

## **Chapter Six: Policy Hacking as a Discursive and Practical Bridge**

In late 2007 I am invited by Sascha Meinrath to attend a meeting in Washington DC, to discuss the future of municipal wireless. I'm not able to travel to the meeting, so I watch the videotaped proceedings on YouTube. I can see that most people in the room are wearing suits. I recognize some people I know from community wireless meetings – they are wearing suits too. Sascha introduces the theme of the conference, which is to discuss policy strategies for expanding both municipal wireless and the open spectrum where unlicensed devices like WiFi routers operate. The speakers at the meeting are familiar colleagues: CWN advocates, people working in organizations dedicated to creating more accessible media and communications, and scholars concerned with democratic media and communication rights. The event is sponsored by the Washington DC-based progressive think-tank the New America Foundation, where Sascha works as the Research Director of the Wireless Futures program. Suddenly all of this seems so serious and political: the suits, the conference room, and the opening speech by a sympathetic United States congressman. The congressman, the Pennsylvania Democrat Mike Doyle, says in his speech, “You have to remember that WiFi was a technology for connecting conference rooms. The fact that it has expanded to cover downtowns and entire communities is a triumph. The massive expansion of WiFi is a testament to the efforts of engineers. Now the task is to extend the benefits of unlicensed spectrum to other areas” (Feb 6, 2008).

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Watching the speech, I am struck by this new, mainstream politicization of WiFi, by the conceptual and technical distance that it has travelled, from being discussed by enthusiastic geeks in black t-shirts to inspiring serious suit-wearing policy wonks. I remember the 2007 Wireless Summit, and the discussion about hacking that ended with Rich McKinnon from Austin Wireless saying, “hackers like unfriendly spaces, so sometimes hackers in technology open a way for policy hackers” (Field Notes, May 20, 2007). Maybe Sascha, sitting next to the congressman in his suit, is still doing a kind of hacking, one that he had defined and experimented with ever since his grad student days when he “invited some geeks over to my apartment for some pizza and beer” (Sascha Meinrath, interview Feb 22, 2008). In transforming the practices of WiFi hacking, and moving its self-taught, grassroots experts into more influential spheres, maybe hacking could be transformed – even into something like “policy hacking.”

## **Introduction**

This chapter describes the expansion of the discourse and practice of hacking, defining “policy hacking” as a critical response to political or policy issues connected with community wireless networking. Describing the policy making actions of CWN actors as “hacking” reinforces what Turner (2006) and other STS scholars in communication studies refer to as bridging discourse: a ‘contact language’ between two previously unrelated fields that enhances their social significance. Like Turner, I argue that bridges can connect both discourses and practices: “policy hacking” brings together technical modifications of WiFi technology and interventions in policy and regulatory spheres, framing them in a new context of public interest advocacy directed at policy change. In this chapter I examine the emerging discourses and practices of “policy hacking” as it is

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connected with CWN. I first describe a conceptual framework and some possible genealogies for policy hacking, and then I examine how key CWN actors have bridged discourses and practices of hacking. WiFi's potential disruption of existing communication ownership and governance structures also contributes to a potential critical juncture for communications in North America. In the second part of the chapter I describe how the politicization of Network Neutrality as a media reform issue connects CWN geeks and media policy actors. Finally, I consider the response of CWN actors to the expansion of municipal WiFi projects in North America. This chapter concludes by describing the limits of CWN policy hacking.

### ***Methods***

This chapter, like the previous one, is based on participant observation of the 2006 National Summit for Community Wireless Networking in St. Charles, Missouri and the 2007 International Summit for Community Wireless Networking in Columbia, Maryland. It also draws on telephone interviews with CWN and media reform actors Josh Breitbart, Dharma Dailey, and Sascha Meinrath conducted in February 2008<sup>1</sup>.

### ***“Policy Hacking”***

The bridging discourse of “policy hacking” connects hacking and politics by expanding the activities that can be considered hacking. It aligns the creative development and modification of software code and hardware devices, with political advocacy, which more often involves writing texts directed at governmental employees or elected officials, making phone calls to gather knowledge or mobilize people, and organizing events. The idea of policy hacking suggests that in order to advocate for policy reform and policy in the public interest, current policy making structures should be transformed.

