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THE MOBILITY COMMONS:
AN APPLICATION OF NETWORK NEUTRALITY TO THE COMMON POOL RESOURCE OF MOBILITY

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Abstract

This paper posits that mobility is a form of infrastructure commons – a common pool resource best managed in a manner of open accessibility that promotes significant positive externalities. Understanding of the commons has evolved over time: traditional definitions of the commons as argued by theorists such as Hardin (1968) and Rose (1986) have given rise to more recent exploration of physical infrastructure, and even the Internet, as commons. Further, striking parallels exist between the debate over the future of the Internet and Network Neutrality and the current issues with mobility in the United States. This paper considers the case example of Wilmington, Delaware, the current state of the mobility commons there and the potential implications with managing mobility in Wilmington as a common pool resource.

Introduction

The concept of community mobility refers generally to the ability of citizens to move about their community with as little encumbrance as possible. To develop a more concrete description, Suen and Mitchell (1999) define mobility as: "[h]aving transport services going where and when one wants to travel; being informed about the services; knowing how to use them; being able to use them; and having the means to pay for them" (p. 1). Their definition largely rings true, with the clarification that "transport services" should explicitly include pedestrian and bicycle modes of transportation. This paper posits that mobility is a form of infrastructure commons – a common

pool resource best managed in a manner of open accessibility that promotes significant positive externalities. Understanding of the commons has evolved over time: traditional definitions of the commons as argued by theorists such as Hardin (1968) and Rose (1986) have given rise to more recent exploration of physical infrastructure, and even the Internet, as commons. Further, striking parallels exist between the debate over the future of the Internet and Network Neutrality and the current issues with mobility in the United States. Finally, this paper considers the case example of Wilmington, Delaware, the current state of the mobility commons there and the potential implications with managing mobility in Wilmington as a common pool resource.

Part One – A Brief History of the Commons

Writing about the carrying capacity of the planet Earth and the perceived limits on population growth, Hardin (1968) articulated his theory of "the tragedy of the commons." According to Hardin, commonly-held property is inexorably destroyed, as users of the property plunder the resource. He proposes the example of a common pasture in which each herdsman has a rational incentive to maximize his own wealth by allowing an ever-larger herd to graze. Since no individual cattleman owns the property, it is in no single individual's interest to graze sustainably, and as each rancher grazes ever more cattle, the pasture will ultimately be devastated. "Freedom in a commons brings ruin to all," he opined (Hardin, 1968, p. 1244).

The public policy impact of Hardin's seminal work has been profound. The "tragedy of the commons" has entered the vernacular, and whether Hardin was the proximal cause or merely reflected a rising tide of individualism and privatization, U.S. federal public policy in the late 20th Century frequently embraced the importance of individual, and not collective, responsibility. Bill Clinton's 1996 welfare reform legislation, the Personal Responsibility and Work Opportunity

Reconciliation Act (H.R. 3734, 1996), went so far as to include individual responsibility in the title of the law. More recently George W. Bush campaigned on an ownership society – and not a collective property society (Karabell, 2008). His status as champion of private ownership notwithstanding, Hardin (1968) actually equivocated on the optimal way to avoid tragedy in the commons, offering private ownership as one among many possible solutions including attaching taxes and fees to public goods to discourage overuse.

Despite the impact of his ideas, Hardin's conclusions have been extensively contested. Rose (1986) wrote a response playfully entitled *The Comedy of the Commons* that persuasively rejected Hardin's central conclusions: collective ownership of the commons does not necessarily engender destruction. Moreover, collective ownership in many cases is the optimal form of governing the commons. A legal scholar, she exhaustively documents British common law and case history to show that certain properties such as roadways and waterways are "inherently public property" (p. 720).

