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Internet Regulation and Development: The Battle Over the Network Neutrality

Ph.D. Thesis Supervisor: Professor Carlos Portugal Gouvêa

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ABSTRACT

CINTRA DE MELO, Lílian. **Internet Regulation and Development**: The Battle Over the Network Neutrality. 2018. 235. Ph.D. Thesis, University of São Paulo Law School, São Paulo, 2018.

We have arrived at crossroads in the debates about the future of the internet governance. It is high time to address the reasons why policy choices have not been sufficient to preserve the internet's promise to bring about development, democratic engagement, and social justice. The network neutrality is central to this debate since it intersects all internet layers and is related to most contemporary issues that will shape future of the internet. My assumption is that network neutrality's failures are not an unintended consequence of the regulatory system, but part of the problem. My core hypothesis is that network neutrality's limits mainly occur because of, first, its inability to secure all envisioned goals and, second, its decontextualized focus on innovation on the last mile of the internet distributional chain. The network neutrality debate has produced a wide variety of work embedded within economic and legal studies regarding what would be necessary to guarantee a free and innovative internet. Although this work has been often disguised under the mask of technique, it is widespread influenced by the evolutionary economics and denies the network neutrality's effects on ongoing struggles for social and economic justice. My proposition is that network neutrality debate has failed because it proved unable to address the problems related to concentrated power structures on the internet and increasing inequalities. To achieve this objective, this dissertation investigates the network neutrality debate over the last decades to identify processes and mechanisms by which its sterile arrangements came to take specific form in time and place, focusing on what such arrangements might inform about contemporary policy efforts. In Chapter 1, prevalent internet governance myths are deconstructed, presenting how specific architecture design and the corresponding network neutrality outcomes came to prevail in particular periods. Drawing upon and integration of distinct source materials, Chapters 2 and 3 identify the specific contingencies over the past decades by which a dynamic set of evolving actors, events, and institutions converged (or not) and gave rise to current network neutrality rules and dissent in the United States and Brazil. At the center of the analysis is the identification of structures and power struggles. Finally, Chapter 4 aims at presenting a new framework towards the network neutrality debate and its potential distributive effects in the global economy, taking technology not as deterministic but embedded and being embedded in all the building blocks of what we term the social.

Keywords: Network neutrality; Internet Governance; Innovation; ICT; Internet access; Inequality; Structure; Economic power; Law and Development; S&TS

Neutralidade da rede; Governança da Internet; Inovação; TIC; Acesso à internet; Desigualdade; Estrutura, Poder Econômico; Direito e Desenvolvimento; Tecnologia e Sociedade.

RESUMO

CINTRA DE MELO, Lílian. Regulação da Internet e desenvolvimento: A disputa da neutralidade da rede. 2018. 235. Tese (Doutorado em Direito). Faculdade de Direito, Universidade de São Paulo, São Paulo, 2018.

A governança da internet vive um momento crítico. É imprescindível abordar as razões pelas quais as escolhas feitas até então não foram suficientes para preservar a promessa da internet de promover o desenvolvimento, o engajamento democrático e a justiça social. Nesse sentido, o debate da neutralidade da rede é fundamental uma vez que ele intersecta todas as camadas da internet e está relacionado com a maioria das questões mais atuais que definirão o futuro da internet. A hipótese da presente pesquisa é a de que as limitações da neutralidade da rede não são uma consequência indesejada, mas o cerne do problema em si. Tais limitações da neutralidade da rede ocorrem, primeiro, porque ela é incapaz de garantir todos os objetivos a que se pretende e, segundo, porque o foco em inovação na última milha da cadeia de distribuição da internet desconsidera a realidade em que se insere. O debate sobre a neutralidade da rede produziu uma ampla variedade de trabalhos que incorporam estudos jurídicos e econômicos sobre o que seria necessário para garantir uma internet livre e inovadora. Embora este debate tenha sido frequentemente produzido sob os auspícios do discurso técnico, é marcante a influência da economia evolutiva, que ignora os efeitos da neutralidade da rede nos atuais dilemas sobre justiça social e desenvolvimento econômico. Propõe-se que o debate da neutralidade da rede fracassou porque não aborda os problemas relacionados às estruturas de poder concentradas na internet e ao aumento das desigualdades. Para tanto, o debate da neutralidade da rede é revisitado nas últimas décadas para identificar os processos e os mecanismos pelos quais seus arranjos tomaram forma específica no tempo e no espaço. No Capítulo 1, os mitos disseminados da governança da internet são desconstruídos, apresentando a forma pela qual a arquitetura específica e os resultados correspondentes da neutralidade da rede prevaleceram em períodos específicos. No Capítulo 1, os mitos disseminados da governança da internet são desconstruídos, apresentando a forma pela qual o desenho e a arquitetura específicos da internet, bem como seus correspondentes resultados na neutralidade da rede, prevaleceram em certos períodos. Partindo de uma consolidação de materiais e de fontes de origem, os Capítulos 2 e 3 identificam as contingências específicas das últimas décadas pelas quais um conjunto

dinâmico de atores, eventos e instituições convergiu (ou não) e deu origem aos atuais consensos e dissensos sobre a neutralidade da rede nos Estados Unidos e no Brasil. Tal análise objetiva identificar as estruturas e os conflitos de poder. Por fim, o Capítulo 4 busca apresentar um novo arcabouço para a análise do debate da neutralidade da rede e de seus efeitos potencialmente distributivos na economia global, afastando-se do determinismo tecnológico e considerando que a internet não só incorpora, como também é incorporada em todos os blocos de construção do que denominamos sociedade.

Palavras-chave: Neutralidade da rede; Governança da Internet; Inovação; TIC; Acesso à internet; Desigualdade; Estrutura, Poder Econômico; Direito e Desenvolvimento; Tecnologia e Sociedade.

RÉSUMÉ

CINTRA DE MELO, Lílian. Règlement de l'Internet et développement: La dispute sur la neutralité du réseau. 2018. 235. Thèse (Doctorat en Droit). Faculté de Droit de l'Université de São Paulo, São Paulo, 2018.

La gouvernance de l'Internet est à un moment décisif. Il est impératif d'examiner les raisons pour lesquelles les choix faits jusqu'à présent n'ont pas été suffisants pour préserver la promesse d'Internet e susciter le développement, l'engagement démocratique et la justice sociale. En ce sens, le débat sur la neutralité du réseau est essentiel puisque il recoupe toutes les couches d'Internet et est lié à la plupart des questions plus actuelles qui définiront le futur d'Internet. Mon hypothèse est que les limites de la neutralité du réseau ne sont pas une conséquence involontaire du système de réglementation, mais le cœur du problème luimême.

Ces limitations de la neutralité du réseau se produisent, premièrement, en raison de son incapacité à garantir tous les objectifs envisagés et, deuxièmement, parce que l'accent mis sur l'innovation dans le dernier kilomètre de la chaîne de distribution de l'Internet ne tient pas compte de la réalité dans laquelle il opère. Le débat sur la neutralité du réseau a produit une grande variété de travaux intégrés dans les études économiques et juridiques concernant ce qui serait nécessaire pour assurerun internet libre et innovant. Bien que ce débat ait souvent été réalisé sous les auspices du discours technique, l'influence de l'économie évolutionniste, qui ignore les effets de la neutralité du réseau sur les dilemmes actuels de la justice sociale et du développement économique, est frappante. Il est proposé que le débat sur la neutralité du network ait échoué parce qu'il ne répond pas aux problèmes liés aux structures de pouvoir concentrées sur l'Internet et à la croissance des inégalités. Pour atteindre cet objectif, cette thèse revisite au cours des dernières décennies pour identifier les processus et les mécanismes par lesquels ses arrangements ont pris une forme spécifique dans le temps et l'espace. Dans le Chapitre 1, les mythes répandus sur la gouvernance de l'Internet sont déconstruits, présentant comment la conception de l'architecture de l'Internet et les résultats correspondants de la neutralité du réseau ont prévalu à certaines périodes.

Partant d'une consolidation des matériaux et des sources originales, les Chapitres 2 et 3 identifient les contingences spécifiques des dernières décennies pour lesquelles un ensemble dynamique et en évolution d'acteurs, d'événements et d'institutions a convergé (ou non) et a

donné lieu au consensus et à la dissidence actuels sur la neutralité du réseau aux États-Unis et au Brésil. Au centre de l'analyse est l'identification des structures et les conflits de pouvoir. Enfin, le Chapitre 4 vise à présenter un nouveau cadre vers le débat sur la neutralité du réseau et ses effets distributifs dans l'économie mondiale, en s'éloignant du déterminisme technologique et en considérant que l'Internet non seulement intégre, mais est également est intégrée dans tous les blocs de construction de ce que nous appelons la société.

Mots-clés: Neutralité du réseau; Gouvernance de l'Internet; Innovation; TIC; Accès à Internet; Inégalité; Structure ; Pouvoir Économique; Droit et Développement; Technologie et Société.

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LIST OF ABBREVIATIONS

ABT Agreement on Basic Telecommunications, 66

ACC Merger control agreement, 147

Anatel National Telecommunications Agency, 123

ANS Advanced Network Services, 43

API Programming interfaces, 58

ARPA Advanced Research Project Agency, 38

AS Autonomous systems, 62

BCR Brazilian Civil Rights Framework, 30

BEREC Body of European Regulators for Electronic Communications, 31

BGP Border Gateway Protocol, 41

BOC Bell of Operating Companies, 75

CADE Administrative Council for Economic Defence, 146

CDA Communications Decency Act, 51

CDN Content Delivery Network, 47

CEI Comparably efficient interconnections, 76

CERN European Organization for Nuclear Research Center, 41

CIX Commercial Internet eXchange, 43

CLEC Competitive Local Exchange Carriers, 79

CNPq Brazilian Federal Government through the National Council of

Scientific and Technological Development, 42

CTS-FGV Center for Technology and Society of the Getúlio Vargas Foundation

DDN-NIC Defense Data Network-Network Information Center, 40

DNS Domain Name System, 40

DoD U.S. Department of Defense, 37

DPI Deep packet inspection, 49

ECFS Electronic Comment Filing System, 110

ECLAC UN Economic Commission for Latin America and the Caribbean, 121

EFF Electronic Frontier Foundation, 51

EGP Exterior Gateway Protocol, 41

Embratel Brazilian Company of Telecommunications S.A., 54

FAPESP São Paulo Research Foundation, 41

FCC U.S. Federal Communications Commission, 30

FTC Federal Trade Commission, 87

Fund for the Technological Development of Telecommunications, 126 **FUNTTEL**

FUST Telecommunications Services Universalization Fund, 126

GIS Global Information Society, 66 HDI Human Development Index, 144

Hypertext transfer protocol, 41 IAB Internet Architecture Board, 69

HTTP

IANA Internet Assigned Numbers Authority, 42

IBGE Brazilian Institute of Geography and Statistics, 34, 142

ICANN Internet Corporation for Assigned Names and Numbers, 67

IETF Internet Engineering Task Force, 42

IGF Internet Governance Forum, 68 **IGP** Interior Gateway Protocol, 41

ILEC Incumbent Local Exchange Carriers, 79

IMF International Monetary Fund, 43, 54

ΙP Internet Protocol, 38

IRTF Internet Research Task Force, 42

ISI Import Substitution Industrialization, 121

ISOC Internet Society, 69

ISP Internet services providers, 30

ITU International Telecommunication Union, 65

IXP Internet exchange points, 45

LGT General Telecommunications Act, 123

LNCC National Laboratory of Scientific Computing, 41

MAC Media access control address, 61

MMDS Multichannel multipoint distribution, 133

NAFTA North American Free Trade Agreement, 66

NBP U.S. National Broadband Plan, 106

NSF U.S. National Science Foundation, 37

ONA Open network architectures, 76

OTT Over-the-top services, 55

PGMU General Plan for Universalization, 125

PNAD National Household Sample Surveys, 34 PST Telecommunications service stations, 127

