Net Neutrality, Zero-rating and the Minitelisation of the Internet

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Abstract

The Internet is a general-purpose network grounded on openness, decentralisation and interoperability. Such features have allowed innovation to flourish, lowering barriers to communication, participation and cooperation, thus empowering end users. 'General purpose' means that the purpose for which the Internet is used is not predefined by the operator but can be autonomously decided by the end user. In this sense, the network neutrality (NN) principle mandates non-discriminatory treatment of Internet traffic to preserve the end-to-end environment which then fosters the general-purpose nature of the Internet, unleashing end users' creativity.

This paper starts by briefly exploring the NN debate, stressing that the rationale of NN is to preserve an open and decentralised Internet architecture, empowering end users and protecting their rights. Subsequently, I stress that the combination of reduced data caps and zero rating (ZR) schemes may create artificial scarcity and jeopardise the achievement of the NN rationale. I provide a taxonomy of ZR models and argue that several ZR practices might limit the Internet to a centralised configuration that characterises limited-generativity networks, such as the Minitel. The phenomenon that I define as 'Minitelisation' of the Internet consists of the shift from a user-centric, general-purpose network to one with a predefined purpose, thereby creating passive consumers of predetermined services, rather than active Internet users.

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Introduction: from openness to Minitelisation

The Internet has been conceived as a general-purpose network grounded on openness, decentralisation and interoperability. Such fundamental features have allowed innovation to flourish online, reducing barriers to communication, participation and cooperation, thus empowering the end users at the edges of the network. Importantly, the term 'general purpose' does not only mean that the Internet generates long-lasting benefits spreading to the whole economy (Bresnahan and Trajtenberg 1996; Jovanovic and Rousseau 2005; Clarke et al. 2015). It also means that the purposes for which the Internet is used are not predefined by the operator; on the contrary they can be autonomously decided by the end user. This feature is particularly important. Indeed, unlike other networks' users, Internet users are not mere consumers or passive recipients of information. On the contrary, they are active 'prosumers' as they have the ability not only to access, but also to create and share, any content, applications and services of their choice and to share them easily at low cost. Therefore, end users can actively contribute to the evolution of a generative[1] network through their creativity.

The Internet's openness and generativity are facilitated by its end-to-end architecture as well as its best-effort delivery paradigm. The end-to-end structure is enshrined in the TCP/IP suite that can be seen as the Internet's technical constitution (Belli 2016). This distinguishes the application functions, consisting in processing of data, from the network functions, consisting in addressing and routing data (Saltzer et al. 1984; Carpenter 1996). As such, the locus of innovation – i.e. the so-called intelligence of the network – is closer to the user who can produce and share applications, directly contributing to the maturation of the Internet. On the other hand, the best-effort paradigm implies that all online services are treated in a non-discriminatory fashion by default, regardless of their type or content (BEREC 2012b).

As such, the operator is agnostic to all user requests, which obtain best-effort delivery regardless of their type or nature: 'the router makes its best effort to forward the data packet quickly and safely, but does not guarantee anything (e.g. delay or loss probability)'[2]. Such a model is in stark contrast to the centralised paradigm traditionally adopted by the telecommunications industry in the development of the Public Switched Telephone Network (PSTN). Indeed, unlike the Internet's end-to-end system design, the

[1] The concept of generativity can be defined as 'a system's capacity to produce unanticipated change through unfiltered contributions from broad and varied audiences'. See Zittrain (2008), p. 70.

[2] See Feher et al. (2007). Operators may also define exceptions to the best-effort paradigm, to manage traffic more efficiently or to provide better quality for specific applications. To this end, operators exploit the 'packet header information to classify packets into flows and treating those flows differently, for example rearranging the order or the timing with which packets are sent, or sending them along different network paths [or] to indicate to routers the quality of service desired'. However, 'traffic differentiation in this sense has not been implemented in multi-provider environments, although it is extensively used within specific networks' managed by a single operator. See BITAG (2015).

PSTN design focuses on the delivery of one predefined service – i.e. voice communication – and does not allow users to create and share applications and services not based on voice communication[3].

Therefore the Internet fundamentally differs from its predecessors, because Internet users can develop and provide applications and services, reaching virtually any other user without need for permission from the network operator. This specifically means that any connected individual can be an entrepreneur and provide services to the rest of the (connected) world. Such 'permissionless innovation' (Daigle 2015; Chesbrough and van Alstyne 2015) unleashes individuals' creativity, expression and entrepreneurship, allowing Internet users to generate and diffuse ideas and services 'over the top' (OTT) of the telecoms network. By contrast, in the pre-Internet environment, voice services were tied indissociably to telecom networks. Therefore, control of the network technology was an essential precondition to provide services, thus providing operators with control over the evolution of networks.

Indeed, the PSTN telecom environment purposefully restricted innovation, allowing only network operators to define the networks' purpose and making it particularly easy for government to control networks' evolution through regulation. Such centralised and top-down architecture was quintessentially represented by the Minitel[4] network, a closed system, which was very popular in France during the 1990s, and in which only the operator could decide which services could be made available to users. The *Direction Générale des Telecommunications* (i.e. the French agency in charge of telecommunications) meanwhile, had the right to approve or disapprove, unilaterally, any service. The Internet, by contrast, has been engineered in a bottom-up and collaborative fashion and was conceived to evolve as a distributed system in the absence of centralised control.

State intervention became necessary only at a later stage of the Internet's evolution, when the emergence of conflicting interests and abusive conducts led to the elaboration of various regulatory frameworks worldwide. In particular, the net neutrality (NN) debate is a response to various political, economic, and social changes that are rapidly transforming the Internet ecosystem (Bauer and Obar 2014). Notably, over the past 15 years, operators have begun vertically integrating with Content and Application Providers (CAPs) and using Internet Traffic Management (ITM) more efficiently. At the same time, complex interconnection arrangements have emerged, producing significant economic, social and juridical implications (Yoo 2010; van Schewick 2010; Belli and De Filippi 2016). NN discussions have focussed on operators' capability to

[3] Although PSTN can be used to deliver services that are not voice-based, such as fax, the PSTN paradigm is a permission-based system, optimised for voice services, where '[o]nly telecoms companies can define and deploy new services within their networks' (ISOC 2012).

[4] For an overview of the Minitel network, see e.g. Hart (1988) and Gonzalez and Jouve (2002).

reduce openness by putting in place undue discriminatory ITM[5]. To avoid such a scenario, the NN principle mandates non-discriminatory treatment of all Internet traffic. The purpose of NN is indeed to preserve the Internet's fundamental features (as a platform unleashing free innovation and communication) thus avoiding the possibility that operators reduce openness and use ITM to favour commercial partners and disfavour competitors.

Although NN focuses on operators' behaviour, it is important to note that threats to Internet openness have also been observed in regard to other segments of the Internet value-chain. Notably, Noam (2015) and Naldi (2016) have highlighted the worrying concentration of the mobile operating system market. Moreover, several dominant online platforms have been criticised for leaving limited space for competitors (Haucap and Heimeshoff 2013) or for putting in place a variety of discriminatory practices[6] that may harm consumers and other businesses (European Commission 2015b; House of Lords 2016). Yet, although the behaviour of online platforms may harm openness, information discrimination is at the heart of both their functioning and business models, consisting in the provision of results tailored to specifically-profiled users. On the contrary, subscribers to Internet access services pay to have access to the entire Internet and expect that operators do not act as editors of the Internet, but rather as 'mere conduits [that do] not select or modify the information contained in the transmission'[7].

