least in terms of number of operators and market share. Grupo Salinas already owned half of Iusacell.

Shortly thereafter, AT&T announced the acquisition of lusacell (deal still pending). While AT&T's entrance into the Mexican market does not change market share or reduce Telcel's dominant position, we think it carries important implications. First, the US operator presumably sees an interesting window of opportunity while Telcel is still subject to asymmetric rates. Second, AT&T will be the first telecom operator to run lusacell, and it has already committed to deploy much-needed capital to expand and improve lusacell's network. With time, we think this will dramatically alter the competitive landscape in Mexico.

Pressures Driving Consolidation in Africa Poised to Persist

Thato Motlanthe

South African Telecom Analyst
Citi Research

Country of Region Covered? South Africa

Opinion about Competitive Outlook for Telecoms [scale of 1 (rising competitiveness) to 10 (heading towards monopolies)] = 3

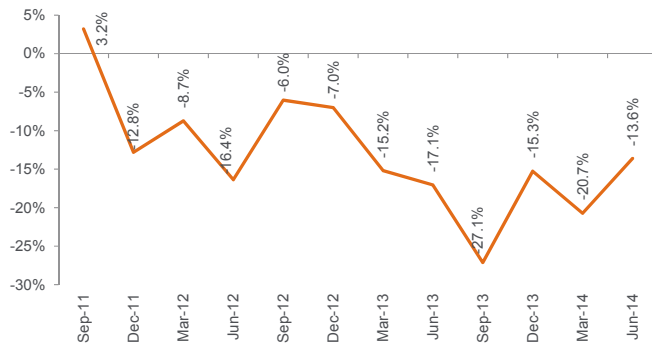
- **Pressure on telecoms traditional businesses has intensified and forced focus.** Intensifying competition and regulation plus the threat of OTT has forced South Africa telecoms to increase the focus on costs and diversify revenue streams from the traditional business model. This has been a catalyst for consolidation.
- **Consolidation happening on several fronts.** South Africa's main telecoms are seeing/driving rising consolidation in their various markets via infrastructure deals, in-market consolidation and expanding into new business streams (enterprise, ICT, data and FTTx). We expect this trend to continue as operators reconfigure their businesses to the new realities, though the benefits (of diminished competition) may only be enjoyed in the longer-term.
- **The competitive landscape will likely remain difficult.** All the major players are pursuing similar strategies, while African markets typically suited to dominance of one or two players in our view. The large number of players in many markets thus suggests that competitive pressures are likely to remain intense until they achieve a more sustainable structure, which could be aided by consolidation over time. Furthermore, South Africa telecoms foray into new business streams suggests that even those markets will be competitive as they come up against each other and incumbents in those spheres.

Market pressures a catalyst for consolidation

Pressures on South African telecoms have risen over the last few years both on the home front – and in many of their other markets on the African continent – which we believe has forced operators to be more active in terms of pushing consolidation.

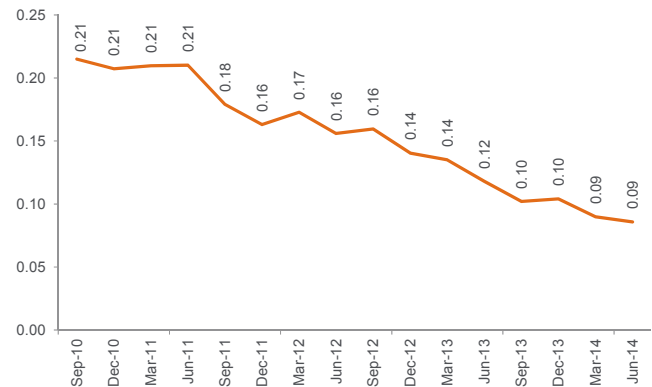
We would summarize these pressures as follows: (1) maturing markets have stimulated more aggressive competition as operators have proactively pursued market share (i.e., rather than more natural market-driven growth); (2) regulators have been increasingly implementing 'pro-consumer' and 'pro-competition' measures; (3) economic conditions have deteriorated, which has put the consumer wallet under pressure – including the ability to spend on telecoms; (4) the rising threat of content and the risk of telecoms becoming 'dumb pipes' to the benefit of OTT players.

Figure 73. South Africa simple revenue growth trends (quarterly, US\$ YoY)



Source: Company data, Citi Research

Figure 74. South Africa revenue/minute profile (US\$)



Source: Company data, Citi Research

These factors, which have put revenue and profit growth under pressure, have even triggered noteworthy turnarounds in telecoms strategic imperatives. For instance we observe that: (1) whereas telecoms had previously indicated that infrastructure/tower sharing would be reserved for smaller operations, we are now seeing deals being concluded for large operations; and (2) although operators had in the past suggested that they would not get into content, this stance has also changed.

South African telecoms are thus increasingly turning to consolidation as a possible tonic to boost flagging growth and indeed diversify from the traditional business. We observe a rise in the following: (1) infrastructure sharing/deals; (2) in-market consolidation; and (3) cross-sector acquisitions – some of which overlap.

South African telecoms have pushed consolidation in the home market

In South Africa there have been severable notable examples of consolidation falling under the consolidation categories alluded to above.

1. **Infrastructure sharing:** (1) Fixed-line (FL) incumbent Telkom is presently in discussions regarding an infrastructure sharing with one of the large MNOs. The arrangement would, in broad terms, entail a reciprocal roaming agreement including a managed network service (MNS) with the MNO taking financial and operational charge of Telkom's RAN roll-out; while the MNO could gain access to some of Telkom's spectrum. The deal is aimed at streamlining longer-term operating expenditures (opex) and capital expenditures for the players.

(2) #3 player Cell C has also indicated that it is in discussions with other operators infrastructure sharing (e.g. co-locating), though not MNS, in a bid to improve breadth and quality of its network ad lower opex and capex.

2. **In-market consolidation:** Vodacom has proposed a R7 billion (\$360 million) enterprise value (EV) buy-out of #2 fixed line player Neotel. This is perhaps a 'hybrid' case in that it also applies to 'cross-over' bullet that follows. Vodacom's rationale is that such a deal would help develop its fiber, as well as enterprise (herein the 'cross-over' element) footprint, while also giving Vodacom access to valuable additional spectrum which would hasten data growth for the company.

3. **‘Cross-over’ M&A:** Telecoms are increasingly looking at non-traditional revenue streams with the preceding Vodacom-Neotel example a case in point. The other major deal in this regard is Telkom’s proposed purchase of ICT player Business Connexions for R2.7 billion (\$240m), which would expand its reach into the enterprise and IT sphere.

Other MNOs also aim to increase their ISP footprint via the acquisition of such businesses. Meanwhile formerly-listed ISP Vox Telecom has indicated that it too is searching for an acquirer citing the strong consolidation environment in South Africa telecoms as presenting an ideal opportunity for this.

There are fairly clear overlaps across all the categories as the deals pursued by the main telecoms seek to deepen their roots in areas they already have some presence. Fixed-mobile convergence is also a major factor in South African telecoms current thinking, with all investing in fiber and looking to gain the ascendancy in FTTx.

In any event the driving force, as suggested earlier, is that the pressure on traditional business models is forcing operators to seek out new revenue streams and increase the focus on cost management.

Tower deals, so far, the main modus operandi in other African Op’s

In the South Africa telecoms’ other markets the main developments have been around tower deals. It has been interesting to note the change in tack with respect to infrastructure sharing in key markets – especially South Africa and Nigeria – where network was previously touted as a key advantage that could be undermined by tower sharing.

In more recent years, this stance has conspicuously softened due, we believe, to the increased pressures on the businesses. Driving growth has become more burdensome, in particular the cost of achieving it. Tower deals have, thus, become a norm as operators seek to rationalize opex and capex going forward.

Figure 75. Recent tower deals in Africa

Country	No. of Towers	Deal Value (\$m)	Value/Tower (\$k)
Nigeria	9,151	1,800	197
Ghana	1,856	498	268
Tanzania	1,149	75	65
Uganda	962	175	182
Côte d’Ivoire	911	141	155
Cameroon	820	143	174
Zambia	719	-	-
Rwanda	550	-	-

Source: Citi Research

Over and above this the aggressive competitive landscape and persistent struggles of subscale smaller operators have increased the pressure for ‘out-and-out’ consolidation in our view. A recent example is the acquisition of #3 operator Warid Telecom by #2 player Airtel in the Ugandan market (where MTN is the #1).

Elsewhere, France Telecom owned Orange is reviewing its investments in Uganda and Kenya, with South Africa’s main operators regularly linked to these assets in the press. In Nigeria, state-owned NITEL and M-Tel (ineffective players as they have been) are being liquidated.

Competitive landscape could remain tight for a while yet

From the preceding discussion, it is clear that consolidation is a prominent theme for South Africa's telecoms. In our view this will remain the case as there appears some way to go before markets reach a level of sustainability.

In our opinion, there are too many players in most key African markets where the structure is suited to the dominance of one or two players. This is evident in the high market share concentration and high incidence of on-net traffic, where dominant players regularly exploit their network advantage. It remains to be seen whether the developments around tower sharing and interventions from regulators could affect this over time.

Figure 76. Key African markets for South African telecoms

Market	No. of players	Population (mln)	Penetration (%)	Mkt Share of #1
DRC	7	69	35%	31%
Ghana	6	26	101%	50%
Cote d'Ivoire	6	24	79%	39%
Tanzania	6	51	57%	37%
Uganda	6	37	44%	54%
SA	4	53	149%	52%
Nigeria	4	170	68%	49%
Sudan	3	36	75%	60%
Mozambique	3	27	39%	34%
Cameroon	2	22	69%	63%

Source: Citi Research

In the meantime, smaller operators will have to remain aggressive in order to try gain sustainable levels of market share and profitability. Even in new business streams (enterprise, content, FTTx), we expect competition to be quite fierce as (1) most the main operators are expanding into the same areas; and (2) they are likely to run into existing players who will likely defend their turf jealously.

The above context supports the assertion that consolidation will continue to be a factor for some time to come. Ironically, competition in African markets appears poised to intensify (or at least remain as intense) before it abates – which may only happen in the very long-term.

