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Network regulation and market development in European telecommunications

Policy paper

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This policy paper has been prepared within the framework of a CERRE Executive Seminar which has received the financial support of a number of stakeholders in the electronic communications industry, including CERRE members. As provided for in the association's by-laws, it has been prepared in complete academic independence. Its contents and the opinions expressed in the document reflect only the authors' views and in no way bind either the CERRE Executive Seminar sponsors or any member of CERRE.

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1. Introduction

On 30 January 2013, CERRE organised in Brussels an executive seminar on the future of European telecommunications regulation[1]. Involving political, regulatory and corporate stakeholders as well as academics, the event combined technical discussions with policy/strategy-related interactions on the challenges which lie ahead in the short and medium terms.

The goal of this policy report is to provide a guide to the issues and offer conclusions on a number of major issues. The topics under discussion include

- network regulation issues;
- innovation and market development.

An important background factor to this report is the difficult commercial position of the European telecommunications sector, with net revenues of many fixed and mobile operators in decline and poor or declining returns on capital employed, while the industry as a whole, including content providers and over the top players (OTTs) appears to be healthy.

[1] See cerre.eu/next-regulatory-frontier-european-telecommunications-1

2. Network regulation issues

Copper unbundling

When the European regulatory framework was established in 2002, the fixed world was almost wholly a copper one, and the application of the Access Directive chiefly involved seeking a remedy for SMP in the relevant wholesale broadband markets via the imposition of requirements for the supply at cost-oriented prices of access products (different varieties of bit stream and unbundled local loops – ULL).

Application of these rules led to significant growth in the share of access-based competitors in broadband markets. In keeping with the notion of the 'ladder of investment', many NRAs expressly encouraged competitors to take their own investments closer to the customer by switching to reliance on ULL. Thus, if in 2002 access seekers bought resale products and ULL in the ratio of 3 to 1 in the EU15, by 2010 the ratio was reversed to 1 to 3.

The passage of time has allowed more systematic evaluation of these copper unbundling measures. Although the studies cover different countries (mostly EU or OECD countries) and different time periods and adopt different methodologies, a rough summary of the results is as follows[2]:

- more severe unbundling encourages entrants' investment but discourages that of incumbents[3];
- the impact on broadband take-up of resale competition is zero or negative; the impact of bitstream is found to be weakly positive or negative; the impact of ULL

[2] It has to be acknowledged that most findings have to be treated with caution due to the nature of the available data sets.
[3] According to one well known study, the net effect is negative: see Grajek and Röller (2012).

tends to be positive but not large; whereas full end-to-end rivalry - the 'gold standard' of competition - enhances take-up.[4]

In relation to the last point, it is noteworthy that in uncabled areas the relevant alternative to unbundling might be no fixed competition at all, rather than full infrastructure competition.

Fibre networks

The European Commission believes that the availability of next generation fibre networks can add materially to European GDP, enhance investment and expand employment opportunities within the EU. Consequently, it established a set of demanding objectives as part of the Digital Agenda back in 2010, including the goal that 50% of European households subscribing to broadband should have 100 Megabits per second access by 2020. According to the European Commission, it will take infrastructure investment of up to €270 billion to meet these objectives. Regulation will play a crucial role in determining the viability of large-scale fibre investments. The return to these large investments also depends on policy measures which enhance the demand for services.

The fairly widespread unbundling of copper networks in the EU forms the background for the current debate concerning regulation of fibre. Fibre presents fundamentally different problems from a regulatory standpoint, since, unlike copper, the investment is generally not yet sunk. Regulators therefore have to keep a close eye on incentives to build fibre networks, and a trade-off may be present between investment and competition-related objectives.

Within regions of the EU, the incentive to invest varies with the availability of a high speed cable alternative, typically based on the DOCSIS 3 standard. In the UK, for

[4] See Cambini and Jiang (2009), Bouckaert, van Dijk, and Verboven (2010), and Nardotto, Valletti and Verboven (2012).

example, the incumbent BT showed little enthusiasm for investing in fibre until the cable company Virgin Media upgraded its network. There are other significant distinctions among Member States. In accession countries in Eastern Europe, often with limited planning constraints, fibre is regularly made available by entrants. Elsewhere the firm investing in fibre is the incumbent. But this picture is complicated where public funding is involved.