Using the example of a town marketplace as a common or "inherently public" resource, Rose (1986) demonstrates that the marketplace benefits from more and more individuals using it. In this case, everyone having open access to make use of the commons does not precipitate its destruction, but rather benefits the community as a whole. Greater levels of commerce place downward pressure on prices. Consumers and venders alike benefit from prices closer to the marginal cost of production and a larger volume of trade. In effect, collective ownership creates economies of scale or a "network externality" (Katz & Shapiro, 1985). Such products for which concurrent consumption enhances their utility are known as "network goods" (Liebowitz & Margolis, 1994) and include telephones, XBOX 360s, and social networking sites. A telephone is only useful when a person owns a phone, and similarly an XBOX360 is more useful with higher

levels of ownership so video gamers can find more opponents for online multiplayer matches or trade games second-hand.

Economists frequently describe goods as either rivalrous (R) or nonrivalrous (NR). A good is rivalrous if one person consuming it denies another the opportunity to consume it. Thus, apples are rivalrous, but a hymn is not. If one person eats an apple no other person can, but one person singing a hymn does not restrict anyone else from singing along or separately (Stiglitz, 1999). Returning to the commons, Rose takes up Hardin's example of common pasturage specifically and notes that even if the amount of land available to pasture is a rivalrous good, the potential for network effects still exists as ranchers can collectively pool the responsibility of labor intensive activities (Dahlman, 1980, referenced in Rose, 1986). Ironically, Rose draws much of her reading directly from Adam Smith, the scion of freemarketeers such as the libertarian think tanks the Cato Institute and Competitive Enterprise Institute that consider public ownership anathema (for example, see Smith, 1981 or De Alessi, 1996).

Since Rose, other theorists have articulated in earnest a more precise demarcation of the commons and delineation of optimal governance structures. Most prominently, Elinor Ostrom (1990), preferring the term "common pool resource (CPR)," defined the commons as "a natural or man-made resource system that is sufficiently large as to make it costly (but not impossible) to exclude potential beneficiaries from obtaining benefits from its use" (p. 30). Much of her research has concerned sustainably managing natural resource commons or "social-ecological systems" (Ostrom, 2009, p. 419) such as irrigation systems (Ostrom, 1992), but as Rose (1986) foreshadowed, infrastructural systems are also a common pool resource (Frischmann, 2005b; Künneke & Finger, 2009).

Effective, sustainable management of CPRs is complex. Mitigating rival claims to the resource is difficult, as is enforcing norms of behavior to prevent excessive use. Like marine fisheries, roadways can be subject to overuse, a phenomenon that is manifest as congestion. Künneke and Finger (2009) identify four typical issues related to managing physical infrastructure as a commons: system management, capacity management, interconnection, and interoperability. These issues, particularly interconnection and interoperability, will prove particularly relevant during later discussion of mobility as a commons, but currently it is sufficient to identify physical infrastructures as commons, with inherent administrative challenges and potential for positive externalities.

The theoretical underpinning for defining a common pool resource is critical. Ostrom (1990) focused on the supply-side variable of excludability. The concept of excludability refers to the ability to selectively exclude users from appropriating a good (Stiglitz, 1999). Thus, a challenge in managing a common pool forest might be excluding users who would overharvest the timber. However, classifying CPRs with demand-side variables is also illustrative.

In his treatise *Infrastructure Commons,* Frischmann (2005b) argues deliberatively that certain classes of CPRs should be publicly held precisely because the free markets fail to satisfy societal demand. He eschews a traditional supply-side definition to define infrastructure focused on society's demand for the end products created with the CPR as direct or intermediate inputs. Frischman further classifies infrastructure as having end products that are chiefly commercial, public, or social in nature. Frischmann acknowledges that some infrastructures can fall into more than one category – he lists the Internet as all three – and that not all infrastructures should be managed as a publicly-held commons. But for infrastructures that are chiefly public or social in nature such as a public lake or monument, public management as CPRs with open access for the

public is an optimal regime. The social benefits of public access to a lake – such as fitness for swimmers, food or sport for fishers, groundwater filtration, etc – are difficult to value quantitatively and thus markets often do a poor job of providing them (Dreisen, 2008).

Frischmann (2005a) further calls for open access to public and social infrastructures with consideration of "nontraditional" forms of infrastructure, particularly the Internet. Frischmann argues for an Internet infrastructure that permits traffic in a nondiscriminatory fashion, so called "Network Neutrality," a topic to be considered more fully in the next section.