REPNBL Special Taxation of the National Broadband Deployment of T

Telecommunications Networks, 133

RFC Request for Comments, 42

RNP National Research Network, 41

SAC service of conditional access, 127

SAL-MJ Secretariat of Legislative Affairs of the Ministry of Justice, 134

SCD Multimedia Communication Service, 127

SCM Multimedia communication service, 126

SGDC Geostationary Defense and Strategic Communications Satellite, 133

SMP Personal mobile service, 133

S&TS Science and Technology Studies

TCP Transmission Control Protocol, 38

Telebrás Telecomunicações Brasileiras S.A., 54

UDP User Datagram Protocol, 60

UNE-P Unbundled network element platform, 80

URL Uniform resource locator, 41

VAT Value Added Tax, 126

VoIP Voice over IP, 44

W3C World Wide Web Consortium, 42

WEF World Economic Forum, 70

WSIS World Summit on the Information Society, 67

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SUMMARY

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INTRODUCTION

The objective of this dissertation is to revisit the network neutrality debate identifying an analytical framework for examining the reasons why arguments have not been sufficient to preserve the internet's promise to bring about development, democratic engagement, and social justice. My assumption is that network neutrality's failures are not an unintended consequence of the regulatory system, but part of the problem. My core hypothesis is that network neutrality's limits mainly occur because of, first, its inability to secure all envisioned goals and, second, its decontextualized focus on innovation on the last mile of the internet distributional chain. Although the network neutrality debate has often been disguised under the mask of technique, it also has produced a wide variety of work embedded within economic and legal studies regarding what would be necessary to guarantee a free and innovative internet. This production has been mainly influenced by the evolutionary economics and denies the network neutrality's effects on ongoing struggles for social and economic justice. My proposition is that network neutrality debate has failed because it proved unable to address the problems related to concentrated power structures on the internet and increasing inequalities. To achieve this objective, this dissertation investigates the network neutrality debate over the last decades to identify processes and mechanisms by which its sterile arrangements came to take specific form in time and place, focusing on what such arrangements might inform about contemporary policy efforts.

Perhaps the most outstanding debate in communications and internet policy of the first decade of the 21st century was - and continues to be - network neutrality. The term "network neutrality" is controversial. It refers to policy and regulatory practices, which prescribe that internet traffic shall be treated in non-discriminatory ways, aim at safeguarding users' capability to access and use lawful content, applications, services, and devices, without having to request the permission of any operators. Anxieties about broadband management practices have echoed past discussions about telephony, broadcast, and cable regulations. Even more ancient, the "common carriage" principle was born in transportation infrastructures, which require roads' owners to provide services without unreasonable

¹ The term "internet" emerged in 1974 as a simple abbreviation for "internet-work" between multiple computers or a "network of networks" (see 1.3). Since the internet's creation, the technical community (such as, IETF, ICANN, W3C and the Internet Society) has spelled "Internet" with an initial capital letter, treated as a proper noun in English. However, this dissertation adopts the 17th Edition of the Chicago Manual of Style which recommends writing "internet" lowercased.

discrimination. The principle has been recurrently adapted, and adopted, in diverse industries, such as electricity, post offices, and telecommunications services.

Dissention about the concept of network neutrality brought together multiple aspects and is currently being debated on numerous forums.² The debate received considerable attention from legislators, technical-scientific bodies, multilateral agencies, academia, and even presidential candidates,³ popular media and beyond.⁴ Most recently, in 2017, the U.S. Federal Communications Commission (FCC) reassessed the network neutrality debate through a proposal called "Restoring Internet Freedom Order," which antagonizes the 2015 FCC Open Internet Order, upheld by the D.C. Circuit Court of Appeals in 2016. The Open Internet Order of 2015 the first time asserted FCC's statutory authority to address the ISPs traffic exchange practices and reclassified broadband internet access as telecommunications services (or "common-carriers"), under Title II of the 1996 Telecommunications Act. This ruling introduced the network neutrality provision in the U.S., which prohibited carriers from blocking or throttling lawful content, charging for prioritized delivery, and unreasonably interfering with content transmission. In its lasted Order, FCC explicitly proposed a rereclassification of broadband as information service, ending the network neutrality rule in the U.S.⁵

In 2016, the European Union Parliament and the E.U. Council adopted the Regulation EU 2015/2120, which establishes communitaire rules to safeguard equal and non-discriminatory treatment of traffic in the provision of internet access services and related end-users' rights. According to the Regulation EU 2015/2120, internet traffic must be treated equally, subject to strict and identified public-interest exceptions and the necessary, day-to-day network management of internet service providers, enshrining the principle of network neutrality into law. The E.U. provision is the result of the adoption of the network neutrality as a policy objective and a regulatory principle in 2009. The E.U. rule came into effect in

² Luis A Albornoz and Ian Barnett, *Power, Media, Culture*, ed. Luis A Albornoz, trans. Ian Barnett (Palgrave Macmillan, 2015), 170.

⁴ In the U.S., the network neutrality issue found its way into places where media policy discussions rarely tread, such as into mainstream venues like "The Daily Show" with Jon Stewart and "Last Week Tonight" with John Oliver. In 2012, the U.S. President Barack Obama campaigned for office on a platform that included explicit support for network neutrality.

⁵ See Section 2.3.2 below.

2016, and the Body of European Regulators for Electronic Communications (BEREC) produced the guidelines for its implementation.⁶

In turn, in Brazil, the Law No. 12,965 of 2014, known as "the Brazilian Civil Rights Framework" (BCR), provides a general legal framework for the use of the internet within the country. Adopted in April 2014, the BCR protects the network neutrality in Brazil into law, prohibiting unilateral practices and agreements between ISPs which compromise the public and unrestricted character of internet access, or promote data and applications packets to the detriment of other offers. The BCR was sanctioned by the Brazilian President during opening ceremony of the NetMundial, an event promoted by global internet governance entities, shortly after the Edward Snowden revelations about U.S. surveillance schemes. Brazil's adoption of the BCR had the broader goal to call the world's attention to the U.S. control over the internet. The network neutrality provision came in form of a principle, which as later regulated by the Decree No. 8,771 of 2016.

The present dissertation describes the technical, political, economic, and legal dimensions of the network neutrality debate to suggest a new analytic framework, contrasting the mainstream environment of increasing rhetoric. This work's objective is twofold. First, it aims at identifying the limits of the network neutrality, and, second, to drafting a proposal for a new agenda for development and social justice to the digital environment that reflects context's specific conditions and history. Neither traditional legal analysis nor its chastened combination with economics can respond to the existing network neutrality *quid-pro-quo* since they lack methods and vocabulary to explore ICT-based societies in all their complexity. For these reasons, this dissertation is placed within an integrated framework of historical, comparative, and critical legal methods. We examine legal issues and court decisions as far as they have significantly altered the shape of the telecommunications industry.

⁶ Barbara van Schewick, "Internet Architecture and Innovation in Applications," *Handbook on the Economics of the Internet*, 2016, 84.

⁷ Edward Snowden, revealed that U.S. surveillance systems targeted Brazilian networks, citizens, as well as the government itself. The Snowden revelations raised concerns globally, and specifically in Brazil it pressured the enactment of the Brazilian Civil Rights Framework during the NetMundial event.

Chapter 1 assumes history⁸ can reframe our understanding of specific problems, permitting to think anew about what the present denies. With the objective of deconstructing widespread myths, this dissertation presents how specific internet architecture design and the corresponding network neutrality outcomes came to prevail in specific periods. The frail dichotomy of law-versus-politics is not only undertheorized but also falsely dichotomized; the two always interact and operate in parallel, simultaneously. An influential scholarship has examined ICT through the lens of the politics of technical architecture. As first introduced by Langdon Winner in his pioneered piece "Do Artifacts Have Politics?" politics is not external to technical architectures. Winner explained that "at issue is the claim that the machines, structures, and systems of modern material culture can be accurately judged not only for their contributions to efficiency and productivity and their positive and negative environmental side effects but also for how they can embody specific forms of power and authority."10 Also growing from various disciplinary backgrounds, Science and Technology Studies (S&TS) encompasses a rich set of theoretical and methodological perspectives directed toward the investigation of how scientific discovery and its technological applications link up with other social developments, in law, politics, public policy, ethics, and culture. 11 According to Sheila Jasanoff, technology and social order are produced contemporaneously, avoiding both technological and social determinism.¹²

Also, Section 1.3 analyzes both competing and collaborator relations between intergovernmental bodies and internet organizations aiming at better understanding how the interplay between public and private actors redefines the role of organizations and creates new spaces for regulation. Internet governance studies have often neglected a structural perspective on the political economy of new markets creation about an emerging technology, such as the internet. Global markets do not emerge out of private initiative only; they depend

⁸ The term "history" is used in this dissertation as both "the past" and the discipline of History.

⁹ Lawrence Lessig, "The Law of the Horse: What Cyberlaw Might Teach," Harvard Law Review 113, no. 2 (1999): 501.

¹⁰ Paul Schiff Berman, ed., Law and Society Approaches to Cyberspace (Ashgate Publishing Limited, 2007), xiii.

¹¹ Lawrence Lessig, "The Law of the Horse: What Cyberlaw Might Teach," *Harvard Law Review* 113, no. 2 (1999): 501. For more about S&TS, see Langdon Winner, "Do Artifacts Have Politics?," *Technology and the Future* 109, no. 1 (2003): 148–64.

¹² Sheila Jasanoff, "The Idiom of Co-Production," in *States of Knowledge: The Co-Production of Sciences and Social Order*, 2004, 2.

on a preexisting global institutional framework.¹³ Thus, in this section, we investigate the interplay between global public and private actors to understand how it creates new spaces for regulation.

