KEEPING THE INTERNET INVISIBLE: TELEVISION TAKES OVER

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I. INTRODUCTION

"Eventually, all television will be Internet only."[1] The Internet itself eventually may be almost "television only."

Students of the Internet know that the evolution of the Internet is being driven by the popularity of video entertainment and news. The volume of such video material being moved over the net already dwarfs email, document retrieval, and search by several orders of magnitude.[2]

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1. Henry H. Perritt, Jr., *Uber TV: Internet only TV Stations*, 22 UCLA ENT. L. REV. NO. 3 (forthcoming 2016). The *Uber TV* article concentrates on transformation of the programming activity, informed by changes in the adjacent activities of content production and distribution. This Article evaluates the relationship among all three activities and considers the most appropriate role of law and regulation to ensure that the markets connecting them function efficiently to deliver technology's promise.

2. *See* Tom Butts, *What Tom Said: Will Video Eat the Internet?*, TV TECHNOLOGY (Feb. 11, 2016), http://www.tvtechnology.com/opinions/0004/will-video-eat-the-internet/277917 (projecting that 4G networks will carry more than 70 percent of all mobile traffic by 2020, and that global mobile data traffic will reach 30.6 exabytes per month, (up from 3.7 exabytes in 2015), with video consuming seventy-five percent of that data traffic; identifying WiFi hotspots and ATSC 3.0 as solutions). The dominance of video entertainment is a relatively new development; *See also* Susan B. Crawford, *Internet Think*, 5 J. TELECOMM. & HIGH TECH. L. 467 (2007)

Accordingly, when thinking about the future of the Internet, it is appropriate to concentrate on how it will handle video. Designing for efficient distribution of high-definition video to millions of simultaneous users may fundamentally alter the Internet's physical architecture and make it more difficult to honor the Internet's founding philosophy. Efforts by economically powerful television producers, programmers and distributors to gain a competitive advantage may lead to the Internet mostly becoming a collection of "walled gardens."[3]

The defining feature of the Internet is that it is invisible, creating the illusion that creators of content and the consumers of that content are dealing directly with each other, hiding the fact that their exchanges involve dozens of intermediate computers performing routing, reformatting, directory, selection, and payment activities. The policy challenge is how to keep the Internet invisible.

The Federal Communications Commission (FCC) is trying to preserve the open character of the Internet as it evolves to handle television by promulgating a net neutrality rule. Advocates of net neutrality tend to think that it should apply to the entire Internet. That is not really desirable for the entire Internet, however, especially as the Internet swallows up other means of distributing information, such as television.

Ten years ago, communications policy involved a war between the telephone companies and new consumer-electronics and wireless transmission technologies, with the mostly local cable television industry and advocates of the relatively new Internet trying to shape the outcome in their favor. The war now is between Silicon Valley and now-legacy broadcasters and cable companies.

In more than three dozen law review articles written over the ten-year period, the author has been active as a student of the evolving technology policy debate. In 1992, he explained how the Internet would facilitate an unbundling of hitherto integrated publishing activities, an unbundling that would disrupt traditional regulatory categories.[4] In the mid-1990s he explored payment systems, format standardization, and methods of

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(emphasizing user publishing of material, barely mentioning user consumption of commercially produced video entertainment).

3. PowerOasis, Inc. v. Wayport, Inc., 2007 WL 1388188, at 2 (D. Mass. May 10, 2007) (describing walled garden in patent infringement case), *vacated*, 273 F. App'x. 964 (Fed. Cir. 2008); Neil W. Netanel, *Temptations of the Walled Garden: Digital Rights Management and Mobile Phone Carriers*, 6 J. TELECOMM. & HIGH TECH. L. 77 (2007) (citing Apple iTunes as example of walled garden).

4. *See* Henry H. Perritt, Jr., *Market Structures for Electronic Publishing and Electronic Contracting*, BUILDING INFORMATION INFRASTRUCTURE: ISSUES IN THE DEVELOPMENT OF THE NATIONAL RESEARCH AND EDUCATION NETWORK (1992); *See also* Henry H. Perritt, Jr., *Tort Liability, the First Amendment, Equal Access, and Commercialization of Electronic Networks*, 5 HARV. J.L. & TECH. 65 (1992).

dispute resolution that would facilitate e-commerce.[5] He helped lead a debate in the legal academy over how courts should exercise jurisdiction over Internet participants.[6] He consistently advocated using the Internet to provide wider public access to government-generated information.[7] He explored the impact of the Internet on concepts of sovereignty and on the international legal system more generally.[8] He considered the tension between governmental and private management of the Internet.[9] He has

5. *See* Henry H. Perritt, Jr., *Format and Content Standards for the Electronic Exchange of Legal Information*, 33 JURIMETRICS J. 265 (1993); Henry H. Perritt, Jr., *Dispute Resolution in Electronic Network Communities*, 38 VILL. L. REV. 349 (1993); Henry H. Perritt, Jr., *Unbundling Value in Electronic Information Products: Intellectual Property Protection for Machine Readable Interfaces*, 20 RUTGERS COMP. & TECH. L.J. 415 (1994); Henry H. Perritt, Jr., *Payment Infrastructures for Open Systems*, 3 DATA LAW REPORT 1 (1995); Henry H. Perritt, Jr., *Legal and Technological Infrastructures for Electronic Payment Systems*, 22 RUTGERS COMP. & TECH. L.J. 1 (1996); Henry H. Perritt, Jr., *Dispute Resolution in Cyberspace: Demand for New Forms of ADR*, 15 OH. ST. J. DISP. RESOL. 675 (2000); Henry H. Perritt, Jr., *Internet Contracts*, 1-2 E DREJTA 101 (2003); Henry H. Perritt, Jr., *Economic and Other Barriers to Electronic Commerce*, 21 U. PA. J. INT'L L. 563 (2000).

6. *See* Henry H. Perritt, Jr., *Jurisdiction in Cyberspace: the Role of Intermediaries*, BORDERS IN CYBERSPACE: INFORMATION POLICY AND THE GLOBAL INFORMATION INFRASTRUCTURE 164 (Brian Kahin & Charles Nesson eds. 1997); Henry H. Perritt, Jr., *Jurisdiction in Cyberspace*, 41 VILL. L. REV. 1 (1996); Henry H. Perritt, Jr., *Will the Judgment-Proof Own Cyberspace?*, 32 INT'L L. 1121 (1998); Henry H. Perritt, Jr., *Introduction*, 38 VILL. L. REV. 319 (1993).

7. *See* Henry H. Perritt, Jr., *Commercialization of Government Information: Comparisons between the European Community and the United States*, 4 INTERNET RESEARCH 7 (1994); Henry H. Perritt, Jr., *Access to the National Information Infrastructure*, 30 WAKE FOREST L. REV. 51 (1995); Henry H. Perritt, Jr., *Sources of Rights to Access Public Information*, 4 WM. & MARY BILL OF RTS. J. 179 (1995); Henry H. Perritt, Jr., *Should Local Governments Sell Local Spatial Databases Through State Monopolies?*, 35 JURIMETRICS J. 449 (1995); Henry H. Perritt, Jr., *The Information Highway: On Ramps, Checkpoints, and Tollbooths*, 13 GOV'T INFO. Q. 143 (1996); Perritt, Jr. & Christopher J. Lhulier, *Information Access Rights Based on International Human Rights Law*, 45 BUFF. L. REV. 899 (1997); Henry H. Perritt, Jr., *Electronic Freedom of Information*, 50 ADMIN. L. REV. 391 (1998); Henry H. Perritt, Jr. & Zachary Rustad, *Freedom of Information Spreads to Europe*, 17 GOV'T INFO. Q. 403 (2000).

8. Henry H. Perritt, Jr., *Cyberspace and State Sovereignty*, 3 J. INT'L LEGAL STUD. 155 (1997); Henry H. Perritt, Jr., *The Internet as a Threat to Sovereignty? Thoughts on the Internet's Role in Strengthening National and Global Governance*, 5 IND. J. GLOB. LEG. STUD. 423 (1998); Henry H. Perritt, Jr., *The Internet is Changing International Law*, 73 CHI.-KENT L. REV. 997 (1998); Henry H. Perritt, Jr., *The Internet is Changing the Public International Legal System*, 88 KY. L. REV. 885 (2000).

9. *See* Henry H. Perritt, Jr., *Property and Innovation in the Global Information Infrastructure*, 1996 U. CHI. LEGAL F. 261 (1996); Henry H. Perritt, Jr., *Cyberspace Self-Government: Town-Hall Democracy or Rediscovered Royalism?*, 12 BERKELEY TECH. L.J. 413 (1997); Henry H. Perritt, Jr., *International Administrative Law for the Internet: Mechanisms of Accountability*, 51 ADMIN. L. REV. 871 (1999); Henry H. Perritt, Jr., *Towards a Hybrid Regulatory Scheme for the Internet*, 2001 U. CHI. LEGAL F. 215 (2001); Henry H. Perritt, Jr., *The Internet at 20: Evolution of a Constitution for Cyberspace*, 20 WM. & MARY BILL OF RTS. J. 1115 (2012); Perritt, Jr., *Code and Other Laws of Cyberspace*, 32 CONN. L. REV. 1061 (2000); Henry H. Perritt, Jr., *President Clinton's National Information Infrastructure Initiative: Community Regained?*, 69

argued against extension of copyright law in a way that frustrates wider access to music and video entertainment.[10] Most recently, he has begun to explore the technological, economic, and legal issues that arise as television moves to the Internet.[11]

The migration of television to the Internet threatens to envelop the Internet in a web of proprietary technologies, technical barriers to competition, and complex copyright-licensing restrictions that undermine the transformative potential of the move. But governmental regulators must be careful that they not move so aggressively to protect competition that they end up limiting it. Net neutrality and opening up set-top boxes are good ideas, but they must be limited to the phenomena where market forces by themselves will not stamp out monopoly.

This Article begins by sketching a vision of what Internet television can become. Then it recalls the technologies and politics that shaped the 1996 Telecommunications Act (Act) and identifies the disruptive developments that require reconceptualizing the Act. It considers eight specific markets in which the ingredients of television are exchanged, assessing their structure, considering how new technologies make them more or less competitive, and identifying the anticompetitive forces that arise as a result. Having built this foundation, it then evaluates pathways for regulation, including net neutrality, opening set-top boxes, and the future of "must-carry" obligations.

II. INTERNET-ONLY TELEVISION: THE VISION

A compelling vision of the future features consumers who have multiple viewing and input devices, each with wireless access to the Internet cloud. Through any of them consumers can choose any content by tapping a key or an icon on a touch screen. As they move around the house, or leave the living room for the car, an airplane, or a stroll, they can resume viewing wherever they left off.

Monetization for content producers, programmers, and distributors begins with access fees for the last wireless or wired mile. Periodic

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CHI.-KENT L. REV. 991 (1994) (Charles Green Lecture).

10. *See* Henry H. Perritt, Jr., *New Architectures for Music: Law Should Get Out of the Way*, 29 HASTINGS COMM. & ENT. L.J. 259 (2007); Henry H. Perritt, Jr., *Flanking the DRM Maginot Line Against New Music Markets*, 16 MICH. ST. J. INT'L LAW 113 (2007); Henry H. Perritt, Jr., *Music Markets and Mythologies*, 9 J. MARSHALL REV. INTELL. PROP. L. 831 (2010); Henry H. Perritt, Jr., *New Business Models for Music*, 18 VILL. SPORTS & ENT. L.J. 63 (2010); Henry H. Perritt, Jr., *Technologies of Storytelling: New Models for Movies*, 10 VA. SPORTS & ENT. L.J. 106 (2010).

11. *See* Henry H. Perritt, Jr., *Uber TV: Extending the Internet Revolution (Further) into Local TV*, RTDNA NEWSL. (Jan. 25, 2016); Henry H. Perritt, Jr., *Uber TV: Internet only TV stations*, 22 UCLA ENT. L. REV. NO. 3 (forthcoming 2016).

subscription payments or per-session payments[12] generate the basic revenue stream. The distributors, who are in the best position to capture, because they easily can offer or shut off connectivity, share it with upstream distributors, programmers and producers.

The basic policy question is whether this vision will materialize on its own or whether it will be yanked away by economic incentives to create a more Balkanized experience and to withhold new technologies because they might disrupt existing business models.

Television viewers should expect to have a television experience like their ecommerce experiences. Shoppers have access to anyone who wants to sell goods and services; they're not locked in to Amazon. But no one expects to get products for free. Various arrangements exist to facilitate deal-making and revenue collection between the customers at one edge and sellers at the other edge. In other words, net neutrality has nothing to do with "free."

Net neutrality means that customers have to make payment deals only with the sellers of the end product, and not with every intermediary that handles the ecommerce traffic. They should be able to roam around the e-commerce shopping center freely rather than having to pay admission to a multiplicity of walled gardens.

All the parts in between are invisible—all the deals and negotiations between content producers and programmers, the specific arrangements between programmers and distributors, the ways that distributors exchange packets with the each other to construct multiple pathways, the ways the packets travel from the backbones to edge connectors and set top boxes and radio receivers.

As more and more of this takes place in the cloud, it is the Internet itself that needs to remain invisible. Viewers should still be entitled to the illusion that they are dealing directly with content producers and not that they now have to switch constantly from one Internet to another to watch TV. That would be a step backwards into the world of channel switching.

III. LAW AND MARKETS

Competition law is a protector of market economies. Section 1 of the Sherman Act codifies the broadest expression of its main principle: "Every contract . . . in restraint of trade . . . is declared to be illegal."[13]

The problem is that all contracts restrain trade. If a piano player agrees to play for a wedding on a particular Saturday afternoon, the obligations

12. As in the case for Internet access in some hotel rooms.

13. 15 U.S.C. § 1 (2004). The Sherman Act is not the only source of competition law, and competition law is a central feature of almost all economic regulation whether it is denominated "antitrust law" or not.

for both the pianist and the wedding planner restrains trade in the market buying and selling wedding music. The wedding planner has obligated herself not to deal with another piano player for the same couple on the same Saturday afternoon. The pianist has obligated himself not to play another wedding at the same time. So other pianists have their market opportunities diminished, and so do wedding planners with respect to other pianists.

Nevertheless, most contracts, like the wedding music contract, are legally permissible and the law enforces them. From the beginning, competition law has straddled the boundary between permissible restraints on competition, thought to be likely to improve social welfare and limitations on competition that would diminish social welfare. Microeconomic analysis of market structures, conditions for competition, and business practices teaches policymakers what behaviors should be permissible and which should be prohibited.

In particular, communications law in United States long has been protective of some anti-competitive arrangements while maintaining vigilance against others. Most radio frequencies are assigned on an exclusive basis for a particular geographic area, because if multiple transmitters operated nearby on the same frequency, their transmissions would interfere with each other, and reception would be garbled. On the other hand, the FCC grants licenses on different frequencies for the same geographic area to ensure that consumers have a choice of more than one television or radio station.

Moreover, as technology advances, policy as to what level of competition best serves public welfare changes. For nearly 100 years, microeconomic theory said that widespread access to telephone technology was more likely if there was only one telephone company, because of economies of scale resulting in what economists call "natural monopoly." By the 1970s, however, policy began to change. Lower costs for telephone hardware (consumer premises equipment or CPE) like telephone sets spawned firms that wanted to sell them to telephone subscribers as an option to replace the telephone set provided exclusively by the telephone monopoly. Improvements in microwave radio technology and switching systems gave rise to enterprises that wanted to offer competing long-distance telephone service. The eventual result was the breakup of the telephone monopoly, beginning with the *Carterfone* decision in 1976[14] that forced open the market for consumer premises

14. *See* N.C. Util. Comm'n v. F.C.C., 552 F.2d 1036, 1042 (4th Cir. 1977) (reviewing history of AT&T's prohibition of interconnecting other manufacturers' CPE and of the Carterphone controversy); Litton Sys., Inc. v. Sw. Bell Tel. Co., 539 F.2d 418 (5th Cir. 1976) (allowing antitrust action against Bell System for its refusal to allow interconnection of private branch exchange equipment).

equipment, and the MCI antitrust decision[15] that forced open the market for long-distance telephone service. In each case, the government forced private enterprise to open up specific markets to competition. It prohibited the telephone monopoly from tying basic access to the telephone infrastructure—getting a dial tone—to the purchase of other products or services, such as long-distance service and telephone hardware.

Various kinds of tying arrangements proliferate throughout the economy. If one buys a Tesla automobile, Tesla does not offer traction motors from different manufacturers as an option; the car comes with Tesla's traction motors. Take it or leave it as a package, even though a particular purchaser might believe that traction motors from General Electric have superior performance or better prices.

Tying arrangements like this can be explicitly contractual, as when a seller says, "My performance under this contract is conditioned on your buying your automobile maintenance from me rather than from the garage down the street," or it can be the natural result of integration, a form of business organization in which one firm produces multiple products or services that it offers as a package. Integration can be horizontal: McDonald's sells both breakfast and lunch; Disney sells television programming, theme park experiences, and Mickey Mouse dolls. Or, it can be vertical, when one firm produces closely related complementary products or services and sells them together. A pizzeria purchases the dough, the cheese, the tomato sauce, and the pepperoni, combines them, and sells the entire pizza.

Some tying arrangements are so likely to enhance social welfare that their legitimacy is taken for granted: Tesla's selling the batteries, body, seats, and traction motors as an automobile; the pizzeria's selling the entire pizza. In all of those instances, the ingredients are complementary, and tying them together reduces the transaction costs of consumers having to search for them separately and to assemble them after purchase.

Complementarity is particularly common when the potentially separate ingredients or service component represent a necessary sequence of activities: buying the dough, cheese, meat, and tomato sauce, mixing them together in the right proportions, cooking them together; and delivering the pizza to the consumer. When complementarity is sequential[16] like this, the markets for the individual ingredients are said to have a *vertical* relationship with each other. When products compete with each other they are said to have a horizontal relationship with each

15. *See* MCI Commc'n Corp. v. Am. Tel. & Tel. Co., 708 F.2d 1081 (7th Cir. 1983) (reviewing judgment on jury award of $1.8 billion damages against AT&T; affirming antitrust liability but remanding for new trial on damages).

16. The dough and the pizza have a sequential relationship: first comes the dough, then the pizza.

other. The market in which Dominos competes with Pizza Hut is horizontal.

Most markets have both a horizontal and vertical dimension. Domino's can buy its mozzarella cheese from Leprino Foods or someone else. That is the horizontal market. Domino's could decide to integrate its operations; it could buy cows and dairy farms and make its own cheese. That would implicate the vertical market.

Tying arrangements can exist in either vertical or horizontal markets. Disney can condition access to ABC television programs on purchase of a season pass to Disney World. McDonald's can condition sales of Big Macs at lunch on a customer also coming to McDonald's for breakfast pancakes and sausage.

In each of the examples given in this section, chosen to be simple and pure, there is still room for argument about classification of market features. Are breakfast and lunch competitors? They are in the sense that one can have a big breakfast and skip lunch or vice a versa with no ill effect. But they also are sequential and complementary. The tradition is to have breakfast first, and then to eat lunch later. Breakfast and lunch complement each other because both are part of a balanced diet. As component parts of one's activities in a 24-hour period, people refer to them as a package: a "day."

Vertical arrangements are more likely to enhance social welfare than horizontal arrangement. The law looks more kindly on Walt Disney Company's providing only one means of transportation inside its theme parks than it would on Disney's conditioning access to Disney World to those with television sets that receive only ABC television programs. Competition law has always struggled with this kind of classification; if one classifies a market restraint is vertical, it is more likely to be permissible. If one classifies it as horizontal it is more like it to be prohibited.

If one classifies the relationship of two products as complementary, tying is more likely to enhance social welfare; if the relationship is competitive, tying them together is likely to diminish social welfare.

So it is with communications regulation. Does tying multiple streams of programming together in a cable television package enhance social welfare or does it diminish it because it restricts subscriber freedom to buy different kinds of programming from different sources? Would it be better for the economy if AT&T refused to sell DSL Internet access to anyone who is not a voice telephone customer?

In the vast majority of cases, self-interested supply and demand behavior eliminates the harmful arrangements, and causes the beneficial arrangements to rise to the top. AT&T and Verizon are happy to sell DSL Internet access to anyone within the reach of their wires and optical fibers; if either ties Internet access to conventional analog voice telephone

service, it loses customers and revenue. If Disney refuses access to Disney World to people who watch NBC or CBS, it loses theme park revenue.

Each of the markets for separate components of Internet television offers the same choices of classification and welfare conclusions. The subsequent sections in this article explore pro-competition forces and anti-competitive temptations in order to build a foundation for sensible policy choices about the relationship between the Internet and the government. At each level an enormous range of technical alternatives exist for tying complementary communication and information processing activities together. Some are obviously beneficial; others are obviously harmful; the effect of many is debatable.

IV. THE 1996 TELECOMMUNICATIONS ACT

Regulation of Internet television proceeds from several provisions of the Act.[17] It, however, became law in a very different technological and political context than exists ten years later.