Part Two – Network Neutrality

The history of the Internet is illustrative. As a system of computers, the original design or architecture of the network was "end-to-end," a layout that stresses the importance of end-users, and not the central computer systems. The network linkages between endpoints are not optimized to do anything other than transmit data from one endpoint to another. The lack of optimization allows for the variety of different uses of the Internet that are so familiar – sending emails, sharing files, conducting Voice-over-IP (VOIP) internet phone calls. In contrast, the old AT&T telephone networks were optimized to transmit voices – traditional telephone calls – from one receiver to another, but proved inflexible and performed poorly at other tasks (Lessig, 2001). Many technical experts believe that the wide-open design of the Internet allowed for experimentation and innovation to flourish (for example, see Herman, 2006). It seems unlikely that the original architects of the Internet could have foreseen Netflix Instant Queue, Facebook, and the millions of weblogs. This seemingly simple design principle that the network should facilitate movement of data irrespective of content or source, without prioritizing one usage over another, belies a fearsome debate over the future of the Internet.

Precisely describing network or "net" neutrality itself has itself been the subject of debate. Generally, net neutrality means users should be able to move their data from one end of the network to another without discrimination, as long as the data does not undermine network integrity through transmission of a virus or other harm. Leading Internet theorists such as Tim Wu, Lawrence Lessig, and Tim Berners-Lee at times differ on the exact definition of network neutrality and the best way to guarantee it. For example, Wu (2003) believes that cable operators should be able to market broadband internet as well, while others fear such an arrangement could create a monopoly in the distribution of information. Time-Warner might not like Internet subscribers watching television programming from a web browser because such a use competes with their cable television business (Lemley & Lessig, 2001). Setting aside technical disputes, what matters most is the potential for harm to users that a discriminatory network poses.

Opponents of regulating network neutrality are typically large firms that operate telecommunications networks. From their perspective, they would like to charge content providers for priority access to the networks they manage. As an example, Amazon.com might have to pay Verizon a premium so that Amazon.com's customers can complete transactions quickly and consistently. Instead of a neutral network, the Internet would become "tiered" between the actors with the resources to pay for the highest level of service, and those without. When questioned in an interview about Internet firms using large amounts of network bandwidth, Edward Whitacre, then-CEO of SBC before the merger with AT&T, summarized the industry's position on network neutrality by stating:

> How do you think they're going to get to customers? Through a broadband pipe. Cable companies have them. We have them. Now what they would like to do is use my pipes free, but I ain't going to let them do that because we have spent this capital and we

> have to have a return on it. So there's going to have to be some mechanism for these people who use these pipes to pay for the portion they're using. Why should they be allowed to use my pipes?
>
> The Internet can't be free in that sense, because we and the cable companies have made an investment and for a Google or Yahoo! [...] or Vonage or anybody to expect to use these pipes [for] free is nuts! (BusinessWeek, 2005)

To Whitacre, Internet startups represented freeloaders on his network who were not paying their fare share for the upkeep of the network. In economic parlance, he wanted to exert the power of excludability – in the form of a premium – on his rivalrous network capacity. Others have pointed out that Whitacre's comment is misleading. The image of freeloaders not paying to use the pipes belies the fact that users pay monthly fees for internet access (Fisher, 2005) and that content providers like Google already have network "peering and transit arrangements" and pay out based on the amount of traffic they move across a network like SBC/AT&T's (Lee & Wu, 2009, p. 72). Essentially, Whitacre and other opponents of network neutrality already get paid twice and seek license to charge network users a third time for using certain applications. Finally, Whitacre confuses neutrality with a free for all. Accessing an infrastructure commons often requires a cost in the form of a toll, but critically:

> Roads and highways, canals, railroads, the mail, telegraph and telephone [...] have always been operated as common carriers that are required to interconnect and serve the public on a nondiscriminatory basis (Cooper 2004, p. 113).

