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## TESTING CURRENT TELECOMMUNICATIONS PRACTICES AGAINST USER AND PROVIDER PRINCIPLES

BY GWEN SHAFFER\* AND SCOTT JORDAN†

What is the future of “Carterfone” style device attachment rules for a converged broadband network? The authors predict that American rules governing device attachment will become unsustainable as network technologies converge, and that a unified statute regarding device attachment will become necessary. They posit that end users will increasingly expect the functionality of the mobile Internet to resemble that of the fixed Internet. Current telecommunications law results in very different requirements depending on the type of network over which service is provided. This article explores the application of a previously proposed set of statutory provisions regarding device attachment to multiple scenarios. The authors find that a combination of an “any device” rule with provisions on device interconnection, device subsidies, and reasonable network management can effectively address the range of likely scenarios.

### INTRODUCTION

Statutes and regulations in the United States for telephone networks, cellular voice networks, and cable and satellite television networks are mature. By contrast, similar statutes and regulations for the Internet are evolving and remain incomplete. In recent years, members of the U.S. Congress have actively debated bills meant to address sharing of copyrighted material, cybersecurity, and digital privacy. Less frequently discussed, however, are telecommunications policies that allow Internet service providers (ISPs) to limit how subscribers use devices attached to their networks. This study predicts that rules governing device attachment will become unsustainable as network technologies converge.

The value of allowing users to attach devices of their choice to a network has long been recognized. Specifically, in the United States users are entitled to connect non-harmful devices such as modems and answering machines to the telephone network. Cable television subscribers may attach competitively-sold navigation devices to these networks. Most recently, in December 2010 the Federal Communications Commission’s *Open Internet Order* entitles consumers to use non-harmful

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devices with fixed broadband Internet access service.<sup>1</sup> A critical challenge to such device connectivity rules is that technologies are converging: in the near future telephone, cable, wireless, and Internet networks will all use a common Internet Protocol (IP). At the same time, the applications offered on each network are also converging, so that each network offers a wide variety of voice, video, and data services.

However, existing device connectivity regulations in the United States result in different policies for similar platforms, and cannot survive these changes. The dichotomy between device attachment rules in wireless and wired networks exemplifies this predicament. In December 2010, the FCC's *Open Internet* Order barred fixed broadband providers from blocking lawful content, applications, services, or non-harmful devices. However, because Open Internet rules do allow mobile broadband providers to block user devices, they fail to protect the nearly 60% of Americans who connect to the Internet wirelessly using a laptop or cell phone.<sup>2</sup>

The challenge of technological convergence for device attachment rules was studied by the present authors in 2011.<sup>3</sup> That article identified one set of entitlements that should apply to users of communications networks, and another set that should apply to providers of communications services. Based on these entitlements, the article proposed statutory language that could be used to create unified regulation of device attachment in converged communication networks. The proposed statute included an “any device” rule, expansion of interconnection rules to user networks and devices, limits on subsidization of user devices, and delineation of reasonable network management of user devices.

The current study examines real-world scenarios – including the availability of digital video recorders, wireless device exclusivity, restriction of content to certain devices, device crippling, and device tethering – that challenge current telecommunications law. It looks to principles considering user entitlements to utilize devices and applications of their choice and provider entitlements to use reasonable network management for guidance on whether these scenarios should be allowed. It also tests these scenarios against the statutes proposed by the authors in 2011. This study predicts that American rules governing device attachment will become unsustainable as network technologies converge, and that a unified statute regarding device attachment will become necessary.

The problems addressed in this article exist in many countries beyond the United States. The technical issues regarding device attachment, device control, and traffic management are global. The proposed entitlements and limits concerning device attachment, device control, traffic management, and service plan integration could be applied internationally because they rely on concepts

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<sup>1</sup> Federal Communications Commission, *Preserving the Open Internet; Broadband Industry Practices*, Report and Order, GN Docket No. 09-191/WC Docket No. 07-52, Dec. 23, 2010, accessed June 7, 2013, [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-10-201A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-10-201A1.pdf).

<sup>2</sup> Aaron Smith, “Cell Internet Use 2012,” report, Pew Internet & American Life Project, June 26, 2012, accessed June 7, 2013, [http://pewinternet.org/~media//Files/Reports/2012/PIP\\_Cell\\_Phone\\_Internet\\_Access.pdf](http://pewinternet.org/~media//Files/Reports/2012/PIP_Cell_Phone_Internet_Access.pdf).

<sup>3</sup> Scott Jordan and Gwen Shaffer, “A Proposed Device Attachment Statute for Converged Networks,” *Journal of Information Policy* 1 (2011): 394-424.

emanating from network architecture – which is itself international. However, the specific examples of law are taken from U.S. code.

The following section considers how distinctions among various types of networks and associated devices are fading. It also discusses obstacles that must be overcome in order to implement vertical regulation of device attachment.

## THE RESEARCH PROBLEM

### *Convergence of Networks and Devices*

For the past three decades, convergence has occurred in multiple dimensions: technologies, content, and industry. With respect to both content and industry, a flurry of mergers between communications companies has brought together content providers, ISPs and broadcasters, as well as providers of cable, landline, and cellular service. This consolidation is leading the communications industry to shift its focus to fast-growing categories of Internet traffic such as online video, gaming, and mobile services. In fact, global network provider Cisco Systems predicted in 2011 that related traffic could quadruple by 2015.<sup>4</sup>

We focus here, however, on technological convergence. This type of convergence merges previously separate network infrastructure, user devices, and sets of applications. Technological advances in network infrastructure allow separate telephone, video, cellular, and Internet networks to merge into a single blended communications infrastructure. Although many refer to the resulting infrastructure as the “Internet,” it is important to note that the Internet architecture itself is evolving as the cores of these networks merge. It is only with the introduction of many new protocols – at the LAN-link layer in access networks, at the network layer in the core, and at the application layer in end devices – that this convergence is occurring. Eventually, this will likely result in a common network core based on the Internet Protocol (IP). However, the various types of access networks – twisted pair wiring, coaxial cable, fiber, and many types of wireless – will continue to use different technologies according to the specific characteristics of each medium.

Technological advances in user devices are blurring the distinction between phones, computers, set-top boxes, and other devices. Converged networks host a wide variety of heterogeneous devices. Today, a typical residential network may connect a modem, a wireless router, computers, printers, televisions, music systems, attached storage, wireless adapters, and set-top boxes. Similarly, cell phone networks now provide Internet access not only for smartphones, but for tablets, e-readers,

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<sup>4</sup> Maggie Fox, “Internet Traffic to Explode by 2015, Cisco Predicts,” *National Journal*, June 1, 2011, accessed June 7, 2013, <http://www.nationaljournal.com/tech/internet-traffic-to-explode-by-2015-cisco-predicts-20110601>.

and navigation devices as well. A wider variety of Internet-connected devices is expected in the near future, and the “Internet of Things” is a much-discussed topic.<sup>5</sup>

Complementary evolution in applications allows users to communicate using voice, video, and data on each platform. Communication transactions that previously required multiple gadgets – making phone calls, listening to music, sending e-mail, browsing the web, watching video, and taking pictures – may all now be performed on a single handheld device. As a result, phrases such as “being online,” “watching TV,” and “making a call” are losing their unique meanings. William Lake, Media Bureau chief of the FCC, predicted that the distinction between TV and Internet services is likely to remain separate for only a short time.<sup>6</sup> Thus all of these networks now support telephone service, streaming video, video conferencing, gaming, e-mail, web browsing, and file transfer.