A. *Genesis of the 1996 Act*

In the mid-1990s, pressure was growing for the Congress to codify and extend a patchwork of regulatory initiatives that subjected cable systems mainly to local regulation, imposed distinct federal licensing requirements on radio and television broadcasters, and was forcing telephone monopolies to open their infrastructures to connections by competitors. A consent decree had required the fragmentation of the nationwide AT&T telephone monopoly, and the FCC had issued orders imposing open network architecture requirements on the successors to AT&T—the "Baby Bells"—under which they had to provide comparably efficient interconnections to new entrants to the telephony industry. As the Act was beginning to crystallize, this author, in the first edition of his book, LAW AND THE INFORMATION SUPERHIGHWAY, said:

> Telecommunications reform legislation almost certainly will relax restrictions on the creation of the telephone market by cable operators and entry into the cable market by telephone operators. It also may extend universal service obligations and certain common carriage obligations beyond "plain old telephone service" (POTS) into certain basic aspects of digital non-voice communication and information services, possibly under the open platform proposal initially submitted by Mitchell Kapor, the

17. Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56.

developer of Lotus 1-2-3 and the founder of the Electronic Frontier Foundation.[18]

In 1985 the dominant players were the broadcasters, Hollywood, and telephone monopoly. The Internet was developing in universities and defense labs but was not yet part of the public consciousness. Cable access to television was growing, but the supplier market was highly fragmented, with one or a few cable distributors in each metropolitan area, reflecting their roots as community access television (CATV) providers. Ten years earlier a few aggressive startups like MCI and Sprint had successfully nibble at the edges of the long-distance telephone market, demanding that AT&T open up access to its last-mile links to telephone subscribers. Some equipment manufacturers had persuaded the FCC to force open the telephone equipment market. Technological advances in wireless communication were inducing the telephone companies to consider new architectures for mobile telephone service, and consumer electronics firms like RadioShack were eager to supply the equipment of what was becoming the cellular telephone system.

By 1990, a few visionaries, entrepreneurs and academics, were predicting that, in 20 or 25 years, point-to-point communication would mostly be wireless instead of wired, and entertainment would mostly be wired instead of wireless.[19]

Regulation of competition in the telephone industry under the AT&T antitrust consent decree[20] was wearing thin and a shifting configuration of interest groups preferred a regulatory regime that the reflected political input, in other words, fundamental statutory reform of the 1936 Communications Act and the much more recent Cable Act. The incoming Clinton Administration had to select among a variety of philosophies for the recent privatization of the Internet. Advances in personal computer technology were persuading early adopters that small computers were engines of productivity, especially if they could be interconnected easily.

A few visionaries predicted that a ubiquitous Internet with PCs at the edges would come to represent the dominant infrastructure for commerce,

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18. HENRY H. PERRITT, JR., LAW AND THE INFORMATION SUPERHIGHWAY 335 (1996) [hereinafter PERRITT, LAW AND THE INFORMATION SUPERHIGHWAY].

19. November, 1990 conversation at Harvard Kennedy School with John T. Dunlop and other economists.

20. United States v. Am. Tel. & Tel. Co., 552 F. Supp. 131 (D.D.C. 1982), *aff'd sub nom.* Maryland v. United States, 460 U.S. 1001 (1983), *amended sub nom.* United States v. W. Elec. Co., Inc., 714 F. Supp. 1 (D.D.C. 1988) *aff'd in part, rev'd in part sub nom*. United States v. W. Elec. Co., 900 F.2d 283 (D.C. Cir. 1990), and *modified sub nom.* United States v. W. Elec. Co., Inc., 890 F. Supp. 1 (DDC 1995), *vacated*, 84 F.3d 1452 (D.C. Cir. 1996) (interpreting consent decree and applying it to information services; holding that bottlenecks gave local telephone companies market power over information services markets; terminating consent decree because of enactment of Telecommunications Act of 1996).

communications, and entertainment. They recognized that the philosophy and technological architecture embedded in the Internet was fundamentally different from the concentrated, centralized philosophy represented by the telephone companies and the broadcast industry. Broadcasters and the telephone companies controlled their own infrastructure; the Internet was intended to permit a democratized, competitive infrastructure in which thousands or millions of individuals and businesses could seamlessly integrate their offerings to provide delivery of content without caring about it its nature; any vendor with a new idea could hook up at the edge. Any consumer interested in new offerings could hook up at the edge halfway around the world and the two could exchange information without caring how it got from one side of the Internet to the other. People were beginning to talk about electronic commerce conducted through the Internet.

B. *The Markets*

In 1996 public policy focused on three markets: the market for interconnecting long-distance service with local service; the market for interfacing CPE with local service; and the market for consumer access to local service.

The telephone market was a monopoly and completely integrated vertically. The policy goal was to craft a way of overcoming legal and economic barriers to entry by new providers of long distance service, local service, and CPE.

Cable television was an essentially local phenomenon. The cable provider put an over the air TV antenna on a hill or, sometimes, made arrangements directly with the television station to get a wired stream, and distributed the signals to its customers through a plant covering a limited geographic area. This was completely consistent with the regulatory regime that emphasized local control and local franchises. But Ted Turner understood the potential of tying local cable networks together so that each of them could carry programming from out of the area. Collectively, they would become a strong competitor to national television networks, delivering national news and entertainment programming. The result, which was already beginning to take shape in 1996, transformed cable television into an economic activity that was largely indistinguishable from broadcast television, although its regulatory structure still reflected dramatically different assumptions.

C. *The Philosophy of the Act*

Putting together the Act was a process that took three years of intensive lobbying and legislative drafting. One virtual war, one

philosophy, and one and a half visions were dominant. The war was between the legacy telephone companies recently split apart from the AT&T monopoly and a variety of new entrants who were pressing for access to the existing infrastructure so they could enter the market Their ranks comprised not only the wannabe long-distance carriers like MCI and Sprint, but a variety of CLECs who wanted to offer local telephone service. The economic debate in this context was over how much of a free ride the new entrants should get on investments made over decades by the telephone companies, recognizing that too much of a free ride would reduce incentives to innovate, both by the ILECs and the CLECs.

The philosophy favored deregulation, a shift away from command and control and government prescription of engineering standards and prices toward a regulatory regime aimed mainly at promoting competition rather than assuring that public utilities "served the public," in exchange for access to the market. The philosophy was animated not only by intellectual capital developed in universities, particularly by the economics faculties, but also by certain new technological realities. The rationale for detailed public service mandates on the broadcast industry based on government grant access to "scarce spectrum" did not make any sense when the same content was carried by wire instead of by electromagnetic signals traveling through space.

The major vision was a market in which cable companies and telephone companies would trespass on each other's turf: telephone companies would distribute entertainment comment content, mainly television programming, and cable companies would offer telephone service. The half vision, so dubbed because it had not yet crystallized very well, and there was almost no proof in the market of its feasibility, was that the Internet would somehow play a role in all of the change.

The center of gravity of the Act was restructuring of the telephone industry. Twenty sections contain requirements for telephone companies to open up their infrastructure to competitors at multiple levels, ranging from consumer premises equipment to access to their backbone switching equipment. Seven sections involve direct satellite broadcast, and eight involve cable TV, mostly adjusting federal-state relationships regulating pricing and other franchise terms. Eleven other sections of the act focus on video programming, and half of those relate to allowing telephone companies to offer video programming.

The word "Internet" appears only eleven times in the statute, twice in the House report, once in the Senate report, and nine times in the Conference report's discussion of the statutory text.

V. TECHNOLOGIES OF DISRUPTION

Seven disruptive technologies transformed telecommunication and electronic entertainment industry after the 1996 statute was enacted. Two of them, the Internet and widespread deployment of cellular telephone systems, were visible when the act was being put together, but how they would crystallize in the marketplace was no more than guesswork. Three others, spectrum reallocation, ATSC 3.0, deployment of Internet multicasting protocols, and targeted advertising developed much more recently.

A. *The Internet*

As this author said in 1996, describing the Internet to lawyers who were then only dimly aware of it:

> The Internet is an open architecture; indeed, that is all it is. Many people are surprised to find out that the Internet is not an entity. There is no chief executive officer of the Internet, nor any board of directors, nor any central network administrative apparatus. The Internet is defined as a collection of several million computer networks connected to each other through routers that use the TCP/IP protocol suite and share a common name and address space.[21]

The Internet is not a defined physical network; it is a philosophy and a family of technical standards that can be implemented on any kind of physical network—systems of routers wired together with coaxial cables and optical fibers; user computers and servers wired together with ethernet cables or linked via Wi-Fi connections; or routers and user computers linked by long-distance radio signals. As long as the computers and the switches that connect them to the links adhere to the relevant protocols, they can exchange traffic with each other.[22]

Common usage refers to the Internet as the "cloud"[23] and its hundreds of millions of connections with individual users or autonomous networks

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21. PERRITT, LAW AND THE INFORMATION SUPERHIGHWAY, *supra* note 18, at 13.

22. *See* Susan P. Crawford, *Internet Think*, 5 J. TELECOMM. & HIGH TECH. L. 467 (2007) [hereinafter Crawford Think] (explaining the three different perspectives on what constitutes the Internet).

23. *See* WNET, Thirteen v. Aereo, Inc., 712 F.3d 676, 694 (2d Cir. 2013), *rev'd on other grounds, sub nom* Am. Broad. Co., Inc. v. Aereo, Inc., 134 S. Ct. 2498 (2014) (using the term "cloud").

as its "edge,"[24] or the "last mile."[25] Colloquially, the links between routers, and sometimes the links with their associated routers at each end, are referred to as "pipes."[26]

The Internet's philosophy is expressed by the open systems interconnection (OSI) stack.[27] The OSI stack identifies six layers: physical, datalink, network, session, presentation, and application.[28] The specific technology used in any one layer is indifferent to the technology used in the layers above it and below it in the stack. Similarly, the Internet is indifferent to the means used at the physical layer, which may be wires or radio waves; it is indifferent to the kind of content that passes through it; it does not care about the hardware and software that operates beyond its edges; and it has no central traffic director. Instead, information moves through it from origin to destination in packets defined according to the Internet Protocol (IP). Specialized computers called *routers* direct packets to other routers according to routing tables maintained by the routers themselves. Multiple "hops" from one router to another determine the overall path from original to destination, which can change from packet to packet depending on link state. Each router is a specialized, high performance, but relatively stupid computer. Its job is simple: to receive packets in the order they are presented on one or more input ports, read the destination contained in the IP packet header, look it up in its routing table, and direct the packet to one of its output ports. All routers have two or more output ports.

Routing tables on each router periodically update themselves according to specialized messages exchanged among the routers.[29] The

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24. *See* Verizon v. F.C.C., 740 F.3d 623, 628-629 (D.C. Cir. 2014) (using the term "edge," and invalidating FCC's net neutrality order).

25. *Id.* at 631 (using the term "last mile").

26. *See* MediaOne Group, Inc. v. County of Henrico, Virginia, 257 F.3d 356, 359 (4th Cir. 2001) (referring to Internet conduits as "pipelines"); Susan Crawford, *Internet Think*, 5 J. TELECOMM. & HIGH TECH. L. 467, 467 (2007) (referring to Internet connections as "pipes").

27. Uyless D. Black, OSI: A MODEL FOR COMPUTER COMMUNICATIONS STANDARDS 8-10 (1990) (providing overview of OSI layers).

28. Phil Zito, *What is the OSI Model*, BUILDING AUTOMATION MONTHLY (May 3, 2013), http://buildingautomationmonthly.com/what-is-the-osi-model/ (table illustration the OSI stack and the protocols associated with each layer).

29. RFC, *Internet Control Message Protocol*, at RFC 792, https://tools.ietf.org/html/rfc792 [hereinafter RFC] ("ICMP messages are sent in several situations: for example, when a datagram cannot reach its destination, when the gateway does not have the buffering capacity to forward a datagram, and when the gateway can direct the host to send traffic on a shorter route." RFC 792. For example, a gateway router may send an ICMP that says, "don't send packets addressed to XXX to me; send them instead to YYY." RFC 791 at 13. The border gateway protocol, defined in RFC 4271, https://tools.ietf.org/html/rfc4271 (2006), exchange routing information between neighbor routers; collectively the information exchanged between neighbors permit them to construct a path from anywhere to anywhere on the Internet. "The primary function of a BGP speaking system is to exchange network reachability information with other BGP systems. This

combination of routing tables and routing messages maintain a current awareness of all other routers connected anywhere in the net and calculate the most efficient path from any router to any other.

The routing system is anchored in a defined address space, in which each computer (including routers) connected to the Internet has a unique IP address. Expansion of the address space occurs because routers at the edge, called *gateway routers* can make up their own addresses for computers connected to them but not visible to the Internet at large. These are called, "*autonomous networks*."[30] Traffic coming from the cloud to a computer beyond the edge on an autonomous network simply is addressed to the gateway router, and the gateway reroutes it to the appropriate computer on the net so that it connects to the cloud.

IP packets comprise a string of digital bits enclosed in a package, each of which has a header with the IP addresses for the origin and destination of that particular packet. The routers do not care what is inside the IP packets, and neither do the links connected to them. The routers faithfully process the packets, understanding the headers, but merely passing along the digital bits inside them (the "payload"), and the links transmit the stream of digital bits, not caring what is in the header or the payload.

Each router examines the destination address of each packet, and looks it up in its routing table. First, it determines if the entire address is on the local network which the router serves as a gateway.[31] If it is, the router lets it remain on the internal network to be selected by the network interface card on the appropriate node. If it is not, it looks up the network address in its routing table.[32] The network address is the first twenty-four bits of the IP address, omitting the host part of the address (the last eight bits of an IP address).[33] For an address not on the local network, the routing table specifies the next-hop router.[34] Most routing tables also contain a default entry, which specifies where a packet should be sent if a network address cannot be found for it.[35] If no route can be found, the router sends a "network unreachable" message back to the originating host.[36]

When a router boots up, it may activate a static routing table or it may send an advertisement to neighboring routers, soliciting their routing

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network reachability information includes information on the list of Autonomous Systems (ASes) that reachability information traverses. This information is sufficient for constructing a graph of AS connectivity for this reachability" RFC 4271 at 1.).

30. LANs within a single enterprise are examples of autonomous networks.

31. 1 W. RICHARD STEVENS, TCP/IP ILLUSTRATED 112 (1994) (describing sequence of routing logic).

32. *Id.*

33. *Id.* at 7-8, 42 (describing IP address and subnetting).

34. STEVENS, *supra* note 31, at 113.

35. *Id.* at 114 (describing default entries).

36. *Id.* at 117.

tables.[37] Advertisements list the routes reachable by that router.[38] As routes change, and as new routers become active or drop off, adjacent routers update their routing tables according to the advertisements, and the changes propagate through the Internet. The basic approach means that each router's routing table need only contain the addresses of the next hop routers and not the addresses of every one of the millions of routers on the Internet.

Higher level protocols at the transport layer of the OSI stack run on origin and destination computers beyond the edge of the Internet. They define the information contained in the package. For example, the transport control protocol (TCP),[39] maintains the illusion of a persistent connection that lasts as long as any particular communication session. TCP is implemented by computers beyond the edge of the Internet, typically the computer that originates the information and the one that displays it to a user or processes its content. TCP processes *segments* encapsulated in IP packets. TCP, and not IP, organizes packets in the sequence in which they were sent, and associates a sequence of segments with a communication session. TCP also determines whether any segments are missing or corrupted. When a segment is missing or corrupted the destination TCP asks the originating TCP to resend it.

The routers are ignorant about the correct sequence of packets or whether one has been omitted from a stream; their job is merely to receive packets on their input ports, and determine what output port they should be sent to in order to get them closer to their destination. They are specialized "best efforts" devices and let the next layer in the OSI stack, such as TCP, worry about maintaining the integrity of a communication stream.

TCP is not a very good protocol for audio and video streams, because it periodically interrupts the flow of the stream to ask for missing segments. Alternative transport layer protocols, the most basic of which is UDP, avoid this limitation by ignoring missing segments so that the stream flow is uninterrupted.[40]

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37. *Id.* at 123.

38. *Id.* at 123-24.

39. TCP, along with IP, are the core Internet protocols. *See* Info. Scis. Inst., Univ. of S. Cal., Transmission Control Protocol DARPA Internet Program Protocol Specification, RFC: 793 (Jon Postel ed. 1981) (defining TCP), *available at* https://tools. ietf.org/html/rfc793.

40. *See* User Datagram Protocol, RFC: 768 (Jon Poste ed. 1980)(defining the User Datagram Protocol), *available at* https://tools.ietf.org/html/rfc768. Real time audio and video information is carried by Real-Time Transport Protocol ("RTP") in conjunction with UDP. *See* H. Schulzrinne et al., RTP: A Transport Protocol for Real-Time Applications, RFC: 3550 (2003) (defining RTP: "Applications typically run RTP on top of UDP to make use of its multiplexing and checksum services; both protocols contribute parts of the transport protocol functionality. However, RTP may be used with other suitable underlying network or transport protocols (see Section 11). RTP suppports data transfer to multiple destinations using multicast distribution if

Above TCP and its alternatives in the OSI stack are presentation protocols such as ASCII, JPEG, MPEG, and GIF. Textual information usually is encoded according to the ASCII standard, still images as jpeg or gif, audio information according to mp3, and video information as mp4, mp3, subsets of MPEG.[41]

At the application layer, hypertext transfer protocol (http) defines the World Wide Web.[42] Http messages encapsulated in TCP frames are responsible for requesting discrete pages from servers determined by their Internet addresses, translated into universal resource locators (URLs). Http is stateless, meaning that all a server running http does is receive http messages, one at a time, find the page desired, and send the page, formatted in the html protocol to the requester. It has short-term amnesia: it responds to a request for a page and then forgets about it and waits for another request, which may be from the same user or a completely different one desiring a completely different and unrelated page. Http leaves it to other procedures at the application layer to create the illusion of a continuing information exchange between a server and a particular user client. Cookies are the dominant way of doing this. When an http server responds to a user request, it sends, not only the html page requested, but along with it a short message identifying the user and providing other information about the information exchange session. When the user requests another page from the same server, the user's client computer sends the cookie back along with the new http request. In their simplest realization, cookies avoid a user having to log in again each time he requests another page from the same website.

At the application lawyer, competing browsers such as Google Chrome, Microsoft Internet Explorer, Firefox, and Apple Safari manage the client side of the http sessions and render html pages on that user's display device, including video. They communicate via an exchange of http messages with operating systems on the server-side, such as Apache and Microsoft's Internet Information Services.

Http messages are expressed in presentation layer protocols such as ASCII, encapsulated in TCP or UDP segments, which are encapsulated in IP packets, which in turn are encapsulated into datalink frames defined by Ethernet, for example, and then translated into electrical impulses to

provided by the underlying network."), *available at* https://tools.ietf.org/html/rfc3550 (2003).

41. The application, presentation, and session layers are more tightly integrated than the lower layers. Sometimes a function is performed in one of the layers and sometimes in another. Sometimes the presentation layer is merely a pass-through for information encoded in a higher layer. *See* Black, *supra* note 27, at 362 (describing the relationships between the application, presentation, and session layers).

42. The original version of http is defined by R. Fielding et al., Hypertext Transfer Protocol – HTTP/1.1, RFC: 2616 (1999*) available at* https://tools.ietf.org/html/rfc2616. It was superseded by M. Belshe et al., Hypertext Transfer Protocol Version 2 (HTTP/2), RFC: 7540 (2015), *available at* https://tools.ietf.org/html/rfc7540.

be transferred by wire or electromagnetic radiation by devices at the physical layer. At the receiving end, hardware demodulates the signal into connection layer frames, and software progressively unwraps each layer to reveal the layer above it. Metaphorically, it is like a message (application layer) enclosed in one envelope, which is enclosed in another envelope, and so on. The programs running at each layer open only one envelope.

The capacity of the Internet is determined by a combination of router processing speed, link bandwidth, and the number of alternative pathways from each origin to each destination. If there are six pathways from one server to one client, each router need have only 1/6 of the processing power as it would need if there were only one path. Likewise for link bandwidth. Router processing power must be matched to link bandwidth. A very fast router can function no faster than the capacity of the links connecting it. A slow router cannot fill the bandwidth of a high capacity link.

The Internet has a physical reality, of course. The electrons and photons that carry the signals representing digital bits move over optical fibers; coaxial cables; and radio, in the form of microwave transmissions, UHF cellphone transmissions, and satellite transmissions.[43] Typically, Internet service providers lease optical fiber or radio capacity from entities that specialize in providing such connectivity, but some entities, like cable MVPDs and the telephone companies, provide their own physical connectivity. They often have physically buried their own cable or established their own transmitters. Multiple types of Internet service providers use this physical capacity. Tier 1 providers handle the largest volumes of Internet traffic,[44] and peer with each other.[45] Tier 3 provides last-mile connectivity to users. Tier 2 providers are intermediate in size. Some enterprises participate in all three tiers.

Since the turn of the 21st-century, content delivery networks (CDNs) have arisen.[46] CDNs which combine load sharing, caching, and network

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43. Physical Layer—OSI Model, http://www.studytonight.com/ computer-networks/osi-model-physical-layer (last visited Feb. 19, 2017).

44. In 2013, the top Tier 1 backbone providers were Level 3, NTT, Telia Sonera, GTT, Cogent, Taga, Spring, Verizon, Tel. Italia Sparkle, TCCW, China Telecom, XO, and Hurricane Electric. *See* Earl Zmijewski, DYN RESEARCH, *A Baker's Dozen* (2013), *available at* http://research.dyn.com/2014/01/bakers-dozen-2013-edition/.