The double purpose of this paper is to analyse the rationale of NN and to apply it in order to examine one of the most important evolutions that the Internet ecosystem is currently undertaking, i.e. the diffusion of zero-rating (ZR) practices. Such business practices[8] are mainly implemented on mobile networks and are based on the sponsorship of the data consumption related to a limited set of applications, which is not counted against the user's data allowance. Although ZR practices may seem beneficial from a short-term perspective, improving access to specific services and content (Eisenach 2015; West 2015), I argue that some ZR models may trigger a phenomenon that I define as '**Minitelisation'** of the Internet. This phenomenon consists in the Internet's evolution from a general-purpose network into a predefined-purpose network,

[5] Such a possibility is particularly problematic in markets where users have a limited choice of operators and the consequences of undue discrimination may be more severe. Before the approval of NN rules, this was the case in the US, where around 75% of end users have only one choice, or no choice regarding Internet access provider thus exacerbating the consequences of potential undue discrimination. See Wheeler (2014). Examples of undue discrimination are available *infra* at note 14.

[6] Platforms are designed to organise information in a non-neutral fashion, to meet the needs of each specific user. Such algorithmic discrimination may be exploited for abusive purposes. For instance, CNNum (2014) notes that, when Google introduced Google Maps and Google Shopping, the traffic directed to websites offering similar services dropped significantly because their page-rank on Google Search was suddenly degraded.

[7] See art 12, EU Directive 2000/31, known as 'the E-Commerce Directive'. Such provision is directly inspired by section 512 of the 1998 US Digital Millennium Copyright Act (DMCA). Operators are categorised as mere conduits in many OECD countries. See OECD (2011) pp. 16-17.

[8] Section III will provide an analysis and a taxonomy of ZR practices.

thus fostering a centralised – and easily controlled – configuration, creating passive customers of selected services, rather than active users of an open and distributed Internet. Such a phenomenon may lead to the Internet's fragmentation into subsets of applications, sponsored and controlled by single entities.

In this paper, I argue that Minitelisation can result not only from discriminatory ITM, but also from price discrimination schemes, such as ZR. Such consideration seems particularly relevant, as mobile Internet is increasingly becoming a key battleground for NN. Indeed, data traffic generated by mobile Internet 'has grown 4,000-fold over the past decade [while] traffic from wireless and mobile devices will account for two-thirds of total IP traffic by 2020'[9]. Hence, stakeholders' attention will focus increasingly on mobile Internet, scrutinising the impact that business and regulatory strategies may have on Internet users' rights. These concerns are already nurturing a new breed of NN debates which focus on the effects of the combination of reduced data caps[10] and ZR practices on how we access and use the Internet. The purpose of this paper is, therefore, to provide an understanding of NN and how the NN rationale can be applied to ZR discussions.

In the first section, I explore the ITM controversy and the various interests at stake within the NN debate, stressing that NN is not an absolute principle and briefly analysing the elements on which stakeholders' consensus crystallises. Secondly, I examine the NN rationale, stressing its relevance to preserving an open and general-purpose Internet, and arguing that some price discrimination schemes may jeopardise it (Section II). Thirdly, I provide a taxonomy of the various permutations of ZR and argue that several ZR practices conflict with the NN rationale (Section III). Lastly, I argue that ZR practices have the potential to restrain openness and foster Minitelisation (Section IV). The majority of ZR schemes are based on exclusively sponsoring access to predefined applications, while billing and capping access to the rest of the Internet, in order to orient user choice towards the sponsored applications. I stress that the combination of several ZR practices with reduced data caps may contradict the non-discriminatory rationale of NN, as they have the potential to fragment the Internet and create new digital divides in the medium and long-term (World Bank 2016). As a conclusion, I argue that public policies aimed at fostering full Internet connectivity can prove more sustainable than merely relying on ZR.

I. Internet traffic management and the Net Neutrality debate

At the heart of the NN debate is the possibility that network operators reduce the Internet's open and decentralised nature by using discriminatory ITM for commercial

[9] See Cisco (2016).

[10] As I will stress, ZR practices only make sense when paired with reduced data caps, so that the limited volume stimulates interest in unbilled access to selected applications.

purposes. A brief preliminary analysis of ITM use and misuse is therefore essential to understand that, over the past decade, NN frameworks have been developed precisely to avoid the Internet becoming Minitelised by the use of undue discriminatory ITM. Indeed, due to their significant reliance on the Internet as an essential tool for everyday activities,[11] Internet users have developed a legitimate expectation that access shall not be unduly restrained or controlled. On the other hand, operators have increasingly been relying on discriminatory ITM for a variety of reasons, including law-enforcement purposes (e.g. to block access to paedo-pornographic material); for contention of cyber-attacks and filtering of malicious software and, last but not least, for congestion management.

In particular, due to the changes of Internet usage patterns – particularly regarding the emergence of video streaming and online gaming – operators have asserted their willingness to utilise ITM to differentiate traffic[12] in order to maintain a good quality of service but also to propose new offerings to support the investment[13] necessary to expand network capacity (Bauer and Obar 2014; Frieden 2014; Bello and Jung 2015). Indeed, the recent growth in video streaming has required economic efforts to handle increasing traffic demands (OECD 2014), prompting operators to propose the use of ITM to charge different prices for different quality levels, thus offering pay-for-priority schemes to extract additional fees.

To appreciate the importance of NN, it is crucial to understand that ITM techniques can be used not only for legitimate purposes, but also to downgrade or block competing services, while favouring commercial partners. In fact, although ITM plays a key role in guaranteeing the smooth operation of electronic networks – for instance by preserving network security and integrity – it is essential to note that operators may (mis)use[14] ITM

[11] In this regard, the Council of Europe's member states have stressed and promoted the 'public service value of the Internet' since 2007 (CoE 2007).

[12] Traffic differentiation is based on the use of any ITM technique 'that classifies and applies potentially different treatment to two or more traffic flows contending for resources on a network (a flow being a group of packets that share a common set of properties)' (BITAG 2015). Differentiation is based on the exploitation of multiple traffic classes that may have varying levels of priority and can be implemented using Differentiated Services (DiffServ), Integrated Services (IntServ) and/or Multiprotocol Label Switching. See Grossman (2002); Baker et al. (2010); Rosen et al. (2001). Unlike best-effort traffic, 'intserv- or diffserv- enabled traffic relies on differential scheduling mechanisms at congested routers, with packets from different intserv or diffserv classes receiving different treatment'. See Floyd and Allman (2008).

[13] It must be noted that operators are not the only economic actors bearing relevant costs and investments and, as noted by Felten (2013), CAPs undertake significant recurring and transit costs as well as major investment to bring their traffic as close as possible to end users.

[14] Prominent examples of ITM misuse for undue discrimination include the Madison River case (FCC 2005), in which the US FCC found the operator Madison River Communications unduly blocking the Voice over IP (VoIP) service Vonage; the Comcast case (FCC 2008), in which the US FCC found that Comcast downgraded P2P traffic that 'pose[d] a potential competitive threat to Comcast video-on-demand service'; the BEREC Report's (BEREC 2012a) findings that at least 36% of European mobile-Internet users and 25% of all European Internet users were affected by P2P restrictions (blocking or

techniques unduly, to block or downgrade specific services or to prioritise affiliated services. Hence ITM can offer welfare-enhancing benefits to both users and operators, but can be also exploited for abusive purposes that solely benefit a narrow range of stakeholders and reduce user welfare. Indeed, ITM may be used to target specific applications, services or content – via so-called application-specific measures – for legitimate purposes, but may also be exploited to discriminate against those OTT services in direct competition with the services provided by operators, such as voice and messaging, or their vertically-integrated[15] partners.