In the following section, we briefly discuss three impacted devices: residential gateways, set-top boxes, and smartphones.

### ***Regulation of Common Devices***

In the United States, a user’s legal ability to attach and control a device to a network depends on whether the device is attached to a telephone, video, or cellular network; or to the Internet. In telephone networks, for instance, Part 68 regulations provide strong assurance that users may attach and control non-harmful devices of their choice.<sup>7</sup> In multichannel video programming distributor (MVPD) networks, CableCARD regulations provide similar assurance.<sup>8</sup> The rules change when it comes to broadband access service. The FCC adopted its *Open Internet* Order to provide some assurance that fixed broadband Internet users may attach non-harmful devices of their choice. However, the regulations do not define “harm,” nor do they clearly specify which functionality of user devices the service provider may control.<sup>9</sup> An entirely different set of rules applies to cellular networks. These regulations allow service providers to exercise great latitude over which devices a user attaches to the network, as well as to control a wide range of the functionality of those devices. In the United States, users obtain nearly all of their wireless devices from their cellular provider.

As a result of technological convergence, American telecommunications law faces a number of challenges. We posit that end-users will increasingly expect the functionality of the mobile Internet to resemble that of the fixed Internet. Mobile device users take for granted their ability to download applications, as well as to view the same content accessible from a PC. Even an executive with

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<sup>5</sup> Kevin Ashton, “That ‘Internet of Things’ Thing,” *RFID Journal*, June 22, 2009, accessed June 12, 2013, <http://www.rfidjournal.com/articles/view?4986>.

<sup>6</sup> John Eggerton, “Broadcasters Squeezed by Convergence Push,” *Broadcasting & Cable*, Dec. 14, 2009, accessed June 13, 2013, [http://www.broadcastingcable.com/article/439909-Broadcasters\\_Squeezed\\_by\\_Convergence\\_Push.php](http://www.broadcastingcable.com/article/439909-Broadcasters_Squeezed_by_Convergence_Push.php).

<sup>7</sup> Federal Communications Commission, *Use of the Carterfone Device in Message Toll Telephone Service et al.*, Release No. FCC 68-661, 13 F.C.C.2d 420 (1968), accessed June 7, 2013, <http://www.uiowa.edu/~cyberlaw/FCCOps/1968/13F2-420.html>.

<sup>8</sup> Federal Communications Commission, *Implementation of Section 304 of the Telecommunications Act of 1996; Commercial Availability of Navigation Devices*, Report and Order, CS Docket No. 97-80, June 24, 1998, accessed June 7, 2013, <http://transition.fcc.gov/Bureaus/Cable/Orders/1998/fcc98116.txt>.

<sup>9</sup> Federal Communications Commission, *Preserving the Open Internet; Broadband Industry Practices*, Dec. 23, 2010.

Comcast – a cable company whose future may depend largely on the continued existence of television audiences – acknowledged that subscribers want to view content on a variety of mobile and non-portable devices. “People... don’t want to hear why certain things are on certain platforms. They just want it,” asserted Comcast’s senior vice president of interactive media.<sup>10</sup>

Increasingly, homeowners are establishing “residential gateways” that allow them to connect a wide variety of devices to the Internet. However, an ISP sometimes mandates use of its own residential gateway, precluding users from attaching routers of their choice. In addition, the Internet service provider maintains control over nearly all protocols used in the gateway. This deprives subscribers of the opportunity to use or control certain applications.

As another example, cable and satellite television subscribers typically access these services through a set-top box. In some cases, the consumer opts to lease the box from the provider. Alternatively, the consumer may elect to purchase a set-top box sold by a retail outlet. Each of these choices comes with disadvantages. The set-top box supplied by the video provider may limit devices that a consumer connects to the network, and it may use proprietary protocols to access certain information streams. As a result, it disables the functionality of other user-chosen devices, such as video navigation. However, a competitively sold set-top box may not provide access to all video content. These impediments violate an “open network” model.

Finally, smartphones pose an even greater challenge to open networks. A cellular provider often exercises control over the devices used on its network through a combination of terms of service and device pricing. Because providers reserve the right to control nearly all communication protocols on a handset, they commonly lock devices to their own networks and cripple device functionality.

Convergence is already rendering vertical regulation of devices on each network unfeasible. This is because users themselves often do not distinguish when connecting to a 4G mobile network, a wireless network like LTE, or a broadband network. Rather, we predict that consumers will increasingly expect to attach a wide variety of devices, and to use these devices without unreasonable interference from a network access provider. In the distant past, some ISPs required subscribers to obtain permission before attaching devices to their networks. ISPs have eliminated such restrictions, and today it is unthinkable that Comcast or Cox would bar subscribers from attaching a particular PC to their cable networks. Yet AT&T and Verizon dictate which handsets may be connected to their wireless networks.

In addition, current statutes and regulations are quite inconsistent on whether and how they apply to telephone networks, cable and satellite multichannel video programming distributors (MVPDs), cellular networks, and fixed and mobile Internet access. In Table 1 below, we illustrate whether statutes and/or regulations apply an “any device” rule, address interconnection of user devices and

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<sup>10</sup> D.M. Levine, “Comcast Exec to Network Bigs: ‘We Have to Get Out of Our Own Way,’” *Adweek*, June 28, 2011, accessed June 7, 2013, <http://www.adweek.com/news/television/comcast-exec-network-bigs-we-have-get-out-our-own-way-133053>.

networks to ISP networks, address device subsidies, and define “reasonable network management.” We conclude that regulation of devices and their associated issues is inconsistent among different types of networks, and we predict that such inconsistency cannot survive technological convergence.

*Table 1: Comparison of Legal Approaches.*

Issue	Telephone	Cable MVPD	Satellite MVPD	Cellular	Fixed Internet access	Mobile Internet access
<b>Any device rule</b>	Yes	Yes	No	No	Yes	No
<b>Interconnection</b>	Partial	No	No	No	No	No
<b>Device subsidies</b>	No	No	No	No	No	No
<b>Reasonable network management</b>	Yes	No	No	No	Partial	Partial

The FCC’s *Open Internet Order* can serve as a starting point for a regulatory framework for converged networks. However, we see the statutory and regulatory framework for the Internet as new and incomplete. Indeed, we find in the scenarios considered below that this framework fails to adequately address many current device issues. Thus we see value in considering which elements of existing statutes and regulations from telephone networks, cellular networks, and cable and satellite are worth extending to the new converged infrastructure.