Enacting Structural Separation in Australia

Justin Diddams

Head of TMT Research for Australia & New Zealand

Citi Research

Country of Region Covered? Australia & New Zealand

Opinion about Competitive Outlook for Telecoms [scale of 1 (rising competitiveness) to 10 (heading towards monopolies)] = 7

- **Government Policy intervention used to facilitate infrastructure investment and rejuvenate competition.** The sheer size and (lack of) scale in the Australian telecom market has resulted in minimal infrastructure competition, despite deregulation of fixed-line access network over 20 years ago, and consequently a lack of investment (and technological advancement) in the access network. In order to improve consumer access to 'faster' broadband the government undertook a decade of policy and legislative reforms to enact the structural separation of incumbent fixed-line operator Telstra.
- **Recreating a Fixed-Line Monopoly.** To achieve structural separation of the access network the government has re-created a monopoly organization called the National Broadband Network (or "NBN Co"). As part of this process the government negotiated long-term leasing arrangements between Telstra and NBN Co for access to the physical infrastructure (pits and ducts) to facilitate the construction of a FTTN/FTTP network. It's also worth noting the government passed legislation preventing any further infrastructure competition (against its new monopoly provider).
- **More (or Less) Competition.** On the infrastructure side of the fixed-line segment, the monopoly is merely transferring from the incumbent into a new standalone entity, implying limited scope for infrastructure competition. From the consumer side, retail services providers face similar barriers to entry but the playing field should become (more) level with a wholesale only provider of network access providing equivalent pricing of network access. Some have argued we could see renewed competition in the retail segment from new entrants and/or lower pricing of broadband services. Interestingly, in recent years there has been a raft of M&A activity among the smaller RSP, with the four major access seekers plus the incumbent Telstra holding 95% of all broadband subscribers in Australia.

The tyranny of distance

The size and (lack of) scale present in the Australian market has seen minimal infrastructure competition, despite deregulation of fixed-line access network over 20 years ago, and consequently a lack of investment (and technological advancement) in the access network leaving Australia with broadband speeds lagging most developed nations (Figure 77).

The majority of broadband access is provided via copper lines, using ADSL technology, as outlined in Figure 78. While HFC cable networks were constructed during the 1990/2000's, the penetration of connected households is around 30%. This implies that Australian households have limited access to "faster" access technologies.

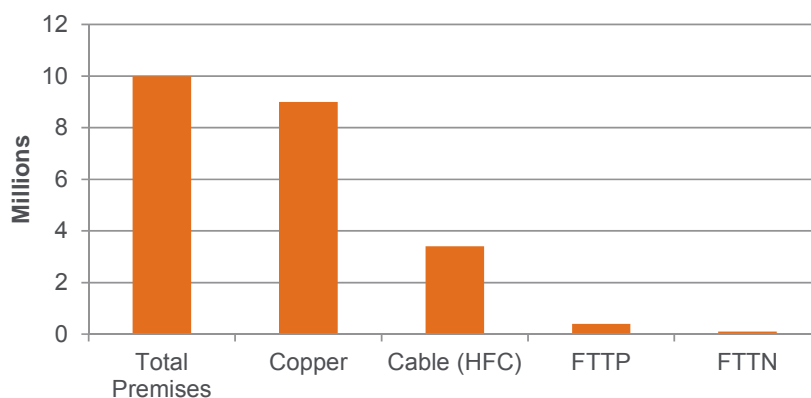
The Government is also seeking to enact structural separation on the incumbent fixed-line operator Telstra, who operate over 75% of the access lines in Australia (See Figure 79).

Figure 77. Average (Mbps) broadband speeds – Australia is #40



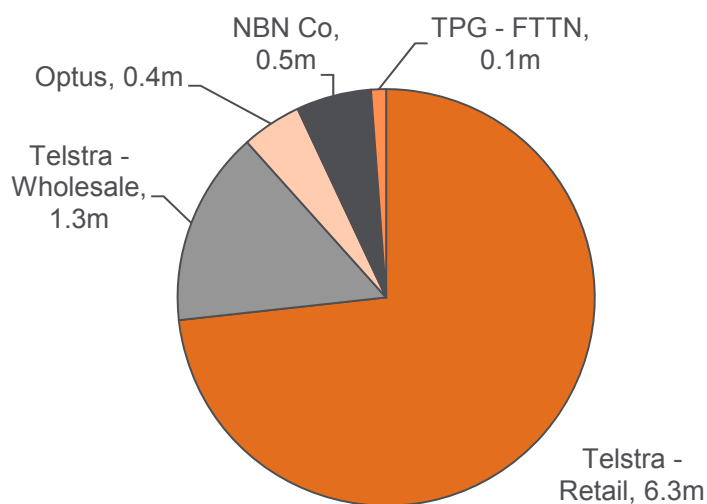
Source: Citi Research, Akamai

Figure 78. Access technologies in Australia in 2014



Source: Citi Research

Figure 79. Market share of access technologies (by operator)



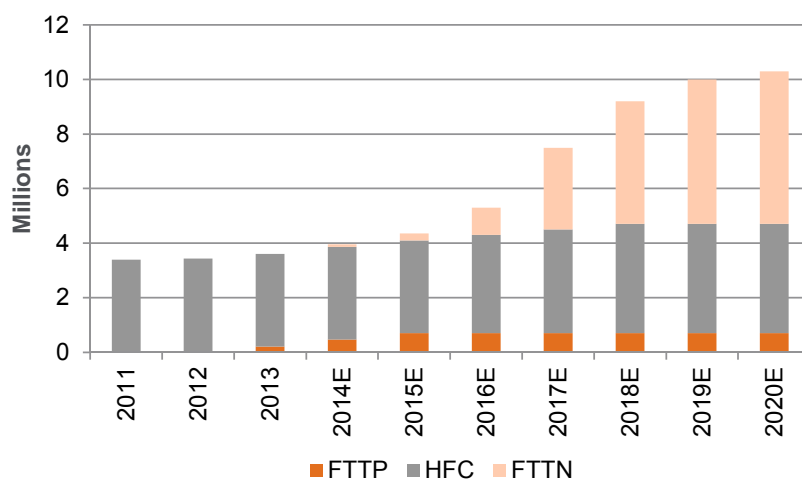
Source: Citi Research

Policy intervention to drive investment

To achieve structural separation of the access network the Government undertook a decade of policy and legislative reforms to enact the structural separation of incumbent fixed-line operator Telstra. At the same time the Government has re-created a monopoly organization called the National Broadband Network (or “NBN Co”), to manage the network upgrades. The current policy framework should see a mix of access technologies (FTTP, FTTN and HFC cable) to facilitate access to “faster” broadband.

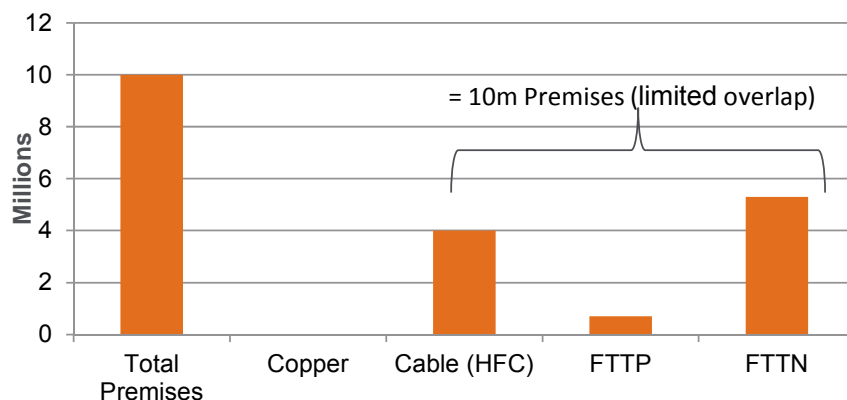
As part of this process the government negotiated long-term leasing arrangements between Telstra and NBN Co for access to the physical infrastructure (pits and ducts) to facilitate the construction of a FTTN/FTTP network. It's also worth noting the government passed legislation preventing any further infrastructure competition (against its new monopoly provider).

Figure 80. Premises passed by “faster” access technology



Source: Citi Research

Figure 81. Access technologies – post completion of NBN project



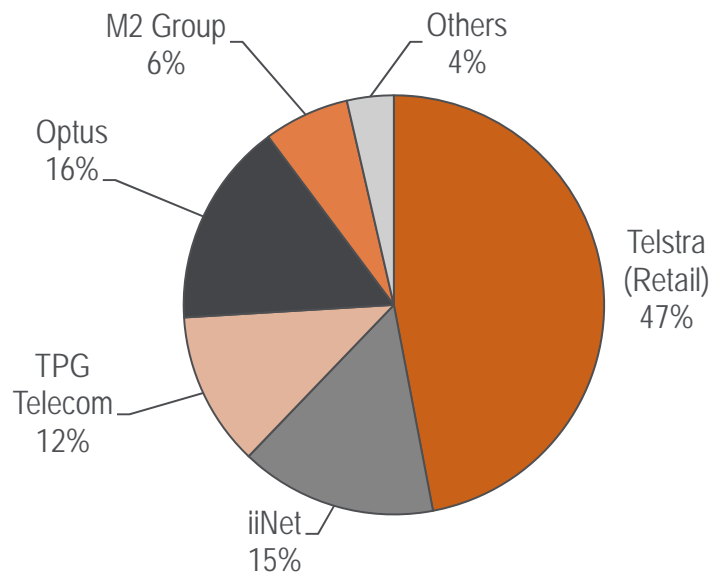
Source: Citi Research

Market already consolidated

On the infrastructure side of the fixed-line segment, the monopoly is merely transferring from the incumbent (Telstra) into a new standalone entity (NBN Co), implying limited scope for infrastructure competition. From the consumer side, retail services providers face similar barriers to entry but the playing field should become (more) level with a wholesale only provider of network access providing equivalent pricing of network access.

Some have argued we could see renewed competition in the retail segment from new entrants and/or lower pricing of broadband services, leveraging the level playing field created by the monopoly wholesale provider. Interestingly, in recent years there has been a raft of M&A activity among the smaller RSP as scale becoming increasingly important given the required investment in backhaul, transit and operational staff. We note the four major access seekers plus the incumbent Telstra now holding 95% of all retail broadband subscribers in Australia.

Figure 82. Retail broadband subscribers – June 2014



Source: Citi Research, Company data



APPENDIX

Definition of Telecom Dominance and Monopoly

Dalibor Vavruska

Head of CEEMEA Telecom Research

I have my own theory about why decline happens at companies like IBM or Microsoft. The company does a great job, innovates and becomes a monopoly or close to it in some field, and then the quality of the product becomes less important. The company starts valuing the great salesmen, because they're the ones who can move the needle on revenues, not the product engineers and designers. So the salespeople end up running the company.

Walter Isaacson, Steve Jobs

- Monopoly, dominance and oligopoly in telecoms arise when one operator or a group either dominates telecom infrastructure in a particular geography or it dominates trading with certain services for a particular group of customers.
- In order to assess monopoly, dominance or oligopoly one needs to establish 'relevant markets', which are not always easy to define in telecoms compared to other industries.

