

## Choosing the right network technologies access mix

*Fixed and mobile telecommunications operators are pragmatically melding different technologies in order to deliver the performance customers want at costs that make sense.*

*By Duarte Bacelar Begonha and Sergio Osle*

Following an intensely disruptive decade, most fixed and mobile telecommunications industry leaders could probably use a break. Instead, they are faced with making a slew of bet-the-company technology-related decisions. Three factors, in particular, make choosing the right suite of network technologies both incredibly important and more difficult than ever.

**Changes in demand:** The rapid growth of bandwidth-hungry fixed and mobile services will require significant increases in peak network speeds, throughput, and capacity. By 2015, for example, the average home connectivity requirements will jump fourfold from year-2011 levels to over 100 Mbps (Megabits per second). Mobile speed and capacity requirements will expand at a similar pace. Also, new devices and services capable of using both fixed and mobile networks – such as tablet computers and cloud computing, respectively – are creating a need for “technology-agnostic” access to data connectivity. And increasing consumer acceptance of fixed-mobile bundled plans is causing single-network players, such as cable companies and mobile attackers, to seek options for integration in order to become fixed/mobile providers.

**New technologies:** With the increasing use of fixed fiber, VDSL2, and hybrid fiber coaxial (HFC) solutions, operators have a variety of alternatives for upgrading their networks. Furthermore, 3G and 4G wireless mobile networks that are based on technologies such as HSPA+ LTE not only boost wireless speed and capacity, but also position mobile service as a viable alternative to “last mile” fixed-line access, especially for homes in low-density areas. A third set of innovations involves technologies that can meld fixed and wireless networks. These solutions, which include femtocells and picocells (both small mobile base stations), and WiFi hotspots, can enable integrated carriers to capture synergies between their fixed and mobile networks.

**Regulatory moves:** The availability of new mobile frequencies at auctions could attract fixed-line players or other attackers to the market. Furthermore, a number of new regulatory frameworks for fixed, next-generation access have already been established. As a result, the influence of future regulation on both the fixed and mobile industries will expand.

### EXPLORING NETWORKS OF THE FUTURE

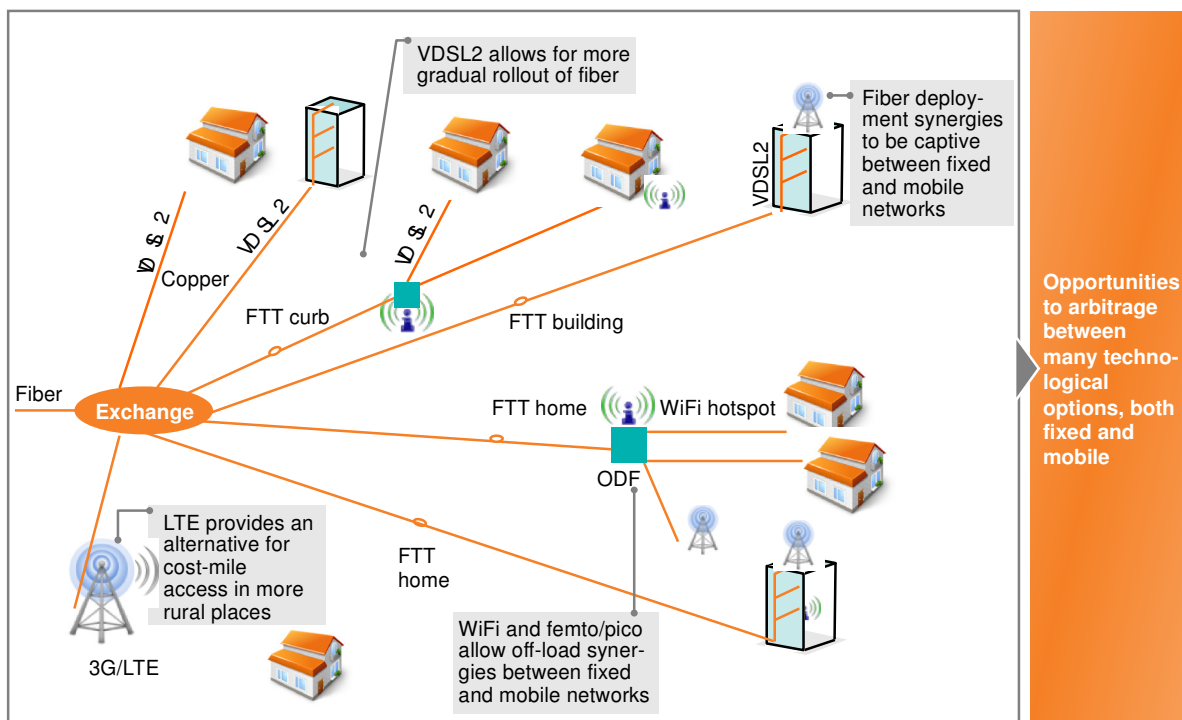
Based on the trends discussed here, several predictions regarding tomorrow’s telecom environment can be made. First, the networks of the future will integrate fixed and mobile services (Exhibit 1). Second, network quality, speed, and enabled services will, from the customer's perspective, become key differentiating factors. And third, these new technologies and regulatory opportunities open broad options for operators.

