FIBRE: TAKING THE RIGHT STEPS

To get the broadband infrastructure and consumer benefit that are needed, regulators have to abandon the short-term thinking that can stifle new entrants and investment, argue **RICHARD CADMAN**, **JONATHAN KINGAN** and **GITA SORENSEN**

The telecoms infrastructure and services we have today are largely a result of investment by new entrants, spurring incumbents to respond to protect their revenue base. Regulation has enabled competition by, accidentally, allowing sufficient profits in the market to encourage competitive investment. However, regulators are now at risk of jeopardising critical infrastructure investment by applying the same economic principles to a radically different market environment. A focus on short-term price reductions risks deterring infrastructure investments by entrants. Without investment by entrants, incumbents have little incentive to respond and can continue to enjoy a quiet life.

BACKGROUND

Liberalisation of the telecoms sector in the 1980s and 1990s brought with it new challenges; it was soon recognised that standard competition law provisions would not suffice in dealing with issues such as refusal to supply and associated anti-competitive behaviour including pricing and operational discrimination.

Competition law is designed to punish anti-competitive behaviour by a dominant firm after the event and so was unable to effectively address the situation of market foreclosure before competition was introduced. Ex ante regulation was therefore developed to prevent operators with significant market power (SMP) from abusing their position, requiring them to grant access to competitors on reasonable and non-discriminatory terms in advance of competition problems arising, thus enabling the introduction and development of competition.

Consumers' interests are ultimately better served by a competitive market than by a regulated monopoly as competition spurs innovation and drives efficiency improvements – both of which regulation struggles to deliver. The focus for regulation became to develop a level playing field between the incumbent and new entrants, mandating access to the incumbent's network and services to enable entrants to replicate the services and deliver them at a price no higher than the price charged by the incumbent.

National regulators were tasked with the development of a framework of ex ante rules to further competition, but with the primary aim of serving the interests of consumers. As one important characteristic of monopoly markets is often very high prices, there was significant focus on driving down end consumer prices. This was typically achieved through charge controls to ensure prices reflective of an efficient cost base. These controls provided

incentives for the incumbent to reduce its costs (inefficiencies would result in the incumbent not recovering its costs) and encouraged price competition (the market entrants priced aggressively to win market share from the incumbent).

While this framework successfully delivered significant price reductions to consumers, it has proved less successful at encouraging the development of innovative new products and services. This is primarily because new entrants are dependent on the incumbent's network and wholesale services – and often at a lower level of quality than the incumbent due to inefficiencies in accessing the incumbent's processes for installation and repair. To enable and encourage increased innovation, it was therefore recognised that market entrants should be encouraged to replicate as much of the incumbent's network as was economically efficient, and operational discrimination in the supply of access services should be reduced as much as possible.

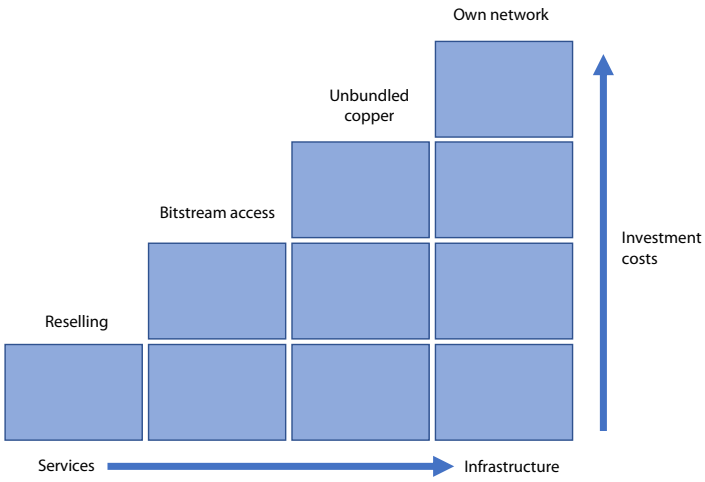
The concept of the ladder of investment was introduced to encourage economically efficient replication of network infrastructure, providing a framework for the development of access services at different levels of the incumbent's network.[1] The aim of this framework was that market entrants should invest as deeply into the network architecture as is economically efficient, which should gradually increase their control over the specification of services and the ability to innovate independently of the incumbent. It was particularly successful at encouraging investment by market entrants in facilities to unbundle the incumbent's copper local loops, which in turn enabled increased investment and innovation in the broadband market.