Right definition of telecom dominance and monopoly is more than semantics

Monopoly can arise from exclusive possession of supply or control of trading in a commodity

Monopolies, dominance and oligopolies all constitute potential failure of liberalization

Let's first define monopoly and dominance in the telecom context. According to Oxford Dictionaries 'monopoly' means:

'The exclusive possession of the supply or of trade in a commodity or service'.

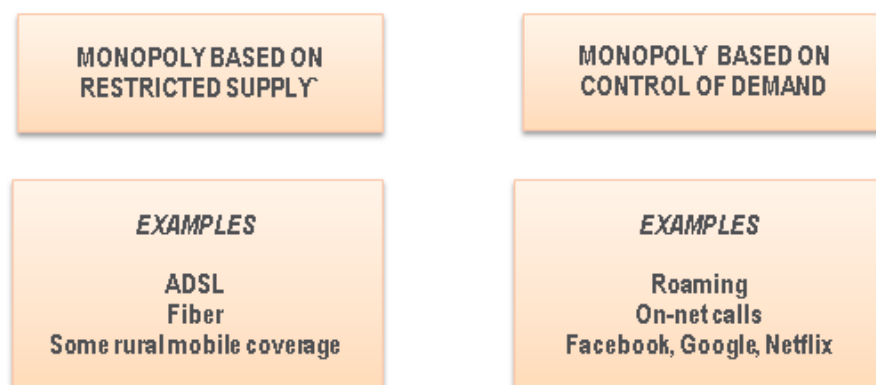
The issue with dominance and monopoly in telecoms arises when one market player possesses (1) either most or all relevant infrastructure or (2) it has significant power, possibly control, over provision of certain service. As shown in Figure 83 the former can be demonstrated by an example of asymmetric digital subscriber line (ADSL) fixed-line networks providing broadband in areas with no fiber, cable TV or wireless options. Similarly, fiber or cable TV may have a monopoly for example on 50Mbps broadband in areas where ADSL is available, but only offers lower speed. Power over service provision can be shown in an example of on-net calls or international roaming provided to a customer of a particular mobile operator (although there is a choice of roaming networks in foreign countries, provision of roaming service and its pricing is controlled by the customers' home operator). Another example is when OTT providers such as Skype, Netflix or Google possibly dominate provision of services such as C2C video calling, on-demand movies or search.

When we talk about monopolies we try to look at the subject from a broader perspective, i.e. talk about degree of competition. In this sense the possible failures of competition include not only monopolies, but also dominance or oligopolies, defined by Oxford Dictionaries as:

'A state of limited competition, in which the market is shared by a small number of producers or sellers.'

Based on this definition oligopolies occur not only when a small number of competitors collude to limit competition, but also for example when network capacity is shared, which is becoming increasingly relevant in telecoms today.

Figure 83. Examples of telecom and Internet monopolies*



* for the purpose of this chart we define monopolies as companies, which dominate their market segments Source: Citi Research

When analyzing health of competition, regulators use concept of 'relevant markets'

In order to analyze the health of telecom competition it is necessary to define the so called 'relevant markets', i.e., markets in which competitiveness is assessed. Relevant markets are defined as the intersection of *relevant product markets* and *relevant geographical markets*. When establishing relevant product markets, regulators look at demand-side substitution (i.e. ability of customers to switch to another product when price of the original product rises) and supply side substitution (i.e. ability of new suppliers of the product to enter the market when prices rise). In telecoms, demand side substitution may occur for example when mobile data customers switch to WiFi for cost saving reasons. Supply side substitution may occur for example when prices of cable TV Internet are high enough to attract fiber investment as an alternative. Meanwhile, geographic market is an area where the same conditions apply to all traders. In the case of telecoms this may refer to regulation, but also presence of certain types of infrastructure etc. Bishop and Darcey (1995) brought an interesting alternative definition of 'relevant market' as 'something that is worth monopolizing'.

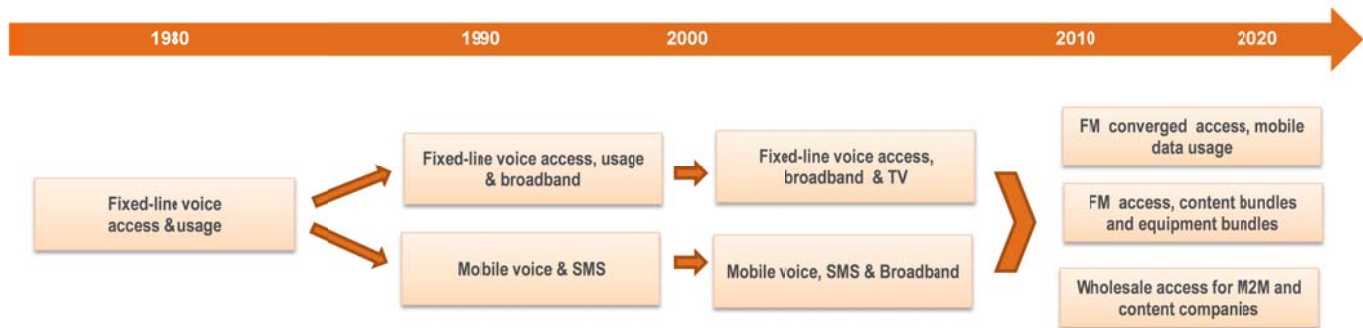
Defining relevant markets in telecoms is challenging

In most infrastructure industries it is relatively easy to define relevant markets. In the case of electricity, for example, relevant market is the market for electricity consumption in a certain area. The consumption of the service is measured by per connection capacity and the amount of electricity consumed. Defining relevant markets is rather technical in the case of electricity, also because the case for building alternative distribution infrastructure practically does not exist. In telecoms, on the other hand, defining and measuring the service and establishing relevant markets is far more complicated, among others for the following two reasons:

1. **There is currently no firm and long-term sustainable definition of telecom service and a way of measuring its consumption.** Nature and size of different telecom markets tends to change depending on technological developments and regulation. For example, fixed-line voice monopoly can be undermined by mobile voice (new technology) or Local Loop Unbundling (LLU) (new regulation). Although none of these actually involves building competitive fixed-line infrastructure with measurable market share, this makes fixed-line infrastructure monopolies (in the strict sense of word) more tolerable. Technology and regulation may create entirely new markets (e.g. LLU) as well as cause markets to become severely scaled down or extinct (e.g. international calls, roaming, voice telephony or ISDN Internet). Creation of faster and better service such as fiber could meanwhile create a new market, which cannot be directly compared for example to the

ADSL market. Fundamentally new markets connected with telecoms such as mobile payments may emerge as well. Figure 84 shows our view about how telecom servicers evolve over time. The nature of the future services is not entirely clear yet.

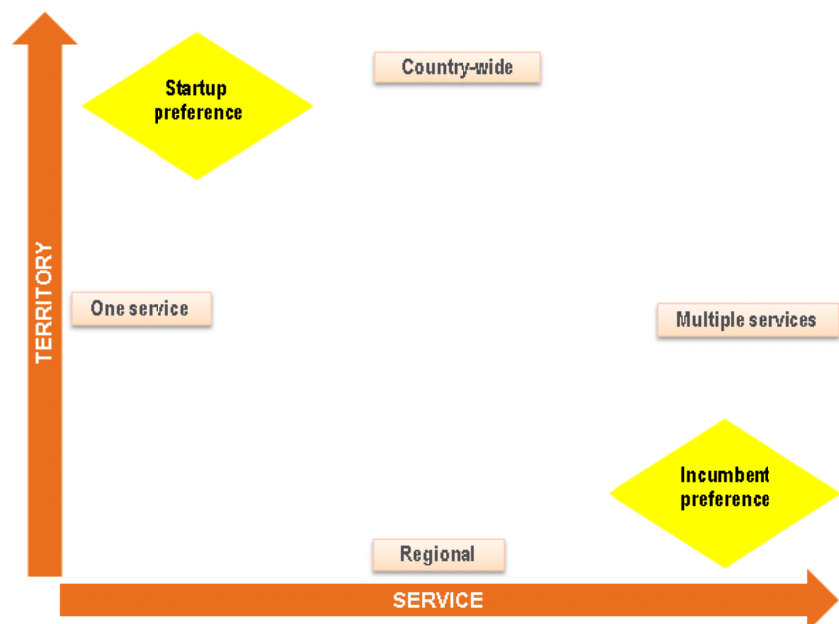
Figure 84. Evolution of telecom services



Source: Citi Research

- Most market participants have vested interests, which impact their view about the definition of relevant markets.** Telecom incumbents naturally prefer broader product definition (e.g. including fixed-line, mobile voice, data and content), which makes their market share appear weaker. Meanwhile, specialized challengers such as mobile-only or cable TV operators tend to prefer narrow definitions, which better expose the incumbents' dominance. Geographically, newcomers often prefer to see relevant markets country-wide, because this may conceal their market share strength in specific regional markets. Incumbents on the other hand usually prefer region by region distinction, which could for example allow them to claim that they are not dominant in certain metropolitan areas.

Figure 85. Defining relevant markets for the purpose of assessing telecom competition



Source: Citi Research

Telecom Regulation (beyond regulating monopolies)

The market needs a strong state to function normally.

Jean Tirole, Economist, Laureate of the 2014 Nobel Prize for Economics

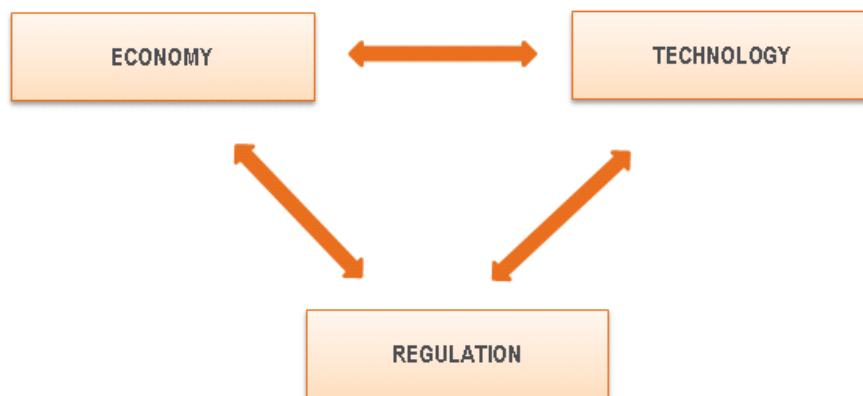
- Telecoms have always been heavily dependent on regulatory policies and we do not expect this to change.
- Regulation in telecoms serves a variety of purposes, helping to address negative impact of monopolies or excessive market fragmentation, governments' desire to promote new technologies, need to manage national resources as well as other issues related to freedom, security, health etc.
- Regulatory policies are in practice driven by a range of often conflicting factors such as global and local visions for the industry, ideological stance towards market interventions, but in some instances also populism, industry's vested interests, desire to raise short-term tax revenue, etc.