The price of copper

One of the key issues affecting fibre investment is the price of copper. This has been the subject of heated debate. On the one hand, a low price of a copper ULL tends to depress the retail price of broadband, thus reducing the return to fibre investment. On the other hand, a high price of copper increases the opportunity cost to the incumbent of a customer switching to fibre and, absent strong competition from other networks, reduces the return to the investment.[5] How can the price be both high and low at the same time? One option, proposed in the UK in 2009, is to impose a tax which creates a wedge between the price received by the access provider and that paid by the access seeker. Another option raised in the debate was to make the price conditional upon fibre investment. However, neither of these approaches - each of which give the regulator an additional instrument to attain a fairly complicated set of objectives - has been tried, and the European Commission's current policy is to keep copper prices at their present level. It is a key issue whether this is the right policy, particularly in the light of the goal to foster fibre investment. In circumstances where we have to guess the economic parameters which determine the effects of this decision, we do not consider this approach to be obviously erroneous.

[5] For a detailed discussion of the effects of regulation of the ULL price to copper on investment in NGA, see Inderst and Peitz (2012a,b)

The access regime

The access regime for fibre has always been problematic, from the time of the 2010 Recommendation on NGAs, several drafts of which, with different access proposals, were circulated by the European Commission before the final one was adopted.[6] Even the latter did not clarify the situation, and it is currently being superseded by the Draft Recommendation on non-discrimination and costing methodologies discussed below.

The fibre provider has more incentive to invest if the access regime is relaxed to allow it to capture more of the rents associated with the investment. The latter can be achieved by granting a regulatory holiday or by offering more freedom to the access provider in setting prices.

The Commission's December 2012 Draft Recommendation[7], sent for consultation to BEREC, appears to offer greater pricing freedom of this kind, but makes it conditional upon the provider re-engineering its business process to ensure full (input) equivalence in provision of the service. That is, it must treat both competitors and its affiliated retailer in exactly the same way. If this condition relating to non-price discrimination is satisfied, the pricing rule may switch from cost orientation to a more flexible regime, based on the avoidance by the incumbent of margin squeezes, and hence having some affinity with retail minus prices.

Investments in fibre are made under a degree of uncertainty that is significant, yet decreasing over time. This implies that an investment which, in expected terms, just recovers costs leads to large profits under some realizations of the uncertainty. The investor must be assured that even in those circumstances the revenues from the investment are protected and cannot be shifted to other market participants as a result

[6] See Cave and Shortall (2011).

[7] *Draft Commission Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment*, December 2012

of regulatory intervention. Since long-term regulatory restrictions appear to be more difficult to implement the further they lie in the future, the best safeguard against *ex post* expropriation of rents appears to be an abatement of earlier access conditions or a limited access holiday.

While an access holiday removes the obligation to provide access at terms imposed by the regulator, this does not prevent the investing operator from granting access at commercial terms at its discretion. The economic arguments for privately granting such access appear to be strong; a regulatory threat to intervene if privately negotiated access terms do not result may not be needed, but it may not hurt much, depending on the track record of the regulator. In case of public subsidies, the need for, and the case for, less rigorous access obligations is weaker.

In areas in which network duplication appears to be neither privately nor socially optimal, risk-sharing agreements between market players appear to increase the scope of fibre investment. Here, a regulatory framework which properly deals with risk-sharing and co-investment appears to be needed. In particular, co-investments can facilitate investments as they allow sharing risk among several risk-averse investing operators.[8]

The introduction of fibre investments also raises issues concerning the so-called 'ladder of investment,' the applicability of which depends in part upon the fibre technology chosen. The present scope of access obligations may need to be revised in order to allow for the deployment of innovative access technologies, such as vectoring, which promise to require less investment as compared to FTTH/B. Here, NRAs have to deal with the trade-off that such a revision may lead to a more efficient and wide-spread innovation, at least in the medium term, but that it excludes competitors from unbundled access. The argument for allowing such innovation is strongest where investment in FTTH/B is socially desirable but appears to be too expensive to be

[8] For the implications of various regulatory policies, see Inderst and Peitz (2013).

profitable. The difficulty then lies in identifying these areas on a prospective basis.