## LITERATURE REVIEW

As the direct relationship between platforms and communications services has broken down, the market structure has changed dramatically. American telecommunications regulatory policies, however, have not kept pace with technological change. Policymakers have attempted to update communications law in reaction to technological convergence. In 1994, the Clinton administration proposed adding a new title to the Communications Act for regulating certain broadband providers.<sup>11</sup> The provision failed to make it into the major overhaul of the statute two years later, though. In 1998, then-FCC Commissioner Michael Powell characterized efforts to preserve the existing “balkanized regulatory framework” as “futile.”<sup>12</sup> Powell proposed creating a regulatory scheme that eliminates “the legal, economic and conceptual boundaries” separating various

<sup>11</sup> Jonathan D. Blake and Lee J. Tiedrich, “The National Information Infrastructure Initiative and the Emergence of the Electronic Superhighway,” *Federal Communications Law Journal* 46, no. 3 (1997): 397-432.

<sup>12</sup> Michael K. Powell, “New Regulatory Thinking,” speech before the Association for Maximum Service Television, 42nd Annual Membership Meeting, Las Vegas, NV. Apr. 6, 1998, accessed June 7, 2013, <http://transition.fcc.gov/Speeches/Powell/spmcp807.html>.

communications media. In recent years, members of Congress have developed proposals to rewrite the Communications Act in a manner that would bring it in line with modern technologies.<sup>13</sup>

Substantial research literature highlights the need for a unified regulatory approach to converged networks in general. Nuechterlein and Weiser argue the telecommunications market cannot operate effectively without a converged regulatory policy that treats like services alike, regardless of what physical infrastructure is used to provide them.<sup>14</sup> Whether consumers place phone calls over traditional copper wires, through voice-over IP, or on a mobile phone, the functionality is the same. Policies that regulate “substitutable platforms” differently create artificial advantages for some competitors, thus distorting the marketplace. They urge policymakers to place heavy regulation on the layers of each network that encompass wholesale transmission services, and to analyze petitions for vertical integration by assessing the potential for that company to leverage its market power to the detriment of competitors at higher levels.

In the absence of such a converged policy, Bar and Sandvig explain that vertical integration means that companies “increasingly interact across regulatory boundaries,” broadening the possibility that industry players will profit by exploiting price differences in similar markets. They propose dropping current regulatory structures that approach regulation based on the physical conduit and who owns it, and conclude that a more appropriate telecommunications policy should focus on the software configuration that defines the architecture of each platform in this converged environment, e.g. the network’s logical architecture or a device’s operating system.<sup>15</sup> Schejter argues that definitions should be developed at the “highest normative level,” with regulators then analyzing and determining how to apply them.<sup>16</sup>

Congressional failures have led to a number of public policy debates about device attachment to various networks. In 2007, Skype Communications submitted a petition to the FCC asking the commission to declare that wireless carrier services are subject to Carterfone rules, including the right to attach non-harmful devices and the right to run applications. Skype also asked the FCC to initiate a rulemaking proceeding to determine whether current wireless carrier practices violate these rules, and to create a mechanism to establish technical standards that ensure that non-harmful applications are allowed.<sup>17</sup>

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<sup>13</sup> Gautham Nagesh, “Lawmakers Prepare to Update Communications Act,” *The Hill*, May 24, 2010, accessed June 13, 2013, <http://thehill.com/blogs/hillicon-valley/technology/99563-lawmakers-prepare-update-to-communications-act>.

<sup>14</sup> Jonathan E. Nuechterlein and Philip J. Weiser, *Digital Crossroads: American Telecommunications Policy in the Internet Age* (Cambridge: Massachusetts Institute of Technology Press, 2005).

<sup>15</sup> Francois Bar and Christian Sandvig, “U.S. Communications Policy after Convergence,” *Media, Culture & Society* 30, no. 4 (2008): 544.

<sup>16</sup> Amit Schejter, “From All My Teachers I Have Grown Wise, and From My Students More than Anyone Else’: What Lessons Can the U.S. Learn from Broadband Policies in Europe?” *The International Communication Gazette* 71, no. 5 (2009): 429-445.

<sup>17</sup> Federal Communications Commission, *Skype Communications S.A.R.L.: Petition to Confirm a Consumer’s Right to Use Internet Communications Software and Attach Devices to Wireless Networks*, Petition, Feb. 20, 2007, accessed June 7, 2013, <http://apps.fcc.gov/ecfs/document/view?id=6518909730>.



Most proponents of wireless network neutrality believe that users should have the right to attach any device and to run any application, so long as they do not cause harmful interference to other wireless users.<sup>18</sup> Most opponents of wireless network neutrality believe that an ISP can reasonably dictate which wireless devices can be used on its network, and that either an ISP or a device manufacturer can reasonably limit which applications may run on wireless devices. These opponents believe sufficient competition exists to ensure that social welfare is maximized.<sup>19</sup>

The FCC's *Open Internet* Order prohibits wireline providers from blocking any lawful content, applications, services, or devices. This new paradigm also bars ISPs from unreasonably discriminating against any traffic. The FCC order guarantees fixed broadband users the ability to attach non-harmful devices, but fails to define "harm." The commission also neglected to address user control vs. ISP control over devices, subsidization of devices, or distribution of content to devices. Without these details, the order provides little guidance to either users or ISPs. The FCC's decision to, once again, treat wireline and wireless broadband differently underscores the need for statutory language that recognizes a technologically converged reality.

Despite widespread discussion of the challenges accompanying convergence, few academic papers address device attachment and control in converged networks. In 2001 Noam considered the emergence of vertically integrated wireless communications providers. He observed that the market and regulation in the United States had resulted at that time in "competition among bundled product packages instead of competition on a product-by-product basis." He stated that limitations by a service provider on the type of attached devices would be considered unreasonable in telephone networks, and that it reduces innovation and choice. He concluded that public policy should implement the equivalent of a Carterfone policy for users' wireless equipment.<sup>20</sup>

Tim Wu has argued for an extension of the FCC's Carterfone rules to wireless networks – prohibiting carriers from locking devices, as well as allowing users to attach compatible and non-harmful devices. Wu also makes the case for extending network neutrality rules to wireless networks, and asserts that carriers should meter and charge for bandwidth usage rather than block particular

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<sup>18</sup> See for example Federal Communications Commission, *Reply Comments of Free Press: Preserving the Open Internet; Broadband Industry Practices*, GN Docket No. 09-191/WC Docket No. 07-52, Apr. 26, 2010, accessed June 7, 2013, <http://apps.fcc.gov/ecfs/document/view?id=7020437465>; Federal Communications Commission, *Comments of Google, Inc.: Preserving the Open Internet; Broadband Industry Practices*, GN Docket No. 09-191/WC Docket No. 07-52, Apr. 26, 2010, accessed June 7, 2013, <http://www.scribd.com/doc/30545713/04-26-10-Google-Open-Internet-Reply-Comments-GN-Dkt-09-191>; Federal Communications Commission, *Comments of New America Foundation et al.: Preserving the Open Internet; Broadband Industry Practices*, GN Docket No. 09-191/WC Docket No. 07-52, Jan. 14, 2010, accessed June 7, 2013, [http://newamerica.net/sites/newamerica.net/files/profiles/attachments/NAF\\_CTC\\_NN\\_Comments\\_0.pdf](http://newamerica.net/sites/newamerica.net/files/profiles/attachments/NAF_CTC_NN_Comments_0.pdf).