Throughout the 1990s and the beginning of the 2000s regulators were, therefore, able to achieve the dual objectives of reducing prices for end consumers while encouraging investment and innovation. The main reasons for that were:

- The investment levels required by market entrants were relatively modest and they could climb the ladder of investment as their customer base grew and it made sense to self-provide some network elements
- The incumbents' costs and prices were so high that, despite a continued downward pressure on both retail and wholesale prices, both entrants and the incumbents were able to make profitable investments.

However, the copper access network is not able to support broadband speeds greater than 24 Mbps or so to the majority of customers, and so deliver the video and other data rich applications demanded by users. To support higher access speeds some incumbent operators have deployed fibre to the cabinet (FTTC), which uses part of the existing copper network (from the street cabinet to the end consumer's premises) but also requires investment to provide the optical fibre cables and electronics at a street level. Other incumbents, and some entrants, have deployed fibre to the premises (FTTP) that does not use any of the copper network, but requires substantial investment in new fibre infrastructure.

OLD LADDER OF INVESTMENT



LLU SHARE IN WESTERN EUROPE

Country	LLU share of broadband lines
France	48%
Germany	30%
Italy	30%
Spain	30%
UK	41%
Western Europe	30%

NEW CHALLENGES FOR REGULATORS

Over time it has become clear that, while the FTTC approach delivered faster broadband speeds to customers more quickly and cheaply that could be done with FTTP, it is very unlikely to be sufficiently futureproof. Global internet traffic from consumers and businesses is forecast to continue growing at a rate of 24% a year over the next 4 years;[2] average speeds are set to nearly double and these trends are likely to continue. FTTC cannot offer the speed or quality of service requirements to support future applications such as connected homes and the delivery of online educational and healthcare services. It also remains dependent on the copper access network, with its high fault rates and maintenance costs.

FTTP offers greatly increased upstream and downstream speeds, much better quality of service and reduced operating costs. However, a step change in investment levels will be needed to deliver futureproof connectivity and this investment is considered substantially more risky than the incremental improvements to the old copper networks, including the FTTC network upgrades.

So, regulators now face two important challenges, which some may consider pull in opposite directions:

- How to encourage investment in FTTP networks
- How to ensure that competition and consumer choice are not sacrificed to encourage investment.

The current level of investment in FTTP networks varies substantially across the world, but whereas in the past that variation could be linked to the economic strength of a country, that is not now necessarily the case for FTTP. As the chart shows (page 31), FTTP investment varies significantly among comparatively prosperous nations, such as EU member states.

The level of FTTP investment is therefore not linked to availability of

funds, but more likely to the incentives for operators to invest in new networks, or alternatively to seek to extract maximum returns from existing copper assets.

It is important to recognise that an incumbent investing in FTTP may not see a substantial increase in revenue, which would come mainly from existing customers transferring from the copper network to the fibre network. Market entrants have a much stronger incentive to invest as incremental investment typically results in incremental revenues as the operator connects new customers to its new FTTP network.

To date, regulators have largely been able to achieve both price reductions for consumers and some degree of investment/innovation by incumbents and market entrants. The relatively modest levels of investment required and the high cost levels of the incumbents allowed this to happen, but those parameters have now changed. We are now in an environment in Western Europe where fixed line capex has been reducing, competition is more intense and EBITDA margins are tightening. The traditional incumbent business model is not generating sufficient cash to fund widespread deployment of FTTP networks, and the regulatory framework needs to adapt to a new set of parameters:

- FTTP investments are very large (for example, recent estimates suggest $400–$800 per premises passed plus $250–$275 per customer connected)
- About 8–10 years is needed to recover costs
- Success depends on rapid deployment and service uptake to achieve profitable penetration levels in each geographic area
- Market shares below 35–40% may not be sustainable for the infrastructure providers – suggesting a maximum of 2-3 operators in each area
- The costs of incumbent providers have been gradually reduced and are now close to that of an efficient operator in most developed economies.

The established ladder of investment is therefore no longer valid for a world where FTTP investment is the objective. Instead, we now have a very different ladder, as illustrated.