Thus, the key factor of a neutral network is its nondiscriminatory interconnectivity. In *The Future of Ideas*, Lessig (2001) presents his clarion call for network neutrality. Not only did the neutral history of the Internet allow innovation to flourish, but by allowing network operators to

create a tiered Internet, the community denies itself the opportunity for future innovations that may not be imaginable given the current state of technology. Previous technological advances made the creation of Google Maps possible, and the neutral network made it deployable. In a tiered network, a future engineer might create an application as revolutionary as eBay, but without the ability to pay for premium access, his or her innovation may never reach the market. Lessig (p. 48) terms this interrelationship between a neutral network infrastructure and innovation the "innovation commons."

The Federal Communications Commission (FCC), which regulates telecommunications in the United States, has waded into the network neutrality debate on several major occasions. In 2005, the FCC released a policy statement outlining four principles of network management. Each principle began "*To encourage broadband deployment and preserve and promote the open and interconnected nature of the public Internet* (italics theirs)," before listing the fundamental rights to access lawful content, run applications, connect non-harmful network devices, and choose from competing service and content providers (Federal Communications Commission, 2005).

Most striking about the policy statement was the Commission's use of the language of common pool resources. As discussed above, maintaining interconnectivity and interoperability are critical to successful infrastructure commons management (Künneke & Finger, 2009) and the FCC endorsed broad consumer rights to nondiscriminatory use and access. Indeed, the FCC explicitly used the term "*public Internet* (italics theirs)" which reinforces the notion of the Internet as a public good. The policy statement's conclusion further illustrates the FCC's belief in the inherently public nature of the Internet.

> To foster creation, adoption, and use of Internet broadband content, applications, services and attachments, and to ensure consumers benefit from the innovation that comes from

> competition, the Commission will incorporate the above principles into its ongoing policymaking activities. (Federal Communications Commission [FCC], 2005)

As the conclusion succinctly states, innovation is at the heart of network neutrality policy.

Since the publication of the policy statement, the FCC forbade Comcast from discriminating against the Bittorrent application on its network, a restriction that the FCC felt violated the "reasonable network management" clause by which network operators can disallow abusive network appropriation (Martin, 2008).

More recently, the Obama administration installed a new FCC Chairman Julius Genachowski, who has also been a strong proponent of net neutrality. Building on the 2005 policy statement in a September 2009 speech, Genachowski added two more principles of network management, further fleshing out nondiscrimination to explicitly prevent the kind of tiered Internet that content providers so oppose and requiring transparency in network administration (Genachowski, 2009). He reiterated the Commission's belief in the critical importance of neutrality in the innovation commons by stating, "Ensuring a robust and open Internet is the best thing we can do to promote investment and innovation" (Genachowski, 2009).

To summarize, theorists have considered the utility of a neutral network. Open and nondiscriminatory access allows users to make use of the network as a commons. Provided they are not spreading viruses or unlawful content, connections should link seamlessly and facilitate the movement of data from one end of the network to another, without degradation or tiering. Federal policy currently recognizes the incredible utility of allowing data to move freely over the Internet: innovation has flourished and driven economic development in the technological sector, creating a "comedy of the commons" to return to Rose's formulation. Clearly there are advantages to well managed network infrastructures. Network neutrality and common pool resource

management theory both provide insight into how communities can do a better job of enhancing community mobility.

Part Three – The Mobility Commons

The concept of mobility is a far reaching one. Suen and Mitchell (1999) contend that the mobility depends on the availability, accessibility, and affordability of transportation services. Their definition is a good start at conceptualizing what a community needs for accessing transport, but a broader definition of the mobility as a commons is more helpful from a community planning perspective. As a network infrastructure, the mobility commons refers to the availability of means to move safely and freely about the community with minimal impediment or inconvenience.

The key difference between the infrastructure commons and the mobility commons is that mobility commons function as a superset of the physical geography of streets and causeways to include the connectedness of a community and the ways that mobility facilitates human functioning. Expanding the infrastructure commons to include the mobility commons firmly seats management policy in an awareness of how mobility management decisions impact the quality of life for community members. In addition to the physical infrastructures of a community, the mobility commons includes the major job centers, churches, grocery stores, libraries, schools and so on in a locality and the level of connection between them. As such, the mobility commons comprises of the built infrastructures, the socioeconomic nodes of a community, and the connections between them.