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This is a different kind of political framing for hacking than ‘hacktivism’, a term that refers to political actions undertaken online. Samuel (2004) defines hacktivism as "the nonviolent use of illegal or legally ambiguous digital tools in pursuit of political ends. These tools include web site defacements, redirects, denial-of-service attacks, information theft, web site parodies, virtual sit-ins, virtual sabotage, and software development" (n.p.). The development of community WiFi systems certainly involves software (and hardware) development in the pursuit of political and social ends, but as previous chapters have explored, these actions have been framed as disruptive or innovative rather than illegal or legally ambiguous. In addition, hacktivism as Samuel understands it appears to primarily act as a way of representing political ideas in the digital realm, rather than being part of a process of creating open communication structures using whatever tools (code, radios, legislation) are available. My concept of policy hacking considers hacking as a type of engagement with and modification of many types of constraining structures. Furthermore, none of the CWN participants I encountered ever referred to what they were doing as “hacktivism.” However, they did use the term ‘hacking’ to refer to advocacy pursuits that did not involve modifying devices, but which held the same purpose as “device hacking”: to critique, route around, or reconfigure structures that constrained liberty of expression or openness and accessibility.

### ***Policy Hacking as Sociotechnical Work***

This chapter completes my examination of 2000s computerization movements by analyzing how the discourses and practices of policy hacking form a bridge between CWN and the media reform movement, defining the participation of non-commercial,

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municipal and community WiFi advocates in the policy-making process. The chapter describes how community WiFi becomes politicized through its integration into the broader media reform movement, and how this movement in turn influences North American (especially U.S.) telecommunications policy changes. The previous chapter has explored how the CWN movement brought together geeks and social justice advocates who shared concerns about the structure and function of communication technologies. This chapter examines how a broader range of actors besides the geek-publics normally associated with hacking leverage its discourses and practices to highlight the importance of developing communications infrastructures in the public interest. These bridges between geeks and policy advocates more firmly establish the political influence of communication technology and suggest that CWN work, like other sites of social and technical co-production, is political. This in turn transforms previous perspectives, including STS perspectives that considered policy as merely a contextual framework within which sociotechnical change could occur.

In an example of this turn towards policy, Bijker (2002) calls for STS scholars not only to consider policy as context, but also to be aware of the political nature of their own work. He writes, “societal problems urge a broadening of the STS agenda. The big issues of social order, international peace, local and social security, national and religious identity, and democracy should be addressed again” (p. 4). This appeal for the politicization of research has also occurred in communication studies, with the U.S. Social Science Research Council establishing a program funded by the Ford Foundation called Necessary Knowledge for a Democratic Public Sphere, “premised on the belief that

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advancing public-interest agendas requires not just the scaling up of political activity, but also a more robust and better-integrated process of knowledge production in and around issues of media, communications policy, and the public sphere” (Social Science Research Council 2007). This chapter addresses not only the co-production of WiFi’s social and technical influence, but also the emerging coproduction of knowledge through research and activism. This co-production of knowledge by academics, policy advocates, and geeks may be one of the most powerful and enduring results of CWN engagement.

Like other actors, policy makers play important roles in defining the symbolic and institutional contexts for new technology. Further, policy is co-produced along with the technology it regulates. Dutton’s (1999; 2006) ecology of games framework not only treats policy-makers as actors, but also acknowledges that they play competing and overlapping roles; thus, policy is the result of the negotiations not just between policy makers and other socio-technical actors, but also between the different roles that individual policy makers play. Understanding policy as being produced along with new technological developments expands the range of actors who can be considered policy actors. Proulx (2007) defines grassroots technology developers as potential policy advocates, and argues that the social appropriation of technology, which requires technical and cognitive mastery over a technology, can lead to new and politically progressive mediations of technologies. These mediations sometimes contribute to the politicization of these new forms, giving voice to their developers in the process.

Therefore, the process of technology production is also a process of political and social engagement. “Policy hacking” is a simultaneous engagement with social and technical

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aspects of media and communications. In keeping with Dutton and Proulx, I advocate for a consideration of policy not as an external force creating the context for the development of technology and social forms, but as an intrinsic part of this development. To this end I focus in this chapter on the bridging of discourses, practice, and expertise from CWN into policy spheres, using “policy hacking” as the organizing concept<sup>ii</sup> and focusing on the influence of media reform at what McChesney (2007) argues is a critical juncture for media, policy, and communications technology.