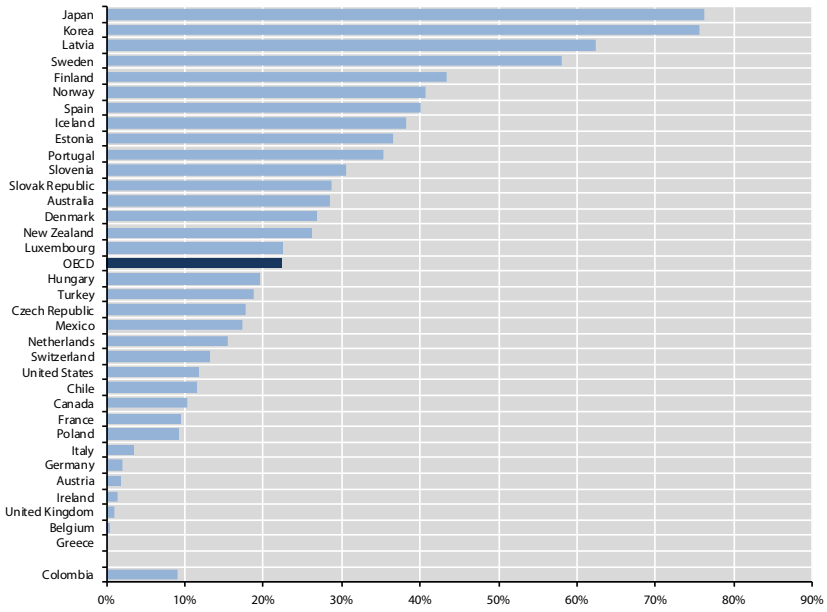
For this new ladder to work, there needs to be economic space between the different steps, including the new step, and the traditional approach of regulating the incumbent's pricing down is no longer appropriate.

ENCOURAGING NETWORK DUPLICATION

Before considering options for how the framework could adapt, it is useful to return to the principle of encouraging economically efficient network duplication. For the past 20 years or so, that principle has been front and centre of most regulatory strategies, supported by the ladder of investment. However, in retrospect, it is now clear that much investment made during that period would in fact have been economically inefficient, had the cost-based access been set using actual efficient costs rather than the inflated costs of former monopoly operators that had not yet become efficient.

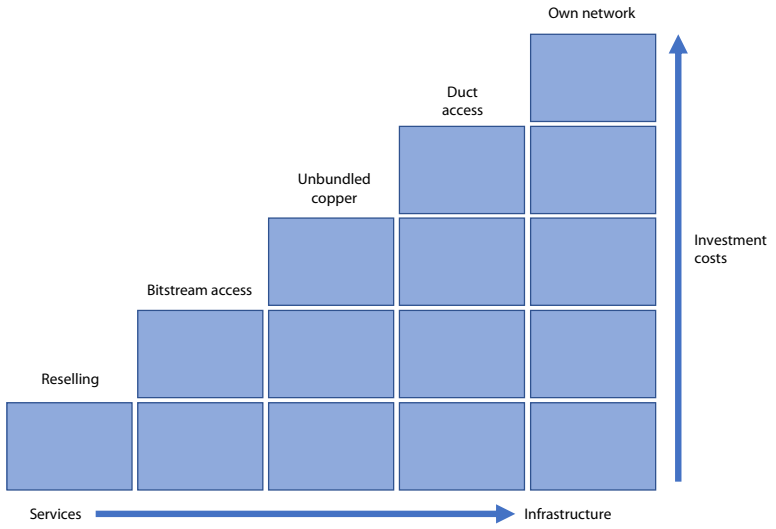
The price levels set for access services were based on the incumbent's costs or on models of efficient new build costs. Although the incumbent's prices may have been double that of an efficient operator at the time of setting the first regulated access prices, access prices were not set to enable competitors to offer prices at half that of the incumbent. Rather, there was a gradual price reduction, or "glide path", allowing the incumbent to become more efficient over time. This meant that, for many years, market entrants found that

GLOBAL INVESTMENT IN FTTP



Source: OECD[3]

NEW LADDER OF INVESTMENT



they could profitably replicate parts of the incumbent's network and incumbents could retain extra profit if they became more efficient at a faster rate than the glide path. Thus, significant investments were made in competing long-distance networks – driving cost reductions, innovation and improvements in quality of service.

A number of market entrants led the way in the development of fibre optic long-distance networks, by building new long-distance networks and using access to the incumbent's local networks to deliver connectivity to end consumers (for example, Mercury and Energis in the UK, Viag-Interkom in Germany and Cegetel in France). This put competitive pressure on the incumbents to also invest in fibre networks and modern electronic equipment that enabled provision of innovative services such as virtual private networks to multisite businesses. There seems to be little doubt that without the investments by market entrants, incumbents would have enjoyed the quiet life of a monopolist and invested less and probably much later than was the case. Much of that investment would, however, not be profitable in today's world, as the incumbent's cost base has reduced, reflecting improved efficiency and the use of new technologies – much of which has happened because of the competitive threat posed by market entrants.