Since the early 2000s, academics have warned that operators may exploit their ITM capabilities to act as chokepoints (Cooper 2000), by unduly discriminating against specific resources and services, thus reducing pluralism and end user freedom (Marsden 1999; Banisar et al. 2003), and putting in jeopardy the end-to-end architecture of the Internet (Lemley and Lessig 2000). To corroborate such a warning, over the past decade, it has been demonstrated by an increasing number of reports[16] and by jurisprudence[17] that operators with market power can misuse ITM, leading to foreclosure and its harmful consequences.

On the one hand, discriminatory ITM practices (consisting of blocking, throttling or prioritisation) may have negative consequences for end users' capability to seek, impart and receive information and ideas freely, without interference, while the use of pervasive filtering techniques – such as Deep Packet Inspection (DPI) – for Internet traffic monitoring[18] may jeopardise the privacy of end users' communications (Marsden 2010; EDPS 2011; Belli and van Bergen 2013; Belli and De Filippi 2016). On the other hand, in the absence of NN regulatory frameworks, vertically-integrated operators may succeed in projecting their market power into the vertically-related market segments, disfavouring the services that compete with their own partners.

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throttling) and various other restrictions; and, most recently, the Open Net study (Nam 2015) showing that KT Corporation, South Korea's largest operator, deployed DPI technology to detect P2P traffic and selectively block it, thus breaching literally all NN provisions contained in Korean regulation.

[15] Vertical integration of network operators together with CAPs offers concrete incentives for lowering the quality or blocking the services provided by competitors and privileging the traffic of the integrated CAPs (Economides 2008; BEREC 2012a; FCC 2015). Although NN policies only focus on operators acting at the access layer, it is important to stress that vertical integration of online platforms, acting at the application layer, may also jeopardise Internet openness (European Commission 2015b). Platforms may 'inhibit rivals on its platform or give preference to its own programs or services (…) to the detriment of rival sellers (and contrary to consumers' wishes)" (House of Lords 2016). Accordingly, the European Commission has argued that 'Google gives systematic favourable treatment to its comparison shopping product (currently called Google Shopping) in its general search results pages' (European Commission 2015a).

[16] See e.g. Grove et al. (2012); BEREC (2012a); Anderson (2013); FCC (2015) and Nam (2015).

[17] See e.g. FCC (2005) and FCC (2008).

[18] Traffic monitoring, generally put in place using techniques such as DPI, is instrumental in achieving efficient ITM (EDPS, 2011; Mueller and Asghari 2012; BEREC 2012a).

Although some voices may dissent,[19] it is generally acknowledged that the Internet's success as a platform for innovation stems from its openness and non-discrimination, which allow a variety of stakeholders to cooperate through interoperable networks with low barriers to the circulation of information and innovation produced at end-user level. NN aims to preserve such a generative and user-empowering platform. However, the non-discriminatory ITM prescribed by NN is not absolute and the various stakeholders largely agree that traffic management is reasonable as long as it is necessary and proportionate to the achievement of a legitimate aim (FCC 2015; IGF 2015; CoE 2016c). In particular, discriminatory ITM is deemed reasonable for network-security and network-integrity purposes, or to prioritise emergency services, in case of force majeure, or to mitigate the effects of temporary congestion[20] via protocol-specific[21] measures, when protocol-agnostic measures are not workable (IGF 2015).[22] Although traffic differentiation can improve the performance and quality of experience of latency-sensitive applications (BITAG 2015), it is also important to stress that the use of differentiation for commercial purposes can lead to undue discrimination.[23] In fact, although traffic differentiation has been implemented within the Internet architecture since the late 1990s, its goal of differentiation is not to create a tool for commercially (dis)advantaging specific services, but rather to allow the preservation of the performance of entire 'classes'[24] of time-sensitive applications, when networks are congested and best-effort management is inefficient.

Furthermore, as noted by Claffy and Clark (2015), operators can respond to network congestion either by increasing capacity[25], or by selling prioritisation to those able to

[19] Most prominently, Yoo has argued that non-discriminatory ITM may threaten network investments and innovation and harm competition (Wu and Yoo 2006).

[20] The assessment of the (un)reasonable use of ITM for congestion management is complicated by the difficulty of identifying objectively the real cause of network congestion. As noted by Frieden (2014), CAPs 'speculate whether retail ISPs have deliberately caused congestion, by refusing to further upgrade network capacity, or by allocating available capacity in ways that bolster the probability of congestion for the traffic of specific content types and sources', whilst operators argue that congestion is caused by 'weather, home-based holidays and the decision of content distributors, such as Netflix, to release an entire season's worth of program episodes'.

[21] The term 'protocol-specific' qualifies ITM techniques targeting a class of applications running on a specific protocol, such as VoIP. By contrast to application-specific ITM, which targets a specific application, protocol-specific ITM targets an entire class of applications exploiting the same protocol. The term 'protocol-specific' is contrary to 'protocol-agnostic' which qualifies an ITM technique that does not target or affect a specific class of applications. See e.g. Bastian et al. (2010).

[22] 84% of stakeholders attending the IGF 2015 expressed favourable or very favourable feedback on such characterisation of reasonable traffic management. See IGF Secretariat (2016).

[23] See *supra*, note 14, 16 and 17.

[24] Data packets' headers include a 'traffic class' field aimed at signaling the existence of network congestion via Explicit Congestion Notification (Ramakrishnan 2001) while allowing operators to give higher or lower priority to data packets transmitting latency-sensitive applications (Grossman 2002).

[25] The very concept of congestion due to limited capacity may be questioned, considering that current network capacity is a small fraction of the potential capacity (Frankston 2009). Indeed, possibilities to increase network capacity are theoretically limitless. Considering copper-based infrastructure, one may

pay for good quality of service during congestion periods. While the former is both desirable and compatible with NN, the latter conflicts with NN, because pay-for-priority models can create an economic barrier which limits the possibility to access and share the ideas and innovations of those players unable to afford prioritisation (BEREC 2012b; FCC 2015). Pay-for-priority models entail the payment of a fee to receive or deliver latency-sensitive services at a guaranteed quality level, while letting those CAPs unwilling or unable to pay prioritisation fees experiment quality degradation (Garcia 2016). Such models have been criticised for raising barriers to non-commercial speech, such as blogs or educational material, for they subject the diffusion of information and ideas to the financial capacity necessary to afford priorisation (Belli and van Bergen 2013).

Indeed, not all kinds of information have the same commercial value and operators may well be tempted to favour more profitable content and services and disfavour competing ones – or those which are not integrated – should they be freely able to block, filter, throttle or prioritise. Moreover, paid prioritisation may reduce incentives to expand network capacity, because congestion is a prerequisite to sell prioritisation (BEREC 2012b). Conversely, CAPs can improve performance by using Content Delivery Networks, considered as compatible with NN because they add capacity to the network, rather than degrading other communications (BEREC 2012b; FCC 2015).

ITM determines significant social, economic and political consequences, affecting virtually every stakeholder across the entire Internet ecosystem and, for this reason, NN debates have acquired crucial importance. NN have opposed large operators to a wide spectrum of human rights advocates, consumer organisations and CAPs – ranging from start-ups[26] to giants such as Google or Netflix – but also to smaller Internet access providers and large software developers. Due to their ability to manage Internet traffic, network operators are amongst the primary stakeholders in the NN debate. Their main interest is in retaining the ability to configure their services in the most efficient and lucrative fashion[27], while avoiding regulatory burden.

