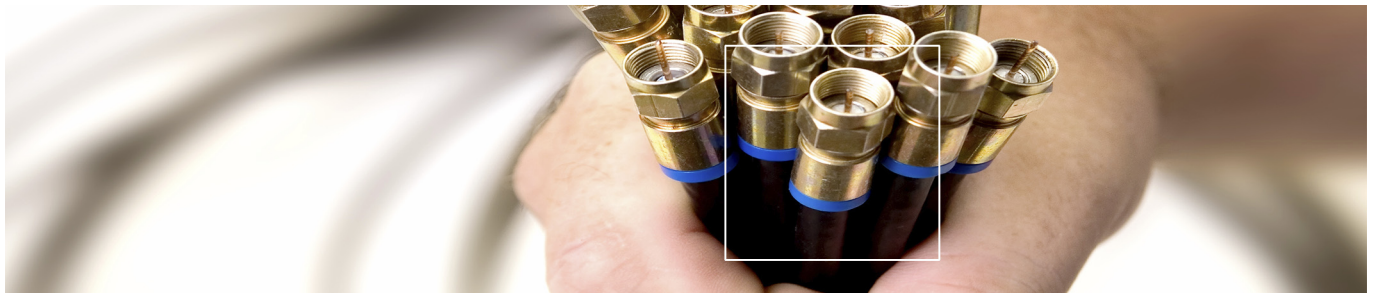


The Moment of Truth

Cable infrastructure as a competitive Next Generation Access (NGA) platform in a financial crunch?



Due to consistent investment in network and new technologies, cable operators are not only increasing their market share, but have also developed a cost-effective evolution path to meet future demand. In the foreseeable future, customer experience over cable will be comparable to that of fiber access networks, despite the attractive technological features of fiber. Investors should consider investment opportunities in cable infrastructure and balance their portfolios and policymakers should take into account cable as a part of NGA platforms.

A proven business model and an evolutionary path with cost advantages

In many countries, cable operators have dominated payTV services and broadened their offer of multimedia services, bundling broadband and telephony services. Strong players in countries, such as Austria, Netherlands, Belgium, Portugal, U.K. and U.S., have not only captured substantial broadband market share, but also are leading the race within their footprint – with a larger share of broadband penetration. (see figure 1 overleaf)

In the last two years, cable operators have further increased their competitive advantage in broadband capacity with DOCSIS 3.0, providing services up to 120Mbps (max. throughput exceeds few Gbit/s). Their investment into comprehensive, end-to-end infrastructure has given cable operators a significant advantage as they can now much more rapidly migrate to very high broadband, successfully managed to counter fiber/ DSL offers and gain market share:

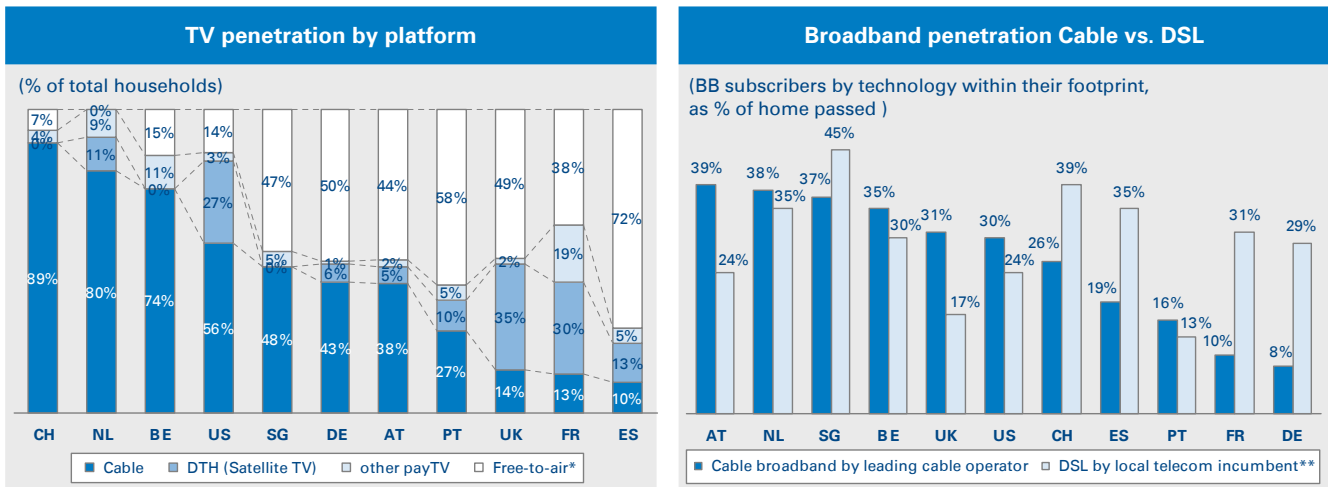
- Despite fierce pressure from telco's fiber offer, **Comcast** saw the greatest increase in broadband subscribers (1.3 million) among operators in the U.S. in 2008; 66% of those subscribers had come from telecom operators versus 44% two years before.
- In 2008, **UPC**, the European regional cable operator, launched a 120Mbps broadband service in the Netherlands using EuroDocsis 3.0. It picked up 10% more broadband subscribers within its footprint (incumbent with DSL/ fiber added around 5% of subscribers).

