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**Supporting fibre rollout and infrastructure competition in  
Ireland via continued pricing flexibility**

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### *Disclaimer*

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# 1. Executive summary

ComReg propose moving from wholesale pricing freedom for Fibre to the Cabinet (FTTC) to comprehensive price controls. Price floors and margin tests are also proposed for FTTC and fibre to the home (FTTH), with margin squeeze tests applying both between retail and wholesale prices and next generation and current generation access. Further, it is proposed that price differentiation should only reflect cost differences, which would preclude value based differentiation.

The shift in stance proposed by ComReg, from pricing freedom to comprehensive price controls for FTTC, is striking given the adoption of the European costing and non-discrimination recommendation – establishing a framework permitting pricing freedom – in September 2013; and the growth in infrastructure based competition in the Irish market. Less, rather than more, regulation appears appropriate.

Virgin continue to upgrade cable and expand coverage using fibre and coax, fibre entrant SIRO who started investing in 2015 and plan to initially reach 500,000 premises with FTTH, and the auction of 3.6 GHz spectrum in May 2017 has increased spectrum supply by 86%, supporting market entry and introduction of 5G “wireless fibre”.

In addition to growing infrastructure competition, regulated current generation copper based access also continues to exert a constraint on other services. Advances in compression are reducing the bandwidth required for a given level of video quality, which tends to narrow the service gap between current and next generation access.

Pricing freedom underpins the growth in infrastructure competition, and investment by eir. Pricing freedom has promoted a virtuous circle, consistent with Goal 13 of the April 2017 ComReg Strategy Statement that:

“Competitive incentives facilitate efficient commercial investment in infrastructure and services to the widest extent possible.”

Reducing FTTC pricing to the estimate ComReg have derived, assuming an implausible 50-year economic life for FTTC, would undermine these developments and, via the impact on the market price of FTTH, undermine achievement of the National Broadband Plan.

Restricting pricing freedom, service price differentiation and inter-service margins has additional adverse consequences beyond the

harm to investment, infrastructure competition and delivery of the National Broadband Plan. These include:

- Limiting scope to charge higher and lower prices for higher and lower service levels respectively, thereby limiting adoption.
- Via reduced fixed adoption an inefficient reduction in indoor Wi-Fi offload.
- Reduced scope to manage the transition to fibre, and ultimately copper retirement.

In addition to the suggestion that there is insufficient pricing constraint on FTTC, ComReg argue that uncertainty regarding the demand for FTTC has diminished to the point where it is possible – presumably with a degree of confidence – to set the price of FTTC.

However, whilst current demand is known, future demand remains uncertain, and longer-term uncertainty has arguably increased with the entry of SIRO into the market.

ComReg consider a time frame of 50 years for FTTC, which is very long given development of competing wireless and fibre platforms, and possible changes in longer-term demand which renders FTTC obsolete. The estimated cost reflective price for FTTC, in turn, depends on assumed demand over the entire 50-year time horizon.

Plausible future demand scenarios and/or a shorter assumed economic life for FTTC are likely to be consistent with a wide range of estimates of cost reflective unit prices. In contrast to a price fixed by regulation, the market can continuously adapt to competition and changing expectations regarding future technology and market developments. As ComReg noted in 2013:

“a pricing regime which is flexible and not overly intrusive is essential to mirror market-based incentive...”.

Whilst there are grounds for continuing to allow pricing freedom for FTTC, there are also a range of options short of a comprehensive price control that should be considered in coming to a view regarding a proportionate approach – if continued pricing flexibility were rejected. ComReg have not done this, instead treating the choice as dichotomous between a comprehensive price control and pricing freedom.

Further, the proposed shift to comprehensive price controls is also arguably inconsistent with the need for regulatory predictability (if pricing freedom was appropriate in 2013 then why not now, given increased infrastructure competition?). Further, a degree of

regulatory commitment not to expropriate the gains from innovation and investment is desirable, and arguably incompatible with a price control for FTTC based on an assumed asset life of 50 years. The need for regulatory commitment, and the benefits of market flexibility, can and should be squared.

A range of intermediate options exist, with the following discussed in this report: a safeguard nominal (CPI-CPI) price cap; a cost oriented price control, but only applied to a service tier below the full capability of FTTC (say at 30 Mbps); and an upgraded anchor product, say at 15 Mbps, based on the price of regulated current generation access.

In conclusion, the growing competitive constraint on FTTC coupled with ongoing demand uncertainty constitutes grounds for maintaining pricing freedom. However, if pricing freedom is no longer considered appropriate, an expanded set of options should be evaluated in deciding on a proportionate approach. In judging what is appropriate, the harmful consequences of a fixed price control – based on an uncertain estimate of costs and future demand - for investment, infrastructure competition and delivery of the National Broadband Plan should be key considerations.

## 2. Context – ensuring connectivity needs are met in Ireland

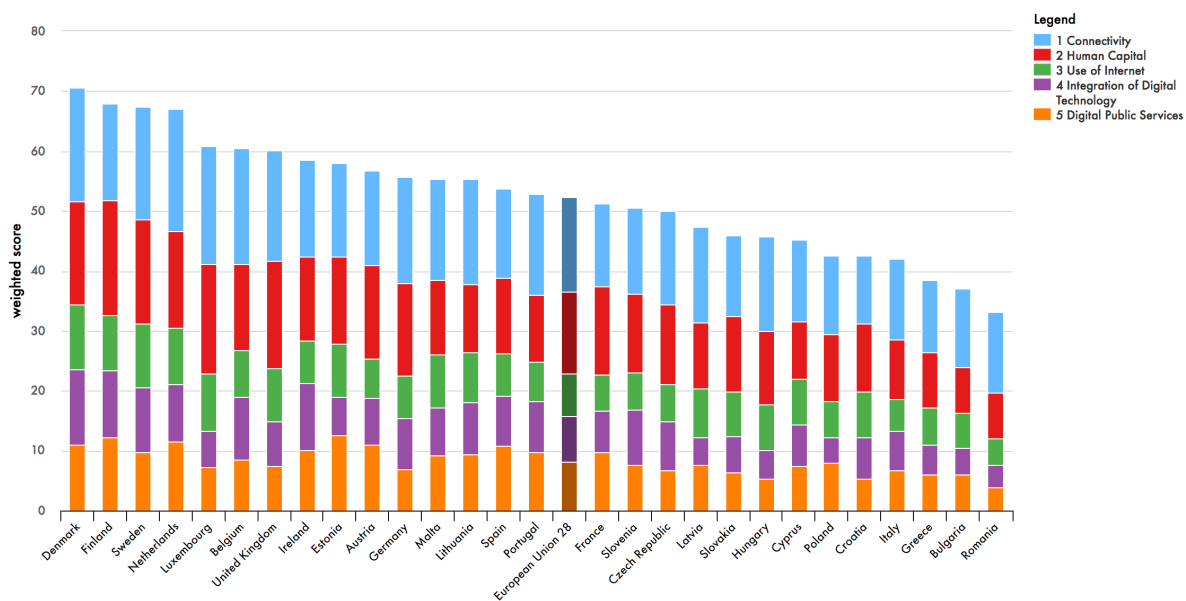
At one level a market review is a narrow technical exercise. It should, however, be seen in the wider context of the contribution of connectivity to society and the economy.

From this perspective connectivity investment, innovation and use; and infrastructure competition, which helps deliver all three, are priorities. This context section therefore sets the scene in terms of where Ireland has got to, and where it might go next, in terms of connectivity.

### The digital economy in Ireland is a success to date

The digital economy in Ireland is a success story to date, and overall outcomes rank 8<sup>th</sup> on the European Digital Economy and Society Index (Figure 1).<sup>1</sup>

Figure 1: Ireland ranks 8th on the Digital Economy and Society Index



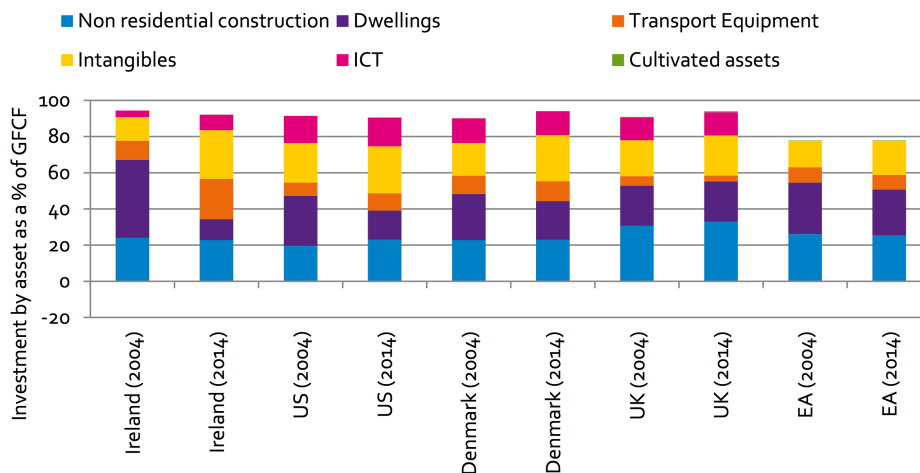
### The ICT sector has made a strong contribution to growth, though investment is relatively weak

The ICT sector has made a strong contribution to growth in Ireland. However, whilst investment in the ICT sector has grown, it is still low as a share of overall investment in the economy relative to the US, UK and Denmark (see Figure 2).<sup>2</sup>

<sup>1</sup> European Commission, *Europe's Digital Progress Report 2017 – Ireland*.

