Inter MEDIA

MAKING THE RIGHT MOVES

How behavioural economics can help consumers

By Tim Hogg

International Institute of Communications

COMMUNICATIONS POLICY AND REGULATION WEEK
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Inter MEDIA

THE WORLD AS A WHOLE

Large countries and institutions such as the US and the European Union are world leaders in researching and developing regulatory policy for the digital economy. They also have an advantage in being able to apply rules across a large population and bring considerable resources to bear on pressing issues such as net neutrality and competition law, although as we see, policies can be slow to enact, as in the EU, and subject to drastic upheaval, as now in the US. In this edition of Intermedia, Rainer Schnepfleitner of Qatar's Communications Regulatory Authority points out that the current agenda is even more challenging for smaller countries. He says they need better coordination among policymakers and regulators on both national and international levels, and more support in dealing with global forces such as the big internet players and 'over the top' issues. The IIC's mission is exactly to cover these issues – and much more.

Chris Chapman, president, IIC

NEWS
FROM AROUND THE GLOBE

Gang of three: as of mid-April 2017, the FCC was operating with only three commissioners. Pictured are the new chairman Ajit Pai flanked by Mignon Clyburn and Michael O'Rielly. In the partisan world of US federal agencies, the sole Democrat, Clyburn, can be outvoted by her Republican colleagues. Pai was appointed as a commissioner by Barack Obama in 2012. Among his views: "Given how rapidly the communications sector is changing, the FCC should do everything it can to ensure that its rules reflect the realities of the current marketplace and basic principles of economics."

UNITED STATES
NEW REGULATORY REGIME SHAPES UP

The direction of the Federal Communications Commission (FCC) is becoming clear under its new chairman, Ajit Pai. In short, there looks to be a big move to deregulation, and already one major plank of the Obama administration has been halted before coming into force. This is the broadband privacy rule that would have required internet service providers (ISPs) to get permission from consumers before selling data such as website browsing.

The US Senate voted to overturn the rules, which were part of a move for the FCC to assume privacy enforcement from the Federal Trade Commission (FTC) following the net neutrality order. Pai, and acting chair of the FTC, Maureen Ohlhausen, have said: "Some argue that internet service providers should be treated differently because they have access to more of your personal information than companies such as Google and Facebook. But that's not true." They also say the claim that ISPs should be treated differently because consumers face a "unique lack of choice and competition in the broadband marketplace" does not hold up. The upshot is that the FTC should again become the privacy agency for ISPs, but the move has come under fierce criticism from privacy campaigners.

Other FCC rules and proposals under review include:

■ The agency is studying restrictions on media ownership, with Pai describing a number of the rules as "quite antiquated"

■ The open internet – net neutrality – order is a big target for elimination by the new FCC regime, and is already being fiercely defended

■ The switch away from copper networks could proceed with less consumer protection, with fewer regulations and obligations on the incumbent phone utilities

■ One place where regulation is likely to stand is on aircraft – Pai has called the FCC's plan to allow cellphone calls on planes "ill-conceived".

Pai says he will establish an office of economics and data (OED) that will "restore the tradition of staff economists spending time thinking about the future and publishing in the present influential white papers that keep us from being stuck in the past". A detailed talk on this is at bit.ly/2oAIDts

BROADBAND
SWEDEN GOES FOR 1 GBPS

Sweden is to become 'completely connected' by 2025, according to the government's latest broadband strategy. It has set the objective of 98% of the population in homes and workplaces having access to a minimum 1 Gbps speed by 2025, with the remaining 2% at least having 100 or 30 Mbps. The strategy is in the hands of housing and digitisation minister, Peter Eriksson, which demonstrates the importance of working across sectors. The Swedish Post and Telecom Authority will play a central role, including consulting with the National Board of Housing, Building and Planning, the Land Survey, and the Swedish Association of Local Authorities and Regions. *See the articles on Canada, and on housing and fibre broadband, in this issue.*

COUNTERFEIT DEVICES
HUGE FAKE TRADE

Nearly one in five mobile phones and one in four video game consoles shipped internationally is fake, as a growing trade in counterfeit IT and communications hardware weighs on consumers, manufacturers and public finances, according to a OECD report. 'Trade in counterfeit ICT goods' finds that smartphone batteries, chargers, memory cards, magnetic stripe cards, solid state drives and music players are also increasingly falling prey to counterfeiters. On average, 6.5% of global trade in ICT goods is in counterfeit products, according to analysis of 2013 customs data. That is well above the 2.5% of overall traded goods found to be fake in a 2016 report. China is the primary source of fake ICT goods, and US manufacturers are most hit by lost revenue and erosion of brand value.
● Check Point, a security firm, has detected malware in 36 Android devices from two makers, showing that malicious code was present on the devices even before they were issued to users.

DATA-DRIVEN REGULATION
MOBILE COVERAGE MAPS

Starting this summer, Arcep, the French regulator, will require mobile operators to publish coverage maps that distinguish those areas with very good coverage, good coverage, limited coverage and no coverage for mobile calling and SMS texts. With these maps, Arcep hopes to spur operators to further improve their mobile coverage. A pilot project in Nouvelle-Aquitaine has already been launched to test the system, and monreseaumobile.fr, a mapping tool for displaying these new maps, is also available. See bit.ly/2o8kS8S

MOBILE NETWORKS
STRATEGIES AND ACTIONS FOR 5G

A number of new reports on 5G have been released, indicating an uptick in the need for strategies for mobile technology. Among the reports:

■ The Centre on Regulation in Europe (CERRE), in 'Towards the successful deployment of 5G in Europe: What are the necessary policy and regulatory conditions?', describes two extreme images of possible futures of 5G: 'evolution' and 'revolution'. It details the policy and regulatory framework that would be required to enable each of these images. See bit.ly/2oKkIli

■ The UK government has published 'Next generation mobile technologies: a 5G strategy for the UK', which includes a section on 'fit for purpose' regulation, noting that: "...we will set out by the end of 2017 whether the government believes further changes are needed to the planning and regulatory system to meet the unique challenges of 5G infrastructure deployment." See bit.ly/2mY6luo

■ French regulator, Arcep, has produced '5G: issues and challenges', a mainly technical report on the views of stakeholders, noting: "5G will thus be not so much a universal technology as a polymorphous, or multifaceted technology, capable of adapting to any use, up to and including the most demanding ones." Download at bit.ly/2ocEz2A

■ On 5G spectrum, Hong Kong's Communications Authority plans to open up the 26 GHz and 28 GHz bands in 2019, and the 3.4 GHz to 3.7 GHz bands in 2020. The Swedish Post and Telecom Authority is to make available 100 to 200 MHz of spectrum in the 3.4 GHz to 3.6 GHz bands and up to 1,000 MHz in the 26 GHz band for 5G tests; the UK's Ofcom too is promoting 26 GHz, also known as the 'pioneer' band for 5G in Europe. In the US, the FCC is reviewing the legal framework for infrastructure deployment to identify regulatory barriers to 5G.

INTERNET
MEDIA LITERACY MAPPED IN EUROPE

The European Audiovisual Observatory, part of the Council of Europe in Strasbourg, has published a study on media literacy, said to be the first major mapping exercise to survey the field in Europe, covering 547 projects involving 939 stakeholders across the EU. Of these projects, developing 'critical thinking' is the most common theme, followed by 'media use' to improve the ability to navigate and use media content and services. Civil society plays an active role in the projects, and many stakeholders have no formal responsibility or duty to act in this field. The study does not include school-based projects (as other studies exist), but the authors found that teens and older students are the main target for media literacy projects. The observatory is running a conference on media literacy on 8 June in Warsaw. See bit.ly/2nOLpMv

MOBILE
UK CONSULTS ON MOBILE REPEATERS

UK regulator, Ofcom, is consulting on proposals to allow consumers to operate two categories of mobile phone repeaters on a licence-exempt basis:

● Static mobile phone repeaters intended for indoor use

● Low gain mobile phone repeaters intended for in-car use.

The use of consumer installed repeaters is unlawful at present, but Ofcom recognises that some homes have difficulty with mobile signals, as do vehicles. In 2016, the regulator set out equipment parameters that could be licence-exempt, and the consultation now has proposals for static mobile phone repeaters.

Ofcom is not prescribing the mobile technologies that can be used (e.g. 3G, 4G). See bit.ly/2onoNSz

IN BRIEF

SMP CONSULTATION
The European Commission is consulting on a review of its significant market power (SMP) guidelines, which date from 2002. The goal is to update the guidelines in time for the implementation of the new electronic communications code and it will take into account changes in telecoms markets and developments in regulatory and competition law.

COMPETITION AWARD
The Australian Competition and Consumer Commission (ACCC) has received an award from the World Bank and International Competition Network (ICN) for its role in elevating competition policy to the national economic agenda. Meanwhile, the ACCC is running a new broadband performance monitoring programme to provide consumers with accurate information about broadband speeds.

ITU'S AI SUMMIT
The ITU is holding a meeting on artificial intelligence, 'AI for Good', in Geneva, 7-9 June. The event will offer "tangible guidance on the tenets of responsible AI development, from the perspectives of technology, ethics, standardisation and policy".

EBU – NEW CHAIR
Olav Nyhus, legal director of Norway's public broadcaster, NRK, has been elected as chairman of the European Broadcasting Union's legal and public assembly.

DC CURRENTS

The IIC's TMF in Washington, DC came at the end of a tumultuous year in world politics, adding spice to the views of the assembled experts

The customary year-end Telecommunications and Media Forum returned to Washington, DC hot on the trail of the unexpected result of the US election. The forum, hosted by Verizon, dedicated its final sessions to discussing the two huge political shocks of 2016 – Brexit and the Trump victory – while keynote presentations – from the Pew Center, Federal Trade Commission (FTC), Verizon and Bell Labs – fired up the opening day.

THE REVOLUTION WILL NOT BE TELEVISED

The first session was all about new technology. In the opening keynote presentation, Lee Rainie, director of internet, science and technology research at the Pew Center, described how users anticipate the next technology revolution.

Currently, 90% of US adults use the internet and 56% of internet users have at least two social media accounts. The internet of things is likely to connect over 12 billion devices by 2020 (figure from Cisco) and experts predict the internet will become 'like electricity' — less visible, yet more deeply embedded in people's lives. However, 52% of US adults are ill prepared for digital life and many are worried about their jobs being taken by smarter algorithms. Just under half of experts surveyed also believe that technology will replace many current human jobs in 50 years. Other sources of concern include the possibility that existing divides may deepen, as algorithms reflect the bias of their programmers or the limitations of the datasets, and that humans may increasingly be left out of the loop.

Speaking about consumer protection at the FTC, commissioner Terrell McSweeny underlined the importance of the data-driven economy in her keynote presentation. In 2015, the top 15 internet firms had a market capitalisation of $2.4 trillion: a huge industry, which relies on consumer trust. This new economy brings many benefits, but also new risks for consumers, including discrimination or criminal activity. To minimise those risks, the FTC relies on the three principles of transparency, choice and context. It also actively supports privacy by design, safety by design and, increasingly, ethics by design. As computerised decision-making

> **This new economy brings many benefits, but also new risks for consumers including discrimination or criminal activity.**

becomes ubiquitous, it should be subjected to human oversight consistent with good public policy, to ensure that artificial intelligence systems work effectively with people, and that their operation will remain consistent with human values and aspirations.

Verizon's Peter Davidson illustrated the company's 5G developments: they are very infrastructure hungry as they require massive fibre deployment, and the technology and telecoms industries are now investing about $50 billion a year in capital expenditure. In addition to investments, Verizon has set up open labs freely available to the tech industry, where 5G products, apps and services can be developed and tested.

INCLUSIVE 5G

In the final keynote of the day, then chairman of the Federal Communications Commission, Tom Wheeler, presented the FCC recipe for 5G: make spectrum available, encourage innovation, drive competition and "stay out of the way of technological development". He mentioned the complexities of multiplying local network sites and, of course, security as key challenges. He also made an impassioned call for industry and policymakers to exploit the unique opportunity of a nascent technology to overcome the challenges of disability, by incorporating accessibility features into off-the-shelf products.

THE FUTURE IS BRIGHT

The disruptive potential of new technologies became even clearer with the afternoon keynote from Marcus Weldon, president of Bell Labs and chief technology officer of Nokia, who described the digital networks, systems and platforms for the 'automation of everything'. Pointing out that future networks will be serving industry, not consumers, he argued that because of the lower latency required by industrial applications, data will need to travel shorter distances. Networks will need to become a lot more distributed and automated.

As more and more intelligence is built into industry, consumers will be able to obtain personalised versions of their chosen products that will be sent as files and 3D, printed locally. Also, will automation take care of most of the mundane tasks we currently do, leaving us with more free time for higher, or more pleasant, tasks? Time is the commodity of the future, he reckoned.

I SHOT THE SHERIFF

The conversation then turned to the impact of the new technologies on regulation. Jeff Brueggeman (AT&T) used the example of the driverless car to point out how a plurality of agencies have oversight over the same application and several companies may need to share consumer data. Regulatory frameworks need to work across industries, for example on privacy. Industry specific regulatory oversight should only be retained where it is truly necessary.

Robert Pepper (Facebook) also called for more horizontal regulation, as today's services may not be linked to a particular network, player or even country. Google's Sarah Holland explained that the company is developing machine learning (making machines that learn, as opposed to machines that are smart), which is the invisible backbone in many Google core products. As machines learn from data, it becomes very important that datasets are complete and representative. From a regulatory viewpoint, it is important to fill the gaps between agencies but also recognise the role of best practice: there is a lot we do not know about the technology, and there is a lot that we can develop along the way.

Sumit Sharma (Oxera) stressed how challenging competition policy becomes when we look at interdependent ecosystems: inter-relationships are relevant when it comes to market power and case-specific analysis may be a better policy instrument than revenue or pricing indicators.

In the discussion, a consensus emerged that companies need to support research and share their knowledge about technology not only with regulators, but also with the wider civil society. Opportunities to learn from each other should be set up and included in the regulatory process.

MEET ME HALFWAY...

Session 2 focused on the latest international policy meetings, with Julie Zoller (US Department of State) reporting on the World Telecommunication Standardization Assembly (WTSA) recently concluded in Tunisia and Veni Markovski (ICANN) reporting on the ICANN 57th meeting in Hyderabad, India. Zoller stressed the need to engage in conversations before ITU meetings, to ensure there is some level of mutual understanding that can progress at the meeting.

The panel further discussed the challenges of shaping international policy with delegates who have no technical knowledge, as internet security, privacy and human rights are discussed at the UN. Alfredo Timermans (Telefónica) remarked that too many international forums seem to be competing to become the space where international regulation takes place, which is confusing and risks compromising the very useful coordination roles of the ITU.

After reporting on the transformation of ICANN, Fiona Alexander (National Telecommunications and Information Administration, NTIA), asked how these multi-stakeholder models should evolve, and Ellen Blackler (Walt Disney) explained the changes taking place at the Internet Governance Forum, another

Clockwise from top left: Terrell McSweeny, FTC commissioner; Verizon's Peter Davidson; Nokia's Marcus Weldon; Robert Holleyman, then deputy US trade representative

multi-stakeholder model. The key ingredients of these models – inclusiveness, openness, transparency, and decisions reached by consensus – were widely praised in the ensuing discussion, and many felt that applying the same openness and transparency to the ITU and UN would improve their work significantly.

BREXIT MEANS BREXIT...

The implications of Brexit for trans-Atlantic ICT policy were the focus of the panel discussions in Session 3. Ambassador Robert Holleyman (then deputy US trade representative) argued that since the UK is the EU's largest digital market, its decision to leave the EU changes some elements of the value proposition of a US trade agreement with the EU. In any event, election campaigning made it clear that US approval of the Trans-Pacific Partnership (TPP) is not on the agenda for 2017 [and indeed withdrawal was one of the first actions of the Trump administration].

Elena Scaramuzzi (Cullen International) added that once it exits from the EU, the UK would no longer be able to take any part in EU decisions on the digital single market (DSM), but there would be some positive consequences too. For example, since EU rules on state aid will no longer apply, the UK will have more leeway for direct government investment in telecoms. Sanford Reback (Akamai ➡

> **Companies need to support research and share their knowledge about technology with regulators.**

Technologies) listed the many things that remained uncertain, including how the UK will proceed after triggering Article 50 [as it did in March 2017], and the future of the European Union, given the refugee crisis, the rise of nationalism, the future of Nato... Most likely, significant changes will not take place immediately, and in the future, a UK-US bilateral agreement could be what happens.

Ann LaFrance (Squire Patton Boggs), highlighted data protection: the UK's recent Investigatory Powers Act has been challenged in the EU courts and the General Data Protection Regulation (GDPR) from the EU is likely to be applicable before Brexit can truly happen. Also, as the EU debates extending some regulatory requirements to number-based over the top (OTT) players, one possible development could be that a lighter approach in Britain may make it the digital hub of geographic Europe once the UK leaves the EU.