Cable operators have several options in terms of cost effective technologies to meet future customer demand for broadband, as well as high-end video service. Most of these technologies have emerged and matured over the last decade and there are already impressive evolution stories of cable operators around the globe:

- **Major operators in the U.S.** are taking incremental steps to further improve their networks: upgrading to 1GHz plant (Cox communications), DOCSIS 3.0 (Comcast, Cablevision) and Switched Digital Video to increase efficiency in digital broadcasting (Time Warner Cable).
- **Cox Communications**, a leading cable operator in U.S., expects the costs of upgrading to 1GHz to drop to around EUR 30 - 50 per home passed, which is about a tenth of the costs of upgrading from 550MHz to 750MHz a decade ago.
- **Starhub** rolled out DOCSIS 3.0 and launched 100Mbps broadband service in 2006 and migrated almost 10% of broadband subscribers. It is continuously exploring further evolution with upcoming technologies – e.g. extending its usable spectrum with spectrum overlay.
- **Virgin Media in U.K.** is currently rolling out DOCSIS 3.0 and plans to completely switch off analogue nation-wide and free up approximately 240MHz bandwidth, which will enable additional space for digital programs.

Thanks to the well-established access network and mature technologies, the upgrade of existing cable infrastructure is much more cost-effective than deploying fiber access networks or VDSL2, where a major re-design of the access infrastructure is required. While evolutionary paths will vary based on the developmental stage of the market and individual operators,

Figure 1: TV and broadband penetration by technology



Source: Exane BNP Paribas, Credit Suisse, Arthur D. Little analysis
 * Free-to-air includes free-to-air satellite, free DTT and analogue free-to-air; ** Excluded wholesale DSL subscribers

we estimate cable operators in general will have to spend approximately EUR 190 - 240 per home passed to upgrade the network, which is 30% (or even less) of the cost of deploying fiber. (see figure 2)

In addition to the access cost, cable operators have significant cost advantages in subscriber acquisition and provisioning costs. CPE costs are a considerable portion of subscriber acquisition costs, and DOCSIS 3.0 cable modems cost approximately EUR 40 - 50, while a FTTH gateway costs around EUR 90 - 120. 2008 was a rocket year for cable broadband equipment sales, and cable operators will continue to benefit from scale effects. They also clearly have less, or at least comparable, provisioning costs as subscribers share fiber nodes, while FTTH/ DSL operators have to manage point-to-point/ multipoint provisions and cannot expect costs to decrease, except in highly dense areas.

Cable vs. FTTH: Customer experiences are comparable

While it is difficult to predict usage development, many operators and equipment manufacturers expect high speed internet demand in the next five to seven years will rise up to 100Mbps. We expect the visionary bandwidth demand in 2015 to reach or exceed 100Mbps down- and 20Mbps up-stream due to the surging demand for sophisticated media services (simultaneous HDTV, 3D TV, webTV), fixed mobile convergence and other online services.

Due to the evolution of cable infrastructure, we see the customer experience via cable infrastructure either already is, or will be comparable to other technologies in the coming years. Some cable operators with DOCSIS 3.0 already provide 120Mbps/ 10Mbps and, theoretically, they will evolve to exceed a few Gbps at peak rate.

Furthermore, given the inherent design of DOCSIS 3.0, cable operators will be able to enhance the customer experience even on their PCs via IP-based "video broadcast" applications. We expect this will help with the expansion of a new video market segment, enabling operators to combine their broadband capacity with a clear leverage in content to bring in a new pocket of video revenue.