Purpose of telecom regulation

Citi telecom research team sees regulation as the most important driver for telecoms globally

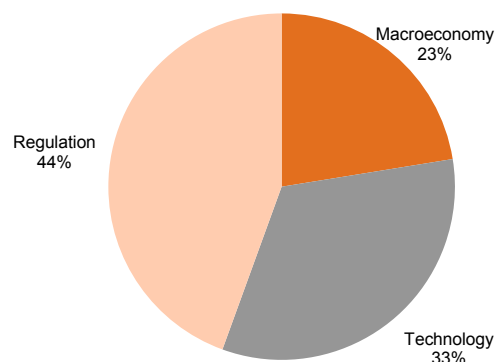
We see the economy, technology and regulation as three key drivers of the telecom industry. Figure 87 and Figure 88 show that the Citi global telecom research team sees regulation as the most important driver not only globally, but in each of the five major regions. Telecoms have always been heavily regulated, not only due to their monopolistic history. We believe that significant regulatory interference is likely to be sustained in the future, although its levels may vary in time and country-by-country to reflect differences in the state of the infrastructure, ideological and policy priorities, purchasing power, influence of the incumbent telecom operators, etc.

Figure 86. Key drivers in telecoms



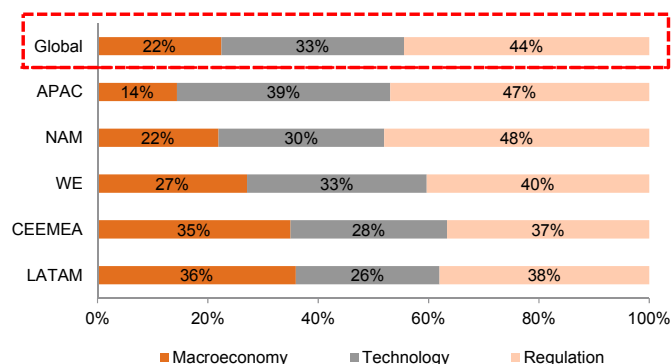
Source: Citi Research

Figure 87. Assessment of global importance of key telecom drivers by Citi global telecom research team



Note: for Top 25 selected countries, including the Top 20 global economies by DP, weighted by countries GDP
Source: Citi Research

Figure 88. Assessment of regional importance of key telecom drivers by Citi global telecom research team



Source: Citi Research

Thirteen reasons to regulate telecoms

We see the following thirteen key points as reasons to regulate telecoms:

Addressing negative impacts of monopoly or fragmentation

1. **Monopoly price premium.** Telecom businesses, unless regulated, tend to lean towards oligopolies, dominance or monopoly. Such situations, unless regulated, tend to lead to excessive pricing and insufficient service differentiation.
2. **Potential abuse of monopoly in bundling.** Telecoms may use their monopoly premium from legacy products to cross-subsidize new products (e.g. fixed-line incumbent subsidizing its mobile or content business). This could be seen as unfair distortion of the subsidized markets, potentially aimed at weakening competitors, which focus on certain products or market segments only.
3. **Negative externalities of building parallel competitive infrastructures.** Building of parallel competitive infrastructures involves negative externalities such as those related to construction works in the cities, excessive number of towers, etc. Such externalities and infrastructure fragmentation may have an adverse impact on the environment, on other industries (e.g. transportation), and also on scale economies in the telecom industry itself.

Encouraging technological investments

4. **Universal right to broadband Internet.** Increasing number of countries, especially in the developed world, see broadband as a 'universal right'. However, from an infrastructure point of view this could become a moving target, because Internet speed and quality standards keep rising with advancing applications. Providing such standard of connectivity may not be profitable in all areas without regulatory interference.
5. **Political demand for telecom infrastructure investments in areas designated for development or re-development.** Telecom infrastructure is often seen as 'value for money' infrastructure investment compared to, for example, transportation infrastructure. Therefore governments sometimes have incentive to encourage telecom investments in areas designated for development or re-development.

6. **Political interest to support domestic TMT industries.** Governments in countries with globally significant technology, media or Internet industries, in some cases consider interests of their global TMT champion companies in regulating local telecoms. Examples of countries with such TMT champion companies include the US (tech, media and Internet industry), Korea (tech industry), China (tech industry), Europe (tech industry) and Japan (tech industry).
7. **Political interest in supporting international expansion of domestic telecom champions.** Value of cross-border synergies in telecoms has always been debatable. That said operators in some countries have been particularly active in building international telecom businesses empires. Countries hosting such international telecom 'empire-builders' include the UK, Spain, France, Germany, Netherlands, Sweden, Norway, Hong Kong and Japan, but also emerging markets such as Mexico, Brazil, Russia, India and South Africa. We would not rule out the possibility that cross-border synergies in some of the cases could have been boosted by implicit government support for international expansion of their national operators.

Management of national resources

8. **Suitability of telecom revenue as a base for tax revenue generation.** Some governments are taking advantage of the relatively low price elasticity of demand in telecoms, which makes the industry (particularly its less competitive parts) a good basis for generating special tax revenues. Governments are also generally aware of their strong position to extract revenue from the telecom industry in competitive spectrum auctions.
9. **Management of scarce natural resources.** Telecoms use finite scarce natural resources such as spectrum. Governments have a duty to allocate such resource to the best interests of their countries. Since telecoms belong to the main users of spectrum, allocation of spectrum to them is therefore one of the most important regulatory policies in the industry.
10. **Government shareholdings in telecom operators.** In many countries governments are still controlling or significant shareholders in telecom operators. Alternatively, they may own golden shares or other special rights. They may also support controlling shareholders in major telecom companies for example to lure infrastructure foreign direct investments (FDIs) into their countries.

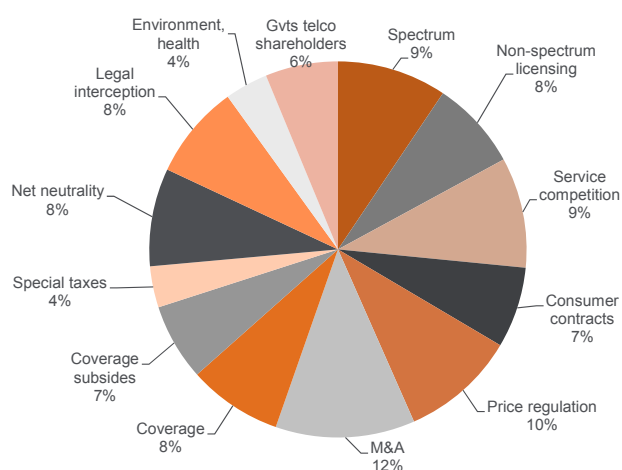
Addressing issues around freedom, security, privacy and health

11. **Political demand for freedom of access to information and privacy.** The key (net neutrality) debate is whether telecom operators should have the right to discriminate different types of content (e.g. by blocking or adjusting quality of connectivity for certain types of content). The opponents say that doing so could harm freedom of consumer's access to information, evoking broader freedom of speech issues. Separately, privacy issues including the 'right to be forgotten' are now becoming important as well.
12. **Political demand for legal interception and blocking of content.** This issue has become more relevant particularly in the last few years. Governments around the world are coming to terms with the increasing powers of Internet and communications networks. Such powers can be used by governments' opponents including individuals and groups with criminal backgrounds. Essentially all countries have therefore some mechanisms for

legal interception and/or blocking of illegal content. Moreover, a growing number of countries are forcing all users of communication networks to reveal their identity. All this naturally raises privacy and freedom of speech concerns. The key issues are: who is authorized to decide about surveillance or content blocking; can this be performed only for reasons explicitly stated in the law; how detailed data about calls and Internet traffic are the operators obliged to store; what share of the obtained data is processed; what tools are used to process it (e.g. use of surveillance software applied on data from users not suspected of breaking the law, etc.) and how is the processed data used.

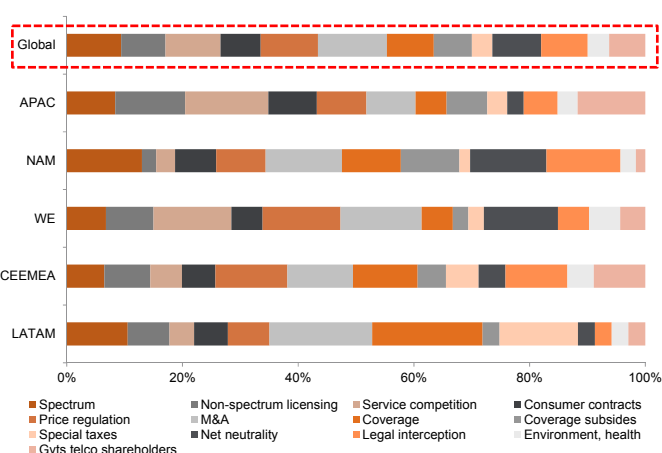
13. **Environmental and health issues.** There are essentially three issues. Firstly, there are environmental issues related to the location of mobile towers. Secondly, use of wireless technologies causes wireless pollution and possibly health implications from excessive exposure to radio waves, whether by using mobile devices or by proximity to wireless masts. Finally, there are issues of mental health related to excessive use of Internet and mobile devices. All these health issues are still being researched.

Figure 89. Citi global telecom research team view on current relative importance of regulatory drivers globally



Source: Citi Research

Figure 90. Citi global telecom research team view on current relative importance of regulatory drivers by regions



Source: Citi Research

Regulatory Tools

Thirteen powers, which the regulators have at their disposal

The above points show that the purpose regulation is far broader than breaking up monopolies. While we have already outlined the reasons, which drive the authorities to regulate telecoms, we will now focus on the tools (or regulatory powers) that the authorities have at their disposal. These include the following:

Powers aimed at protecting consumers from monopolies

- Enforcement of wholesale network access to fuel competition and allow creation of service or so called virtual operators; examples of such enforcement include LLU, national roaming, MVNO, access to passive infrastructure, etc.;
- Regulation of operator-consumer contracts to protect consumer rights;
- Retail and wholesale price regulation of monopolies; and
- Regulation of mergers and acquisitions.

Powers aimed at encouraging investment

- Enforcement of coverage requirements (often linked licensing); and
- Subsidies of certain investments

Powers aimed at raising tax revenue

- Special taxation.