NET NEUTRALITY AROUND THE WORLD

Most of the panellists discussing net neutrality principles in this session expected that the new administration would reset these rules. As Russell Hanser (Wilkinson Barker Knauer) further explained, net neutrality rules were successfully challenged in court by a number of ISPs. Jeffrey Campbell (Cisco) reported that the Trump administration would not only reverse the current regulations, but maybe propose new legislation as well.

What about the rest of the world? Practices like zero rating and pay prioritisation may look different when analysed within the context of small developing countries, argued David Geary (Digicel). They help drive data usage and technology take up. Principles such as no blocking and no tracking, and any intervention, should only occur in the case of clear evidence of harm to consumers. Many countries around the world are getting on just fine without these rules.

His views were echoed by Irene Kaggwa Sewankambo (Uganda Communications Commission), who also praised the potential of zero rating, for example in driving take up of healthcare or education applications. The UCC has found that the 'wait and see' approach has worked better than ex-ante rules, and has also given better incentives for innovation. Dhanaraj Thakur (Alliance for Affordable Internet, World Wide Web Foundation) presented research on zero-rated services from developing countries, suggesting that there is no evidence of consumer harm, and no evidence of detrimental effects on competition. Defending the benefits of zero rating, Nicol Turner-Lee, (Center for Technology Innovation, Brookings Institution) added that the issue of service affordability remains relevant in the US as well.

Comments from the floor and the panel suggested that although it may not be the solution to the digital divide, or at least not as much as initially hoped, zero rating is certainly helpful in bringing relevant content to people, fostering the digital mindset, and helping users manage their data budgets. It also helps increase take up rates in

Colleagues in arms: left, the IIC's Amanda Crabbe with the FCC's Tom Sullivan and Facebook's Robert Pepper; right, IIC president Chris Chapman with the then FCC chairman, Tom Wheeler

poorer countries with low ARPU. Opponents worry that it exposes people to bias and offers a walled garden view of the internet, although this is not the case with non-exclusive offers.

The debate has moved from an ideological phase – 'zero rating is against the open nature of the internet' – to a more pragmatic approach that recognises that these are nuanced decisions, dealing with different situations and many variations of data plans.

GIVE ME FIVE...

Last but not least, panellists in the final session were asked to propose five priorities for the Trump administration. Andrew Haire (IIC), sketched the ideal regulator as being goal/outcome driven and working towards deregulation, using a light touch approach – as much as possible – to promote the public interest. As to the priorities, the first is upgrading competition policy tools to improve understanding of the value of data rather than just looking at company revenues. Second, more training is needed. Finally, the regulator needs to be open, transparent, fast and decisive.

For Adolfo Cuevas Teja (Federal Institute of Telecommunications, Mexico) regulation and public policy have to put people at the centre. That is the most important reference, both in the economic dimension as consumers and in the political interest as citizens. However, change cannot happen through the regulator alone; it has to come from the entire political system. Nicol Turner-Lee (Brookings Institution) observed that with a Republican majority in both houses in the US, the current administration has a unique chance to push policy and it should do so looking forward, rather than focusing on undoing what had been done in the past. Peter Davidson (Verizon) reckoned that telecoms reform is not high on the agenda – it is more likely to happen in 2018 and likely to call for light touch, ex-post regulation underpinned by broad, transparent rules.

> **A lighter approach in Britain may make it the digital hub of Europe once it leaves the EU.**

SWITCH IN TIME

The digital switchover is still hard for some regions such as the Caribbean, where there are many issues to be resolved, as **SONIA GILL** explains

As a region, the Caribbean often defies superficial attempts at definition, encompassing as it does continental and island territories, home to multiple language groups and population sizes ranging from 5,000 to 11 million, comprising indigenous and migrant peoples, and descendants of slaves.

Even in the face of this diversity, for Caribbean broadcast media there are many commonalities, social, economic and political. And a poll of the sector would likely find that the transition from analogue to digital is the most important issue for the past decade.

Digital switchover (DSO) has long been a high priority for the Caribbean Broadcasting Union (CBU), a 47 year old body, grouping media entities in 24 countries and territories in the Dutch, English, French and Spanish-speaking Caribbean. Our mandate includes facilitating indigenous programme production and sharing; capacity-building of media institutions and professionals; joint negotiation of rights for programming; and advocacy in regional and international forums on policy and technology issues.

Despite the existence of established supra-national institutions whose main purpose is to allow these tiny states and dependent territories to enjoy the benefits of integrated action, there has been no regional consensus on the best way to achieve DSO. The 2010 announcement by the ITU of a 2015 analogue switch-off date for Region 1, in which the Caribbean is located, was immediately noted by the CBU, and we directed our lobbying efforts to the most prominent of the regional political institutions, the Caribbean Community (CARICOM). As stated in our DSO policy position paper of 2013, in light of the lack of preparedness of the region, we advocated for the region to be treated as an exception, and therefore benefit from the extended deadline of June 2020.

CRITICAL DECISIONS
For the Caribbean the critical decisions include:
● The digital and compression standards and distribution (multiplexing) methodology to be adopted
● Financial and regulatory cost
● Effective switchover date.

On the last point, we have continued to urge: "Caribbean regulators, policymakers and broadcasters … not to rush into aggressive digital switchover timelines that could place broadcasters in debt [or] at the risk of profitability thereby potentially jeopardising the jobs of hundreds of media workers."

And we have repeatedly highlighted the lack of preparedness of audiences and the wider public. In the resolution passed at our 2009 general assembly, and in similar resolutions at every assembly since, we have continued to appeal to policymakers to "commence dissemination of educational programmes aimed at instructing the public in the region on the implications for them and their households of the digital switchover".

An aspect of DSO that has special importance for Caribbean countries and territories is environmental. In a 2015 study,[1] supported by the Caribbean office of the ITU, we expressed serious concern about the weak policy and regulatory framework throughout the region in relation to e-waste, including that expected from the transition to digital broadcast systems. Research carried out in 15 of our countries highlighted the glaring absence of policies to deal with e-waste from electronics, including cellphones and TVs.

MULTIPLE STANDARDS
Even though there have not been final answers on many of these questions, the process has begun around the region, driven by the availability of state resources, which is why the Bahamas selected the North American standard (ATSC), Cuba accepted a soft loan from China and adopted DTMB, and the former Dutch territory of Curaçao went with DVB-T2. There is even an extreme situation in Suriname, which sits on the South American mainland – it has mixed the North American and European standards.

All eyes are on the two largest English-speaking media markets, Jamaica and Trinidad and Tobago, where broadcasters and regulators continue intense discussions on the critical question of a feasible post-switchover business model in markets dominated by privately-owned media.

At the CBU, we will examine the lessons from those that have already moved into the digital era, and support stakeholder consultation for those yet to make the digital jump. And we will move from the current focus on real challenges, to identifying the opportunities and benefits inherent in the digital transition, so that the broadcast sector can continue to support the development of the region.

REFERENCE
1 Review of international practices relating to the control of imports/production of TV devices and e-waste management practices and standards in the Caribbean. Project ITU-SSA No. 6964.

SONIA GILL *is secretary general of the Caribbean Broadcasting Union. The CBU will be addressing recent developments in digital terrestrial television (DTT) at its 48th annual general assembly in Nassau, Bahamas, 21–24 August, 2017.*

ANTI-SPAM ACTION

Canada's CRTC and the IIC kicked off discussion on international efforts to combat unwanted communications, as **STEVEN HARROUN** explains

From nuisance to abuse, unsolicited communications encompass a wide range of impacts on citizens. Spam is no longer a problem exclusive to email – it has become a vehicle for deceit and has expanded to a multitude of electronic platforms that citizens all over world use to support their businesses, perform their jobs, access government services, and engage in social interactions and relationships. From unknowingly downloading a malware infection to having personal data stolen, bad actors are constantly in search of new victims. Fortunately, many governments see the urgency in acting on these issues and anti-spam efforts are underway across the world.

The Canadian Radio-television and Telecommunications Commission (CRTC), in partnership with the International Institute of Communications (IIC), hosted a workshop on combating spam and other forms of nuisance communications. The half-day event took place as part of the IIC's annual Communications Policy and Regulation Week in Bangkok, Thailand. In attendance were 45 participants – including representatives of regulators from all global regions, and of industry, plus academics and other communications experts.

The purpose of this workshop was threefold. First, it sought to bring together experts from both policy and enforcement communities around the world, allowing them to exchange views and experiences in policy, regulation, and enforcement of spam and nuisance communications. These communities are actively engaged in conversation and productive work to combat spam and other unsolicited communications. However, too often, these conversations take place in isolation, remaining mostly within each community; policy may be developed without sufficient consideration for enforcement needs, while feedback from investigators may not make its way back to policymakers, resulting in legislative barriers that hinder enforcement activities.

The workshop also had participants brainstorm on how to advance efforts to work collaboratively across borders as the global nature of these issues introduces its own unique challenges. While important considerations for anti-spam efforts can apply to both domestic and international initiatives, the focus of this workshop was primarily international, on approaches to working across jurisdictions.

Finally, these discussions aimed to engage regulators from emerging economies and to introduce them to the work of established networks, communities and organisations working in this space.

SCOPE OF DISCUSSION
The workshop began with a keynote introduction that presented the main themes for discussion, described the impacts of unsolicited communications on governments and citizens, and outlined the current landscape faced by regulators and enforcement agencies. The first panel, consisting of enforcement experts and practitioners, discussed three case studies, detailing the international and cross-jurisdictional nature of the challenges of enforcing spam and unsolicited communications rules. The second panel, consisting of policy and technical experts, identified capacity gaps and ways to increase harmonisation of cross-border policies and enforcement activities. Discussion also included the opportunities and challenges specific to emerging economies.

WORK IS UNDERWAY
It is critical that governments, regulators, enforcement agencies and the private sector be aware of ongoing efforts and contribute their knowledge and expertise to build global capacity. Each community of expertise must leverage their relationships with each other and ask for assistance when needed, building their own skills and experience that can in turn be shared with others.

As part of the workshop's introductory keynote, participants were introduced to the Unsolicited Communications Enforcement Network (UCENet), an expert network of organisations engaged in international cooperation on spam enforcement. UCENet coordinates and promotes international cooperation and activities targeting spam related problems such as online fraud and deception, phishing, dissemination of viruses, and unsolicited calls and texts.

In 2016, 11 enforcement agencies, which are also members of UCENet, signed a memorandum of understanding (MoU) to share information and intelligence between agencies. Signatories include the CRTC, ACMA (Australia), the FTC and FCC in the US, the UK's Information Commissioner's Office, the Korea Internet & Security Agency, the Netherlands Authority for Consumers and Markets, the

> **Too often, these conversations take place in isolation... policy may be developed without consideration for enforcement needs.**

Department of Internal Affairs in New Zealand and the National Consumer Commission in South Africa.

The organisations have also committed to sharing knowledge and expertise through training programmes and staff exchanges, as well as to inform each other of legal developments in their respective jurisdictions. The MoU provides a clear framework that demonstrates a strong commitment to cross-border cooperation, thereby strengthening the fight against a global problem. Such a development sends a clear message to those responsible for fraudulent or malicious messages and calls: bad actors cannot escape enforcement attention and the interests of citizens are being protected.

This important international agreement allows these agencies to collaborate and pursue cases that cross borders and jurisdictions. Nonetheless, participants at the workshop highlighted continuing challenges caused by legislative and policy inconsistencies. Discussions also touched on the challenges posed by rapid technological evolution facilitating spam and other nuisance communications, and the capacity gaps among nations struggling with these complex issues.

NEW REPORT

Based on these discussions, the CRTC has produced a report that summarises findings from the workshop and outlines agreed actions to improve international collaboration on unsolicited communications. Major themes include:

● **Inconsistencies in policy and legislation:** The global nature of the issue means that cases almost always cross national borders. This can create challenges when policies, approaches and legislative tools are not consistent. These inconsistencies can make it difficult to share information and collaborate on enforcement.

● **Technology enables anonymity:** The rapid evolution of technology has made the job of spammers and fraudsters easier, while rendering effective enforcement more complex. Specifically, VoIP and other OTT applications have allowed spammers to remain anonymous, reduced the cost of sending unsolicited communications around the world, and made it harder to track the proceeds of criminal activities.

● **Capacity building for emerging economies:** While spam and unsolicited communications are a global problem, not all countries are well equipped to combat these threats. Many emerging economies have leapfrogged wireline and gone straight to mobile communications technologies, while lacking a robust legislative framework to control unsolicited calls and emails.

The report elaborates three key 'next steps' that were agreed by workshop participants to advance spam and nuisance communications efforts:

● Engaging in regular policy discussions to ensure that policy and legislation keep pace with the evolution of the threat, including lessons learned from enforcement activities

● Leveraging public-private sector partnerships to ensure clear communication among different

agencies involved in fighting unsolicited communications, and tapping the expertise of network operators and other private sector players

● Participating in UCENet to ensure that enforcement agencies collaborate across borders, identify threats and share information.

These next steps represent important collective actions to strengthen enforcement capacity and build robust, flexible policy to combat unsolicited communications. The commitment to continued collaborative discussions, the involvement of the private sector and the mobilisation of global resources like UCENet are key pillars in advancing our common agenda.

Bringing a group of experts from these different communities together for an afternoon of discussions was a good starting point. More work is needed, but fundamentally, addressing this challenge requires dialogue. Regulators, policymakers, service providers and enforcement agencies must improve their ability to share information, learn from one another and focus on the common goal of reducing threats to our global communications system.

We encourage regulators, policymakers and other stakeholders to identify their role in successfully combating this challenge. The CRTC looks forward to advancing this dialogue, together with its partners.

STEVEN HARROUN is chief compliance and enforcement officer at the Canadian Radio-television and Telecommunications Commission in Ottawa. Visit crtc.gc.ca to download the report.

MUCH MORE THAN JUST A NUISANCE

● Spam accounts for nearly two-thirds of total email volume, according to Cisco's 2017 annual cybersecurity report, and the company's research suggests that global spam volume is growing due to large and thriving spam-sending 'botnets'. About 8–10% of the global spam observed in 2016 could be classified as malicious, and the percentage of spam with malicious email attachments is increasing. Adversaries appear to be experimenting with a wide range of file types to help their campaigns succeed. See bit.ly/2jtum0w

● Cisco has also addressed a latest spam technique called 'hailstorm', a step on from so-called 'snowshoe' spam campaigns. "Both snowshoe and hailstorm spam are sent using a large number of sender IP addresses, but unlike snowshoe spam, hailstorm campaigns are sent out in very high volume over a short timespan." See bit.ly/2o5q944

● According to the FCC, American consumers received about 29 billion robocalls in 2016 or about 230 calls for every US household. The agency's commissioners have recently voted to adopt rules that allow carriers to block spoofed caller ID numbers associated with phone lines that do not actually dial out, without running afoul of FCC rules requiring carriers to complete all calls. The FCC says unwanted calls are the top concern of consumers. More at fcc.us/2ocVf6B

● Payment fraud involving email addresses sold on the 'dark web' is one of the most common cybercrimes in the UK. In the US, there has been a huge increase in scams targeting tax returns, reports IBM.
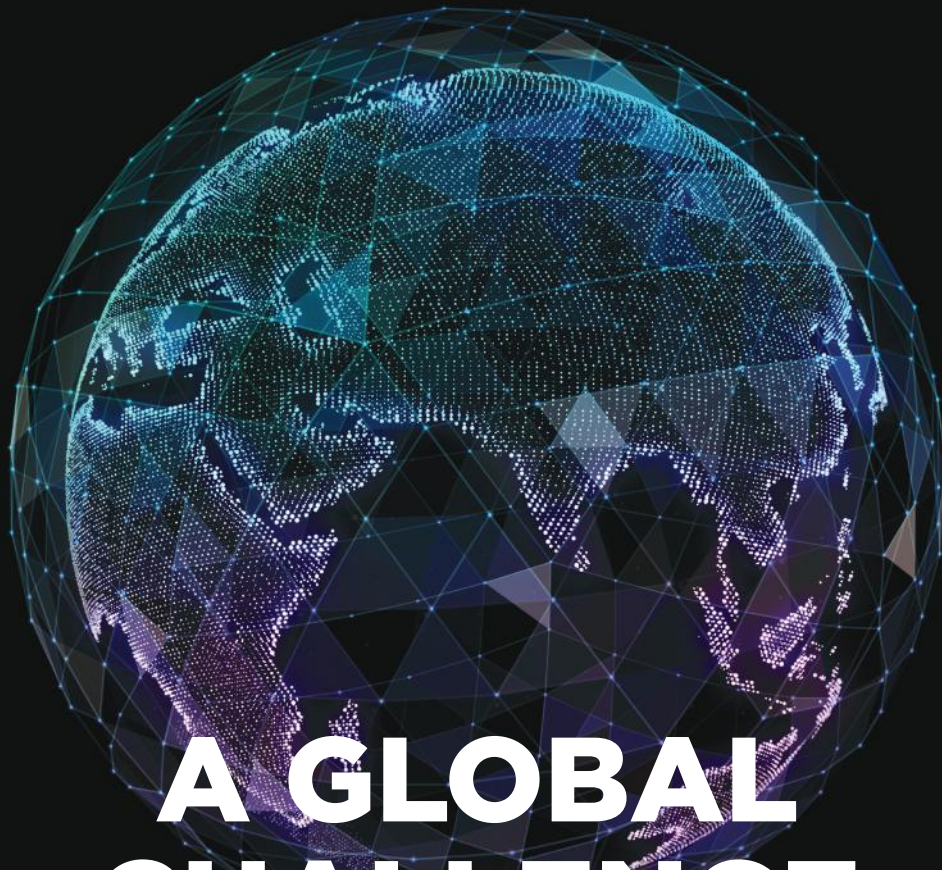
A GLOBAL CHALLENGE

Setting out a framework for coherent policy and regulation for the digital economy is our major challenge, especially for countries outside of the EU and US, writes RAINER SCHNEPFLEITNER

The global economy is rapidly becoming digital and all IP (internet protocol). Information and communications technology (ICT) is no longer a specific sector but the foundation of all modern, innovative economic systems. The internet and digital technologies are transforming the lives we lead and the way we work – as individuals, in business, and in our communities – as they become more integrated across all sectors of our economy and society.