45. Peering, in contrast to transit, involves exchanging traffic without paying each other. Transit connections provide access to any place on the Internet for a fee. Networks with roughly equivalent traffic levels usually peer; networks with disparate levels of traffic usually enter into transit arrangements.

46. George Pallis & Athena Vakali, *Insight and Perspectives for Content Delivery Networks*, 49 COMM. OF THE ACM 101, 101 (2006); Gilbert Held, A PRACTICAL GUIDE TO CONTENT DELIVERY NETWORKS xiii (2d ed. 2011) (referring to "hidden network within the Internet"); Mukaddim Pathan, *Cloud-Based Content Delivery and Streaming, in* ADVANCED

connectivity.[47] They store content on a multiplicity of large servers placed geographically near the edge to serve expected demand. The multiple servers provide greater reliability through redundancy and greater efficiency by offloading repeated requests for the same content from one central server.[48]

The physical architecture is simple. A connection, say an optical fiber, connects to routers at each end. Peering and transit sites, called Internet Exchange Points,[49] are simply large routers. The mesh has considerable flexibility. A content producer or programmer may want to carry its traffic closer to where its viewers are.[50]

It can arrange to lease its own optical fiber, buy its own large-scale routers, and make peering or transit arrangement with other backbone providers closer to where the largest groups of viewers are.[51] Or, if it does not want to be in the physical networking business, it can hand off its traffic further upstream to a third-party backbone provider or to a CDN which will hand it off to backbones at multiple points further downstream.[52]

CONTENT DELIVERY, STREAMING, AND CLOUD SERVICES 1 (Mukaddim Pathan et al. eds., 2014) (explaining growing popularity of CDNs).

47. *See In the Matter of Protecting & Promoting the Open Internet*, 30 F.C.C. Rcd. 5601, 5688 (2015) (noting that CDNs enter into both transit and peering arrangements with backbone providers).

48.

> ISPs regularly cache popular content—anything from simple text to streaming video—so that when a subscriber requests such content it can be retrieved more quickly (and with less load on the network) than would occur if the request were sent to its specified destination. And it's not just an ISP's own servers that cache content; an entire industry of content delivery networks have sprung up to move content closer to Internet users to improve performance.

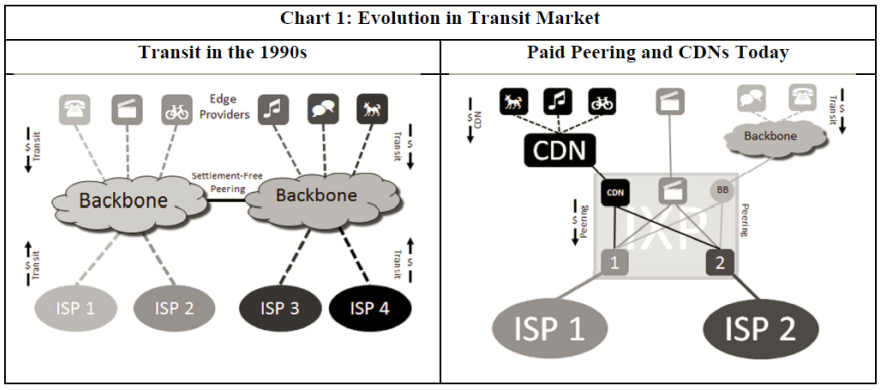
Id. at 5956 (Pai, dissenting).

49. An Internet exchange point typically is configured as ethernet ring in a single facility to which each participating carrier attaches a gateway router. *See* Equinix Internet Exchange, http://www.equinix.com/services/interconnection-connectivity/internet-exchange/ (last visited Feb. 19, 2017) (offering peering at 19 Internet Exchange Point locations, worldwide).

50. Building a pipe that terminates close to be edge reduces the number of hops packets must take from their origin to their destination. Reducing the number of hops minimizes delays and increases effective bandwidth.

51. *See* 30 F.C.C. Rcd. at 5688 (noting that AT&T, Comcast, Time Warner Cable, and Verizon have built or purchased their own backbones).

52. *Id*. at 5689.



The chart compares the Internet architecture of the 1990s to that of now, emphasizing the role of CDNs.

The Internet protocols are becoming the norm for video distribution. Television programmers are harmonizing their internal exchanges on IP. Eighty percent of telephone MVPD providers use IPTV.[53] Cable Internet access providers are embracing a decentralized infrastructure that looks like the Internet's multicasting.

The Internet's core virtue is that it is invisible. Producers and consumers of information have the illusion of dealing directly with each other. Each has a broad choice. Any consumer can deal with any producer, and all producers have access to all consumers

The dominant policy goal is to keep the Internet invisible, in this sense.

B. *Multicasting*

When television moves through the Internet, multicasting is a better way to stream it than the one-to-one package exchange that typifies symmetrical Internet exchanges. Multicasting has been an Internet protocol since 1995. It eliminates some of the inefficiencies of processing viewer requests, packet-by-packet. When many viewers request the same content, multicasting content servers to send one stream of packets from the origin to a small number of intermediate routers which distribute it to the edge of the Internet where radio transmitters or cable head ends break it up into streams for each user. Although it is interactive, it is a one-to-a-great-many protocol rather than the one-to-one protocol represented by simple IP and TCP. Internet vendors like the telephone companies who

53. In the Matter of Annual Assessment of the Status of Competition in the Mkt. for the Delivery of Video Programming, 30 F.C.C. Rcd. 3253, 3264 (2015); FCC, 2015 Video Competition Report, ¶ 27, at 11.

see their future in wireless are working hard to extend the original multicast protocols into what is colloquially called IPTV,[54] even as the television industry rushes to get ATSC 3.0[55] in place.

C. *Cellular Telephony*

The cellular telephone system is a mesh of interconnected relatively low power radio transmitters and receivers, almost always combined into *transceivers.* The transceivers and their antennas are grouped and placed on cell towers, with their power and propagation characteristics assigned to cover a limited amount of territory, rarely more than 10 ten square miles.

The cellphone system shares frequencies by dividing its coverage area into multiple cells.[56] Each cell has a cluster of VHF or UHF frequencies for communication and a control channel. Adjacent cells use different frequencies to prevent interference.[57] Cell towers contain multiple antennas and radiate relatively low power signals from a multiplicity of transmitters, one for each frequency, and receive transmissions from the individual cell phones. When the signal from a cell phone becomes stronger in an adjacent cell than in the cell to which a cellphone is connected, the Mobile Telephone Switching Office (MTSO) hands off the customer to an adjacent cell.[58]

The Base Station Controller (BSC)[59] and Radio Network Controller (RNC),[60] subsystems within the MTSO are responsible for detecting when a customer wants to make a call by sending an attached message on a cell's control channel and the call to an available frequency within the cell.[61] The same subsystems keep track of all cellphones within the range

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54. Internet Protocol Television. *See* Tom Nolle, Defining IPTV to Clarify Your Video Planning, http://searchtelecom.techtarget.com/tip/Defining-IPTV-to-clarify-your-video-planning (last visited Feb. 19, 2017).

55. *See* Rich Chernock, ATSC 3.0: Where We Stand, http://atsc.org/ newsletter/atsc-3-0-where-we-stand/ (last visited Feb. 19, 2017) (describing how hard the television companies are working to finish ATSC 3.0).

56. *See* Nat'l Ass'n of Broadcasters, Eng'g Handbook, 594-95 (Edmund A. Williams et al. eds., 10th ed. 2007) (explaining architecture of cell networks) [hereinafter NAB Engineering Handbook].

57. *See* Criterion Cellular.com, Cellular Frequencies and Bands in use Today, http://www.criterioncellular.com/tutorials/ bandsandfrequencies.html (last visited Feb. 19, 2017) (explaining that different cell sites of each carrier use different frequencies).

58. Cory Janssen, *Handoff*, TECHOPEDIA, http://www.techopedia.com/definition/16851/handoff (last visited Feb 19, 2017).

59. GSM—The Base Station Subsystem, http://www.tutorialspoint.com/gsm/gsm_base_station_subsystem.htm (last visited Feb. 19, 2017).

60. UMTS—A New Network, http://www.tutorialspoint.com/umts/umts_a_new_network.htm (last visited Feb. 19, 2017).

61. *See* Mobile Telephone Switching Office, https://en.wikipedia.org/wiki/Mobile_

of a cell and signal them when they receive calls.[62] 4G and LTE systems, representing more advanced technology with higher data rates and greater capacity, have somewhat different architectures,[63] but the principles for beginning and terminating call, for handoffs, and for accounting are the same.

The MTSO connects mobile calls to the public switched telephone system (PSTN). Data exchanges, as contrasted with voice conversations, are routed by the MTSO to the Internet cloud, rather than to the PSTN. The MTSO also is responsible for accounting for call minutes or data used and for roaming—handing off a customer to another provider when the customer is outside the coverage area of the provider to which she is subscribed.[64]

D. *Micro and Pico Cells*

Wireless providers increase the capacity of their networks through a variety of techniques. First, they decrease the height of cell towers, thereby reducing the range of each, resulting in smaller cells and increased frequency reuse. Eventually, however, demands on the capacity results in congestion and deteriorating performance. The answer is to subdivide each of these macrocells into smaller sub-cells, known as *small cells*, comprising micro- and picocells.[65] Small cells use the same frequencies as their macrocell parents, but provide higher received power to user devices than the macrocells, causing the user devices to select them. "Backhaul"—the signals and messages tying all the sites together is provided ideally by optical fiber links, but, when necessary, the system uses wireless links implemented on higher frequencies, in the 18 and 23 GHz bands and even millimeter wave in the 60 and 80 GHz bands, affording greater available bandwidth through larger slices of spectrum, at the expense of greater atmospheric attenuation, which does not matter as much given their smaller size.

Small cell sites achieve greater density than macrocells by closer spacing, possible because of lower output power and lower height. Typically, 14 small cell sites serve each macrocell. Small cell transmitters provide stronger signals to user devices close to a small cell than their

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Telephone_Switching_Office (last visited Feb. 19, 2017) (explaining attachment and handoff procedure).

62. *Id.*

63. *See* Robert Triggs, *4G vs LTE—What is the Difference?*, ANDRIOD AUTHORITY, http://www.androidauthority.com/4g-vs-lte-274882/ (last visited Feb. 19, 2017) (explaining 4G and LTE).

64. Robert Keith, *How Cell Phones Work*, http://iml.jou.ufl.edu/projects/fall04/keith/Works.htm (last visited Feb. 19, 2017) (explaining roaming and accounting functions of MTSO).

65. Michael Alfaker, *An Efficient Approach to Small Cell Design*, AGL Small Cell Magazine, Dec. 2015 [hereinafter Small Cell Design].

associated macrocells, causing the user devices to connect to the small cells instead of increasing the load on the macrocells.

Finding locations for small cells is a constraint. Providers must make use of light poles, utility poles, billboards, and building façades, and eventually they run out of space.

Eventually, cells using licensed spectrum to define the physical layer at the edge of the Internet, blend with user provided Wi-Fi points of presence using unlicensed spectrum beyond the edge of the Internet.

Capacity requirements can be increased further by deploying the cell infrastructure's equivalent of multicasting—a technique known as Multimedia Broadcast Multicast Services (MBMS). Ultimately, the strategy of increasing capacity by reducing transmitter power, can be reversed by shifting more of the traffic to boomers, which have very large coverage areas and which use the ultimate in multicasting—sending one signal to an infinite number of viewers.

E. *Frequency Sharing*

When the basic regulatory regime for broadcast was erected, radio technology meant that frequency sharing would produce chaos and undermine the potential of radio—and, later, television. Accordingly, the centerpiece of broadcast regulation was exclusive licenses to particular frequencies for broadcasters who, in exchange for this acquisition of a quasi-property right in the publicly owned radio spectrum, would have certain public service obligations.

Technology has changed that. Improvements in radio transmitter and receiver technology made higher frequencies available, which pose less risk of interference because of their short range. Analog to digital encoding of sounds and pictures opened up new ways to multiplex different signals on the same frequency. Spread spectrum and frequency hopping modulation schemes expand frequency sharing further. Multiple transmitters use the same cluster of very narrow slices of spectrum simultaneously by splitting up their signals and sending small pieces of them on different frequency slices, none lasting more than a few milliseconds. As the transmitters bounce around in the frequency block, they avoid each other, or when the pieces collide, the adverse effect on the overall flow of content is small and tolerable. Cell phone switching fabrics and highly directional antennas couple with relatively low-power transmitters and a multiplicity of cell sites make it possible for thousands of users to share the same frequencies by automatically switching from one collocated transceiver or cell site to another.

F. *Spectrum Realignment*

Electromagnetic radiation, such as radio and television broadcast signals, occupies radio spectrum. The radio spectrum covers frequencies ranging from 10 KHz to 300 GHz, equivalent to wavelengths of 100,000 km to 1 mm.[66] Signals at different frequencies move through space (*propagate*) differently. Lower frequency signals travels for hundreds or thousands of miles over and under the Earth's surface. High frequency signals (1.6 to 30 MHz) bounce off layers of the ionosphere and return to earth hundreds or thousands of miles away. VHF, UHF, and microwave frequencies penetrate the ionosphere and are limited to receivers within line of sight.[67]

Under U.S. law, no one may transmit radio signals without a license from the FCC.[68] The growth in video uses of the Internet, including viewing on mobile devices, has necessitated additional spectrum for broadband wireless providers. Spectrum for this purpose has been reallocated through spectrum auctions and through implementation of digital television.

Congress gave the FCC authority to organize spectrum auctions in 1993.[69] The first auctions were intended to make spectrum available for new uses of cellular telephone technology, known at the time as "PCS"—personal communications services.[70] PCS used digital signals, unlike cellular telephone service, which was predominantly analog at the time. "Broadband PCS also is used for new wireless Internet services,"[71] one commentator explained at the time.

Fifteen years later, the President, the FCC, and the Congress recognized that, while spectrum auctions had been largely successful in making additional spectrum available for broadband wireless, further deployment was limited by the unavailability of further spectrum to auction. New methods had to be found, beyond the FCC's authority to revoke existing licenses, to free up additional spectrum to be auctioned.[72] The FCC targeted spectrum between 225 MHz and 3.7 GHz for

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66. John Norgard, The Electromagnetic Spectrum, Nat'l Ass'n of Broadcasters, Eng'g Handbook, 6-7 (Edmund A. Williams et al. eds., 10th ed. 2007).

67. THE ARRL HANDBOOK FOR RADIO COMMUNICATIONS ch. 19 (2015) (Propagation of Radio Signals).

68. 47 U.S.C. § 301.

69. Section 6002(a) of the Omnibus Budget Reconciliation Act of 1993, Pub. L. 103-66, 107 Stat. 312, adding subsection (j) to 47 U.S.C. § 309.

70. Mark W. Munson, *A Legacy of Lost Opportunity: Designated Entities and the Federal Communications Commission's Broadband PCS Spectrum Auction*, 7 MICH. TELECOMM. & TECH. L. REV. 217, 226 (2000-2001) (summarizing history of spectrum auctions).

71. *Id.* at 227.

72. Jessica Elder, *Voluntary Incentive Auctions: The Benefits of a Market-Based Spectrum Policy*, 20 COMMLAW CONSPECTUS 163, 171-72 (2011) (explaining the spectrum crunch).

reallocation, based on its conclusion that these frequencies were best suited for broadband wireless.[73] Those frequencies were mostly occupied by broadcast television and mobile satellite service (MSS) licensees.[74] The wireless industry argued that broadcast television spectrum should be a particular target for reassignment because:

> [O]nly ten percent of U.S. consumers utilize free OTA television because most consumers choose to subscribe to pay-TV services that are not delivered through the airwaves. Consequently, . . . a portion of the broadcast television spectrum should be repurposed for mobile broadband because the benefits of over-the-air broadcast can be enjoyed by virtually every American citizen without the use of over-the-air broadcast spectrum.[75]

Even if this was to be done, something was necessary other than traditional methods, which "revisiting and revising process takes an average of six to thirteen years and forcible spectrum repurposing faces seemingly interminable judicial review."[76]

The answer recommended by commentators and the FCC was broadband incentive auctions.[77] "The auction presents a once-in-a-lifetime opportunity for broadcasters," the FCC said in its 2014 Report and Order on the incentive auction policy.[78] "Payments to broadcasters that participate in the reverse auction can strengthen broadcasting by funding new content, services, and delivery mechanisms"[79] The auction, scheduled to begin on March 29, 2016,[80] is designed to allow the holders of FCC licenses for 38-6 MHz UHF channels to volunteer to give up their spectrum assignments in exchange for substantial payments estimated to be in the hundreds of millions of dollars per station.[81] The United States

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73. *Id*. at 172.

74. *Id*.

75. *Id*. at 174 (internal quotations and footnotes omitted).

76. *Id*. at 175.

77. *Id*. at 179-86 (analyzing emergence of legislation).

78. FCC, *In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, FCC 14-50, GN Docket No. 12-268, at 4 (June 2, 2014), https://www.fcc.gov/document/fcc-adopts-rules-first-ever-incentive-auction.

79. *Id*.

80. FCC, Broadcast Incentive Auction, https://www.fcc.gov/about-fcc/fcc-initiatives/incentive-auctions.

81. Grant Gross, *FCC: Some TV stations could earn huge dollars in spectrum auction*, COMPUTERWORLD (Oct. 1, 2014), http://www.computerworld.com/article/2690553/networking-hardware/fcc-some-tv-stations-could-earn-huge-dollars-in-spectrum-auction.html. (Speculating that some television stations could earn as much as $400 million per station by auctioning off their VHF frequency assignments in major markets); David Oxenford, *TV Incentive Auction Moves Forward – FCC Estimates the Value of TV Stations and Clarifies the Interference Standard for Stations Who Remain After the Auction*, BROADCAST LAW BLOG (Oct. 2, 2014), http://www.broad

Court of Appeals for the D.C. Circuit denied review of the FCC order in June, 2015.[82]

The purpose of the auction is to facilitate rationalization of UHF spectrum to provide more bandwidth for digital communication systems such as broadband wireless Internet access.[83]

No one knows how many legacy TV stations will elect to participate in the auction.[84] Under the FCC's rules for the auction, it will not disclose which stations sign up for the auction; their identities will remain confidential for two years after the auction is complete.[85]

Many profitable large market stations will sit on the sidelines. But the number of stations that must relinquish frequency assignments to free up the spectrum the FCC needs for new uses is substantial. Less profitable stations are, even now, evaluating their options. They may elect to sit it out, as well. Or, they may shift to new over-the-air frequencies; they may go off the air all together; or they may elect to become Internet only TV stations by shutting down their boomers or by converting them to ATSC 3.0.[86] The auction will allow spectrum for broadband wireless to grow further.

All U.S. TV stations completed the transition from analog transmissions using the NTSC standard to digital transmissions using the ATSC standard in 2009.[87] The conversion required stations to change frequency assignments to free up spectrum for public safety and broadband wireless application.[88]

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castlawblog.com/2014/10/articles/tv-incentive-auction-moves-forward-fcc-estimates-the-value-of-tv-stations-and-clarifies-the-interference-standard-for-stations-who-remain-after-the-auction/ (Reporting on FCC report on station value).

82. National Association of Broadcasters v. FCC, 789 F.3d 165 (2015) (rejecting arguments by TV broadcaster trade association that FCC approach failed to protect existing stations' market areas).

83. FCC 2014 R&O at 4 (summarizing purpose of auction); FCC, 2015 Video Competition Report 76, ¶ 165 (explaining repacking).

84. *See generally* NAB: no. of volunteers needed, http://www.nab.org/spectrumAuctions/participationbyMarket.asp

85. In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, FCC 14-50, GN Docket No. 12-268 at 165-66 (Report and Order June 2, 2014), https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-50A1.pdf [hereinafter Broadcast Incentive Auction Report and Order] (explaining that disclosure of participants could adversely affect investors and advertisers).

86. *See* Henry H. Perritt, Jr., *Uber Television: Internet-Only Television Stations*, 23 UCLA ENT. L. REV. 65-132 (2016).

87. All radio signals are analog, but can be modulated by information encoded digitally. Indeed, the first radio communications were digital, because Morse Code is digital: the carrier radio signal is either on (1) or off (0).

88. FCC, Digital Television, https://www.fcc.gov/general/digital-television (describing advantages of digital television, the statutory mandate to use its technology exclusively, and the motivate to free up spectrum for public safety and broadband wireless); *compare* Brett Jenkins & John Freberg, Digital Television Transmitters, NAB Handbook at 1535 (providing brief history

G. *ATSC 3.0*

A television industry standard, ATSC 3.0, will permit television broadcasters to join cable internet access providers, DSL providers and mobile broadband wireless as distributors of video content moving through the Internet.

Each time an Internet packet traverses a router, the router must process it by looking up its address field in a routing table and determining where to send it next. This is an extremely inefficient way of transferring the same information to multiple users, as by sending camera imagery and commentator discussion at the Super Bowl to tens of millions of viewers who want to watch the same game at the same time Using the traditional router mesh all the way from origin to all the users necessitates hundreds of millions of router processing cycles—the more recipients the more processing. Major e-commerce enterprises like Google recognize this and use load-balancing algorithms to decentralize the routing of the most popular information, caching it (stockpiling it) on regional servers to reduce the number of hops required to get information to users who have requested it.