Chapters 2 and 3 aims at getting inside the black box of internet governance to address the network neutrality processes and mechanisms by which cause gives rise to effect. History has a strong influence on policy decision that might shape the future since it limits the available options for public and private agents. Thus, this dissertation identifies the specific contingencies over the past decades in the United States and Brazil by which a dynamic set of evolving actors, events, and institutions converged (or not) and gave rise to current network neutrality rules and dissent. The historical research demonstrated the significant role played by the U.S. in the network neutrality debate, succeeding its central contribution to the internet's creation and development, as well as its governance. Specific comparisons between the U.S. and Brazil shall consider their complex and overlapping set of problems. These considerations get some inspirations from the now enduring concept of "path dependence," 14 according to which a set of historical events and institutions in a country's past have exerted an influence upon its subsequent history. Although the concept of path dependency is influential to this work, its meaning is not narrow perceived as a deterministic influence upon history or technological change. Here, we comprehend the past as constitutive of the present, nor determinative of it.

Concluding 0 is based on a multidisciplinary approach towards a new framework for the analysis of the network neutrality, which takes technology not as deterministic but embedded and being embedded in all the building blocks of what we term the social. In the same way, it considers law does not exist in a vacuum but interacts with technical design, political choices, and economic structures, ranging from individual civil liberties to global innovation policy.¹⁵

¹³ Michael Woolcock, Simon Szeter, and Vijayendra Rao, "How and Why History Matters for Development Policy," in *History Historians and Development Policy: A Necessary Dialog*, ed. Rayly et al., 2011, 13–18

¹⁴ The term "path dependence" was originally coined by economic historian Brian Arthur to refer to the way certain technological choices persisted, because they had become engrained in everyday practices. The key idea is that in a sequence of events, the latter events are not completely independent from those that occurred in the past. *See* "Decree No. 8,771," Pub. L. No. 8,771 (2016).

¹⁵ Tim Wu, "Network Neutrality, Broadband Discrimination," *Journal on Telecommunications & High Technology Law* 2, no. 2001 (2003): 141–76.

At the center of the analysis presented in 3.3.24 is a new framework for the identification of power and structure. Critical Legal Thought has shown that "[1]aw is not free," there are structures that support the "repeat play of the haves against the have-nots." ¹⁶ Here, the term critical refers to traditions of critique as well as values of investigating and questioning arrangements.¹⁷ The critical approach places emphasis on the unequal distribution of power and the arrangements whereby such inequalities are sustained and reproduced. This recognition, in turn, requires critical engagement with the analysis of structural changes for accomplishing law's distributive role in the global political economy. As Carlos Portugal Gouvêa states "increases in economic inequality may create barriers for the integrations of the poorer individuals in the poorest countries into the global economy" 18 Thus, the true democratic and inclusive internet governance model shall contest inequality and the network neutrality debate can play a significant role, taking one step back and assuming a more critical perspective, identifying past failures, such as disregarding the effects of digital exclusion. However, if it continues to follow the current mainstream approach, the network neutrality is doomed to death. The internet governance is at crossroads and how it will adjust its strategies and policies will shape the future of the internet.

This work draws upon and integration of distinct types and source materials. In the first three sections, it reveals an extensive analysis of bibliographical research and official documents related to the evolution of the network neutrality debate and the political, legal, and economic contexts in which the U.S. and Brazil have discussed and adopted their rules over the last twenty years. ¹⁹ One seeking to deepen the analysis on network neutrality debate

¹⁶ Sheila Jasanoff et al., eds., *Handbook of Science and Technology Studies* (Sage Publications, 1995).

¹⁷ Term critical also alludes to values of critique in intellectual enquiry, such as questioning, interrogating, and challenging the adequacy of phenomena explanations.

¹⁸ Carlos Portugal Gouvêa, "Equity Cost Analysis: A Contribution to Institutional Theory in Face of Increasing Global Inequalities." 2008, 240.

Official documents included: (i) the FCC Protecting and Promoting the Open Internet proceedings; the FCC Preserving the Open Internet proceedings; the FCC Restoring Internet Freedom proceedings; the FCC Computer Inquiries; the FCC Framework for Broadband Access to the Internet Over Wireline Facilities; Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 Inquiry; High-Speed Access to the Internet over Cable and Other Facilities Inquiry; Deployment of Advanced Telecommunications Capability to All Americans Inquiry; (ii) merger proceedings: America Online, Inc. and Time Warner Inc., WL 1836342 F.T.C. (Docket No. C-3989) (2000); AT&T Inc. and BellSouth Corporation Application for Transfer of Control, Memorandum Opinion and Order, 22 FCC Rcd. 5662, 5814 (2007); MediaOne Group, Inc. to AT&T Corp. 15 F.C.C. Rcd. 9816 (Order) (1999); SBC Communications Inc. and AT&T Corp. Applications for Approval of Transfer of Control, Memorandum Opinion and Order, 20 FCC Rcd. 18290, 18392 (2005); (iii) other FCC proceedings: Formal Complaint of Free Press & Public Knowledge Against Comcast Corp. for Secretly Degrading Peer-to-Peer Applications, 23 FCC Rcc. 13028 (2008); Madison River Commc'ns, LLC, Order and Consent Decree, 20 FCC Rcd.

is easily misled by the existing literature: it is massive, saturated with commonplace and shallow ideas that provide the illusion of increasing knowledge related to communications and internet policy. For this reason, primary materials, such as official documents and case law, are fundamental to this research. In the U.S., documents set included a series of relevant court decisions, 20 the FCC proceedings regarding broadband internet access, and significant telecommunications merger proceedings. Additional empirical data related to the U.S. demographics, broadband internet reachability and its effects are briefly analyzed. In Brazil, the document set encompassed official documents produced by Brazilian authorities during the discussions of the Bill No. 2,126 of 2011, the Law No. 12,965 of 2014, and the Decree No. 8, 771 of 2016.²¹ Also, a selection of supporting documents from the Brazilian National Telecommunications Agency (Anatel), and the Brazilian Internet Steering Committee (CGI.br) was examined. This work uses data representative of the Brazilian population from the National Household Sample Surveys (PNAD), conducted by Brazilian Institute of Geography and Statistics (IBGE), to illustrates the internet access' reachability and its effects. The Gini index is used to explore the evolution of the digital divide and its determinants.²² Finally, surveys developed by the Organization for Economic Co-operation and Development (OECD), the U.N. International Telecommunication Union (ITU), Anatel and CGI.br related to global internet access were also included in the present analysis.

Having described some useful theoretical and methodological approaches utilized in the present research, some of its research limits also deserves attention. The first and most relevant of these limits is the spuriousness of the data related to traffic management practices. Many assumptions about the relationship between network neutrality rules and investment

4295 (2005); and (iv) U.S. Bills referring to "net neutrality" or "open internet" available at the U.S. Congress website.

AT&T, et. al. v. City of Portland, U.S. Court of Appeals, 9th Circuit, Appeal No. 99-35609 (1999); Bell Atlantic Telephone Companies v. F.C.C 206 F.3d 1, 340 U.S.App.D.C. 328, 199 P.U.R.4th 458, D.C.Cir.," 2000; Brand X Internet Servs. v. FCC, 345 F.3d 1120 (9th Cir. 2003), rev'd and remanded sub nom. Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs., 545 U.S. 967 (2005).; Comcast Corp. v. FCC, 600 F.3d 642 (D.C. Cir.) (2010); Computer and Comm. Indus. Ass'n v. FCC, 693 F.2d 198, 203 (D.C. Cir.) (1982); Hush-A-Phone Corp. v. U.S. 238 F.2d 266 United States Court of Appeals District of Columbia Circuit (1956); Carterfone Device in Message Toll Tel. Serv., 31 F.C.C.2d 420 (1968); Time Warner Telecom, Inc. v. FCC, 507 F.3d 205 (3d Cir.) (2007); Verizon v. FCC, 740 F.3d 623 (D.C. Cir.) (2014); United States Telecom Ass'n v. FCC, 825 F.3d 674 (D.C. Cir) (2016).

²¹ The BCR Public Hearings Reports, regarding Bill No. 2,126 of 2011, Law No. 12,965 (2014); Decree No. 8,771, Pub. L. No. 8,771 (2016); CADE Technical Note No. 02 (2015); CADE Technical Note No. 34 (2017); CGI.br Principles for the Governance and Use of the Internet, Pub. L. No. Resolution CGI.br/Res/2009/03/E (2009); NetMundial Multistakeholder Statement (2014).

²² Gini index measures the degree of inequality in the distribution of family income in a country. The more nearly equal a country's income distribution, the lower its Gini index.

in internet access infrastructure are hard to prove since variables may be related to each other but have no causal relationship. Also, any causal link between innovation and investment in internet access would require the presentation of hard-to-measure data. However, this limitation is not restricted to the present work, but applies to any research in the field. Another limitation of the present research is related to the proposal of a new agenda for internet governance focusing on economic and social justice. In this sense, perils of reductionism shall be avoided, recognizing one-size-fits-all models under the facade of harmonization or universality cannot address the structural challenges posed by countries. The present framework proposal focuses on the experiences of the U.S. and Brazil and does not pretend to exclude others that might be complimentary. Therefore, presenting such a framework has also the purpose of increasing future researches in the field. as explained in Chapter 4.

CONCLUSION

Few internet governance topics have raised so many controversies as the network neutrality debate. History, since it can reframe our how we perceive specific problems, permitting to think anew about what the present denies. By revisiting the development of the internet form its early days to the most recent challelenges, we deconstructed widespread myths. First, despite common perceptions, the state intervention is deeply rooted in the internet and one of the reasons such technology succeeded. Regulation created the solid ground that made the commercial internet possible. Historically, government was extraordinarily proactive and entrepreneurial in the development and commercialization of the internet. Moreover, design principles for the original architecture were impregnated not only with libertarian thought, but also with the welfarist tradition. In its turn, far from retarding the economic system, regulation also had a leading role in the internet's development, fostering innovation and dynamism.

The network neutrality debate arose within the context of traditional telecommunications policy and internet governance. In the U.S., several key struggles preceded the emergence of the network neutrality concept. Today's FCC Restoring the Internet Freedom Order is the latest iteration of an old debate regarding common carriage obligations aboard telecommunications infrastructure. The network neutrality debate grew out of years of regulatory skirmishes over the extent to which common carriage obligations should apply to data services offered by telephone companies. "Deregulatory" measures previously taken by the FCC created an environment of distress. The emergence of new digital technologies directly competing with the carriers' telephone or video offerings and the decline in operator competition catalyzed concerns with broadband ISPs' potential to discriminate against sources of content and applications.