<sup>2</sup> National Competitiveness Council, *Benchmarking Ireland's Productivity Performance – 2004-2014*, January 2017.

Figure 2: The ICT investment share has grown, but is roughly half that in the US



ICT investment is likely to be a key determinant of longer-term growth for Ireland, and policies which support investment should therefore be given priority.

### Household broadband adoption compares favourably

Household broadband adoption lagged the European average up to 2013, but has now overtaken it with household adoption at 86% versus 83% for Europe.<sup>3</sup> The proportion of adults who used the internet over the past three months was 82% in 2016, equal to the European average.<sup>4</sup>

### Broadband platforms are diverse, competing & expanding

Broadband is provided over a diversity of platforms in Ireland. Cable covers 42.7% of households, around the EU average,<sup>5</sup> whilst wireless is widespread and satellite close to universal.

Figure 3 shows broadband platform market shares. Next generation access adoption has grown strongly in recent years, with VDSL subscriptions now outnumbering ADSL subscriptions, having grown 33.9% in the year to Q1 2017.

In relation to mobile broadband, the statistics do not include smartphone only households. However, Eurobarometer

**Figure 3: Broadband platforms shares<sup>6</sup>**

Platform	Subscribers	Share
DSL	414473	24.1%
VDSL/FTTC	526026	30.6%
Cable	367653	21.4%
FTTP	12076	0.7%
Satellite	5218	0.3%
Fixed wireless	47452	2.8%
Mobile broadband	348820	20.3%
<b>Total</b>	<b>1721718</b>	<b>100%</b>

<sup>3</sup> Eurostat, *Digital economy and society statistics - households and individuals*, 2017.

<sup>4</sup> Eurostat, *Digital Economy and Society*, 2016.

<sup>5</sup> EC, *Broadband coverage in Europe*, 2015.

<sup>6</sup> ComReg, *Quarterly Key Data Report Data as of Q1 2017*, June 2017.



estimate that smartphone only households had grown to 11% of households by 2015<sup>7</sup>.

Some argue that smartphone only access is not functionally equivalent to broadband. However, smartphones offer functionality that a PC does not, including the diversity of applications and in-built sensors. Smartphones can also support other devices via Wi-Fi tethering. For many, they are superior, not inferior, to a PC. Smartphone data connectivity also continues to improve in terms of speed and data allowances.

The prospects for further growth in infrastructure competition and next generation access are good, with eir and SIRO investing in FTTH, and Virgin investing in footprint expansion, including FTTH in areas not covered by DOCSIS, and network upgrades.

SIRO's Phase One fibre investment, which started in early 2015, will see SIRO initially reaching 500,000 premises in 51 towns and is expected to be fully rolled-out by the end of 2018. eir committed in April 2017 to rolling out FTTH to 300,000 premises.<sup>8</sup>

Imagine Communications Ireland Ltd, currently the largest Wireless Internet Service Provider (WISP), obtained 60 MHz of spectrum in the 3.4-3.6 GHz auction which concluded in May 2017. Others have also acquired spectrum, and the development of competing service offers is anticipated, as ComReg Chairperson Gerry Fahy put it:<sup>9</sup>

“The outcome also produced new market entry with the potential for increased investment and innovation, thereby enhancing competition and customer outcomes”

The National Broadband Plan also envisages further extension of high speed broadband, likely to comprise FTTH, to an additional 542,000 premises.

## **Broadband speeds compare favourably but lag leading nations**

Average broadband speeds in Ireland compare favorably with the EU-5, but lag those in leading nations. The average speed in Ireland, as measured by Akamai (an end-to-end measure including in-home constraints), was 15.6 Mbps in Q1 2017.<sup>10</sup> This compares speeds in France 10.8 Mbps, Germany 15.3 Mbps, Italy 9.2 Mbps, Spain 15.5

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<sup>7</sup> Eurobarometer, *E-Communications and Telecom Single Market Household Survey*, 2016.

<sup>8</sup> DCCA, *Naughten finalises the Broadband Intervention Map*, March 2017.

<sup>9</sup> ComReg, *Five Winning Bidders in ComReg's 3.6 GHz Band Spectrum Award*, May 2017.

<sup>10</sup> Akamai, Q1 2017, *State of the Internet – connectivity report*, Volume 10, Number 1.

Mbps and the UK 16.9 Mbps; and 23.5 Mbps for Norway which had the highest broadband speed in Europe.

## Conclusion

Outcomes in Ireland in terms of the digital economy are strong. Whilst there are underserved areas in relation to broadband access, overall progress towards next generation access and in terms of average broadband speeds compare favourably, but are not exceptional.

Infrastructure competition is well developed and intensifying. The next phase, involving improvements in coverage under the National Broadband Plan and commercial FTTH deployment by SIRO and eir, will be challenging. Mobile network densification, particularly as 5G is deployed, will also require additional fibre investment.

The proposal to move from pricing freedom for FTTC to a comprehensive cost-oriented price control, if implemented, will intensify the challenge by lowering anticipated revenues for all investors.

The cost in terms of foregone infrastructure competition, innovation and investment - and ultimately foregone benefits to Irish Citizens and the Irish economy – is likely to be high.

This paper considers the rationale for the proposals, assessing them against the market context and economic benefits of pricing flexibility, and concludes that a move to a comprehensive cost based price control is unwarranted and would prove harmful.

Whilst the *status quo* is preferred, options other than comprehensive price controls exist. Setting up a choice between pricing freedom and comprehensive price controls is a false dichotomy.

The proposed approach should be re-appraised considering wider economic and social objectives for the Irish economy, market developments towards infrastructure competition and an assessment of the potential foregone benefits of pricing flexibility.

### 3. The ComReg rationale for pricing freedom, and price controls

#### ComReg rationale for moving to comprehensive price controls

##### *Rationale*

ComReg 17/26 of March 2017 gives the following reasons for moving to cost orientation:<sup>11</sup>

“ComReg considered that recent price increases by Eircom for both standalone broadband services and for POTS based NGA services, ...indicates that pricing constraints in relation to Eircom’s retail and/or wholesale broadband prices, are of limited effectiveness and that existing price controls (i.e., margin squeeze obligation) need to be updated to reflect new circumstances. In particular, the constraint posed by copper based broadband is likely to have diminished as evidenced by the reduction in LLU volumes and the switch from copper to fibre based services in the NGA footprint. Cable alone cannot create a full retail constraint on Eircom’s NGA products at the national level but only in geographically limited areas. SIRO’s fibre to the building (‘FTTB’) coverage is likely to be very limited in the short to medium term. Therefore, alternative networks cannot generate competitive pressure across a sufficiently broad territory. In addition, prices are differentiated between networks. FTTB/H products are priced at a premium to FTTC products, which in turn are priced at a premium to CGA products. Therefore, price constraints between the different technologies are not sufficiently strong.” Paragraph 5.5.

“In addition, demand for FTTC based NGA services is now easier to forecast given the historic penetration data that is available since Eircom began deploying its fibre network in 2013. Therefore, it would be easier to determine forecasted costs and volumes associated with the provision of FTTC based NGA services.” Paragraph 5.6.

##### *Comment*

ComReg state that price increases for broadband services indicate that pricing constraints are of limited effectiveness. However, initially setting prices for a new service low and later raising them

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<sup>11</sup> ComReg, [\*Pricing of wholesale services in the Wholesale Local Access \(WLA\) market and in the Wholesale Central Access \(WCA\) markets: Further specification of price control obligations in Market 3a \(WLA\) and Market 3b \(WCA\)\*](#), April 2017.

("penetration pricing") is a means of achieving word of mouth marketing and gaining momentum (Netflix, for example, increased its price in Ireland from an initial €7.99 to €9.99 in May 2016). Returns may also be front-loaded with irreversible investment under uncertainty and competition due to real options effects, as discussed by Ofcom.<sup>12</sup> Further, eir has been a price follower rather than leader, responding to price changes by Virgin, and to regulatory changes by ComReg which reduced the scope for common cost recovery from copper loops.