These changes are happening at a scale and speed that bring immense opportunities for innovation, growth and jobs. They also raise challenging policy issues. These challenges can be tackled holistically by larger countries, such as the US, or by entities representing larger blocs, such as the European Commission as in its 2015 document, 'A digital single market strategy for Europe'. But for smaller countries outside a supranational umbrella it is very difficult to set up a coherent policy and regulatory framework.

In my past and current policy work, and in IIC meetings, we have been and still are discussing the ever-changing environment and the fact that regulators and industry are faced with a new reality and different market rules – and have to fundamentally change our modus operandi. This is undisputed.

What needs more emphasis in the discussion is the 'what'. What is new, what are the new market rules, what do regulators need to change? What are the priorities? What is the roadmap?

This, the first in a series of articles, attempts to stimulate discussions, and ultimately to propose a way forward to bridge this policy gap.

This first article sets out yesterday's ecosystem – the 'good old world' – and has a view on the 'brave new world', which we don't yet fully grasp. After having had a round of hopefully controversial feedback, subsequent articles will propose a roadmap. Currently, I see two main themes emerging: coordination between policymakers and regulators on a national and international level; and how to deal with the international giants.

THE WORLD HAS CHANGED
Yesterday was simple and unidimensional. Markets were organised on a national level, telecoms service providers (TSPs) had a predominantly national focus. The industry was rather healthy, regulation reached maturity, and rules were understood and accepted (this is, of course, an oversimplification and mostly applicable to advanced countries).

The new reality is complex, multidimensional and converged. Industry profits appear insecure, while global over the top (OTT) players disrupt old business models. (I refer to OTT in the wider sense – OTT players deliver their services over fixed and

mobile broadband provided by the TSPs. Customers pay (with their data) to the OTT company. OTT services may be in competition with services provided by TSPs, as in international voice services or in addition, as with video. So boundaries are blurry and overlap.)

Previously, in the late 1990s, 'convergence' was a buzzword, much as 'smart' and 'IoT' are today. Convergence was focused on technology, was never defined and was without a viable business model. Now convergence has rapidly arrived, in a never envisaged form fueled by fast and ubiquitously available IP networks. We embrace global business models that not only disrupt the telecoms industry, but also other industries such as the hotel business and even taxis, in the transport world. OTT players are global by nature and often have a position of tremendous strength.

Geographic borders often no longer exist; we operate in a 'glocal' (global/local – we live locally but consume globally) environment. Boundaries between domains, which were often isolated silos, also no longer exist. For example, spectrum is as much requested by private entities, mostly in the form of unlicensed bands, as by traditional users, i.e. broadcasters and mobile operators.

It is also increasingly unclear what is a content producer or a mere customer of a platform. We definitely live in a 'prosumer' world – today's customers are consuming services, but also producing data and content, which is monetised by the platforms.

THE CONSUMER PERSPECTIVE

Yesterday the deal was straightforward. The consumer paid money for a service. Today's prosumers are either additionally or fully paying with their personal data. Free apps and communication on social networks, resulting in targeted advertising, are prime examples.

Consumer protection, in the wider sense, is becoming more important. It is no longer only about getting refunds, but about data protection, striking the right balance between privacy and data exploitation, the right to be forgotten, protection from cyber-bullying, identity theft, hate speech, data ownership and the portability of data and content when dealing with global entities. These of course have a different significance for private and commercial users.

There are no free lunches. If a 'free' app asks for access to your address book, emails, browsing history etc., common sense says there is something wrong and you are paying with your data and loss of privacy.

THE INDUSTRY PERSPECTIVE

Mindset change

TSPs were used to owning and to a certain extent controlling the customer via the last mile. Therefore they had near exclusive access to the customer and all their data. With OTT players, TSPs are now faced with global competitors implementing an often superior business model:

● 'Free' international calls are hard to beat
● A substantial movie catalogue for $9 a month is a reasonable proposition.

After some years of futile fight, TSPs are now switching to a more cooperative model, where OTT players are seen as complementary and enablers rather than competitors. This has coincided with a shift of the business model towards selling connectivity and data. Without OTT players no one would need an unlimited mobile data package with speeds of 100 Mbps. One might also argue that the benefits of fast internet are enabled by OTT – otherwise we might still be paying per minute.

Change in business model

TSPs are selling connectivity and enabling convergent services but keep complaining about OTT impinging on their revenues. However, convergence cuts both ways as, for example, TSPs are breaking into the banking sector with money transfers and e-payments. Further examples of business opportunities are in providing data ➡

TELECOMS AND AUDIOVISUAL (AV) CONVERGENCE

A prime example of the challenge we face is the convergence of telecoms, IT and audiovisual media. Here we see all the elements of a converged environment and competition, or the absence of, at various levels of the value chain.
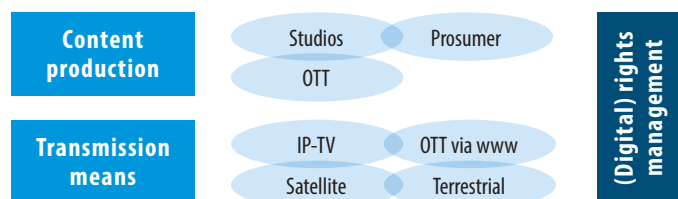
The transmission, i.e. the delivery, can be part of a TSP's triple play bundle or simply as OTT on the internet. The 'last mile' is often in a competitive setting, e.g. cable TV operators are delivering fast broadband services and TSPs are providing triple play.

The AV industry is one the biggest drivers of bandwidth, with currently around 80% of internet usage being AV content. The AV industry is driving and will continue to drive innovation, through virtual realities and holographic images, as examples. All of this will be accompanied by a massive increase in bandwidth.

Nevertheless, when we turn to the AV business model we see a huge gap concerning the needs and wants of the global 21st century user. The overwhelming share of content production and intellectual property rights (IPRs) are clinging to completely outdated concepts: the industry is adhering to business models that are not accepted by the user and easily circumvented by technology. Pirating is the consequence. But what is the AV industry doing? Complaining, instead of reacting to the changed environment.

I see this as a very good example of an industry unwilling to come to terms with a changed reality. This reminds us very much of the 1990s music industry, where due to Napster and others a whole industry was reformed.

It is undisputed that the interests of the authors need to be protected and an effective IPR regime is needed. However, shouldn't this regime be in line with a global setting rather than maintaining the status quo and preserving the existing collecting societies?

◀ centre services and smart city platforms.

TSPs are very vocal in complaining about OTT cutting into their core revenue. But have we heard banks complaining or have taxi companies named TSPs as accomplices in the establishment of ride sharing platforms? Have IT companies complained about TSPs setting up data centres and cutting into their core business?

To give a concrete local example of convergence cutting both ways, in 2010 non-telecoms revenue in Qatar was around 5% of total revenue of the TSPs. This increased to more than 20% or around 2 billion Qatari riyal by 2015. As a result, the regulatory implications are drastically changing. The industry is faced with regulations ranging from financial to health, cybersecurity, blocking and filtering, critical infrastructure, data retention and interoperability of spectrum – to name just a few.

REGULATORY INSTITUTIONS

Previously, issues were nicely compartmentalised, not only from a sectoral but also from a competency and geographical point of view. The new reality is international and multidimensional. Telecoms regulators previously dealt ex-ante with telecoms matters and the competition authority handled ex-post cross-sectoral matters on a national level. Media authorities addressed content related issues. Financial watchdogs dealt with financial issues. Data protection authorities tackled privacy concerns. Some regional coordination, as with BEREC in Europe and the Gulf Cooperation Council have evolved over the years.

Issues and abuses have not only become multinational, but are now also cross-sectoral. Many countries have taken the right steps, setting up a converged communications regulator that also takes care of the AV sector. Some authorities have developed ex-ante and ex-post competencies. But coordination with the competition authority is still a mixed bag – working well in many jurisdictions while in others we see a turf war.

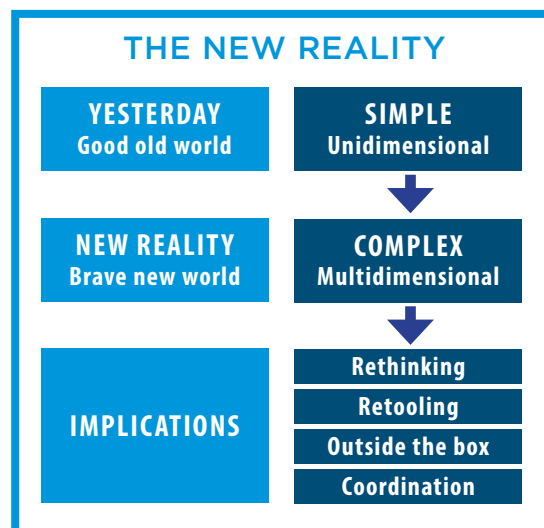We need to move from silos to a converged mindset and environment.

IMPLICATIONS

The implications of the new reality are vast. We are required to rethink our approach and also to retool. We need to critically evaluate which tools are still fit for purpose in this interconnected world.

This brings us back to the key question – what do we want to achieve in our jurisdictions? This question is or will be answered in a completely different way in a Trumpian US than a protectionist Middle Eastern country.

It is not only Qatar where we need a 'glocal' approach since many of the problems are global, as are some of the solutions. But we need to break it down to the local context and solve the issues in our own environment. What is clear is that without a clear policy goal, without the buy-in of all stakeholders and effective enforcement, we can't achieve any targets.

One implication that is already clear is that there needs to be a lot more coordination between the

THE NEW REALITY

YESTERDAY Good old world	SIMPLE Unidimensional
NEW REALITY Brave new world	COMPLEX Multidimensional
IMPLICATIONS	Rethinking / Retooling / Outside the box / Coordination

regulatory entities to address these global issues. Another question is whether our traditional ex-post proceedings, lasting three years or so, are fit for purpose or just solving yesterday's problems. For example, is there a real controversy about ride sharing platforms and the business of taxi drivers, or is the actual focus on worker protection?

There seems to be a common understanding that similar rules for similar services should apply. However, implementation is hard. First of all, what are 'similar' services in an all-IP world? The fact that an OTT call has limitations regarding location and should be treated differently to 'classic' voice calls seems to be increasingly far-fetched, especially in light of voice over LTE, which is effectively a carrier grade OTT service.

And lastly, we often talk about regulation but are not clear what we mean. Is it market access by licensing; is it data protection; is it wholesale and retail charge approval? Here all entities are challenged to create clarity.

OUR DEBATE

The IIC has long been at the centre of the policy and regulatory debate about telecoms and media, but the past few years have brought unprecedented challenges from new technologies and convergence. We invite you to respond to Rainer Schnepfleitner's article in whatever format suits you best – with a particular focus on how the many smaller regulatory authorities can best achieve coordination in the 'global/local' environment. In the coming months we will gather feedback and look forward to your responses.

RAINER SCHNEPFLEITNER heads the regulation affairs and competition department of the Communications Regulatory Authority (CRA) of Qatar. The CRA was recently set up as a converged regulator for telecoms, IT, access to digital media and post. A key part of his current role is policy for converged communications. This article does not represent the official position of the CRA.

COMPETING FOR PROTECTION

What is the status of international copyright reform in the digital age?
TED SHAPIRO contrasts efforts at the World Intellectual Property Organisation
with ongoing reform in the EU as part of the digital single market initiative

In 1996, the international community under the auspices of the World Intellectual Property Organisation (WIPO) agreed two ground-breaking treaties for the digital age – the WIPO Copyright Treaty and the WIPO Performances and Phonogram Treaty (WPPT) – sometimes referred to collectively as the WIPO internet treaties. These two instruments introduced some very important concepts into the realm of international copyright law, including in particular the exclusive right of 'making available' (i.e. the on-demand right), and technological protection measures (TPMs – such as encryption of content).

The negotiations leading to the adoption of these instruments involved a wide range of stakeholders including rightsholders from across the content spectrum, internet service providers (ISPs), civil society groups, libraries and other user groups. Some argue that the interests of developed countries and copyright owners dominated the debate. However, the role played by ISPs and other groups was crucial to the final outcome.

Yet, while many interests opposed to advancing the protection of copyright law at the international level were present in Geneva in 1996, the current situation at WIPO is quite different. At present, civil society groups, certain powerful developing countries and major international internet companies have more or less halted the advance of international copyright while many developed countries and rightsholder groups oppose the weakening of current norms.

NATIONAL ACTION AND PUSHBACK

Following the agreement on these international treaties in 1996, the action moved to national ratification and implementation. This sparked a new round of debate, particularly in intermediary liability and interplay between TPMs and copyright exceptions. As national legislators moved to incorporate the WIPO treaties into domestic law, ISPs, anti-copyright groups and academics began to argue that things had gone too far.

ISPs feared they would incur crippling liability for copyright infringement on their networks, which would break the internet, chill free speech and threaten democracy itself. They forcefully argued that they should be given liability privileges or ➡

⬅ safe harbours. These privileges were introduced in the US Digital Millennium Copyright Act (DMCA, copyright only) in 1998 and in the EU e-commerce directive in 2000.

Rightsholders argue that these privileges have enriched internet platforms at their expense. Academics and many user groups focused on the TPMs, which they saw as breaking the copyright bargain (exclusive rights in exchange for exceptions). These groups argued that rightsholders would deploy technology to 'electrify the fences' and thereby eliminate copyright exceptions. As a result, the US DMCA includes a triennial rule-making procedure run by the US Copyright Office, and the EU's copyright directive introduced a complex intervention mechanism for EU member states, both of which are intended to conciliate TPMs and exceptions. Both mechanisms have their critics.

For over a decade (and the process is still ongoing in some countries), rightsholders and other stakeholders have fought over implementation of these treaties and sometimes additional measures sought by rightsholders to fight online infringement, and in certain cases over attempts to weaken copyright. In many cases, the battles came after initial implementation of the WIPO treaties.

For rightsholders, including in particular the content industries, the WIPO internet treaties provide the vital building blocks for their new business models in the digital environment. Content is licensed for distribution on the basis of the exclusive right of making available (on-demand) and other exclusive rights. The usage rules set by these licences are enforced and managed by TPMs (each content sector uses digital rights management, DRM, to varying degrees – even the music industry still uses it). Thus, exclusive rights and TPMs are the primary drivers of content financing, production and dissemination (along with contractual freedom and territorial exclusivity, of course).

To combat unauthorised use of their content online, rightsholders have deployed a wide range of strategies, some of them controversial:
● Direct action against structurally infringing websites (which is difficult as these sites tend to operate anonymously and offshore)
● Action against end-users (suing one's former customers)
● So-called graduated responses (where recidivism gives rise to some form of a penalty)
● Legal actions against intermediaries (quite effective according to many studies but this is disputed by ISPs, which tend to revile measures such as site-blocking or de-indexing)
● Education and awareness programmes.

The situation has varied greatly from country to country (even within the EU). However, the battles over legislation underpinning certain of these strategies have generally been quite bloody. At the end of the day, most stakeholders agree that the number one way to fight copyright infringement is through the creation of attractive legal alternatives. For rightsholders, however, enforcement remains an important tool for protecting those legal alternatives from unfair competition.

THE DEVELOPMENT AGENDA

In recent years, WIPO did manage to adopt a further copyright treaty, the Beijing Treaty on Audiovisual Performances, in 2012. This treaty, which was largely agreed in 2000 but then languished for years due to a disagreement over a highly technical point relating to consolidation of rights in producers, is very similar to 1996 WPPT (with some particularities related to the audiovisual sector). However, it does bear the imprint of a changed WIPO – one where the advancement of intellectual property has largely been subordinated to a development agenda.