The shift from open access to network neutrality reveals much more than a shift in rhetorical and political strategy. It enables us to analyze present understandings of the network neutrality and the illusion these understandings portend. If the US had left unbundling rules in place, for example, net neutrality would not have to fulfill this goal of controlling market power locally, it could have been done with unbundling instruments, which is much better suited to control market power. In this sense, the reason for the creation of the network neutrality is the abandonment of the idea of increasing competition through structural measures and facilities unbundling. Many advocates of network neutrality are

fighting to defend openness. However, in the debate nobody is fighting to preserve the internet's promise to bring about development, democratic engagement, and social justice.

In Brazil, the network neutrality debate is deeply entrenched in structural issues related to economic power and inequality. Internet debate has been far too focused on sponsoring innovation in its regulation at the expense of the distributional objectives of communications law. It is time for policymakers and scholars in developing countries put aside the fallacy of the virtuous cycle of internet innovation, and focus their attention to affirmative action to ensure universal access to internet and, consequently, equality.

Finally, the analysis presented in 3.3.24 suffers a way to re-engage in the network neutrality debate, subjecting it to a critical analysis about its contribution to political and economic goals. The chosen analytical approach allows disentangling value and instrumental rationality aspects and a more informed assessment of the specific policy proposals that are put forward. It also allows assessing existing network neutrality policies, notably whether they implemented a combination of instruments that can influence the system in the desired direction. Although we discussed the models that are currently in discussion or in use, other approaches and instrument combinations are theoretically possible. One way of constraining power simultaneously in the internet layers is to create mechanisms for assuring transparency and accountability challenging the need for app approval at all. The main concern with any such system is that it would itself create a control point in the hands of a single gatekeeping entity, whether public or private. Examining the direction of effects and of causality relations can help clarify the ability of single instruments and of combinations of instruments to achieve consented objectives. Its application may facilitate the finding and implementation of important policies that safeguard the broad range of legitimate goals raised in the present debate.

Therefore, the internet debate has been far too focused on sponsoring innovation in its regulation at the expense of the distributional objectives of communications law. It is time for policymakers and scholars in developing countries put aside the fallacy of the virtuous circle of Internet innovation, and focus their attention to affirmative action to ensure universal access to Internet and, consequently, equality. This work makes a novel contribution to the scholarship by identifying the misconception of the current regulatory framework of network neutrality, based on spillover effects of innovation to society's welfare, where the digital divide remains a stubborn problem. Faintly, this dissertation has

attends to produce a theoretical framework for unequal countries, with social and broadband patterns similar to the U.S. and Brazilian disparities, to redress the internet regulation focus to distributional goals. Unless disparities are addressed directly, internet regulation could worsen existing inequalities in the short and long term.

APPENDICES

APPENDIX 1- FIRST DRAFT OF THE NETWORK NEUTRALITY RULE PROPOSED BY TIM WU AND LAWRENCE LESSIG

- § 1. General Right to Unrestricted Network Usage. Broadband Users have the right reasonably to use their Internet connection in ways which are not illegal or harmful to the network. Accordingly neither Broadband Operators nor the Federal Communications Commission shall impose restrictions on the use of an Internet connection except as necessary to:
- (1) Comply with any legal duty created by federal, state or local statute, or as necessary to comply with any executive order, warrant, legal injunction, subpoena, or other duly authorized governmental directive;
- (2) Prevent physical harm to the local Broadband Network caused by any network attachment or network usage;
- (3) Prevent Broadband users from interfering with other Broadband or Internet Users' use of their Internet connections, including but not limited to neutral limits on bandwidth usage, limits on mass transmission of unsolicited email, and limits on the distribution of computer viruses, worms, and limits on denial-of service-or other attacks on others;
- (4) Prevent violations of the security of the Broadband network, including all efforts to gain unauthorized access to computers on the Broadband network or Internet;
- (5) Serve any other purpose specifically authorized by the Federal Communications Commission, based on a weighing of the specific costs and benefit of the restriction.
- § 2. As used in this section,
- (1) "Broadband Operators" means a service provider that provides high-speed connections to the Internet using whatever technology, including but not limited to cable networks, telephone networks, fiber optic connections, and wireless transmission;
- (2) "Broadband Users" means residential and business customers of a Broadband Operator;
- (3) "Broadband Network" means the physical network owned and operated by the Broadband Operator;
- (4) "Restrictions on the Use of an Internet Connection" means any contractual, technical, or other limits placed with or without notice on the Broadband user's Internet Connection.

APPENDIX 2 - NETWORK NEUTRALITY RULE IN BRAZIL (LAW NO. 12.965 OF 23 APRIL 2014)

- Art. 9. The agent in charge of transmission, switching, and routing must give all data packets equal treatment, regardless of content, origin and destination, service, terminal or application.
- §1. Traffic discrimination and degradation will be subject to regulations issued under the exclusive powers granted to the President of the Republic in Art. 84(iv) of the Federal Constitution, for faithful implementation of this Law, after hearing the Brazilian Internet Steering Committee (CGI.br) and the National Telecommunications Agency (Anatel), and may only result from:
- I technical requirements essential to the adequate provision of services and applications, and
- II prioritization of emergency services.
- §2. In the event of traffic discrimination or degradation, as contemplated in §1, the agent in charge must:
- I refrain from causing damage to users, as provided for in Art. 927 of the Law No. 10,406 of 10 January 2002 (Brazilian Civil Code);
- II act in a fair, proportionate, and transparent manner;
- III provide users, in advance, with clear and sufficiently descriptive information on its traffic management and mitigation practices, including network security measures; and mitigation,
- IV provide services on non-discriminatory commercial terms and refrain from anticompetitive practices.
- §3. Subject to the provisions of this article, the content of data packets may not be blocked, monitored, filtered or analyzed in Internet connections, either paid or free of charge, or in transmission, switching, and routing. 348

³⁴⁸ Free translation from "Art. 90 O responsável pela transmissão, comutação ou roteamento tem o dever de tratar de forma isonômica quaisquer pacotes de dados, sem distinção por conteúdo, origem e destino, serviço, terminal ou aplicação.

^{§ 10} A discriminação ou degradação do tráfego será regulamentada nos termos das atribuições privativas do Presidente da República previstas no inciso IV do art. 84 da Constituição Federal, para a fiel execução desta Lei, ouvidos o Comitê Gestor da Internet e a Agência Nacional de Telecomunicações, e somente poderá decorrer de:

I - requisitos técnicos indispensáveis à prestação adequada dos serviços e aplicações; e

II - priorização de serviços de emergência.

^{§ 20} Na hipótese de discriminação ou degradação do tráfego prevista no § 10, o responsável mencionado no caput deve:

I - abster-se de causar dano aos usuários, na forma do art. 927 da Lei no 10.406, de 10 de janeiro de 2002 - Código Civil;

APPENDIX 3 - NETWORK NEUTRALITY RULE IN BRAZIL (DECREE NO. 8.771 OF 11 MAY 2016)

- Art. 3. The equal treatment requirement under Art. 9 of Law No. 12.965 of 2014 must preserve the public and unrestricted character of Internet access and the foundations, principles and objectives of Internet use in Brazil, as provided for in Law No. 12.965 of 2014.
- Art. 4. Traffic discrimination or degradation are exceptional measures, in that it may result only from technical requirements that are essential to providing adequate service and applications or

from prioritization of emergency services, and must comply with all the requirements under Art. 9 §2 of Law 12.965 of 2014.

- Art. 5. The technical requirements that are essential for the adequate provision of services and applications must be complied with by the agent in charge of transmission, switching or routing activities, within its respective network, and must be intended to maintain the network's stability, security, integrity and functionality.
- § 1. The essential technical requirements referred to above are those resulting from:
- I handling network security issues, such as restriction on sending bulk messages (spam) and controlling denial-of-service attacks; and
- II handling exceptional network congestion situations, such as alternative routes in case of main route interruptions and emergencies.
- § 2. The National Telecommunications Agency (Anatel) will conduct inspections and investigations of infractions as to the technical requirements set out in this article, taking into consideration the guidelines established by the Brazilian Internet Steering Committee (CGI.br).³⁴⁹

III - informar previamente de modo transparente, claro e suficientemente descritivo aos seus usuários sobre as práticas de gerenciamento e mitigação de tráfego adotadas, inclusive as relacionadas à segurança da rede; e

II - agir com proporcionalidade, transparência e isonomia;

IV - oferecer serviços em condições comerciais não discriminatórias e abster-se de praticar condutas anticoncorrenciais

^{§ 30} Na provisão de conexão à internet, onerosa ou gratuita, bem como na transmissão, comutação ou roteamento, é vedado bloquear, monitorar, filtrar ou analisar o conteúdo dos pacotes de dados, respeitado o disposto neste artigo."

³⁴⁹ Free translation from "Art. 30 A exigência de tratamento isonômico de que trata o art. 9° da Lei nº 12.965, de 2014, deve garantir a preservação do caráter público e irrestrito do acesso à internet e os fundamentos, princípios e objetivos do uso da internet no País, conforme previsto na Lei nº 12.965, de 2014.

Art. 40 A discriminação ou a degradação de tráfego são medidas excepcionais, na medida em que somente poderão decorrer de requisitos técnicos indispensáveis à prestação adequada de serviços e aplicações ou da priorização de serviços de emergência, sendo necessário o cumprimento de todos os requisitos dispostos no art. 9°, § 2°, da Lei nº 12.965, de 2014.

- Art. 6. In order to provide adequate Internet services and applications, network management is permitted when it is intended to preserve network stability, security and functionality, and uses only technical measures compatible with international standards developed for the proper functioning of the Internet, subject to compliance with the regulatory standards issued by Anatel and taking into consideration the guidelines established by CGI.br.
- Art. 7. The agent in charge of transmission, switching or routing must adopt transparency measures designed to ensure that users understand the reasons for implementing network management practices that result in the discrimination or degradation referred to in Art. 4, such as:
- I including provisions in service contracts entered into with final users and application providers; and
- II disclosing information on network management practices on their websites, using easily understood language.

Sole paragraph. The information contemplated in this article must contain at least:

- I a description mentioned practices;
- II the effects the adoption of mentioned practices on the quality of users' experience; and III the reasons and need for adopting the practices.
- Art. 8. Degradation or discrimination due to the prioritization of emergency services may only result from:
- I communications directed to emergency services providers, or communications among emergency service providers, as provided in regulations issued by the Anatel.
- II communications necessary to warn the population of disaster risks, emergency situations or states of public calamity.

Sole paragraph. Transmission of data in the cases listed in this article will be free of charge.³⁵⁰

Art. 50 Os requisitos técnicos indispensáveis à prestação adequada de serviços e aplicações devem ser observados pelo responsável de atividades de transmissão, de comutação ou de roteamento, no âmbito de sua respectiva rede, e têm como objetivo manter sua estabilidade, segurança, integridade e funcionalidade.

^{§ 10} Os requisitos técnicos indispensáveis apontados no caput são aqueles decorrentes de:

I - tratamento de questões de segurança de redes, tais como restrição ao envio de mensagens em massa (spam) e controle de ataques de negação de serviço; e

II - tratamento de situações excepcionais de congestionamento de redes, tais como rotas alternativas em casos de interrupções da rota principal e em situações de emergência.