Another consideration, in judging whether prices are excessive, is whether demand is suppressed (demand reflects both quality and price, and is therefore arguably a better measure than price alone). Good progress relative to European peers, as discussed in Section 2, in terms of digital economy outcomes, overall internet use, broadband adoption and transition to higher speed services does not suggest that demand is suppressed in Ireland.

The argument that "alternative networks cannot generate competitive pressure across a sufficiently broad territory" is curious given that the geographic extent of competition from alternative networks, and their capability, has increased and is expected to increase further (and acts as a national constraint given that eir market broadband on a national basis).

Whilst adoption of high speed broadband has grown, the switch from copper to fibre based services is not *per se* evidence that the constraint of regulated current generation broadband on next generation services has diminished. A judgment regarding incremental willingness to pay for different bandwidths, and the likely response to an increase in price differentials, is instead required. Consideration of drivers of demand and willingness to pay, and evidence from other markets which could inform such a judgment, are considered in Section 4.

The claim that a price premium for higher bandwidth technologies and products indicates that price constraints between the different technologies are not sufficiently strong is entirely without foundation. A price gradient with speed is efficient and to be expected. Retail providers of SIRO fibre differentiate their offers by speed, differentials are observed in other broadband markets and in other markets including the air travel market. Service-price

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<sup>12</sup> Ofcom, [Ofcom's approach to risk in the assessment of the cost of capital](#), August 2015. Annex to Section 9.

differentiation increases overall demand, and better aligns investor and customer interests. Finally, Ofcom have noted that:<sup>13</sup>

“... a premium for SFBB [superfast broadband] is consistent with a chain of substitution.”

The argument that it is now easier to forecast demand is of course correct in relation to current demand, but not necessarily future demand. Demand for FTTC could steadily grow, slow (if improvements in compression make ADSL an increasingly acceptable alternative) or reverse (if households migrate to cable, FTTH and 5G wireless instead of FTTC).

Demand, at least in the medium-term, remains uncertain; and given the entry of SIRO and recent developments in relation to 5G “wireless fibre” is arguably less predictable than it was in 2013 when ComReg decided to allow pricing freedom.

## **The original ComReg rationale for pricing freedom**

### *Rationale*

ComReg 17/26 of March 2017, which proposed cost orientation for FTTC, gave the following reasons for having previously allowed pricing freedom:

“In the 2013 NGA Decision ComReg considered that a cost orientation obligation was not appropriate given the then level of uncertainty associated with the rollout of FTTC, both in terms of costs and penetration levels. In addition, ComReg considered at that time that there was a sufficient degree of effective retail pricing constraints from cable and prospectively from LLU based retail and wholesale services (if the right regulatory protections were in place) to warrant a more flexible pricing approach.” Paragraph 5.3.

ComReg 13/11 of January 2013<sup>14</sup> set out the following rationale for pricing freedom, subject to a margin squeeze test:

“In order to stimulate investment in NGA or at least ensure that there are no regulatory barriers to investment, sufficient flexibility is needed to provide scope to react to market demand, since demand and appropriate price points are uncertain at the early stages of market development. In particular, a pricing regime which is flexible and not overly

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<sup>13</sup> Ofcom, [Review of the wholesale broadband access markets - Statement on market definition, market power determinations and remedies](#), 26 June 2014, Paragraph 3.70.

<sup>14</sup> ComReg, Next Generation Access (‘NGA’): [Remedies for Next Generation Access Markets](#), January 2013.

intrusive is essential to mirror market-based incentives, by allowing the incumbent to respond to observed prices and demand levels.” Paragraph 2.17.

ComReg 13/11 also pointed to the benefits of flexibility:

“a pricing regime which is flexible and not overly intrusive is essential to mirror market-based incentive...”.

ComReg 13/11 also noted that:

“Consistent with the principle of proportionality, which requires that the means used to attain a given end should be no more than what is appropriate and necessary to attain that end, ComReg has undertaken an incremental assessment of remedies (from the lightest to the most intrusive).” Paragraph 2.12.

### *Comment*

Uncertainty regarding demand is identified as a rationale for pricing flexibility. Yet, over the very long – 50 year time horizon - used by ComReg to assess cost oriented pricing for FTTC, demand is likely to be as, or more uncertain, than it was in 2013. Indeed, demand for FTTC could ultimately fall to zero if demand for bandwidth grows and cable, FTTH and 5G fixed wireless are available as alternatives.

The broader rationale for pricing flexibility identified in 2013, namely “to mirror market-based incentive” remains valid, yet the proposals for cost orientation are not assessed relative to this broader rationale. Section 5 of this paper unpacks the value of pricing flexibly, broadening the basis for an assessment of alternative regulatory remedies.

Further, following the 2013 ComReg decision, the Commission adopted the pricing and non-discrimination recommendation that set criteria for allowing pricing freedom:

“In view of the benefits of pricing flexibility in these circumstances, under the recommended approach, wholesale access prices for passive NGA wholesale inputs or non-physical or virtual NGA wholesale inputs offering equivalent functionalities are deemed to be sufficiently constrained (i.e. price-related competition problems are considered to be effectively addressed) when: (i) there is a demonstrable retail price constraint resulting from the infrastructure competition or a price anchor stemming from cost oriented wholesale copper access prices, and (ii) the ex ante economic replicability test is in place in those cases

where wholesale price regulation should not be imposed, and (iii) there is an obligation of providing wholesale access services on the basis of EoI. In other words, where EoI is applied and NRAs consider that the above competitive safeguards are in place, they should not impose a regulated access price for those NGA wholesale inputs.” Paragraph 52.

“NRAs should ensure that the margin between the retail price of the SMP operator and the price of the NGA wholesale input covers the incremental downstream costs and a reasonable percentage of common costs. Where wholesale price regulation for NGA wholesale inputs should not be imposed on the SMP operator when additional safeguards are implemented in accordance with this Recommendation, a lack of economic replicability can be demonstrated by showing that the SMP operator’s own downstream retail arm could not trade profitably on the basis of the upstream price charged to its competitors by the upstream operating arm of the SMP operator (‘equally efficient operator’ (EEO) test). The use of the EEO standard enables NRAs to support the SMP operators’ investments in NGA networks and provides incentives for innovation in NGA-based services.” Paragraph 64.

The adoption of the September 2013 recommendation, alongside material and growing infrastructure competition in Ireland since 2013, provides a sound basis for allowing continued pricing freedom for FTTC, coupled with an economic replicability test based on the equally efficient operator standard.

Finally, in assessing alternative remedies, ComReg has not set out a range of options and undertaken an incremental assessment to identify a proportionate approach. Rather, the proposal to move to cost orientation is considered as a binary choice versus a continuation of the *status quo*. Additional options are considered in Section 7.

## **Conclusion**

The case for moving from pricing freedom to cost orientation set out by ComReg is not supportive of such a precipitative shift in regulatory stance. The proposed shift in stance should be evaluated against two criteria, namely the degree of competitive constraint in the market and the incremental costs and benefits of different remedies.

Independent infrastructure competition has increased, and looks set to continue to increase with further expansion of competing cable

and fibre and the possibility of 5G fixed-wireless coupled with substantially greater spectrum availability. ADSL will continue to provide a constraint, and improvements in compression are reducing video bandwidth requirements (traffic growth *per se* does not necessitate a higher connection speed, if it relates to increased use rather than peak simultaneous use). The combined competitive constraint of ADSL and independent infrastructure may have strengthened, and has not obviously weakened.

Further, the full set of considerations for deciding the balance of costs and benefits of different remedies, including pricing freedom, remain valid. These include the 2013 rationale, namely “to mirror market-based incentive”, which was not evident in relation to the 2017 evaluation. Further, whilst the proposed costing and non-discrimination recommendation had been signaled at the time of the 2013 decision, its adoption in September 2013 strengthens the institutional basis for maintaining pricing freedom.



## 4. The impact of supply and demand side innovation

Following the decision to allow pricing freedom in 2013 several changes, and announcements in relation to anticipated changes, in supply and demand conditions have occurred. Some information is also comparatively recent, and was not available to inform the ComReg November 2016 draft wholesale market review decision (ComReg 16/96). Developments in supply and demand conditions point to:

- Increased scope for infrastructure competition.
- Ongoing uncertainty regarding demand for fixed broadband, and for FTTC.
- Compression of the willingness to pay bandwidth gradient.

Whilst supply and demand side developments are first considered separately below, the two interact. For example, a reduction in the required bandwidth for video may increase competition between lower and higher bandwidth access services.