It seems that regulators have accidentally encouraged investments that were, in fact, statically inefficient when measured against the costs of an efficient incumbent operator benefiting from economies of scale and scope. The substantial dynamic efficiency benefits of those investments are, however, beyond dispute. Regulators should therefore take care to not simply apply the efficient network duplication principle without taking a longer-term view of how they can achieve the dual objectives of encouraging FTTP investment and also safeguarding competition at the deepest level possible.

Due to the history of delivering both price reductions and (modest) investment/innovation, regulators now often consider the need to deliver short-term consumer benefits (typically price reductions) as paramount. The often short periods for which regulation is applied (in the EU there is currently an obligation on regulators to review market definitions and remedies every 3 years, which may be extended to 5 years in the forthcoming European Electronic Communications Code) does not make it easy for regulators to promote longer-term investments. There is a real risk of under-investment to the longer-term detriment of end consumers.

REGULATORY OPTIONS

If we are to encourage investment we must state what it is that motivates entrepreneurs to risk their money: profit. Nobody invests to lose money and most people will want a higher return for a risky investment than a less risky one. So, if we are to encourage investment, we must allow the investor to make a return at least in line with the cost of capital. However, we would not want to see consumers get a bad deal and feel "ripped off". So while investors need to see a return, consumers also need a good deal.

In the short term, some might feel that there is a zero-sum game played between producers and consumers: producers make money at the expense of consumers getting a bad deal, or consumers get a bargain at the expense of companies' returns on investment. The challenge for regulation is to encourage investment while ensuring consumers get a good deal. However, if we lift our sights to the long-term outcomes we may find a way through this maze if regulators are prepared to deliberately make the "mistakes" they accidentally made before: allow enough profit in the market to encourage investment. There are several options that regulators could consider.

Regulatory holiday. The first option is a regulatory holiday: imposing no regulatory obligations on the firm either for a limited period or until it becomes clear that no competition will emerge. This would mean that the normally regulated firm does not have to provide access at all, much less at a regulated price. This does not mean that the investor has a de jure monopoly – there is nothing to prevent others investing in competing technology – but it does mean that if no one enters the market to compete it has a de facto monopoly, at least in the short term.

> **The challenge is to encourage investment while ensuring consumers get a good deal.**

Regulatory holidays have not found favour with the European Union. In 2007 the European Commission launched infringement proceedings against Germany over a proposed law that would have granted Deutsche Telekom just such relief. The Commission was concerned that a holiday would jeopardise competition in the market. However, there is an equivalent in the pharmaceutical sector, where firms that invest in new drugs benefit from an exclusive period protected by patents. In some countries where a national health service is the main purchaser of drugs, drug companies are allowed to set prices well above cost to compensate them for all the research that does not produce useable drugs. At the end of the patent period, generic manufacturers are able to enter the market and produce the same drug, usually at much cheaper prices.

Under a regulatory holiday approach, there is nothing to prevent the incumbent from providing access to its fibre network on purely commercial terms. It would still be bound by competition law not to abuse its dominant position and so an access seeker could seek redress if the terms offered are exclusionary. However, the empirical evidence to date is that dominant operators are unlikely to be willing to give access to retail rivals and redress through the courts is a long and costly process.

Pricing freedom. A second option is to require the regulated firm to grant access but to allow it sufficient pricing freedom that it can earn high

REFERENCES
1 Cave M (2006). Encouraging infrastructure competition via the ladder of investment. Telecommunications Policy 30 (3): 223–37.
2 Cisco. Complete Visual Networking Index (VNI) Forecast 2016–2021.
3 OECD. Percentage of fibre connections in total broadband. bit.ly/2Eby013

enough profits to attract investment while not harming potential competition. There are various approaches that can be used:

- Setting retail price on a margin squeeze basis while not controlling the wholesale price
- A wholesale price based on retail minus
- A reciprocal arrangement, as has delivered substantial FTTP investment in France and Spain, whereby the operator that builds the fibre network to the premises has to allow all other operators access. The initial builder may gain a first mover advantage and earns revenues from selling access to others, while reducing its network build costs by accessing other operators' physical infrastructure on a mutual basis.