<sup>19</sup> See for example Federal Communications Commission, *Comments of AT&T, Inc.: Preserving the Open Internet; Broadband Industry Practices*, GN Docket No. 09-191/WC Docket No. 07-52, Jan. 14, 2010, accessed June 7, 2013, [http://www.att.com/Common/about\\_us/public\\_policy/AT&TNet\\_Neutrality\\_Comments1\\_14\\_09.pdf](http://www.att.com/Common/about_us/public_policy/AT&TNet_Neutrality_Comments1_14_09.pdf); Federal Communications Commission, *Reply Comments of CTIA-The Wireless Association: Preserving the Open Internet; Broadband Industry Practices*, GN Docket No. 09-191/WC Docket No. 07-52, Apr. 26, 2010, accessed June 7, 2013, [http://files.ctia.org/pdf/filings/100426\\_CTIA\\_NN\\_Reply\\_Comments\\_COMBINED\\_FINAL.pdf](http://files.ctia.org/pdf/filings/100426_CTIA_NN_Reply_Comments_COMBINED_FINAL.pdf).

<sup>20</sup> Eli M. Noam, "The Next Frontier for Openness: Wireless Communications," in *Competition for the Mobile Internet*, ed. Dan Steinbeck and Eli M. Noam (Norwell, MA: Kluwer Academic Publishers, 2003), 21-38.

applications. Finally, he recommends that carriers and equipment manufacturers work toward standardizing application platforms.<sup>21</sup>

In response, Hahn, Litan, and Singer claim that attachment of devices and Quality of Service (QoS) are separate issues.<sup>22</sup> Having previously opposed network neutrality as a method to regulate QoS,<sup>23</sup> in their later article they contest many of Wu's proposals. First, they argue that sufficient wireless competition exists to avoid market failure, and that innovation in wireless devices and applications is thriving. Next they provide an economic analysis concluding that the benefits of device subsidies, device exclusivity, and limits on devices and applications outweigh the costs of each.

Rob Frieden notes that "limitations on the use of wireless handsets juxtaposes with the Carterfone policy." He examines the costs and benefits of government-imposed rules that would mandate the right of subscribers to attach any technically compatible handset to wireless networks. He predicts that consumer disenchantment will trigger congressional and FCC consideration of the application of Carterfone policies to wireless handsets.<sup>24</sup>

While all these papers are relevant, none propose a specific statute or regulation for a unified legal framework for device attachment in converged networks.

### ***Research Questions and Methodology***

We began this study by clearly defining our objectives and identifying both the unsolved problem and an ultimate goal. In 2011 we proposed two sets of entitlements – one that should apply to users of communications networks and another that should apply to providers of communications services. We then constructed a set of definitions and statutory language that could be used to guarantee these sets of principles.<sup>25</sup> The present study builds upon our findings by identifying real-world scenarios that challenge current American telecommunications law – typically, these involve a network carrier blocking access to content or a device. We then test the scenarios against our proposed principles to determine whether the practice violates any user or ISP entitlements, and against our proposed statutory language to determine whether the practice would be allowed.

While this article focuses exclusively on the relationship between wireless devices and network carriers, we acknowledge that the owners of mobile operating systems are responsible for imposing some handset restrictions. For instance, Apple's iPhone does not support Adobe Flash, a popular multimedia platform used to incorporate animation, video, and interactivity into web pages. Similarly, Google's Android 2 smartphone comes with built-in hardware that prevents device owners

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<sup>21</sup> Tim Wu, "Wireless 'Carterfone'," *International Journal of Communication* 1 (2007): 389-426.

<sup>22</sup> Robert W. Hahn, Robert E. Litan, and Hal J. Singer, "The Economics of 'Wireless Net Neutrality,'" *Journal of Competition Law & Economics* 3, no. 3 (2007): 399-451.

<sup>23</sup> Robert W. Hahn and Robert E. Litan, "The Myth of Network Neutrality and What We Should Do About It," *International Journal of Communication* 1 (2007): 595-606.

<sup>24</sup> Rob Frieden, "Hold the Phone: Assessing the Rights of Wireless Handset Owners and Carriers," *University of Pittsburgh Law Review* 69 (2008): 675-725.

<sup>25</sup> Jordan and Shaffer.

from making custom modifications to that operating system, despite the fact that it is based on open source code.

## PRINCIPLES AND PROPOSED STATUTORY LANGUAGE

Historically, the FCC has crafted new communication policies based on rules for established technologies. For instance, regulators viewed the telephone as an extension of the telegraph, and defined cable television similarly to broadcast television – regardless of whether these precedents fit with emerging technologies.<sup>26</sup> In fact, new rules are often crafted to satisfy the demands of those who control American communications networks (or, less frequently, to appease their critics). The FCC's recently-adopted *Open Internet* Order represents governmental compromises with corporations that control communication networks – and seek to profit from them. We argue that sound policy should be grounded in principles rather than in politics. While the principles detailed in this section do not negate the needs of industry stakeholders, they place equal emphasis on the entitlements of communications users.

With regard to Internet consumers, the FCC explicated a set of principles including an entitlement to connect legal devices and an entitlement to run applications.<sup>27</sup> In 2011 we proposed to expand these principles to all communications services:

[Any Device Principle] Users of communications services are entitled to connect any legal device to a communications network, so long as that device does not cause harm to the network.

[Any Application Principle] Users of communications services are entitled to run applications of their choice on their devices.<sup>28</sup>

The FCC's *Open Internet* Order described “reasonable network management” as a principle, and made its rule subject to it.<sup>29</sup> In 2011 we proposed to expand this principle to all communications providers:

[Reasonable Network Management Principle] Communication providers are entitled to the use of reasonable network management.<sup>30</sup>

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<sup>26</sup> Ithiel de Sola Pool, *Technologies of Freedom* (Cambridge, MA: Belknap Press, 1983).

<sup>27</sup> Federal Communications Commission, *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, et al.*, Policy Statement, CC Docket No. 02-33 et al., Sept. 23, 2005, accessed June 7, 2013, [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-05-151A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-151A1.pdf).