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note that wires' speed was 300bps in the 1960s but increased to 56Kbps in the 2000s. Subsequently, digital-subscriber-line (DSL) technology and very-high-bit-rate DSL increased speed up to 52Mbps, based on the ability to control both ends of the wire, and the same copper infrastructure can now support 20Gbps speeds, thanks to USB-C technology (Barrett 2015).

[26] Start-ups and established Internet companies have been amongst the most fervent NN supporters in the various counties where NN policies have been discussed. European stat-ups established the 'Start-ups for net neutrality' initiative http://www.startupsfornetneutrality.eu/ that was replicated in Brazil http://www.startupspelaneutralidadedarede.com/ whilst, in India, nearly 700 start-ups urged Prime Minister Modi to defend NN. http://timesofindia.indiatimes.com/tech/tech-news/Nearly-700-startup-founders-urge-PM-Modi-to-defend-net-neutrality/articleshow/50729785.cms

[27] In this regard, some operators have been particularly explicit with regard to their intention to discriminate against OTT services. For instance, Telefonica's CEO stated: '*Internet search engines use our net without paying anything at all, which is good for them but bad for [Telefonica]. It's obvious that this situation must change. Our strategy is to change this*.' See Eatwell (2010). Similarly, Dutch operator KPN expressed intentions to 'monetise OTT'. See KPN (2011).

On the other hand, end users – who include both individuals and CAPs – are directly affected by ITM techniques, although they expect non-discriminatory Internet access to exercise fully their fundamental freedom of expression as well as their freedom of choice.[28] In this sense, it is important to stress not only that users are entitled to receive the quality levels for which they pay, but also that any contractual provision unduly limiting their fundamental right to access and share information and ideas must be 'considered null or void'[29]. (CoE 2014b). In this sense, although some voices have argued that operators *de facto* 'exercise editorial control over the information they convey' (Yoo 2005), it is essential to remember that the operators' role is not to discriminate against specific information or edit the Internet, but rather to be non-discriminatory conveyers of information. This is why US and EU legislation, amongst others, categorises operators as mere conduits,[30] exempting them from liability for content conveyed via their networks.

Furthermore, it is important to stress that, when Internet users are CAPs, non-discriminatory ITM is essential to compete on a level playing field. This is particularly true when CAPs have reduced dimensions, though it is not the case when CAPs vertically integrate with operators, or when they are sufficiently wealthy to afford prioritisation. In this latter case indeed, CAPs would benefit from discriminatory ITM, which would offer (anti)competitive advantage. Lastly, governments are key stakeholders, because they have both the authority to regulate ITM practices and a duty to act to preserve the public interest. In this regard, besides having the responsibility to safeguard healthy and competitive markets, public authorities bear the obligation to protect, respect and promote the full enjoyment of individuals' human rights (UNHRC 2011; CoE 2014a).[31]

[28] Several studies have stressed that, once consumers are made aware of what NN is, they show considerable interest in, and concern about, the effects of ITM. Furthermore, consumers seem to expect a free and open Internet and oppose the idea of traffic management for commercial purposes. See Lawford et al. (2009); Kenny and Dennis (2013) and Arnold et al. (2015).

[29] Such a statement is corroborated by the Council of Europe's Recommendation CM/Rec (2014) 6, reiterating that the 'obligations of States to respect, protect and promote human rights include the oversight of private companies. Human rights, which are universal and indivisible, and related standards, prevail over the general terms and conditions imposed on Internet users by any private sector actor.' (CoE 2014a)

[30] Operators are exempted from liability because they do 'not select or modify the information contained in the transmission'. See art. 12, EU Directive 2000/31 and section 512 DMCA.

[31] In particular, the UN Human Rights Council has explicitly advised that 'the positive obligations on States Parties to ensure [human] rights will only be fully discharged if individuals are protected by the State, not just against violations [perpetrated] by its agents, but also against acts committed by private persons or entities that would impair the enjoyment of Covenant rights in so far as they are amenable to application between private persons or entities.' See UNHRC (2004).

However, when regulating ITM, many governments – particularly in Europe – found themselves facing a conflict of interest, because they retain relevant shares[32] in the former national monopoly operators, and thus have an important economic stake in the very activity that they are supposed to regulate. For this reason, national regulatory agencies have become essential to the independent monitoring of operators' behaviour and the implementation of NN regulation. The cooperation of the aforementioned stakeholders plays an instrumental role in fostering the elaboration of 'legally interoperable' NN frameworks (Belli and Foditsch 2016), and their implementation. Indeed, the participation of an ample and variegated spectrum of stakeholders seems beneficial, not only to design the rules of the road for operators, but also to monitor their application effectively.

In the following section, I briefly analyse the NN rationale to allow the reader to assess whether ZR models can be considered as compatible with such rationale.

II. The net neutrality rationale and the rise of price discrimination

In the previous sections, I stressed that the undue use of discriminatory ITM can jeopardise the Internet's open and decentralised architecture, thus limiting users' freedom to impart and receive information and, consequently, their ability to innovate without permission and to compete on a level playing field. Therefore, NN frameworks have been developed to safeguard the enjoyment of Internet users' human rights, allowing an open Internet with minimal barriers to enter the digital economy. This promotes competition across the entire Internet value-chain and provides equal opportunities for the development of new applications, services and business models.[33]

Importantly, the NN rationale is grounded in international human rights law. Since 2011, the Special Rapporteurs for Freedom of Expression have jointly stressed that '[t]here should be no discrimination in the treatment of Internet data and traffic, based on the device, content, author, origin and/or destination of the content, service or application'[34] and the importance of NN is corroborated by the jurisprudence of both the Inter-American and European Courts of Human Rights. The Inter-American Court (IACHR) has stated that 'equity must regulate the flow of information' calling on

[32] As an instance, at EU level, the governments of two of the most prominent member states, France and Germany respectively, hold a share of 13.4% of Orange (Zonebourse 2016) and 14.3% of Deutsche Telkom (Deutsche Telekom 2015).

[33] Such rationale is the cornerstone of various NN frameworks (NPT 2009; Lei N° 12.965/2004; FCC 2015; CoE 2016) and enshrined in the preamble of the Policy Statement on Network Neutrality, one of the outcomes of the IGF 2015 (IGF 2015). The Statement was developed via an open, participatory process and all interested stakeholders had the opportunity to evaluate its provisions. 96% of participants 'agreed' or 'strongly agreed' with the rationale enounced in the Preamble (IGF Secretariat 2016).

[34] See LaRue et al. (2011).

member states to 'extend equity rules, to the greatest possible extent, to the participation in the public debate of different types of information, fostering informative pluralism.'[35]

In this regard, the American Convention on Human Rights is of particular interest, clarifying that 'the right of expression may not be restricted by indirect methods or means, government or **private controls** over […] equipment used in dissemination of information'[36]. Accordingly, the IACHR Special Rapporteur for Freedom of Expression has emphasised that the 'protection of net neutrality is fundamental for guaranteeing the plurality and diversity of the flow of information',[37] warning that 'with the objective of controlling different types of expression, both the State and private actors have sought to take advantage of the position held by intermediaries as points of control over access to and use of the Internet'[38]. On the other side of the Atlantic, the European Court (ECtHR) has consistently stressed that freedom of expression "applies not only to the content of information but also to the means of dissemination since any restriction imposed to the [means] necessarily interfere with the right to receive and impart information"[39]. On these grounds, members of the Council of Europe have agreed to 'take all the necessary measures […] to safeguard the principle of network neutrality'[40] explicitly recognising the importance of NN and its application 'to all Internet access services'[41].