Access to the mobility commons means access to the community. Denying members of the community open access to the mobility commons means shutting them out of the community. Creating a more neutral commons will generate a more connected community that allows the

autoless and those who would prefer not to drive the ability to get to work, shop for groceries, conduct transactions at the bank, attend church services, or visit a neighbor freely.

The positive externalities of neutral mobility are numerous. Community mobility is inherently a network good, and as such, livability improves as more community actors consume it. Concretely, decreasing reliance on cars not only empowers the autoless population, but promotes public health by facilitating walking and biking, decreases the amount of pollutants dumped into the environment, and could bring down the amount of fossil fuels that must be extracted and imported. The consequences of the status quo are staggering. Recent estimates of the number of short trips taken via pedestrian, bicycle, and public transit modes tally only 8% of all short trips, (Basset, Pucher, Buehler, Thompson, & Crouter, 2008) and on a monthly basis 400 pedestrians are killed by drivers (Padgett, 2009). Apart from cleaner air and water, a neutral mobility commons would literally save lives.

The language of common pool resources is appropriate here. Physical infrastructures are "partially nonrivalrous" (Frischmann, 2005b, p. 942). As an example, roadway capacity is usually nonrivalrous. A large number of automobiles can drive on the highway at one time without impacting each other's ability to utilize the network. However, congestion at peak demand – a state of rivalry – can occur, and does so during rush hour in most metropolitan areas. Indeed, it may be an inescapable consequence of economic development (Downs, 2004). The mobility commons is also partially nonrivalrous. Buses and subway cars face periodic crowding, but pedestrian overpasses or crosswalks rarely do. Irrespective of whether one deems mobility a rival, nonrival, or partially rival good, it is a common good. As Lessig (2001) wrote, "[w]hat determined 'the commons,' then, is not the simple test of rivalrousness. What has determined the commons is the *character of the resource* and how it *relates to the community*" (p. 21).

Later while discussing the ability of the free market to regulate CPRs, Lessig (2005) argued that"[i]f the NR-input is sufficiently generic, and it is an input into a sufficiently diverse range of goods, then the market will not regulate access to the good well" (p. 1035). In this case, mobility is generic; the mechanisms of roadway mobility can accommodate many different kinds of traffic: pedestrians, cyclists, rapid buses, private sedans, or commercial trucks. The outputs are diverse: business or leisure travel, jogging, commuting, and deliveries. As Lessig predicts, the market does a poor job of regulating mobility. The current system of management prioritizes automobiles. Their traffic dominates our roadways, and significantly limits the interconnectedness of auto-less citizens. The network is tiered, and interconnectedness suffers.

Currently the mobility network is governed by a number of players, each with individual interests that may not align with those of other actors. The demographic and geographic characteristics of a locality will determine its mobility commons and also the agents that jockey for influence over it. Areas with sizeable elderly populations might need to plan for a substantial number of citizens with limited driving ability because of failing eyesight or the onset of dementia. Communities with large numbers of children need safe routes to school. Moreover, the mobility commons of New York City, with its extensive public transportation bears little resemblance to small town in rural Iowa.

Nevertheless, though different constituencies might have more sway in a particular locality, managing mobility as a common pool resource means balancing the desires of multiple appropriators in a sustainable way, and thus the game of resource management includes comparable players. The brokers of the commons include elected and appointed policymakers, interest groups that represent business, environmental, industry, minority, or senior concerns, citizens and outsiders. The policy framework enables (or limits) the decisions they can make.

Appendix 1 depicts some of the key managers of the mobility commons at various levels and sketches some of their interests.