<sup>28</sup> Jordan and Shaffer, 401.

<sup>29</sup> Federal Communications Commission, *Preserving the Open Internet; Broadband Industry Practices*, Notice of Proposed Rulemaking, GN Docket No. 09-191/WC Docket No. 07-52, Oct. 22, 2009, accessed June 7, 2013, [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-09-93A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-09-93A1.pdf).

<sup>30</sup> Jordan and Shaffer, 401.

The FCC's *Open Internet* Order attempted to guarantee these principles through regulation of fixed broadband Internet access service, and to a lesser extent to mobile broadband Internet access service. However, in the real-world scenarios discussed below, we find that the “any device” and “any application” rules leave a great deal of ambiguity with respect to a number of complex situations. In addition, as illustrated above in Table 1 above, neither the *Open Internet* Order nor previous statutes and regulations consistently apply an “any device” rule nor associated rules. In 2011 we therefore proposed statutory language that we believe can implement these principles in a manner that can be applied to converged networks. We found it necessary to propose an expansion of telecommunication services to:

COMMUNICATIONS SERVICES – The term “Communications Services” means all services – (A) over a network that uses a public right-of-way; and (B) that reside at or below the network layer or are required to manage the network.<sup>31</sup>

We also found it necessary to formally define the user device that separates devices that an ISP should control from the user devices that an ISP should not control:

USER COMMUNICATIONS GATEWAY – The term “User Communications Gateway” means the user device with network layer functionality that is closest to the demarcation point.<sup>32</sup>

The notion of a “demarcation point” was borrowed from telephone networks and expanded to converged networks. Definitions of “user device” and of “harm” were also expanded to include Internet and wireless devices.

Among the statutory language we proposed are four key provisions. Any device rules exist in different forms in telephone, cable, and fixed broadband Internet networks. The proposed rule applies uniformly to all types of networks, including satellite, cellular, and mobile Internet where no such rule currently applies:

ANY DEVICE RULE – User devices that do not cause harm may be directly connected to the facilities of the communications provider. User devices must be certified not to cause harm, or must connect through protective circuitry that is certified to prevent harm. Technical criteria published by a recognized national or international standards body are the presumptively valid technical criteria for the protection of the facilities of the communications provider from harms caused by the connection of user devices.<sup>33</sup>

Service plans are sometimes used to entice or require users to select particular devices. These subsidies may threaten a level playing field in devices. Unfortunately, minimal guidance exists here. No existing statute or regulation effectively limits subsidies in telephone networks, cable or satellite

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<sup>31</sup> Ibid., 405.

<sup>32</sup> Ibid., 416.

<sup>33</sup> Ibid., 409-410.

networks, cellular networks, or Internet access. The proposed statutory language builds off of Section 629 of the Communications Act, which gives the FCC authority to regulate navigation devices offered by MVPDs, and applies a similar approach to all communication devices:

DEVICE SUBSIDIES – (A) A communications provider or an affiliated equipment provider may supply a device to a subscriber through lease and/or purchase. If so, then (i) the communications provider shall offer communications and information services without requiring this device lease and/or purchase, and (ii) the communications provider’s charge to a subscriber for such device shall be separately stated and not subsidized by charges for any service offered over the communications provider’s network. (B) If a communications provider supplies a device through purchase, then (i) any subsidy shall be disclosed, and (ii) any early termination fee associated with the device shall be no greater than the device subsidy, and shall decrease at least linearly over the life of the service contract. (C) A communications provider may charge a service initiation fee and/or an early termination fee associated with the providing initial service to the subscriber, provided that any such early termination fee is no greater than the incremental cost of providing initial service minus the set-up fee. (D) When a communications provider supplies a subsidized device to a subscriber, it may restrict use of that device to its own network for the life of the service contract.<sup>34</sup>

The connection of a device to a network can also be linked to the service plan. In addition, users increasingly connect a whole residential network to the Internet, rather than simply one or two devices. Interconnection rules currently only apply to telephone networks, and they do not apply to residential networks.<sup>35</sup> The proposed statutory language builds off of Section 251(c)(2) of the Communications Act, which addresses interconnection between common carriers, and applies a similar approach to the connection of user devices:

INTERCONNECTION – A communications provider shall provide, for the facilities and equipment of any subscriber, interconnection with the communications provider’s network – (a) for communications services; (b) that is at least equal in quality to that provided by the communications provider to user devices provided to the subscriber; and (c) on rates, terms, and conditions that are just, reasonable, and nondiscriminatory. A communications provider shall not require any communications or information service based on a subscriber’s device.<sup>36</sup>

Finally, we turn to the issue of reasonable network management. The FCC settled on “a network management practice is reasonable if it is appropriate and tailored to achieving a legitimate network management purpose, taking into account the particular network architecture and technology of the broadband Internet access service.” For the purposes of this study, we need to define “reasonable

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<sup>34</sup> *Ibid.*, 412-413.

<sup>35</sup> Rules regarding demarcation points and foreign attachments do apply to residential networks.

<sup>36</sup> Jordan and Shaffer, 411.

network management” only for practices implemented in user devices. Based on previous work examining traffic management practices,<sup>37</sup> we propose this definition:

REASONABLE NETWORK MANAGEMENT – (A) A communications provider may exercise control over communications services of all devices between and including the demarcation point and the communications provider’s side of the user communications gateway. (B) A communications provider shall not exercise control over any communications or information services not included in part (A) unless it constitutes reasonable network management. A network management practice used by a communications provider in a user device is reasonable if and only if the user has control over the use of the practice, or if the practice controls Quality-of-Service on the basis of reasonable payment.<sup>38</sup>

The relationships between the principles and statutory provisions are outlined in Table 2 below. The set of statutory provisions are believed to be sufficient to guarantee the principles. This belief is tested in the next section via real-world scenarios. For each scenario, we discuss how current law applies. We determine which principles apply and whether they indicate if the practice should be allowed. We then separately determine whether the practice would be prohibited by the statutory language presented above. If the statute prohibits a practice that principles state should be allowed, or vice versa, this would indicate a flaw in the proposed statute.

*Table 2: Relationships between Principles, Statutory Provisions, and Scenarios.*

Principle	Statutory Provision	Scenarios
Any Device Principle	Any Device Rule	Device certification; Digital video recorders
Any Device Principle	Device Subsidies	TiVo
Any Device Principle, Any Application Principle	Interconnection	Content exclusivity to devices; E-readers
Any Application Principle	Device Subsidies; Reasonable Network Management	Device crippling; Digital video recorder access to content
Any application Principle; Reasonable Network Management Principle	Interconnection; Reasonable Network Management	Requiring a service plan based on the device; Tethering

## SCENARIOS FOR THE ANY DEVICE RULE

### *Device Certification*

CableLabs, the cable industry research consortium, charges cable modem manufacturers \$75,000 to conduct tests ensuring their devices comply with FCC standards. Even so, in fall 2010 Comcast established its own cable modem testing requirement and began charging manufacturers \$25,000 for

<sup>37</sup> Scott Jordan and Arijit Ghosh, “A Framework for Classification of Traffic Management Policies as Reasonable or Unreasonable,” *ACM Transactions on Internet Technology* 10, no. 3 (2010): 12:1-12:23.