Both systems highlight that freedom of expression encompasses not only the fundamental right to disseminate freely information and ideas, but also to seek and receive them freely and without interference. Such an approach is particularly relevant in assessing the risks that ITM practices and commercial strategies may pose to freedom of expression, when trying to orient the choice of Internet users towards specific content, applications and services. Conspicuously, in the Internet context, freedom to impart and receive ideas also means freedom to share and access innovation without having to ask for permission. Undue discrimination may discourage permissionless innovation from the edges, imposing barriers to the possibility of sharing new applications (BEREC 2012b; Daigle 2015), while the non-discriminatory treatment mandated by NN, aims at removing 'gatekeepers' involved in the communication between end points on a network, thus stimulating the free circulation of innovation. For this reason, more than a quarter of the world's governments agree that 'the principle of network neutrality supports technological innovation and economic growth'[42].

[35] See IACHR (2008) and IACHR (2011).
[36] See American Convention on Human Rights, art 13.3.
[37] See Botero Marino (2013), p 12.
[38] See *ibid*. p 40.
[39] See ECtHR (1990) and ECtHR (2012).
[40] See CoE (2016).
[41] *Idem.*
[42] See CoE (2016).

Yet it is important to consider that not all kinds of innovation – and therefore not all kinds of ideas – are equally profitable from an operator's perspective. In particular, it may be much more profitable to direct users towards merely consuming affiliated content and services rather than allowing them to create competing ones. As such, the possibility to shape – or limit – users' ability to seek, impart and receive information becomes a crucial asset in order to convert prosumers into mere consumers, while acquiring their attention. In an online eyeball economy based on user attention and data collection, this is key. Indeed, as opposed to the material world, where goods and services are scarce and the economy is based on monetary currencies, in the online economy, content and services are overflowing rather than scarce, and the currency is users' attention – an intrinsically limited resource, nearly equally distributed to all individuals (Goldhaber 1997; Lanham 2007). Accordingly, actors enjoying market power may consider passive consumers – whose attention may be easily directed and monetised – as indubitably more lucrative and less dangerous than active users who could turn out to be potentially disruptive competitors.

It seems understandable that vertically-integrated operators may have a concrete incentive to orientate users' Internet experience towards the mere consumption of affiliated content, applications and services, because their revenues largely depend on the revenues of the integrated CAPs. As such, it seems plausible to argue that the natural behaviour of a vertically-integrated operator with market power will be to limit forms of innovation that compete with its own, while incentivising passive consumption of affiliated services. Indeed, such orientation of users' attention towards associated services may be monetised through data collection for advertisement purposes.

This latter behaviour may be expected form online platforms, whose business models consist of user profiling so that content and advertisement can be customised to specific users. However, it is important to reiterate that operators are supposed to behave as mere conduits[43] of information rather than as online platforms or Internet editors. Moreover, in contrast to PSTN users, who were mere recipients of voice services unilaterally provided by operators, Internet users are prosumers and have the right to innovate and compete with established services. These are fundamental considerations to bear in mind when analysing the impact that discriminatory ITM and price discrimination may have on users. Indeed, the orientation of users' choice of content, applications and services does not merely influence the commercial behaviour of users, but can have a direct impact on their ability to share innovation, as well as to choose independently the sources of information necessary to form their own opinion.

NN aims to avoid private controls over circulation of information and innovation that, on the contrary, may be implemented via discriminatory ITM, but also via price discrimination. Conspicuously, the obvious purpose of setting low-volume data caps and sponsoring access to specific applications – both within fixed and mobile networks

[43] See *supra*, note 7 and 32.

– is to orient user choice. However, such price-discrimination practices may go far beyond the mere orientation of consumer choice and, eventually, Minitelise the Internet. Indeed, the combination of reduced data caps with the simultaneous increase of Internet access prices, *de facto* limits user choice, by imposing an economic burden on the ability to access and share the forms of expression and innovation that are not sponsored.

Importantly, sponsoring access to selected applications only make sense when paired with reduced data caps, because when Internet access is not limited, users are not attracted by sponsored applications (Arnold et al. 2015). Consequently, some forms of price discrimination may trigger a vicious circle, raising economic barriers to the circulation of those forms of expression without commercial value, such as educational or non-for-profit material. In this regard, the introduction of price-discrimination schemes based on limited data caps may also lead to increased prices of open Internet access, as has been observed amongst EU and OECD operators proposing zero-rated[44] video-streaming services (Rewheel 2016).

Operators' intentions to implement price-discrimination schemes have therefore triggered numerous critiques.[45] With regard to fixed networks, the combination of reduced download limits and the exemption of specialised services – such as sponsored IPTV – from such limits, has been criticised for being anti-competitive (Ermert 2013). A telling example was Deutsche Telekom's 2013 announcement that it would exempt its video-streaming service from download limits, and pair this with the throttling of all non-sponsored traffic once the data caps had been reached (Deutsche Telekom 2013; EDRi 2013). Moreover, the use of data caps to manage network capacity has been criticised for being highly inefficient; rationing data does not prevent network usage at peak periods when congestion occurs.

On the contrary, one of the primary effects of data caps is to disincentivise the use of the Internet connection once the cap is reached, rather than optimising usage. In this regard, data released by T-Mobile suggests that capped users utilise 20 to 30 times less broadband than uncapped users (Weinberg 2011; Feld 2014). Yet, although it can be argued that prices of Internet access should be correlated with costs, the fact that T-Mobile recently decided to enrol all its mobile subscribers onto its 'Binge On' offering – which provides unlimited access to video streaming, while keeping capped access to the rest of the Internet – suggests that the purpose of data caps is not to cope with limited network capacity, but rather to steer individuals' attention towards specific services. In this regard, van Schewick (2016) notes that, by delivering mostly commercial video entertainment, rather than user-generated, educational or non-profit content, Binge On "turns the mobile Internet offered by T-Mobile into [a] platform for commercial entertainment."

[44] ZR practices are analysed in Section III.

[45] In particular, critiques emerged both in developed (Weinberg 2011; Economist 2011; Ermert 2013) and developing counties (IDEC 2016).

The price-discrimination controversy is particularly palpable with regard to ZR practices and stakeholders' opinions on the desirability of such schemes seem quite polarised. Such polarisation has been evident during the Indian national consultations[46] – where stakeholders' opinions harshly diverged on price discrimination – and during the recent Brazilian[47] consultation on the regulation of Law 12.965/2014 (better known as *Marco Civil da Internet*), in which data caps and ZR were hotly debated. Notably, analysis of the contributions to the Brazilian consultation revealed a telling configuration of stakeholders' interests and opinions, highlighting that only telecom operators and networking-equipment manufacturers supported ZR practices, while literally all other stakeholders argued that ZR contradicts NN (Brito Cruz et al. 2015).

As I will point out in the following section, the debate on data caps and ZR should consider the existence of several permutations of ZR, as well as the consequences that the different ZR types may have for the whole Internet ecosystem. Although several national regulators have already deliberated on the matter,[48] policy discussions are still ongoing and policymakers – notably those who have already expressed support to NN – should try to understand the various nuances in order to put forward a clear vision. In the following section, I will provide a ZR taxonomy, discussing the various ZR practices and their compatibility with the NN rationale.