To explore the first prediction further, the new, hybrid networks now emerging offer leaders more opportunities to make trade-offs among many fixed-line and mobile technology options. Exhibit 1, for example, shows that by adopting VDSL2, the operator can reduce the level of urgency in the roll-out of expensive fiber cable, as well as deploy LTE mobile service for running “last mile” access (i.e., physically connecting individual homes to the network) in low-density areas. And the creation of WiFi hotspots will allow operators to capture greater synergies with regard to how fixed and mobile networks work together.

All of these predictions will, however, be tempered by the cash constraints operators will face as they attempt to achieve the best possible returns on these investments in new services.

## EXHIBIT 1

### Networks of the future will see different technologies cohabiting and strong fixed-mobile integration

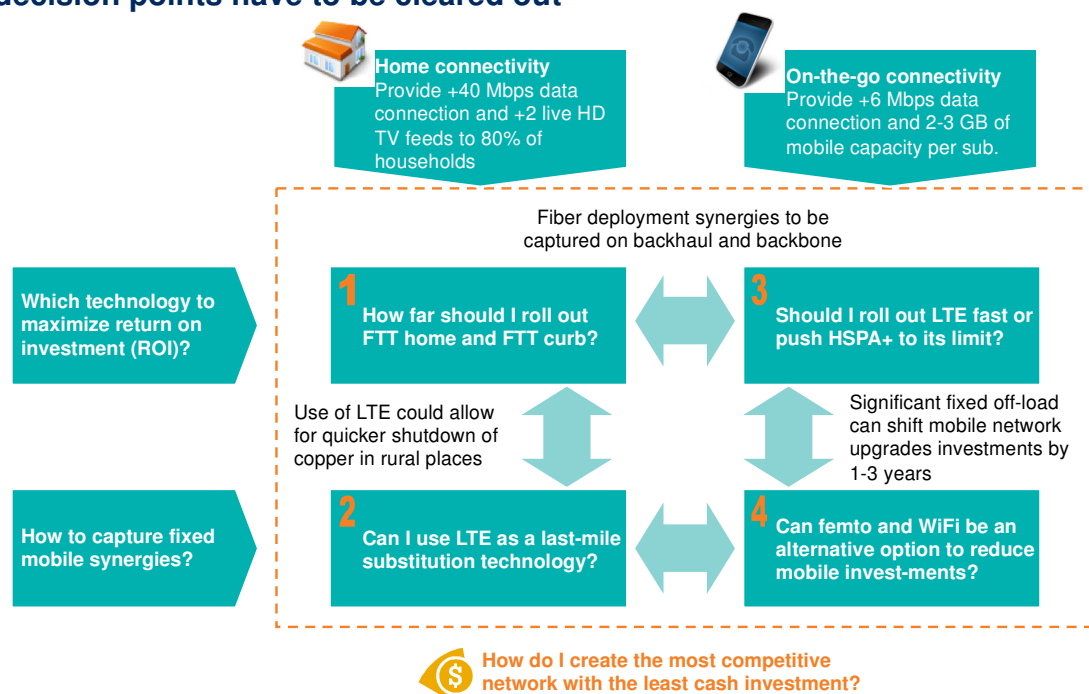


## CHOOSING A NETWORK INVESTMENT STRATEGY

When deciding on a strategy for investing in tomorrow’s telecom networks, leaders need to resolve four interlinked questions (Exhibit 2). The answers to these questions can help top managers decide which network technologies offer the best return on investment (ROI) and how their companies can capture the most powerful fixed/mobile network synergies.