### ***Hacking as Critique of Existing Structures***

Politicizing technology by hacking devices or policies reaffirms the role of hacking as a critique of existing structures. This interpretation of hacking highlights its critical and resistant potential rather than its destructive or subversive nature. Computerization movements since the 1970s have contained this element of critique, but until the 1990s internet boom era, hacking was restrained to a small group of experts (Levy 1984; Markoff 2005). However, the expansion of open-source software development (Moody 2002) and the interweaving of geek expertise into media-oriented new social movements such as IndyMedia (as discussed in Chapter 5) publicized hacking and began to frame it as a potentially politicized activity associated with media-related new social movements including, as I discuss below, the media reform movement. The early 2000s present a critical juncture for media and communications where policy hacking becomes even more important as an intervention in technology, regulation, and media production and distribution. Thinking about public interest policy advocacy as a form of hacking extends its criticism and resistance into a new realm of discourse and practice. It also provides a new kind of identity and expertise to public interest policy advocates: the identity of a

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hacker confers the credibility of a technical expert and an activist, as well as being associated with creativity and resistance to authority.

The rest of this chapter describes how CWN discourse, practice, and expertise create bridges with the media reform movement and engage with the municipal wireless boom. After describing the contributions that CWN discourses and practices have made in media reform and municipal wireless, the chapter then explores one specific site of ‘policy hacking’ and analyses its influence on media reform and municipal wireless. This site is the foundation of a non-profit consultancy called The Ethos Group, which grew out of CWN activism, connecting some of the people who had been most active in framing and discussing the policy relevance of community wireless networking in North America. These people developed their knowledge of WiFi hacking by working with CWN geeks and participating in the network forums of the Summits, and their association through the consultancy creates an intermediate institutional space between grassroots activists including geeks working on local CWN projects, and policy decision-makers.

The chapter’s final example of bridging describes a CWN intervention in the Requests for Information (RFI) process for the municipal WiFi project developed in Boston, Massachusetts. The chapter concludes with an assessment of the limitations of hacking in the context of institutional changes for WiFi at the current critical juncture. These limitations are related to scale: no matter how well organized CWN advocates become, nor how well connected to other public interest advocates, they can not compete directly with telecommunications companies, as the example of the radio spectrum auctions that

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University took place in the United States in late 2007<sup>iii</sup> indicates. Because CWN's influence in policy spheres has resulted from its bridges with the media reform movement, I begin the chapter with a discussion of democratic media reform and its importance at the current critical juncture.

## **Media Reform**

The media reform movement, or “democratic media reform” has been defined as a social and political mobilization dedicated to addressing the “massive democratic deficit in the field of public communication. Hackett and Carroll (2006) describe the movement as a type of new social movement linking broad criticism of existing, hegemonic media institutions with grassroots engagement oriented towards ameliorating the public sphere through the creation of counter-hegemonic media and sensibilities, establishing the function and importance of alternative and community media. They describe eight main themes of concern:

- the media's increasing failure to help constitute a democratic public sphere;
- the centralization of political, civic, and symbolic power inherent in the political economy of commercial media industries, in the era of ‘convergence’;
- the reinforcement of gender, ethnic and especially class inequality resulting from the commodification of information, the dependence on advertising revenue, and other economic as well as ideological mechanisms;
- the relative homogenization of the potential diversity of publicly articulated discourses;
- the media's subversion of a healthy political culture and a sense of community, at local, national and global levels, through such imperatives as fragmentation, ethnocentrism, and consumerism;
- the transformation of the public commons of knowledge into a private enclosure of corporate-controlled commodities, notably through the expansion of ‘intellectual property rights’;
- the elitist and often secretive process of communication policy-making in the US and UK<sup>iv</sup>;
- the erosion of privacy and free expression rights since the 9/11 terror attacks, particularly in cyberspace. (p. 3-4)

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By engaging with these themes, the media reform movement attempts to construct a new paradigm and public interest policy regime for public communications. McChesney (2007) argues that media and communication systems in North America is at a critical juncture, because of the increasingly undemocratic nature of mass media – which is converged in ownership and limited in content – and the unfolding and often vexatious debates about how to regulate the internet. The political consequences of unpopular military conflicts and the failure of conventional media to criticize government also contribute to this critical juncture, which is intensified by consolidation of media ownership and an evisceration of quality, investigative journalism. McChesney (2007) also argues that the current ownership, regulatory, and technological context places communications at a critical juncture because of three factors: a revolutionary new communications technology (distributed digital media); a discreditation of existing media content; and a major political crisis where the existing order fails and oppositional social movements form. This argument establishes media and communications as central issues of concern for democratic life at the current critical juncture.