A more neutral network would surely benefit the community, and would include at least some of the following physical attributes:

- "Complete Streets" with bike lanes, trails, pedestrian crossing signals, and pedestrian over or underpasses (for an overview of complete streets see McCann, 2005).
- Safe transportation for pedestrians, who risk fatality in auto-pedestrian collisions (Loukaitou-Sideris, Liggett, & Sung, 2007) and safe routes to school for children.
- Robust public transportation options that provide service outside of traditional commuting hours, with late-night and weekend trips at the lowest fare possible. Equitable public transportation does not engage in "transit racism" and provides quality service with similarly equipped buses or trains and stops in all parts of the community (See Grengs, 2002, Grengs, 2004, or Bullard, Johnson, & Torres, 2004).
- Transportation options for the handicapped, through accessible curbs, buses and trains, and lifts (Audirac, 2008).

As stated previously, however, availability of transportation options is only a part of mobility. Interconnectedness requires geospatial planning. The populations of seniors and the disabled are growing (Smith, Rayer, & Smith, 2008), and any of these populations that live in the suburbs are likely disconnected from public transportation options which exist almost entirely in

the city. Also, planning solutions in communities that are distant from major urban centers may require a greater emphasis on bus rapid transit and park and ride facilities, for instance.

While many of the above recommendations resemble Smart Growth principles, that is an unintended consequence. In truth a variety of competing livability principles exist including New Urbanism, Eco-Cities, Urban Containment among others (Jabareen, 2006) and declaring one particular set of design principles as supreme is beyond the scope of this study. The critical point is that the current management regime of the mobility commons that vastly favors automobiles over every other conceivable mode of transportation is inequitable and creates a tiered structure.

Part Four – The Wilmington, Delaware Mobility Commons

Wilmington, Delaware provides a case example in identifying the mobility commons. Situated in northern Delaware, recent federal census estimates peg Wilmington's population at roughly 64,000, with 12.9% of the population 65 years or older. Wilmington reports a racial mix of 55.1% African-American and 39.7% White. Ethnically, 9.9% of residents report Hispanic or Latino ethnicity. Median household income stands at $38,708, and major employers operate in the sectors of education and health care (22%), retail (13%), professional, scientific, management and administrative positions (13%), and the financial industry (12%) (U.S. Census Bureau, 2000).

The Delaware Transit Corporation (DART) provides public transportation services, including fixed-route buses, commuter rail connections to Southeast Pennsylvania Transportation Authority (SEPTA), and on-demand paratransit (Delaware Transit Corporation, 2009).

The federally recognized municipal planning organization in the area is the Wilmington Area Metropolitan Planning Council (WILMPACO), which plans for the two-county region of New Castle County, Delaware, and Cecil County, Maryland. In addition to WILMAPCO, official

players in the Wilmington mobility commons include: the Wilmington Parking Authority, which operates an assortment of 11 parking lots and garages as a public authority (Wilmington Parking Authority, 2009), the Wilmington City Council, the New Castle County Council, state level actors such as the Delaware Department of Transportation (DelDOT), the state legislature, and federal level policy makers in the Congressional delegation and United States Department of Transportation.

A list of non-governmental agents that influence and mediate the Wilmington mobility commons would include auto commuters that travel to or through Wilmington, the freight traffic that connects the Port of Wilmington to transportation network, the public school population, the mobility-impaired, and many others.

This outline of the players in the Wilmington mobility commons is a brief sketch. A fuller picture would include detailed origin and destination data across modes of transportation, an exploration of the interplay between Wilmington and its suburban environment, more examination of the economic and geographic factors of Wilmington as a port city in the Northeast Corridor, as well as a thorough exploration of the power structures that play out in governance decisions. Finally, the analysis of the geo-spatial characteristics of the commons, and the spacing of commercial, residential, and community nodes here is superficial. However limited, this overview provides a basic glimpse of the community and allows for further consideration of the level of community interconnectedness.

WILMAPCO has undertaken to study the mobility commons in its two-county area and uncovered an uneven picture. The areas is home to significant concentrations of "transportation justice" (p. 6) – autoless, disabled, and senior – populations (Wilmington Area Planning Council [WILMAPCO], 2007). Some low income supermarkets were well served by transit options, but

many employment centers were not (WILMAPCO, 2009). Further, WILMPACO has identified several "environmental justice" communities – predominantly low-income and minority – that have been neglected by planners and policy makers. Though the transportation justice population is significantly more likely to walk, many poor and minority neighborhoods in Wilmington are not connected to maintained paths. Therefore this population must traverse crumbling sidewalks and intersections lacking crosswalks or pedestrian signals (Wilmington Area Planning Council, 2009).