### Supply side changes – innovation and competition

Increased infrastructure competition was anticipated by ComReg in 2013, and announcements in relation to cable and fibre plans in Ireland have confirmed these expectations. Technology change is also opening new possibilities and lowering barriers to entry:

- Advances in the capability of cable (and telco copper) beyond what was previously anticipated, for example full duplex (symmetric) multi-gigabit-per-second cable DOCSIS technology.<sup>15</sup>
- Advances in 4G coverage, capacity and capability, coupled with the growing capability of smartphones and apps to perform many functions.
- The transition to 5G opens the possibility of “wireless fibre”, with Qualcomm announcing the XG50 5G modem<sup>16</sup> and trials underway in the US and elsewhere.<sup>17</sup> Fixed wireless access, rather than mobile, is the early use case for 5G.<sup>18</sup>

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<sup>15</sup> <http://www.cablelabs.com/full-duplex-docsis/>

<sup>16</sup> <https://www.qualcomm.com/news/onq/2017/02/27/hype-reality-leading-way-global-5g-nr-trials-accelerate-5g>

<sup>17</sup> AT&T, *AT&T Details 5G Evolution*, January 2017.

Verizon, *Verizon to deliver 5G service to pilot customers in 11 markets across U.S. by Mid 2017*, February 2017.

Verizon, *J.P. Morgan Global Technology, Media and Telecom Conference*, 22 May 2017.

<sup>18</sup> Williamson, *Mobile first, fibre as required – the case for “fibre to 5G”*, January 2017.

- AT&T is trialing the use of powerline infrastructure as a waveguide for millimeter band radio (“AirGig”).<sup>19</sup> This technology could provide backhaul for small cell fixed wireless to the home.
- Increases in capacity for geosynchronous satellite broadband, for example, with a doubling of capacity between ViaSat-1 and ViaSat-2 (which launched in June 2017), and an almost 10-fold increase in capacity between ViaSat-1 and ViaSat-3, which will offer total capacity of 1 Tbps.<sup>20</sup>
- Low-earth-orbit, low-latency, satellite. This is more speculative, though SpaceX have submitted plans with the FCC for a constellation of 4,425 satellites to deliver high speed broadband and plans to launch the first test satellite in 2017.<sup>21</sup> SpaceX has demonstrated re-use of a first stage rocket booster, which is expected to substantially lower launch costs.

Changes in wireless technology will be coupled with a substantial increase in spectrum available for mobile and fixed wireless access in Ireland, from 405 MHz post the 2012 multi-band award to 755 MHz following the 3.6 GHz award in May 2017, and 1145 MHz allowing for future 700 MHz, 1.4 GHz, 2.3 GHz and 2.6 GHz awards.<sup>22</sup>

### **Demand side changes – mobile devices and wireless**

On the demand side, the pivot to mobile devices and to over the top video services has made Wi-Fi the default form of indoor connectivity and led to more bandwidth efficient applications:

- The shift to Wi-Fi, rather than wired connectivity, indoors means that Wi-Fi, rather than broadband constraints, are growing in relative importance. A US study found that:<sup>23</sup> “...nearly 80% of the bottlenecks are in the wireless network when access throughput exceeds 20 Mbps.”; whilst UK fibre provider Gigaclear note in relation to speed tests that “Realistic WiFi performance is in the range 30-50Mbps and therefore we do not recommend speed tests via wireless.”<sup>24</sup>

<sup>19</sup> IEEE Technology Blog, [AT&T to Trial Highly Touted AirGig Technology for fronthaul/backhaul](#), May 2017.

<sup>20</sup> SpaceNews, [ViaSat plans massive ground network of smaller gateways for ViaSat-2 and ViaSat-3 satellites](#), May 2017.

<sup>21</sup> The Verge, [SpaceX plans to launch first internet-providing satellites in 2019](#), May 2017.

<sup>22</sup> ComReg, [Electronic Communications Strategy](#), 17/30, April 2017.

<sup>23</sup> Sundaresan, Feamster and Teixeira, [Home Network or Access Link? Locating Last-Mile Downstream Throughput Bottlenecks](#), March 2016.

<sup>24</sup> Gigaclear, [Verifying the speed of your new service](#). Accessed 16 May 2017.

- Growing consumption of video indoors on mobile devices, coupled with lower bandwidth requirements for small screen consumption, lowers bandwidth requirements.
- Improvements in compression including from H.264 to H.265 – which halves the requirement (with an H.265 successor under development which could halve the requirement again)<sup>25</sup>; and to the open standard VP9 and its successor AV1.<sup>26</sup> These developments are expected to reduce requirements to a few hundred Kbps for mobile video, 1-2 Mbps for HD and under 10 Mbps for 4K. Compression is also under development for AR, VR and 3D graphics.<sup>27 28</sup> Finally, advances in machine learning may support further reductions in file size, for a given quality of experience.<sup>29</sup>
- Wider implementation of existing, but improved compression, as advances in computing and operating systems support new compression standards. Apple, at the World Wide Developer Conference 2017, announced implementation of H.265 compression with the forthcoming release of macOS “High Sierra” alongside High Efficiency Image File Format (HEIF) in iOS which will halve the size of photos.<sup>30</sup>

Consumption on small screens and improved compression are driving down bandwidth requirements, thereby reducing the difference that higher speed access makes. Use of Wi-Fi also reduces the differences that superfast broadband makes, since Wi-Fi becomes the binding constraint at higher speeds.

On the other hand, the shift to higher quality video formats and increased simultaneous use within household drives up bandwidth demand, but these drivers have natural limits (in terms of the human ability to perceive quality differences and everyone simultaneously using video or other applications within a household). Further, increased overall data traffic does not necessarily require higher speed access, if it relates to more use of online (for example, watching more hours of Netflix), rather than higher peak bandwidth demand.

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<sup>25</sup> The Register, [ITU-T wants video sizes to halve again by 2020](#), February 2017.

<sup>26</sup> Streaming Media, [Bitmovin Pushes AV1 Forward, Joins Alliance for Open Media](#), April 2017.

<sup>27</sup> Facebook, [Next-generation video encoding techniques for 360 video and VR](#), January 2016.

<sup>28</sup> Google Open Source Blog, [Introducing Draco: compression for 3D graphics](#), January 2017.

<sup>29</sup> Google blog, [Saving you bandwidth through machine learning](#), January 2017.

<sup>30</sup> Apple, [macOS High Sierra delivers advanced technologies for storage, video and graphics](#), 5 June 2017.

Apple, [iOS 11 brings powerful new features to iPhone and iPad this fall](#), 5 June 2017.

## Evidence in relation to bandwidth demand

Whilst Ireland has seen a migration from ADSL to FTTC, it is difficult to infer much from this regarding incremental willingness to pay for higher speed, since VDSL service is not offered at a price premium over ADSL service.

In Australia, however, the price of fibre service (FTTH and FTTC) offered by NBN is differentiated by speed at the wholesale level and this differentiation is reflected at the retail level. The price premium of 50 Mbps over 25 Mbps is AUS\$10, as is the price premium of 25 Mbps over 12 Mbps.<sup>32</sup>

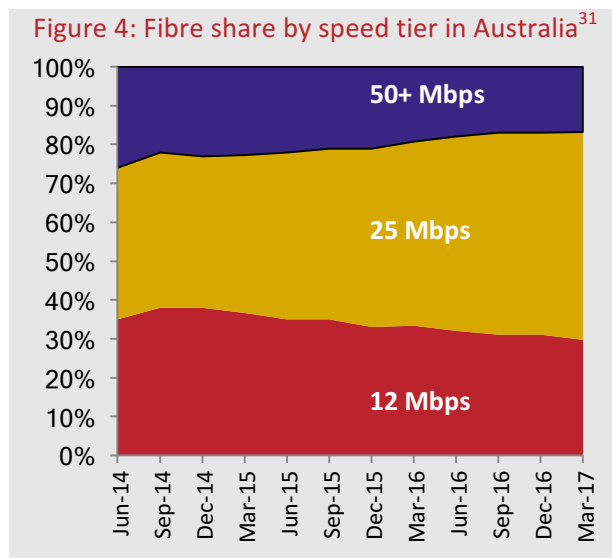


Figure 4 shows that the proportion of customers taking a speed of 25 Mbps or less has been growing, whilst the proportion of those taking more than 25 Mbps and 12 Mbps has been shrinking.<sup>33</sup> A declining proportion of people are willing to pay a AUS\$10 premium for 50+ Mbps, but a growing proportion are prepared to pay a AUS\$10 premium for 25 Mbps.

The decline in incremental willingness to pay for a 50+ Mbps service in Australia has occurred despite 26 unbroken years of GDP growth – a developed country record – since the last technical recession involving two quarters of negative growth i.e. it does not appear to be due to an income effect.