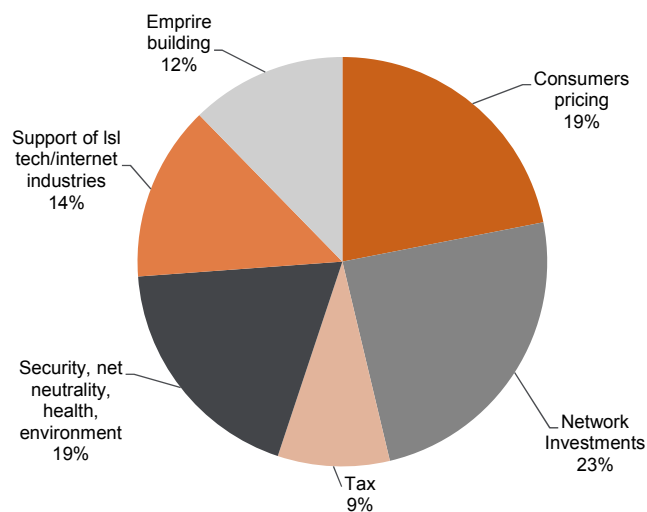
Powers aimed at objectives in the area of freedom, security, privacy, environment and health

- Net neutrality regulation;
- Restriction and surveillance of certain types of content/ privacy regulations; and
- Regulation of radio equipment from environmental and health point of view.

Power with multiple aims

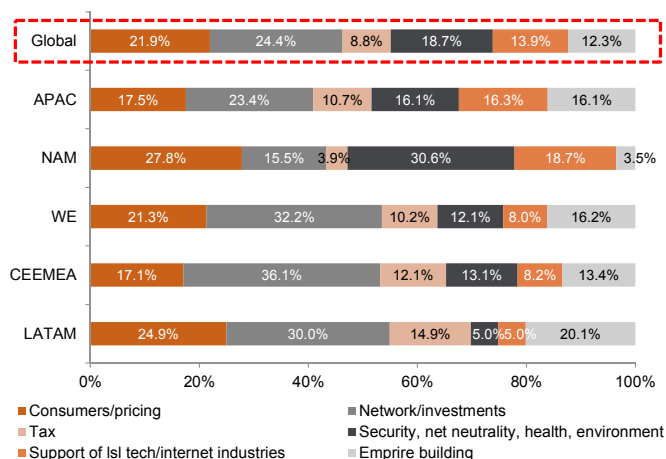
- Spectrum allocation;
- Shareholder decisions in government-controlled telecoms; and
- Licensing, i.e. banning certain entities from provision of certain services.

Figure 91. Citi global telecom research team view on current relative importance of different interests driving regulation globally



Source: Citi Research

Figure 92. Citi global telecom research team view on current relative importance of different interests driving regulation by region



Source: Citi Research

Regulatory approaches

Telecom regulatory decision-making processes are often complex

The above lists show that regulatory objectives and tools are quite complex and in some cases possibly contradictory. Although a majority of the leading countries have 'independent' telecom regulatory bodies, their true independence and powers are often subject to debate. In practice, telecoms are regulated simultaneously by regional, national and multinational bodies. Moreover, their regulation is also subject to interference by governments and courts. The resulting complexities often make the regulatory environment hard to predict.

Four criteria for assessing telecom regulation

We suggest analyzing telecom regulation along the following four criteria:

- Global vs. Local
- Visionary vs. Technocratic
- Interventionist vs. Free-market based
- Re-shaping market structure vs. Regulating Existing Players

Most regulatory powers are currently at the national level, but there are reasons for global co-ordination

Global vs. local. The bulk of the regulatory powers usually lies at the national level. National governments try to retain as much power as possible, especially in crucial areas such as spectrum allocation. That said economies of the telecom businesses have many global drivers as well due to the global nature of technologies, the vendor industry, the Internet and content industries, etc. We see the following three main instances where regulatory policies are set or influenced on international basis:

- Global coordination of spectrum use;
- Global competition between nations tends to promote spread successful technologies and regulatory models; and
- Multiple countries creating blocks with unified regulation (e.g. the EU)

There is growing uncertainty about the mainstream regulatory vision . . .

Visionary vs. technocratic. Although truly visionary regulators are relatively scarce, it is worth remembering that telecom liberalization in the 1980-90s (see the next chapter) was itself based on a vision that free-market competition of service providers would bring benefits for the economy and society as a whole. However, alternative visions have been emerging. These include:

- Utility-like open, universal, technologically homogeneous networks monopoly networks;
- Potential state involvement in operating the above-mentioned monopolies; and
- Increased emphasis on offering telecom services in bundles with equipment and content.

. . . while many regulators remain rather technocratic

Despite the above-mentioned visions, many telecom regulators are rather technocratic. They face complex challenges and are often subject to strong pressures from the industry or other government bodies. Subsequently policies are often driven by short-term objectives such as raising tax revenue, supporting certain companies and achieving certain populist goals.

Interventions are especially a problem when regulators end up constantly re-shaping the market

Interventionist vs. free-market based. The level of intervention usually reflects the overall ideology of governments, particularly their faith in free markets. Most interventions are justified by the alleged failure of free markets. Ideally, interventions would target specific market failure, they would be short-term and effective, allowing free market to function thereafter. In practice, governments often adopt liberalization policies without having full faith in free markets, which forces them to intervene more fundamentally on a more sustained basis (see Figure 93). Such ongoing interventions increase the long-term unpredictability of regulation.

Figure 93. Risk facing interventionist regulation



Source: Citi Research

Any plans to re-shape markets naturally require a vision

Re-shaping market structure vs. regulating existing players. Some regulators at certain points take a view that it is desirable to fundamentally change the market structure, for example by breaking up monopolies, enforcing entry of new competitors, or, on the other hand, by encouraging in-market consolidation and convergence with other industries. Such changes naturally require significant degrees of interventions, although those may be time limited. Any plans to reshape the market (e.g. break monopolies instead of regulating them) naturally require a vision.

Telecoms in the Historical Context: From Monopoly to Liberalization

'If you want to understand today, you have to search yesterday.'

Pearl S. Buck, writer

- Out of the industry's nearly 140 years history, telecom services were provided by 'natural monopoly operators' for more than a century.
- Telecom monopolies started marginally eroding in the 1960-70s based on the spread of new technologies; however competition in its true sense only emerged after the liberalization and wireless licensing in the 1980-90s.
- Turning former monopolies into ordinary free market competitors has proven difficult if not impossible; in their effort to achieve such a goal regulators sometimes used discriminatory policies and in some cases (far from the ideas of liberalism) essentially guaranteed success to particular new entrants.
- Telecom liberalization has fulfilled its initial purpose of driving telecom investments (particularly wireless and into urban areas), increasing the industry's efficiency and ultimately creating the Internet; however it has also lead to major capital misallocation and severe destabilization of the telecom business models.

The early days of telecoms

Telecom services have nearly 140 years history, the key wireline and wireless inventions all occurred towards the end of 19th century

The first use of electrical wire for human communication dates back to over 200 years ago. Today's communications networks are largely based on technologies such as copper/fiber cables and radio transmission, key inventions which occurred in 1879. The first commercial voice telephony services were launched based on US inventor A.G. Bell's patented technology in the 1870s. The world's first telecom operator, AT&T was established as the Bell Telephone Company in 1879 based on Bell's patented technology, meaning that voice telephony now has nearly 140 years of history. The first wireless call was also conducted in 1880s, using optical technology that was co-invented by Bell and later utilized in fiber-optic communications. In the 1890s, Italian inventor Guglielmo Marconi for the first time commercially used electromagnetic (radio) waves for communication.

Despite quick spread of local telephony, long distance, international, wireless and data took longer to develop

The local voice telephony technology spread very quickly, with most US cities having their local telephone networks operational within a decade of the first commercial launch of the technology. That said the long distance service first crossed the US reaching San Francisco only in 1915. The first trans-Atlantic cable did not arrive until 1956 (radio technology was used for trans-Atlantic connections as of 1927). Internet and wireless telephony started emerging in the 1950-70s, but they experienced proper commercial deployment only in the 1980s and later. Outside the US, telecoms were usually established as government-owned monopolies and managed along with the postal services.

AT&T operated what many would call telecom monopoly for nearly a century, protected by the notion of 'natural monopoly'

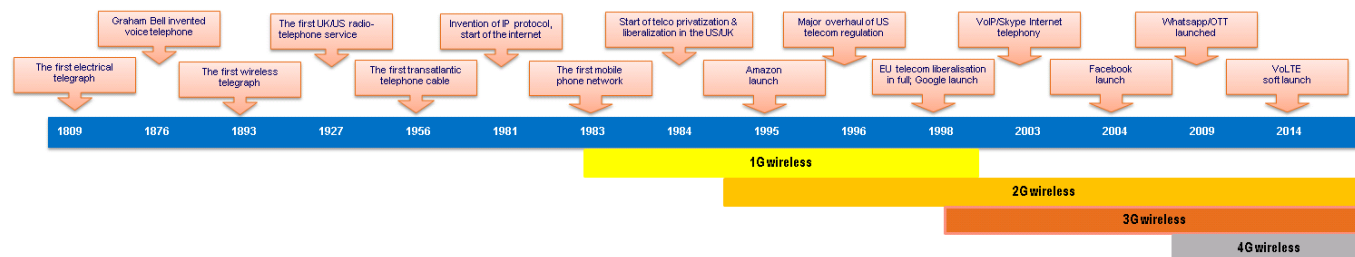
The pioneer of telecommunications, AT&T, operated what many would call a telecom monopoly business in the US for nearly a century. Although AT&T did not build and control all of the country's local networks in the initial stage, the alternative networks were much smaller and they tended to monopolize their respective regions as opposed to competing with AT&T's. In the early 20th century the company supported its monopoly by a slogan 'One network, One System, Universal

service'. In the Kingsbury Commitment from 1913, AT&T accepted some constraints with regard to acquiring further independent local operators and agreed to provide universal interconnect service. This further cemented both the monopolistic nature of local markets as well as AT&T's monopoly in long distance. The universal service concept became important in 1917, as in the following two years the entire US telecommunication infrastructure was briefly nationalized on national security grounds, with AT&T receiving royalty payments and in fact profiting from the arrangement. US telecoms became heavily regulated in the 1920s with higher rates in the cities subsidizing lower rates in the less populated areas. The idea of 'natural monopoly' led the state governments to forbid potential competitors from building lines to avoid 'duplication'. In 1925 the 'monopolistic' AT&T launched a successful R&D business, Bell Labs. In the following decades AT&T in essence monopolized the US telecom market in terms of infrastructure, service as well as end-user equipment (this was owned by AT&T and leased to the customers).