Far better would be a protocol that subdivides the Super Bowl stream so that it is broadcast to closely clustered, multiple viewers, rather than being processed, packet-by-packet, through multiple routers. For the Super Bowl, and other popular programming, the packets representing the live program would be sent to radio transmitters for the last hop[89] to multiple users.

The television industry's standards organizations embrace this vision and are working on ATSC 3.0 to make it a reality. ATSC 2.0, adopted by the FCC as a standard for digital television, already uses the Internet Protocol to packetize information before it is sent to transmitters. ATSC 3.0 goes considerably further. It "is designed to accommodate and extend the existing high-power/tall-tower broadcast infrastructure and associated business models, while, for the first time, supporting delivery of robust vehicular and pedestrian mobile television and other data services to all portable devices."[90]

It will enable

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of digital television and its standards) with Jay C. Adrick, Analog Television Transmitters, NAB Handbook at 1481 (describing analog transmission systems).

89. The movement between each pair of routers is referred to colloquially as a "hop." For example, the packets comprising an ABC7 Chicago newscast the author watched on January 26, 2016 moved through 11 distinct routers, two of them near Las Vegas, before connecting back to ABC7's infrastructure in Chicago. Traceroute from the author's computer to abc7chicago.com, performed at 1312 on Jan. 26, 2016.

90. One Media Open Network Enabled, http://onemediallc.com/.

> a broadcast infrastructure that can deliver both traditional linear television programming with exceptional, ultra-high definition capability receivable deep inside buildings and to portable and mobile devices and also data services that require broadcasting's enormously efficient one-to-many architecture. . . . The addressable feature of the transmission facilitates coding that will permit unique geographical "zoning" of programming, advertising and data services, supporting expansion of services that broadcasters can offer.[91]

The diagram on the home page of ONEMedia portrays a radio antenna sending signals to PCs, tablets, smartphones and convention TV monitors, containing "hyperlocal" zoned ads, distance learning, agriculture information, public safety, and navigation maps with traffic.[92] ONE Media, LLC is a joint venture between Coherent Logix and Sinclair Broadcast Group, with a central role in developing the ATSC 3.0 standard. Its chief technology officer, Kevin Gage, was Chief Technology Officer of the NAB and founder of NAB labs.[93]

Under a prototype demonstrated at the April, 2015 NAB trade show, the UHF transmitter sent a UHF signal to a home gateway, which processed it and sent it on to user computers and video screens through a conventional WiFi connection.[94] The FCC granted ONEMedia temporary special authority to test a full-power prototype of the base elements of ATSC 3.0 in the Baltimore Washington area, beginning in 2016.[95]

Indeed, one of the realizations that drove the development of the content of the ATSC 2.0 and 3.0 standards was the realization that most viewers prefer to watch TV programming, except for sports, asynchronously rather than having to be available when the program is streamed. Most cable providers already provide this capability through their equipment they provide to subscribers. The ATSC 2.0 and 3.0 standard provide some more capability for signals received over the year.

Internet service contracts provide more download bandwidth than upload bandwidth, precisely because Internet users watch so much video through their Internet connections. The NTSC 3.0 standard extends this concept by allowing the download circuit to be unbundled from the

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91. *Id*.

92. *Id*.

93. *About Us*, ONEMEDIA http://onemediallc.com/about-us/.

94. ONEMedia, Demonstration, National Association of Broadcasters Convention, Wynn Hotel, Apr. 13-15, 2015, http://onemediallc.com/files/NAB%20Demo%20Schematic%20FINAL%2004092015.pdf.

95. Press Release, ONEMedia, One Media to Test and Operate Next Generation Broadcast Platform in Washington/Baltimore (Sept. 3, 2015), http://onemediallc.com/files/Press-Release-SFN-STA-Final-090215.pdf.

upload circuit. In other words, a viewer sends requests via a conventional Internet connection, and TV stations send the requested material by broadcasting it.[96] Most Internet connections multiplex packages intended for different destinations. Routers and network interface cards select the packets intended for a particular user. The same thing occurs in a ATSC 3.0 digital broadcast stream. Programming intended for a particular user has a tag associated with that user permitting it to be detected and received by him, alone.

Television stations and cable distributors have always been competitors; they provide alternative tubes through which TV content can flow. Since the cable plant was built out by turn of the 21st-century, viewers have progressively shifted to cable and away from over the air reception. The ATSC 3.0 standard, if it is widely adopted, will reignite the competition. Viewers wanting to cut the cord to their cable company will be able to get much of the same functionality and eventually much of the same content through over the air radio signals from local television stations.

Whether the same range of programming, is available through ATSC 3.0 depends upon how aggressively television stations and networks seek syndication arrangements as broad as cable providers have, and, of course, whether TV stations make deals with cable-only networks like HBO.

If consumers embrace a return to over the air reception, content producers have an incentive to make their content available through as many distribution tubes as exists. On the other hand, the owners of competing tubes, especially cable roadband wireless digital data services have an incentive to erect barriers to a general move to over the air reception. Cable providers already negotiate for exclusivity in licensing agreements, and they will intensify these efforts.

Most profoundly, ATSC 3.0 makes it possible for over the air television to become subscription-based, using essentially the same technologies that cable providers use to permit only paid subscribers to receive the signals that travel through their cables.

Technology for the physical layer of ATSC 3.0—the definition of the signal—became a "Candidate Standard" in late 2015, and expected to be adopted formally in March, 2016.[97] The ATSC 3.0 physical layer was tested at the 2016 Consumer Electronics Show. The tests involved high-dynamic range, over-the-air 4KTV signals picked up by prototype

96. Such asymmetrical distribution already is employed by direct broadcast distributors. FCC, 2015 Video Competition Report, ¶ 114, at 49.

97. Deborah D. McAdams, *HPA 2016: ATSC 3.0 Update: New Standard Looks like a Bigger, Badder Internet*, TVTECHNOLOGY (Feb. 16, 2016), http://www.tvtechnology.com/news/0002/hpa-2016-atsc-30-update/277950.

receivers.[98]

Upstream, at the presentation layer of the OSI stack, ATSC 3.0 will use HEVC Main 10 profile compression, which provides a 35-50% performance gain over AVC/H.264, and has roughly twice the efficiency of the compression technology used in ATSC 1.0. The HDR technology specification for the A/341 ATSC Video Candidate Standard is expected to be selected by July 31, 2016.[99]

The industry has put ATSC 3.0 on a fast track to coincide with the FCC's TV spectrum incentive auction. The goal is to have the standard ready in time for the post-auction channel repack.[100] The standard's developers expect that broadcasters will petition the FCC to approve ATSC 3.0 for use as part of the spectrum repacking initiative of which the Broadcast Incentive Auction is a part.[101]

Important architectural and compatibility issues must be resolved before ATSC 3.0 joins the large family of Internet related standards. One important barrier to widespread adoption is the inability of most TV receivers to handle ATSC 3.0 signals. While the FCC mandated TV receiver manufacturers to handle the initial digital TV standard, ATSC 1.0, it is not expected to do the same for ATSC 3.0, even though it welcomes deployment of ATSC 3.0 because of its greater spectral efficiency.[102] ATSC 3.0 broadcasters may provide set-top boxes that translate the ATSC 3.0 signals so that ATSC 1.0-compliant receivers can display them.[103]

Internet routing system must make rational decisions about when a packet should be routed to the next router-to-router link, and when it should be routed directly to viewers through a high-power radio transmitter.[104] Switched digital video (SDV) transmits only those programs being received by a group of subscribers. The result is much like multicasting through the Internet. Nearly half of cable distributors in high-density markets employ SDV.[105]

ATSC 3.0 puts broadcasters into the wireless Internet access business. ATSC 3.0 is bi-directional, and asymmetrical, requiring a fat pipe—

98. *Id.*

99. *Id.*

100. *Id.*

101. Mark Richer, *President's Memo: Ushering in a New Era in Television*, ATSC (Jan. 2016), http://atsc.org/newsletter/presidents-memo-ushering-in-a-new-era-in-television/.

102. *McAdams*, *supra* note 97.

103. *Id.*

104. *Id.* (using the phrase "high-power radio transmitter" to refer to existing or similar television transmitters and antennas, because the sense of the discussion distinguishes that means of communication from other wireless links like cellular and Wi-Fi, which also use radio transmitters, but much less powerful ones.).

105. FCC, *supra* note 53, ¶ 80, at 36.

boomer TV transmitters and antennas to download content—and a skinny pipe to bring back the interactive requests.[106]

IPTV has a head start, because multicasting already is in wide use to feed wireless customer appetites for streaming video. ATSC 3.0 is still in the prototype phases. But the level of resources available from both, from the broadcast side's ATSC 3.0 and from the wireless carrier side's IPTV, mean that both are likely to reach fruition and be generally deployed—barring some unpleasant grounding on unforeseen implementation problems.

The result will be a future Internet architecture, through which virtually all television programming moves, but an architecture with a new addition, one represented by genuine omnidirectional broadcasts at the edge rather than packet by packet processing and cell phone tower switching. There is no reason to believe that one will eclipse the other. They will remain as alternatives, with suppliers making judgment according to the relative costs of a broadcast with one-to-one backhaul as compared with faster and more complex signaling and switching systems.

H. *Targeted Advertising*

Targeted advertising,[107] as a supplement or substitute for traditional mass-market advertising, is proving its worth to both advertisers and consumers. Targeted advertising, available for more than twenty years,[108] delivers advertising content to individual users of the Internet depending on data indicating their interests and purchasing behavior.[109] "[It] permits advertisers to target online advertisements only to those consumers fitting desired demographic, geographic and 'psychographic' criteria,"[110] or engaging in certain online behavior:

> [I]f the user is using the computer to search for information on stocks, then client software . . . can detect this (whether by

106. Email from Fred Baumgartner to author (Feb. 1, 2016) (on file with author).

107. BLACK'S LAW DICTIONARY 712 (9th ed. 2009).

108. *See* Reception system for an interactive computer network and method of operation, U.S. Patent No. 5,347,632 (filed July 28, 1989) (issued Sep. 13, 1994) (claiming basic components of targeted advertising system).

109. The process is described in Computer Interface Method and Apparatus With Targeted Advertising, U.S. Patent No. 6,628,314 (filed Oct. 30, 2000) (issued Sept. 30, 2003) [hereinafter Patent 314], ruled invalid by Facebook, Inc. v. B.E. Technology, LLC, Case IPR2014-00052, Patent 6, 628, 314, 2015 WL 1735098 (Patent Tr. & App. Bd. Mar. 31, 2015) (Ad servers and the databases on which they rely typically do not maintain data about individuals, but rather on behavioral clusters. Individuals are tagged with a multiplicity of behavioral clusters that their past behavior links them to). *See* Patent 314, *supra*, at 15 (explaining behavioral categories).

110. Morsa v. Facebook, Inc., 77 F. Supp.3d 1007, 1009 (C.D. Cal. 2014) (describing subject matter of patent).

> recognizing the web site being accessed, the keywords used in the web pages being accessed, the program being executed, or some other aspect of the user's search) and can display an advertisement that is relevant to this topic, whether it be for a stock brokerage, a stock exchange, an investment group, or some other organization.[111]

Data intermediaries collect large quantities of data about the behavior of everyone who uses the Internet. Google, for example, records every search request and every page visited. Amazon keeps track of book purchasing and browsing. Airline, lodging and entertainment venues, and retailers keep track of purchases. Some of these enterprises sell their data to intermediaries called "data brokers" like Acxiom and Experian.[112]

Other intermediaries function as specialized advertising agencies. They accept or help craft ad content and undertake to place the ads according to profiles submitted by the advertiser. For example, an advertiser might want to serve ads about drones to everyone who has shown an interest in drones in the past through their web browsing behavior.[113] Or, the distributor of blood pressure medication might want to serve ads to anyone who has searched for information about hypertension and blood pressure.

When an Internet user clicks on a website, the user's IP address and other available identifying information is sent invisibly to an ad server, usually by means of a "cookie." While the web server the user is visiting (the content server) is preparing the requested webpage, the ad server quickly looks up the user and matches her profile with the specifications provided to the ad agency by the advertiser. The data stores generally do not track individual users, but rather group them into clusters of users with similar interests and behaviors. A simpler system avoids the behavioral databases and serves ads according to their relationship with the particular page a user has requested.[114]

Then the ad server (or the content server) inserts the ad into the requested page and sends it to the requester. Obviously, the infrastructure supporting the system must be quick in its data look-up, programmed decision-making, and transmission of ads to avoid unacceptable delays to the user.[115]

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111. Patent 314, *supra* note 109, at 16.

112. *See generally In re* Facebook Internet Tracking Litigation, 140 F.Supp.3d 922,926-28 (N.D. Cal. Oct. 23, 2015) (describing how website visits use cookies to direct targeted advertising).

113. Patent 314, *supra* note 109, at 15 (describing category identifiers associated with ad content).

114. *Id.* at 16 (describing "reactive targeting").

115. *See Why Internet Users Abandon Digital Videos*, EMARKETER (Jan. 4, 2016),

The result is an advertising market that is more acceptable to users than one that interposes ads for products and services the user has no interest in.[116] Targeted advertising is available to very small businesses, because the pricing is adjustable and flexible—pay-per-impression or pay-per-click—are common options, under which the advertiser pays only for the ads actually served and, in many cases, only when a target clicks on the ad. Its fine granularity and low-price thresholds have the potential to bring many more advertisers into the market. It is relatively easy to place a targeted ad on Google, Amazon, Facebook, and other large scale e-commerce and social networking sites.[117]

Google's Adsense, for example, permits content sites to sign up for the service with a few minutes' interaction on its website. The host site has complete freedom to design where ads appear on its pages. "Block ads you don't want, choose where ads appear, and change the look and feel of text ads to match your site. You can even control the categories of ads you allow. Your site. Your rules."[118] Google takes complete responsibility for ad revenue accounting, processing payments from advertisers and periodically sending direct deposits to the host's bank account. Google reports that it paid out nearly $10 billion in ad revenue to its AdSense customers.[119]

Various reports indicate that Google pays out about 75% in ad revenue to those hosting its ads,[120] and Google itself recommends that ad developers share 75-100% of the revenue with advertising hosts.[121] Targeted advertising is, of course unavailable for over-the-air, cable, and satellite distribution of television programming, but is available on legacy station websites. Internet only television stations are likely to exploit the possibilities more thoroughly. They will have more of their content on the Internet than legacy stations, thus providing more opportunities for ad

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http://www.emarketer.com/Article/Why-Internet-Users-Abandon-Digital-Videos/1013415 (summarizing research showing that 61.8% of users skip videos that have too many ads; 51.3% skip if the video buffers more than once, 26.7% skip if an add appears before the video and cannot be skipped; and 16.4% skip if an ad appears before the video).

116. *See* Katy Bachman, *Poll: Targeted Advertising is Not the Bogeyman [Updated] Nearly 70% like at Least some Tailored Internet Ads*, ADWEEK (Apr. 18, 2013), http://www.adweek.com/news/technology/poll-targeted-advertising-not-bogeyman-updated-148 649.

117. *See* Kate McFarlin, *How to Advertise on a GoDaddy Parked Page*, HOUSTON CHRON., http://smallbusiness.chron.com/advertise-godaddy-parked-11256.html (describing process for enabling targeted advertising on domain names established with popular domain registrar); FACEBOOK, *How to Target Facebook Ads*, https://www. facebook.com/business/a/online-sales/ad-targeting-details/ (describing how to use targeted advertising on Facebook).

118. Google AdSense, Benefits, https://www.google.com/adsense/ start/benefits/.

119. *Id.*

120. Amit Agarwal, *The Revenue Share of Google AdSense Publishers*, DIGITAL INSPIRATION (Feb. 22, 2012), http://www.labnol.org/internet/adsense-revenue-share/12531/.

121. AdSense Host API, Flexible Revenue Sharing, https://developers.google.com/adsense/host/revenuesharing.

placement. Legacy producers have been slow and clumsy in their use of Internet advertising, however,[122] although television stations do a better job than many newspapers. *The Chicago Tribune*, for example, places full-screen ads that cover up the requested content, and the content of these ads only sporadically aligns with user interests.[123] More effective page design inserts graphical ads at the margins of requested pages without obscuring requested content.[124] When they are closely aligned with user interests, they may appear to be part of the requested page itself, increasing the likelihood of a click through.

The trend is away from CPM-based advertising rates, common for broadcast television, toward performance based rates, typical for targeted advertising.[125] The shift toward targeted advertising has engendered battles among advertisers, advertising platform vendors, and consumer advocates. Controversy over efforts to patent targeted advertising systems has been fierce among participants and would-be participants in the system.[126] Privacy advocates have aggressively challenged targeted advertising on invasion-of-privacy grounds, but generally have been unsuccessful.[127]

Programmers want to attach their ads to their programming so they cannot be stripped off and discarded by viewers or stripped off and replaced by ads sold by others in the chain. In this respect, programmers have a mixed view of targeted advertising. If they can control ad placement and get the benefits of targeting technology, their position to obtain advertising revenue is enhanced. On the other hand, if someone else further down in the chain controls ad placement, the programmers lose control of their advertising, and advertisers are likely to split their ad payments between the programmer and the downstream host. One of the advantages of targeted advertising is that it relieves the ad platform of the cost of soliciting advertisers. TV stations already have the marketing

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122. *See* Andrew Ross Sorkin, *Beyond 'Star Wars,' a Dark Force Looms for Disney: Cord-Cutting*, N.Y. TIMES, Dec. 21, 2015 (arguing that Disney's ESPN is in financial trouble because it has not joined other networks in streaming to Internet, and Internet subscription fees cannot cover "the enormous cost of licensing live sports programing").

123. *See* Chicago Tribune, Breaking News, http://www.chicagotribune.com/news/local/breaking/.

124. Patent 314, *supra* note 109, at 4 (describing "ad region" of page displayed to user).

125. FCC, *supra* note 53, ¶ 294, at 140.

126. *See* Morsa, 77 F. Supp.3d at 1016 (rejecting claim for infringement of targeted advertising patent because patent covered only abstract concept); B.E. Technology, LLC v. Groupon, Inc., 957 F. Supp.2d 939 (W.D. Tenn. 2013) (denying motion to transfer infringement case involving targeted advertising patent); Facebook, Inc. v. B.E. Technology, LLC, Case IPR2014-00052, 2015 WL 1735098 (Patent Tr. & App. Bd. Mar. 31, 2015) (invalidating Patent 6,628,314 involving targeted advertising).

127. *In re* Facebook Internet Tracking Litigation, 140 F. Supp. 3d at 937 (rejecting privacy-invasion claims by Facebook users for lack of injury-in-fact standing).

infrastructure necessary to solicit advertisers, and so in that respect, a shift to targeted advertising does not benefit them as much as it benefits their new-entrant competitors. New-entrant competitors embrace targeted advertising to reduce economic barriers to entry.

If television stations regain control of the distribution of their programming, prying viewers away from cable, DSL, and broadband wireless distributors, they secure their control of advertising, whether it is of the traditional kind or targeted.

VI. MARKETS

The market structure for communications is in a constant state of flux. New technologies such as the Internet fragment industry structure for a while, and then there is a period of reconsolidation along new lines.

Much has changed in ten years, since the Act was adopted. The battle was largely by the telephone companies, but they transformed themselves in the process, concentrating on providing the core infrastructure, and leaving it to others to provide consumer premises equipment. The CLECs are all gone, either liquidated and bankruptcy or absorbed into the legacy telephone companies. The fragments of the AT&T breakup eventually consolidated into two major telephone enterprises, AT&T and Verizon, one descendent of some of the CLECs–Sprint—and one remnant of a startup—T-Mobile.

The regional cable companies have consolidated even more into one behemoth Comcast and a couple of duopolistic competitors, mainly Time Warner. The main vision of 1996 is been realized; telephone companies are offering access to television, and cable companies are selling telephone service. But the half-vision has taken over the main vision; increasingly whatever cable television companies do is shifting to the Internet.

There are 99 national programming networks affiliated with the top 5 cable MVPDs. Comcast alone has ownership interests in 47.[128]

Some 1400 full power television stations exist in the United States;[129] few face competition from more than one or two other broadcasters in their limited geographic markets. Most TV stations are affiliated with networks, and all three major networks are owned by entertainment companies that also own content producers.[130] ABC, CBS, NBC provide affiliated stations was twenty-two hours per week of primetime programming with additional hours of daytime programming. Fox, My Network TV, and The CW supply their affiliates with about fifteen hours

128. FCC, *supra* note 53, ¶ 155, at 71.
129. *Id.* ¶ 145, at 68.
130. *Id.* ¶ 155, at 71.

per week.[131]

Vertical integration in the cable industry has been dramatic. Most content production occurs within integrated enterprises that also provide television programming and distribution; most access to the Internet is provided by the same enterprises, which also control production and programming. Comcast has ownership interests in each mode of video distribution, including OVD.[132] Telephone companies, on the other hand, are not vertically integrated. Neither Verizon or AT&T has ownership interests in video programming networks.[133]

Multi-channel Video Programming Distributors (MVPDs) include cable operators, direct broadcast satellite operators, and telephone companies.[134] At the end of 2013, 36 cable MVPDs, 2 DBS MVPDs, and 2 large telephone MVPDs existed.[135] Comcast, Time Warner cable, Charter communications, Cox Communications, and Cablevision Systems account for 82% of all cable MVPD subscribers.[136] The 2 DBS providers, DISHnetwork, and DirecTV have a 34% share of the MVPD market.[137] Telephone companies account for about 11% of the market.[138]

The cable providers rarely compete with each other in the same geographic area, but are faced with competition by DBS providers and telephone companies.[139] The two direct TV satellite providers compete with each other across the United States. Verizon and AT&T, for the most part service distinct geographic areas and hence are monopolists for their wired services, but compete nationally for their wireless services.