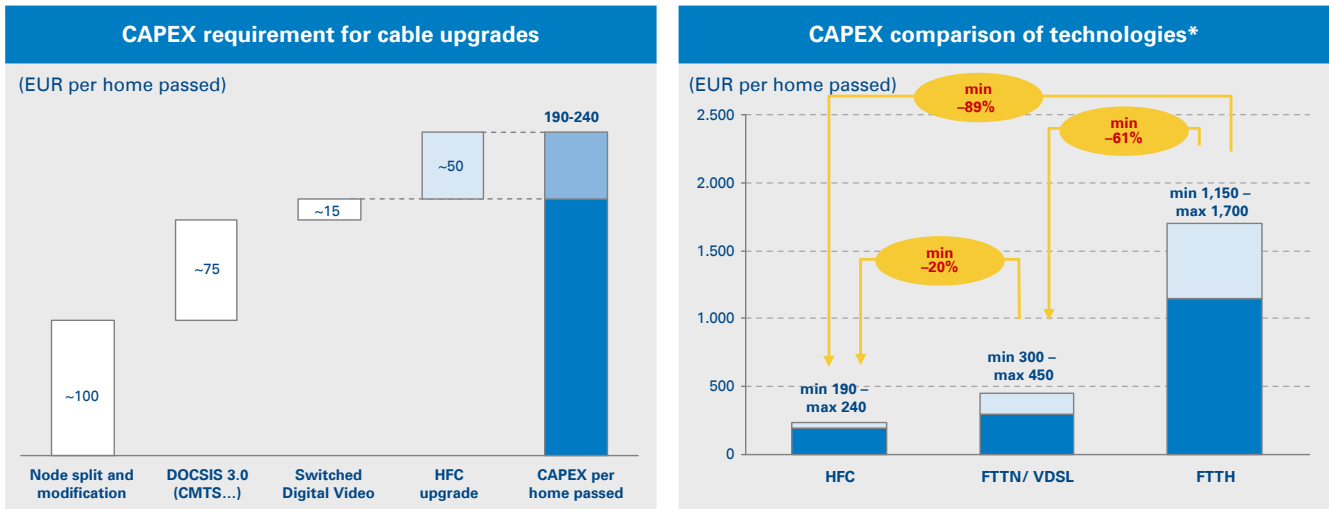
- Cable giant **Comcast in U.S.** launched Fancast.com which delivers major TV shows, such as "Heroes" and "CSI" to PCs. We expect Comcast to eventually offer subscribers the option to record the show into Comcast DVR and playback on TV.
- **CJ Cablenet**, a leading cable operator in South Korea, is currently running a trial of webTV services that enable their subscribers to watch TV channels and VoD on their PCs. It plans a commercial launch in next few months, and is also considering a multi-screen service through which the subscriber can order content via PCs, but watch it on TV, and vice versa.

The success of any technology depends on the timeliness of new services to take advantage of abundant bandwidth. Cable infrastructure is already evolving to meet customer demand in timely manner, and offers significant cost-effectiveness *vis-a-vis* fiber.

Further opportunity to move into mobile

Cable operators also have evolution paths (eventually in partnership with mobile-only operators) to counter convergent offers by incumbents and other players. The availability of new spectrum in 2.1/ 2.6GHz, 700MHz spectrum by analogue switch-off (so-called digital dividend) and new micro-cell technologies, such as femtocell, are opening up a new opportunities for cable operators. This could be even accelerated by the shift in regulation, as regulators in some markets are likely to not only lower license fees, but also lower obligations in terms of coverage, etc.

Figure 2: Access cost comparison of cable infrastructure vs. other technologies



Source: Casework and industry benchmark * The estimates and results are in line with Arthur D. Little's previous suggestion in "Broadband Vision 2011" report published in 2006

The motivation for cable operators to move into mobile services is not only to gain a share of the current mobile revenue, but also to address the increasing customer demand for mobile multi-media services in the deep indoor environment, so-called “@home” experiences. Here we believe cable operators have clear leverage – a well-established footprint in customer premises with multimedia service capability.

Emerging mobile technologies makes it easier for cable operators to take advantage of the opportunity in mobile. For instance, last year, Starhub in Singapore launched the world's first 3G femtocell on the top of their cable infrastructure, which illustrates an evolution for cable operators into mobile.

There is currently at least one commercial mobile offer by a cable operator and three more launches planned in 2009 or soon after (excluding the resell of mobile offers):

- **Comcast** has invested in Clearwire in order to deploy WiMax across its footprint in the U.S. It will most likely provide mobile broadband and mobile video as well.
- In 2008, **Cox Communications** acquired 22 spectrum licenses out of digital dividend (700MHz) and is now testing its own wireless network with a partnership with Sprint.
- **Telenet in Belgium**, backed by regionally-active cable operator Liberty Global, has declared its interest in acquiring the 4th license planned to be tendered in 2009.
- **RCS & RDS**, a leading regional operator in Europe, deployed its own UMTS (2.1GHz) network across its footprint in Romania and is aggressively pushing a mobile voice offer.