AT&T's monopoly was initially undermined by end-user equipment and long distance microwave technologies

AT&T's natural monopoly started eroding in the 1950-60s, initially on the equipment side, i.e. by allowing end-user equipment from alternative manufacturers to connect to AT&T's network. Liberalization pressures on the equipment side were further fuelled by the availability of new types of equipment such as fax machines. Meanwhile, AT&T's long-distance monopoly started getting undermined in the 1960-70s with the rise of microwave technology, which was able to transmit voice and data wirelessly, without a need to lay cable and hence demand expensive rights of way.

Figure 94. History of telecommunications



Source: Citi Research

Telecom liberalization

Major wave of telecom liberalizations started in the US in the 1980s, driven by a notion that telecom competition would speed up deployment of economically beneficial new technologies

After the initial erosion of AT&T's monopoly caused by relatively less important technologies (end-user equipment such as fax machines, long-distance microwave radio transmission) the US administration made a crucial decision to liberalize the telecommunications market and break up AT&T in 1982. We believe that this dramatic development, which subsequently caused telecom liberalization around the world, occurred for several reasons:

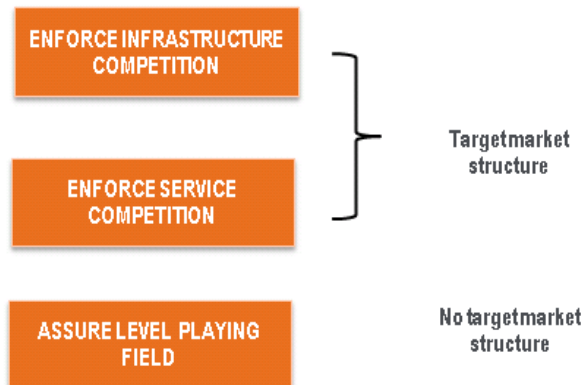
1. Prevailing free market based ideology at that time;
2. Technologies with significant mass-market disruptive power (such as cable TV and wireless) started emerging as commercially viable;
3. The authorities took a view that such technologies may bring substantial benefits for the overall economy;
4. The authorities also believed that telecom monopolies could hinder the spread of such technologies;

5. It became clearer that the Internet was to become the next big phenomenon in communications and hence importance of data vs. voice in communications would grow significantly, further increasing the need for deployment of new communications technologies; and
6. Outlook for supply and demand for bandwidth, including the capabilities of the innovative technologies, were highly uncertain, which increased the case for use of the free market to drive investment decisions

Although different countries approached liberalization differently, most countries introduced wireless infrastructure competition right from the beginning

Different countries joined telecom liberalization at different times, mostly in the 1990s or later, and with different level of enthusiasm. However, one thing that most countries have in common is the creation of wireless infrastructure competition straight away by issuing multiple wireless licenses. When applying liberalization, policy emphasis however differed from country to country. Some policymakers targeted specific outcomes to their competitive models, which made them apply asymmetric regulations to support newcomers and to essentially guarantee their success.

Figure 95. Different approaches to telecom liberalization



Source: Citi Research

Turning former monopolies into ordinary competitors proved hard

Most countries accompanied telecom liberalization with privatization and stock market listing of their incumbent operators, which in most cases were previously government-owned monopolies. Creating fair competition that involves these former monopolies however proved challenging in most markets. The former monopoly incumbents continued to enjoy leading market position in a majority of countries.

Figure 96. Privatization and largest shareholders of the world's top twenty telecom companies by market capitalization

Company name	Market cap (US\$bn)	Privatisation Year	Controlling/Largest shareholding	% Shareholding
China Mobile	244	1997	China Government	73%
Verizon Comm	199	1983	Vanguard	5%
AT&T	177	1983	Vanguard	5%
Vodafone	81	1988	Blackrock	7%
América Móvil	83	2001	Family Trust	47%
Telefonica SA	65	1987	Banco Bilbao Vizcaya Argentina	7%
NTT	66	1987	Minister of Finance	36%
Deutsche Telekom	62	1996	KFW Banking Grp & Federal Republic of Germany	32%
NTT Docomo	63	1998	NTT	63%
Telstra	59	1997	HSBC Custody Nominees (Aus.) Ltd	15%
KDDI	50	1993	Kyocera	13%
China Telecom	50	2002	China Government	71%
BT Group	47	1984	Blackrock	6%
Singtel	46	1993	Temasek	52%
Orange	36	1997	French State	27%
Softbank	81	1994	Masayoshi Son	19%
Saudi Telecom	37	2003	Public investment fund	70%
China Unicom	35	2000	China Government	74%
Telenor	31	2000	Norwegian Govt Ministry Trade	54%

Note: market cap as of October 2014

Source: Company data, Citi Research

In their effort to liberalize regulators often tried to guarantee success to newcomers by discriminating against the incumbents

The success of liberalization practically became measured by the success of new market entrants. In their effort to succeed, regulators sometimes guaranteed success to particular newcomers, which is far from the original idea of liberalism. This was done in the following ways:

- Forcing the incumbents to sell their capacity on a whole basis to re-sellers, i.e. service (virtual) operators;
- Discriminating against incumbents and against the 'old technologies' for example through asymmetric interconnect regime;
- Discriminating against the incumbents in spectrum tenders (e.g. through price, exclusion from the tenders, scoring system etc.);
- Discriminating against the incumbents by applying stricter rules for service bundling;
- Regulating the incumbents' retail prices; and
- Positively discriminating towards companies, which technologies are seen as 'progressive'.

Groundbreaking implications of telecom liberalization

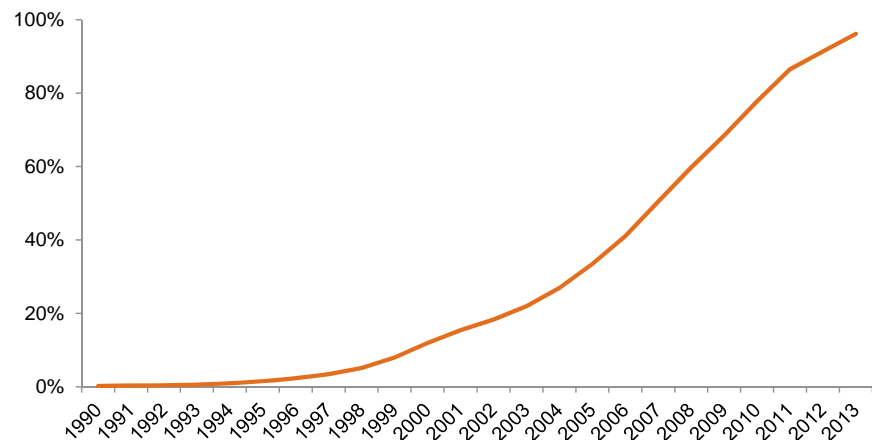
The 1980-90s telecom liberalization had profound implications on the industry globally. Below we summarize some of the most crucial implications:

1. **Telecom investment boom mainly in urban areas.** Liberalization and high overall expectations from the new technologies which followed it, naturally attracted investments into the industry. Similarly to other infrastructure industries, densely populated (urban) areas are far more economically attractive for telecoms compared to less populated suburban or rural areas. This is due to scale economies of network rollouts, usually higher spending power and usually better ability of telecoms to price-discriminate (e.g. excessive price for roaming) in the urban areas. It is therefore no surprise that liberalization attracted telecom investments based on a variety of technologies (such as cable TV, local Ethernet networks, fiber, wireless)

primarily in the densely populated urban areas. While challengers often enjoyed regulatory support, which drove their investments in those areas, the incumbents faced pressure to invest for defensive reasons.

2. **Wireless boom.** Award of the first 2G mobile licenses was a crucial point in telecom liberalization in most countries for two main reasons. Firstly, in a vast majority of countries the governments awarded multiple licenses to encourage fair mobile infrastructure competition right from the onset. Secondly, the mobile voice service provided a viable alternative to fixed-line voice. Mobile substitution of fixed-line often turned to be the most effective competition to the former monopoly incumbents. The opportunity to cannibalize fixed-line incumbent revenue along with the opportunity to tap into a new significant market for mobile communications triggered unprecedented growth in the mobile industry. This was further fuelled by low technological risks due to regulators effectively setting monopolistic mobile technology (particularly in Europe), an interconnect regime aimed at transferring value from fixed-line towards mobile (particularly in Europe) and tapping into new geographical markets not covered by telecom infrastructure before (mainly emerging markets). Figure 97 shows very fast growth in wireless penetration since the early days of wireless markets.

Figure 97. Global mobile SIM penetration (%)

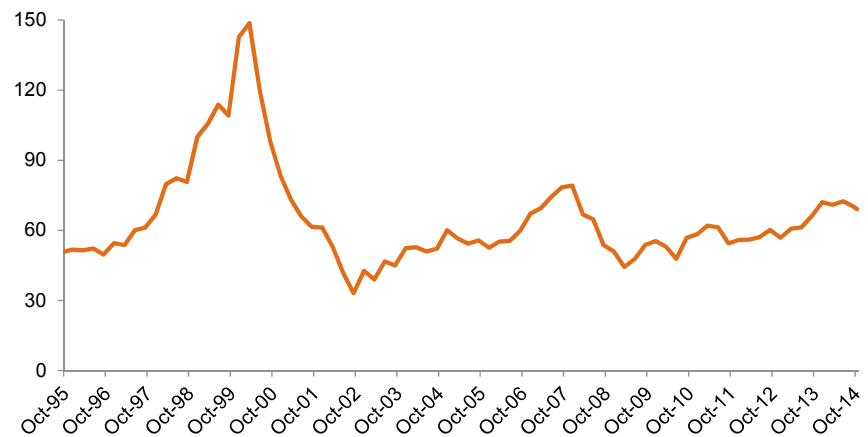


Source: World Bank, Citi Research

3. **Efficiency improvements in the telecom industry.** Liberalization also brought major efficiency improvements in the telecom industry for two main reasons. Firstly, the newly built companies, for example the wireless players, were built as competitive commercial entities right from the onset with significantly higher operating efficiencies compared to the former monopoly incumbents. Secondly, the former monopoly incumbents were forced to undergo significant restructuring and boost their efficiency to compete in liberalized markets.
4. **Tech driven stock market bubble in the 1990s.** We also believe that the 1990s telecom/tech driven stock market bubble (see Figure 98), one of the main examples of capital misallocation in modern history, was at least partially caused by policies including telecom liberalization and the promotion of new technologies. At the height of the bubble the leading telecom operators spent significant funds acquiring assets and spectrum, which

subsequently proved to be worth significantly less than expected. We think that the policymakers' enthusiasm for new technologies and new (supposedly superior) business models in telecoms could have partially fuelled the misguided market expectations in the late 1990s. The aftermath of the 1990s bubble affected funding for the TMT industry for almost a decade, quite possibly slowing down development of new generation wireless technologies etc.