As this chapter explores, a key aspect of this critical juncture is that communication infrastructures are increasingly integrated with content providers and within large organizations. For example, in Canada Bell Canada Enterprises owns a broad swath of the communications landscape, from mobile telephony, television, and newspapers in many markets. Not only does this situation produce greater profits for these companies, it can also limit the diversity of the media content available in each individual market. Where local newspapers once carried critical and well-researched local news,

consolidation of media markets has limited this local influence by centralizing newsrooms and media production. As alternatives, local community and broader “alternative media” outlets such as IndyMedia, political websites like TakingITGlobal (not to mention local community-run radio stations) promise the diffusion of more diverse voices in the media. The promise of Île Sans Fil’s leverage of WiFi as a community media tool draws on this aspect of the media environment’s critical juncture.

Media’s critical juncture also extends to the level of infrastructure. As cable and telephone companies control more of the backhaul infrastructure that allows people to connect to the internet, they have an increased ability to control how traffic is transferred across those sections of the network. Local networks including WiFi networks provide potential means of routing around this consolidation. WiFi networks also potentially create a platform for community media, since they are accessible to a wide variety of devices without charging fees for connection. However, as the developers of these local networks begin to be involved in broader CWN mobilizations, and share knowledge with people involved in policy formation, democratic engagement increases as more people become involved in the policy making process. Therefore, the expansion of CWN has the potential to provide several new paths for communication policy at this critical juncture.

As Napoli (2006) argues, media and communications policy research is reflecting media reform practice by studying a much broader range of subjects including how media and communications systems are defined, built, and used, as well as the process of media

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University activism. This parallels the bridging efforts that bring together the discourses and practices of geeks and media justice advocates. Similarly, Kidd and Barker-Plummer (2006) argue that linkages are emerging between media reform, alternative and independent media, and the social movement sector. They argue that these linkages can create alternative public spheres that change the nature of media as well as media institutions. The linkages between people with different sets of experiences and a shared commitment to the public good can create alternative public spheres where new policy orientations form.

The media reform movement has an obvious resonance with computerization movements (particularly the critical counter-computerization movements that proposed alternatives to military-industrial structures) through its critique of the hegemonic nature of the existing media system and the encouragement of alternative institutions and structures. However, there is one key difference between the two: computerization movements, even when they are highly critical of the hegemonic nature of the computerization industry, still struggle with the challenge of making computing more accessible and less linked to technocratic dominance. In this context, discourses and practices developed in the more technically-oriented, specialized space of the CWN Summits are reoriented towards openness, justice, and accessibility as they bridge towards media reform's response to the current critical juncture.

### **Expanding Hacking**

As I discussed in Chapter 5, the CWN movement itself is not always explicitly politicized or policy-oriented, although its members (in spite of the tensions between their politics)

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are brought together by a sense that they are working for the greater public good.

Moving from this politically agnostic perspective towards one where politically motivated policy changes are part of the agenda involves a further bridging of discourses and practices. Many participants in local CWNs are volunteers primarily concerned with keeping their networks functional, accumulating enough funding to continue their work, and making their projects relevant to their local communities. Meinrath describes the difficulties of mobilizing CWN participants to contribute to policy reform: “for the most part people have not played active roles in the policy sphere and it’s difficult to get people active. The most we see is people sign on to commentary on a proposed bill or something. I certainly don’t blame anyone, when you are talking about groups that are all volunteer and have many other responsibilities” (Interview Feb 22, 2008).

I argue that CWN projects have impacted telecommunications policy in important ways. First, the WiFi hacking described in Chapters Three and Five has altered expectations about WiFi’s potential uses, expanding the types of organizations who build and managed communication networks. For example, ISF’s evocation of the community-public through the development of its WiFiDog hotspots as sites for community media has reframed how WiFi is understood and used in Montreal. Among other things, it suggests that grassroots community development and management might form an appropriate organizational structure for WiFi – much as the development of Fredericton’s communication infrastructures suggests that municipal ownership is appropriate there. Second, this hacking became integrated with a second set of discourses and practices that enrolled WiFi activism into a wider set of concerns framing the expansion of

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participation and expertise in technology as a means of creating greater social and political justice. For example, the CWN “movement” suggests that social justice advocates could develop WiFi networks along with the geeks. This bridging brings the discourses and practices of hacking – often associated with a perspective of WiFi as a disruptive technology and with a libertarian political ideology – into a context that politicizes WiFi technology as part of a broader movement towards more ubiquity and accessibility of communications. The first example of bridging is the representation of network neutrality as a political issue, especially in the context of media reform.