Further, in Denmark just 11% of FTTP customers take speeds of 100 Mbps or higher,<sup>34</sup> whilst in the UK the price premium of dual play super-fast broadband over standard broadband has declined over time.<sup>35</sup>

Overall it appears that incremental willingness to pay for higher speeds may have declined rather than risen, and that there is very little incremental willingness to pay beyond around 25-50 Mbps. The price of lower speed services can therefore be expected to exert a strong constraint on the price of higher speed services.

<sup>31</sup> ACMA, [NBN Wholesale Market Indicators Report](#), May 2017.

<sup>32</sup> Based on retail prices from one provider: [V4 NBN Pricing and Product Information](#), [accessed 19 June 2017]

<sup>33</sup> Wholesale tiers include 12/1, 25/5, 25/10, 50/20 and 100/40 Mbps. The two 25 Mbps download packages, and 50 and 100 Mbps packages, are combined in the figure.

<sup>34</sup> Energistyrelsens, [Telestatistik - Første halvår 2016](#), 2016

<sup>35</sup> Ofcom, [Pricing trends for communications services in the UK](#), 2017. Figure 1.22.

## Timeframe for analysis – beware of hubris

In the near-term, it is reasonable to anticipate that demand and incremental willingness to pay for ever higher speed access will be subject to diminishing returns (as compression improves and quality approaches the limits of human vision). In the near-term, it is also reasonable to assume a continued transition from current to next generation broadband, and that fixed access will maintain a sizable share of the access market.

However, over the longer-term, beyond a decade or so, all bets are off. Peak bandwidth demand growth may see a resurgence if AR and VR go mainstream, large screen video consumption at home sees a resurgence and compression hits diminishing returns. Alternatively, the shift to small screen devices and improving compression may see peak bandwidth requirements decline over the medium term, alongside increasing data consumption as more video is consumed.

On the supply side FTTC may rapidly give way to FTTH, or FTTH may turn out to be anything but “future proof” with 5G “wireless fibre” and low earth orbit satellite meeting demand at lower cost, and offering greater value by supporting mobility as well as broadband access indoors.

We really don’t know what supply and demand will look like 10 years from now, let alone several decades hence. Uncertainty grows, rather than diminishes, the further out one looks.

This is a reason, where at all possible, to forebear from choosing technologies and setting prices and margins. A market continuously adapts, whereas regulation imposes hard constraints (and whilst regulation is periodically reviewed, there is a tendency towards path dependence and lock-in since regulation itself is not a competitive endeavor, and what regulation crowds out is not observed).

Where one chooses to intervene, one should admit and take account of the underlying uncertainty. To do otherwise risks hubris, and consumer and economic harm.

To illustrate the risk, ComReg assume a 50-year time horizon in modelling FTTC costs and demand. Yet, let’s be honest, we really don’t know what, if any, role FTTC will play in the market beyond the next decade or so.

The EC 2013 costing and non-discrimination recommendation mentions the economic life of FTTC:

“When setting the economic life time of the assets in a modelled FTTC network NRAs should take into account the expected technological and network developments of the different network components.” Paragraph 41.

## **Conclusion**

On the supply side, 5G fixed access may play a growing role alongside cable and FTTH (with FTTC expected to prove transitional in the Irish market). Ensuring an efficient transition from current generation access and FTTC to FTTH points to the need for pricing flexibility for fibre and for the margin between different services.

On the demand side, improved compression may reduce the capability gap between different platforms in the near term, thereby intensifying platform competition. Demand uncertainty would also be increased for a given platform.

In the longer-term, it is less clear what will happen in terms of supply and demand. Continued advances in compression will lower video requirements, whilst virtual, augmented and mixed reality may create new demands beyond 2020. On the supply side, 5G fixed wireless may come to play a prominent role, supported by a dense fibre network, but not requiring fibre to the premise.

## 5. The value of service-price flexibility

“[T]he communications sector is different to utilities. The communications sector is characterised by a continual evolution in technologies and service capabilities, matching changing consumer demand and differentiated willingness to pay for different features.” Ofcom, 2015<sup>36</sup>

Given the dynamic nature of the telecoms sector the ability to offer a diversity of access services at different price points, and the ability to adapt and respond, has particular value (put simply, telecoms is not a utility). The value of flexibility should be considered when deciding whether, and how, to intervene; and in deciding what response is proportionate.

No only should intervention pass a competition test to see whether the market is sufficiently competitive (taking account of competition from regulated current generation access and other competing platforms), but the costs and benefits of different interventions in relation to FTTC should be assessed in deciding what approach is proportionate.

An assessment of the value of flexibility is an important input to such an evaluation, and the following elements of the value of flexibility are considered in this section before considering a range of regulatory options in the following section:<sup>37</sup>

- Promoting investment and infrastructure competition.
- Supporting delivery of Ireland’s National Broadband Plan.
- Promoting fibre use, efficient mobile backhaul and copper retirement.
- Minimising the information burden and cost of “errors”.

### Promoting investment and infrastructure competition

Investment is needed to deliver required connectivity; whilst investment by eir and competing cable, fibre and wireless providers strengthens infrastructure competition (itself a spur to further investment and lower prices). Such a virtuous circle is consistent with Goal 13 of the April 2017 ComReg Strategy Statement that:<sup>38</sup>

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<sup>36</sup> Ofcom. July 2015. “Strategic review of digital communications – Discussion document.” Paragraph 1.22. [http://stakeholders.ofcom.org.uk/binaries/consultations/dcr\\_discussion/summary/digital-comms-review.pdf](http://stakeholders.ofcom.org.uk/binaries/consultations/dcr_discussion/summary/digital-comms-review.pdf)

<sup>37</sup> These considerations span the economic concepts of dynamic, allocative and productive efficiency.

<sup>38</sup> ComReg, *Electronic Communications Strategy Statement: 2017 – 2019*, April 2017.

“Competitive incentives facilitate efficient commercial investment in infrastructure and services to the widest extent possible.”

Yet, whilst in 2013 ComReg pointed to the benefit of pricing flexibility “a pricing regime which is flexible and not overly intrusive is essential to mirror market-based incentive...”; ComReg now argue that that price controls are preferable:

“A cost orientation obligation for FTTC based NGA services should also provide the appropriate investment signals to market participants...” Paragraph 5.6

The view in 2013 was the correct one, since pricing freedom, rather than a regulated price based on an uncertain estimate of unit costs, is needed to provide appropriate investment signals. There are a number of reasons for this:<sup>39</sup>

- First, a price control is based on estimates of costs, demand asset lives and the cost of capital, which are uncertain and will almost inevitably prove wrong. There are sound reasons for thinking that demand risk will persist (see previous section), and favourable near-term FTTC adoption may presage a more rapid transition to FTTH or fixed wireless and a truncated asset life. The market can continuously anticipate and adapt to change in a way that a price control cannot.
- Second, it is likely to be optimal – from an investor and consumer perspective – to differentiate service levels and prices (in a manner that reflects value rather than cost differences) to better align investment decisions with customer willingness to pay, and to maximise adoption via lower speed lower price offers alongside higher speed higher price offers. A comprehensive price control may rule out such differentiation.
- Third, investment decisions should reflect value as well as cost. With pricing flexibility investment decisions can take account of the potential to charge more for improved service. Imposing a price control is likely to result in inefficient investment choices.

Non-cost based differentiation between current and next generation access may also be efficient where they share costs in common, or to foster transition and, ultimately, retirement of the legacy service. Imposing cost based margin constraints between different

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<sup>39</sup> Brian Williamson, [Anchor Product Regulation - Retrospective and Prospective](#), October 2013



broadband services would therefore be expected to result in inefficiency.

The September 2013 European Commission recommendation on costing and non-discrimination noted benefits from pricing flexibility:<sup>40</sup>

“...pricing flexibility at wholesale level is necessary to allow both the access seeker and the SMP operator’s retail business to introduce price differentiation on the retail broadband market in order to better address consumer preferences and foster penetration of very high-speed broadband services.” Paragraph 49.

The Commission recognised the benefits in terms of investment in terms of consumer preferences, and adoption (see Figures 5 and 6 below which illustrate why differentiation better aligns consumer and investor interests, and supports lower-speed entry products as the counterpart of higher-speed premium products).