While it is too early to comment on the success of many ventures, RCS & RDS is already a success story, acquiring one million mobile voice subscribers within the first 12 months of operation.

Challenges ahead: Improving customer excellence

Customer operations management and marketing have been, and will remain as an obstacle to many cable operators to successfully convert their technological advantage into an increase in market share. Technological advantages cannot be turned into a market success, unless operational excellence and branding are also a part of the value proposition to the end users.

Throughout its project experiences, Arthur D. Little has seen a significant variance in customer operation and marketing capabilities among operators and the primary reasons are:

- Continuous acquisitions have been the key growth initiative for many operators, and often the network itself, as well as its operation system, is yet to be fully integrated.
- Operators have not been able to focus on improving customer operation management in parallel with the continuous node splits (often with the excessive operation and maintenance costs).
- Many small cable operators still run legacy network and operation systems, as they could not afford to install and upgrade the network management system in timely manner.

For example, a French cable operator is currently leading the market in terms of fiber coverage (3.2 million lines passed as for Dec 2008; 76% of the French fiber lines), but the conversion ratio (fiber subscribers over passed homes) is close to 4%, which is one the lowest ratio in Europe. On reason for this could be low customer satisfaction and poor brand management.

Cablevision in U.S., on the other hand, has been able to significantly improve customer service by shortening the time window for a technician's repair visit to within two hours, introducing a sophisticated on-line tool to help with troubleshooting – which enabled them to successfully defend telco's fiber attack within its footprints.

'Reliability' has been telcos' key selling point in the cable versus xDSL battle, and operational excellence will remain as a key success factor for cable operators, especially where they pursue further consolidation to broaden their footprints.

Conclusion

Cable infrastructure has significant competitive strengths: substantial footprint, lower CAPEX requirements, more effective provisioning and service architecture, and development paths into the mobile world.

Many governments, most notably in the U.S., but also in some countries in Europe, such as Germany, Portugal, France and the U.K., are planning to encourage further investment into broadband, as part of stimulus plans. Given the difficult economic environment, investors should consider investment opportunities in the cable sector, as further investment into fiber will be delayed and the value of cable operators may increase as the race for very high broadband continues. We believe that it is right time to invest in cable infrastructure.

- Financial communities shall re-think their investment strategy and shift their portfolio from FTTH-only investments to a more balanced NGA portfolio that includes cable infrastructures. The cable operators will maintain or even strengthen their competitive advantage, as well as explore new pockets of revenue, particularly in a mobile sector.
- Fixed operators, especially for those alternative operators considering deploying fiber access network, shall consider an acquisition of cable infrastructure – if feasible from a regulatory perspective. Investment in cable could be an attractive option, rather than rolling out a parallel FTTH/ N fiber infrastructure.
- Mobile operators should consider a partnership with a cable operator as an option for fixed market entry, especially where ULL operators will not be sustainable against incumbents fiber deployment. M1, 2nd mobile operator in Singapore, recently launched 100Mbps broadband service partnering with Starhub, and we expect such move will likely have a significant competitive advantage in the long run.
- Policymakers should consider cable infrastructure as a part of their NGA strategy. Cable infrastructure could provide a cost-effective platform for ensuring ultra-broadband access. For example, the Chinese government has recognized cable as modern IP-based backbone and started to fund cable operation as a way to evolve to ultra broadband platform.

Cable players need to fully leverage their assets in order to reinforce their competitive position. The success and competitive attractiveness of cable platforms presents an inherent risk that regulators will require cable operators to open their services to other players. This is currently under consideration in the Netherlands, for example, and policymakers in Europe are currently re-thinking their overall NGA regulation, in which cable will be considered as a part of the overall picture. However, this risk can also provide an opportunity for cable operators to pre-empt the regulators by proactively developing wholesale offers especially to mobile-only operators (which is already the case for Starhub and M1), in order to generate additional revenue.

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Arthur D. Little

In the technology economics for NGA platform and cable TV sector, Arthur D. Little has advised multiple operators (cable, fixed and mobile), financial investors and regulatory authorities all around the world on all topics highlighted in the view point. Among our recent experiences include: CAPEX requirement for technologies (DOCSIS 3.0 and beyond), supporting a cable operator to enter mobile voice data market, assisting a cable operator to receive comprehensive wholesale offer and assisted several strategic (including mobile operators) and financial investors to evaluate and acquire cable operators.

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