III. A zero-rating taxonomy

ZR is the last but not least topic to unleash heated NN controversies around the world. Supporters of ZR argue that the practices do not conflict with NN and that, on the contrary, ZR favours product differentiation and may expand consumer choice, enticing new users with free samples of applications (Howell 2016), thus increasing consumer welfare (Eisenach 2015). Conversely, ZR detractors affirm that ZR distorts the market, limiting freedom of expression and the circulation of innovation and forcing users into walled gardens, thereby creating new Internet gatekeepers (Rossini and Moore 2015; Malcolm et al. 2016; van Schewick 2016). In particular, opponents of ZR argue that sponsoring specific applications, whilst billing the rest, 'profoundly affect internet users' choices', ascribing to operators 'the power to favor some sites or services over others [and] pick winners and losers online—precisely what the open internet rules exist to prevent'[49].

Nonetheless, it seems important to stress that a number of diverse practices may be considered as ZR and, therefore, several *species* of the ZR *genus* exist. Specifically, ZR

[46] For the contributions to the Indian consultation on Differential Pricing for Data Services, see TRAI (2016c). For a concise analysis of the opinions expressed during the consultation, see Williams (2016).
[47] For an analysis of the contributions to the consultation aimed at developing the Presidential decree regulating Law 12.965/2014, see Brito Cruz et al. (2015).
[48] See e.g. Caf (2015); ACM (2015); CRTC (2015) and TRAI (2016b).
[49] Open Letter to FCC on zero-rating practices. http://www.stayopenfcc.org/letter.pdf

practices can be categorised into: (i) application ZR, (ii) application sponsoring, (iii) ZR platforms and (iv) application-agnostic data sponsoring. Although not all types of ZR are in stark contrast to the NN rationale, the most common ZR models have the potential to substantially modify the way we use the Internet, triggering the phenomenon that I define as Minitelisation, i.e. the shift of the Internet from a general-purpose network to predefined-purpose network. Indeed, the very rationale behind the non-counting of the data consumption of specific applications whilst capping access to the open Internet, is to achieve two fundamental objectives for operators and large Internet companies: the attraction of subscribers from competitors' networks and the creation of new consumers of predefined (affiliated) services. Hence, the ZR types based on such a rationale aim at predefining the purpose for which the Internet is used, in order to increase consumers of specific services rather than creating new prosumers.

ZR type	**Who is the sponsor?**	**What is sponsored?**
Application ZR	Operators	Access to application(s) selected by the operator
Application Sponsoring	CAPs	Access to application(s) sponsored by the CAP
ZR platform	Generally CAPs but potentially any entity	Access to applications selected by the sponsor and/or respecting the technical guidelines defined by the sponsor
Application-agnostic data sponsoring	Generally CAPs but potentially any entity	Data allowance to be used at users' discretion

It is therefore important to note that, while Internet access penetration has already achieved high levels in developed countries, the growth of operators' subscriber-bases and revenues are tending towards flatness – particularly in Western Europe (Ovum 2015). Hence, the differentiation of operators' offerings via ZR is becoming a key business strategy aimed at expanding subscriber-bases and restoring growth. For this reason, operators zero-rate popular services, such as dominant social networks, to attract new users.

The 'application ZR' model is quite telling in this regard. It is based on the operators' initiative to bundle Internet access service and unlimited use of a selection of

applications – or a specific class of applications, such as video-streaming services – and does not request sponsoring fees from the zero-rated CAPs. On the other hand, CAPs with sufficient financial capacity[50] may be keen on sponsoring the data usage of their services, thus extending their consumer bases and acquiring a considerable advantage, compared to their less well-resourced competitors, due to the gratuity of the sponsored service. As an example, the online review, Slate, tested the attractiveness of ZR, communicating to its readers that a specific 'Slate podcast wouldn't count against the data plans on their smartphones [the targeted] group was 61% more likely to press play' (Knutson 2013). This practice may be categorised as 'application sponsoring' model and consists of CAPs paying operators a *de facto* right of preferential access to (new) customers, whose personal data will be subsequently collected and monetised.

The main difference between the application-ZR and application-sponsoring models is the entity that bears the cost of ZR. In the application-sponsoring model, data consumption of the sponsored application is charged to the application provider, which undertakes the role of sponsor. Conversely, in the application ZR model, the operator sponsors the data consumption. In both cases, the user is not billed for accessing a specific service and, besides being bundled to specific data-plans, sponsored services may sometimes be offered with no requirement to pay for a data plan. This latter option has been particularly criticised due to its potential to lead ZR consumers to believe that the sponsored application 'is the Internet', as has emerged from surveys conducted in various developing countries (Mirani 2015)[51].

Such a scenario reinforces the critiques according to which ZR contradicts the NN rationale, creating 'walled-gardens'. As previously argued, the inner purpose of NN is to avoid interference with users' freedom to use the Internet as they wish, accessing and sharing any content, application or service and using any device. Conversely, the purpose of application ZR and application sponsoring is to steer users' choice and attention towards predefined services, thus discouraging access to the open Internet, while encouraging its fragmentation into sponsored subsets of services unilaterally defined by operator or sponsors.

Another important facet of the ZR debate is the usefulness of such practices in bridging digital divides fostering the adoption of online services in geographical areas where Internet penetration is particularly low. Digital divides between and within countries are due to a variety of factors that may be associated with infrastructural, geographic, economic and cultural barriers (West 2015; ITU 2015; A4AI 2016a). As noted by Garcia (2016), when infrastructure is poor and the price of connection is exorbitant, the main problem is getting individuals to access the Internet, rather than assessing whether specific content or services are unduly discriminated against.

[50] For instance, Facebook and Google have launched Facebook Zero or Google Free Zone, in partnership with various African and Latin American operators, offering free mobile access to a text-only version of Facebook and to a selection of Google services.
[51] See Section IV.

For this reason, in countries where the majority of the population is disconnected, policymakers have been generally parsimonious with objections to ZR, preferring the provision of specific services to no Internet access. In such a context, application ZR and application sponsoring have been considered as useful, providing free – though limited – communication and information, and stimulating investments in infrastructure (Eisenach 2015). However, although such practices may be beneficial in the short term, providing a free channel for communication to unconnected individuals,[52] they only create service users, *de facto* eliminating the ability to innovate without permission, whilst transforming the Internet into a centralised network where few players act as points of control.

Conversely, application-agnostic data sponsoring and some forms of ZR platforms may be considered as necessary and proportionate exceptions to NN. The best known example of a ZR platform is the controversial Internet.org initiative, launched by Facebook and some partners in 2013, with the ultimate purpose of 'bring(ing) internet access and the benefits of connectivity to the two-thirds of the world that doesn't have them'[53]. However, critics argue that this initiative would ascribe to Facebook the same form of gatekeeping role that operators would gain by implementing discriminatory ITM. Indeed, although Internet.org proclaims its aim is to 'bring internet access' to the unconnected, the platform has been conceived to provide access only to a selection of applications, approved by Facebook. Only after NN advocates expressed harsh critiques[54] of the project, and several content providers – including the Times Group[55] – decided to withdraw from Internet.org, did Facebook resolve to add to its original initiative the Free Basics platform, allowing the inclusion of 'any low-bandwidth online service that meets its technical guidelines'[56]. However, despite the establishment of Free Basics, the original Internet.org configuration persists unchanged – including only few services – in many of the countries where it is available,[57] despite Facebook's stated willingness to create 'an open platform [where] anyone who meets these guidelines will be able to participate'[58].