Wilmington's elderly and disabled residents often rely on paratransit services, which offer door-to-door transportation for a $2 fare. In 2006 each paratransit trip in New Castle County cost DART $27, a noticeably high deficit (WILMPACO, 2007). The same study estimated the cost to DART of a traditional bus trip at $4, so moving more of these passengers to traditional buses would represent a significant reduction in overhead. WILMAPCO recognizes raising the level-of-service for DART as an opportunity to improve the livability of the region as a whole.

Notably, though these potential service quality investments might be targeted at transportation justice segments of the population, improved service would have the potential network effects of increasing all ridership. As the quality of DART improves, more people with mobility options might choose DART over private automobile traffic. This phenomenon could raise farebox revenue and elevate public transportation's influence over the mobility commons, thus resulting in even greater subsidies to spend on level-of-service variables.

WILMAPCO's efforts to identify and remedy breaks in the interconnectedness of the community are laudable, but above all, they illustrate a tiered network. The governing actors in the Wilmington mobility commons reflect the country at large and prioritize automobile traffic over all other appropriations of the mobility CPR. A philosophy of greater mobility neutrality would provide a significant quality of life enhancement for the transportation and environmental justice

populations as well as anyone who would prefer not to drive. A network neutral regime that nonprejudicially conveys all harmless data traffic along the network is worth considering.

Part Five – Final Remarks and Future Considerations

Having sketched the community mobility as a common pool resource and related that concept to the neutral system by which data traffic moves across the Internet, a consideration of the applicability of network neutrality is necessary. Lee and Wu (2009) raise the issue of generalizability directly and caution against hastily mandating neutrality in other networks through their discussion of the policy known as zero-pricing that prohibits network operators from charging content creators to reach their customer base,

> There is effectively no opportunity cost of subsidizing new content and lowering the barrier to entry, since no other content is not precluded from existing or reaching users. In contrast, in media networks such as radio or cable television, each station uses a fixed amount of bandwidth or spectrum [...]. Thus even if subsidizing content may be desirable, the scarcity of airtime, spectrum, or shelf space may very well render zero-pricing unappealing and undesirable in other industries (p.74).

Community mobility is not broadcast media, but neither is it packets of data sifting through the ether. The built infrastructures for pedestrians, cyclists, public transportation passengers, private vehicle drivers, and freight traffic and the quality of connection between those structures need not be exactly comparable to the nature of network traffic for net neutrality to be instructive. To reiterate, the question of whether a property is inherently public does not depend exclusively on the rivalrousness of the good – whether airtime or mobility. The key is how the good impacts the community. In any event, the best use of network neutrality may be to paint in stark relief

current mobility limitations and aid in the conceptualization of the governance decisions that would result in more equitable mobility. It is reasonable for influencers of the mobility commons to aim for policies that foster quality of life improvements in a manner comparable to the way that neutral management of the Internet has changed everyday life for billions around the world.

As a practical matter, devising a system of truly neutral mobility would likely be neither plausible nor desirable. Some amount of zoning to separate different built structures may be beneficial and implies at least some spatial mismatch between where people live, work, and carry out their daily activities, which in turn creates the challenge of equitably managing the mobility commons. Furthermore, there may be justifiable reasons to continue privileging autos over other appropriators – the current lack of alternative modes, for instance – however, creating a more just management system that offers safe alternatives to the community should be a priority.

A final consideration on the appropriateness of using network neutrality to inform the governance of the mobility commons is that it brings into focus the potential positive externalities that communities currently deny themselves. In the same way that the original architects of the Internet never foresaw the innovations that network neutrality would engender, it is plausible that there are not-yet-imagined uses of the mobility commons.