<sup>38</sup> Jordan and Shaffer, 417, 419.



certification. A lawsuit filed by Zoom Telephonics contended that Comcast's own testing requirement makes it harder for modem manufacturers to compete with the cable giant, which rents modems to its 17 million high-speed Internet subscribers. Comcast responded that it "wants to make sure devices our customers purchase at retail will work well and are safe."<sup>39</sup> Although the parties reached a settlement in March 2011, the potential for similar situations merits examination.

Because cable modems are used for broadband Internet access service, the FCC's *Open Internet Order* covers these devices. The regulations thus prohibit Comcast from blocking non-harmful devices, subject to reasonable network management. Comcast may require that cable modems conform to widely accepted and publicly available standards applicable to their services. However, Comcast may also claim that its cable modem testing requirement ensures conformity with the company's services. As a result, it is unclear whether the additional testing would be allowed.

The "any device" principle entitles users to connect legal devices that do not cause harm to the network. Comcast's justification for the additional testing invokes communication providers' entitlement to reasonable network management. However, cable modems that are certified to follow applicable cable Internet standards (e.g. DOCSIS) cannot cause harm to Comcast's network, regardless of Comcast's services. Accordingly, Comcast cannot credibly claim that the "reasonable network management" principle prohibits the use of cable modems not certified by Comcast. Rather, the principles suggest that users of Comcast's fixed Internet access service should be entitled to connect CableLabs-certified cable modems of their choice.

The statutory provisions would guarantee this. The transmission components of fixed broadband Internet access services fall under our definition of communications services. The "any device" rule states that technical criteria published by a recognized national or international standards body are the presumptively valid technical criteria necessary to prevent devices from harming communications providers' facilities. Comcast would not be allowed to require additional testing for modems already approved by CableLabs.

### ***Digital Video Recorders***

Cable television networks and satellite television service are the most common providers of multichannel video service in the United States. Device attachment rules differ, however, between the two.

Prior to 2007, cable television providers could require the use of a set-top box they supplied. However, the Telecommunications Act of 1996 mandated the FCC to assure the commercial availability of equipment used by consumers to access multichannel video programming – and other services – from vendors not affiliated with the cable television provider. Starting in 2007, the FCC required cable television providers to allow subscribers to obtain set-top boxes from unaffiliated

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<sup>39</sup> Matthew Lasar, "Modem Maker Accuses Comcast of Squelching Competition," *Ars Technica*, Dec. 1, 2010, accessed June 7, 2013, <http://arstechnica.com/tech-policy/2010/12/modem-maker-accuses-comcast-of-squelching-competition/>.

vendors, providing that the set-top box supports the CableCARD standard. The cable television provider must supply a PCMCIA CableCARD to insert into the set-top box, and the CableCARD governs access to services, e.g. channels. Although there is no Part 68 requirement to ensure that devices do not harm the network, harm is prevented through use of certified standards such as DOCSIS.

Unlike cable television providers, satellite television providers are not required to allow subscribers to obtain set-top boxes from unaffiliated vendors. The satellite television provider usually supplies the set-top box for the subscriber. The set-top box often allows an access card to be inserted, which governs access to services. However, this access card usually does not follow the CableCARD standard, preventing subscribers from replacing the set-top box with one of their choice.

The “any device” principle entitles users to connect legal devices that do not cause harm to the network. Digital video recorders can easily be designed to ensure that they do not cause harm. There is no plausible claim that the “reasonable network management” principle could be construed to prohibit use of digital video records obtained from unaffiliated vendors. In fact, the network management required in satellite television networks is similar to that required in cable television networks. The principles thus suggest that users of direct broadcast satellite should be entitled to connect digital video recorders of their choice.

The statutory provisions would guarantee this. The transmission components of both cable television and satellite television fall into the definition of “communication services” given above. The “any device” rule is consistent with the current operation of cable television using CableCARD set-top boxes. Current CableCARD requirements ensure that these architectures allow subscribers to choose their own set-top box, as well as to attach any other non-harmful devices of their choice. The “any device” rule would allow a cable provider to use either CableCARD or any other method that allows user choice (e.g. they can limit channel access using a standardized authentication protocol over the network instead of using a CableCARD).

The “any device” rule would also apply to direct broadcast satellite. It would mandate that such providers allow connection of non-harmful devices including digital video recorders. A recognized standards body would likely certify the devices.

## **SCENARIO FOR THE SUBSIDIES RULE**

### ***TiVo***

Cox Communications subscribers can now access the cable operator’s entire video on demand library via a TiVo Premiere box. As part of the agreement, Cox supports the TiVo Premiere box as an optional set-top box and provides free installation for subscribers who purchase it from retail outlets such as Best Buy or from tivo.com.



Current regulations require cable television providers (but not DBS providers) to allow subscribers to obtain set-top boxes from unaffiliated vendors, as long as the set-top box supports the CableCARD standard. There are related requirements about availability of programming; however, these do not seem to bear upon the Cox-TiVo arrangement. Therefore, the practice would likely be legal.

Some may question whether the agreement between Cox and TiVo violates the spirit of the intent to provide a competitive marketplace for devices. However, the principles allow the practice. The “any device” principle entitles consumers to connect a TiVo set-top box to their Cox cable television service. The “any application” principle entitles consumers to receive on-demand streaming if included in their service plan. There would be a violation of this principle if users could only access the Cox video-on-demand library via a Cox set-top box. However, because the TiVo Premiere box is sold competitively, no violation exists.

The statutory provisions would also allow the practice. As discussed above, the transmission components of cable television and satellite television fall into the definition of communication services given above, and the “any device” rule is consistent with the current operation of cable television using CableCARD set-top boxes. The “device subsidies” rule applies since Cox provides free installation. However, the rule merely mandates that Cox offer cable television service without requiring any particular device, and that Cox separately state the device purchase charge and not subsidize it with charges for any service. The agreement also meets these obligations.

## SCENARIOS FOR THE INTERCONNECTION RULE

### *Content Exclusivity to Devices*

V-cast is a video-on-demand service and video library hosted by Verizon Wireless. Only Verizon subscribers with specific V-cast enabled handsets obtained from Verizon can download or stream content from the collection. There is no “any device” rule in current law in either cellular networks or mobile broadband Internet access service. Thus, the Verizon V-cast practice seems consistent with current law.