Many of the proponents of this agenda question the maxim that intellectual property is a driver of development. Developing countries want access to the intellectual property of developed countries and feel jilted by empty promises of technology transfer

> **Developing countries feel jilted by empty promises of technology transfer.**

in the context of the World Trade Organization (WTO) and the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement, which the WTO says is so far "the most comprehensive multilateral agreement on intellectual property" and which also binds some aspects of the Berne Convention to countries that are not signatories to the convention.

Major internet companies see copyright as an impediment to their business models, which are largely about selling advertising, attracting users with free content and generating network traffic. Developing countries and stakeholders in this camp argue that development should be achieved by weakening copyright through creating mandatory copyright exceptions at the international level.

ROAD TO AND FROM MARRAKESH

A first example of this approach was the adoption of the Marrakesh treaty for the visually impaired in 2013, which established a mandatory exception for the visually impaired. While it is hoped that the treaty, which turned out to be relatively balanced, will provide real benefits for the visually impaired, the issue of the availability of accessible formats also faces economic challenges that cannot be solved by copyright. This basically represents the first time that an international treaty has established an exception which contracting parties must incorporate into their national laws.

The usual approach is that countries can implement whatever exceptions they want subject to the so-called Berne three-step test which establishes limits on the scope of permissible exceptions. This approach has proven effective since it avoids the difficulties in having to achieve consensus on the contentious issues surrounding exceptions, and provides countries with a great of flexibility. Yet, in the context of Marrakesh and ongoing debates on whether there should be further instruments, proponents seek to weaken the three-step test and argue for mandatory exceptions and limitations.

Often, the proponents of this approach also do so for domestic political reasons – they need an international obligation to get change at home.

This is in sharp contrast to the approach of many developed countries, which rarely agree to international instruments that actually require them to do anything. Their goal in making international copyright treaties tends to be about securing protection elsewhere – it usually exists at home already. The proposed broadcaster treaty (Protection of Broadcasting Organizations) is a prime example.

At present, however, it is not clear whether there is sufficient political will to achieve the necessary consensus to create further norms affecting the international copyright system.

While many developing countries would like to see further treaties on exceptions, the EU and others would prefer to see a treaty for broadcasters (though some developing countries want both). This has led to a bit of stalemate. WIPO is reportedly keen to move the broadcaster treaty forward. However, there are significant impediments and risks. It is not clear that the new US administration will favour any new international treaties on anything. Of course, the international community has adopted international copyright norms without the US in the past.

'SECOND GENERATION' AND THE EU
In the EU, we are in the midst of a second generation of copyright legislation – some call it copyright reform – others say it is anything but. As a reminder, the EU implemented the 1996 WIPO treaties with its 2001 copyright ('in the information society') directive, which was transposed into the national laws of member states (a process that ran until 2006). Although further legislation (enforcement, term extension for music, orphan works and collective management) has also been adopted in the ensuing period, the copyright directive remains the centrepiece of EU copyright legislation.

While certain aspects of the debate in Europe will resound in many other places around the world, including the US, there is a particular point that is specific to the EU. Proposed EU copyright legislation must be seen in the context of the internal market and indeed, the ongoing digital single market initiative. Thus, proposals to reform EU copyright law are also about breaking down perceived barriers to the circulation of copyright works across the borders of EU member states. This is particularly an issue for the international principle of the territoriality of copyright. It has implications for the exercise of exclusive rights, which are protected under international norms, and reach of the exceptions and other limitations on such exercise.

I will start with some background and the broader political context. In July 2014, the incoming president of European Commission, Jean-Claude Juncker, explained one of his priorities as follows:

"I believe that we must make much better use of the great opportunities offered by digital technologies, which know no borders. To do so, we will need to have the courage to break down national silos in telecoms regulation, in copyright and data protection legislation, in the management of radio waves and in the application of competition law."

WIPO BRIEFS ON BROADCASTING PROTECTION

As WIPO says, international rules to protect television broadcasts from piracy have not been updated since the 1961 Rome treaty, drafted at a time when cable was in its infancy and the internet not invented. Signal piracy can take physical form, such as unauthorised recordings of broadcasts on video tapes, DVDs or USB sticks, or it can be virtual, such as the unauthorised redistribution of signals over the air or online.

Although there is broad agreement in principle that broadcasters should have updated international protection from theft of their signals, WIPO members have so far failed to agree on how this should be done and what further rights, if any, broadcasters should be given. Outstanding issues are:

What should be protected? Broadcasters obviously want protection for all means of transmission of their signals. But some countries and civil society groups are wary of restrictions affecting internet transmissions.

How should broadcast signals be protected? Broadcasters want to outlaw the breaking of anti-piracy locks on digital signals but critics argue that rules could also block perfectly legal uses of TV broadcasts, such as recording programmes for personal or educational uses.

What further rights should be given to broadcasters? In much of the world it is perfectly legal to retransmit a broadcast over the internet without permission.

See www.wipo.int/pressroom/en/briefs/broadcasting.html

Following this ambitious statement, the Commission published its strategy for a digital single market (DSM) on 6 May 2015 in which it defined the DSM as follows:

"A digital single market is one in which the free movement of goods, persons, services and capital is ensured and where individuals and businesses can seamlessly access and exercise online activities under conditions of fair competition, and a high level of consumer and personal data protection, irrespective of their nationality or place of residence."

> **The international community has adopted copyright norms without the US in the past.**

The DSM, which according to a press release would be worth €415 billion to the economy, is based on three pillars:
1 Better access for consumers and businesses to online goods and services across Europe
2 Creating the right conditions for digital networks and services to flourish
3 Maximising the growth potential of the European digital economy.

Copyright resides in the first pillar along with related issues and the not so related matter of cross-border parcel delivery. To achieve a modern, more European copyright framework, the Commission promised:

"The Commission will make legislative proposals before the end of 2015 to reduce the differences between national copyright regimes and allow for wider online access to works by users across the EU, including through further harmonisation measures."

◄ On 9 December 2015, a first action plan for modernising European copyright was released together with a proposed regulation on cross-border portability.

The portability regulation, which is more or less agreed, will usher in EU portability, including for current contracts, by early 2018. In short, the regulation is aimed at enabling subscribers to online content services, such as Netflix and Sky Go, to access their services when temporarily present in another country within the EU. It seeks to achieve this by imposing on online content services a requirement to enable subscribers who are temporarily present in another EU member state than that of their residence to access the service.

To deal with the territorial nature of copyright and the licensing of content on this basis, the regulation creates a 'legal fiction' which localises all relevant copyright acts in the provision and use of an online content service in the subscriber's member state of residence when the subscriber accesses the service from another member state. To ensure that rightsholders and online content service providers do not contract around the portability obligation, the instrument establishes a broad ban on contractual overrides.

Any contractual provisions, which are contrary to the regulation, including those which prohibit cross-border portability or limit portability to a specific time period, are unenforceable. However, the limitations on contractual freedom in the regulation do not stop there. The process for determining a subscriber's member state of residence is strictly regulated through a closed list of verification means, and online content services may not impose additional charges for EU portability.

The portability regulation will represent the first major piece of copyright legislation adopted under the auspices of the digital single market initiative. As a regulation, which is a first for EU copyright, it

> ## "Portability will be the first major piece of copyright legislation adopted under the DSM."

represents a very powerful legislative tool that is directly applicable in the member states without the need for national implementation.

LOBBYING THE COMMISSION

In the run up to the second wave of copyright legislation, various stakeholder groups pressed their cases. The European film industry had become increasingly concerned about the Commission's war on territoriality. In the DSM strategy, the Commission had pledged to respect the value of rights in the audiovisual sector. In brief, the audiovisual sector worries that its funding model, which is based on the pre-sale of rights by territory, is at risk. Moreover, the Commission's competition directorate (DG Competition) has an ongoing investigation into the licensing practices of the Hollywood studios in the pay TV sector.

While the audiovisual sector urged the Commission, the member states and anyone else who would listen, to just leave them alone, the music industry lobbied for action on the 'value gap' – it wanted the Commission to intervene to provide them with more leverage in their negotiations with platforms like YouTube, which invoke the liability privilege in Article 14 of the e-commerce directive (hosting exemption). For publishers, on 12 November 2015, the Court of Justice of the EU (CJEU) in its Reprobel decision had struck down their entitlements to shares of private copy and reprography levies. The publishers were already worried about new exceptions, particularly text and data mining, as well as the value gap and the power of certain online platforms.

However, the CJEU decisions in Reprobel and Svensson (which limited the extent to which linking could be considered to implicate the exclusive right of communication to the public) made their situation even more precarious. National initiatives in Germany and Spain had fallen short. While their critics say they need new business models, some publishers might consider the value gap to be a luxury problem. Authors and performers, while grooving to the music sector's value gap, had their own more personal value gap; they wanted the Commission to propose a statutory remuneration right for 'making available' which would be subject to mandatory collective rights management. And that is just a brief look at rightsholder groups.

Other stakeholders, including anti-copyright groups, libraries, consumer organisations, researchers and other users, had been encouraged by the Commission's early statements and the adoption of the so-called Reda report on 24 June 2015 by the European Parliament. These groups were looking to the Commission to scrap the territoriality of copyright within the EU, introduce lots of new exceptions and make the existing ones mandatory while weakening contractual freedom and the legal protection of technological measures. The report, which was a non-binding resolution, was meant to examine the implementation of the copyright directive.

WHAT THE EUROPEAN COMMISSION SAYS ABOUT COPYRIGHT REFORM

The reform is predicated on:

● Better choice and access to content online and across borders. About 75% of young people access content online and one in five have tried to access services in another member state.

● Improved copyright rules for education, research, cultural heritage and inclusion of disabled people. Almost a quarter of teachers face copyright-related restrictions in their digital teaching activities and researchers encounter difficulties in carrying out text and data mining. There is a huge amount of archival print and audio waiting to be digitised, and "the 26 million blind and visually impaired people in Europe should not be limited in their access to culture just because the formats they need are not readily available".

● A fairer online environment for creators and the press. The proposed rules "reinforce the position of rightsholders to negotiate remuneration for their creative content" and it will be the first time that press publishers are legally recognised as rightsholders.
See ec.europa.eu/digital-single-market/en/copyright

A century of the Berne Convention came and went back in the 1980s

However, the initial draft, penned by Julia Reda, Pirate Party member of the European Parliament, was less about implementation and much more about 'fixing' what she did not like about EU copyright. In the end Reda had to compromise to secure adoption of her report, which was adopted with a broad majority. The end result, however, is a typical Christmas tree legislative instrument; everyone will find something for themselves under it. While such reports can sometimes send important political messages, this one was so riven within internal inconsistencies that it is hard to derive too much substance from it.

THE NEW PACKAGE ARRIVES

Finally, on 14 September 2016, the Commission presented its much-awaited second package addressing copyright in the digital single market. During the summer, texts of the draft proposals were leaked; some further changes were made before the Commission formally approved these drafts and sent them to the European Parliament and the Council (the member states). The legislative proposals are four:
● The proposed regulation
● A proposed directive on copyright in the digital single market
● A proposed directive on visually impaired persons
● A proposed regulation on visually impaired persons.

The last two are part of the EU's implementation of the Marrakesh Treaty.

Jean-Claude Juncker promised to tear down national copyright silos and it is clear that these proposed instruments, depending on their final form, will have a profound impact on EU copyright law. They include a proposed extension of the country of origin doctrine to broadcasters' ancillary online services, and mandatory collective rights management for a broader range of cross-border retransmissions – not to mention the cross-border effect of an out-of-commerce mechanism and new exceptions – and so the territoriality of copyright in the EU could take a major hit.

The proposals include three new mandatory, cross-border exceptions for:
● Text and data mining
● Teaching both on the premises of an education

establishment and via a secure electronic network for non-commercial purposes
● The preservation of cultural heritage – but nothing on the so-called freedom of panorama (although note there is already an optional exception in the copyright directive) or private copying.

For the value gap, the Commission has proposed a new tool with which rightsholders should be able to require platforms that store and provide access to large amounts of works uploaded by their users to take measures to ensure the functioning of their agreements or to prevent the availability of their services or works identified by rightsholders (and all that without touching Article 3 of the copyright directive or Articles 14 and 15 of the e-commerce directive). The proposal also confirms that press publishers should obtain the right to authorise online uses, i.e. reproduction and making available, of their content which will last for 20 years. Scientific and other publishers are excluded but a further provision will enable member states to permit all publishers to share in the proceeds of private copy and reprography levies.

Finally, the proposals would impose transparency obligations on producers and publishers vis-à-vis authors and performers who will also benefit from a so-called bestseller clause (allowing them to seek additional remuneration in the event the originally agreed remuneration turns out to be disproportionately low compared with the financial success of the particular work).

This is not exactly the package that many anti-copyright groups and user groups were contemplating – certain items fell by the wayside while others emerged. The proposals have elicited a barrage of criticism aimed at the measures to bridge the value gap and invest press publishers with a related right (which is something that producers and broadcasters already have under EU law).

The legislative battle has begun. The European Council of member states has begun its consideration of the proposals and in parallel a number of draft reports from the competent committees have been released in the European Parliament. The proposed amendments are starting to flow. The process will likely last through to the end of this Commission/Parliament in 2019 – some say longer. The end product is hard to predict but it will look different from the original proposals.

Meanwhile, back in Geneva, where does this leave WIPO? Any movement on exceptions seems extremely unlikely. The EU will not support new international norms while it is getting its own house in order. The EU may, however, be more supportive of movement on the broadcaster front but of course that depends on the approach. And as noted, the US is unlikely to be pushing for new treaties.

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MAKING THE RIGHT MOVES

Behavioural economics is becoming popular because it promises to improve competition and consumer outcomes. But as **TIM HOGG** asks, is it a paradigm shift, a passing fad – or somewhere in between?

R egulators are waking up to the power of behavioural economics to understand markets, assess competition and improve consumer outcomes. Is it a passing fad or will it replace traditional economics? This article argues for a middle way – that behavioural economics is a valuable new arrow in the quiver of a modern telecoms regulator, one that complements and brings out the best from traditional regulatory frameworks.

Behavioural economics is the incorporation of psychological insights into economics – a process that has been underway for a long time (see timeline on page 19). Behavioural insights can complement the traditional economic understanding of markets and add to the telecoms regulator's toolbox.

Throughout the 20th century economists assumed a number of mathematically useful characteristics about consumers – that they are perfectly rational and consistent, able to compute the optimal decision no matter how complex the choice, are unaffected by how a choice is framed, able to accurately predict future behaviour, and are never a prisoner of inertia. Behavioural economics is the pursuit of more realistic economic models.

Incorporating behavioural economics into regulation is an opportunity to improve competition, ensure that consumers are not exploited, and achieve more with less: it opens up the exciting prospect of using less intrusive, less costly regulation.

This article outlines key behavioural insights and explores how regulators in telecoms and other sectors are using behavioural economics to improve competition and consumer outcomes.

HOW DO CONSUMERS THINK ABOUT DECISIONS?
A huge number of behavioural biases and quirks have been documented, but this article focuses on just those that are most relevant to new behavioural approaches in regulation. Some psychological

TWO MODES OF THOUGHT

The Nobel award winning psychologist Daniel Kahneman introduced the helpful theory that there are two modes of thought: System 1 and System 2:

SYSTEM 1 is automatic and uncontrolled – it is unconscious, fast and effortless, relying on habit, emotion and first impressions. System 1 is always deployed and readily produces an answer, which is often not sense checked using System 2.

SYSTEM 2 is reflective and controlled – it is slow, deductive and requires effort. System 2 makes judgements where required, and is deployed where System 1 is unsure or where otherwise prompted.

   System 1 makes life manageable (we make thousands of small decisions every day) and often uses rules of thumb to simplify decisions. While System 1 often leads to the right answer, it also produces systematic mistakes. For example, consider the following problem:

   A bat and a ball cost $1.10 in total.
   The bat costs $1 more than the ball.
   How much does the ball cost?

The intuitive answer that first springs to mind is 10 cents, but on reflection this is obviously wrong!

Kahneman D (2003). Maps of bounded rationality: psychology for behavioural economics. The American Economic Review 93 (5): 1449-75. bit.ly/2plJPSI

observations may seem obvious but the application of them in a robust economic framework yields valuable new insights for regulation.

   One of the core insights is that people have limited cognitive power and only use it where necessary. Not only does this mean that we are vulnerable to information overload and the subsequent inertia, but that the way cognitive effort is rationed can lead us to make poor decisions, as described in the panel above.

RULES OF THUMB AND MENTAL SHORTCUTS

Decisions can be complicated, especially over complex products like those in telecoms. People use rules of thumb (or heuristics) to simplify choices. These mental shortcuts are often very useful, but can lead to systematic mistakes. Common heuristics include:

Confirmation bias – people look for evidence that confirms their prior beliefs. For example, if a consumer believes that switching provider is too complex, they may prematurely stop searching for a new package if they cannot immediately find a better one.

Availability bias – people make decisions based on information that is easily available or recalled. For example, when deciding whether to renew a TV package, a consumer may think about their recent TV viewing rather than their consumption over a longer period of time. This may lead them to under-

or overestimate the value of the package to them.