Conceptualizing community mobility as a common pool resource network that should be managed in a manner of nondiscrimination (or minimally less discrimination) raises at least as many questions as it purports to clarify. If assuming that true mobility neutrality is unwanted or unattainable, then a valid point of inquiry would be delineating minimum standards of mobility, and implicitly identifying the maximal usages by other appropriators. This demarcation would require the community to endorse auto privilege but determine its upper limit and consequently some higher minimal level of alternative mobility.

Returning to the example of Wilmington, Delaware, addressing the acknowledged limitations of the mobility commons sketch previously outlined by fleshing out the actors and gathering substantive data would be a necessary condition for more meaningful analysis. Only then might planners attempt experimentation between different design approaches – Neotraditional, Eco-City, etc – to see which results in the most equitable resource management paradigm would also be necessary. Another promising investigation might examine a case-study in the consequences of a non-neutral Internet, including recent instances of government censorship in China, France, and elsewhere (Goldsmith & Wu, 2006). Finally, other network goods like cable television, the telephone, or even postal mail prioritize traffic differently, and may prove useful models for mobility as a network good.

Apart from the abstract issues of using network management theory to drive mobility policy are the very concrete ways in which data networks are shaping mobility. Telecommuting, e-commerce, online traffic reports, and route planning websites are all impacting community mobility. Each of these phenomena is worthy of substantive exploration, as is a fundamental consideration of how technological innovations interact with the nuanced power dynamics embedded in all policymaking, and the extent to which technology amplifies or narrows power gaps between actors.

An altogether separate question is the cooperative action problem of achieving a more neutral mobility commons. The CPR management literature would likely be helpful here in formulating the decision making processes, resource appropriation rules, and consequences for rule violation. The question is not merely abstract; with the manifold variables of access and use and the stochastic nature of CPR capacity, devising the one management system that maximizes for ideal usage is exceedingly unlikely (Ostrom, 1999). Nevertheless, sustainable CPR management

systems are well documented (for example, see Wade, 1988). Each sprawling suburban development complicates the mobility CPR picture and makes creating a more just, neutral commons all the more difficult.

In closing, constructing a more neutral mobility commons will be no easy task, but the consequences of inaction are also substantial. The history of the Internet has demonstrated the abundance that a neutral network can bring, which may hold some guidance for the influencers of the mobility commons. The factors at play – power, opportunity, equity, entrenched policy, racial and class divisions – are daunting, yet the issues that a neutral management of the mobility CPR are worthy of further study.

Appendix 1: **Influencers of the Mobility Commons**

Organization:	Interests:	Mechanism of Influence:
Department of Transportation State or Federal	Maintenance of existing physical infrastructures, balancing appropriations between modes of transportation, promoting economic development, ensuring safe transportation, building out new starts.	Appropriations, Regulatory Authority
Planning Organizations MPOs, City or State Planning Departments	Providing for growth and development with Transportation Improvement Plans and Long Range Plans.	Advisory; planners create plans, elected officials choose to implement them.
Legislative bodies US Congress, State legislature, city and county elective bodies	Local economic development in district, satisfying constituent concerns about congestion and safety, reelection, etc	Appropriations through earmarks and Federal Transportation Bill, legislation governing safety, environmental health, etc.
Business Lobby (Chamber of Commerce, Homebuilders, etc)	Promote pro-business policies that favor sprawling new developments and private vehicle sales.	Campaign contributions, advertisements, and activism.
Environmental Lobby (Sierra Club, Friends of Earth Action, etc)	Promote sustainable development, increased public transportation utilization, protecting green space and wildlife habitat, clean air and water.	Campaign contributions, advertisements, and activism.
Other activists	May promote disability rights, senior citizen issues, racial disparities, etc	Campaign contributions, advertisements, and activism.
Community members	Safe, reliable, expedient transportation options, high levels of mobility, responsible stewardship of tax dollars.	Voting, citizen activism, campaign contributions, etc
Community nonmembers	Make use of mobility commons as visitors or by passing through. May value scenery or simply fast, direct routes.	Patronage of retail establishments or local sites.

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