In countries where adverse conditions impede the fostering of free and non-discriminatory connectivity, ZR platforms such as Free Basics may become a necessary and proportional exception to the NN principle, in order to allow individuals to exercise their fundamental right to freedom of expression. However, it is important to note that

[52] In this sense, Carrillo (2016) argues that, in developing countries, ZR practices could be considered as necessary and proportionate exceptions to NN, in order to foster communication.
[53] See https://info.internet.org/en/mission/
[54] See open letter to Mark Zuckerberg Regarding Internet.org, Net Neutrality, Privacy, and Security. https://www.facebook.com/notes/access-now/open-letter-to-mark-zuckerberg-regarding-internetorg-net-neutrality-privacy-and-/935857379791271/
[55] See Times Group (2015).
[56] See Ribeiro (2015).
[57] See e.g. the Colombian version www.tigo.com.co/internetorg and the Kenyan version of the project africa.airtel.com/wps/wcm/connect/africarevamp/kenya/home/personal/promotions/internet.org
[58] See Facebook (2015).

such platforms do not represent a sustainable solution able to empower individuals with open Internet connectivity. On the one hand, when ZR platforms are open to any kind of proposed service, such platforms do not create Internet users, but rather foster Internet fragmentation, creating users of a sub-Internet platform controlled by a single entity.

On the other hand, when the platform is closed and the platform sponsor retains the power to choose which applications can be included, such efforts merely create consumers of preselected and easily controllable services. Moreover, as stressed by Rossini and Moore (2015), the use of such suboptimal solutions may dissuade governments from working towards optimal solutions aimed at empowering the unconnected community through the provision full Internet connectivity. Indeed, in light of the fact that operators do not seem to require that sponsors pay for such platforms,[59] governments may well claim that ZR platforms allowing access to selected services for free, may be a good suboptimal solution, *de facto* Minitelising the Internet.[60]

Lastly, the application-agnostic data-sponsoring model may be the best solution to provide unconnected individuals with the benefit of connectivity. In this category, a sponsor entity subsidises a limited amount of data for users who can use it for whatever purpose they wish. Hence, by contrast to the application-sponsoring model, this model does not imply discriminatory treatment with regard to content, application or services. The best known initiative in this regard is Mozilla's Equal rating project, launched in 2015 in various African countries, in partnership with the operator Orange. The initiative consists of selling a low-cost smartphone, running the Firefox operating system and including unlimited text, conversation and 500 MB data allowance per month for six months (Dixon-Thayer 2015). Similarly, since December 2015, Indian operator Aircel has been offering 500 MB data allowance to all new prepaid activations for 90 days from the date of activation.[61]

Another type of application-agnostic data sponsoring is offered by the mCent application, which rewards with data allowance, users' participation in a variety of activities such as 'application downloading and using apps, taking surveys, watching videos, signing up for a service, and/or participating in contests'[62]. It seems evident that, although application-agnostic data sponsoring can be categorised as a ZR model, its rationale is not to (dis)favour specific content, applications or services, but rather to foster Internet connectivity. Hence, this latter model should be deemed as fully compatible with NN, while representing a win-win solution for users – who can trade

[59] Facebook has consistently claimed that it does not pay operators for its Internet.org/Free Basics initiative. However, to date, no other stakeholder has been allowed to enjoy the same privilege.
[60] See Section IV.
[61] This offering is called 'Free Basic Internet' and should not be confused with Facebook's 'Free Basics'.
[62] See http://mcent.com/about-us/

some of their attention for free data allowance – as well as for operators – who may increase their revenue thanks to the sponsoring fees, without infringing NN.

IV. The Minitelisation of the Internet

Although ZR schemes may seem to be legitimate market practices, it is important to ponder what impact such schemes may have on the Internet ecosystem as a whole. The key question is whether they have the potential to distort the Internet ecosystem, prompting a shift from a general-purpose, distributed network to a predefined-purpose, centralised one. Such a phenomenon, which I define as Minitelisation, can be the result of undue discrimination at the network level, as well as of the combination of low data caps and some ZR practices. Both strategies aim to predefine artificially how individuals should use the Internet, whilst NN aims at avoiding such phenomenon.

As I have argued in Section II, the definition of limited data caps is an essential component of the success of ZR and, eventually, Minitelisation. Indeed, as explained by Arnold et al. (2015), consumers consider ZR offerings as attractive primarily when data caps are low. When data caps are wide or absent however, consumers do not manifest particular interest in ZR offerings. As such, a further collateral effect of ZR schemes may be to incentivise operators to keep data caps as low as possible, whilst increasing the prices of open Internet access, thus creating artificial scarcity in order to extract additional profit. In particular, vertically-integrated operators may have a strong incentive to keep data caps artificially low and gigabyte prices artificially high, in order to orient users' preferences towards the affiliated zero-rated services.

As pointed out by Rewheel (2014), by the end of 2014, ZR offerings had been introduced in more than 80% of EU and OECD countries and the introduction of such offerings generated 'sharp hikes in the price of mobile internet usage'[63] amongst the operators deploying ZR practices. Such a tendency is confirmed by data concerning 2015 and the first 2016 semester, according to which, EU and OECD operators that zero-rate selected video-streaming services sell half as much open Internet access than operators that do not (Rewheel 2016). By contrast, the absence of ZR may stimulate operators to increase the volume of data caps, as demonstrated in the Netherlands, where one week after the Authority for Consumers and Markets' had banned ZR, the main Dutch operator, KPN, decided to double the volume of its mobile Internet data caps (Rewheel 2015). As tellingly explained by KPN's CEO, such an example reveals that when ZR is not an option, operators are incentivised to 'increase the size of its data bundles for users, to encourage carefree usage'[64]. The Dutch example is of particular interest because, contrary to the price-increase tendency evidenced in other European counties, KPN reduced of 80% the price of mobile Internet usage, whilst doubling

[63] See Rewheel (2014) p. 1.
[64] See KPN's CEO, Eelco Blok, quoted by Rewheel (2015), p. 1.

monthly data caps between November 2014 and February 2015 (Rewheel 2015). Similarly, data caps doubled and the price of megabytes dropped of 60%, when Brazilian operator, Claro, decided to abandon its ZR in early 2015 (Belli 2015).

Furthermore, data analysed by A4AI in eight developing countries seems to corroborate the Minitelisation thesis, showing that ZR has direct impact on users' freedom of choice. Indeed, although the vast majority of users[65] affirm that they would prefer to have full Internet connection for a limited time or limited data volume, rather than unlimited access to specific services, ZR practices induce 72% of users to remain within ZR services. In particular, '35% of all zero-rating users continue to use the zero-rated service and a paid plan [while] 37% continue to use […] zero-rated service in combination with public WiFi.' Although '28% of all zero-rating users no longer use a zero-rating plan and are now paying customers'[66] it must be noted that ZR seems to be much more effective in creating new customers for selected services, rather than new Internet users. It therefore seems desirable that policymakers and regulators carefully ponder the potential (social, economic and strategic) costs and benefits that the various ZR practices may entail.

Application ZR, application sponsoring and some types of ZR platforms may well be considered as a form of permanent discrimination, the main purpose of which is to drive users' choice towards applications selected by the operator or the sponsor. In this context, it seems palpable that the choice of both existing and new mobile-Internet users is heavily orientated by the perceived gratuity of the application. This concretely means that the financial power of the CAP, or its affiliation with an operator, may became the primary criterion for user choice, rather than the application's quality or usefulness. Although such a system may be economically efficient in providing selected applications to users at no monetary cost (Eisenach 2015), it would likely limit access to the non-zero-rated Internet, including any future innovations that may not materialise, or be successful due to the economic filter preventing their diffusion. Indeed ZR may provide an unfair advantage to the zero-rated CAPs, compared to the non-zero-rated ones or any new entrant, because access to the latter would *de facto* be taxed, requiring a payment – i.e. the consumption of an increasingly pricey data cap (Rewheel 2016). Such configuration would likely restrict the possibility to share and access innovation freely, leading the Internet from a permissionless-innovation environment to a centralised paradigm, closer to the Minitel model.