Technological neutrality

Throughout this process, it is increasingly important that the principle of technological neutrality be respected. The communications marketplace is increasingly developing towards a system of multiple regulated and unregulated players. Technological advances, in particular the migration towards an 'all IP' world, have generated new forms of competition. The boundaries of the relevant markets consequently require frequent revisiting. It is important that cable networks are kept within scope of the regulator. They pass more than one third of EU homes and are responsible for the vast majority of high speed broadband connections. They may thus enjoy significant market power themselves at the network level and elsewhere, or may act as a powerful constraint on a telecommunications company.

This raises a further complication arising from the different landscapes encountered in regional markets. Heterogeneity of competitive conditions across regions makes it desirable to consider local or regional market definitions, or at least differentiation of remedies. While this heterogeneity across regions suggests local or regional market definitions, fixed-to-mobile convergence leads to interactions across markets.

Fixed-mobile convergence and spectrum release

The relentless rise in mobile data traffic is a reflection of a trend towards convergence between fixed and mobile, as it indicates a stronger substitutability between services available online and services available on a fixed line network. Ensuring an adequate supply of spectrum at low prices for mobile data is a very high priority, both for the achievement of goal of universal broadband service and for sharpening competitive pressure on fixed broadband providers. The Radio Spectrum Policy Group's hunt for

additional spectrum seems to be bearing fruit, with the 700 MHz band (the 'second digital dividend') the next matter to be resolved.

With the increased offerings available through mobile networks, boundaries between fixed and mobile networks are becoming increasingly blurred. For instance, consumers may access the internet with their smartphone e.g. over via a 3G network or their tv or computer via a fixed line (cable, copper, or fibre), depending on their contract and the quality of the service on offer. Quadruple play offers are bundles which link otherwise separate markets. The capacity of devices to move across access networks makes it even more problematic to define markets based on the technology.

Public funding

Public funding offers a means of addressing the trade-off between investment and competition, in the sense that a fibre network enjoying public subsidy can be profitable under more stringent access conditions than one without a subsidy. There are many examples of public subsidy for broadband, either from European funds or more significantly from within Member States. The Commission has clarified its policy on State Aid for broadband, most recently in December 2012. Public Private Partnership (PPP) arrangements also offer an alternative set of contractual arrangements governing both the roll-out of fibre networks and how prices are set over a significant period ahead. However, it is difficult to achieve efficiency in such arrangements. Without carefully designed tendering processes, costs may be high. And the choice of where public resources should most fruitfully be put to use is challenging, when economic objectives are vying with social ones; in practice, coverage requirements may be imposed in a fairly arbitrary manner.

It seems likely that budgetary stringency within the Commission will limit the ability of the proposed Connection Europe Facility to offer support to investment on a significant scale.

Net neutrality

Net neutrality (NN) 'hit' Europe some years after gaining currency in the United States, where the term was first used in 2003. The debate goes wider than many others, as it embraces issues of freedom of speech, pluralism and political rights, as well as control of market power, consumer protection and incentives to innovate and invest - the mainstay of economic regulation. Our discussion is confined to the latter group of matters.

The USA authorities issued in 2010 a decision (currently under appeal) imposing NN rules on fixed and mobile operators, with some derogations for the latter. In Europe, on the other hand, despite some 'consumer protection' measures in the revised Directives adopted in 2009, no radical or overarching NN measure has been taken.[9]

This difference has been attributed to a variety of factors, including the presence in EU broadband markets of a considerable number of (often access-based) competitors.