The philosophy of the Act has withstood anti-competitive pressures. The communications infrastructure of 2017 is private, not subject to any kind of traditional regulation as it existed in 1995, but not very competitive with respect to its core attributes. The major players have found new ways and new technologies to lockout competitors, ranging from copy protection schemes, overbroad extension of copyright law, anti-competitive hardware, and a variety of commercial arrangements that make concerted refusals to deal part of the bargain. The vision now is more dramatic than it was twenty years before and a bit more amorphous. Now, the vision is one of seamlessness: anyone should be able to access any existing content existing anywhere from anywhere, and he should be able to do it without having to wrestle with climbing many

131. *Id.* ¶ 148, at 69.
132. *Id.* ¶ 159, at 72.
133. *Id.* ¶ 120, at 52.
134. *Id.* ¶ 16, at 7.
135. *Id.* ¶ 17, at 8.
136. *Id.* ¶ 25, at 10.
137. *Id.* ¶ 26, at 10.
138. *Id.* ¶ 27, at 11-12.
139. *Id.* ¶ 22, at 9.

different walls to run around the garden.

The philosophy still opposes detailed government prescription of how technology should be deployed and used, but pressures are growing to re-impose regulation to reduce perceived threats to personal privacy, widespread criminal activity on the Internet, state and non-state based terrorism, and commercial mishaps of enormous scale.

Now the policy goal is to preserve competition among content producers. That requires assuring competitive access to a concentrated but competitive structure of programmers. It requires preserving competition among programmers, which requires assuring competitive access to content upstream and to distributors, downstream. It also requires guaranteeing competition among distributors, which requires assuring competitive access upstream to programmers and to viewers, downstream. Collaterally, policy seeks to preserve competition among advertisers in all three of the markets in which they operate.

A. *Overview*

Television comprises three distinct activities: content production, programming, and distribution. *Content production* includes the traditional tasks of moviemaking: scripting, casting, principal photography, and editing. It also includes collecting content, as in capturing imagery and writing stories about news, and producing content from in-studio activities.

Programming involves selection and arrangement of content—stitching it together. In *Fortnightly*, the Supreme Court had to decide what constitutes "broadcasting" in order to support its conclusion that CATV systems were not engaged in that activity, but only distribution. It identified five activities constituting broadcasting—what this article calls "programming"—selection and procurement of programs to be viewed, producing programming itself, and converting the visible images and audible sounds of programs into electronic signals.[140] In *Teleprompter*, the Supreme Court added program origination, selling advertising, and interconnecting with other systems as also core activities of the programming activity.[141] It emphasized that programming and distribution involve distinct activities, even when they are offered as a bundle to customers.[142] The Supreme Court uses the term "origination" to refer to programming, and the term "reception" to refer to distribution.[143] In *Aereo*, the Supreme Court associated exercising choice

140. Fortnightly Corp. v. United Artists Television, Inc., 392 U.S. 390, 398 (1968).
141. Teleprompter Corp. v. Columbia Broad. Sys., Inc., 415 U.S. 394, 403-04 (1974).
142. *Id.* at 405.
143. *Id.*

over what to transmit as a programming activity.[144]

Distribution takes programed content and makes it available to viewers. The Aereo Court enhanced understanding of distribution, as the term is used in this article, by focusing on what it called—communicating programming to viewers.[145]

In 2016, public policy focuses on six markets: the market for programmer acquisition of content; the market for programmer access to distribution; the market for viewer access to distribution; the market for advertiser access to programming; the market for advertiser access to distributors; and the market for advertiser access to viewers.

Some of the markets are external; some are internal. Consolidation and concentration increases the reliance on internal markets, as established firms integrate vertically and make deals between producer, programmer, and distributor through their internal rules, and budgets rather than by contracting in the marketplace.[146] As technology enables new entrants, the markets become more competitive, and a greater proportion of transactions occur in external markets.

Understanding the composition of the supplier and customer communities at each level is not enough. In many cases, what matters most are market mechanisms for connecting them. How are search costs to be managed? What kinds of past practices and exclusive dealing arrangements make it difficult for new entrants to compete? How can new entrants get access to the necessary channels for delivering their product to customers? Accordingly, the following sections begin by describing the composition of each community of suppliers and customers, but then emphasizes market mechanisms for connecting them.

A variety of content producers deliver their content through the cloud to a variety of programmers inside the cloud. The programmers package the content, and develop business models. They then deliver it through a variety of distribution enterprises to the edge, from which it travels the last mile to the viewer.

Things are more complicated than this, of course. Some activities described as content production actually involve acquiring content from other production enterprises, the ones who actually script, shoot, and edit movies and TV series. Television networks and stations produce some content themselves, particularly news. Legacy TV stations also are in the distribution business through their boomer antennas and transmitters.

The simplified schematic is helpful, however, to illustrate the

144. Am. Broad. Co., Inc. v. Aereo, Inc., 134 S. Ct. 2498, 2505 (2014).

145. *Id.* at 2506 (interpreting the "transmit clause" in the 1976 Act).

146. *See* Ronald H. Coase, *The Nature of the Firm*, 4 ECONOMICA 386 (1937) (explaining that firms choose between market transactions –contracting out—and internal transactions—integration—depending on relative cost); Oliver E. Williamson, *The Theory of the Firm as Government Structure: From Choice to Contract*, 16 J. ECON. PERSPECTIVES 171 (2002) (same).

anticompetitive incentives. Comcast is the most fully integrated of the big three, with relatively good balance among its production, programming and distribution activities. The big three are different in where their centers of gravity lie. Disney is strong in content production and programming, but weak in distribution, having only broadcast television pipes. Comcast is dominant in cable distribution, and strong in content production, with Universal Studios, and in programming, with NBC. AT&T provides not only DSL distribution, but with its acquisition of DirecTV, satellite distribution as well.

The big three are Disney (ABC), National Amusements, an affiliate of Viacom (CBS), and Comcast (NBC). Other major players include Time Warner, AT&T, Verizon, and, more recently, Google, Amazon, and Netflix. The big three are all fully integrated, with holdings in production, programming, and distribution activities. Time Warner is strong in content production and distribution, but does not have a TV network. AT&T and Verizon are primarily distribution enterprises, and lack of content production and programming. Among the new entrants, Google and Amazon represent a new wave of programming enterprises; they are aggressively pushing upstream into content production, and are dipping their toes in the water for distribution. Netflix is predominantly a programming enterprise, and is aggressively moving into content production.[147]

Microeconomics teaches that perfectly competitive markets are better at adjusting to change and satisfying buyers and sellers than government supervision can be. But for this to be true, the markets have to be "perfect:" so many buyers and sellers that no one can influence price, perfect information for all participants, and frictionless deal-making.[148] None of those conditions prevails and any of the markets for television.

In all six markets, large vertically integrated enterprises, benefiting from significant economies of scale, compete with much smaller enterprises specializing in only one activity. The smaller enterprises are proliferating because of much lower barriers to entry resulting from dramatically lower prices for equipment and the Internet's ability to connect them to other stages of the television value chain. The decreasing costs of hardware reduce the economies of scale for new entrants. A multi-million-dollar boomer transmitter and antenna system is not necessary for a programmer, who now can "broadcast" its content to

147. John Koblan, *Netflix Aims for Family-Friendly Nostalgia With New Slate*, N.Y. TIMES, Feb. 25, 2016, https://www.nytimes.com/2016/02/26/business/media/netflix-aims-for-family-friendly-nostalgia-with-new-slate.html?_r=0 (reviewing Netflix success in original programming).

148. *See* Verizon Communications, Inc. v. FCC, 535 U.S. 467, 504-507 (2002) (discussing characteristics of perfectly competitive markets); Thomas C. Arthur, *The Costly Quest for Perfect Competition: Kodak and Nonstructural Market Power*, 69 N.Y.U. L. REV. 1, 7-12 (1994) (reviewing characteristics of perfect competition in micro economics).

viewers through the Internet with the same quality they can obtain over the air or through a cable television connection. A $3 million helicopter is not necessary for a news collector that wants aerial imagery; he can use a $1,200 drone. A $500,000 studio camera is not necessary for a content producer that makes effective use of a DSLR or GoPro mounted on a $75 tripod.

As the following Parts explain, disruptive technologies are changing market competitiveness in different ways. Technology is making the producer-programmer market more competitive. The programmer-distributor market is becoming more competitive on the programmer side but, on the distributor side, the technologies for high-bandwidth throughput create incentives that make it more oligopolistic. The distributor-distributor market is becoming more concentrated and less competitive as firm size increases to cover the capital costs of specialized, high bandwidth pipes for video. The distributor-viewer market is becoming more competitive, though still oligopolistic, with the addition of more broadband wireless coverage, improvements in bi-directional satellite connectivity, and the promise of ATSC 3.0.

B. *The Six Specific Markets*

Each of the following sections describes the current market structure, emphasizing the degree of concentration and vertical integration for both sellers and buyers. Each then identifies new entrants and considers the likely terms of competition, given various anticompetitive motivations.

1. Content-Producer to Programmer

Market analysis begins with content production. The only reason that the markets for programming and distribution exist is that viewers want to see the content that these downstream activities provide. In a perfect market, a content producer would interact directly with its viewer. A court jester in King Henry II's time came to court and performed for the King – his primary viewer.[149] No elaborate programming or distribution mechanism was necessary. Bach performed directly for King Frederick.[150] Later, some differentiation had begun to occur. Shakespeare did not finance, own, or operate the theaters in which his plays were performed.[151] Mozart did not finance, own, or operate the concert halls in

149. *See Medieval Jesters*, MEDIEVAL LIFE AND TIMES (Jan. 2017), http://www.medieval-life-and-times.info/medieval-life/medieval-jesters.htm.

150. *See* JAMES R. GAINES, EVENING IN THE PALACE OF REASON: BACH MEETS FREDERICK THE GREAT IN THE AGE OF ENLIGHTENMENT (2005).

151. *Shakespeare's Theatres*, SHAKESPEARE ONLINE (2014), http://www.shakespeare-online.com/theatre/.

which his music was performed.

A twenty-first-century content producer, unlike the court jester, Bach, and Shakespeare, needs programmers and distributors to reach its viewers.[152] Some content producers make deals with distributors directly, but for the most part they deal directly with programmers, who, in turn deal with distributors.

In the traditional market for content, the sellers are content producers, and the buyers are programmers. Fewer programmers than content producers exist: the broadcast television networks; the broadcast television stations; and several dozen cable networks. In other words, the market is an oligopsony—many sellers and only a few buyers.[153]

A diverse set of individuals and entities produce television content. They include large traditional movie studios controlled by Disney and Time Warner. They include 'indie" but large budget producers that win Sundance and Cannes festivals. They include reporters and photojournalists holding salaried positions with TV networks and TV stations. New entrants include tens of thousands of genuinely indie movie makers who usually find no outlet for their art beyond YouTube and Vimeo. The array of content options available is much more varied than it was 20 years ago. Millions of YouTube and Vimeo videos are available to anyone in the world, and some of them have artistic merit. Some become blockbusters by becoming "viral."

New content producers also include a growing number of stringer journalists. Technology is making the producer-programmer market more competitive. Lower costs and increasing power of digital cameras, editing software, and crowdsourcing for putting together the elements of a movie have opened the doors to thousands of additional entertainment producers. A few large players, new to the content game, are beginning to mine this lode. Netflix, Hulu, Google, Amazon, and others are actively soliciting contributions from small, hitherto unknown, entertainment producers.

Improvements in camera technology, inexpensive drones, and improved video wireless transmission have put good news gathering tools in the hands of almost anyone with a nose for news. TV programmers regularly use stringers and may use more as their tools improve.

At the same time, ubiquitous access to the Internet, and improvements in video editing software have spawned a new generation of Internet-only programmers.

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152. Patrick Murphy, *Retransmission Consent: A Mixed Signal for Cable Copyright*, 17 COLUM.-VLA J.L. & ARTS 237, 238 (1993) (evaluating retransmission consent stating "[t]he value of television is the value of the programming.").

153. *See In re* Beef Industry Antitrust Litigation, MDL Docket No. 248, 600 F.2d 1148, 1154 n.3 (5th Cir. 1979) (applying ologipsony concept in antitrust case).

Despite the decreasing barriers to entry for moviemakers[154] and newsgatherers, various types of market failure blunt the competitive effect. Search costs for buyers of indie movies are enormous,[155] and so far most programmers have preferred to stick with the large content producers they already know. Information asymmetry penalizes the new, smaller sellers, and negotiating a deal with legacy programmers like HBO or NBC is a daunting undertaking, probably involving substantial expenditures for agents and lawyers. It surely is not a welcoming activity for first timers.

Improving the functioning of this market and realizing the new opportunities the technology affords depends upon the emergence and growth of new types of intermediation to tie content producers with programmers. Intermediaries must make it easier for buyers and sellers to find each other and to make deals. Two essential attributes of such intermediation exist. First, intermediaries must provide an efficient means for assessing quality according to articulable criteria. Second, they must provide standardized alternative terms affording significant choice for both parties, while sparing them the burden of reinventing each new deal and rediscovering all the variables that come into play.

As new forms of intermediation crystallize, the flow of content from the small entities will increase and become more of a factor in the market. Economies of scale surely exist for making a big-budget action movie, but are far less important for a compelling documentary or story focused on human relationships. What matters is not the cost and weight of the camera, mixing equipment, and editing equipment; each of those is available for less than $1,000. What matters is creativity in writing the script and good acting, directing, cinematography, and editing. These qualities are embedded in the human participants and cannot be automated effectively, no matter how much money is available to invest in hardware and software.

It is too early to tell whether asymmetrical market arrangements will prevail, or whether intermediation that looks more like Facebook, YouTube, and NewsCastic will evolve into effective ways of finding good quality content and plugging it into the stream. Anticompetitive incentives are stronger on the programmer side than on the content-producer side of the market. Even if one programmer has a dominant market share, say 80%, the content producer still would like to get

154. Henry H. Perritt, Jr., *Technologies of Storytelling: New Models for Movies,* 10 VA. SPORTS & ENT. L.J. 106 (2010).

155. Search costs are large not only because of the large number of in the movie makers, but also because the quality of their work varies greatly. *See* Carole Levitt & Mark Rosch, *Finding Entertainment Law Online, From Scholarship to Scandals*, 26 L.A. LAW. 54 (2003) (giving examples of overbroad search results on YouTube). The signal-to-noise ratio for on YouTube and Vimeo is quite low.

revenue through the 20% programmers. So content producers have every incentive to make non-exclusive deals. On the other hand, unless the content producer produces only one movie, or television show, it has multiple products some of which will inevitably be more popular than others. So it does have an incentive to tie the products together so that the more popular ones pull the less popular ones into greater profitability.[156] Programmers understand that viewers will be drawn to their programming lineups according to the content the lineups offer. If CBS offers NCIS, and the other three networks do not, more viewers will be drawn to CBS. For that reason alone, CBS has an incentive to make exclusive deals with content producers, and thus to become a monopolist for having NCIS in its programming lineup. But CBS also needs to have a variety of content; offering only NCIS is not much of a program lineup, although it might be attractive to that narrow part of the market that wants to do binge viewing of NCIS. So CBS's incentive is to get exclusive deals on a wide, but coherent, collection of program content, and it may, because of the incentives for the content producers to be a part of popular programming streams.

These anti-competitive incentives for programmers present big barriers for new entrants wishing to cultivate relationships with established programmers and new-entrant programmers, and for new programmer entrants to establish relationships with established content producers and new programmer entrants. It is difficult for them to gain admission to the club. Any collusion falls short of explicit agreements to limit output, they are few enough in number to engage in conscious parallelism[157] on the terms of content licenses, and because of a high degree of vertical integration, can use the leverage they have in adjacent markets to punish competitors who ease up on license restrictions, for example, releasing content to Internet programmers simultaneously with its release to traditional over-the-air and cable-television programmers.

In the legacy market connecting content producers with programmers, vertical integration significantly reduces competition. ABC7 Chicago need not go into the marketplace to license entertainment or national news content; it simply makes arrangements with its parent ABC network, or one of the sibling studios within the Disney family. HBO does not need to shop among a variety of producers for movies and documentaries; it simply talks to a sibling within Time Warner.

In other cases, long established relationships between programmers and large content producers limit the competitive energy on both sides; it

156. *See* Christopher R. Leslie, *Tying Conspiracies*, 48 WM. & MARY L. REV. 2247, 2250 (2007) (explaining anti-competitive effect of tying arrangements).

157. *See* Matthew M. Bunda, Monsanto, Matsushita, and "Conscious Parallelism": Towards a Judicial Resolution of the "Oligopoly Problem," 84 WASH. U. L. REV. 179, 187 (2006) (explaining how proof of conscious parallelism provides circumstantial evidence of price fixing).

is much easier simply to negotiate a renewal of an existing license agreement—perhaps with different pricing--or to extend it to new content than to scrutinize competing licensors. Given the uncertainty that underlies any substantial investment in entertainment, additional uncertainties about the reliability and artistic vision of new partners is unwelcome.

The market for connecting content production in the form of news collection with programmers is mainly avoided by substantial vertical integration. Most news programmers have their own news collection teams. Cost pressures are forcing more of them to go into the market and use stringers as a content source, but the stringer phenomenon operates only at the margins and through mostly informal relationships between individual assignment editors and stringers. NewsCastic represents an interesting new model, in which an independent entity provides the intermediation between independent news collectors and programmers. While the initial implementation of NewsCastic focuses on well-established television stations, there is no apparent reason why it cannot easily be extended to smaller, new-entrant programmers.

2. Programmer to Distributor

The programmer-distributor market is becoming more competitive on the programmer side for the reasons detailed in Part 0 but, on the distributor side, the technologies for high-bandwidth throughput create incentives that make it more oligopsonistic. Programmers include television networks and local TV stations, dozens of cable programmers such as HBO and ESPN, and a growing community of entities that stitch together content according to their business visions, intending it to be distributed through the Internet.

They enter into deals with distributors, sometimes within a vertical integrated enterprise, as when TV programmers simply send their content through their stations' boomer transmitters and antennas, and other times by negotiating deals with independent distributors such as Comcast, AT&T, or newer Internet-predominant distributors.

The FCC's assessment of online video distributors (OVDs) is limited to entities that offer video content akin to the professional programming traditionally offered by broadcast stations or broadcast and cable networks, and which is usually created and produced by media and entertainment companies using professional grade equipment, talent, and production crews that hold or maintain the rights for distribution.[158] This is an activity that this article calls "programming." The FCC identifies Apple, Amazon, Microsoft, Sony, Google, Warner Bros., Netflix, and

158. FCC, *supra* note 53, ¶ 214, at 100.

Hulu as major OVD programmers.[159] Hulu is jointly owned by NBC, 20th Century Fox, and Disney.[160]

Apple, Google, Microsoft, and Amazon did not exist as major programming enterprises in 1996. Apple and Microsoft existed, but Apple was just making desktop computers and facing losing market share so fast it looked like it might go out of business. Microsoft was producing operating-system and office-productivity software.

At the distribution level, Comcast is in a similar position to CBS: it will attract subscribers in proportion to the attractiveness of the content viewers can get through its pipes. For the same reasons as CBS, it is interested in exclusive deals with the widest possible variety of content. Coherence doesn't matter as much to Comcast as to CBS.

Both Comcast and CBS want the power to enter into exclusive deals themselves, while denying that power to their competitors. They do not want to be locked out of any program content that viewers are willing to pay for.

The programmers and distributors with the most market power will be able to get the exclusive deals for the most popular material, and that will add to their attractiveness, increase their market share, and lead to more market power to get the next deal. Being able to make exclusive arrangements is central in this dynamic. One can see that in operation in the reluctance of major studios to experiment with OTT (over the top) distributors, because of a concern that would it would disrupt their long-term and highly profitable arrangements with legacy programmers. It is important to understand in this regard that they must carry and retransmission consent provisions apply only to programming and not to the content. Copyright interacts with the statutory puts and calls. If ABC has an exclusive deal with the NFL, Comcast may have a statutory call on ABC's programming stream, but it still has to negotiate with ABC for rights to the Super Bowl.

Further downstream, in the market for programming, elements of oligopoly and oligopsony exist as well. Relatively few programmers—the television networks and the cable networks--exist. They compete with each other to sell programming, and fewer than a dozen distributors compete as buyers. The fact that there are 1400 local television stations does not change this traditional market structure, because they do not compete in a national market; rather a couple of them may compete with each other in hundreds of local markets.

Competition in this market is increased, however, by the inherent nature of Internet distribution. A programmer can make a deal with a provider of Internet connectivity and send its programming wherever it

159. *Id.* ¶¶ 221-31, at 103-08.
160. *Id.* ¶ 231, at 108.

wants. But that possibility depends upon the Internet connectivity providers' being willing to accept programming from anyone, on equal terms, and to let it go wherever the programmer wants to send it, again on equal terms. The refusal of major connection services like Comcast to do that was the stimulus for the net neutrality movement.