Figure 5: Without differentiation

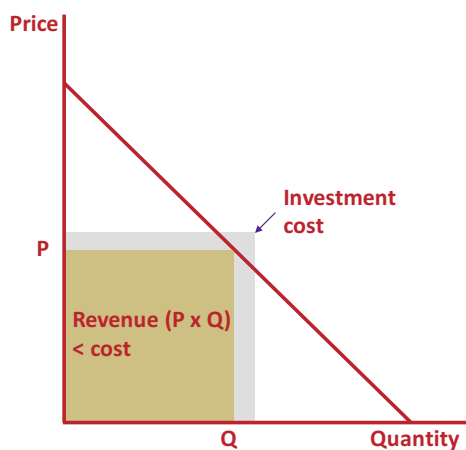
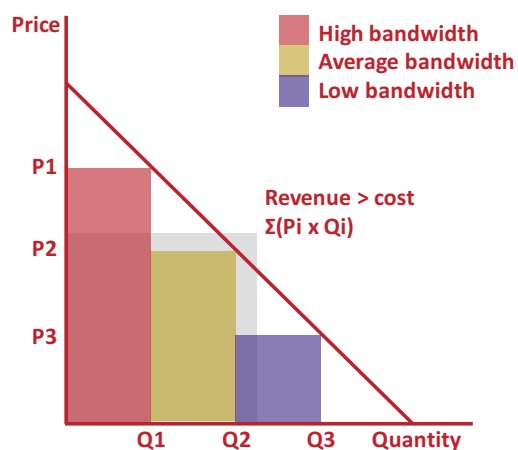


Figure 6: With service-price differentiation



The Commission also recognised that differentiation at the wholesale level is necessary to sustain retail differentiation (since, otherwise, retail arbitrage based on a single wholesale input will undermine speed differentiation at the retail level).

Prior to the EC recommendation, Ofcom first contemplated the anchor product approach and pricing flexibility in 2007, noting several rationales for pricing flexibility including flexibility to experiment, differentiation and investment:<sup>41</sup>

<sup>40</sup> [Commission recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment](#), September 2013.

<sup>41</sup> Ofcom, [Future broadband - Policy approach to next generation access](#), September 2007. (A7.18)

“Anchor products provide a high degree of flexibility for investors in new access networks, allowing the option to secure higher returns for new or higher performance services. This flexibility also provides operators with an ability to experiment with service offerings and tailor them to end customer needs. Such price differentiation is also welfare enhancing. Price differentiation...could in turn allow investments to take place that would, with a single price, not be possible.”

In 2008 Ofcom further developed the rationale for pricing flexibility and an anchor product approach:<sup>42</sup>

“We consider that of the options outlined, the anchor product pricing approach has significant advantages. Where feasible, [it] is likely to be the most efficient pricing approach for risky next generation access products. Its main advantages are:

- it provides incentives to invest by allowing higher returns on new products (likely to be higher speed broadband);
- it minimises the risk of detriment by ensuring that products equivalent to those available today are offered at equivalent prices;
- the ability to charge excessive prices is limited because the anchor product’s price constrains the prices of all other products offered;
- it allows flexibility in pricing, enabling investors to trial different price points and change price to maximise take-up; and
- it carries less regulatory cost and risk compared with the option where the regulator sets the absolute prices.”

An additional point noted by Ofcom is the reduction in regulatory cost and risk compared to price setting. In 2009 Ofcom announced its intention to allow pricing flexibility.<sup>43</sup> Simultaneous with the Ofcom announcement, BT announced its intention to invest in FTTP and FTTC. The policy approach was formally agreed in 2010. Virgin also subsequently proceeded in expanding their footprint in the UK utilising DOCSIS and FTTH.

Ofcom now propose moving to a cost-oriented anchor product set at 40 Mbps, with pricing freedom for other service levels (though the 40 Mbps specification is excessive since it corresponds to the most

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<sup>42</sup> Ofcom, *Delivering super-fast broadband in the UK*, 23 September 2008

<sup>43</sup> Ofcom, *Stimulus to super-fast broadband*, March 2009.

popular existing service tier rather than one sufficient to constitute a price on constraint on other services).

HSBC Global Research (April 2017) consider that the Ofcom proposal, if implemented, would harm investment:<sup>44</sup>

“...would be highly counterproductive, as it would not only impact BT’s ability and incentive to invest, but would also we believe render a substantial portion of Virgin Media’s intended build programme uneconomic”.

The Financial Times, reporting on an increase in the value of TalkTalk shares, noted the HSBC analysis:<sup>45</sup>

“Investment in faster services only invites further regulation so, rather than being incentivised to build their own networks, BT competitors will be better off reselling BT’s infrastructure, said HSBC. That makes TalkTalk “an obvious beneficiary”, it argued.”

Pricing flexibility, rather than a comprehensive price control, is required to support efficient investment and infrastructure competition. Further, in considering whether to move to cost orientation the various rationales for, and benefits of, pricing flexibility should all be given due weight.

### *The fair bet and adequate returns*

Ofcom discuss the “fair bet” in a paper on assessing risk, and note that.<sup>46</sup>

“An important point to note is that, when assessing cash flows on an ex post basis, it should be recognised that there may be a discrepancy between the cash flows that are realised on an ex post basis and those that were expected on an ex ante basis. High cash flows that are realised on an ex post basis may partly reflect a reward for ex ante uncertainty, and, if correctly applied, the NPV framework offers investors a “fair bet”, in which the rewards from successful investments within the portfolio are expected to be sufficient to pay for the losses associated with unsuccessful investments, and additionally to allow an adequate return overall across the diversified set of investments.”

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<sup>44</sup> HSBC, Price controls = less investment, April 2017.

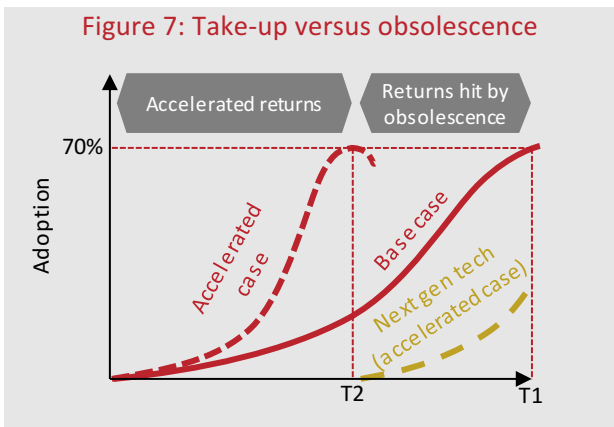
<sup>45</sup> Financial Times, [TalkTalk climbs on talk of price controls backfiring](#), 21 April 2017.

<sup>46</sup> Ofcom, [Ofcom’s approach to risk in the assessment of the cost of capital](#), August 2015. Paragraph 3.14.

We note that, in assessing the fair bet, regard should not only be had to investment risk relating to eir, who started investing in FTTC in 2011; but also to other investors. SIRO, who started Phase One of their FTTH investment plan in early 2015 and plan to initially reach 500,000 premises in 51 towns by the end of 2018.

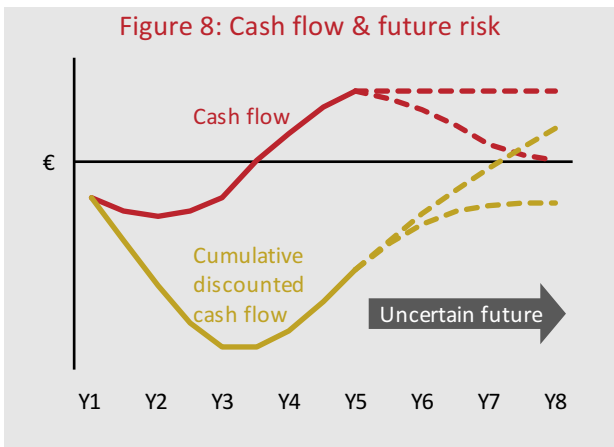
Even if it were concluded that eir had had a fair bet, which seems unlikely, SIRO could not possibly have had a fair bet within the current review period. This matters, as the price of FTTC will impact the price and share of FTTH.

If returns, including anticipated returns, are higher than a normal return consistent with the weighted average cost of capital, that of itself is not grounds for intervention to bring prices down. First, higher returns in a “good state of the world” may simply offset poor returns in an equally plausible “bad state of the world” (*ex ante*). Second, higher returns in the short-term - say due to more rapid adoption than anticipated – may presage poor returns in the future as bandwidth demand outstrips not only ADSL but also the capability of FTTC (as illustrated in Figure 7).



Accelerated obsolescence will feed into the overall returns of the investment, by reducing value in the outer years. This can mean that that an investment achieves positive cash-flow, but nonetheless fails to generate a positive net present value (Figure 8). Only with full hindsight will the full picture be clear.

An evaluation taking account of the fair bet could therefore either lead to a decision not to impose price controls on grounds that returns look reasonable given the *ex ante* risk at the time investment was made; or to a decision to apply a higher price cap than would otherwise be the case (for example, by taking account of the impact of faster adoption than anticipated for the asset life assumed for FTTC).



However, forbearance and a higher *ex ante* risk adjusted price cap nevertheless differ. The price cap, even if adjusted based on the best available information, will almost immediately be “wrong” as circumstances change. It is also likely to impede service-price

differentiation, which will result in lower overall adoption and weaker incentives for eir and others to invest.