Representative bias – people tend to focus on one salient dimension that they consider to be representative of the product, and to ignore others. For example, when choosing a mobile contract the consumer needs to consider factors such as price; quantity of minutes, text messages and data; quality of service; data speed; coverage; and duration of contract. The consumer may simplify this choice by focusing on representative product dimensions like price and quantity of data. This could lead to less competition by mobile operators on other product dimensions. The representativeness bias could be especially relevant when evaluating bundles.

Overconfidence bias – people are often too optimistic about their own ability. For example, someone may sign up to a mobile contract with the intention of staying below the data cap (and therefore ➡

TIMELINE OF BEHAVIOURAL ECONOMICS

18th and 19th centuries	Early economists such as Adam Smith and Jeremy Bentham regularly incorporate psychological insights into their analysis.
Early 20th century	Economists focus on mathematical models that assume super-rational consumers, and in so doing jettison some of the psychological reality.
1940s-50s	Herbert Simon introduces the idea of 'bounded rationality' and that consumers 'satisfice' rather than optimise.
1960s-70s	Psychologists demonstrate that choice is influenced by the 'frame' in which it is presented.
1979	Daniel Kahneman and Amos Tversky introduce prospect theory, which explains many behavioural 'anomalies'.
1980s	Economists find that people are inconsistent in how they value future costs and benefits – 'time inconsistencies'.
1985	Richard Thaler introduces the theory of mental accounting, which describes how individuals divide their money into separate budgets and use them in different ways.
1990s	Economists find people behaving in ways predicted by behavioural economics in a variety of contexts, such as labour and financial markets.
2002	Daniel Kahneman wins the Nobel Memorial Prize in Economic Sciences for his work on behavioural economics.
2008	'Nudge' by Richard Thaler and Cass Sunstein launches an era of using behavioural economics in public policy to improve decision making through changing 'choice architecture'.
2010–present	Financial regulation increasingly incorporates behavioural economics, and regulators in other sectors begin to follow suit.

REFERENCE-DEPENDENT PREFERENCES

Consumer preferences are not set in stone – they are often influenced by both the choice environment and relevant 'reference points'. Rather than an independent, self-contained and dispassionate evaluation, consumers tend to evaluate outcomes by comparing them with their expectations, the status quo and other people's outcomes.

Moreover, consumers are also often 'loss averse': they are more sensitive to losses than equally sized gains. The value a consumer places on a product depends on whether they currently purchase the product or not: consumers are less willing to give something up (lose it) than forego something they never had. For example, this 'endowment effect' might nudge people towards renewing telecoms contracts that they would not otherwise have purchased (if they did not already have the service).

Reference dependence also leads to 'framing effects' where the frame in which a choice is presented impacts the decision that people make. Whether a choice is framed as a loss or a gain can be important.

◀ avoiding overage charges), but they might be overestimating their ability to control their consumption.

Status quo bias – people are often biased towards keeping the status quo. This could be due to loss aversion (see box above) or inertia due to information overload. Status quo bias can lead to low switching rates, and increases the likelihood that the auto-enrolment of contracts is effective at retaining customers.

Ultimately, if people have unstable preferences then it is difficult for them to 'optimise'.

MENTAL ACCOUNTING AND NOW VERSUS LATER DECISIONS

Consumers often simplify their budgeting by thinking about their expenditure in categories, or budgets. This is 'mental accounting' – the thought process through which individuals classify, appraise and keep track of their financial activities. For example, they might have a budget for their mobile phone bill and a separate budget for their fixed broadband. These budgets may be explicit or implicit, and vary in their strictness. In an extreme case, a consumer will not take from one budget to add to another budget, even if it would be beneficial.

Whether consumers have a single broad telecoms budget or multiple narrower budgets affects how likely they are to bundle. Certain types of customers are more likely to have a single telecoms budget: for example, education is positively correlated with bundling in Turkey,[1] and household income is positively correlated with bundling in Sweden,[2] Turkey and the UK.[3]

A combination of factors means that consumers

> **Several factors mean consumers find 'now versus later' decisions difficult.**

often find 'now versus later' decisions difficult. First, people overweigh short-term costs relative to long-term gains (present bias). Second, people may not know what is in their long-term interests, or be able to forecast their long-term consumption patterns. Third, people often fail to act as they earlier intended. For example, people may sign up to a contract with the intention of leaving after the low teaser price ends. While some remember to switch, many do not.

NEW REGULATORY APPROACHES USING BEHAVIOURAL ECONOMICS

Regulators in a variety of sectors are increasingly incorporating insights from behavioural economics into their understanding of consumer behaviour and markets. Behavioural policies and remedies take into account the way that consumers actually make decisions and the factors that influence them. Effective remedies harness behavioural biases and quirks, rather than work against them, and are thoroughly tested before implementation.

Next I discuss some examples of competition authorities and regulators applying insights from behavioural economics to assess competition, improve customer communications, tackle choice complexity in the retail market, and assess business models.

ASSESSING COMPETITION

Behavioural economics is increasingly used by regulators to understand the nature of competition in the market.[4] The access-assess-act framework, first used by the UK Office of Fair Trading, incorporates various insights from behavioural economics into a competition policy tool. It has been adopted by a number of regulators, and focuses on whether consumers are able to fully engage in the market. Figure 1 lists some key behavioural reasons why consumers might fail to correctly access market information, assess it or act upon it.

This framework can be easily applied in telecoms markets, and should take account of learning

FIGURE 1
THE ACCESS-ASSESS-ACT FRAMEWORK

Demand	Access	Assess	Act	Supply
Well-informed, confident, rational and effective consumers can play a role in activating vigorous competition	Inertia limits the extent of external search	Framing effects	Lack of self-control (immediate gratification)	Vigorous competition should provide firms with incentives to deliver what consumers want
		Poor at assessing future		
	Lack of knowledge about where to search	Limits to processing ability	Inertia: limits switching	
		Use heuristics	Inertia: do not act on assessment	
	Inability to recall information	Look at limited information		

Source: Office of Fair Trading (2010). Behavioural economics and competition policy. Presentation by Amelia Fletcher, OFT Behavioural economics seminar, 22 April.

opportunities. If consumers face the same choices repeatedly and are able to learn from experiences, then they may become more sophisticated and less prone to biases, leading to better market outcomes.

It is also possible for behavioural biases and insights to be incorporated in agent-based models of consumers switching.[5] Such modelling gives new insights on the state of competition and informs where effort should be focused to increase switching.

IMPROVING COMMUNICATION

Effective product disclosure is informed by and aware of behavioural insights.[6] The way in which information is presented affects switching behaviour, but this should always be tested as it is likely to depend on the situation.[7]

The timing of information provision is also likely to be important, with consumers more receptive at certain salient points in time. For example, the effect of information designed to encourage switching will be greater if it is delivered close to when the consumer's existing contract ends.

Telecoms regulators have started to mandate clearer, simpler information to consumers. For example, in December 2016 the German parliament passed BNetzA's (the telecoms regulator) Transparency Ordinance for telecommunications with the aim of improving transparency and promoting competition. This forces telecoms providers to provide information to consumers:
● On all key contract terms (e.g. duration, data speeds, prices) displayed on a customer information sheet before the contract is signed
● On minimum term and contract notice periods, displayed on customer invoices
● On how to test the actual data speeds experienced by the consumer.[8]

Similarly, in 2016 the Colombian telecoms regulator, Comisión de Regulación de Comunicaciones (CRC), consulted on reform of the telecoms consumer protection regime using behavioural insights,[9] supported by the OECD.[10] The remedies included:
● Monthly invoices will have to display past usage in visual formats. For example, if a consumer's monthly limit was 700 minutes they would be presented with the chart in figure 2
● Operators will have to show the prices of the individual components of bundles and the level of discount that the bundle offers
● Operators will have to pay greater attention to consumer communication through social media platforms.

The effectiveness of these remedies will depend on the extent to which they do not impede competition or overload consumers with too much information.

TACKLING COMPLEXITY

Consumers in telecoms markets face increasingly complex decisions as technology advances and the number of choices expands. Such complexity is a by-product of technological progress, convergence, and product bundling – all of which can have

FIGURE 2
CONSUMPTION STATUS ON COLOMBIAN TELECOMS INVOICES

Voice minutes

APR	MAY	JUNE	JULY	AUG	SEPT	AVERAGE
434	437	577	221	398	361	405
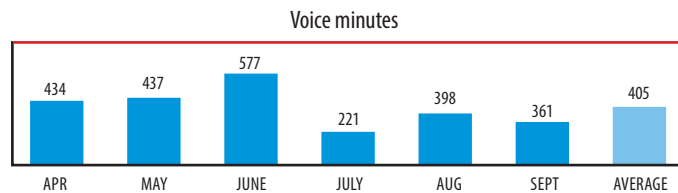
TOTAL MINUTES PLAN: 700

Source: Comisión de Regulación de Comunicaciones (2016). Revisión Integral del Régimen de Protección de los Derechos de los Usuarios de Servicios de Comunicaciones.

pro-competitive and welfare-enhancing attributes and effects. However, it is not always easy for consumers to figure out the best option for them, even with the growing role of price comparison websites.[11]

In this context regulators have started to seek opportunities to simplify decisions for consumers. For example, in November 2015, the UK telecoms regulator Ofcom and the UK Advertising Standards Authority (ASA) acted to simplify fixed broadband pricing. They conducted a survey to see whether there was a problem with excessive complexity and implemented an evidence-based remedy.

In the UK, fixed broadband prices were divided into two: line rental, and broadband service. Fixed broadband could not be purchased without the line rental f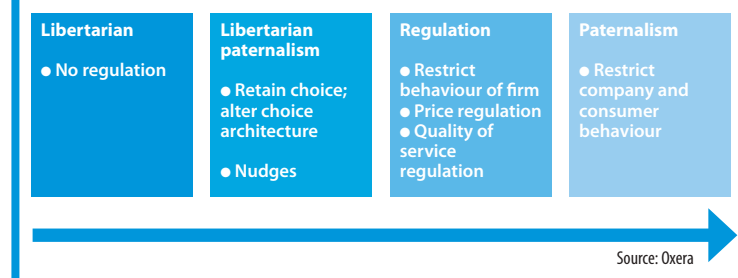ee. Ofcom and the ASA's survey tested whether this division caused confusion among consumers. The results confirmed the regulators' hypothesis: 24% of consumers were unable to state correctly the total cost of broadband. Additionally, the survey found that consumers struggled to distinguish upfront costs from monthly costs, and found teaser rates confusing.

> **Regulation aimed at reduced complexity backfired in one situation in the UK.**

Ofcom and the ASA judged that there was a case for regulation, and ruled that fixed broadband advertising had to show all-inclusive costs and no longer separate out line rental; give greater prominence to the contract length and any post-discount pricing; and give greater prominence to upfront costs.[12]

However, in another situation, regulation that aimed to reduce complexity backfired. In 2013, the UK energy regulator Ofgem acted to simplify energy retail markets by banning complex tariffs and mandating that no firm could offer more than four separate tariffs.[13] This intervention was later judged by the Competition and Markets Authority (CMA) to "restrict the behaviour of suppliers and constrain the choices of consumers in a way that may have distorted competition and reduced consumer welfare". In particular, the remedy was considered to reduce the ability of retail energy

FIGURE 3
REMEDY DESIGN

Libertarian	Libertarian paternalism	Regulation	Paternalism
● No regulation	● Retain choice; alter choice architecture ● Nudges	● Restrict behaviour of firm ● Price regulation ● Quality of service regulation	● Restrict company and consumer behaviour

Source: Oxera

◄ suppliers to implement innovative tariff structures that better meet consumer demand.[14] The rules will be removed following the CMA's investigation.[15] This example highlights the importance of testing hypotheses before regulating and illustrates how behavioural economics is a complement to standard competition economics rather than a substitute.

ASSESSING BUSINESS MODELS

Analysis of a firm's business model by itself can indicate whether consumer and commercial objectives are aligned. Aligned incentives are less likely to lead to consumer harm.

In the UK, the Financial Conduct Authority (FCA) found that the commercial and consumer objectives were not aligned in the high-cost short-term credit market ('payday loans').[16] Consumers who paid back the credit on time (i.e. behaved 'well') were unprofitable for the firms, while consumers who did not pay back on time (i.e. behaved to their own detriment) paid penalty fees and were thus profitable for the firms.

The business model relied on consumer biases: it was in the firms' interests to attract only those customers who behaved 'poorly' and encourage those 'poor' behaviours and biases (e.g. present bias, overconfidence bias). In effect, the consumers who behaved 'poorly' were subsidising the consumers who behaved 'well'.

A cross-subsidy from one group of consumers to another may be efficient (Ramsey pricing)[17] or have other societal benefits – cross-subsidies should be judged on a case by case basis. In the case of payday loans the FCA found that the customers who behaved poorly needed protection and therefore it imposed interventionist remedies.

In a similar case, the FCA explored whether consumer and commercial objectives were aligned in the credit card business model. Here the FCA found that consumers who behaved in their own best interests and paid back on time were indeed profitable for the firms. Therefore the incentives were aligned and no such interventionist regulation was imposed, although some light-touch nudges were introduced to encourage consumers to behave 'well' and pay back on time.[18]

This framework could be applied by telecoms regulators in assessing whether incentives are aligned and whether cross-subsidies from one type of consumers to another are problematic.

WHAT DOES GOOD BEHAVIOURAL REGULATION LOOK LIKE?

Consumer harm might justify the introduction of regulation; if this is the case, there remains a question over the appropriate extent of this regulation. In general, regulators have a continuum of approaches open to them, ranging from light-touch nudges to interventionist restrictions on company and consumer behaviour, as shown in figure 3. Different regulation might be appropriate in increasing competition, improving communication, reducing complexity and aligning commercial and consumer interests.

According to the European Commission, proportionate regulation should be as simple as possible and should not go beyond what is necessary to achieve the objective.[19] Therefore, before using traditional regulatory tools, regulators should first see if there are behavioural remedies or nudges that would accomplish the same goal. Preferably, such nudges should alter behaviour in predictable ways but without forcibly restricting choice by mandating or forbidding options – this principle is often called 'libertarian paternalism' (as in figure 3).[20]

Evidence-based policy requires that behavioural remedies be thoroughly tested before implementation. Does the remedy alleviate the identified theory of consumer harm? Does it have unintended consequences, such as stifling competition or innovation? Does it help naïve consumers but hurt sophisticated consumers? Testing could involve laboratory experiments, online experiments or field experiments. Given the dynamic nature of the telecoms industry, regulators should regularly review the appropriateness and effectiveness of behavioural remedies.

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SOLVING THE ONLINE PLATFORM PUZZLE

How can policymakers make sense of the impact of online platforms?
CHRISTIAN HILDEBRANDT and **RENÉ ARNOLD** put forward
a model that covers the complex dimensions

The internet can reduce information and transaction costs to almost zero – so it lends itself well to creating platform business models that act as intermediaries to match two or more users or groups quickly and independently of their location. It is not surprising that two of the earliest actors in the commercialisation phase of the internet were Amazon and eBay – and both companies are still thriving today.

With consumers spending more time online, advertising expenditure was bound to quickly follow eyeballs. Google, Facebook and others build on the insights they are able to gather about consumers, but also about advertising effectiveness, to create highly profitable platforms for advertisers. Recently, new competitors such as Snapchat and WeChat, which better understand how to capture the attention of consumers on mobile devices, are catching up.

As the latest communication from the European Commission on online platforms reflects,[1] policymakers have grown more convinced of the positive socioeconomic impact of online platforms. However, they still appear to have some difficulty grasping all the building blocks of online platforms at once, identifying patterns and making comparisons across business models, or quickly assessing the potential impacts of new entrants.
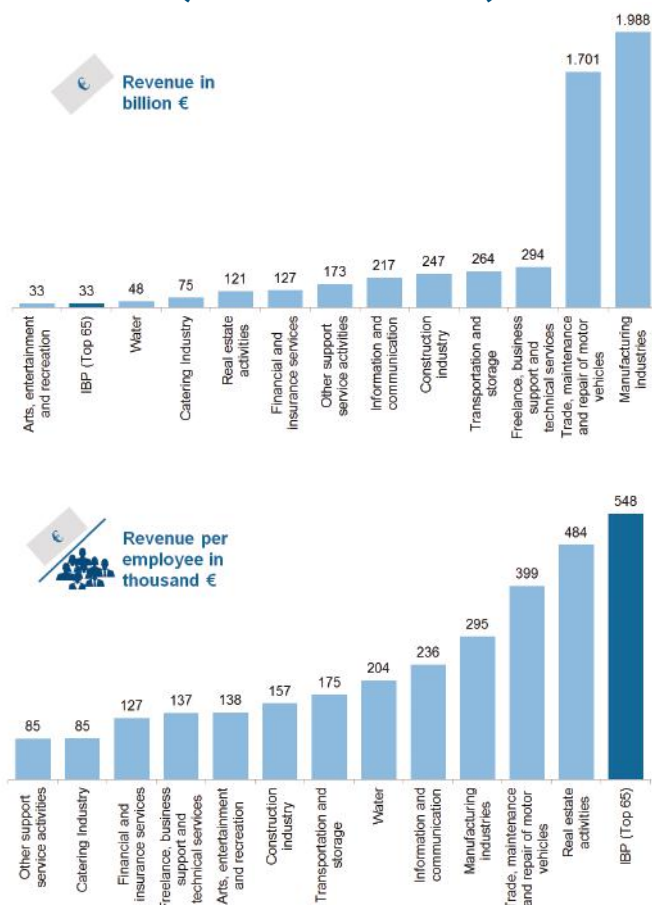
We have taken up the call for a new conceptual framework to consistently identify and analyse online platforms. First, we present our findings on the impact of online platforms, underscoring their importance from both economic and societal perspectives. Second, we present our new conceptual framework. It draws on business model research and provides an intuitive approach to understanding platforms' major building blocks, enabling a quick assessment of existing and new actors, including their potential competitive effect.