The depths and nature of the programming activity differ depending on the type of content. The programming activity adds considerable value when the content is news. News occurs and producers capture it as discrete events. Traditionally, viewers expected TV networks and stations to stitch the event-specific packages into a newscast, in which the programming entity decides what *is* news, controls the sequence in which events are presented, and determines the pace, with the goal of holding viewers through the entire newscast. Movement of news dissemination to the Web increasingly allows viewers to consume these event-specific packages one at a time, but tradition and habit prolongs the life of traditional newscasts at specific times of the day.

The same goal—holding viewers—informs entertainment programming, as well. Programmers assemble their daily schedules to use the gravitational pull of the most popular programs to cause viewers to pick their channels and then rely on the transaction costs of changing channels to retain the viewers for the advertising carried by less popular content. Viewer desire to consume entertainment when they want to rather than when the programmer wants is gradually eroding traditional programming models for entertainment content. Viewers prefer to be able to select content on an episode by episode basis, rather than having to be "tuned in" to a particular channel at a particular time. As programmers accede to this demand, and content producers leapfrog the programmers altogether, programmers end up doing a little more than selecting pieces of content to be made available under their brands; they do not do much stitching together anymore. To a lesser extent, the same thing is true of news programming; viewers are shifting away from watching newscasts, and instead go to a trusted news website where they pick and choose the stories that interest them. Selection and arrangement of the stories to be displayed remains important, however.[161]

Here is what one millennial said:

> I grew up with my father reading the Wall Street Journal cover to cover, every day. As I grew older I would pick it up and read an article or two before starting the day – specially on weekends. We frequently watched the world news in the evenings as Mom cooked dinner if we were inside which was rare in the good weather

161. *See* Community Tool Box, Section 4, Arranging News and Features, http://ctb.ku.edu/en/table-of-contents/participation/promoting-interest/news-feature-stories/main (explaining importance of good selection and arrangement of news stories).

> months. Now I get only about 10% of my news from watching a traditional TV newscast. But every day, I spent an hour or so on the Apple or Microsoft Windows news app. I've configured both of them to include the news sources I want which includes the WSJ and NYT feeds as well as so many others, being I wouldn't subscribe to if the only method I could obtain the content was via hardcopy.
>
> I end up "bingeing" on news. (laughs). I'll go in to check the headlines, read one story, and see something else, maybe in the trending list or in the "related stories section that pulls me in. So I read one of those stories, and they lead me somewhere else. I end up having to tear myself away to get back to work. It's great if you're in a particular mood for the day you can focus on technology stories or maybe politics, but the highlight packages are great to get what is the must know about stories of the day.
>
> The effect is just like "hook and hold" in traditional news programming. But instead of forcing me to follow the sequence designed by the news director, I determine what "hooks" me, and then what "holds" my interest.
>
> From a news programming standpoint, it's the same thing, although it involves more shared responsibility. When someone designs a news website she makes news judgments about what may hold my interest and what is likely to pull me from one story to another. The same rules of thumb about accidents, murders, and disasters being the strongest hooks still apply, as does the idea that hard hooks are most naturally followed by longer-form analysis, and then by softer longer human interest material. But ultimately, I decide. I get to choose whether I want hard hooks first and then human interest or analysis, or whether I just want to jump from one hard news item to another.
>
> I don't agree that the programming activity is thinning out; it's just changing. Decisions about sequencing are shared between news programmer and viewer, and automated selection and sequencing devices, like trending algorithms, are more a part of the process.[162]

The thinning out of the programming activity affects analysis of the market connecting buyers or sellers of content. In the

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162. Interview with Eliot O. Sprague, Helicopter Pilot, U.S. Helicopters, Inc., (Feb. 20 2016).

producer/programmer market, the trend reduces the bargaining power of programmers, as content producers can threaten to leapfrog them and make deals directly with distributors.

In the programmer/distributor market, programmer bargaining power similarly is weaker, because distributors can threaten to make deals directly with content producers. The programmer/distributor market is an oligopsony,[163] but the new entrants are making it more competitive.

But the absorption of virtually all long-distance communication into the Internet profoundly alters the architecture of distribution and opens it to competition. Technically, any programmer can access any distribution path, simply by addressing its Internet packets appropriately. The Internet routing protocols inherently seek the best path without regard to the originator of the content.

It is, however, possible to program routers to exclude certain originators, and that is the concern of the Net Neutrality concept. Multiple motivations for anticompetitive behavior by distributors exist. Suppliers of pipes want to tie customers to their Internet connections by offering access to content viewers can get nowhere else. This leads the pipe providers to seek exclusive deals with their content providers, or as is the case with vertically integrated firms, to license their content to no other pipe providers.

Programmers, however, can make more money if they all have *non*-exclusive deals with multiple pipes. Vertically integrated programmers have another anticompetitive incentive: they want to protect their own content from competition. This is the evil the FCC's net neutrality rule aims to thwart. Net neutrality insists that pipe providers not discriminate against content based on its source. In a perfectly competitive market, pipe providers would be happy to carry anyone's content; the more content they have, the more subscribers they will attract. But that is true only if they offer something that competing pipes do not offer; hence the incentive for exclusive deals.

Programmers are concerned about competition from other programmers. Thus, their ideal deal with each pipe would lock out their competitors from that pipe. If CBS makes a deal to pay $1 billion to carry NFL/AFC football games for a season, it does not want ABC, NBC, or Fox to carry the same games. If all the networks carry the same games, the advertisers will split their advertising payments among them. If only one TV network carries them, all the advertising dollars will go to that network. If Disney, for example, can strike a deal with Verizon under which Verizon agrees to bar original productions from Netflix and Amazon, Disney protects itself from those competitors. The FCC's 2015

163. *See Oligopsony*, BLACK'S LAW DICTIONARY (10th ed. 2014). An oligopsony is a market with many sellers but only a few buyers.

ONO report cites concrete examples of anticompetitive behavior.[164]

The success of an OVD depends on the willingness of content producers to license content to them. They have proven reluctant to do so in many cases because of concern about the effect on their existing channels of distribution.[165] Vertical integration and exclusivity arrangements involving cable networks, broadcast networks, and BPDs often lock out unaffiliated OVDs.[166] Costs also are significant. Netflix, for example was paying $7.3 billion for content for its online streaming services, as of the end of 2013.[167]

The battle now is likely to shift to the broadband wireless and to ATSC 3.0 markets. Substantial investment is required to make ATSC 3.0 and mobile IPTV realities, and the providers of those enhanced pipes want to be able to charge as much as possible. The providers have two opportunities to do this. First, they can charge subscribers more for access, enforcing the pricing arrangement by set-top boxes for ATSC 3.0 and mobile hardware for IPTV that limits access depending on the subscription level.

Second, they can charge content providers more for higher capacity pipes, or, which is the same economically, negotiate discounts in the licensing fees they otherwise would pay for the most popular content. The mechanisms for connecting programmers with distributors are mostly not market based; many occur within vertically integrated enterprises like Comcast and Time Warner. HBO arranges with Comcast cable TV to carry its programming, according to internal rules, budgets, and overall enterprise strategy. Of course, legacy television stations distribute their own programming through boomer transmitters and antennas. Deals between programmers and DSL distributors do occur in the market, because telephone companies are less vertically integrated than cable TV distributors.

Demonstrated efforts to exclude competing programmers from distribution gave rise to merger conditions[168] and to the net neutrality rule.[169] Conceptually, net neutrality entitles new entrant programmers to

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164. FCC, In the Matter of Protecting and Promoting the Open Internet, GN Docket No. 14-28, para. 19 (Mar. 12, 2015) [hereinafter Open Network Order] (summarizing record evidence of undesirable practices showing need for order).

165. FEDERAL COMMUNICATIONS COMMISSION, ANNUAL ASSESSMENT OF THE STATUS OF COMPETITION IN THE MARKET FOR THE DELIVERY OF VIDEO PROGRAMMING, SIXTEENTH REPORT 117 (2015) [hereinafter FEDERAL COMMUNICATIONS COMMISSION, ANNUAL ASSESSMENT].

166. *Id.* at 119.

167. *Id.* at 118.

168. Press Release, Dep't of Justice, Justice Department Allows Charter's Acquisition of Time Warner Cable and Bright House Networks to Proceed with Conditions (Apr. 25, 2016); *Independent Measurement Expert Identified in Accordance with AT&T-DirectTV Merger Condition*, MB Docket No. 14-90, Public Notice, DA 15-1116, Oct. 1, 2015.

169. *See infra* Part VII.A.1.

equal access to existing distribution channels.

3. Distributor to Distributor

The distributor-distributor market is becoming more concentrated and less competitive as firm size increases to cover the capital costs of specialized, high bandwidth pipes for video. Here, the question is, not so much whether anti- competitive motivation will reduce competition, but whether the exigencies of technological optimization will reduce it.

No distributor has the physical plant to connect everyone around the globe that uses the Internet. The layered philosophy of the Internet envisions many different physical pipes that connect to each other and collectively connect everyone who puts content into and extracts content from the Internet. Accordingly, any assessment of relevant markets must consider the market for interconnecting distributors. They connect to each other by peering and transit deals.

Historically, neither peering nor transit arrangements were subjected to government regulation or to legal oversight, except for contract enforcement, and merger conditions. High-volume backbone providers had an incentive to interconnect. When they had roughly equivalent traffic levels, exchanging traffic benefited both and the burdens on their facilities were symmetrical. By engaging in peering instead of transit exchanges, they spared themselves the accounting overhead associated with charging for traffic.[170] The market determines the various kinds of peering and transit arrangements, the locations where they occur, and the connectivity each provides, ranging from access to all connections that a particular pier provides to access to only certain parts of the Internet. Regulatory prescription of such arrangements is unwieldy and impracticable without negating the desirable flexibility to accommodate changing traffic patterns. No Internet engineer thinks that detailed regulation appearing in transit arrangements is desirable.[171]

Moreover, the rapidly growing volume of video traffic necessitates evolving the physical architecture of the Internet to handle it, suggesting big specialized pipes from major points of origin, like TV broadcasters' master control center in Atlanta,[172] to high density markets, such as New York, Los Angeles, and Chicago. It is more efficient to send NCIS

170. Mark Winther, *White Paper: Tier 1 ISPs: What They Are and Why They Are Important*, IDC: ANALYZE THE FUTURE 11 (May 2006), https://www.us.ntt.net/downloads/papers/IDC_Tier1_ISPs.pdf (arguing that distributor mergers and proliferation of large CDNs will jeopardizing peering).

171. 2015 ONO note 482 (noting statement by FCC chairman that peering is a matter better addressed separately from ONO).

172. Frank Beacham, Outsourced Master Control Drives NBC O&Os, TVNewsCheck, Nov. 17, 2011, http://www.tvnewscheck.com/article/55504/outsourced-master-control-drives-nbc-oos (describing contract with Encompass for master control operation in Atlanta).

episodes through one link between an Atlanta router and one router close to Chicago, rather than having all the packets for each viewer traverse multiple routers throughout the Internet's general mesh. A route involving two or three hops is more efficient than one involving seven or ten.[173]

If the specialized pipes were obligated to carry traffic unrelated to the video programming that justified establishing them in the first place, achievement of their purpose would be undermined. Nevertheless, consolidation and its attendant vertical integration threaten the peering phenomenon. The vertically integrated distributors have an unusually strong position, *vis-a-vis* other distributors, because of their historic last-mile connectivity.[174]

They may disrupt the distributor-to-distributor market by degrading the quality of peered connections, decline to peer with other distributors, or impose higher transit or paid-peering charges.[175] The FCC conditioned its approval of the AT&T-SBC and Verizon-MCI mergers on their maintaining the same number of peers, but only until 2008.[176]

4. Distributor to Viewer

The distributor-viewer market is becoming more competitive, though still oligopolistic, with the addition of more broadband wireless coverage, improvements in bi-directional satellite connectivity, and the promise of ATSC 3.0. Competition in the distribution market also is increased by the reality that broadband wireless providers have national footprints. At the beginning of 2015, Verizon Wireless had a 38% market share, AT&T had 33%, Sprint had 14%, and T-Mobile had 13%.[177]

Here, the question is whether distributors will deploy artificial means to limit competition in order to protect their traditional business models. The distribution activity at the edge of the Internet presents the most interesting questions about market structure. Here, competition is facility-based, and the existing facilities require huge amounts of capital, to build out an MVPD cable infrastructure or the last mile of wired telephone access. The same thing is true of the cell phone infrastructure and broadcast boomers. A small business is not likely to find capital to allow it to compete directly with the distribution establishment for these technologies, although it certainly could become a contractor to an

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173. *See* 2015 ONO notes 487, 489 (noting evolution of peering system to include "on-net-only" agreements).

174. Winther, *supra* note 170, at 10-11.

175. *Id.* at 12 (listing anticompetitive temptations).

176. SBC Commc'ns, Inc. and AT&T Corp. Applications for Approval of Transfer of Control, Memorandum Opinion & Order, 20 FCC Rcd. 18,290, 18,392 (2005).

177. FEDERAL COMMUNICATIONS COMMISSION, ANNUAL ASSESSMENT, *supra* note 165, at 15.

established distributors.

The requirement by virtually all cable in MVPDs that subscribers use interface hardware ("set-top box" or "cable box") provided by the cable company is a classic example of a tying arrangement. Moreover, the programming of the cable boxes excludes programming originating from anywhere but from the cable provider. This device requirement affects only the market for traditional cable television; it does not affect the market for cable Internet access. As television viewing moves from traditional cable television connections to Internet TV, the anticompetitive effect eventually will disappear.

Suppliers of interfaces offer viewers ways to get their cable streams through bypassing the cable boxes, some hardware-based, and some software based, but their market penetration is low.[178] The anticompetitive effect, however, is limited to that part of the market served by cable MVPD's. It has no effect on the part served by telephone distributors and direct satellite distributors.

If this tie were to be broken, as the FCC proposes to do,[179] competitors of the cable companies would benefit only to the extent that viewers do not cut the cable cord. Competitions would not have access to the cable stream unless a subscriber subscribes to cable TV service.

The interesting alternative is the deployment of Wi-Fi, or pico- and micro transceivers representing last mile alternatives to groups of viewers. Anyone can buy a Wi-Fi point of presence for a few hundred dollars and obtain a subscription to cable Internet, DSL Internet or broadband Internet connectivity for another few hundred dollars per year. The subscriptions are accompanied by the necessary cable modems, DSL modems, and broadband wireless "dongles." When the Internet access provider permits, a subscriber can also obtain the necessary consumer premises equipment at any number of online and brick-and-mortar retailers.

Google Fiber is an important facilities-based new entrant into the MVPD market. It has constructed fiber-to-the-premises systems in three metropolitan areas and has started discussions in nine additional metropolitan areas.[180]

With these low barriers to entry, new enterprises can supplement last-mile distribution. A condominium association, for example, likely already has an array of Wi-Fi points of presence its facility, and it can provide connectivity to the Super Bowl or Game of Thrones to everyone

178. Amazon Fire TV, AppleTV, Chromecast, Roku, FCC, In the Matter of Expanding Consumers' Video Navigation Choices, MB Docket No. 16-42, FCC 16-18 para. 14, at 9 (Feb 18, 2016) [hereinafter Cable Box NPRM] (nothing devices that can access OTT programming such as Netflix, Amazon Instant Streaming, and Hulu, but for the most part not MVPD programming).

179. *See infra* Part VII.A.2.

180. FEDERAL COMMUNICATIONS COMMISSION, ANNUAL ASSESSMENT, *supra* note 165, at 31.

in the condo complex, reducing the load on the distributors who connect the complex to the rest of the Internet. One copy of the Super Bowl stream is provided to the condo complex, and the last mile of distribution occurs through the association's Wi-Fi apparatus.

Already, major distributors recognize that sponsored Wi-Fi points of presence represent an alternative to building out their infrastructures with micro and picocells deployed by the distributors themselves. There are, of course, a variety of capacity issues to be worked out– streaming the Super Bowl to five hundred viewers in a condo complex requires much more of the Wi-Fi system than a single-family household with several television screens, PCs, and tablet computers connected wirelessly.

The capacity demand on the established distributors, however, may be no greater than at present. If they send only one instance of the Super Bowl to the condo complex, the traffic requirements on their edge infrastructure is no greater then when they send it now to a single subscriber.

To the extent that last mile distribution is performed by entities not under the control of established distributors who pay for only a single subscription, the scenario represents significant lost revenue to the established providers. They will use copyright law's treatment of redistribution to the public or public performance to extract additional fees. And, of course, they can set their own subscription terms and insist on controlling the set-top boxes to enforce a requirement to pay more for material that is redistributed to the condo members.

The market for last mile connectivity is oligopolistic. Only a handful of sellers exist in each geographic market—cable modem, DSL, and broadband wireless—while there are millions of buyers. In some respects, competition among the three groups of sellers is ferocious, and widespread deployment of ATSC 3.0 will add another competitor.

The risk is that each seller will try to restrict its customers from also using competitor services by equipping their consumer premises equipment with various kinds of lockout provisions for parallel streams. A patchwork of FCC prohibitions addresses this interference with the market, for example by prohibiting cable providers from restricting over-the-air reception,[181] and, more recently, requiring cable providers to open the set-top box market.

A countervailing trend exists in the distributor-to-viewer market that is less friendly to competition: the shift away from generic browsers to specialized apps, not only on exclusively mobile devices, but on new operating systems for desktops and laptops, such as like Windows 10 and Apple's OS X Snow Leopard. Apps provide access to only one source of content. If one already has the HBO Now app and wants to watch a movie

181. 47 C.F.R. § 1.4000

from Netflix, one must download—and perhaps pay for—the Netflix app as well. That imposes higher switching costs than if one simply types the Netflix URL into a Google Chrome, Firefox, Microsoft Internet Explorer or Safari browser.[182] But on a computer and through a connection fast enough to play video, the app download times are modest, as is the pricing, so the switching costs are not all that high. If a user has free access to the tens of thousands of apps that are widely available he still has a high level of competitive choice.

5. Advertising

Anyone who wants to sell goods or services must communicate his offerings to potential customers. Some form of advertising is the usual way to do that. A seller may buy pages or parts of pages representing display ads in print publications; they may distribute fliers; they may buy time and attach their advertising to TV programs; they may make use of the new technologies for targeted advertising to implant ads directly on html pages served to viewers.

The market for connecting advertisers to advertising platforms is in a considerable state of flux. Vertical integration of advertising sales teams into content production and programming enterprises is substantial; most television stations of any size have their own traffic departments and advertising sales reps. In addition, long established advertising agencies facilitate and reinforce connections between content providers and programmers as customers for large enterprises with substantial advertising budgets.

Significant economies of scale define the traditional market. Transaction costs for advertisers are lower if they place a buy a few ads with a handful of newspapers, television networks, and stations than if they have to shop around the Web for everyone who might provide a metaphorical billboard site. Moreover, the established relationships increase the friction for an advertiser jumping ship and taking its revenue elsewhere.

But targeted advertising is an undeniable reality, and its market structure is completely different. The advertising agency function is performed by ad networks and behavioral data base vendors, largely independent of traditional advertising agencies. Moreover, the core concept of targeted advertising spreads advertising budgets over millions of very small "billboard sites" where ads are more likely reach audiences with whom a particular ad resonates.

This part of the analysis focuses on the two markets that connect

182. *See* Brian Barrett, *The FCC's War to Liberate Your Cable Box*, WIRED (Feb. 19, 2016), http://www.wired.com/2016/02/fcc-set-top-box-rules/ (noting Google's concern that move toward apps diverts market share away from generic Internet access).

advertisers with content producers and programmers. Targeted advertising introduces a third advertising market, one that links advertisers directly with distributors. A distributor knows who a viewer is every time the viewer sends an http request for a page or a stream. There is no reason that distributors cannot feed these individually identifying attributes directly to ad networks, allowing them to respond with targeted ads that the distributor integrates with the content stream sent to individual viewers. The result bypasses content producers and programmers.

Further, targeted advertising is available not only to established firms like Procter & Gamble and General Motors; it is available to the smallest e-commerce site. Anyone willing to host a virtual billboard can make a deal through Google's AdSense or with Facebook to host ads. It only takes an Internet connection and a few minutes to set the terms online. So the economies of scale are much reduced both for advertising hosts and advertisers.

The establishment may prefer to stick with its established advertising channels so that it can keep all the ad revenue rather than sharing it with ad networks. It also may value its close ongoing relationships with advertisers too much to turn them loose into a more diffuse advertising market. But the trend toward more use of targeted advertising is undeniable, and more and more advertising revenue will shift to these new market mechanisms.

C. *Non-Economic Switching Costs*

Economic analysis long has identified transaction costs such as search costs, information asymmetry, and collusion among producers as sources of market failure.[183] Too little attention, however, has been paid to another source: non-economic switching costs, reflected in the power of traditional relationships between buyers and sellers.[184]

The phenomenon has received some attention in a different area of inquiry: relational contract, explaining why firms entering into commercial contractual relations prefer to work things out rather than suing each other for breach of contract.[185] The ultimate relational contract

183. Henry N. Butler & Barry D. Baysinger, *Vertical Restraints of Trade as Contractual Integration: A Synthesis of Relational Contracting Theory, Transaction-Cost Economics, And Organization Theory*, 32 EMORY L.J. 1009, 1015-18 (1983) (describing and giving examples of opportunistic behavior that imposes transactions costs on market transactions).