### *Irreversible investment, uncertainty and real options*

Investment decisions do not typically involve a binary choice at a point in time; but involve the option to wait, the option to expand or curtail investment whilst it proceeds and potentially the option to upgrade (for example introducing vectoring with FTTC).

With irreversibility and uncertainty – which apply to next generation access investment – these options have value and may change the “text book” decision rule to invest when the net present value is greater than zero. The hurdle rate for investment may be greater than the cost of capital, and price dynamics over time may be influenced by real option values.

Ofcom have considered real options, and note that they can impact price dynamics as follows:<sup>47</sup>

“...under uncertainty, short-term prices are high enough for the successful outcomes to be sufficiently profitable for them to compensate the early investor for the unsuccessful outcomes, whilst investors that wait until uncertainty is resolved still make only normal profits – prices fall as uncertainty is eliminated.”

The complexity of the dynamics involved is itself a further reason to put weight on pricing freedom, real options are also a consideration in deciding whether prices are excessive and, if cost orientation is introduced, real options are relevant to the efficient time profile of regulated prices.

### *Information rents and efficient investment*

To support efficient ongoing investment and investment choices, returns must not only be acceptable allowing for *ex ante* risk, but must be aligned with the value of alternative investment options. To align consumer and investor interests, not only should returns reflect value, but some surplus (referred to by economists as “information rent” - the additional return required to motivate efficient investment choices with information asymmetries<sup>48</sup>) must be left with the investor.

Further, as investors are not simply making an invest/don't invest decision, but deciding on the technology, timing, pace and extent of investment; it is not simply a matter of offering just enough surplus

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<sup>47</sup> Ofcom, *Ofcom's approach to risk in the assessment of the cost of capital*, August 2015. Annex to Section 9.

<sup>48</sup> Jean Tirole, *Market power and regulation*, October 2014.

to get them to invest. The payoff should be greatest for making the right decision, and pricing flexibility is the only way to incentivise this.<sup>49</sup>

Price controls, even if sufficient to motivate investment, will not motivate efficient investment choices. Pricing flexibility has an inherent advantage in this regard.

### **Supporting Ireland’s National Broadband Plan**

One of the objectives of the National Broadband Plan is to deliver universal availability of broadband in Ireland capable of 30 Mbps downstream and 6 Mbps upstream. Doing so will require significant investment, and such investment is dependent on commercial returns and government support.

The ComReg proposals would undermine delivery of the National Broadband Plan (or necessitate increased government funding) since, by lowering the price of FTTC, ComReg would also lower the price and revenues expected by investors under the plan.

#### *New Zealand – a lesson in what can go wrong*

Experience in New Zealand illustrates the harm that can arise when regulation and national broadband objectives are pursued independently. Following the 2008 general election, the incoming Government promised a NZ\$1.5bn investment to bring fibre to the premise (FTTP) to 75% of New Zealanders by 2019.

Responsibility for fibre rested with the Government, not the regulator, with contract prices set out to 2020. Acting independently, and with responsibility for copper but not fibre, the regulator (the Commerce Commission) proposed a significant reduction in the price of copper in 2012, thereby undermining the fibre business case. In response, Prime Minister John Key:<sup>50</sup>

“indicated the Government would change the law rather than see its ultra-fast broadband network compromised by a Commerce Commission decision.”

The decision threatened not only fibre plans, but New Zealand’s reputation amongst international investors. It also undermined regulatory independence. In December 2015, the price of copper was

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<sup>49</sup> Williamson, The regulation of next generation access networks and the draft Commission Recommendation, In [NEREC – Monitoring EU telecoms policy](#), 2009.

<sup>50</sup> Radio NZ, [PM not ruling out legislation over broadband](#), December 2012.

partially restored to the pre-review level. As Bronwyn Howell (2013) noted regarding experience in New Zealand:<sup>51</sup>

“It appears that the government’s “grand strategy” for a fibre network was implemented as if it was a stand-alone project independent of any need to co-ordinate the integration of either the network or the requisite regulatory framework governing it into the existing industry. Meanwhile, the custodians of the regulatory framework governing the pre-fibre industry appear to have failed to appreciate the revolutionary effect of the government’s strategy on their sector.”

Maintaining pricing freedom for FTTC would help ensure that similar problems do not arise in Ireland.

### **Promoting fibre use, efficient mobile backhaul and copper retirement**

There is little point in building a high quality broadband access network in Ireland unless it is adopted and used. As discussed above, adoption can be promoted by pricing flexibility since flexibility allows experimentation and differentiation. The rivalry associated with infrastructure competition, promoted by pricing flexibility, also supports adoption.

Whilst pricing flexibility supports adoption, it also supports optimal use of fixed and mobile from a converged perspective. The reason for this is that mobile has high incremental per gigabyte costs and low fixed costs; whilst fibre has high fixed costs and very low incremental per gigabyte costs. To the extent that fixed access is made available, but not adopted and used, overall inefficiency can therefore arise since indoor mobile traffic must be carried by the mobile network rather than Wi-Fi and the fixed network.

From a converged perspective pricing flexibility, by increasing the likelihood that fixed is used for backhauling indoor mobile device traffic, therefore promotes overall efficiency across fixed and mobile infrastructure. Concern regarding indoor mobile coverage is also reduced if fixed and Wi-Fi is adopted (Wi-Fi calling was introduced by eir in May 2017).

Finally, pricing flexibility and service-price differentiation also support copper-fibre migration and, ultimately, copper retirement. Entry level transition products can be offered on fibre. To support

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<sup>51</sup> Bronwyn Howell, *Broadband Regulation and Government Investment in Nationwide UltraFast Fibre Broadband Networks: evidence from New Zealand*, September 2013.

efficient transition flexibility is not only required to differentiate fibre service prices, but also flexibility to lower prices for transitional services if required to support transition, and to reduce the margin between next and current generation access. The ComReg proposals, which include price floors and inter-service margin tests, are not compatible with these requirements.

### **Minimising the information burden & cost of “errors”**

A benefit of maintaining the anchor product approach is that it reduces the information burden and cost of “errors”, since costs and demand do not need to be modelled to set a price or revenue cap, and since the market has greater scope to self-correct given competition and anticipated changes in technology and demand.

The reality is that in setting a price control, there is little prospect of getting it right. The costs of “errors” in setting different regulatory constraints should therefore be considered. No one has perfect foresight, and whilst a regulated firm may have information that the regulator lacks, both the regulator and the firm operate with imperfect information and in an uncertain world.

The likelihood of substantial error is compounded by the 50-year time horizon used by ComReg in modelling the costs of FTTC, a technology which is expected to prove transitional.

The market can correct errors much more quickly than regulation. The cost of persistent errors, and the cost involved in the expectation that such errors are likely to arise, is therefore a relevant consideration in deciding the extent to which prices should be fixed by regulation versus free to adjust.

### **Conclusion**

Price flexibility, including scope for service-price differentiation on a value rather than cost reflective basis and flexibility regarding inter-service margins, offers a range of benefits. These benefits should be given appropriate weight in deciding what, if any, form of price control is required.



## 6. The value of predictability and commitment

ComReg rightly point to the desirability of predictability and stability. However, ensuring predictability and stability may appear difficult to reconcile with the previous sections' emphasis on the benefits of pricing flexibility.

The key to reconciling the desire for predictability and stability with the benefits of flexibility and change is to consider market governance and market conduct separately, and to distinguish predictability and stability from commitment.

A normal market, particularly one significantly impacted by technological and demand changes, is anything but stable (and may or may not prove predictable, depending on how much foresight different market participants have).

The benefit of flexibility regarding services and prices is that it allows the market to shape and adapt to changes, including through investment, in both technology and demand. For example, the development of the multi-touch smartphone involved substantial investment and risk, but generated substantial economic surplus with demand forthcoming at a substantially higher price point than existing phones.

It is difficult to imagine this innovation happening, had the mobile handset market been subject to "cost oriented" price controls. Telecoms is, of course, different – to the extent that access genuinely is a bottleneck and wholesale access regulation is justified. Nevertheless, the value of flexibility should be recognised and its scope maximised.

Predictability comes to play in relation to the conduct of regulation, since the regulator has considerable power – subject to statutory objectives and due process – to reallocate value. If regulatory discretion is unfettered, investors may be reluctant to invest, fearing that once investment is sunk access prices will be lowered.<sup>52</sup> Access seekers must also make commitments, investing in complementary assets and in gaining market share.

Predictable regulation does not necessarily imply regulatory stability, since if the facts change it may be appropriate for regulation to

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<sup>52</sup> This concern does not indicate a lack of regard by the regulator for the public good, rather it recognises that socially optimal conduct over time may require a regulator to commit – to tie their hands – so as not to pursue near term gains. Kydland and Prescott, Rules rather than discretion, the inconsistency of optimal plans, *The Journal of Political Economy*, Volume 85(3), June 1977.

change. It also most certainly does not imply market stability: innovation may see new technology replace old technology; significant service and price changes; and, potentially, new market participants displacing existing market participants.