The “any device” principle, however, entitles Verizon subscribers to connect any legal non-harmful handset to the Verizon network. Verizon’s network is not potentially harmed by the connection of a device capable of receiving and displaying video streaming, even if that device is obtained from another vendor. In addition, the “any application” principle entitles Verizon subscribers to run the applications of their choice on such handsets. Verizon might respond that reasonable network management allows the company to limit distribution of V-cast video. However, we reject this potential argument because streaming specific content consumes the same amount of bandwidth, regardless of which mobile device is used to access it. One might argue that Verizon’s practice neither prohibits connection of a non-Verizon handset nor prohibits running streaming applications

on them. However, limiting distribution of content based on the device can effectively tilt the playing field in devices. The principles are thus inconclusive.

The statutory provisions would prohibit the practice. Although the V-cast service itself is not a communication service as defined above, the transmission components of cellular data service (i.e. mobile broadband Internet access service) are communication services. The “any device” rule is not helpful here if Verizon allows handsets obtained from other vendors on its network but bars V-cast streaming to them. However, the interconnection provision prohibits interconnection between handsets and Verizon’s cellular network on terms that are discriminatory. Offering V-cast service based on whether the subscriber obtains the handset from Verizon is discriminatory.<sup>40</sup> The statutory language thus implements the “any device” and “any application” principles liberally in this situation.

### *E-Readers*

The providers of electronic readers (e-readers) often sign exclusive agreements with ISPs so that the cellular data-enabled e-readers obtain connections solely through the provider’s ISP. For instance, recent versions of Amazon’s Kindle and of Barnes & Noble’s Nook work in the United States exclusively on AT&T’s cellular network.<sup>41</sup> Owners of these e-readers do not have a choice, should they prefer to obtain connectivity through a different cellular carrier.

No statute or regulation in communications law pertains to this service. The FCC has explicitly excluded connectivity bundled with e-readers from the definition of broadband Internet access service.<sup>42</sup> Consequently, this exclusivity practice appears consistent with current law.

The “any device” and “any application” principles do not apply, since the subscriber of the communications service is the provider of the e-reader, not the user of the e-reader. Thus the principles would allow the practice. Although the transmission component of the service is a communication service as defined above, none of the statutory provisions apply for a similar reason. Therefore, the statutory language would also allow the practice.

## SCENARIOS FOR REASONABLE NETWORK MANAGEMENT

### *Device Crippling*

Verizon and AT&T cripple some Android devices when they subsidize the cost. Specifically, the wireless carriers replace Google with Bing as the default search engine and prevent consumers from changing it back. Paid Verizon apps like Verizon Navigator are given priority over free apps like Google Maps. Finally, “bloatware” is layered on top of the devices. The FCC’s *Open Internet Order*

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<sup>40</sup> Content protection should allow a communications provider to limit distribution of copyrighted content, but this limitation should be on the basis of content protection standards. There are non-Verizon devices that could similarly implement such standards.

<sup>41</sup> They can also use Wi-Fi connections and wired Internet connections through other devices.

<sup>42</sup> Federal Communications Commission, *Preserving the Open Internet; Broadband Industry Practices*, Dec. 23, 2010.

prohibits mobile broadband Internet access service providers from blocking applications that compete with the provider's voice or video telephone services. However, practices that cripple search engines and mapping applications do not fall within this prohibition. Thus, these practices seem to be consistent with current law.

The "any application" principle, however, entitles users to run the applications of their choice, and such crippling clearly interferes with this entitlement. The service providers may claim that crippling is reasonable network management, but since use of the competing applications neither causes harm nor additional traffic to the network, this claim is difficult to justify. On the basis of these principles alone, the practice should be prohibited.

The entitlements that a service provider gains through subsidization of devices remain missing from these principles. In 2011 we proposed an additional principle explicitly stating that providers of communication services should be entitled to charge for communications services provided to their subscribers.<sup>43</sup> The subsidy entitles the provider to place some limits on the use of the device. In this case, these two principles are in tension with one another. We must consider whether the carriers offer the same device without subsidy and with full functionality. If AT&T and Verizon subsidized the cost of their Android devices, restricting their functionality would be acceptable according to our principles. If users paid full-price for Android devices, our principles would bar AT&T and Verizon from locking or crippling these handsets.

The statutory provisions would similarly allow the practice only under certain circumstances. The transmission components of cellular data service (i.e. mobile broadband Internet access service) are communication services. The device subsidies provision states that if a communications provider supplies a subsidized device to a subscriber, it may restrict use of that device. The "reasonable network management" provision prohibits a communications provider from exercising this type of control over communications and information services unless it constitutes reasonable network management. But acceptance of the subsidy constitutes user choice, which makes the practice reasonable network management. All of these conclusions are reliant on the offering of the same device without subsidy and with full functionality. Therefore, the statutory provisions reach the same conclusion as the principles.

### *Access to Content by Digital Video Recorders*

Attachment of digital video recorders was considered above. Here we turn to services provided by digital video recorders.

Although the Telecommunications Act of 1996 required the FCC to assure the commercial availability of equipment used by consumers to access multichannel video programming and other services from vendors not affiliated with the cable television provider, CableCARD has largely failed to encourage a competitive market for set-top boxes. According to the FCC, part of the reason is that CableCARDs do not allow access to two-way services such as video on demand, and they

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<sup>43</sup> Jordan and Shaffer, 401.

require users to frequently upgrade set-top boxes to keep up with advances in the cable television providers' services. In response, the FCC is considering replacing CableCARD with a new regulatory model dubbed AllVid that would establish a standard for connecting residential video devices to a paid-TV service.<sup>44</sup> AllVid would consolidate all proprietary technology specific to the video service provider into a single device. It would allow a video service provider to require the use of a proprietary adapter capable of performing only limited functions. The permitted functions would include serving as a modem, governing access to services, content protection, and routing. However, an adapter would not be allowed to include navigation functions including programming guides and search functionality. The adapter would be either a small device that attaches to another device, or a gateway that attaches to other devices via an open standard such as Ethernet.

The "any device" and "any application" principles, taken together, entitle subscribers of cable television service to access all purchased services independent of the device (assuming the device is technically capable of accessing those services). Although the service provider can use reasonable network management, as in several of the scenarios considered above, this should not be construed in a manner that reduces the set of devices that can receive content.

Although the goal of CableCARD and AllVid is to allow user control over most of the higher functionality of set-top boxes, we do not see their delineation of allowed and prohibited functionality as a clear line. In contrast, the proposed provision on reasonable network management given above would provide a clear delineation based on layering and required network management. The rules would ensure that users have access to all purchased communication services (e.g. video on demand) with their choice of devices. They would allow service providers to control the modem and to limit access to purchased services, but not to control higher layer functionality such as navigation and search. The AllVid approach would allow a video service provider to mandate the use of a proprietary adapter, which violates users' entitlements to attach devices of their choice. In contrast, the "reasonable network management" provision accomplishes this without reliance upon proprietary adapters.