184. *Compare id.* at 1017-18 (explaining how vertical integration can eliminate opportunism as a transaction cost), *with id.* at 1030 (explaining how vertical integration imposes its own costs such as self-interested employee or divisional behavior at odds with enterprise goals and additional costs of making and enforcing rules to mitigate effects of such behavior).

185. "Relational contracting systems are designed to maintain very long-term relationships that will undoubtedly be faced with considerable pressures for change as they are subjected to

arrangement is vertical integration.[186]

Economic evaluation of alternatives is surely part of every make or buy decision. Contracts with outside suppliers almost always have limited terms, and when the terms expire the parties renegotiate, influenced by what they perceive as competing sources of supply. That is the main difference between a vertically integrated enterprise and one purchasing collateral functions in the marketplace. The relationship between a corporate subsidiary and its parent corporation does not get renegotiated periodically in the same sense. Changes in management and business failures may stimulate a reassessment of how decision-making authority is allocated between subsidiary and parent, and sometimes the participants in an integrated enterprise get divorced, as when the corporate entity is dissolved or a subsidiary sold.

In theory, rational, hardheaded, economic analysis of alternative competitive alternatives is a regular part of supplier purchaser contracting in markets. But the switching costs often are enormous and unpredictable. If, say, a television station decides to change its news helicopter contractor, it must engage in an extensive due diligence investigation to see if the new contractor can do the job, to scrutinize price and cost figures from both entities to ensure that they are comparable, to consider whether the new helicopter personnel will have good relationships with assignment editors and transmission control personnel, and whether the new provider has as good back up capability as the old if the helicopter breaks or a pilot is sick.

Centralized master control functions for television programmers provide an even more dramatic example. ABC contracts with Imagine Communications to provide centralized master control from Atlanta for all their owned-and-operated owned stations.[187] For this to work—as it does—thousands of detailed interfaces, human and technological, are necessary between network and contractor, contractor and station infrastructure, and network, contractor, station workflow. If a station or network decides to change master-control contractors, untangling all of this would be a massive undertaking.

Circuit Judge Easterbrook made the point in a case involving a trademark dispute:

> Allowing the businesses to part ways is especially important in

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exogenous economic shocks." *Id.* at 1039 (explaining relational contract theory and how long-term relationships reduce adaptation to changes in business environment).

186. *Id.* at 1043-44.

187. Phil Kurz, ABC To Move To Cloud-Based Master Control, TVNewsCheck (Apr. 12, 2015), http://www.tvnewscheck.com/article/84472/abc-to-move-to-cloudbased-master-control (reporting Disney's ABC contracting with Imagine Communications for centralized master control of its televisions broadcasting).

> distribution contracts and other forms of partial vertical integration, where the firms must coordinate their conduct over an extended period to deliver a product. Terminability means that, if the firms' goals or methods diverge, either side may get out. It also means that both sides have a credible threat to walk away, and this threat may induce the other side to compromise. Because these long-term relations produce continuing profits for both sides, both have something to lose by taking the exit option without trying to work out differences first. A combination of the need for flexibility in relational contracts and the fact that both sides have an ongoing interest in accommodating the other makes a presumption of terminability sensible.
>
> This trademark license differs from a distribution contract. These parties are not locked together in a form of partial integration by contract-as, for example, when a distribution partner serves as a substitute for vertical integration into warehousing and sales.[188]

Human caution shapes the development of any market. An economist's model of the "rational man" may suggest certain scenarios for market evolution, but the decisions are going to be made not by robotic "rational men," but by human beings with limitations on their creative vision, reluctance to take risks that may sideline their careers, concerned about cannibalizing existing revenue streams and therefore failing to meet budget and investor expectations, and simply daunted by the reality that most new ideas do not work out. A high proportion of first movers regret having made the first move.

So notwithstanding the facts that compelling content is available from indie producers, that stringers can handle more news collection, that drones can replace news helicopters in many instances, and that Internet only TV, whether through a ATSC 3.0 or IPTV, might be more efficient and appeal to viewers more, the established enterprises are less likely to be first movers than new entrants.

Not all new entrants are tiny. Google and Amazon have market capitalization exceeding that of the largest of the integrated media companies. The market configurations sketched in this Article may or may not be realized, but if they are not, the reason will not be the reluctance of the establishment to embrace them, alone. Google and Amazon will be happy to take the first step.

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188. Baldwin Piano, Inc. v. Deutsche Wurlitzer GmbH, 392 F.3d 881, 885 (7th Cir. 2004) (citing Alan Schwartz, *Relational Contracts in the Courts*, 21 J. LEGAL STUD. 271 (1992); Charles J. Goetz & Robert E. Scott, *Principles of Relational Contracts*, 67 VA. L. REV. 1089 (1981); Benjamin Klein et al., *Vertical Integration, Appropriable Rents & the Competitive Contracting Process*, 21 J.L. & ECON. 297 (1978).

VII. PUBLIC POLICY

The Internet, unlike earlier forms of information dissemination, has never been tightly regulated. Cable, television, direct broadcast satellite and telephone dissemination have grown up with the FCC alongside, and often prodding providers in the ribs. Efforts to force natural or *de jure* monopolies to open their architectures to competition has been a consistent theme in communications regulation. Common carriage by telephone systems is an early example. The *Carterphone* and *MCI* decisions and the breakup of AT&T came next, and then the ongoing struggle under the Act to force incumbent local service carriers to open their networks to CLECs, and the effort to re-level the playing field for television broadcasters and cable and direct satellite distributors as new technologies and business practices tilted it one way or another.

Now, the gravitational pull of the Internet architecture for video is reopening the question of how much and how the Internet should be regulated. New technologies are opening some parts of Internet television to more competition, even as other technologies make it more concentrated and less competitive. In the areas where competition is intensifying, anti-competitive temptations grow how long with it.

The disruptive technologies have shifted the justification for regulation of communication networks. The technologies of frequency sharing have lessened need for exclusive FCC licenses to particular frequencies and made spectrum use more efficient when the FCC grants block of frequencies to multiple users and the makes other blocks available for unlicensed use. The fact that the Internet evolved into a form of common carriage without any of its components being regulated as common carriers has fueled one side of the debate over new neutrality. But the rise of CDNs as private networks specializing in applications, like television, that demand very high bandwidth has skewed the Internet architecture and fuels the other side of the debate. Private networks do not hold themselves up as common carriers; instead, they make private deals with those who can help them find their capital investments.

The need for, and utility of, some regulatory tools has diminished. Must carry is an artifact of a distribution market in which over-the-air television was suffering inroads from other means of delivery—mostly cable. That shift is almost complete now, and for the time being at least, the perception that viewers want local content means that distributors want to carry local television programs; the law does not have to force them to carry it.

Compulsory licensing under the retransmission consent rules[189] was a

189. 17 U.S.C. §§ 111, 122 (2017). *See generally* Patrick Murphy, *Retransmission Consent: A Mixed Signal for Cable Copyright*, 17 COLUM.-VLA J.L. & ARTS 237 (1993) (evaluating retransmission consent); Gregory J. Vogt, *Does Retransmission Consent Need Fixing? (Or Do*

compromise born out of the fact that television programming was an intangible good that was non-rival and non-excludable—the traditional hallmarks for copyright protection to avoid free riding.[190] Yet, for practical reasons, over-the-air content had never been subjected to copyright protection. Retransmission consent was a practical compromise to extend copyright protection for broadcasters while preserving the cable industry's established access. Now, digital distribution via cable and wireless makes television programing excludable. The law does not need to protect it; copyright owners can embed copy protection with the content.

The concept of broad compulsory licensing could be extended to harmonize copyright protection with net neutrality, but the political constellation would have little stomach for this, and the proliferation of new sources of content suggests that any need for it is fading rather than intensifying. Content regulation in the form of obligations to carry public-service programming now seems quaint, after the Supreme Court held that such obligations violate the First Amendment except for entities holding exclusive broadcast licenses.[191] The FCC generally has backed away from it. The battleground mainly involves net neutrality and opening set-top boxes.

A. *FCC Regulation*

The anticompetitive incentives and resulting anticompetitive behavior has led the FCC to issue rules to protect competition, including the net neutrality rule. FCC rules under section 628(c)(2) of the Act prohibit cable operators from inducing vendors to shut out competing MVPDs, but only with respect to satellite delivered programming.[192] Since 2010, similar rules apply to terrestrial delivered cable affiliated programming under section 628(b).[193] FCC rules prohibit cable operators or other MVPDs from obtaining exclusive rights to programming as a condition for carriage.[194]

Consumers Need Help So They Can Watch the Super Bowl, World Series, And Academy Awards?), 22 COMMLAW CONSPECTUS 108 (2014) (arguing that entry of new competitors to cable distributors have given broadcasters leverage to demand higher retransmission consent fees).

190. *See* John A. Rothchild, *The Social Costs of Technological Protection Measures*, 34 FLA. ST. U. L. REV. 1181, 1184 (2007) (explaining character of authorship as a "public good").

191. Turner Broadcasting System, Inc. v. FCC, 512 U.S. 622, 637 (1994) (explaining that rationale for relaxing First Amendment protection of broadcasters does not apply to cable distributors).

192. FEDERAL COMMUNICATIONS COMMISSION, ANNUAL ASSESSMENT, *supra* note 165, at 19.

193. *Id.* at 20.

194. *Id.*

1. Net Neutrality

The Open Network Order, and all other proposals for net neutrality, are essentially non-discrimination rules. Cell phone providers are common carriers, and thus may not discriminate.[195] Non-discrimination rules in any market are simple in concept but over time prove difficult to implement and enforce. The reality is that, for markets to function freely, buyers and sellers need to make choices. Most choices must be dictated by variables that each participant sets in terms of his or her own preference functions. Thousands of employment discrimination cases show how difficult it can be to decide whether a decision is impermissibly discriminatory or is based on rational workplace considerations. Likewise, a century of enforcement of non-discrimination rules in railroad economic regulation shows how wide the opportunities are for game playing and evasion and how vigorous enforcement of non-discrimination can strangle innovation as new technologies become available.[196]

After its first open Internet order was nullified in part by the DC circuit in Verizon[197] it promulgated its 2015 Open Internet Order.[198] Evidence of discrimination by Comcast against Netflix was one of the major motivations for the Open Internet Order.[199] The order classifies both fixed and mobile broadband Internet access service as a telecommunication service under title II.

The pipe providers argued that net neutrality was poor public policy. Part of their argument was that plenty of competition exists in the market, broadly defined—cable Internet providers face competition from broadband wireless and DSL.

They also argued that meeting consumer demand for high-quality video requires substantial investment in the cable infrastructure, and cable firms should be able to charge a premium for access to the faster, high-quality infrastructure. Smaller content providers countered that a premium to Comcast is a surtax on them, worsening their business model. If they do not pay it, the relatively poorer quality of their viewers' experiences will drive viewers to their competitors who do pay for premium access.

The ONO addresses the market connecting programmers and distributors. It refers to programmers as "edge providers" and the

195. 47 U.S.C. § 332(c)(1) (2017).

196. Central Power & Light Co. v. United States, 634 F.2d 137, 144-80 (5th Cir. 1980).

197. *Verizon*, 740 F.3d at 648.

198. Protecting and Promoting the open Internet, GN Docket no. 14-28, FCC 15-24 (2015) [hereinafter ONO].

199. FEDERAL COMMUNICATIONS COMMISSION, ANNUAL ASSESSMENT, *supra* note 165, at 122-23.

distributors as "backbone providers." The report identifies the factors that impair competition in the market: concentrated market structure, significant barriers to entry by new distributors, switching costs, and incentives for distributors to discriminate against certain programmers—those affiliated with a distributor in integrated enterprises, premium payments by programmers for favored treatment, and programmer-demanded blocking of competing programmers to protect programmers from competition in their markets.

The 2015 Open Network Order generally imitates the 2010 order, but asserts authority under Title II as well as section 706 for it. The Order prohibits blocking: "A person engaged in the provision of broadband Internet access service, insofar as such person is so engaged, shall not block lawful content, applications, services, or non-harmful devices, subject to reasonable network management."[200]

Providers may, however, block illegal content, including infringing material.[201] It prohibits throttling:

"A person engaged in the provision of broadband Internet access service, insofar as such person is so engaged, shall not impair or degrade lawful Internet traffic based on Internet content, application, or service, or use of a non-harmful device, subject to reasonable network management."[202]

It prohibits paid prioritization:

> A person engaged in the provision of broadband Internet access service, insofar as such person is so engaged, shall not engage in paid prioritization.
>
> "Paid prioritization" refers to the management of a broadband provider's network to directly or indirectly favor some traffic over other traffic, including through use of techniques such as traffic shaping, prioritization, resource reservation, or other forms of preferential traffic management, either (a) in exchange for consideration (monetary or otherwise) from a third party, or (b) to benefit an affiliated entity.[203]

Finally, it prohibits imposing any unreasonable disadvantage:

> Any person engaged in the provision of broadband Internet access service, insofar as such person is so engaged, shall not unreasonably interfere with or unreasonably disadvantage (i) end

200. ONO, *supra* note 198, at 48.
201. *Id.* at 48-49.
202. *Id.* at 51.
203. *Id.* at 53.

> users' ability to select, access, and use broadband Internet access service or the lawful Internet content, applications, services, or devices of their choice, or (ii) edge providers' ability to make lawful content, applications, services, or devices available to end users. Reasonable network management shall not be considered a violation of this rule.[204]

It declined, however, to require that practices be "commercially reasonable."[205]

The Commission recognized that programmers with significant resources still can gain an advantage "by constructing their own extensive networks that interconnect directly with the ISPs."[206] The rule applies both to fixed and mobile broadband.[207]

The Court of Appeals overturned the 2010 order because the FCC had not justified its provisions under relevant statutory authority.[208]

The principal thrust of the 2015 ONO is, not so much to change the content of the net neutrality requirements, as to justify them based on the FCC's authority to regulate common carriers under title II as well as its authority, which was the core of the 2010 order, to encourage the department of new technologies, under section 706.[209] The commission justified its conclusion that backbone Internet connectivity is the 21st-century of common carriage by telephone in the 1930s,[210] but also it also acknowledged the undesirability of 1930s-style detailed regulation of market entry and exit, rate and service regulation.[211] Its solution was to subject backbone Internet providers to Title II common-carrier regulation but to exercise its "forbearance" authority,[212] to exempt them from most of the detailed rules historically applied to telephone companies.[213]

Two significant changes in FCC posture are important pillars of the 2015 ONO. First, the agency changed its position that Internet connectivity constituted not, telecommunications, subject which

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204. *Id.* at 60.

205. *Id.* at 65.

206. *Id.* at 57 (declining to act to limit such a practice).

207. *Id.* at 50.

208. Comcast Corp. v. FCC, 600 F.3d 642, 652-653 (D.C. Cir. 2010) (holding that FCC failed to cite any statutory authority for imposing net neutrality provisions); Verizon v. FCC, 740 F.3d 623, 628, 659 (D.C. Cir. 2014) (holding FCC open network order invalid because it classified broadband providers as not being common carriers, yet regulated them as such, contravening statute).

209. 740 F.3d at 628 (holding that FCC reasonably interpreted section 706 to authorize open network order).

210. ONO, *supra* note 198, at 315 (drawing analogy to 1930s monopoly regulation).

211. *Id.* para. 451 (forbearing to impose rate regulation).

212. *Id.* para. 435 (discussing forbearance authority).

213. *Id.* para. 451 (discussing forbearance to impose rate regulation).

regulation, but "information services." The original classification was counterintuitive, as Justice Scalia pointed out in his famous pizza-delivery analogy.[214] In the 2015 order, the FCC squarely reiterates its new position that Internet connectivity is a telecommunication service, and that it can be separated from content production and programming when the same enterprises perform multiple functions.[215]

A second major change in position involves whether the same net neutrality rules should apply to broadband wireless carriers as to fixed broadband carriers. In its 2010 order, the FCC said, "no."[216] The 2015 order erases this distinction, pointing out that broadband wireless is no longer a nascent industry, beset with uncertainties about how it should be deployed, what technology it should use, and consumer response. Those were the differences between mobile and fixed broadband justified lighter treatment of mobile broadband in 2010, but it they no longer do.[217]

Application of the 2015 ONO will prove challenging because of the diversity of arrangements through which various kinds of traffic discrimination can occur, much of it justifiable based on basic design considerations and business arrangements.[218]

The 2015 ONO does not distinguish among different types of Internet exchange points in imposing its open-access duties.[219]

It seems obvious that, if AT&T or Comcast programs their set top box or edge routers connecting a neighborhood of viewers to their systems to block packets originating with Netflix that would violate the order. Similarly, if Comcast refuses to allow transit or peering access to the Netflix distribution network upstream at one of its exchange points that also would violate the order.

But what if ABC builds a large pipe from its master control center in Atlanta to Chicago, to carry video programming to its viewers there?[220] Fox demands upstream access to the new pipe under the 2015 ONO. If ABC must give Fox access, it is being forced to share the fruits of an investment it has made alone. This is precisely the problem the confronted legislators and the FCC and telephone providers when the

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214. Nat'l Cable & Telecomm. Assn. v. Brand X Internet Servs., 545 U.S 967, 1007 (2005) (Scalia, dissenting) (arguing that the FCC should not treat the telecommunication service separate from the content in which subscribers access, and comparing it to a pizzeria's combined services of baking and delivering pizza, which are not two separate elements of the pizza business).

215. ONO, *supra* note 198, para. 310 (discussing history of broadband regulation).

216. *Id.* para. 341 (describing changed rationale for regulation of wireless services).

217. *Id.* paras. 306-425 (discussing evolution of regulation of wireless services).

218. *See id.* at 88(explaining how incentives to offer open access changes with shifts between peering and transit arrangements).

219. *See id.* at 57 (noting Netflix comments express concern about discrimination by Comcast at peering points).

220. Actually it probably would lease additional fiber capacity rather than digging a trench from Atlanta to Chicago and laying new fiber.

1996 Act was adopted. To what extent should a facilities-based carrier be forced to share its facilities with a competitor who skips the facilities investment?[221] The general answer in the telephone context was distinguish between existing facilities, as to which the capital was already sunk, and new facilities.[222] Facility-based incumbents had to share existing facilities, but not the new ones.[223] A consensus exists, however, that telephone style regulation should not be imposed on the Internet, not even a "simplified" regulation of the ILECs under the 1996 Act, circa 2000.

Commissioner Ajit Pai articulated the concern in his dissent to the 2015 ONO.[224] In particular, he criticized the extension of regulation to internet traffic exchange at the wholesale level:

> But the Order then goes quite a bit further and adopts a "regulatory backstop prohibiting common carriers from engaging in unjust and unreasonable practices," subjecting Internet traffic exchange arrangements like those mentioned immediately above to "sections 201 and 202 on a case-by-case basis." With this authority, the Commission can order an Internet service provider "to establish physical connections with other carriers, to establish through routes and charges applicable thereto . . . , and to establish and provide facilities and regulations for operating such through routes." In other words, the Order classifies Internet traffic exchange as a Title II telecommunications service in everything but name.[225]

He extended Justice Scalia's pizzeria metaphor: "[T]his Order does not only cover the delivery of a baked pie. Instead, the Order reaches the exchange of ingredients between a pizzeria and its suppliers, since all those ingredients must be 'delivered' to the pizzeria."[226] AT&T emphasized this possibility in opposing a Title II basis for net neutrality.[227]

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221. Henry H. Perritt, Jr., DIGITAL COMMUNICATIONS LAW §§ 7.03[D], [E], [F] (rev. ed. 2010) (explaining economic rationale for FCC's imposing unbundling, resale, and interconnection obligations on monopoly telephone companies).

222. *Id.* at 7-31 to 7-32 (explaining different economic incentives with respect to existing facilities, compared with new facilities).

223. *Id.*

224. ONO, *supra* note 198, at 321.

225. *Id.* at 347 (Pai, disssenting) (internal footnotes omitted).

226. *Id.* at 360

227.

> It would capture movies purchased from Google Play or iTunes, videos downloaded from YouTube, and OTT subscription services like Netflix and

The answer lies in the 2015 ONO's was embrace of the common carrier concept and the order's distinction between private networks and common carriage. The ONO does not impose open access obligations on private networks.[228] In the example, the new pipe from ABC's Atlanta master control service center to Chicago is a private network to which it can control access as it wants.[229]

On the other hand, a backbone provider clearly engages in common carriage within the meaning of the Act, because it holds itself out as willing to handle traffic from anyone. So does Comcast with respect to its Internet access subscribers at the retail level.