Figure 98. MSCI World Telecoms index – showing the 1990s bubble



Source: Bloomberg, Citi Research

5. **Rise of Internet.** More detail in “The Era of Internet” chapter.
6. **Severe challenge to the telecom business model.** More detail in “Telecom Business Model Under Siege”.

The Era of Internet

I haven't worked on net neutrality. It means several things. One of them is paying for bandwidth and congestion, and that's natural economics because we want firms to pay for the social costs of their choices.

Jean Tirole, Economist, Laureate of the 2014 Nobel Price for Economy

- Mass market commercial deployment of Internet after the 1990s provided further endorsement to regulatory policies aimed at liberalizing telecom services and supporting new access technologies.
- IP telephony initially emerged as a disruption to the incumbents' businesses; most incumbents have since been slow to adopt VoIP and all-IP approach.
- As Internet has evolved, net neutrality has become one of the most fundamental policy issues facing the telecom industry at the current time.

History of the Internet

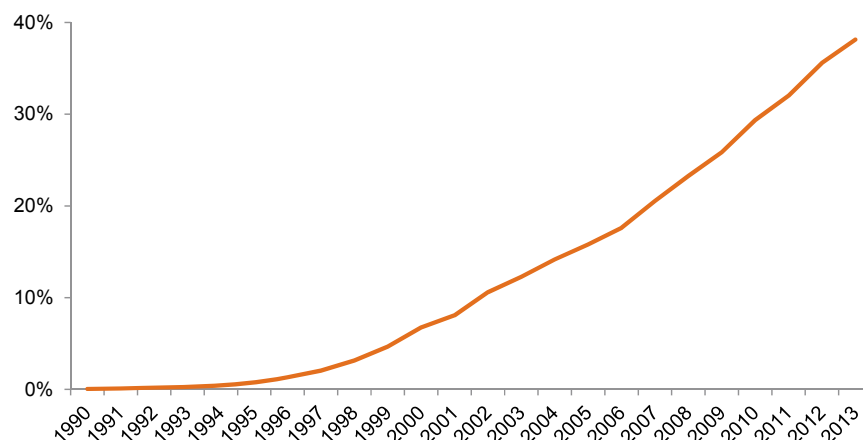
The Internet was created in 1970-80s, a century after invention of the key communication technologies

In the previous chapter we said that the key inventions, which laid grounds for today's telephony services (use of copper wire, optics and radio waves to transmit voice and information) all occurred in the late 19th century. Nearly a century later, the 1970s brought another key invention, the Internet Protocol. TCP/IP (Transmission Control Protocol/Internet Protocol) revolutionized the way communications networks are used. The main innovation brought by IP was transmission of any information over the networks in a form of individual data packets as opposed to a continuous connection. This had significant benefits including better utilization of telecom infrastructure, possibility to bypass faulty or congested parts of the networks, use of a single protocol for transmission of any type of content such as Web sites, pictures, voice, data, video etc. In 1970s and early 1980s IP was used mostly in an experimental mode and to allow time sharing of (at that time expensive) computer processing capacity. The DNS (Domain Names System), what we know today as Internet, was created in 1984.

Fast growth of Internet, especially in developed markets, further endorsed regulatory support for innovative access technologies such as cable TV

The Internet entered a stage of fast growth and global relevance in the late 1990s (Figure 99). Initially, it was naturally much more successful in the developed markets due to their stronger telecom infrastructure, purchasing power and literacy rates. The Internet phenomenon further highlighted the need for continued telecom infrastructure investments and use of alternative access technologies. This endorsed regulatory policies that promoted such technologies. Universal service was clearly not a big issue in the early days of Internet rollout. The priority was to first connect customers in metropolitan areas, where it was economically most feasible.

Figure 99. Global Internet penetration (%)



Source: World Bank, Citi Research

IP telephony

Although IP can handle voice and video, its initial deployment to substitute voice telephony was slow . . .

Despite the universal nature of IP, use of IP for voice telephony (VoIP) only really took off in the middle of the past decade. Mass-market VoIP was pioneered, for example, by Skype (founded in 2003 and acquired by eBay for \$2.6 billion in 2005 and later in 2011 for \$8.5 billion by Microsoft) and Vonage (first entered the market in 2004). Uptake for VOIP was slow initially due to the following:

- Relatively low Internet and broadband penetration;
- Reliable provision of IP voice/video services required a certain level of network and end-user equipment quality, which took time to develop;
- IP telephony proved heavily disruptive for the established telecoms, who therefore lacked incentive to promote it as an alternative to their voice services, particularly in the initial stage; and
- The IP telephony was sometimes seen not sufficiently secure in emergency situations, among others due to a need for constant power supply at the customer premises.

. . . despite this, IP is today disrupting not only the fixed-line and mobile, but also cable TV operators' businesses

Despite the initial obstacles IP telephony is now wide-spread, especially in fixed-line networks. Its spread in cellular networks is taking more time, because of lower quality of the cellular data connections as well as other challenges (e.g. cell handover for a moving customer). However, this is now changing as well and IP telephony is heavily used by both business and residential customers. Today, IP-based services are not only disrupting businesses of fixed-line operators (VoIP) and mobile operators (OTT), but also cable TV operators (Netflix).

After experiencing a fall in their revenue, incumbent telecoms now have higher incentive to endorse IP and transform their networks to all-IP

Major fixed-line and mobile operators are eventually responding to the IP disruption by giving up voice traffic-driven revenues and fundamentally reshaping their tariffs in favor of bundles with essentially zero cost of additional traffic (e.g. voice calls) to the customer. This, together with advancement of mobile technologies, is now finally opening an opportunity for the incumbents to fully endorse IP technologies and offer all their services on a single platform sometimes called 'all-IP'. Such solutions should eventually allow the telecoms to retire the old voice-driven technologies (such as PSTN and later for example GSM) and move to a single platform for

providing all services. Such a move should have positive cost implications for the incumbents. Nonetheless, it is interesting to note that while 'all IP' has been debated for years, none of the major operators has yet adopted it in full scale. Deutsche Telekom, which recently completed all-IP transition in its Macedonian subsidiary, is relatively more vocal compared to peers about 'all IP'.

Net neutrality

Net neutrality is now becoming one of the key policy issues in telecoms

While competition was the most crucial telecom policy issue in the 1990s, net neutrality emerged in the middle of the previous decade as an equally important fundamental policy issue. It is defined by Oxford Dictionary as:

'The principle that Internet service providers should enable access to all content and applications regardless of the source, and without favoring or blocking particular products or websites.'

Pro-neutrality case is based on freedom of information, competition between content providers and preservation of the concept of Internet as we know it today

Net neutrality supporters link the issue to fundamental rights of freedom of speech, freedom of press, etc. They argue that abandoning net neutrality principles would give telecom operators excessive power to influence selection of content consumed by their customers. This would in their view lead to the creation of tiered Internet with its cheaper versions for example deliberately curtailing access to certain types of content. They say that in a non-neutral environment operators may restrict content not only due to direct financial reasons, but also for other reasons, e.g. to limit spreading negative publicity about themselves (according to press reports of such cases occurring for example in the US). Compromising net-neutrality, according to supporters, would in fact destroy the concept of the Internet as we know it today, where content (web sites) is equally accessible by all users. Furthermore, supporters also argue that net neutrality is important for competition in the content market (Internet companies), because the ability of the leading content/Internet companies to purchase 'priority bandwidth' for their services would sideline their smaller rivals.

The anti-neutrality case is based on pragmatism, need to guarantee service quality, benefits of bundling TMT services and re-balancing of power between telecoms and the Internet companies

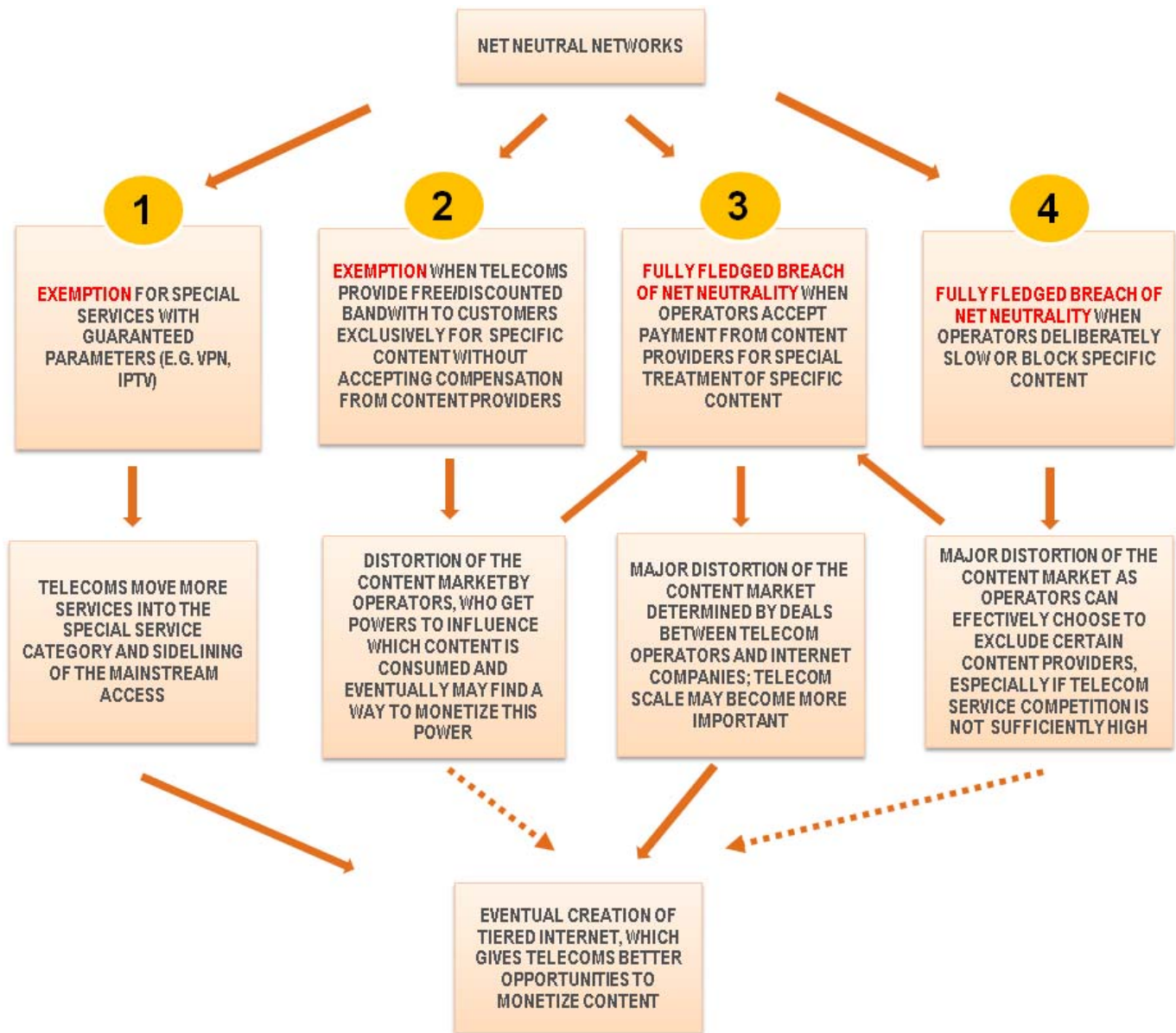
Net neutrality opponents meanwhile argue that the entire concept is flawed, dogmatic, idealistic and impossible to fully implement. No one would surely argue against prioritizing emergency calls against entertainment videos. Similarly, governments may have good reasons to restrict some types of content (e.g. illegal content). Moreover, a net neutral environment does not allow operators to guarantee quality of delivery of the end-user product (such as IPTV), which may become more relevant in the future than it is now. Net neutrality opponents also argue that a non-neutral environment would allow more freedom and hence more creative pricing and bundling strategies by the operators, which may among other things lead to more innovation at the local level. A non-neutral environment may also improve returns for telecoms and hence positively change economics of building networks in more challenging areas or upgrading capacity in competitive metropolitan markets. Finally, as shown below, net neutrality has arguably caused major value outflow from telecoms to the Internet industry. The opponents argue that this leads to the creation of Internet monopolies, possibly even more dangerous for the economy than telecom monopolies would be.