It is widely recognised that some level of traffic management by internet service providers (ISPs) is beneficial or even indispensable. However, traffic management policies may be used to discriminate in favour of content owned by an ISP affiliate. Also, they may not be transparent to customers. Discrimination is covered by competition law (although one may wonder whether, in practice, this is appropriately dealt with) and transparency is required by the revised Directives. As long as the net neutrality debate is concentrated on ensuring transparency and non-discrimination to avoid anti-competitive vertical foreclosure, these are concerns which also appear in other industries.

More controversially, the Directives now contain a provision for an NRA to impose minimum quality of service obligations on ISPs. Some consider this to be an intrusive

[9] Although the Netherlands and Slovenia have introduced NN measures in the law. In other member states the call for net neutrality measures is part of the political debate.

remedy which restricts choice and would only be justified in reaction to market failures which result in active degradation of (best effort) transport capacities. Nor would it necessarily require equal transportation of all IP packets: the Directives allow for service limitations as long as they are transparently communicated.[10] The foregoing concerns are familiar from other telecoms regulatory contexts.

'New' NN issues arise from the analysis of two-sided markets – markets in which a firm stands between and may transact with two separate classes of agents. In this case, ISPs stand between content and application providers (CAPs) and households. This gives the ISP in principle the opportunity to extract revenues from both sides; currently such two-sided pricing exists already for content delivery via content delivery networks, which, however, bypass the internet. One way of formulating NN is to say that it prohibits any payment levied by the consumers' ISP on a CAP. This can be called the 'one-sided market' approach, since revenue can only be extracted by the ISP from households. The alternative, more parsimonious definition is to say that NN allows two-sided pricing but prohibits the 'tiering' of payments made by CAPs – arrangements in accordance with which CAPs can pay ISPs extra to gain priority for their traffic.

What does economic analysis tell us about NN as a policy? Since it closes off options for firms and households, it is not surprising that in a static context (ignoring effects on investment and innovation), NN is generally found to have adverse effects on welfare.[11] Compared to other two-sided markets a further complications arises however, since due to the time-sensitivity of some services, direct negative externalities for traffic are likely to arise. Thus, in addition to managing indirect externalities between content providers and users, efficient prices need to account for congestion externalities. The key question

[10] See Kroes, MEMO-12-389, Brussels, 29 May 2012.

[11] For an overview of the academic literature showing these results, see the survey by Krämer, Wiewiorra, and Weinhardt (2012). While arguments in favor of flexible pricing and thus departing from NN are often straightforward, some economists have come up with sophisticated arguments in support of some NN rules (see Choi and Kim, 2010, and Economides and Hermalin, 2012). In light of the complex interaction, it is of little surprise that it depends on the particular setup which conclusions emerge.

then is whether crude regulatory interventions following from NN rules will assure a more efficient price structure than emerges from unrestricted market prices (for tiered services). An important issue is the interdependence of the price structure and the possibility that users benefit from lower prices in the absence of NN rules. Lower retail prices may arise as ISPs may compete more fiercely for users. This is driven by the fact that users become more valuable because of the revenue they generate on the other side of the market. Overall, while inefficiencies in the market may arise in the absence of significant market power of ISPs (which rules out ex post interventions based on competition law and thus requires specific regulatory intervention), it appears to be quite possible that imposing NN rules makes things worse. Such rules severely limit the business models which can be chosen by ISPs. This tends not to be in the public interest, as the private incentives of ISPs regarding the price structure in many environments produce results which are broadly in line with the welfare-maximizing price structure.

This may go some way to explaining why the European regulatory institutions seem to have chosen a wait-and-see policy of analysis and consultation on NN. Vice President Kroes observed in 2010 that:

> *"I will not be someone who comes up with a solution first and then looks for a problem to attach to it. I am not a police officer in search of a busy corner."*[12]

Notwithstanding this wise observation, such persistent official study and analysis may have a destabilising influence on network investment. Moreover, if, as seems likely, a genuine two-sided market with tiering is welfare enhancing, the European Commission and NRAs may want to develop strategies to encourage the offering of tiered services. This may prove fundamental for the deployment and adoption of cloud computing and new services, as will be spelled out below.