THE IMPACT OF PLATFORMS
The recent initial public offering (IPO) by Snap (Snapchat's parent) has proven once more that traders are fond of online platforms. In fact, many large platforms achieve impressive market capitalisation despite their comparatively small turnover and sometimes non-existent profits.

To explore the socioeconomic impact of platforms and explain their success, we collected data on the companies behind the 65 most important online platforms in Germany. Our study focused on five types of online platform:

FIGURES 1 & 2
REVENUE OF ONLINE PLATFORMS (GERMANY – 2015)

Revenue in billion €

Sector	Value
Arts, entertainment and recreation	33
IBP (Top 65)	33
Water	48
Catering Industry	75
Real estate activities	121
Financial and insurance services	127
Other support service activities	173
Information and communication	217
Construction industry	247
Transportation and storage	264
Freelance, business support and technical services	294
Trade, maintenance and repair of motor vehicles	1.701
Manufacturing industries	1.988

Revenue per employee in thousand €

Sector	Value
Other support service activities	85
Catering Industry	85
Financial and insurance services	127
Freelance, business support and technical services	137
Arts, entertainment and recreation	138
Construction industry	157
Transportation and storage	175
Water	204
Information and communication	236
Manufacturing industries	295
Trade, maintenance and repair of motor vehicles	399
Real estate activities	484
IBP (Top 65)	548

Source: WIK (2016)

● Search engines
● Comparison tools
● Media and content providers
● Social networks
● Collaborative economy services.

We find that collectively the 65 companies, some of which operate more than one type of online platform, made €33 billion revenue in Germany in 2015. This is roughly a tenth of their global revenues, which we estimate at €320 billion in 2015. They employ approximately 61,000 and 589,000 people in Germany and worldwide respectively. Given that there are new entrants and many smaller actors which we did not capture in our estimates, these figures are conservative.

If one thinks of online platforms as a sector just like financial services or construction, their total revenues are comparatively small. However, the revenue per employee (about €548,000) that they are able to attract is very high compared with other sectors in Germany (see figures 1 & 2).

Besides revenues, the cost structure of online platforms differs fundamentally from other sectors. While there can be significant costs to set up and scale a business, the marginal cost is practically zero. This explains part of the high market capitalisation and underscores the importance of the underlying choice of business model.

HOW TO ANALYSE PLATFORMS

Understanding these choices is crucial for policymakers, regulators and business actors. We suggest the 'data revenue attention model' (DRAM) (see figure 3) as a novel conceptual framework to identify and analyse online platforms. Just like the 'business model canvas',[2] DRAM offers an intuitive taxonomy of an online platform's essential building blocks and their interactions.

As the name suggests, the model seeks to capture the three main flows (data, revenue and attention) that are typically exchanged among platform users and, with some degree of mediation, with the online platform itself. In our model, users can enter a theoretically unlimited number of user roles on the platform. Each user role is defined by the platform, as is the barrier to enter a user role. This is where most of a platform's creative leeway resides.

First and foremost, each user role is designed with the purpose of value creation in mind. For example, a search engine provider benefits from search query listings and users benefit from finding relevant websites (information, media content, etc.) via search engines. Thus, there is value creation for both sides of the platform. The barrier to entry can range from typing a query, e.g. as a search engine user, to qualifying for a specific role on a platform by providing relevant certificates such as a driver's licence. The barrier to entry to a specific user role can be determined in part by national legal and regulatory frameworks, as with a driver's licence.

Online platforms create value by mediating the flows of data, revenue and attention among the different user roles. For a business model view, it is critical to understand how a specific online platform taps each of the flows defined in the DRAM. While designing this part of the business model can be

FIGURE 3
THE DATA REVENUE ATTENTION MODEL (DRAM)

Source: WIK
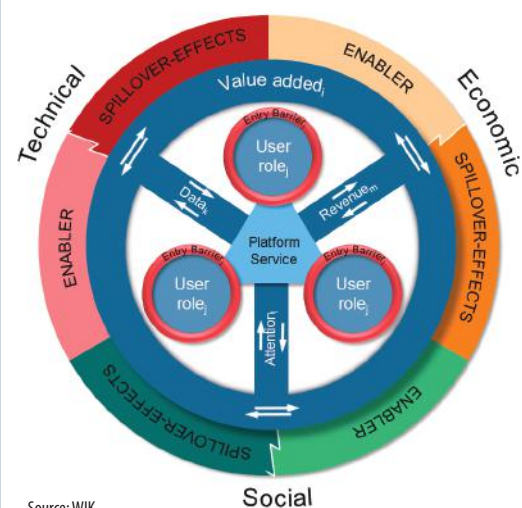
fairly simple, such as with a fee that is collected for each purchase made on the platform, mediating the interaction between the various user roles can be a major challenge. The quality and quantity of users in each user role has to be precisely tuned.

Finally, the DRAM conceptualises the enabler and spillover effects of online platforms. This exogenous perspective appears to be of particular relevance for policymakers as they seek to understand how they can create a positive environment for online platforms and their socioeconomic impact. Both enabler and spillover effects can be characterised as economic, technological or societal. In our study, we registered economic spillover effects for all five types of online platforms:

● Search engines − Average saving of €119,000 per capita annually for the average German firm[3]
● Online marketplaces − Trigger continuous growth for courier services (+4.5% annually)[4]
● Media and content platforms − The top 13 YouTubers grossed $54.4 million in 2015[5]
● Social networks − Facebook's economic impact in Germany is €2.63 billion[6]
● Sharing economy − Airbnb contributes €100 million to Berlin's economy.[7]

In sum, the DRAM provides an integrative taxonomy to capture and analyse the significance that business model choices have for both the potential success of online platforms as well as their socioeconomic impact. Thus, it also offers a novel perspective on regulatory and antitrust analysis that is dominated by the concept of market definition.

Market definition is a traditional concept that has difficulty coping with the complexity and peculiarities of online platforms such as network effects, data-specific economies of scale and scope, and feedback effects. In addition, there are network complementarities and complex interdependencies pointing to an important role of network evolution.[8] Finally, services are often offered at zero monetary cost, which renders key tools of market analysis such as the small but significant non-transitory increase in price (SSNIP) test impractical.[9]

The exchange of data, revenue and attention determines a platform-specific mix between quantity and quality when matching different user roles by differentiating service quality and prices.[10] Thus, these three main building blocks merit in-depth analysis. The following discusses data, revenue and attention flows in online platforms, and regulatory implications.

DATA COMPLEXITY

Since online platforms are data-driven business models, the role of big data raises the attention of antitrust and regulatory authorities.[11,12] The real-time flow of immense volumes of structured and unstructured data combined with technologies such as data fusion, machine learning and predictive analytics, form a complex business environment that is becoming more difficult to assess.

The data flow in the DRAM can be broken down into two powerful economic forces in platform business models: user and monetisation feedback loops, as illustrated in figure 3.

FIGURE 3
USER AND MONETISATION FEEDBACK LOOPS
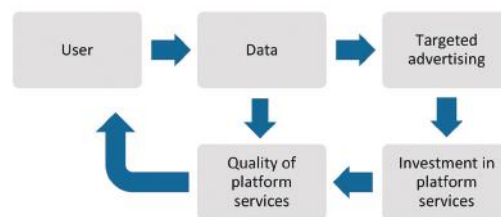
Source: WIK

According to the user feedback loop, a platform provider with a large user base is able to gather more and more data to improve its algorithms, which increases the quality of the platform service and therefore attracts new platform users (data flow). The monetisation feedback loop enables platform providers to analyse their data and to get the most out of them in terms of targeted advertising and content distribution (revenue flow). This generates further means for investment in the quality of the platform services, attracting even more data-generating platform users. Thus, both effects enable fast scaling and consequently gaining strong positions by platform providers. They are the mechanisms constituting the basis for potentially gaining market power in digital markets.[13] Indeed, an online platform can achieve a competitive advantage by offering superior quality. This may lead to monopoly-like situations.

However, a dominant position of an online platform is not problematic per se given the strong competition apparent among actors. Generally, a strong market position is more vulnerable and contestable than in other settings.[14] Notably, data shares some characteristics that make contesting dominant positions even more feasible. In general, data is arbitrarily usable and can be utilised for different applications at various times. Thus, in many cases data is non-rivalrous in usage. But there are situations in which excludability of other actors from specific data happens. Nonetheless, there are data brokers acting as a corrective from which excluded players can buy relevant data to realise a position in which they can replicate necessary data.

In this context the heterogeneity of data is playing an important role. Data on income cannot be replaced by location data and extracted data from search queries are only partially replaceable from data on buying behaviour. Thus, the complementary character of different types of data becomes apparent. This is also a main reason for many data-based merger and acquisition activities of online platform providers.

> **A strong market position is more contestable than in other settings.**

◀ FLOWS OF REVENUE

The organisation of revenue flows among user roles as well as between roles and the platform provider can have a significant impact on a platform's success. Our study identifies the following major types of organisation and corresponding impact.

Many platform businesses build at least partly on attracting eyeballs for advertising display. Since payment for online advertising is only triggered when a consumer clicks on the advertisement, platform owners need to consider how to ensure best possible targeting of their adverts. Notably, they can outsource this task to advertising networks.

Advertising also plays a role in 'freemium' models common among video and music streaming or VoIP services that offer a free version and their premium services only for a subscription fee. Other online platforms ask for subscription fees for one or more of their user roles right away.

Royalties or pay-per-use models are most common for supply-side user roles. This can be Uber trips, Amazon sellers or Airbnb hosts.

Most notably, in almost all online platforms that were analysed in our study, there is at least one other user role that does not pay a monetary price: users allegedly 'pay with their data'. While there is some truth in this assertion, the more common means of payment is attention or eyeballs.

PAYING ATTENTION

The relevance of attention in advertising funded online platforms is obvious. Arguably, a significant part of the success of collaborative platforms such as Airbnb and Uber is linked to their superiority in creating attention for apartments or rides offered. In the same vein, YouTube and others seek attention for their own or promoted content. The way that Facebook, LinkedIn and others create and shape attention from users for content created by others is critical for engagement and hence revenue.

In light of its relevance, it is surprising that the public debate and the economic literature on online platforms has largely neglected this attention flow. Based on our results, we would even argue that managing the flow of attention among user roles is indeed the most critical strategic asset for (many) online platforms. The significance of this aspect is further underpinned by the fact that attention is the true bottleneck all players are competing for. By definition, one cannot spend more than 24 hours a day on any online platform.

CONCLUSION

In sum, online platforms play an increasingly important role in our daily lives from finding and enjoying content on the internet, to enabling transparency of insurance offers, to engaging in social interactions. Their businesses are often complex and quickly attune to the high competitive pressure as well as sometimes rapid changes in consumer behaviour. Our analysis shows that traditional regulatory, legislative and antitrust approaches have some difficulty keeping up with these complexities. Specifically, the internet landscape is characterised by complementarities

> ❝
> **The ecosystem renders untenable any premature regulatory intervention.**
> ❞

and interdependencies that are different from telecoms, casting doubts on the traditional economic way of defining clear-cut markets.

Against this backdrop, we have suggested a new approach for consistently identifying and analysing online platforms: the DRAM. It offers a complementary tool that provides a consistent taxonomy of online platform building blocks as well as their interactions. The model will be further developed into a comprehensive analysis toolkit.

In future work, it will be important to understand the interdependencies of online platforms. The DRAM can already account for these as one or more user roles can be fulfilled by another online platform. It is exactly this idea of an ecosystem that renders any premature regulatory intervention untenable. Indeed, our analysis underscores that simplistic black and white approaches hardly capture the subtleties of data, revenue and attention flows within online platforms.

Furthermore, the DRAM offers a holistic and functional perspective on the complexity of developing a successful online platform business model. Insights generated in this way can aid both policymakers and regulators, as well as industry. Its main advantage is that it can highlight the subtle specificities of individual online platform business models and so enables a detailed, but nonetheless intuitive, comparison of online platforms.

Finally, the model enables us to formulate relevant framework conditions for online platforms captured by technological, economic and social enablers. Policymakers and regulators should focus on setting sustainable technological standards for data security, data protection and consumer protection, and making sure there are open application programming interfaces (APIs) to ensure a competitive internet landscape.

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TAKING THE WI-FI ROUTE

Most of the visions for 5G are not based on what we really need, says **WILLIAM WEBB.** Here he examines what problems we are trying to solve and why Wi-Fi is as important as cellular networks

There are flaws in the vision for 5G. I suggest that users do not value faster speed and that the need for capacity growth will in any case end shortly after 5G's widespread adoption. But there are a number of visions for 5G that are needed, such as enhanced coverage. Here I discuss these elements and how they might come about – and why Wi-Fi is a powerful and overlooked resource.

CONSISTENCY IS KEY
If internet servers were always responsive, and if mobile users always had a good signal level in uncongested cells, then speed would be more than adequate for all of the applications commonly in use today. The problem is that all of these conditions are rarely met. The situation is similar to the road networks – all would like quicker journeys but the limiting factor is not the top speed of cars but the capacity of the roads. That is why ad hoc surveys and anecdotal evidence suggests that for many, speed has reached the point where further gains are of limited value and what is becoming much more important is consistency.

Most people would rather have satisfactory data rates available everywhere than very fast rates in some places and a lack of any connectivity in others. It is the same for most vertical applications – for example, constant connectivity even at relatively low rates would be more helpful for autonomous vehicles than erratically available high data rates.

This raises the question as to why some mobile operators still advertise the high speeds their networks can achieve. This appears to be 'bragging rights' – using an attribute few care about directly to demonstrate the strength of the network. It is akin to carmakers promoting high-performance models that few will buy.

Concentrating on consistency now that there is a basic sufficiency of data rates is also more likely to improve productivity and social value – certainty of having a connection would enable new methods of business and better responsiveness.

Speeds above 10 Mbps (to the home) are currently almost entirely used for entertainment, which enhances pleasure but not productivity. With governments looking to improve productivity, global competitiveness and more, a focus on consistency rather than speed appears appropriate.

Everyone will experience different connectivity issues and they will vary hugely from country to country, and consistency is hard to deliver and hard to measure – there will always be a basement or remote area that does not have coverage. So, it is better to focus on locations where coverage or capacity is most problematic. These include:
● Rural areas
● Transport, mainly trains; less so, buses
● Buildings: homes, offices and public
● Very dense areas such as major train stations and stadiums.

◀ RURAL AREAS

Covering rural areas is predominantly a matter of economics. It could be achieved with widespread deployment of cellular masts but these masts would generate less revenue than they would cost to deploy and maintain. Hence, few if any mobile operators would voluntarily deploy them. Getting better coverage could be achieved by:

● Appropriate financial incentives such as payment from governments in return for achieving certain coverage objectives

● Technology that enables a greater range from a base station thus requiring fewer base stations and so making the coverage more economic.

The first tends to happen indirectly using coverage obligations in spectrum licences. However, a better approach might be to encourage mobile operators and others to bid to deliver the required coverage. The government would then select the best bid and pay the winner to deploy their solution. That could then be shared among all operators such that all subscribers gain coverage at the lowest cost to the government.

Subsidising rural coverage is far from a new idea. For example, in Australia the federal government has a mobile blackspot programme that is intended to improve mobile coverage and competition in regional and rural Australia through subsidising the cost of building new base stations in areas without coverage. The government committed AUS$100 million in round 1 to deliver nearly 500 new and upgraded mobile base stations across Australia.[1]

Standards bodies have not tended to focus on technology that extends range as this is generally at the expense of higher data rates. The classic solution, used extensively in many internet of things (IoT) systems, is to use data spreading (known as direct sequence spread spectrum, DSSS) to increase the range at the expense of the data rate. This is precisely the solution used by GPS satellites to enable a low-power transmission from orbit to be received by small devices. Adding a DSSS mode into the standards would give operators flexibility to trade off data rate against range when it was appropriate to do so, facilitating rural coverage. Unfortunately, such a mode does not currently appear to be on the agenda of the key standards bodies.