^{§ 20} A Agência Nacional de Telecomunicações - Anatel atuará na fiscalização e na apuração de infrações quanto aos requisitos técnicos elencados neste artigo, consideradas as diretrizes estabelecidas pelo Comitê Gestor da Internet - CGIbr."

³⁵⁰ Free translation from: "Art. 60 Para a adequada prestação de serviços e aplicações na internet, é permitido o gerenciamento de redes com o objetivo de preservar sua estabilidade, segurança e funcionalidade, utilizando-se apenas de medidas técnicas compatíveis com os padrões internacionais, desenvolvidos para o

- Art. 9. Unilateral conduct is prohibited, as are agreements made between agents in charge of transmission, switching or routing and applications providers that:
- I compromise the public and unrestricted nature of the Internet and the foundations, principles and objectives of Internet use in Brazil;
- II prioritize data packets by reason of commercial arrangements; or
- III prioritize applications offered by the same agent that is in charge of transmission, switching or routing or by a company within its economic group.
- Art.10. Commercial offers and Internet access pricing models must preserve the unity of the Internet and its open, plural and diverse nature, serving as a means to promote human, economic, social and cultural development, and contributing to build an inclusive and non-discriminatory society.³⁵¹

bom funcionamento da internet, e observados os parâmetros regulatórios expedidos pela Anatel e consideradas as diretrizes estabelecidas pelo CGIbr.

Art. 70 O responsável pela transmissão, pela comutação ou pelo roteamento deverá adotar medidas de transparência para explicitar ao usuário os motivos do gerenciamento que implique a discriminação ou a degradação de que trata o art. 40, tais como:

I - a indicação nos contratos de prestação de serviço firmado com usuários finais ou provedores de aplicação;

II - a divulgação de informações referentes às práticas de gerenciamento adotadas em seus sítios eletrônicos, por meio de linguagem de fácil compreensão.

Parágrafo único. As informações de que trata esse artigo deverão conter, no mínimo:

I - a descrição dessas práticas;

II - os efeitos de sua adoção para a qualidade de experiência dos usuários; e

III - os motivos e a necessidade da adoção dessas práticas.

Art. 80 A degradação ou a discriminação decorrente da priorização de serviços de emergência somente poderá decorrer de:

I - comunicações destinadas aos prestadores dos serviços de emergência, ou comunicação entre eles, conforme previsto na regulamentação da Agência Nacional de Telecomunicações - Anatel; ou

II - comunicações necessárias para informar a população em situações de risco de desastre, de emergência ou de estado de calamidade pública.

Parágrafo único. A transmissão de dados nos casos elencados neste artigo será gratuita."

- ³⁵¹ Free translation from: "Art. 90 Ficam vedadas condutas unilaterais ou acordos entre o responsável pela transmissão, pela comutação ou pelo roteamento e os provedores de aplicação que:
- I comprometam o caráter público e irrestrito do acesso à internet e os fundamentos, os princípios e os objetivos do uso da internet no País;
- II priorizem pacotes de dados em razão de arranjos comerciais; ou
- III privilegiem aplicações ofertadas pelo próprio responsável pela transmissão, pela comutação ou pelo roteamento ou por empresas integrantes de seu grupo econômico.
- Art. 10. As ofertas comerciais e os modelos de cobrança de acesso à internet devem preservar uma internet única, de natureza aberta, plural e diversa, compreendida como um meio para a promoção do desenvolvimento humano, econômico, social e cultural, contribuindo para a construção de uma sociedade inclusiva e não discriminatória."

APPENDIX 4 - EVOLUTION OF THE BRAZILIAN LEGISLATIVE PROCESS FOR THE ELABORATION OF THE NETWORK NEUTRALITY RULE SET FORTH IN LAW NO. 12.965 OF 2014

| Versions Text and Proposed Changes | | | | | |
|---|---|--|--|--|--|
| | Art. 3 The discipline of Internet use in Brazil has the following principles: () IV - preservation and guarantee of network neutrality; Article 9. The agent in charge of transmission, switching, and routing | | | | |
| Draft Bill 8 April 2010 | must give all data packets equal treatment, of content, origin and destination, service, terminal or application, being prohibited from establishing, and its prohibited any discrimination or degradation of traffic that does not derives from technical requirements intended to preserve the contractual quality of the services. Paragraph 1. The content of data packets may not be monitored, filtered analyzed or inspect in Internet connections, either paid or free of charge, | | | | |
| | except for the hypotheses allowed by law. Art. 3 The discipline of Internet use in Brazil has the following principles: | | | | |
| | () IV - preservation and guarantee of network neutrality, <u>according to regulation</u> ; | | | | |
| Draft Law No. 2,126 24 August 2011 | Article 9. The agent in charge of transmission, switching, and rour must give all data packets equal treatment, <u>regardless</u> of content, or and destination, service, terminal or application, <u>being prohibited for establishing</u> , and its prohibited any discrimination or degradation traffic that does not derives from technical requirements intended preserve the contractual quality of the services <u>necessary for the adequal provision of services</u> , in accordance with regulations. Paragraph 1. The content of data packets may not be monitored, filter analyzed or inspect in Internet connections, either paid or free of characters for the hypotheses allowed by law. | | | | |
| | Art. 3 The discipline of Internet use in Brazil has the following principles: | | | | |
| | () IV - preservation and guarantee of network neutrality, <u>according to regulation</u> ; | | | | |
| Amendments to the 1 st Substitute 11 July 2012 | Article 9. The agent in charge of transmission, switching, and routing must give all data packets equal treatment, regardless of content, origin and destination, service, terminal or application—and its prohibited any discrimination or degradation of traffic that does not derives from technical requirements intended to preserve the contractual quality of the services necessary for the adequate provision of services, in accordance with regulations. | | | | |
| | § 1. Traffic discrimination or degradation will be subject to regulations issued Decree, after consulting the recommendations of the Internet Steering Committee in Brazil (CGI.br) and may only arise from: | | | | |

I - technical requirements essential to the adequate use of services and applications; and

II - prioritization of emergency services.

§ 2 In the event of traffic discrimination or degradation, as contemplated in § 1, the agent in charge must:

I - refrain from causing harm to users;

II - respect free competition; and

III - provide users, in advance, with clear and sufficiently descriptive information on its traffic management and mitigation practices;

§ 3° The content of data packets may not be monitored, filtered analyzed or inspect in Internet connections, either paid or free of charge, except for the hypotheses allowed by law regulation.

Art. 3 The discipline of Internet use in Brazil has the following principles:

(...) IV - preservation and guarantee of network neutrality;

Article 9. The agent in charge of transmission, switching, and routing must give all data packets equal treatment, regardless of content, origin and destination, service, terminal or application.

§ 1. Traffic discrimination or degradation will be subject to regulations issued Decree, after consulting the recommendations of the Internet Steering Committee in Brazil (CGI.br) and may only arise from:

Amendments to the 2nd Substitute 7 November 2012

I - technical requirements essential to the adequate use of services and applications; and

II - prioritization of emergency services.

§ 2 In the event of traffic discrimination or degradation, as contemplated in § 1, the agent in charge must:

I - refrain from causing harm to users;

II - respect free competition; and

III - provide users, in advance, with clear and sufficiently descriptive information on its traffic management and mitigation practices;

IV - refrain from anticompetitive practices.

§ 3° The content of data packets may not be blocked, monitored, filtered analyzed or inspect in Internet connections, either paid or free of charge, or in transmission, switching, and routing, except for the hypotheses allowed by regulation.

Art. 3 The discipline of Internet use in Brazil has the following principles:

Amendments to the 3rd Substitute

(...) IV - preservation and guarantee of network neutrality;

5 November 2013

Article 9. The agent in charge of transmission, switching, and routing must give all data packets equal treatment, regardless of content, origin and destination, service, terminal or application.

- § 1. Traffic discrimination or degradation will be subject to regulations issued Decree, after consulting the recommendations of the Internet Steering Committee in Brazil (CGI.br) and may only arise from:
- I technical requirements essential to the adequate use of services and applications; and
- II prioritization of emergency services.
- § 2 In the event of traffic discrimination or degradation, as contemplated in § 1, the agent in charge must:
- I refrain from causing harm damages to users as provided for in Art. 927 of the Law No. 10,406 of 10 January 2002 (Brazilian Civil Code);
- II respect free competition; and
- II act in a fair, proportionate, and transparent manner;
- III provide users, in advance, with clear and sufficiently descriptive information on its traffic management and mitigation practices;
- $IV-\underline{provide\ services\ on\ non-discriminatory\ commercial\ terms\ and}$ refrain from anticompetitive practices.
- § 3° The content of data packets may not be blocked, monitored, filtered <u>or</u> analyzed or inspect in Internet connections, either paid or free of charge, or in transmission, switching, and routing.
- Art. 3 The discipline of Internet use in Brazil has the following principles:
- (...) IV preservation and guarantee of network neutrality;
- Article 9. The agent in charge of transmission, switching, and routing must give all data packets equal treatment, regardless of content, origin and destination, service, terminal or application.
- § 1. Traffic discrimination or degradation will be subject to regulations issued Decree Anatel, and may only arise from:
- I technical requirements essential to the adequate provision of services and applications; and

Amendments to the 4th Substitute 11 December 2013

- II prioritization of emergency services.
- § 2 In the event of traffic discrimination or degradation, as contemplated in § 1, the agent in charge must:
- I refrain from causing damages to users, as provided for in Art. 927 of the Law No. 10,406 of 10 January 2002 (Brazilian Civil Code);
- II act in a fair, proportionate, and transparent manner;
- III provide users, in advance, with clear and sufficiently descriptive information on its traffic management and mitigation practices, <u>including</u> <u>network security measures</u>;
- IV provide services on non-discriminatory commercial terms and refrain from anticompetitive practices.
- § 3°. <u>Subject to the provisions of this article</u>, the content of data packets may not be blocked, monitored, filtered or analyzed in Internet connections, either paid or free of charge, or in transmission, switching, and routing.