### ***Requiring a Service Plan Based on the Device***

Cellular providers typically require subscribers to purchase a data plan if they wish to use a smartphone on the provider's network. However, some consumers would prefer to subscribe only to a voice plan, and use the smartphone's data capabilities only when connected via Wi-Fi. Neither current law regarding cellular carriers nor regulations regarding mobile broadband Internet access service address this situation. As a result, this practice is probably legal. However, the "any device" principle could easily be construed to entitle cellular subscribers to choose either a traditional phone or a smartphone without impacting the service plan.

The "any device" rule might apply to the situation. However, since a subscriber is allowed to connect a smartphone, contingent upon subscription to a data plan, it might be interpreted as non-

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<sup>44</sup> Federal Communications Commission, *Video Device Competition, et al.*, Notice of Inquiry, MB Docket No. 10-91 et al., Apr. 21, 2010, accessed June 8, 2013, [http://fjallfoss.fcc.gov/edocs\\_public/attachmatch/FCC-10-60A1\\_Rcd.pdf](http://fjallfoss.fcc.gov/edocs_public/attachmatch/FCC-10-60A1_Rcd.pdf).

applicable. The proposed provision on interconnection, which prohibits communications providers from requiring any communications or information service on the basis of a subscriber's device, gives more direct guidance. This illustrates the advantages of addressing not only the use of foreign devices but also the terms on which they are used.

### *Device Tethering*

Tethering applications allow users to connect various mobile devices to the Internet via their smartphones – essentially transforming handsets into wireless access points. Until recently, Google blocked Verizon, T-Mobile, and AT&T wireless subscribers' attempts to download tethering applications sold through its Android Marketplace (now Google Play Store). Google claimed it was simply honoring requests from the carriers. Following an investigation, the FCC ordered Verizon to stop blocking its Android users from downloading third-party tethering apps. Verizon also agreed to pay the FCC \$1.25 million in fines.<sup>45</sup> Even though this situation has been resolved, similar situations are likely to arise in the future. Therefore, it merits examination.

The “any application” principle entitles smartphone users to download and use tethering applications. The “any device” principle entitles users to connect mobile devices via their smartphone using such tethering applications. Verizon, T-Mobile, and AT&T defended their ban on third-party tethering applications by citing communication providers' entitlement to use reasonable network management. However, this argument is weak. These same providers allow tethering using their own applications if the consumer also subscribes to a tethering service plan. The principles thus suggest that blocking third-party tethering applications should be prohibited.

Two provisions from the proposed statutory language are relevant. First, blocking such applications falls outside our proposed definition of “reasonable network management.” Furthermore, the interconnection provision prohibits communication providers from requiring any communications or information service on the basis of a subscriber's device. Simply requiring an additional service plan for the connection of mobile devices such as laptops via a smartphone would be prohibited. Instead, subscribers should pay for the additional bandwidth these activities consume – regardless of whether they are enabled by a direct connection to the Internet or by cell phone tethering.

## CONCLUSION

An increasing number of Americans own Internet-connected mobile devices. Industry analysts predict that 82 million Americans will own tablet computers by 2015,<sup>46</sup> and that smartphone sales

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<sup>45</sup> Sarah Jacobsson Purewal, “Verizon to Allow Third-Party Tethering Apps on Android Phones,” *PC World*, Aug. 1, 2012, accessed June 8, 2013, [http://www.pcworld.com/article/260184/verizon\\_to\\_allow\\_thirdparty\\_tethering\\_apps\\_on\\_android\\_phones.html](http://www.pcworld.com/article/260184/verizon_to_allow_thirdparty_tethering_apps_on_android_phones.html).

<sup>46</sup> Sarah Rotman Epps, “Tablets Will Grow as Fast as MP3 Players,” report, Forrester Research, Jan. 4, 2011.

will generate nearly \$130 million in revenue during 2013.<sup>47</sup> Despite the explosive growth in the use of these devices, no federal policy uniformly addresses attachment of communication devices.

This article has examined real-world scenarios – including the availability of digital video recorders, wireless device exclusivity, restriction of content to certain devices, device crippling, and device tethering – that challenge current telecommunications law. We found that current law results in very different decisions depending on whether the service is provided via telephone networks, cable television networks, satellite television networks, cellular networks, fixed broadband Internet access, or mobile broadband Internet access.

In addition to the scenarios considered above, other situations involve complicated combinations of devices and services. Time Warner Cable temporarily removed shows produced by Fox Cable, Viacom, and Discovery from its free iPad app after all three networks threatened to sue for unlicensed distribution of programming. Time Warner argued that its existing carriage contracts with the networks encompassed all the screens in a subscriber's home, while the content producers countered that their agreements with cable companies permit live feeds of channels to televisions only.<sup>48</sup> Existing federal policy fails to substantiate either position. In another high-profile conflict, Verizon and AT&T blocked subscribers from running the Google Wallet application, which allows users to pay for items just as they would with a credit card. Current law would allow these cellular carriers to permanently keep Google Wallet off their smartphones, even though they are invested in the competing mobile payment system Isis.<sup>49</sup>

This article has explored the application of “any device,” “any application,” and “reasonable network management” principles. Although we found that such principles can be uniformly applied to all types of communications networks, we also found that the principles sometimes conflict and thus lack clear guidance (for example, content exclusivity to devices). We also found that sometimes these principles are insufficient (for example, device crippling), and that there is value in adding a principle explicitly stating that providers of communications services should be entitled to charge for communications services provided to their subscribers.

This article has also explored the application of a previously proposed set of statutory provisions regarding device attachment and use. We found that an “any device” rule fails to address many of the scenarios effectively. However, we found that provisions on device interconnection, device subsidies, and reasonable network management can effectively complement an “any device” rule, and that this combination of provisions can effectively address the range of scenarios considered.

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<sup>47</sup> Consumer Electronics Association, “CE Industry Revenues to Reach Record-High \$209 Billion in 2013, According to CEA,” Jan. 8, 2013, accessed June 8, 2013, [http://www.ce.org/News/News-Releases/Press-Releases/2013-Press-Releases/CE-Industry-Revenues-to-Reach-Record-High-\\$209-Bil.aspx](http://www.ce.org/News/News-Releases/Press-Releases/2013-Press-Releases/CE-Industry-Revenues-to-Reach-Record-High-$209-Bil.aspx).

<sup>48</sup> Alex Sherman, “Time Warner Drops Fox, Viacom from App amid Dispute,” *Bloomberg*, Mar. 31, 2011, accessed June 8, 2013, <http://www.bloomberg.com/news/2011-03-31/time-warner-cable-drops-networks-including-fox-from-ipad-app-amid-dispute.html>.

<sup>49</sup> See “Ready for Isis?” accessed June 8, 2013, <https://www.paywithisis.com/get-isis.xhtml>.

We have focused here on technological convergence. However, we recognize that content convergence and industry convergence also involve important policy concerns regarding device attachment. These likely include competition policy that considers the market power of ISPs, device vendors, and content providers.



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