ON TRAINS

Mobile operators have been trying to provide good coverage in trains for many years with variable success. The best solution to most of the problems is a Wi-Fi repeater within the train – and this is becoming increasingly widely deployed. A repeater overcomes the isolation problem caused by metallised windows – indeed it benefits from this isolation as it reduces any external interference, which helps in areas with high demand. It also solves the handover problem as far as the devices inside the carriage are concerned as they stay registered onto the one internal Wi-Fi access point. It can also help somewhat with the problem of cuttings and tunnels by using an external antenna mounted on the roof of the train with much better performance than handsets in the train.

The repeater could also transmit cellular signals alongside Wi-Fi signals. However, this tends to be problematic because cellular transmissions have to be on licensed frequencies owned by operators. Gaining their approval and then selecting frequencies that do not cause interference to their external network is difficult, and the repeater becomes much more complex, having to cover multiple bands.

Finally, for most users, data connectivity is more important than voice because they can then browse, receive emails and make calls using voice-over-Wi-Fi solutions such as Skype and WhatsApp. The only problem is not being able to receive incoming calls via the cellular network.

However, the repeater transfers the coverage problem to the backhaul connection between the carriage and the network. With many tens of users in a carriage, all able to use laptops or tablets, total data rate requirements within a packed carriage could potentially exceed 100 Mbps at peak times. That is beyond the capacity of most existing backhaul systems. Instead, base stations mounted alongside the track are needed where they can provide good coverage along a length of line.

> **Mobile operators have been trying to provide coverage in trains with variable success.**

But these are predominantly logistical problems, requiring legislation and incentives on various players in the railway industry to resolve. They could materially improve train communications, delivering a big improvement on the situation today.

IN THE HOME

For most, data coverage in the home is provided via self-deployed Wi-Fi, which generally gives excellent data rates as long as the home broadband connection is acceptable, there is no significant Wi-Fi interference, and the signal level throughout the home is strong. Interference can often be addressed by changing channel and poor signal levels by using repeaters or better siting of the access point.

The remaining issues are then cellular coverage and possibly coverage for visitors. Cellular coverage can be important, particularly in receiving incoming calls. Outgoing calls can be made from the home cordless phone or using Wi-Fi calling apps. Various attempts have been made by mobile operators in the past to get in-home coverage using femtocells but mostly these have failed because:

● Home owners do not want an extra box in the home

● The solution is tied to one mobile operator (unless multiple boxes are installed) which makes switching harder and may not suit all members of the family

● Integrating the home femtocell into the operator's network can be complex and expensive.

As Wi-Fi continues to gain traction it seems unlikely that femtocells will see a resurgence; instead, ways around poor cellular coverage using Wi-Fi will be developed for the home. Wi-Fi coverage

WHY 5G IS A MYTH – FLAWS IN THE CURRENT VISION

● The 5G community cannot be accused of being short of visions – but they are utopian. Achieving them would require astonishing breakthroughs in radio technology and for subscribers to be prepared to significantly increase their spending. The visions of 10x to 100x faster speeds and 1,000x increases in capacity set out by the key players are unrealisable, and the technology to deliver a new generation has not materialised; 5G as currently proposed is a myth. While technology has improved dramatically over previous generations it has now reached a point where further improvements are hard won.

● Current mobile data speeds are more than adequate for all foreseeable uses. Even 4k video requires only about 20 Mbps.[2] This is an upper limit as most mobile screens are far too small to make watching video at this resolution worthwhile. Operators have found that 'throttling' video to 1 Mbps or even less has no noticeable impact on mobile handset users.

● Regarding latency (the speed needed for instant web browsing), beyond a certain speed other factors such as the maximum turnaround time at the server and the delays inherent in the internet become constraining.[3] This data rate is currently about 4-8 Mbps and so most users will not notice an improved browsing experience once data rates rise above this point.

● Demand for data has exploded, growing around 100-fold in the five years from 2007 to 2011, and has continued to grow rapidly since. But growth is predicted to fall to 37% a year by 2020 and, if the trend continues, to zero by around 2027. Once users are watching video in all their free moments while downloading updates and attachments there is little more that they could usefully download.

● Without growing average revenues from users (ARPUs), the only rationale for mobile operators to invest in new technology is to prevent subscriber churn to their competitors. This threat has resulted in them moving quickly to deploy 4G, which does have material benefits for subscribers. But without any clear benefits from 5G there is limited incentive to upgrade networks.

● Of course, there is the possibility of another 'iPhone moment' – the emergence of either a device or service, including the internet of things, that causes another step-change in demand – but see box on page 30.

● There is the argument that 'if we don't build it they won't come' but new applications often emerge on sub-optimal networks, demonstrate potential, and then network enhancement can be justified. The need to build before applications appear might apply in the case of the 'tactile internet'. But it seems likely that many applications such as virtual reality could be trialled indoors initially, with outdoor capability being provided if needed in due course. It will be challenging to engineer the low latency and reliability needed for applications such as these.

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for visitors can be achieved just by telling the visitor the password. This is workable but somewhat clunky and a more automated process could be envisaged. This might be part of a broader solution to automate the process of signing into Wi-Fi access points (see also page 31).

IN THE OFFICE

To a fair degree this is the same set of issues as in the home. Wi-Fi provides a good solution but cellular coverage can be poor. Femtocells and small cells have not proven widely popular and that seems unlikely to change. Using the same set of solutions as the home to provide Wi-Fi calling and a simplified way to gain passwords would resolve most issues.

IN PUBLIC BUILDINGS

Technically, public buildings are not different from office buildings (although some, such as museums, can be larger and so more challenging to cover). Hence, as with the home and the office, the same solutions apply of relying on Wi-Fi. Administratively, this requires the deployment of Wi-Fi and a mechanism to enable easy access. If governments did deploy a universal password solution for public buildings, this might be of value in delivering universal password solutions more widely – for example the same solution could be adopted for homes and offices. Alternatively, governments could make use of solutions being developed in the private sector.

The European Commission has recently proposed funding to assist in such deployments – see the latest on the WiFi4EU scheme for promoting internet connectivity in local communities.[4]

DENSE AREAS

Areas of very high user density such as major train stations and stadiums present particular problems. Cellular solutions struggle to cope with the need for extremely small cells in often a very open environment where there is little to prevent interference from one cell with another.

In stadiums there are specific Wi-Fi solutions where access points are deployed across the inside of the roof, providing downward pointing beams that might target only 20 seats or so. Similar solutions could be deployed for cellular, but again it is difficult to deploy one solution per operator and the building owner may prefer to deploy a self-owned/operated solution rather than negotiate with the mobile network operators.

Similar solutions could be envisaged in train stations. At present, most Wi-Fi in these venues is provided by shop owners or similar in an ad hoc manner and so tends to have poor coverage in some areas and to interfere in others. Centralising the planning and deployment of Wi-Fi would dramatically improve the situation. This would require agreement from shop owners, some of whom might deploy specific solutions as part of

> " **Femtocells have not proven widely popular and that seems unlikely to change.** "

their franchise (e.g. in Starbucks). As with railway coverage, it might take government intervention to bring about an improvement in major train stations. In areas such as malls, there may be sufficient commercial self-interest from the mall owner to make centralised deployment occur.

MOVING FORWARD

So across the various solutions there are a number of common threads, namely:
● Intervention from government in aspects such as train franchises, Wi-Fi in major stations and trackside coverage to force through change, and in awarding contracts for rural coverage
● Sharing of infrastructure among all mobile operators in rural areas and possibly other places
● The addition of a DSSS mode in cellular to enable greater range for rural coverage
● The ability for incoming cellphone calls to be re-routed across Wi-Fi such that if there is no cellular connectivity people are still in contact
● The ability for devices to be sent information on Wi-Fi network names and passwords rather than users having to manually enter details. This could be generic (along the lines of BT's OpenZone where any customer can use the Wi-Fi router of any other customer) or it could be based on various criteria (e.g. allowing friends on Facebook access to the password, linking hotel bookings made using a browser with a download of the Wi-Fi details, etc.)

> ## " It is worth recalling that we already live in a Wi-Fi-first world.
> "

WHAT ABOUT THE INTERNET OF THINGS?

Predictions for the number of connected 'things' range from 50 billion to a trillion. There seems little doubt that there is benefit in connecting many of the things around us, and that this will increasingly happen as the various pieces of the technological and logistical puzzle fall into place. The connectivity to enable IoT need not await 5G. Many operators have enthusiastically embraced the 4G technologies designed for IoT, including LTE-M and NB-IoT, which can be deployed as software updates to existing base stations.

IoT may also involve some element of self-provision or provision by alternative emerging operators. By analogy, mobile communications are delivered via a mix of operators using licensed spectrum and self-deployment of Wi-Fi access points by myriad entities in unlicensed spectrum. The combination of both is needed to meet the coverage and capacity challenges.

Already, a number of unlicensed IoT technologies are being deployed including those from Sigfox, LoRa and based on the Weightless standard. Operators such as Arqiva in the UK and Comcast in the US are using unlicensed solutions as a way to enter the market, and others such as Orange in France plan to deploy both licensed and unlicensed solutions in a complementary manner.

Some user communities, such as campus-based organisations and airports, are considering deployment across their area. But the path towards a widely deployed unlicensed solution is less clear. It is uncertain which technology or standard will be the winner, or indeed whether there will be multiple winners. It is also unclear whether the route to widespread deployment will be via a single operator or through community action with shared access. Governments could engage in smart procurement of a nationwide IoT service, spurring suppliers and operators into action. Regardless, IoT is emerging and will grow strongly over the next few years.

A WI-FI-FIRST WORLD

Previous calls for enhanced coverage have mostly focused on cellular, and previous efforts to provide widespread Wi-Fi municipal coverage have generally been seen as a failure. The steps I have set out would move Wi-Fi back centre stage in the world of communications. Is this plausible, and have lessons been learnt from previous attempts to deploy widespread Wi-Fi?

It is worth recalling that we already live in a Wi-Fi-first world. Well over 50% of the traffic from our mobile phones flows over Wi-Fi and typically 100% of the data from tablets and laptops. Wi-Fi carries at least an order of magnitude more data than cellular, perhaps even two orders of magnitude. We typically own only one cellular-connected device but often five or more Wi-Fi-connected devices. There are probably around 20 million Wi-Fi access points in a country like the UK, but only around 60,000 cellular base stations. A hotel or office without Wi-Fi would be seen as unacceptable; one without cellular coverage merely irritating.

There are good reasons why Wi-Fi is preferred in most cases. Cellular is expensive to provide and has inherently limited capacity. Wi-Fi is almost free to provide and we are still a long way from reaching the capacity of current systems. This is not because of technology or spectrum – both use near-identical technologies (OFDM) and have near-identical amounts of spectrum available to them (around 500 MHz in total). The difference comes from the deployment model. Deploying coverage 'inside out' is much more efficient than 'outside in'.

With most data usage taking place inside buildings and with the outer walls of the buildings forming a partial barrier to radio waves, then delivering the radio signal from inside the building ensures users have a strong signal and takes advantage of the isolation provided by the walls to reduce interference to other users. Conversely, cellular systems have to try to blast through the outside walls, delivering poor signals inside, which reduces overall cell capacity, and results in interference between outdoor cells.

In principle, cellular could deploy indoors too – and many attempts to do so using femtocells and similar have been tried. But the scale of the deployment challenge is beyond a single company and only achieved with Wi-Fi through the actions of millions of users deploying their own access points. Now that we have Wi-Fi widely deployed, the rationale for also deploying cellular indoors is reduced and a self-fulfilling movement towards Wi-Fi-only devices has happened.

This is not to attempt to replace cellular. Wi-Fi can never provide connectivity in rural areas, along most roads and for most people when moving. Cellular is an essential component of our complete communications infrastructure, just not the best way to deliver the final elements needed for ubiquity in most cases. There are a number of issues still to address, including:

Re-routing incoming cellular calls. For a device only connected to Wi-Fi (and not via cellular), making a voice call is simple. However, the routing of an incoming call made to a cellular number can be problematic. It generally requires the mobile operator to receive signalling from the phone with details of the current connection and then to take appropriate action. Other options are possible. A simple one is to use a numbering scheme not tied directly to cellular which aims to contact the handset via Wi-Fi – effectively a Skype or WhatsApp 'handle' acts in this manner. However, this may not be convenient for the user. Alternatively, the automatic 'divert on not-reachable' for an incoming cellular call could be to a Wi-Fi access enabler to assess whether a voice-over-Wi-Fi call is possible. Some regulatory intervention might be needed if mobile operators refuse to allow any access to their numbering systems or call routing functionality.

Automated passwords. It is normal for travellers to ask, "What's the Wi-Fi password?" at hotel check-in, even before they enquire about breakfast and other arrangements. Manually selecting networks and entering passwords is a workable solution but far from ideal. Logical partitioning of the access point can overcome this. Having a separate part which others can access and which has no direct connection to the owner's network and over which the owner's traffic has priority prevents concerns about hackers and makes free riders less of an issue. Modes of operation could be envisaged where an unknown device is allowed onto a network purely for the purposes of sending an automated registration request along with suitable credentials. A valid request would receive the password in response which would then allow full access to the network.

A more proactive stance would be for governments or regulators to mandate that all routers sold should make some small fraction of their capacity available for visitors for the first few days that the visitor seeks usage – this provides access that would be sufficient for most while preventing the problem of long-term 'borrowing' of resources.

In most countries there is no requirement for a company providing Wi-Fi connectivity as part of a larger business offering (such as a hotel) to record details of those using the Wi-Fi. Security agencies can ask that such recording be put in place if they suspect the Wi-Fi connection is being used for illegal purposes. Many organisations currently appear to either be misreading the law or applying excessive gating just in case.

Security. Wi-Fi can provide excellent security as long as appropriate modes of encryption are used. The biggest threat is rogue access points that seem to offer connectivity but yet will inspect traffic, looking to extract passwords and other valuable information. Many ways to resolve this could be envisaged such as:
● User applications encrypting data end-to-end to prevent a 'man-in-the-middle' being able to extract important information. This is already done routinely

● Use of a central validation server. For example, a Wi-Fi device could send the service set identifier (SSID) and password to this server along with other contextual information such as the SSIDs of other visible Wi-Fi nodes. This would allow the validation server to verify that the node is known and had been appropriately certified
● Use of a system managed by a single company – again the BT OpenZone system is a solution to this.

There does not appear to be any significant security-related reason for Wi-Fi not to adopt a more significant role.

Reliance on unlicensed spectrum. Wi-Fi uses unlicensed spectrum that could, in principal, become congested or suffer interference. In practice, we have seen that congestion builds slowly over years, allowing time for it to be addressed, and that regulators have provided additional frequency bands, such as 5 GHz, when needed. In the future, any emerging problems will likely happen slowly and be addressed through regulation.

This does imply that regulators should pay close attention to unlicensed spectrum. With a Wi-Fi-first policy, spectrum for Wi-Fi becomes more important than that for cellular, and commensurate resources should be devoted to it. This might involve more monitoring to understand congestion and a preference to provide unlicensed spectrum over licensed spectrum. Statements suggesting that the regulator would address issues that reduce the efficiency of Wi-Fi as a matter of great importance would also help reassure users and investors. More generally, a review of policy towards unlicensed spectrum and its role and value in the modern environment at both a national and international level would be appropriate.

Failure of municipal Wi-Fi. There have been various attempts to cover entire cities with Wi-Fi which have all failed, mostly because the scale of the challenge is large and the revenues small. My suggestion is different – not to expand Wi-Fi coverage into areas where there already is cellular coverage, but to selectively deploy Wi-Fi, predominantly indoors, to provide consistency, funded mostly by government in various ways. This might include direct funding for government buildings and indirect funding via licence obligations on franchises and similar.

ROLE FOR 5G

Much of 5G is focused on higher data rates and much increased capacity in dense areas. I have suggested that the delivery of ever higher speeds, above the 100 Mbps already theoretically possible with 4G, is unnecessary. Delivering increased capacity in dense urban areas would be of value, but the key solution proposed of using small cells and microwave frequencies appears uneconomic and unlikely to address the majority of data users, who are indoors.

Some elements of 5G are useful. The separation of control and data planes and the possibility of better linkage to Wi-Fi could help form a more seamless use of cellular and Wi-Fi networks. Similarly, the use of software defined networks (SDN) and network function

← virtualisation (NFV) could make integration with third-party systems simpler and faster (*see also Richard Feasey's article in Intermedia, January 2017*).

Another potential development that might impact on this area is licensed assisted access (LAA). This is an approach where mobile operators use unlicensed spectrum alongside their licensed allocation to improve throughput. Often the control link to the device is retained in the licensed spectrum, with data download occurring opportunistically in unlicensed spectrum. LAA is typically assumed to use the same 5 GHz band as Wi-Fi and is being developed as part of 4G, so might be deployed prior to the 5G era.