- Art. 3 The discipline of Internet use in Brazil has the following principles:
- (...) IV preservation and guarantee of network neutrality;
- Article 9. The agent in charge of transmission, switching, and routing must give all data packets equal treatment, regardless of content, origin and destination, service, terminal or application.
- § 1. Traffic discrimination or degradation will be subject to regulations issued Decree Anatel, and may only arise from:
- I technical requirements essential to the adequate provision of services and applications; and
- II prioritization of emergency services.
- \S 2 In the event of traffic discrimination or degradation, as contemplated in \S 1, the agent in charge must:
- I refrain from causing damages to users, as provided for in Art. 927 of the Law No. 10,406 of 10 January 2002 (Brazilian Civil Code);
- II act in a fair, proportionate, and transparent manner;
- III provide users, in advance, with clear and sufficiently descriptive information on its traffic management and mitigation practices, including network security measures;
- IV provide services on non-discriminatory commercial terms and refrain from anticompetitive practices.
- § 3°. Subject to the provisions of this article, the content of data packets may not be blocked, monitored, filtered or analyzed in Internet connections, either paid or free of charge, or in transmission, switching, and routing.
- § 4°. Subject to the provisions of the caput, special conditions for the traffic of data packets between the person responsible for the transmission and third parties interested in a different provision of service are allowed, provided that there is no harm to normal data traffic.
- Art. 3 The discipline of Internet use in Brazil has the following principles:
- (...) IV preservation and guarantee of network neutrality;
- Article 9. The agent in charge of transmission, switching, and routing must give all data packets equal treatment, regardless of content, origin and destination, service, terminal or application.
- § 1. Traffic discrimination or degradation will be subject to regulations issued by Anatel under the exclusive powers granted to the President of the Republic Art. 84(iv) of the Federal Constitution, for the faithful implementation of this Law, after hearing the Brazilian Internet Steering Committee (CGI.br) and the National Telecommunications Agency (Anatel), and may only result from:
- I technical requirements essential to the adequate provision of services and applications; and
- II prioritization of emergency services.

Agglutinative Amendment 13 March 2014

Approved Text 23 April 2014

- § 2 In the event of traffic discrimination or degradation, as contemplated in § 1, the agent in charge must:
- I refrain from causing damages to users, as provided for in Art. 927 of the Law No. 10,406 of 10 January 2002 (Brazilian Civil Code);
- II act in a fair, proportionate, and transparent manner;
- III provide users, in advance, with clear and sufficiently descriptive information on its traffic management and mitigation practices, including network security measures;
- IV provide services on non-discriminatory commercial terms and refrain from anticompetitive practices.
- § 3°. Subject to the provisions of this article, the content of data packets may not be blocked, monitored, filtered or analyzed in Internet connections, either paid or free of charge, or in transmission, switching, and routing.
- § 4°. Subject to the provisions of the caput, special conditions for the traffic of data packets between the person responsible for the transmission and third parties interested in a different provision of service are allowed, provided that there is no harm to normal data traffic.

Source: Author's elaboration.

APPENDIX 5 - PROPOSED BILLS IN THE U.S. HOUSE OF REPRESENTATIVES AND SENATE (1999-2017)

| Date | Name | Record | Situation |
|------------|---|-----------|-----------------|
| 24/04/1999 | Internet Freedom and Broadband Deployment Act of 2001 | H.R. 1542 | Introduced |
| 05/05/1999 | Internet Freedom Act | H.R. 1686 | Introduced |
| 01/07/1999 | Internet Freedom and Broadband Deployment Act of 1999 | H.R. 2420 | Introduced |
| 19/10/1999 | Internet Freedom Protection Act | S. 1747 | Introduced |
| 02/10/2002 | Global Internet Freedom Act | H.R. 5524 | Introduced |
| 10/10/2002 | Global Internet Freedom Act | S. 3093 | Introduced |
| 07/01/2003 | Global Internet Freedom Act | H.R. 48 | Introduced |
| 04/06/2003 | Global Internet Freedom Act of 2003 | S. 1183 | Introduced |
| 10/05/2005 | Global Internet Freedom Act | H.R. 2216 | Introduced |
| 14/02/2006 | Global Internet Freedom Act of 2006 | H.R. 4741 | Introduced |
| 16/02/2006 | Global Online Freedom Act of 2006 | H.R. 4780 | Introduced |
| 02/03/2006 | Internet Non-Discrimination Act of 2006 | S. 2360 | Introduced |
| 01/05/2006 | Communications Opportunity, Promotion and Enhancement Act of 2006 | H.R. 5252 | Passed House |
| 15/05/2006 | Network Neutrality Act of 2006 | H.R. 5273 | Introduced |
| 18/05/2006 | Internet Freedom and Nondiscrimination Act of 2006 | H.R. 5417 | Introduced |
| 19/05/2006 | Internet Freedom Preservation Act of 2006 | S. 2917 | Introduced |

| 05/01/2007 | Global Online Freedom Act of 2007 | H.R. 275 | Introduced |
|------------|---|-----------|-------------|
| 01/09/2007 | Internet Freedom Preservation Act of 2007 (known as | S. 215 | Introduced |
| 01/09/2007 | the "Snowe-Dorgan" bill) | 5.215 | IIII oddood |
| 12/02/2008 | Internet Freedom Preservation Act of 2008 | H.R. 5353 | Introduced |
| 08/05/2008 | Internet Freedom and Nondiscrimination Act of 2008 | H.R. 5994 | Introduced |
| 06/05/2009 | Global Online Freedom Act of 2009 | H.R. 2271 | Introduced |
| 14/05/2009 | The Broadband Conduit Deployment Act of 2009 | H.R. 2428 | Introduced |
| 31/07/2009 | Internet Freedom Preservation Act of 2009 | H.R. 3458 | Introduced |
| 22/10/2009 | Internet Freedom Act of 2009 | S. 1836 | Introduced |
| 04/02/2010 | Internet Freedom Act of 2010 | H.R. 4595 | Introduced |
| 09/03/2010 | Internet Freedom Act of 2010 | H.R. 4784 | Introduced |
| 25/01/2011 | Internet Freedom, Broadband Promotion, and | S. 74 | Introduced |
| 23/01/2011 | Consumer Protection Act of 2011 | 5. 74 | miroduced |
| 01/02/2011 | Internet Freedom Act | H.R. 96 | Introduced |
| 17/02/2011 | Cybersecurity and Internet Freedom Act of 2011 | S. 413 | Introduced |
| 06/04/2011 | Global Online Freedom Act of 2011 | H.R. 1389 | Introduced |
| 12/08/2011 | Global Online Freedom Act of 2011 | H.R. 3605 | Introduced |
| 21/09/2012 | Global Free Internet Act of 2012 | H.R. 6530 | Introduced |
| 20/12/2012 | Data Cap Integrity Act of 2012 | S. 3703 | Introduced |
| 04/02/2013 | Global Online Freedom Act of 2013 | H.R. 491 | Introduced |
| 28/02/2013 | Global Free Internet Act of 2013 | H.R. 889 | Introduced |
| 21/02/2014 | Internet Freedom Act | H.R. 4070 | Introduced |
| 02/03/2014 | Open Internet Preservation Act of 2014 (Democrats) | H.R. 3982 | Introduced |
| 02/03/2014 | Open Internet Preservation Act of 2014 (Democrats) | S. 1981 | Introduced |
| 17/06/2014 | Online Competition and Consumer Choice Act of 2014 | H.R. 4880 | Introduced |
| 17/06/2014 | Online Competition and Consumer Choice Act of 2014 | S. 2476 | Introduced |
| 09/09/2014 | Open Internet Act of 2014 | H.R. 5429 | Introduced |
| 19/11/2014 | Defending Internet Freedom Act of 2014 | H.R. 5737 | Introduced |
| 07/01/2015 | Online Competition and Consumer Choice Act of 2015 | H.R. 196 | Introduced |
| 07/01/2015 | Online Competition and Consumer Choice Act of 2015 | S. 40 | Introduced |
| 03/03/2015 | Internet Freedom Act | H.R. 1212 | Introduced |
| 17/03/2015 | Open Internet Act of 2015 | H.R. 1409 | Introduced |
| 03/04/2015 | Global Free Internet Act of 2015 | H.R. 1307 | Introduced |
| 12/05/2015 | Defending Internet Freedom Act of 2015 | H.R. 2251 | Introduced |
| 16/11/2015 | Small Business Broadband Deployment Act of 2016 | H.R. 2283 | Introduced |
| | | | |

| 24/02/2016 | Small Dusiness Dusadhand Danleymant Act of 2016 | H.R. 4596 | Passed |
|------------|--|------------|------------|
| 24/02/2010 | Small Business Broadband Deployment Act of 2016 | п.к. 4390 | House |
| 25/02/2016 | Restoring Internet Freedom Act | S. 2602 | Introduced |
| 06/08/2016 | Protecting Internet Freedom Act | H.R. 5418 | Introduced |
| 06/08/2016 | Protecting Internet Freedom Act | S. 3034 | Introduced |
| 04/01/2017 | Small Business Broadband Deployment Act of 2017 | H.R. 288 | Passed |
| 01/01/2017 | Sman Business Broadsand Beproyment Net of 2017 | 11.IX. 200 | House |
| 04/01/2017 | Small Business Broadband Deployment Act of 2017 | S. 288 | Introduced |
| 01/02/2017 | New Deal Rural Broadband Act of 2017 | H.R. 800 | Introduced |
| 01/05/2017 | Restoring Internet Freedom Act | S. 993 | Introduced |
| 07/12/2017 | Save Net Neutrality Act of 2017 | H.R. 4585 | Introduced |
| 19/12/2017 | Open Internet Preservation Act of 2017 (Republicans) | H.R. 4682 | Introduced |

Source: Author's elaboration. Data Available at: https://www.congress.gov/ Data gathered in January 2018

APPENDIX 6- GINI COEFFICIENT AS A MEASURE FOR HOUSEHOLD INCOME DISTRIBUTION INEQUALITY FOR U.S. STATES IN 2016

| State | Gini | State | Gini |
|----------------|------|---------------|------|
| DC | 0,54 | West Virginia | 0,47 |
| New York | 0,51 | Missouri | 0,46 |
| Louisiana | 0,5 | Nevada | 0,46 |
| California | 0,5 | Oklahoma | 0,46 |
| Florida | 0,49 | Oregon | 0,46 |
| Connecticut | 0,49 | Washington | 0,46 |
| Alabama | 0,48 | Colorado | 0,46 |
| Georgia | 0,48 | North Dakota | 0,45 |
| Illinois | 0,48 | South Dakota | 0,45 |
| Kentucky | 0,48 | Kansas | 0,45 |
| Massachusetts | 0,48 | Maryland | 0,45 |
| Mississipi | 0,48 | Maine | 0,45 |
| New Jersey | 0,48 | Minnesota | 0,45 |
| New Mexico | 0,48 | Indiana | 0,45 |
| North Carolina | 0,48 | Idaho | 0,45 |
| Rhode Island | 0,48 | Nebraska | 0,45 |

^{*} Bills referring to "net neutrality" or "open internet"

| Tennessee | 0,48 | Vermont | 0,45 |
|----------------|------|---------------|------|
| Texas | 0,48 | Delaware | 0,45 |
| Arkansas | 0,47 | Iowa | 0,45 |
| Michigan | 0,47 | Wisconsin | 0,45 |
| Arizona | 0,47 | Hawaii | 0,44 |
| Montana | 0,47 | Wyoming | 0,44 |
| Ohio | 0,47 | New Hampshire | 0,43 |
| Pennsylvania | 0,47 | Utah | 0,43 |
| South Caroline | 0,47 | Alaska | 0,41 |
| Virginia | 0,47 | | |

Source: World Bank. Available at: https://data.worldbank.org/data-catalog/all-the-ginis/ Data gathered in December 2017.