Commissioner O'Reilly, who criticizes extension of open network obligations to internet traffic exchange, explained the distinction:

> [C]ontent providers and network operators enter into interconnection relationships with ISPs through individually negotiated private agreements. Regardless of the form they take—"peering," "transit," or "on-net-only"—providers do not hold themselves out to serve the public indifferently. When considering whether to enter into these "voluntary, market-based agreements," providers "independently make decisions about interconnection by weighing the benefits and costs on a case-by-case basis." As one provider stated, "the exchange of Internet traffic invariably entails arrangements between sophisticated commercial parties with very large amounts of traffic so." Indeed, another provider noted that providers reserve the right not to enter into agreements even where guidelines are met. This "flexibility to customize service arrangements for a particular customer is the hallmark of private carriage, which is the antithesis of common carriage." As such, these arrangements, which some mistakenly refer to as "interconnection," have never been regulated as common carriage

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> HBO Go. It could also implicate advertising served over the Internet — if those companies are providing, at least in part, a Title II transmission service, contribution to USF is mandatory for the revenue associated with the Title II service. That means allocating revenues between the telecommunications service and the information service, filings justifying those allocations, Form 499s. . . . you get the drift. Innovators would be paralyzed before they even get off the ground. . . . Title II regulation would strangle broadband investment.

Jim Cicconi, *Net Neutrality and Modern Memory*, AT&T PUBLIC POLICY BLOG (June 6, 2014), http://www.attpublicpolicy.com/fcc/net-neutrality-and-modern-memory/.

228. ONO, *supra* note 198, at 149.

229. *See* Cicconi, *supra* note 227 (arguing that common carrier regulation always has allowed higher prices for higher levels of service).

services subject to Title II.[230]

Despite the concerns, the Order itself is cautious about extending open access obligations to peering: "we conclude that, at this time, application of the no-unreasonable interference/disadvantage standard and the prohibitions on blocking, throttling, and paid prioritization to the Internet traffic exchange arrangements is not warranted."[231]

> Since broadband Internet access service providers cannot, on their own, connect to every end point on the Internet in order to provide full Internet access to their customers, they historically paid third-party backbone service providers for transit. Backbone service providers interconnected upstream until traffic reached Tier 1 backbone service providers, which peered with each other and thereby provided their customer networks with access to the full Internet.487 In this hierarchical arrangement of networks, broadband Internet access providers negotiated with backbone service providers; broadband Internet access providers generally did not negotiate with edge providers to gain access to content.[232]

The extension of Tier 1 backbones tied together at a smaller number of peering points reduces incentives for settlement-free peering with smaller distributors.[233]

> Internet traffic exchange agreements have historically been and will continue to be commercially negotiated. We do not believe that it is appropriate or necessary to subject arrangements for Internet traffic exchange (which are subsumed within broadband Internet access service) to the rules we adopt today. We conclude that it would be premature to adopt prescriptive rules to address any problems that have arisen or may arise. It is also premature to draw policy conclusions concerning new paid Internet traffic exchange arrangements between broadband Internet access service providers and edge providers, CDNs, or backbone services.[234]

It is not, however, embrace a completely laissez-faire approach to peering:

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230. ONO, *supra* note 198, at 392-93 (O'Reilly, dissenting).
231. *Id.* at 87.
232. *Id.*
233. *Id.* at 88.
234. *Id.* at 92 (internal footnotes omitted).

> [W]e believe that a case-by-case approach is appropriate regarding Internet traffic exchange arrangements between broadband Internet access service providers and edge providers or intermediaries—an area that historically has functioned without significant Commission oversight. . . . [W]e will rely on the regulatory backstop prohibiting common carriers from engaging in unjust and unreasonable practices. . . . The Commission's regulatory and enforcement oversight, including over common carriers, is complementary to vigorous antitrust enforcement. . . . [I]t will remain essential for the Commission, as well as the Department of Justice, to continue to carefully monitor, review, and where appropriate, take action against any anti-competitive mergers, acquisitions, agreements or conduct, including where broadband Internet access services are concerned.[235]

Industry structure figures into the calculation. A natural monopoly or any other kind of monopolist might have an incentive to claim that it is a private network, to avoid its obligations under the ONO. But the history of common carriage provides a conceptual solution for this. Owners of "essential facilities" are deemed to be common carriers,[236] at least if there is any kind of holding out.

An interesting question is whether TV stations embracing ATSC 3.0 and turning their boomers into Internet access points thereby become common carriers subject to ONO obligations. The answer is, "no," unless they hold themselves out to carry traffic from anyone. If they wish to carry only their own programming on their facilities, they qualify as private networks, thus exempt from the ONO. Status as a private carrier does not exclude the possibility of a few select contractual arrangements to carry other people's traffic. The distinction between holding out to the public in general and being a private contract carrier is fairly well worked out in the context of aviation regulations.[237] Whatever the merits of the arguments for and against the Open Network Order, litigation is certain.[238]

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235. *Id.* at 93

236. *See* MCI Comm. Corp. v. Am. Tel. & Tel. Co., 708 F.2d 1081, 1144 (7th Cir. 1983) (discussing relationship between common carrier status and essential facilities doctrine).

237. FAA, AC 120-12A – Private Carriage Versus Common Carriage of Persons or Property (Apr. 24, 1986), https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%20120-12A.pdf (explaining the difference).

238. *See* Larry Downes, *On Net Neutrality, Six Ways the FCC's Public Utility Order Will Lose in Court*, FORBES, (Apr. 8, 2015, 6:00 AM), http://www.forbes.com/sites/larrydownes/2015/04/08/on-net-neutrality-six-ways-the-fccs-public-utility-order-will-lose-in-court/#b0a89e5303b2 (marshalling policy and legal arguments against subjecting Internet access to Title II).

2. Set-Top Boxes

FCC regulation comes into play here with respect to any requirements for set-top boxes. Also, judicial interpretation of distribution public performance rights is important for the same reason.

On February 16, 2016, the FCC released a notice of proposed rulemaking that would require cable MVPDs to adopt open architecture for cable interfaces and prohibit them from requiring rental of their own set-top boxes as a condition of cable subscription.[239] The proposal applies not just to cable MVPDs but to all MVPDs, including telephone companies and direct satellite providers.[240]

The Commission and the Congress vigorously debated the merits of the proposal. Everyone agrees that, in the long run hardware interfaces will be unnecessary. They disagree, however, on the need for FCC action to facilitate this transition. Chairman Wheeler[241] and Commissioners Clyburn[242] and Rosenworcel[243] support the proposed rule and advocate its adoption mainly in terms of the monopoly rents that the current set top box requirements extract from subscribers. They also argue that it will open the market for programmers. "[C]reators of content who have been unable to get MVPD carriage may soon have a means to reach consumers directly."[244] Opening the architecture will make it easier for OTT programmers to compete with MVPD distributors' exclusive deals with programmers.[245]

Commissioners Pai[246] and O'Reilly[247] attack it on seven grounds. First, they argue that it is unnecessary. The market is already transitioning away from the need for proprietary interface hardware.

Second, they argue that it will have the effect of arresting or delaying

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239. Cable Box NPRM, *supra* note 178.

240. *Id.* at 50.

241. FEDERAL COMMUNICATIONS COMMISSION, STATEMENT OF CHAIRMAN TOM WHEELER, *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-18A2.pdf.

242. FEDERAL COMMUNICATIONS COMMISSION, STATEMENT OF COMMISSIONER MIGNON L. CLYBURN, *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-18A3.pdf [hereinafter CABLE BOX CLYBURN STATEMENT].

243. FEDERAL COMMUNICATIONS COMMISSION, STATEMENT OF COMMISSIONER JESSICA ROSENWORCEL, *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-18A4.pdf.

244. CABLE BOX CLYBURN STATEMENT, *supra* note 242.

245. Brian Barrett, *The FCC's War to Liberate Your Cable Box,* WIRED, (Feb. 19, 2016, 5:46 AM), http://www.wired.com/2016/02/fcc-set-top-box-rules/ (noting argument that opening up cable box architectures allows viewers to get Netflix and all other OTT services, lessening demand for cable subscriptions).

246. FEDERAL COMMUNICATIONS COMMISSION, DISSENTING STATEMENT OF COMMISSIONER AJIT PAI, *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-18A5.pdf.

247. FEDERAL COMMUNICATIONS COMMISSION, DISSENTING STATEMENT OF COMMISSIONER MICHAEL O'RIELLY, *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-18A6.pdf.

technological development otherwise certain to lead to improved, more open, interfaces. Third, they argue, somewhat inconsistently, that the proposal will jeopardize the exclusive deals internalized into the cable programming stream and thereby undercut established business models. If the subscriber cable interface is open, any competing distributor can alter the stream provided by the cable distributors, in effect getting a free ride, they say, on the cable operator's programming. In many cases, the competitors will alter the programming to provide their own, differing, programming products.[248] Their competitive focus is on the market between programmers and distributors, not on the horizontal market in which distributors compete.

Fourth, as a part of the third line of attack, the critics explicitly cite the possibility that competitors will take advantage of open interface architecture to substitute their own ads for those embedded in the stream provided by the cable companies, thereby reducing the revenue advertisers are willing to pay the cable distributors.[249] Fifth, the critics recognize the growing value of data about viewer behavior.[250] They argue that the present set-top box arrangements enable cable distributors to acquire and monetize those data, and that competitor access it will further undermine cable distributor business models, going forward.

Sixth, they argue that open interface architectures will expose viewers to breaches of their security and to more general forms of piracy and computer crime. It is not clear, however, how the proposal would serve its intended goal unless it requires that the cable companies provide the keys to decrypt their program content; virtually all television content distributed by cable MVPDs is encrypted. Merely opening up access to the encrypted scheme does not enable competitors to do much with it.[251]

Some commentators argue that the proposal is merely a move in a "game of special-interest squabbles that use the regulator to get a leg up," intended to benefit information brokers at the expense of cable distributors.[252] The cable industry fiercely opposes it. "Rather than investing in their own programming or negotiating with other content

248. The proposal, however, obligates competing interface providers to "implement content protection to ensure that the security of MVPD services is not jeopardized, and must respect licensing terms regarding copyright, entitlement, and robustness." Cable Box NPRM, *supra* note 178, at 17.

249. *See* Brian Barrett, *The FCC's War to Liberate Your Cable Box,* WIRED, (Feb. 19, 2016, 5:46 AM), http://www.wired.com/2016/02/fcc-set-top-box-rules/ (noting claim by cable industry that effect of proposal is to allow Google to insert ads into cable programming).

250. Cable Box NPRM, *supra* note 178, at 9 (soliciting comment on degree to which MVPDs track consumer viewing behavior and profit exploiting the data or selling it).

251. *Id.* ¶¶ 51-60, at 26-29 (discussing and imposing requirements to protecting digital rights management schemes).

252. George S. Ford, *The FCC's cynical set-top policy*, THE HILL, (Feb. 3, 2016, 7:30AM), http://thehill.com/blogs/pundits-blog/technology/268004-the-fccs-cynical-set-top-box-play.

creators, Big Tech companies want the FCC to allow them to "poach" video programming without honoring agreements or paying licensing fees. Critics call it a "a brazen money grab." Small, diverse and independent programmers would be particularly at risk.[253]

B. *Copyright is the Major Barrier Now*

Copyright remains an important part of the regulatory equation because it makes it so easy for content producers to insist on tying arrangement. Broad net neutrality is not going to work unless the monopoly power associated with copyright is addressed. The FCC could extend compulsory licensing or the courts could expand the copyright misuse doctrine.[254]

The problem is not copyright; it is exclusive dealing. While movie studios and record labels exaggerate the effect, piracy does occur, and, has some adverse effect on revenue streams for those who have invested in creating content. Eliminating copyright would decrease content production.

The existing copyright act has the seeds of one possible solution: the mechanical license for audio recordings, and the retransmission consent rule. The so-called mechanical license refers to the compulsory license mandated by section 115,[255] which requires the owner of a copyrighted audio recording who releases it for distribution to one distributor to make it available to all distributors. The mandate is accompanied by a statutory

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253. The Future of TV Coalition, http://futureoftv.com/#sthash. 6T9n1Cf0.dpuf

254. *See* UMG Recordings, Inc. v. Lindor, 531 F. Supp.2d 453, 458 (E.D. N.Y. 2007) (observing that most instances of copyright misuse arise from typing arrangements or other activity that violate antitrust law; striking misuse defense in infringement action); Sandy Azer, *A Three-Tiered Public Policy Approach to Copyright Misuse in the Context Of Tying Arrangements*, 82 FORDHAM L. REV. 81 (2013).

> This Note proposes a three-tiered framework, as follows. First, the court must determine whether the tying arrangement is outside the scope and boundaries of the copyright grant. If it is, the copyright misuse defense prevails. If it is not, the court must next inquire about the availability of feasible economic alternatives for the defendant. If there are, the defense fails. If such alternatives do not exist, the court must last examine whether the copyright owner has any critical business justifications for the tying arrangement. If so, the defense fails; if not, the defense prevails. The alleged infringer carries the burden of proof for the first two inquiries and the copyright owner carries the burden for the final inquiry. The following subsections describe the framework of the proposed approach in greater detail.

Id. at 121.

255. 17 U.S.C. § 115.

scheme for determining royalties. Sections 111[256] and 122[257] grant statutory licenses to cable and direct-satellite distributors to rebroadcast over the air television programs.

Government-set prices are in disfavor, for good reason. They divert resources into litigating over rates from productive activity; rates are set according to political power rather than market forces; rates tend to become more complex over time to try to stay a step ahead of evasive efforts; and rate regulation undermine innovation in products and contractual arrangement. These are the lessons learned from decades of railroad and airline rate regulation, which was abandoned as a result.

But a compulsory license need not be accompanied by government rate regulation. The retransmission right for cable TV enterprises carrying local TV station programming is an example. The congress could craft a 21st-century equivalent of mechanical rights that would allow the market to set prices. One straightforward for doing this is to enact a most-favored-nation clause as a part of the arrangement; actually, it would be more logical to call it a broader must-carry rule. Whatever rate one pipe negotiates with content provider must be offered by that content provider to everyone else. There is a long history of nondiscriminatory pricing rules in traditional communications and transportation regulation.

To be sure, those traditional regulatory approaches been abandoned in favor of greater reliance on market, but the major players in the communications industry have never been cheerleaders for competitive markets. Throughout their history, they have jockeyed continuously for government intervention to favor their economic position at the expense of their competitors, suppliers, and customers. That jockeying will continue as technology advances, and there is no reason that it should not be channeled by an understanding of what advances social welfare.

C. *Relying on the Market*

Broadly accepted law-and-economics theory says government intervention is legitimate when it corrects for market failure, the realities of such intervention are fraught with difficulties. Intervenors must guess how technology will develop and reshape markets. Statutes and regulations are hard to change once they are on the books. Interest group politics skews the content of the intervention so it often adds to market failure instead of reducing it. Moreover, detailed government intervention, especially that focused on setting rates, distracts market participants from their core business activities and invites them to divert energies from innovation and marketing to litigation and politics.

256. 17 U.S.C. § 111.
257. 17 U.S.C. § 122.

The market structure for video entertainment is highly concentrated, but the disruptive technologies are undermining the competitive dominance of legacy firms. Moreover, the conflicting interests among producers, programmers, and distributors are sufficiently great that competition is actually quite robust. In the vertical dimension, large firms adjacent to each other wage brutal battles as they negotiate new terms. Negotiations between cable companies and television and sports networks are a strong example.[258]

In the horizontal dimension, broadband wireless providers, DSL providers, and cable Internet providers fight ferociously for market share, and now ATSC 3.0 equips TV stations to do the same with broadband wireless providers. Programmers want to attach their ads to their programming so they not cannot be stripped off and discarded by viewers or stripped off and replaced by others in the chain. In this respect, programmers have a mixed view of targeted advertising. If they can control ad placement and get the benefits of targeting technology, their position to obtain advertising revenue is enhanced. On the other hand, if someone else further down the chain controls ad placement, the programmers lose control of their advertising and likely a share of advertising revenue.

One of the advantages of targeted advertising is that it relieves the ad platform of the cost of soliciting advertisers. TV stations already have the marketing infrastructure necessary to solicit advertisers, and so in that respect, a shift for targeted advertising does not benefit them as much as of benefits their new entrant competitors. New entrant competitors experience targeted advertising as a reduction in the economic barriers to entry.

If television stations regain control of the distribution of their programming, prying viewers away from cable, DSL, and broadband wireless providers, they secure their control of advertising, whether it is of the traditional kind or targeted.

FCC Commissioner Ajit Pai, dissenting from the 2015 Open Internet Order,[259] explained some of the pernicious effects of aggressive government regulation:

> [T]he FCC is abandoning a twenty-year-old, bipartisan framework for keeping the Internet free and open in favor of Great Depression-era legislation designed to regulate Ma Bell, at least the American public is getting something in return, right? Wrong.

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258. *See* Richard Sandomir et al., *To Protect Its Empire, ESPN Stays on Offense*, N.Y. TIMES, (Aug. 26, 2013), http://www.nytimes.com/2013/08/27/sports/ncaafootball/to-defend-its-empire-espn-stays-on-offensive.html?pagewanted=all (reporting $ 6 billion in cable fees to ESPN, which televises 35,000 hours of sports programming annually).

259. ONO, *supra* note 198, at 321.

> The Internet is not broken. There is no problem for the government to solve.[260]

> The FCC's newfound control extends to the design of the Internet itself, from the last mile through the backbone. Section 201(a) of the Communications Act gives the FCC authority to order "physical connections" and "through routes," meaning the FCC can decide where the Internet should be built and how it should be interconnected. And with the broad Internet conduct standard, decisions about network architecture and design will no longer be in the hands of engineers but bureaucrats and lawyers.[261]

D. *Keeping the Internet Invisible*

At each level of television production, programming, and distribution competition is potentially intensifying with the advent of new entrants. Stringers compete with salaried reporters and photographers for the news collection part of content production. Indie movie makers compete with established studios for entertainment content production.

In the programming layer, large new entrants like Amazon, Google, and Netflix are seeking new content producers and have the wherewithal to force their programming through existing or new distribution pipes. Scores of new programmers have entered the market and are redefining programming to accommodate different viewing patterns associated with the Internet

In the distribution lawyer, new CDNs are being constructed with substantial resources. Others regularly join the community at one or more of the three tiers of Internet connectivity. The most dramatic change in the structure is at the edge, where ATSC 3.0 and the buildout of micro- and pico-cells is occurring to improve mobile video capacity.

Advertisers are flocking to targeted advertising and relaxing the old bonds that glued them to traditional programmers for spot advertising. The structure in these markets will continue to concentrate and fragment as incumbents buy up new entrants that show the most promise of success, and other new entrants fill in behind them, using new configurations of technology.

So where is government intervention needed to keep the Internet invisible? As a theoretical matter, it is needed where those with market power or those acting in concert increase entry barriers and where were switching costs for purchasers are particularly high or artificially established.

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260. *Id.* at 333 (Pai, dissenting).
261. *Id.* at 324 (Pai, dissenting).

In the producer to programmer market, new entry collides with new methods and temptations to restrict it. But in this market, variations in behavior are strongly driven by differences in artistic and marketing judgments and by the huge number of permutations for business arrangements. The large numbers of content producers and the growing number of programmers with different ideas about what programming means for Internet TV means that the FCC cannot regulate this market effectively without completely stifling creativity and innovation. Net neutrality should not be extended to deals between producers and programmers.

In the market where programmers and distributors strike deals with each other, the arguments in favor of regulation are somewhat stronger. While the number of distributors and the way they connect with each other is highly malleable, the bandwidth demands of video mean that only a few of them are equipped to handle it well. While there are many programmers, and their number and technological diversity is growing, enormous disparity in size increases the potential for programmers to seek deals with distributors the lock out the new entrants.

The best way to pursue net neutrality goals here is for the FCC to articulate a simple concept: that vertical exclusive deals must have an articulable business justification. Suspect arrangements can be scrutinized by complaint proceedings rather than by commission enforcement initiatives.

It is in the distributor-to-consumer market and the distributor-to-distributor markets where the argument in favor of regulation is most persuasive. Here the Internet is most likely to lose its invisibility. If Time Warner says to its cable subscribers, "you can only move Time Warner programming through your set top boxes," or Comcast says, "[Y]ou cannot watch Netflix movies without paying an extra premium," no one would find a cable, DSL, or broadband wireless subscription acceptable if it said you can shop nowhere but Amazon.

But even in this market, application of net neutrality principles is fraught with difficulty. As ABC deploys ATSC 3.0 must its boomers carry NBC programming as well as ABC's? Must Fox's apps offer access to CBS programming as well as to Fox's? Surely not; the inherent nature of apps is to focus on, and be designed around, a particular kind of content from a particular source. On the other hand, if a distributor prohibits the use of certain apps in its subscription agreements or programs its set top boxes to allow the HBO Now app but to exclude the Netflix app, that does call for regulatory intervention.

More egregious instances of anti-competitive behavior not justified by legitimate business considerations violate the antitrust laws. The best regulatory approach for the markets where the need for FCC regulation is most questionable is to provide greater opportunity for antitrust

litigation. Presently, private antitrust actions are likely to be dismissed on the grounds of the FCC has primary jurisdiction. The FCC could forbear to exercise its primary jurisdiction in certain areas and explicitly say that it intends to leave them open to antitrust scrutiny in the regular courts.

Such an approach contravenes the conventional wisdom that that administrative agency regulation is preferable to Article III court litigation in specialized areas of economic activity, but the opposite may be true. The high transaction cost of antitrust litigation with its unpredictable results would impose a substantial additional cost on anticompetitive behavior. The existence of that possibility might be just enough shadow of law to channel entrepreneurial energies into productive deals that embrace the fruits of innovation rather than blocking new sources of competition.