[12] Neelie Kroes, *Net Neutrality in Europe*, speech in Paris, 13 April 2010.

Such an endeavour would raise the important issue of how regulation (or deregulation) should address the question of promoting an equitable and efficient relationship between networks and over the top (OTT) players, or more generally between firms engaged in presently regulated and non-regulated activities. Regulators must be careful not to constrain regulated firms in their ability to compete in non-regulated market segments, unless a deliberate decision is made to enforce vertical separation of activities by network operators from those of over the top players.

Regulatory stability

Finally, attaining these goals requires a degree of regulatory stability. Stable regulation is a precondition for capital-intensive investments in network industries. Within the EU, that goal is increasingly recognised, notably in the above-noted 2012 draft Recommendation on NGAs, which seeks to provide stability in real terms until 2020.

This is a laudable objective, but it is threatened by four factors: the past record of volatile regulation of fibre; the need under the Directives to re-regulate following market reviews on a three year schedule; the limited ability of any Commission to fetter its successor's discretion; and the above-noted fact that the high-speed broadband is from the standpoint of the Commission both a major policy objective (the Digital Agenda) and an object of regulation. Given the limited number of policy instruments (beyond regulation) which the Commission has at its disposal, the temptation to change regulation will be considerable if the policy goal proves elusive. A public commitment of the type proposed in the draft Recommendation can tip the scales in favour of stability, but some tensions may survive.

Regulatory stability is most effective if it is based on general principles rather than rules that depend on the particular circumstances. While in general firms in similar circumstances should be regulated symmetrically, complications arise due to differences in technologies and in market positions. Thus the request for symmetric regulation

suffers from its limited applicability, as different technologies do not allow for the same access regime. In addition, in the case of asymmetric market shares it is an open question how these shares should be taken into account by regulation. Based on the concept of significant market power, only 'large' firms would be regulated within the relevant geographical market (which, as noted above, should in some cases be a sub-national one). However, in the presence of indirect externalities, it may be in the interest of society to accept the prevalence of SMP and devise efficient means of regulating it.

3. Innovation and market development

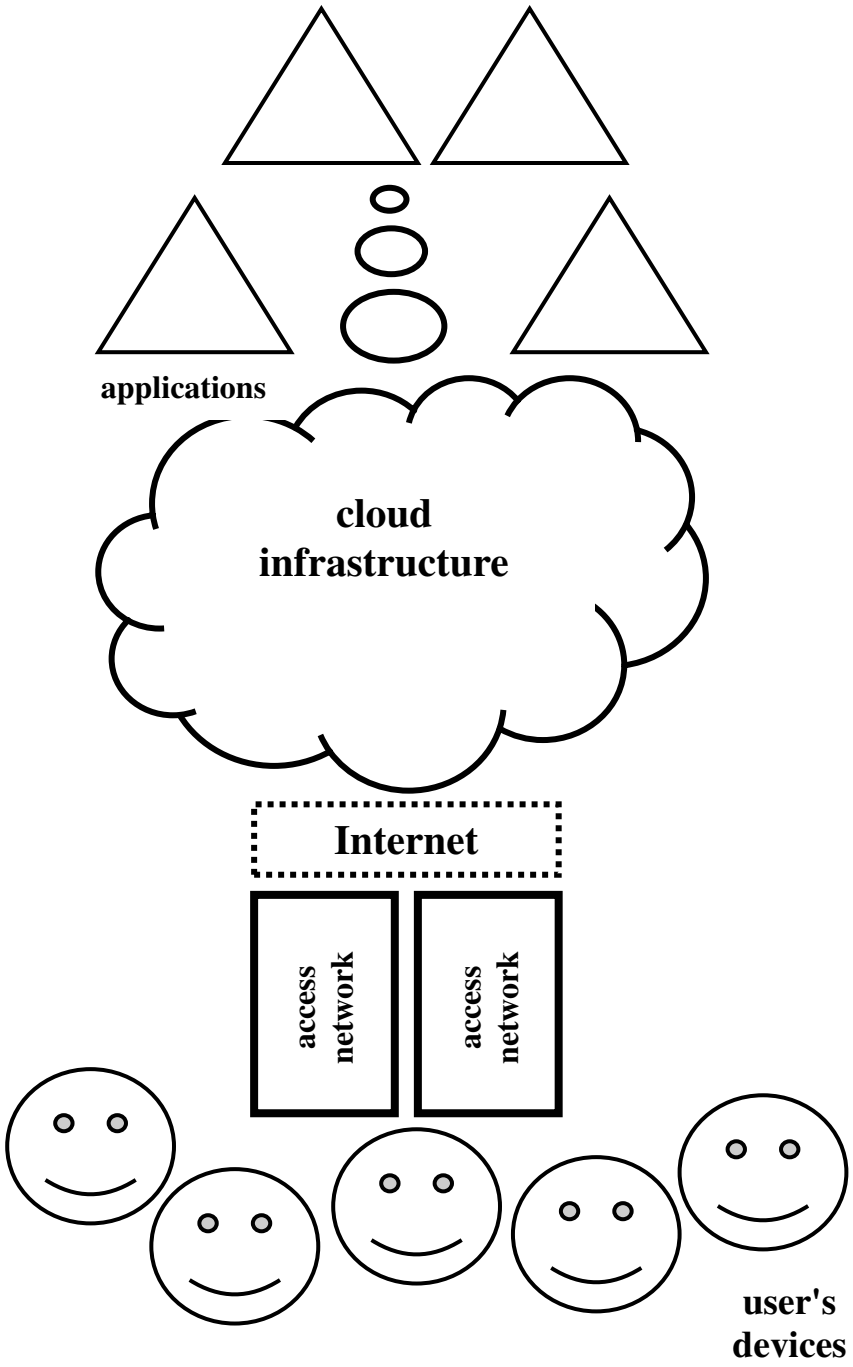
Upgrading telecommunications and cable networks may become efficient if traffic-intensive products and services are demanded by users. The long-held view that data and programs may be separated from a particular device is gaining relevance.