APPENDIX 8- TOTAL OF AMERICAN URBAN AND RURAL POPULATION WITHOUT ACCESS TO 25 MBPS/3 MBPS SERVICE (%) IN 2016

| | All Areas | Urban Areas | Rural Areas |
|---------------|-----------------|--------------------|--------------------|
| State | % of Total Pop. | % of Urban Pop. | % of Rural Pop. |
| United States | 10% | 4% | 39% |
| Alabama | 20% | 6% | 41% |
| Alaska | 26% | 5% | 67% |
| Arizona | 13% | 8% | 63% |
| Arkansas | 25% | 7% | 48% |
| California | 5% | 2% | 61% |
| Colorado | 10% | 4% | 53% |
| Connecticut | 1% | 1% | 1% |
| Delaware | 3% | 2% | 10% |
| Florida | 7% | 4% | 29% |
| Georgia | 9% | 4% | 25% |
| Hawaii | 2% | 0% | 22% |
| Idaho | 18% | 4% | 55% |
| Illinois | 9% | 4% | 56% |
| Indiana | 17% | 5% | 52% |
| Iowa | 15% | 4% | 37% |
| Kansas | 15% | 5% | 49% |
| Kentucky | 16% | 3% | 34% |
| Louisiana | 19% | 8% | 50% |
| | | | |

| Maine | 12% | 4% | 17% |
|----------------|-----|-----|-----|
| Maryland | 4% | 3% | 13% |
| Massachusetts | 3% | 2% | 10% |
| Michigan | 12% | 3% | 37% |
| Minnesota | 12% | 1% | 43% |
| Mississippi | 34% | 9% | 60% |
| Missouri | 20% | 5% | 61% |
| Montana | 31% | 9% | 61% |
| Nebraska | 16% | 6% | 51% |
| Nevada | 8% | 5% | 65% |
| New Hampshire | 7% | 3% | 15% |
| New Jersey | 3% | 2% | 21% |
| New Mexico | 20% | 9% | 61% |
| New York | 2% | 0% | 17% |
| North Carolina | 7% | 1% | 20% |
| North Dakota | 14% | 2% | 37% |
| Ohio | 8% | 2% | 31% |
| Oklahoma | 27% | 9% | 66% |
| Oregon | 10% | 5% | 37% |
| Pennsylvania | 6% | 3% | 20% |
| Puerto Rico | 62% | 50% | 98% |
| Rhode Island | 2% | 2% | 2% |
| South Carolina | 18% | 8% | 38% |
| South Dakota | 11% | 2% | 26% |
| Tennessee | 13% | 2% | 34% |
| Texas | 11% | 5% | 46% |
| Utah | 6% | 3% | 39% |
| Vermont | 17% | 2% | 27% |
| Virginia | 11% | 3% | 38% |
| Washington | 3% | 1% | 14% |
| West Virginia | 30% | 10% | 48% |
| Wisconsin | 13% | 1% | 43% |
| Wyoming | 23% | 3% | 63% |

Source: FCC. Data available at: https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2016-broadband-progress-report Data gathered in December 2017.

APPENDIX 9- PERCENTAGES OF DEVELOPED CENSUS BLOCKS IN WHICH ISPS REPORTED THE DEPLOYMENT OF RESIDENTIAL FIXED BROADBAND AS OF JUNE 30, 2016

| | | At least 3MBPS downstream and 768kbps upstream | At least 10MBPS downstream and 1 Mbps upstream | At least 25MBPS downstream and 3 Mbps upstream | At least 100 MBPS downstream and 10 Mbps upstream |
|-----------|---|---|--|--|---|
| | 0 | | | 21% | 51% |
| Providers | 1 | | 3% | 37% | 37% |
| Flovidels | 2 | 10% | 18% | 29% | 10% |
| | 3 | 90% | 79% | 13% | 2% |

Source: FCC. Data available at: https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2016-broadband-progress-report Data gathered in December 2017.

APPENDIX 10- THE MOST AND LEAST EXPENSIVE COUNTRIES FOR BROADBAND - AVERAGE COST OF A BROADBAND PLAN PER MONTH (U.S. DOLLARS)

| 1 | Iran | \$5,68 | 67 | Spain | \$42,58 | 13 | 33 | Myanmar | \$76,76 |
|----|-----------------------|---------|----|-------------------------|---------|----|----|--------------------------|---------|
| 2 | Ukraine | \$5,21 | 68 | Finland | \$42,68 | 13 | 34 | Montserrat | \$76,09 |
| 3 | Russian Federation | \$10,20 | 69 | Monaco | \$43,08 | 13 | 35 | Bahamas | \$77,10 |
| 4 | Moldova | \$11,02 | 70 | Venezuela | \$44,55 | 13 | 86 | Botswana | \$83,56 |
| 5 | Syria | \$12,15 | 71 | St. Pierre and Miquelon | \$45,42 | 13 | 37 | Jordan | \$78,42 |
| 6 | Egypt | \$12,36 | 72 | Guatemala | \$44,34 | 13 | 88 | Saint Kitts and Nevis | \$78,41 |
| 7 | Belarus | \$12,77 | 73 | Malaysia | \$45,93 | 13 | 89 | Samoa | \$79,02 |
| 8 | Romania | \$13,81 | 74 | Mayotte | \$46,71 | 14 | 10 | Benin | \$81,98 |
| 9 | Kazakhstan | \$13,64 | 75 | Peru | \$45,62 | 14 | 11 | Nigeria | \$80,14 |
| 10 | Georgia | \$17,47 | 76 | Armenia | \$47,16 | 14 | 12 | New Caledonia | \$82,86 |
| 11 | Serbia | \$19,19 | 77 | The Netherlands | \$48,83 | 14 | 13 | Switzerland | \$82,92 |
| 12 | Poland | \$19,80 | 78 | Cyprus | \$49,02 | 14 | 14 | Bolivia | \$81,78 |

| 13 | Nepal | \$19,39 | 79 | Chile | \$50,82 | 145 | Norway | \$83,36 |
|----|--------------------------|---------|-----|--------------|---------|-----|-----------------------------|----------|
| 14 | Tajikistan | \$19,28 | 80 | Gibraltar | \$50,90 | 146 | Saint Helena | \$85,24 |
| 15 | Tunisia | \$19,98 | 81 | Austria | \$51,29 | 147 | Greenland | \$85,46 |
| 16 | Latvia | \$20,06 | 82 | Japan | \$50,70 | 148 | Saudi Arabia | \$84,05 |
| 17 | Sri Lanka | \$20,18 | 83 | Belgium | \$52,42 | 149 | Guam | \$85,00 |
| 18 | Israel | \$20,97 | 84 | Colombia | \$52,36 | 150 | Kenya | \$85,98 |
| 19 | Saint-Martin (France) | \$20,79 | 85 | Portugal | \$53,76 | 151 | Maldives | \$85,91 |
| 20 | Slovakia | \$22,53 | 86 | Guernsey | \$53,98 | 152 | Anguilla | \$86,62 |
| 21 | Mongolia | \$22,12 | 87 | Cambodia | \$52,89 | 153 | Faroe Islands | \$90,41 |
| 22 | Yemen | \$22,70 | 88 | Iraq | \$52,42 | 154 | Virgin Islands (U.S.) | \$88,01 |
| 23 | Hungary | \$25,34 | 89 | Kuwait | \$53,52 | 155 | Liechtenstei n | \$90,44 |
| 24 | Uzbekistan | \$24,31 | 90 | Philippines | \$54,37 | 156 | Belize | \$88,49 |
| 25 | Croatia | \$26,26 | 91 | Greece | \$56,06 | 157 | French Polynesia | \$94,07 |
| 26 | Turkey | \$26,70 | 92 | Canada | \$56,02 | 158 | Sudan | \$91,26 |
| 27 | Thailand | \$27,00 | 93 | Paraguay | \$56,23 | 159 | Djibouti | \$97,41 |
| 28 | Mexico | \$26,23 | 94 | Lebanon | \$55,24 | 160 | Marshall Islands | \$97,45 |
| 29 | Estonia | \$27,95 | 95 | Sweden | \$57,72 | 161 | Malta | \$100,36 |
| 30 | Taiwan | \$28,00 | 96 | Nicaragua | \$55,44 | 162 | Seychelles | \$100,20 |
| 31 | Bulgaria | \$29,08 | 97 | South Africa | \$63,33 | 163 | Bahrain | \$105,21 |
| 32 | Italy | \$29,57 | 98 | Jersey | \$58,04 | 164 | Barbados | \$105,17 |
| 33 | Czech Republic | \$29,96 | 99 | Grenada | \$57,13 | 165 | Lesotho | \$124,65 |
| 34 | South Korea | \$30,22 | 100 | Fiji | \$58,79 | 166 | Gabon | \$112,77 |

| 35 | Réunion | \$30,78 | 101 | Falkland Islands | \$58,67 | 167 | Caribbean Netherlands | \$110,12 |
|----|---------------------------|---------|-----|---------------------|---------|-----|--|----------|
| 36 | Slovenia | \$31,53 | 102 | Côte d'Ivoire | \$61,24 | 168 | Kyrgyzstan | \$112,46 |
| 37 | Montenegro | \$32,64 | 103 | Libya | \$60,46 | 169 | Guyana | \$114,14 |
| 38 | Argentina | \$30,19 | 104 | Australia | \$60,37 | 170 | Panama | \$112,81 |
| 39 | Algeria | \$32,30 | 105 | Dominica | \$62,11 | 171 | Sierra Leone | \$113,40 |
| 40 | Turkmenista n | \$32,17 | 106 | Ecuador | \$62,29 | 172 | Tanzania | \$115,18 |
| 41 | China | \$32,93 | 107 | Vietnam | \$62,58 | 173 | Comoros | \$118,11 |
| 42 | Albania | \$33,62 | 108 | New Zealand | \$66,29 | 174 | Somalia | \$117,00 |
| 43 | Dominican Republic | \$33,01 | 109 | Guadeloupe | \$65,67 | 175 | Turks and Caicos Islands | \$119,21 |
| 44 | Germany | \$34,88 | 110 | Mauritania | \$63,73 | 176 | Niger | \$123,22 |
| 45 | Brazil | \$34,79 | 111 | Jamaica | \$65,32 | 177 | Micronesia (Federated States of) | \$124,87 |
| 46 | Macedonia | \$36,16 | 112 | El Salvador | \$65,11 | 178 | American Samoa | \$122,59 |
| 47 | Denmark | \$36,74 | 113 | Gambia | \$65,59 | 179 | Bermuda | \$126,80 |
| 48 | France | \$37,21 | 114 | United States | \$66,17 | 180 | Angola | \$139,29 |
| 49 | Mauritius | \$36,80 | 115 | Ethiopia | \$66,57 | 181 | Virgin Islands (British) | \$146,05 |
| 50 | Bosnia and Herzegovina | \$37,57 | 116 | Mozambique | \$70,71 | 182 | Oman | \$147,85 |
| 51 | Palestine, State of | \$37,88 | 117 | Puerto Rico | \$68,37 | 183 | Qatar | \$149,41 |
| 52 | Saint Barthélemy | \$38,20 | 118 | Afghanistan | \$67,82 | 184 | Antigua and Barbuda | \$153,63 |
| 53 | India | \$37,99 | 119 | Honduras | \$68,62 | 185 | Vanuatu | \$154,07 |
| 54 | Isle of Man | \$38,59 | 120 | Cameroon | \$70,88 | 186 | United Arab Emirates | \$155,17 |