## EXHIBIT 2

### In deciding on future network investment strategy, 4 major interlinked decision points have to be cleared out



Source: NGTI

**1) How far should I roll out fiber-to-the-home and curb?** Historically, the fixed-line industry has moved quickly to meet consumer bandwidth needs, and have progressed from ISDN to DSL to ADSL/ADSL2 to VDSL. Many observers expect the industry to do the same in the future. In order to provide multiple streaming capabilities and full-scale 3D television, for instance, by 2012, networks will probably feature bandwidth in the range of 100 to 250 Mbps (compared to 50 to 100 Mbps in 2010). By 2015, we expect the industry to provide service that exceeds 250 Mbps, in order to support full 3D virtual collaboration capabilities and new services.

One potential roadblock in this scenario involves the situational nature of fiber-to-the-home (FTTH) installation costs. One analysis revealed that installation costs per home could vary three- to five-fold depending on the “density” of the housing involved and the accessibility of the horizontal and vertical ducts that installers use to thread fiber cable into homes.

In locations where fiber makes no economic sense, operators can expand the performance (and useful life) of their traditional copper networks in a number of ways. Pair bonding, for example, relies on the use of multiple copper wires for each customer in order to increase bandwidth, while vectoring is a noise cancellation technique that helps telcos improve a copper network’s signal to noise ratio (SNR) and thus boost its capacity. Other approaches include “phantoming” (used with pair bonding to increase the SNR and boost speed three-fold), and reallocation of network frequency usage in order to increase transmission speeds. These techniques can help operators reach “fiber-like” speeds at minimal costs, especially in lower-density population areas.

Leaders who aim to optimize future technology investments will recognize the benefits of a melded fixed/mobile (“heterogeneous”) network. Under this strategy, the operator rolls out FTTH in city centers where competition is high. In the suburbs, the company more gradually rolls out fiber-to-the-curb (FTTC) and VDSL2 service, and does so in areas with heavy competition first. In rural areas, companies can explore alternative technologies that might cost less than upgrading copper, such as using 4G LTE to provide IP connectivity.

**2) Can I use LTE as a last-mile substitute?** As previously mentioned, wiring up the last mile to a customer’s residence can be expensive in rural areas. One alternative is to use mobile 4G LTE technology to wirelessly bridge that last mile. LTE not only has the potential to lower network costs, but it also offers better speeds at longer distances from the base station than ADSL2+.

McKinsey analysis shows that LTE could substitute for fixed networks in 10 to 30 percent of households. There are some caveats, however. LTE has yet to become economically feasible for high bandwidth applications such as IPTV, for instance.

**3) Should I roll out 4G LTE rapidly, or push 3G HSPA+ to its limit?** Planning new network technology roll-outs requires leaders to trade off cost against performance. Operators seeking technology leadership often make the leap from basic HSPA to LTE, while those who are quick to follow have the option to upgrade current networks to HSPA+ and can only switch to LTE at a date. Stragglers do risk being left behind, however, because LTE provides a true step-change in customer experience, offering higher speeds (already 10X vs HSPA), much faster connection times (up to 95 percent less connection time required vs HSPA+), and lower latency (3 times less than HSPA). However, even for mobile leaders, market broadband demand and the availability of 4G frequencies will ultimately trigger a decision LTE roll-out.

**4) Can technologies such as femtocells and WiFi effectively reduce mobile network investments?** Ballooning mobile data consumption could make LTE economics less feasible in the mid- to long-term. To reduce the escalation of data traffic, operators can explore opportunities to offload traffic to public WiFi networks. Along with WiFi, femtocells and picocells offer an attractive option for limiting network capacity investments. One analysis revealed that operators could offload a significant amount of mobile network traffic, since most wireless traffic (up to 70%) occurs in places that have fixed-line connectivity options nearby. WiFi, femtocells, and picocells could theoretically double network capacity at a fraction of the cost of adding new network sites. A number of technical issues do exist, however, such as the ability to achieve seamless 3G switchover and spectrum interference.

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When choosing a network investment strategy, it is critical for leaders to answer four questions. However, there is no unique solution for all markets; operators around the world are following different network technology paths in order to offer fixed and mobile services. In some cases, they are even using unconventional strategies and, for example, combining DTH and IPTV or partnering with cable providers. As more industry players begin to choose among an expanding menu of fixed and mobile technologies in order to create networks that meet the evolving needs of the customer, the distinctions that currently differentiate fixed-line from mobile networks could, ultimately, disappear entirely.

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