Regulatory predictability may be necessary, but is not sufficient, to support efficient investment. What is required is a commitment not to remove the gains from innovation and investment *ex post*. This is a hard problem, but one regulatory institutions should constantly seek to solve through their conduct over time and the signals they send to the market. A degree of commitment not to transfer the gains from innovation and investment wholly to competitors or consumers is required, if the optimal degree of innovation and investment is to be forthcoming.

The proposal to move to from pricing flexibility to comprehensive price controls for FTTC would forego the ongoing benefits of pricing freedom set out in the previous section. It is also arguably inconsistent with the need for predictability (if pricing freedom was appropriate in 2013 then why not now, given increased infrastructure competition?); and with a commitment not to expropriate the gains from innovation and investment, something a price control for FTTC based on an assumed asset life of 50 years would surely do.

The following section considers a range of options for squaring the requirement to check the prospect of abuse of market power with the benefits of market flexibility and regulatory commitment. A continuation of the *status quo* until the next review – pricing freedom – should remain amongst the options for re-evaluation.

## 7. Beyond dichotomy – introducing a wider set of options

Assessing the *status quo* versus a comprehensive cost-oriented price control represents a false dichotomy.

If – notwithstanding the evidence and pitfalls set out above – ComReg conclude that the *status quo* is not a sustainable and proportionate approach, for the period to 2020, then there are a range of intermediate options short of a comprehensive price control that should be considered. Several options are considered below.

### Introducing a safeguard cap

A straightforward option would be to apply a nominal cap (CPI-CPI) based on the current price of FTTC. No estimate of costs or demand are required, and such a cap would prevent any price increase over the review period. In three years' time the development and impact of infrastructure competition can be assessed, and the option to move to cost orientation or to restore full pricing freedom re-considered.

A variant of this approach, which would leave greater pricing flexibility with the market whilst also providing clarity regarding the price allowed under the National Broadband Plan, would be to apply the nominal cap to a 30 Mbps downstream, 6 Mbps upstream, anchor product.

### Moving to a higher quality anchor product

If the concern is that an ADSL anchor product, coupled with infrastructure competition, is insufficient constraint on FTTC prices, then a possibility short of a comprehensive price control would be to upgrade the quality of the anchor product.

Ofcom has pointed to the possibility, should the chain of substitution break down, of adopting a fibre based anchor product:<sup>53</sup>

“...an anchor fibre price ... combined with flexibility on more advanced service offers.”

The 2013 EC costing and non-discrimination recommendation includes the option of an NGA-based anchor product:

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<sup>53</sup> Ofcom, *Fixed access market reviews: wholesale local access, wholesale fixed analogue exchange lines, ISDN2 and ISDN30*, Volume 1, June 2014. ¶12.144, 12.151 and 12.154

“If the product offered by the SMP operator on the legacy access network is no longer able to exercise a demonstrable retail price constraint on the NGA product (for example in the event of a copper switch-off), it could in principle be replaced by an NGA-based product that is tailored to have the same product features. However, it is not envisaged that such an NGA-based anchor will be required in the immediate future or before 2020.”

A higher quality anchor could be specified above typical ADSL service levels, but below the full capability of FTTC, to act as a price constraint via a chain of substitution whilst preserving a degree of pricing freedom and scope for service-price differentiation.

In New Zealand, where the government proposes that from 2020 the current contract price for a fibre anchor product be rolled forward as a safeguard price cap (and adjusted annually for inflation), and that copper based broadband be deregulated in FTTH areas, it was noted that:<sup>54</sup>

“the regulated fibre broadband anchor product should be an entry-level product, not the most popular product”

An anchor product with a download speed of around 15 Mbps and an upload speed of around 2 Mbps could be introduced at a price equivalent to that for ADSL. This would strike a balance between pricing freedom and constraint. 15 Mbps would offer a download speed better than most ADSL customers receive, whilst 2 Mbps is double the upload speed for ADSL.

Choosing an anchor significantly below the National Broadband Plan specification of 30 Mbps downstream and 6 Mbps upstream would also reduce the negative impact on the plan.

This approach would also aid transition from ADSL to VDSL, and FTTH if the basic anchor speed tier were mirrored for fibre; and allow partial or full copper retirement in fibre areas since the anchor is decoupled from the underlying technology.

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<sup>54</sup> MBIE, *Review of the Telecommunications Act 2001: Final Decisions on Fixed Line Services, Mobile Regulation and Consumer Protection*, June 2017.

## Removing other controls if cost orientation is adopted for FTTC

Should cost orientation be applied to FTTC, a margin squeeze test need not also be applied. Ofcom propose dropping the *ex ante* margin squeeze test if they adopt cost orientation for VDSL<sup>55</sup>.

Further, if cost orientation is applied to FTTC it would act as a constraint on ADSL in FTTC areas. Therefore, ADSL pricing could be deregulated subject to a margin squeeze test and flat national pricing.

Whilst current generation broadband constrains next generation broadband pricing, the constraint in the other direction is even stronger. Thus, if some form of price control is introduced for next generation access, there are grounds for removing current generation access regulation.

This would simplify regulation and leave the market to determine the margin between current and next generation access considering the difference in willingness to pay and the desirability of migration (and ultimately retirement) of legacy services and network elements. This is the approach proposed in New Zealand alongside regulation of a fibre anchor product.<sup>56</sup>

## Conclusion

There are a range of options between pricing freedom and cost orientation for FTTC. The incremental costs and benefits of a wider set of options should be appraised by ComReg and a proportionate approach adopted, if it is decided that pricing freedom is not appropriate. Further, to the extent that additional price controls are introduced, there may also be opportunities to remove other existing regulation.

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<sup>55</sup> Ofcom, [Wholesale local access market review](#), Volume 1, March 2017, Para 5.11.

<sup>56</sup> MBIE, [Telecommunications Act Review: Post-2020 Regulatory Framework for Fixed Line Services](#), February 2017.

## 8. The way forward

The way forward is to first reappraise the combined competitive constraint from regulated current generation access and growing infrastructure competition on FTTC pricing in Ireland. This reappraisal should consider anticipated changes in supply and demand conditions, and international as well as local evidence.

If it is concluded that the combined competitive constraint is sufficient to prevent excessive pricing, then not only should wholesale pricing be maintained, but flexibility should apply to the margin between next and current generation access.

If it is concluded that the combined competitive constraint is insufficient, then a range of possible remedies should be assessed. A judgement regarding the incremental costs and benefit of each option is required, to identify a proportionate approach.

The appraisal of alternative remedies should have regard to the range of benefits of pricing flexibility - price experimentation, optimisation of inter-temporal cost recovery and service price differentiation - which in turn support investment, broadband adoption, transition to fibre and retirement of copper, infrastructure competition, efficient in-premise wireless backhaul and delivery of the National Broadband Plan.

It may be decided, following an evaluation of alternative remedies, that even were there to be some potential for excess pricing, that on balance maintaining the *status quo* is appropriate given the balance of costs and benefits of alternative options (and accounting for the fact that a degree of pricing power need not harm downstream retail competition, provided there is non-discrimination).

However, if additional consumer protection in relation to pricing is considered appropriate, a proportionate option should be chosen. If the concern is the possibility of future price increases, then a nominal (CPI-CPI) price cap could be adopted – potentially on an intermediate bandwidth service, say 30 Mbps, and based on the current price of FTTC. Alternatively, an uprated anchor product, say at 15 Mbps and priced in line with current generation access could be adopted.

If it is, nevertheless, decided that cost orientation is proportionate, then the fair bet should be assessed; and future FTTC demand, asset life and efficient intertemporal cost recovery re-appraised having regard to cable upgrades, FTTH investment and prospective 5G fixed wireless.

Pricing freedom and scope for service-price differentiation should, to the extent possible, also be preserved if a cost orientated control is imposed. One way of doing so would be to adopt a revenue cap rather than price cap. Another option would be to impose the cost-oriented price cap to a 30 Mbps anchor product, rather than to FTTC more generally.

The *ex ante* margin squeeze test should also be dropped if cost oriented pricing is imposed. Where a margin squeeze test is applied it should be on an equally efficient operator (EEO) basis, and should not apply to every margin (for example, between current and next generation access) to enable prices and margins to be varied to support network transition. In the event of cost orientation for FTTC, regulation of current generation broadband could also be phased out in FTTC areas.

The work done to date provides a valuable starting point. However, a fresh start is required - utilising a wider evidence base, giving due weight to the value of pricing flexibility and considering a wider set of potential remedies. The potential benefits for consumers and the Irish economy from such a re-appraisal more than justify the time and effort involved.