| 55 | Azerbaijan | \$38,09 | 121 | Lithuania | \$71,23 | 1 | 87 | Mali | \$168,05 |
|----|-------------------|---------|-----|---------------------|---------|---|----|------------------------------------|----------|
| 56 | Bangladesh | \$38,59 | 122 | Swaziland | \$79,91 | 1 | 88 | Zimbabwe | \$170,00 |
| 57 | Singapore | \$39,54 | 123 | Costa Rica | \$70,05 | 1 | 89 | Cook Islands | \$179,83 |
| 58 | Åland Islands | \$39,94 | 124 | Ireland | \$73,00 | 1 | 90 | Cayman Islands | \$172,58 |
| 59 | Morocco | \$39,91 | 125 | Saint Lucia | \$71,01 | 1 | 91 | Haiti | \$224,19 |
| 60 | San Marino | \$40,74 | 126 | Hong Kong | \$71,15 | 1 | 92 | Lao People's Democratic Republic | \$231,42 |
| 61 | French Guiana | \$41,35 | 127 | Curaçao | \$71,41 | 1 | 93 | Brunei Darussalam | \$272,79 |
| 62 | Macau | \$40,41 | 128 | Iceland | \$72,31 | 1 | 94 | Namibia | \$495,24 |
| 63 | United Kingdom | \$41,74 | 129 | Trinidad and Tobago | \$72,22 | 1 | 95 | Papua New Guinea | \$595,86 |
| 64 | Pakistan | \$38,94 | 130 | Sint Maarten | \$73,10 | 1 | 96 | Burkina Faso | \$988,37 |
| 65 | Martinique | \$42,09 | 131 | Luxembourg | \$77,68 | | | | |
| 66 | Uruguay | \$41,88 | 132 | Indonesia | \$71,84 | | | | |

Source: www.cable.co.uk/media-centre/release/new-worldwide-broadband-price-league-unveiled/ Data gathered in January 2018

APPENDIX 11- PERCENTAGE OF PERMANENT PRIVATE HOUSEHOLDS USING THE INTERNET, BY TYPE OF CONNECTION IN BRAZIL (2013-2015)

| Internet Connection | 2013 | 2014 | 2015 |
|----------------------------|------|------|------|
| Broadband | 97,7 | 99,2 | 99,6 |
| Fixed Broadband | 77,1 | 71,9 | 71,5 |
| Mobile Broadband | 43,5 | 62,8 | 69,8 |
| Fixed and Mobile Broadband | 23 | 35,5 | 41,7 |
| Dial up | 4,7 | 2,8 | 3,4 |
| Only Dial up | 2,3 | 0,8 | 0,4 |

Source: IBGE, Diretoria de Pesquisas, Coordenação de Trabalho e Rendimento, Pesquisa Nacional por Amostra de Domicílios 2015 Data gathered in December 2017.

APPENDIX 12- HOUSEHOLD WITH ACCESS TO THE INTERNET IN BRAZIL - PERCENTAGE OF TOTAL HOUSEHOLDS IN 2015

| State | Broadband density access per 100 households | Broadband Services | % Total |
|-------|---|--------------------|---------|
| DF | 69,27 | 701.840 | 2,46% |
| GO | 41,03 | 927.148 | 3,25% |
| MS | 41,28 | 386.201 | 1,35% |
| MT | 33,77 | 389.416 | 1,36% |
| AL | 15,13 | 159.581 | 0,56% |
| BA | 17,1 | 874.667 | 3,07% |
| CE | 24,56 | 714.731 | 2,50% |
| MA | 13,15 | 262.990 | 0,92% |
| PB | 22,92 | 288.323 | 1,01% |
| PE | 17,24 | 526.912 | 1,85% |
| PI | 17,16 | 167.367 | 0,59% |
| RN | 29,01 | 317.960 | 1,11% |
| SE | 25,42 | 181.774 | 0,64% |
| AC | 25,84 | 61.255 | 0,21% |
| AM | 25,97 | 277.742 | 0,97% |
| AP | 30,14 | 64.987 | 0,23% |
| PA | 14,62 | 349.523 | 1,22% |
| RO | 25,31 | 152.329 | 0,53% |
| RR | 23,84 | 37.751 | 0,13% |
| TO | 21,4 | 110.568 | 0,39% |
| ES | 39,46 | 546.469 | 1,92% |
| MG | 40,37 | 2.841.731 | 9,96% |
| RJ | 51,92 | 3.099.957 | 10,86% |
| SP | 63,81 | 9.922.201 | 34,77% |
| PR | 52 | 2.029.947 | 7,11% |
| RS | 43,01 | 1.803.511 | 6,32% |
| SC | 53,56 | 1.339.247 | 4,69% |
| Total | 41,19 | 28.536.128 | 100,00% |

Source: Anatel. Data available at: http://www.anatel.gov.br/dados/destaque-1/269-bl-acessos Data gathered in December 2017.

APPENDIX 13- HUMAN DEVELOPMENT INDEX PER BRAZILIAN STATES IN 2014

| Brazil | 0,761 |
|--------|-------|
| DF | 0,839 |
| SP | 0,819 |
| SC | 0,813 |
| PR | 0,79 |
| RS | 0,779 |
| RJ | 0,778 |
| ES | 0,771 |
| MG | 0,769 |
| MT | 0,767 |
| MS | 0,762 |
| GO | 0,75 |
| AP | 0,747 |
| RR | 0,732 |
| ТО | 0,732 |
| AC | 0,719 |
| RN | 0,717 |
| CE | 0,716 |
| RO | 0,715 |
| AM | 0,709 |
| PE | 0,709 |
| BA | 0,703 |
| PB | 0,701 |
| SE | 0,681 |
| MA | 0,678 |
| PI | 0,678 |
| PA | 0,675 |
| AL | 0,667 |

Source: PNUD. (Programa das Nações Unidas para o Desenvolvimento), Ipea (Instituto de Pesquisa Econômica Aplicada) e Fundação João Pinheiro. Data gathered in December 2017

APPENDIX 14- PARTICIPATION OF BROADBAND SERVICE BY ECONOMIC GROUP IN NOVEMBER 2017

| Economic Group | November 2017 |
|------------------------------|---------------|
| ALGAR (CTBC TELECOM) | 1,89% |
| BT | 0,08% |
| CABO | 0,39% |
| CLARO BRASIL | 31,08% |
| NEXTEL | 0,00% |
| NOSSATV | 0,00% |
| OI | 22,17% |
| OUTROS | 14,29% |
| PREFEITURA DE LONDRINA/COPEL | 0,75% |
| SKY/AT&T | 1,28% |
| TELECOM ITALIA | 1,44% |
| TELEFÔNICA | 26,63% |
| Total | 100,00% |

Source: Anatel. Data available at: http://www.anatel.gov.br/dados/destaque-1/269-bl-acessos Data gathered in December 2017.

APPENDIX 15- PROPORTION OF INTERNET USERS, BY DEVICE UTILIZED FOR INDIVIDUAL ACCESS IN BRAZIL - PERCENTAGE OF TOTAL INTERNET USERS IN 2015

| | | PC + Mobile | Mobile | PC |
|--------------|-----|-------------|--------|----|
| | A | 86 | 7 | 7 |
| Social Class | В | 75 | 14 | 11 |
| Social Class | C | 47 | 42 | 11 |
| | D/E | 20 | 69 | 10 |
| Total | | 54 | 35 | 11 |

Source: CGI.br/NIC.br, Centro Regional de Estudos para o Desenvolvimento da Sociedade da Informação (Cetic.br), Pesquisa sobre o Uso das Tecnologias de Informação e Comunicação nos domicílios brasileiros - TIC Domicílios 2015 Data gathered in December 2017.

APPENDIX 17- GINI COEFFICIENT AS A MEASURE FOR HOUSEHOLD INCOME DISTRIBUTION INEQUALITY FOR U.S. STATES IN 2016

| State | Gini |
|---------------------|-------|
| Santa Catarina | 0,419 |
| Goiás | 0,436 |
| Alagoas | 0,438 |
| Mato Grosso | 0,445 |
| Rondônia | 0,452 |
| Ceará | 0,453 |
| Rio Grande do Sul | 0,454 |
| Amapá | 0,457 |
| Pará | 0,459 |
| São Paulo | 0,46 |
| Paraná | 0,465 |
| Sergipe | 0,47 |
| Espírito Santo | 0,471 |
| Amazonas | 0,476 |
| Minas Gerais | 0,478 |
| Mato Grosso do Sul | 0,479 |
| Bahia | 0,481 |
| Rio Grande do Norte | 0,487 |
| Pernambuco | 0,492 |
| Acre | 0,5 |
| Roraima | 0,5 |
| Rio de Janeiro | 0,503 |
| Tocantins | 0,504 |
| Piauí | 0,505 |
| Maranhão | 0,506 |
| Paraíba | 0,51 |
| Distrito Federal | 0,555 |

World Bank. Available at: https://data.worldbank.org/data-catalog/all-the-ginis/ Data gathered in December 2017.

APPENDIX 16- PERCENTAGE OF PERMANENT PRIVATE HOUSEHOLDS USING THE INTERNET, BY TYPE OF CONNECTION IN BRAZIL (2013-2015)

| Internet Connection | 2013 | 2014 | 2015 |
|----------------------------|------|------|------|
| Broadband | 97,7 | 99,2 | 99,6 |
| Fixed Broadband | 77,1 | 71,9 | 71,5 |
| Mobile Broadband | 43,5 | 62,8 | 69,8 |
| Fixed and Mobile Broadband | 23 | 35,5 | 41,7 |
| Dial up | 4,7 | 2,8 | 3,4 |
| Only Dial up | 2,3 | 0,8 | 0,4 |

Source: IBGE, Diretoria de Pesquisas, Coordenação de Trabalho e Rendimento, Pesquisa Nacional por Amostra de Domicílios 2013-2015. Data gathered in December 2017.

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