Cloud computing

One of the key changes in the landscape of data use is the increasing importance of data in the cloud. Cloud computing refers to the remote storage of data (for instance, text files, pictures and video) and the remote use of a computing platform or application software (infrastructure as a service, platform as a service, software as a service). Users gain access to these data and programs over a network (typically the Internet) on the device of their choice. Presuming connectivity, cloud computing allows users to access their data from multiple devices. In addition to the retrieved data, software may also operate from the cloud.

This opens the door for new business models and substantial cost savings on the part of users, in particular businesses and public authorities. The future structure of cloud computing will possibly resemble other potentially two-sided platform markets at various stages of their development. Cloud computing providers offering a platform may offer their integrated services and/or may rely on third parties. A typical development is that platform offer integrated services at the launch of the platform to avoid the chicken-and-egg problem that it takes applications and users for the business to work and a later stage increasingly rely on third-party developers for services.[13] This may explain the business strategies of Microsoft and Google which start from an existing software in the cloud (hotmail and gmail) and add further services and application software (word processor, spread sheet, and presentation software) running on operating systems in the cloud.

[13] For detailed description of other platform markets see Evans, Hagiu, and Schmalensee (2006).



While the above description resembles in structure those of other platform industries, an important feature has to be added. For all these services to be valuable, users have to be connected to the cloud. Thus, the cloud environment can be summarized by five layers of players: users, access providers, cloud infrastructure providers, cloud operating

systems providers, and cloud application providers. As Figure 1 illustrates, users connect to cloud infrastructure and possibly software and services in the cloud through an access network. Various partially integrated services are possible. For instance access network operators may offer cloud computing infrastructure. Also, providers of cloud operating systems may offer integrated software and offer their own cloud infrastructure. The role of policy is to provide an environment in which cloud services can flourish and in which various types of industry players who may use partially vertically integrated business models can operate in a level-playing field. In 2012, Vice President Neelie Kroes said:

> *"Cloud computing is a game-changer for our economy. Without EU action, we will stay stuck in national fortresses and miss out on billions in economic gains. We must achieve critical mass and a single set of rules across Europe."*[14]