There are several ways to breach net neutrality, but they may all lead to profound changes of how the Internet works compared to today

Let's now look at four different situations which net neutrality may be breached (see Figure 100). Each of these breaches gives powers and benefits to the telecom operators. We do not rule out that any of the breaches may have profound impact on the way the Internet works, access is paid for, etc. Some of these changes may be positive while others less so, potentially demanding regulation.

1. **Exemption of special services such as VPN and IPTV from net neutrality.** This is considered as the softest breach of net neutrality, and in fact is commonly used in the industry already. Net neutrality opponents fear that if such exemption is legally endorsed, telecom operators will gain an incentive to promote such exempt services and divert disproportionately high resources into their development at the expense of development of mainstream connectivity service.
2. **Provision of free or discounted bandwidth for specific content.** One example is the Internet.org initiative sponsored by Facebook, which encourages telecom operators in developing countries to provide free Facebook access to their customers. The aim is to encourage low-income population segments to purchase smartphones with the hope that once they use Facebook, they may be willing to pay for access to other content. Despite the honorable objectives of such an initiative, it is possible to argue that allowing telecom operators to offer free or discounted bandwidth for specific types of content distorts the market for content, arguably giving advantage to providers of content, bandwidth for which is subsidized by the operators. It is hard to rule out that operators may at some point be able to find ways to monetize such powers.
3. **Fully fledged breach of net neutrality when telecom operators accept payments from content providers.** This is considered as fully fledged breach of net neutrality as the operators would be incentivized to allocate maximum bandwidth to those content providers who offer the most attractive economic terms to them, at the expense of bandwidth available for consumption of all other content.
4. **Fully fledged breach of net neutrality when operators deliberately slow or block specific content.** Unless this blocking is done for legal reasons, this is the most severe breach of net neutrality. Operators sometimes justify attempts to block or slow content by excessive use of capacity specific content (e.g. Netflix, YouTube), which could overload their networks, or more blatantly by competitive threats to their own services. Recent industry developments suggest that some developed markets operators may for example consider a practice of blocking some advertisement content in order to negotiate payments from the advertisers.

Figure 100. Four potential ways to abandon net neutrality



Source: Citi Research

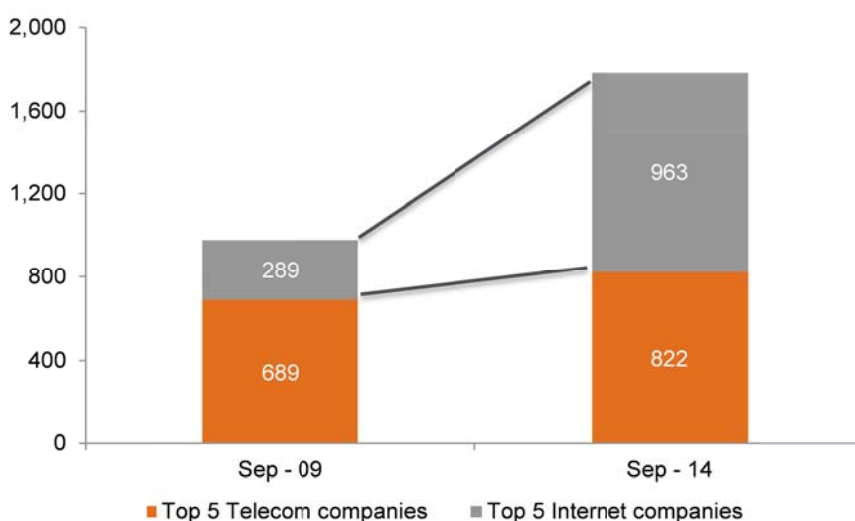
Today's networks are broadly net neutral so the debate is about whether this should be sustained

The issue of net neutrality is in fact as old as wired communications themselves. In 1869 San Francisco Herald, a local West Coast newspaper, raised complaints with the Western Union Telegraph Company about the latter's proposed price increase of telegraphed news, arguing that such an increase was aimed to force it out of business and give 'the four favored papers virtual monopoly on Eastern Telegraphic news'. In comparison to this historical example, today's networks are broadly neutral. Today's debate is mainly about whether such neutrality should be sustained. Some operators argue that the strictest net neutrality hinders future development of the industry whereas some politicians and pressure groups argue that net neutrality must be preserved at any cost as a fundamental principle.

Net neutrality has allowed the Internet industry to create substantial value while enjoying broadband access provided by the telecoms and fully paid for by their customers

As we already mentioned, neutral networks have also had major effects on the economy of the telecom and Internet businesses. Ten years ago, when global Internet penetration was 13%, net neutrality was an ideal model. By allowing Internet companies such as Google or the social networks to access final customers essentially for free, it supported development of this content, which in turn fuelled growth in Internet penetration, helping telecom revenue as well. Today's 40% global Internet penetration together with the income constraints of the off-line population suggests that penetration related revenue growth opportunities for most telecoms are constrained. Meanwhile, the Internet industry appears to be extracting significant value from its customers and global scale effects. Figure 101 and Figure 102 show significant stock market outperformance the Internet industry vs. telecoms in the past five years.

Figure 101. Market capitalization of the world's top five Internet and telecom companies over the past five years (US\$bn)



Notes:

Top 5 measured by market capitalization

Top 5 Listed Telecom companies in 2009: China Mobile, AT&T, Telefonica SA, Vodafone & Verizon

Top 5 Listed Telecom companies in 2014: China Mobile, Verizon, AT&T, Vodafone & Softbank

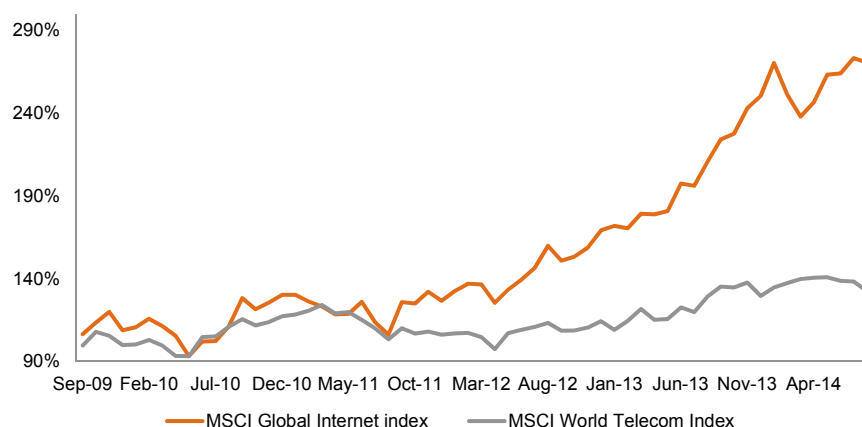
Top 5 Listed Internet companies in 2009: Google, Amazon, Tencent, Ebay, Yahoo

Top 5 Listed Internet companies in 2015: Google, Facebook, Amazon, Tencent, Baidu

Market capitalization is not adjusted for dividends except for one-time extraordinary dividend paid by Vodafone after the Verizon stake sell-off

Source: Citi Research

Figure 102. MSCI World Telecom Index vs MSCI World Internet Index in the last five years



Source: Bloomberg, Citi Research

Net neutrality regulation is still in its infancy

The concept of regulating net neutrality remains in its early stages with most countries currently not having specific net neutrality regulation in place. However, despite the fact that non-neutral behavior is not explicitly banned in most countries, the industry does not appear to be evolving in a direction where Internet companies pay telecoms for bandwidth allocated to specific content. We see two main reasons for this.

- Firstly, the net neutrality concept is generally beneficial for the major Internet companies such as Google, Facebook etc., which see major benefits from global scale and essentially free access to customers globally. They currently do not appear to see sufficient threats in their own markets or business models, which would encourage them to seek deals with the telecom operators to protect their own business.
- Secondly, the net neutrality issue is highly politically charged with anti-net neutrality views being generally unpopular. The US President Barack Obama for example regularly speaks in favor of net neutrality. Shortly before this year's EU Parliamentary elections, the EU Parliament passed a strictly pro-net neutrality law, which is however still subject to additional approvals and potential review. We think that both the operators as well as the Internet companies prefer to avoid signing deals, which could be seen as controversial and could trigger harsh legal responses.

Policy makers in the US and Europe have been working on a net neutrality compromise

Net neutrality is currently high on the policymakers' agenda both in the US and Europe. Policymakers in both geographies are searching for practical compromises which would give telecom operators more flexibility to develop their own services while not excessively compromising the idea of the one-for-all public Internet.

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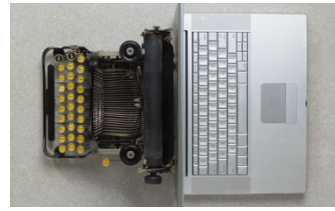
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