Simplistically, LAA might not change much. The handset will choose whether to download its required data from LAA or Wi-Fi. Both use the same frequency bands and both use similar technology. One would simply substitute for the other with little net effect. However, LAA does allow mobile operators to have more control over the operation of the handset, which might bring some benefits especially if some of the developments needed to integrate Wi-Fi and cellular more tightly fail to materialise. If delivered from a home hub, LAA might provide mobile operators with a rationale for a stronger in-home presence which could also have an impact on the industry dynamics.

REGULATORY AND GOVERNMENTAL ACTION

For such a world of consistent communications to happen requires government action of various sorts, as listed earlier. Governments and regulators need to change policies away from those focused on speed and towards those aimed at connectivity. This section considers those policies that are no longer needed and the new ones that should be started.

In considering policy and regulatory stance, some thought is needed as to potential industry structure under such a vision. At present, consumers typically have a contract for their home line with a company like BT in the UK, and a contract for their mobile with a company like Vodafone. Wi-Fi is self-provided or they use multiple different hotspots run by various companies like Starbucks. Regulation is typically focused on engineering as much competition as possible. In mobile communications this is through maintaining three or four operators. In fixed it can be through unbundled access or other forms of competition above the physical access layer. Success of regulation is measured through access speed and consumer cost with some interest also in universal service provision on fixed lines.

In future, consumers might also add some form of Wi-Fi access enabler to their list of contracts. This could be a company like BT providing hotspots in some cases, or like Google, providing passwords and certification of access points deployed by others. They may also have accounts with the government for access in public buildings. The majority of their data traffic might flow across this Wi-Fi network. Their phone may be provided by their Wi-Fi access enabler rather than their mobile operator, pre-programmed to work effectively using voice over Wi-Fi solutions. Incoming calls might be routed first

> ## "Governments and regulators should focus on connectivity rather than speed."

to the Wi-Fi access enabler and only onto the mobile network if access over Wi-Fi is not available. The contract with the mobile operator might even be handled by the Wi-Fi access enabler.

Shared network access is likely to grow. Mobile operators will deliver some of their services across Wi-Fi. Backhaul to Wi-Fi on trains might be delivered through a shared network owned by a third party but using spectrum from the operators. Similarly, a single rural network might be constructed that all operators use.

This is not a radically changed world, but it does have significant changes, not least in policy.

Policies no longer needed. Aiming for consistent connectivity would render some current regulatory and policy approaches unnecessary including:

● Fibre to the home initiatives and more generally a desire to be high in global speed league tables. A universal service obligation set at around 10 Mbps to the home is appropriate but most home broadband needs can be met via solutions such as FTTC and then VDSL or G.Fast over the last drop. Requiring more speed takes investment time and money away from areas such as universal Wi-Fi networks that incumbents are typically well placed to deliver

● 5G testbeds that focus on high data rates. Instead, testbeds that improve integration between cellular and Wi-Fi, that demonstrate improved rural connectivity or better backhaul to trains would be valuable

● Seeking competition among the mobile players – other providers may be more important and mobile operators may be encouraged into network sharing in some cases.

Policies to be started. The various policies that governments need to embark on include:

● Investment in Wi-Fi networks in public buildings including museums, schools, hospitals, universities and offices in city centres. This includes not only the deployment of the access points but also the introduction or adoption of a universal sign-in system. This should be a relatively inexpensive investment, with access points purchased in bulk and installed by the buildings team

● Investment in rural cellular coverage through awards of funds against specific coverage objectives

● Obligations on railway franchise holders and possibly also bus franchise holders to deploy Wi-Fi with accompanying obligations on track owners to work to enable effective backhaul provision

● Potentially, greater regulation for Wi-Fi in areas such as spectrum, security and competition regulation for any Wi-Fi providers that might have significant market power

● Potentially, regulation to assist in routing incoming calls to Wi-Fi-connected phones. This could be a modified form of number portability or similar.

Each of these are clear and can be embarked on immediately. They typically do not require new legislation and the funding requirements are relatively modest.

In the second part of this article I will look more closely at regulatory policies.

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The aurora borealis over Yellowknife in Canada's Northwest Territories

SHEDDING LIGHT ON UNIVERSAL BROADBAND

Canada has embarked on an ambitious universal broadband policy that could be a model for other countries, as **HEATHER HUDSON** details

The Canadian Radio-television and Telecommunications Commission (CRTC) recently issued a decision stating that broadband must be available to all Canadians. While regulators and policymakers in other countries have set similar goals for their residents, the CRTC's decision is path-breaking in that it declares broadband to be a universal service, sets ambitious speed targets, and establishes a fund to extend broadband in Canada's sparsely populated rural and remote regions.

The CRTC stated its universal service objective (USO) as: "Canadians, in urban areas as well as in rural and remote areas, have access to voice services and broadband internet access services, on both fixed and mobile wireless networks."[1] It also declared that basic telecoms services within the definition of the Telecommunications Act include fixed and mobile wireless broadband services as well as fixed and mobile wireless voice services.

The CRTC has set ambitious targets of 50 Mbps download and 10 Mbps upload actual speeds, considerably higher than some intervenors had proposed. It justifies these targets as necessary to keep pace with global trends, noting that: "Many of Canada's trading partners … are implementing digital strategies to achieve download speeds of 50 Mbps or more within the next few years…"

It determined that in addition to speed, quality of service levels for latency, jitter, and packet loss need to be established to define high-quality fixed

broadband services as specified in the USO, and directed that the CRTC interconnection steering committee (CISC) reviews and makes recommendations on appropriate metrics within six months.

The proceeding was also noteworthy for its duration (more than 20 months from the original announcement until the decision, with multiple rounds of written submissions and three weeks of in-person hearings) and for the participation of several consumer representatives and indigenous organisations. The indigenous groups included providers of internet services in Nunavut and in the northern regions of seven provinces, where most isolated communities have no road access.

The decision was also ambitious because its objectives are to apply to all Canadians including those living in the isolated communities of the remote north. As the CRTC pointed out: "A country the size of Canada, with its varying geography and climate, faces unique challenges in providing similar broadband internet access services for all Canadians."

The indigenous representatives emphasised that broadband is important to their communities for education, healthcare, accessing government services, and operating businesses and non-profit organisations, as well as to individuals for staying in touch with distant family and friends, e-commerce, and entertainment. Some northern and indigenous organisations proposed a new fund for northern ➡

infrastructure and services. They pointed out that market forces had not resulted in extending broadband facilities in much of the north.

The CRTC appeared to agree, noting that it had previously relied on market forces and targeted government funding for the continued deployment of broadband internet services, but would now establish a fund to extend and upgrade broadband for rural and remote regions. Significantly, the fund is to be open to applications from all qualified communications providers, such as indigenous, municipal and regional commercial and non-profit entities, rather than being limited to incumbents. A total of CAN$750 million will be allocated over five years. A follow-up hearing will determine the fund governance structure and eligibility criteria.

STEPS TO UNIVERSAL BROADBAND

The CRTC's new fund is intended to complement other government funding programmes designed to extend broadband access. For example, the federal government has announced CAN$500 million for broadband infrastructure in its Connecting Canadians initiative. However, neither the CRTC fund nor the federal government's Connecting Canadians programme provides any ongoing subsidies for operating expenses.

More than 70 communities in the northern territories and northern regions of the provinces access the internet via satellite, using a 'community aggregator' model, i.e. a single satellite station for the community, with local distribution via telephone line, coaxial cable, or fixed wireless networks. This satellite service provides speeds which are typically much lower than those available on terrestrial networks, and its prices are considerably higher. Up to 10% of the broadband funds available over the first five years is to be allocated to satellite-dependent communities to support operational costs and some related capital costs. Intervenors in the hearing included proponents of new high throughput satellite (HTS) systems that they believe will provide a viable solution for remote regions, while others championed future low earth orbit (LEO) systems.

The CRTC stated that it expects fixed broadband internet access services based on the new criteria to be available in 90% of Canadian premises by the end of 2021, and in the remaining 10% "within 10 to 15 years". No penalties were proposed for providers that do not reach these targets. Also, the 10% are likely to be in rural and remote regions, including the north, but only vague guidelines were proposed: "In communities where distance, geography, and limitations to existing technologies present challenges, the Commission expects that intermediate steps will be taken to progress towards these goals." No criteria for intermediate steps were given, nor was there any sanction proposed if providers do not meet 'expectations'.

The decision was also notable in that it did not address non-infrastructure barriers to access, particularly affordability, but also digital literacy.

Many consumer representatives, indigenous organisations, and individual citizens emphasised

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1 Unless otherwise stated, all quotations in this article are from Telecom Regulatory Policy CRTC 2016-496. 21 December 2016. bit.ly/2n08xT2
2 Telecom consultation CRTC 2015-134. Transcript, 18 April 2016.

that internet services, and broadband where available, are not affordable for many Canadians. Of particular concern to northerners are data caps on fixed networks which result in expensive overage (excess) charges, especially as households are large, with many family members sharing a single connection. Often, subscribers are unaware of these overage charges until they receive their bill, resulting in what the CRTC calls 'bill shock'. It noted that in 2015, the average monthly amount of data downloaded and uploaded by Canadian residential subscribers was 93 GB and 10.9 GB respectively. Yet data caps in northern regions may be as low as 20 or 30 GB, with overage fees of up to CAN$15 per GB.

The CRTC chose not to address affordability directly, rejecting a proposal by a consortium of consumer groups to introduce a low income user subsidy similar to the Lifeline programme in the US (originally a subsidy for low income voice subscribers, now extended to broadband). It did, however, take steps to address bill shock by setting a six month deadline for internet service providers to include plain language in their bills for customers with overage charges about data used for common online activities, alternative data plans, and account management tools. Also, the CRTC established as part of the USO that Canadians must have the option of subscribing to a fixed broadband service with an unlimited data allowance – although no pricing guidelines or ceilings were specified.

> **Canadians must have the option of a broadband service with an unlimited data allowance.**

The CRTC acknowledged that "a gap in digital literacy skills is a factor that can contribute to limiting consumers' ability to participate in the digital economy and society...". However, it declined to provide any funds for digital literacy training, as had been proposed by some intervenors, stating that digital literacy was not within its mandate.

The chairman, Jean-Pierre Blais, enlivened the hearings when he reflected on preparing his garden for spring over the weekend after the harsh Ottawa winter, and mused: "One wonders if we are ready to develop over the next two weeks and the subsequent stages in this proceeding our Canadian broadband garden." He then challenged those who had not yet testified (and later invited all participants to contribute in final written comments) "to create together a coherent national broadband strategy".[2] The final decision alluded to the need for a national broadband strategy, but conceded: "While the Commission may take some leadership on defining the strategy, it would not be alone in implementing and financing it."

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INCLUDE FIBRE IN HOUSING POLICY

With so much equity tied up in the world's housing stock it makes sense to direct a proportion towards stalled fibre broadband rollouts, argues **RICHARD FEASEY**

Movements in the value of almost any nation's housing stock massively exceed the costs of deploying fibre to every one of those households.[1] Global housing equity is about 2.7 times that of global gross domestic product (GDP). In Europe, where house prices are growing at about 4% annually, the total cost of deploying fibre to every home would absorb less than a quarter of the annual increase in the value of the region's housing stock. Yet housing policy and broadband policy remain totally disconnected. In this article, I explain why policymakers around the world need to think about how to use house price inflation to finance fibre roll out.

Three pieces of evidence inspire this thought:
● An excellent academic paper, published by Gabriel Ahlfeldt and colleagues,[2] explains that house prices in the UK rose by as much as 3% when broadband speeds improved
● Sweden is a leading nation in fibre to the home network deployment, with almost 60% of households passed by fibre and fibre accounting for almost 50% of all broadband subscriptions.[3] One distinctive feature of the Swedish model is that householders first have to pay a connection charge which averages SEK19,000 ($2,000) if they want to obtain access to the fibre network
● Companies building new fibre to home networks often use 'demand led' strategies. In the UK, firms like Gigaclear (disclosure – to which I am an adviser) and Virgin Media will not start construction until a certain proportion of householders in the local area

(30% in Gigaclear's case) have committed to subscribe to the service.[4]

These examples suggest that it ought to be possible to persuade householders to contribute to the cost of deploying fibre networks today in the expectation that they will more than recoup these costs when they later sell the property.[5] The first challenge is to connect the future buyers of properties (who are willing to pay for fibre through inflated house prices) to decisions to deploy fibre networks which need to be made today. The second challenge is to avoid the risk that some householders might 'free ride' by seeing the value of their houses rise without themselves contributing to the costs of the network which produces those gains.

INTERGENERATIONAL ASPECTS
There is an important intergenerational aspect which may contribute to the challenge. Homeowners in many countries are, of course, invariably older than the average: in the UK 10% of under 24s owned a home in 2012 (down from 30% in 1991) whereas over 70% of the over 70s do (up from under 50% in 1991).[6] In contrast, those who are likely to attach greatest value to fibre broadband are generally younger than the average, with 80% of under 24s having fixed broadband but only 54% of over 65s.[7] If we assume that those who value fibre broadband most today will (eventually, somehow) become the homeowners of tomorrow, then we can use current expectations about future house

prices to connect today's older homeowners (who may themselves see little value in fibre broadband but are in a position to pay for it from future capital gains) with tomorrow's broadband users (who may see great value in fibre broadband, but are in no position to pay for it today).

Rented property, which may combine older landlords with younger tenants, may have similar connections, with the older landlord capturing the value of broadband both in higher rents today and in higher sales prices in the future.

Any arrangement which tries to harness house price inflation in this way must ensure that the householder is not forced to pay away all the anticipated capital gain. Householders who pay for fibre today are taking a risk on what future house buyers will be prepared to pay for fibre (although many are accustomed to speculative investment in property). If the commitment by the current householder is too low then operators are unlikely to be able to fund the network at all. This suggests that there ought to be a 'sweet spot' at which the level of financial commitment is low enough to ensure householders take the risk, but high enough to ensure that the operator captures enough of the anticipated surplus to get the network built.

WHO PAYS – AND MINIMISING 'FREE RIDING'

The other key challenge is about who pays. The Gigaclear model could suffer from 'free riding', since as many as 70% of householders in a given area could benefit from higher house prices provided at least 30% of their neighbours do commit to buy fibre now. The model relies on collective action and on those households that see enough value from fibre to want it irrespective of the impact on house prices (a group which Gigaclear is very adept at identifying) persuading others that they will also benefit, whether from having a fibre connection today or from the impact fibre will have on the value of their property.

The challenge arises if there are not enough of these kinds of people and some householders will need to subscribe before they might otherwise wish to in order to get the network built at all. These householders may then discover benefits from having fibre which they had not previously appreciated, but they may also feel that they have had to pay for something which they would have preferred to defer and from which other neighbours might still benefit without having made any such commitment. This is not likely to encourage good community relations.

There are various policies which might address this problem. One is provided by the Swedish case, in which each household has to commit individually to access the fibre network. There is presumably some benefit for all households when the basic network is built in the neighbourhood, but without a connection to that network the effect on the value of the individual property is likely to be modest and full value only obtained once the property is connected. This model minimises free riding, avoids coordination issues, and requires each household to make its own valuation of costs and

benefits. (The models could also be combined, so that the network only gets built if (a) a certain proportion of households commit to purchase a connection at a later date, e.g. within the next 5 years, or (b) a certain proportion of households acquire an option at a lower price than currently to buy a connection, for which they would then pay a further fee at some later date.) The 57% coverage in Sweden suggests that the fibre network can be built quite extensively using that model, while the very high connection rate suggests that the connection charge is not a barrier to adoption.

> ❝ **The 57% coverage in Sweden suggests the network can be built extensively using this model.** ❞

The other approach involves requiring all households to commit collectively to access the network, irrespective of any individual householder's own valuation. This would be akin to Gigaclear saying that it would build only if 100% of households in the area committed in advance to subscribe to the service. It is, of course, how the telephone network was first built in most countries. It entirely removes the free riding problem, but it is very difficult to obtain 100% commitment to anything on a voluntary basis. This model, therefore, is only likely to work if public authorities oblige all householders to contribute.

This is of course what existing government broadband programmes do, by requiring all taxpayers to fund broadband deployments, irrespective of whether a ratepayer then chooses to subscribe to the service or indeed, whether they live in an area (or even own a property) which stands to benefit from the deployment.

GOVERNMENT INTERVENTION

It is possible that new models to finance fibre to the home could emerge commercially and without government support, as the Gigaclear model did. Operators could, for example, simply decide to offer debt to householders who wanted to purchase a connection (although there would need to be an appropriate regulatory regime to allow them to do so cost effectively). But governments could also encourage these models in various ways – previous government and industry campaigns to promote home insulation and energy efficiency in many countries come to mind.

Governments could themselves provide low cost finance or tax incentives to support capital improvements by householders, or could ensure that existing lenders were doing so. Tax incentives seem a particularly interesting option to consider further, especially if they would reduce the subsidies which governments might otherwise have to provide to achieve their fibre goals.

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ISSN 0309 11 8X

Annual subscription £175

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