A different concern is that global players may be able to dominate the most profitable segments of the cloud computing business, as other players may lack the possibility to offer vertically integrated solutions of cloud computing infrastructure and applications. By adding services to their cloud computing activities firms such as Apple, Google and Microsoft may be able to lock users into their platforms. However, due to increased interoperability (relative to the old world of on-premise operating systems and applications) and the presence of other strong players (telcos, cable companies, media firms), it appears to be possible that the concern is exaggerated. Perhaps more likely is a world of competing alliances, varying degrees of vertical integration and an innovative sector of application providers featuring low entry costs.

A related issue that will shape the market and its success is the portability of data. Non-portability risks leading to large switching costs, which may make users hesitant to become locked-in. However, it is a priori unclear whether this risk will actually materialize since the interaction between competition and portability is a complex one.

[14] Cited from European Commission, Digital Agenda: New strategy to drive European business and government productivity via cloud computing, press release, 27 September, 2012.

This suggests that monitoring the market may be appropriate, while enforcing portability or particular standards to ensure interoperability risks making mis-informed decisions which may become the source of major inefficiencies in the market.

Public authorities may play a non-negligible role in the development of cloud computing as a group of users which may cause new cloud-computing businesses to take off. A relevant issue for such a take-off is the ability of firms which offer cloud computing to be able to deploy EU-wide solutions. Furthermore, high standards with regard to security and protection of sensitive data are perceived as a major competitive advantage of European cloud solutions. Consequently, the European Commission has proposed to update data protection rules and adopted a Cyber Security Strategy. The proposed extension of the scope of the directive to the entire value-chain of the online eco-world, like e-commerce platforms or social networks, as well as to other sectors which operate critical infrastructures (transport energy, banking, etc.) appears to be of major importance for the competitiveness of EU market players and is aiming at enhancing the trust of private and corporate customers in cloud offerings and, in particular, in new e-services**.**

The take-up of cloud computing offerings may be linked to public policy with respect to the net neutrality debate. It can be argued that net neutrality has the desirable property that it enables cloud computing providers to make uniform service proposals. This applies to any rule which is harmonized across networks, but it might not be the case for differentiated QoS. To the extent that enforcing a version of net neutrality does not allow for highly reliable services, certain business models are prone to fail. Thus, cloud-computing providers may come to rely on ISPs for service guarantees which cannot (profitably) be provided for all services but only for those that are particularly time-sensitive and require high priority. This holds, in particular, in the light of the foreseeable growth of the mobile use of cloud services and other internet usage which are likely to lead to occasional capacity problems. In this context, it appears to be

important to discuss the pros and cons of harmonized vs. decentralized solutions of QoS.

New services

Future demand for e-health, e-mobility, and smart metering/smart grid (as an incomplete list of potentially important new services) is difficult to predict. While it is not clear whether and to which extent any of the above areas will progress well, it is apparent that there is high potential in and potentially a substantial societal need for the take-up of each of those areas. The role of public policy with regard to those new services' development may be to try to pick winners and to promote a particular standard or technology at an early stage or to provide an innovation-friendly environment, which, at the same time, protects consumers from malpractice. The latter might lead to multiple standards and multiple firms incurring sunk costs. The former might lead to the choice of an inefficient standard. It is an open question in which environment the introduction of new services occurs more rapidly. At the present stage, it appears to be preferable to adopt a policy which stimulates investment into multiple innovative services rather than to provide support to one particular approach.

Data protection and Internet security

New services need to be trustworthy to become successful from a data protection point of view. This suggests the need of high standards with respect to data standards. The general problem that insufficient measures to address security concerns may be taken by software firms has long been recognized.[15] Disclosure policies are an important element to address security concerns. However, this may be insufficient to provide strong incentives to invest in security measures prior to a particular attack.

[15] Moore and Anderson (2012) provide a very useful overview on the theory and empirics of internet security.