The limitation of sources of information due to the the combination of sponsored applications and reduced data caps is particularly relevant with regard to media pluralism, which governments have a positive obligation to protect and promote in order

[65] A4AI (2016b) highlights that 'when faced with a restriction in exchange for "free" data, a majority (82%) of users prefer access to the full Internet, even if that access is limited in terms of time or by a data cap' while only a minority of respondents, '(18%) preferred having unlimited data for accessing a limited number of sites (i.e. the way in which most zero-rated services are currently implemented).'
[66] *Ibid.*

to ensure individuals' ability to form their own opinion freely (UNHRC 2004; UNHRC 2011; CoE 2014a). Such consideration has been adamantly voiced by Swedish public-service media, after the introduction of social-media ZR offerings, noting that such practices would endanger public-interest media and national content production to the profit of a very concentrated market, where one single player – i.e. Facebook – owns the majority of social-networking applications. In addition, the use of ZR plans risks the creation of a double filter, limiting users' ability to seek, impart and receive information, via both the price discrimination in favour of the zero-rated application, and the application's term of service and algorithmic features. The effects of such limitations on individuals' freedom of expression and opinion may prove to be particularly relevant in developing countries, where ZR plans are presented as a solution to bring information and knowledge to unconnected individuals. Indeed, the Internet experience of such previously unconnected individuals would be limited to the ZR applications, thus allowing them to receive information and communicate only through limited and controlled channels.

Although it may be argued that restricted access to online information and communication may be better that no access at all and that ZR may encourage new users join mobile networks (Facebook 2015), it may easily be imagined that private entities in control of the information supply may be tempted to take advantage of such position. This risk was particularly evident in India, where Facebook intensively lobbied for ZR during the national consultation on price discrimination. Facebook's lobbying strategy to orientate the outcomes of the Indian consultation is particularly relevant. Notably, the social network has been criticised by the national regulator for sending to its users – through its zero-rated platform Free Basics – notifications encouraging them to 'send a message to TRAI [the telecom regulator] to support [Facebook's position on] digital equality'[67] with a link to a standard email with the rather explicit subject, 'I Support Free Basics in India'[68].

This is one of the reasons that led TRAI to rule against ZR, pointing out that such practices 'can prove to be risky in the medium to long term as the knowledge and outlook of [ZR] users would be shaped only by the information made available through those select offerings'.[69] Moreover, it is important to consider that zero-rated users may not even realise they are constrained within a subset of the Internet. This observation seems to be corroborated by the fact that, in several developing countries, users of zero-rated applications, such as Facebook, outnumber Internet users (Mirani 2015) and a considerable percentage of these users assumes that 'Facebook is the Internet'[70] because Facebook is the only accessible application (Orriss 2014).

[67] See TRAI (2016a).
[68] *Idem.*
[69] See TRAI (2016b).
[70] See Mirani (2015).

It seems evident that the purpose of the combination of reduced data caps and the majority of existing ZR schemes[71] is to create artificial scarcity in order to direct new or existing users towards a subset of the Internet, so that their attention can be concentrated on zero-rated content and services and subsequently monetised. As such, users are actively disincentivised from venturing beyond the zero-rated applications and steered into a Minitel-like environment, thus fostering fragmentation of the Internet into subsets of services predefined in a top-down fashion by single operators. These are some of the reasons why several regulators[72] have already deliberated that ZR may disadvantage the CAPs – particularly the small-sized and local ones – that have neither the bargaining power nor the financial capability to be sponsored. In fact, it seems likely that CAPs deemed insufficiently appealing by operators would suffer a competitive disadvantage that is not supposed to exist in an open Internet environment. This situation 'may thus create entry barriers and non-level playing field for these players stifling innovation'[73]. Besides, it is important to stress that ZR service users may be prevented from utilising encrypted HTTPS connections, and thus faced with a difficult trade-off between a free application and the protection of their communications' privacy. T-Mobile's Binge On offering is a telling example, foreseeing that videos using HTTPS encryption 'require additional T- Mobile assessment of the technical feasibility to qualify for inclusion in the offering'[74].

For these reasons, regulators should carefully scrutinise ZR practices, assessing their compatibility with NN and the effects that they may have on end-user control, competition, consumer protection, innovation and free expression.

Conclusion: Internet or Minitel? That is the question.

The extent to which ZR may be interpreted as a legitimate business practice or as an interference with competition, freedom of choice and freedom of information, depends on the specificity of the ZR model and, importantly, on the legal framework of reference. In this respect, the US Open Internet rules provide useful criteria which aim to evaluate ZR schemes based on a case-by-case approach (FCC 2015). However, it remains highly debatable whether a case-by-case approach might be beneficial, or simply add a further level of complexity – and ultimately, whether ZR practices might be desirable at all. Indeed, as argued in the previous sections, although ZR may determine short-term benefits, it also has the potential to generate distortions similar to those that can be produced by discriminatory ITM. Furthermore, besides fostering Minitelisation, the diffusion of ZR offerings might dissuade governments and other

[71] In particular, I refer to application ZR, application sponsoring and closed ZR platforms.
[72] See *supra* note 50.
[73] See TRAI (2016b), p. 6.
[74] See T-Mobile (2015).

stakeholders from working towards sustainable solutions to foster open Internet access (Rossini and Moore 2015).

Access to selected portions of the Internet – unilaterally defined by private entities based on diverging commercial interests – has the potential to foster fragmentation and create digital divides. This scenario is antithetical to a network of networks, created to let innovation spring up from everywhere. As I have argued, such generativity is key, because it definitively means that the growth and evolution of the Internet are not, and cannot be, predefined by the will of any controlling entities. Indeed, unlike preceding networks, whose purpose was delineated by the operator, the Internet empowers every individual user who has the ability to choose how to use and contribute to the Internet, as an active participant rather than a simple consumer. When discussing ZR, particularly in the context of NN frameworks, the question that policymakers should keep in mind is therefore whether specific ITM practices or price-discrimination practices have the potential to hinder such a user-empowering environment. Internet generativity and permissionless innovation are not mere side effects; on the contrary, they have greatly contributed to the Internet's success and are key to unleashing end-user creativity, favouring freedom of expression and entrepreneurship (van Schewick 2010; Daigle 2015; Belli and De Filippi 2016).

The fundamental goal of policymakers should be the promotion of sustainable Internet connectivity rather than Minitelisation. As such, while regulators should scrutinise ZR practices, policymakers should promote the adoption of alternative approaches to foster full Internet access. A viable alternative to the traditional Internet access models, and to ZR, may be, for instance, the promotion of community networks, crowdsourced networks, structured to be open, free, and neutral, and which are springing up all around the world (Baig et al. 2015; De Filippi and Tréguer 2016). Such networks represent a possibility for individuals not only to be at the heart of creativity but also at the heart of connectivity, fostering a Fibre-From-The-Home rather than Fibre-To-The-Home system (Echániz 2015), involving individuals in the development and organisation of the infrastructure. This seems to be the kind of empowerment that policymakers should be promoting, aiming for a sustainable Internet environment, where information and innovation can circulate freely and it is possible for users to be active developers, creators and entrepreneurs, rather than being forced to be passive consumers.

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