Reasonably efficient operator. A third option is to set the wholesale price but do so on the basis of a "reasonably efficient operator" (REO), rather than the incumbent's own costs. In the short term this would allow the regulated firm to earn excess profits, but would also allow a firm that did not enjoy the economies of scale and scope of the incumbent to operate profitably at a lower scale. There would also be a short-term cost to consumers, through higher prices, but if it worked there would also be long-term gains from competition. This option is a little like what happened accidentally in the past. Regulated access prices were set at a supposedly efficient level, but were in fact based on the incumbent's costs and those had not yet reached efficiency.

In all three of these options, the regulator could set a price floor, perhaps on the basis of an REO, to ensure that the incumbent firm with SMP cannot set its prices so low that other firms cannot enter. Of course, a dominant firm would be subject to competition law and unable to set a predatory price, but it is well known that competition law enforcement is time consuming and by the time a case is settled, the competing firm could have exited the market. An ex ante price floor ensures the dominant firm cannot set an anticompetitive price in advance.

Spreading risk. A fourth option, and one that is being expressly accounted for in the draft Electronic Communications Code currently being negotiated in the EU, is to spread the risk through joint investment. The thought here is that if firms can collaborate to invest in basic infrastructure they can spread the risk and the capital needed. There are some indications of this happening either with firms investing together or a regulatory environment that allows an investor to have a monopoly locally on the physical network that is open to all service providers to offer retail products. This is the case in France and in Greece, where operators bid for a local physical monopoly on the proviso that access is granted to all.

All four options have some merit. The trick for any regulator is to intervene at the Goldilocks level – neither so restrictively that investment is deterred because investors cannot earn enough, nor so loose that investors reap monopoly profits at the expense of consumers. Judging the right level may be a question of art rather than science and it may always be better to risk intervening too loosely on the basis that some excess profits may be better for the economy than a lack of innovation and investment. A regulatory failure that results in market power over fibre networks can later be corrected by the market or future regulation, whereas a regulatory error that deters investment will leave consumers without ultrafast broadband and can take many years to correct.

The regulator, or the government, may have one other option which is to use state funds in the event of a complete failure by the market to invest. States already do this to a greater or lesser extent and especially in rural areas where the costs are likely to be too high for private investors. Indications in several countries are that the market is still willing to invest in fibre so long as regulatory conditions allow firms to earn a return. Until we reach the outer limits of private investment perhaps governments should be reticent about using public funds.

PROTECTION AGAINST ANTICOMPETITIVE BEHAVIOUR

As well as tailoring regulation to encourage efficient investment in new fibre infrastructure, regulators also need to consider the risk to that investment posed by potential exclusionary/predatory pricing by the incumbent. We have discussed above the reluctance by incumbents to invest, given the limited additional revenues they can expect and their natural incentives to sweat existing assets. It is also necessary, however, to recognise that the value to incumbents of maintaining a significant market share is very high and an incumbent would therefore have a strong incentive to adopt marketing and pricing approaches that would limit its loss of market share, with the ultimate motive of squeezing out the new market entrant.

Regulators have the powers to set price floors or other interventions to prevent incumbents from squeezing out new entrants. While such measures may result in some short-term economic costs (in the form of higher end user prices), the long-term benefits of effective competition to the incumbent (which will almost certainly spur FTTP investment from the incumbent) are likely to significantly outweigh such short-term costs.

CONCLUSION

It is now critical that national regulators take a longer view of consumer benefits. The level of investment required to roll out FTTP networks nationally in any country is extremely large and the returns are uncertain, especially for incumbent operators that would have a natural incentive to maximise the return from their current assets. The optimal regulatory solutions will vary depending on the national circumstances, but it is clear that they must include the ability of market entrants to invest profitably. Without the competitive threat resulting from market entry, the incumbent operators are unlikely invest in a timely manner.

It is also clear that regulators need to incorporate measures to prevent exclusionary or predatory pricing by the incumbent in their basket of measures to encourage competitive FTTP investment. Regulators are in an unprecedented situation of being on the critical path of the development of infrastructure that will be crucial for the commercial and social prosperity of their countries.

There may not be a single regulatory answer, and regulators will have to take account of national conditions. However, whatever option they choose they should bear in mind that it is likely to be more economically efficient to correct for investment plus some market power than for no investment and short-term lower prices.

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