While the government has to define legal standards with respect to liability, it is in a weak position to assess security risks. It appears to be more promising for private third parties to provide certification for certain services, so that direct government intervention is rather the *ultima ratio*. Such certification may potentially come from Telcos, ISPs, OTTs and third parties and may include the certification of well-defined security standards. The task of public authorities is then to set out the essential requirements concerning privacy and security as well as to monitor the implementation of these essential requirements and to provide for sanctions in case they are not met. Private actors take care of implementation and certification, much as is done now for many products. Other areas of the world, e.g. the USA or Asia, are more advanced concerning standards for new technologies. It appears, therefore, important to gather innovative competences in Europe to promote new services and to simplify their deployment (e.g. by Smart Grid Task Force set up by the EC DG Connect and DG Energy).

By putting data and tools into the cloud, users no longer directly control their content. In 2012 EC Vice-President Viviane Reding said:

> *"Europe needs to think big. The cloud strategy will enhance trust in innovative computing solutions and boost a competitive digital single market where Europeans feel safe. That means a swift adoption of the new data protection framework which the Commission proposed earlier this year and the development of safe and fair contract terms and conditions."*[16]

In the context of cloud computing, both their providers as well as ISPs (together with users) will want to operate in an environment with little legal uncertainty, clear obligations as to security standards, and the ability of the courts to interpret and enforce contracts between the relevant parties.

[16] Cited from European Commission, Digital Agenda: New strategy to drive European business and government productivity via cloud computing, Press Release, 27 September, 2012.

Privacy

Privacy is of particular importance for private users. Providers which are not trusted may face problems to convince users to take up their offerings. Privacy issues may in the future constitute important barriers to entry. However, given the negligent manner in which private information is often voluntarily revealed by users, currently the main concern is not about entry costs and the ensuing competition issues, but rather the possibility that users are harmed by receiving safeguards against data protection violations which are too low and lead to ever diminishing privacy standards. It thus appears to be rather a consumer protection issue than a competition issue.

In the context of social networks, it can however be observed that many users manage to organize themselves. They may then develop a strong position to act on privacy concerns. While European privacy and data protection guidelines appear to be desirable, the market may provide information and certification, such that e-literate users can pick their best offering. In light of the key importance of data security and privacy issues, there appears to be a great need for the European Commission and national governments to focus their activities on building up expertise on those issues. If so, regulatory intervention may be seen as a last resort, to be used where asymmetric information problems cannot adequately be dealt with by market players. Offering satisfactory security solutions for new services may turn out to be a critical factor determining their viability. To this effect, a sound legal framework is needed.

Our discussion is deliberately not addressing direct interference by governments such as censoring certain type of information and obtaining person-specific information in the absence of criminal activities. However, this issue is more of a concern in several countries outside the European Union. Nevertheless, in some member states, this may also need to be treated seriously, based on principles that apply in the whole EU. A somewhat related issue is whether data owned by EU users that are located on servers

abroad can be analysed by non-EU entities and whether, in order to void this to happen, certain types of data and services are required to stay within the EU. Alternatively, transparency rules on this issue may be implemented which would require users to evaluate possible risks themselves, depending on the type of data involved. To give an example, a user may be concerned about the security of her tax or health records, but less concerned about security risks of her digital music collection.

4. Summary of policy recommendations

In summary our policy recommendations for future regulation are as follows:

i) maintain the price of copper at about the current level,

ii) explicitly recognise the trade off in setting access prices for investor-funded fibre projects between investment and competition objectives,

iii) ensure that regulatory policy is genuinely technology neutral,

iv) take every step possible to prevent a 'spectrum crunch' in the supply of mobile broadband,

v) encourage the allocation of public funding for fibre in a more considered fashion,

vi) in the interest of fibre deployment, resist the temptation of net neutrality and encourage more varied financial relationships between networks and content an application providers,

vii) devote more consideration to how procedural reform can give added credibility to the goal of creating a more stable regulatory environment for fibre investment,

viii) consider data protection and privacy as important policy issues which will affect the deployment of new services; here the task of public authorities is primarily to set out the essential requirements, while the market can develop proper standards and certification schemes.

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