### ***Net Neutrality – From a Technical Issue to a Civil Rights Question***

Net neutrality (or, “open internet”) provides a good example of how the politicization of technology that emerged in the CWN movement has transferred to a broader context with specific relevance to the social justice concerns of media reform. As discussions of network neutrality have shifted away from describing technical principles to describing neutrality as a political goal, its meaning has changed. In this chapter I use “network neutrality” to describe the principle of neutral network design, an original feature of the internet’s design based on non-discrimination in packet switching, and “Net Neutrality” (with capitals) to refer to the policy goal. In technical terms, network neutrality refers to the principle that packets are not prioritized based on their origin, destination, or content. The principle emerged from the design of the internet, a “dumb” network where packets follow the fastest route from origin to destination, rather than being controlled by network switches along its path. Such a ‘neutral’ network does not distinguish between packets originating from a video and packets originating from an e-mail. When most internet traffic moved over telephone lines, the principles of common carriage that had

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University regulated communications since the age of canal shipping applied: no operator could prioritize or impede the transfer of information regardless of its origin, destination, or content. This neutrality became a structural feature of the internet (Barratt and Shade 2007; Sandvig 2006) and arguably facilitated the participation of its users in its development, since the network's structure did not differentiate between different types of content, meaning that individuals' blogs load as fast as mass-media outlets' web pages.

The classic definition of network neutrality, as Wu (2003) argues, is a design principle based on non-discrimination of network traffic: no carrier should discriminate against any type of content delivered over the network. In 2003, Wu argued that this non-discrimination principle would better preserve the architecture of the internet in an age of vertical integration between internet service providers and cable companies, rather than a market-based "open access regime" where everyone is free to choose internet service providers, since consolidation could reduce the economic interest in maintaining neutrality. Further, neutrality should definitely apply to public networks.

*Politicizing Net Neutrality: WiFi wants to be free*

As a standard, WiFi has historically been open: the 802.11 standards provide interoperability between a variety of devices. Furthermore, since WiFi devices use unlicensed or license-exempt radio spectrum, they do not need to be closed to protect a specific privately owned resource. Schmidt and Townsend (2003) evoke this by claiming that WiFi "wants to be free": "It is the expert opinion of the authors that the popularity of open wireless networks is a combination of open standards and the benefits of mass-production and interoperability they bring, and the intrinsic value that a wireless 'cloud'

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University brings to the place in which it is located" (p.49). However, while they were initially structured as ad-hoc networks where anyone with a WiFi modem could participate, these early efforts proved more useful at demonstrating how many geeks with WiFi routers lived in a given area than providing robust and useful networks (see Priest 2004 for a description of this phenomenon in London, UK). Now some CWNs including ISF receive tens of thousands of connections. These large networks require management. Structural choices made by the developers of CWN networks have not always followed the most technically open path, especially as the size of networks has scaled up. Therefore, practical and ideological tradeoffs mark the efforts to construct open systems using WiFi networks.

Conversely, a politicized concept of Net Neutrality provide a technical frame of reference for media democracy issues such as equality of access and the right to communicate. This interpretation of Net Neutrality operates as a bridge between geeks dedicated to open systems and social justice advocates and media reformers interested in promoting more democratic access to the means of communication. The ideal of network neutrality's equality of access and non-prioritization based on content resonated with geek interest in maintaining open technical structures as well as with social justice principles of fairer access to communications.

#### *Network Neutrality paradigms in research and advocacy*

Two paradigms characterize research and advocacy discourse about network neutrality: the first considers the internet's information transfer as a type of basic transport network that should be regulated in the public interest. Sandvig's 2006 article "Network

Neutrality is the new common carriage” represents this point of view, which is shared by Wu (2003). The other paradigm is that telecommunications operators should be allowed to charge people using their networks to transfer data commensurate with the amount or type of that data. Under this paradigm, downloading large files, for example, would cost more than sending text-based e-mails. The polemical split between these two perspectives illustrates how technical structures can become politicized.

These two perspectives were broadly debated in a series of venues including the 2006 Telecommunications Policy Research Conference<sup>v</sup>, where McTaggart (2006) of Telus Corporation, a Canadian ISP, argued for providers’ rights to charge for transfer of information, and scholar Frieden (2006) referred to regulation favouring net neutrality as “bias.” Some economic analyses attempt to rationalize the consequences of choices between paradigms. For example Aronson et al (2006) argue in favour of allowing providers to choose whether they offer customers a neutral or non-neutral service while Lehr et al (2006) create various scenarios for a “Network Neutrality arms race” where “even in the absence of network neutrality regulation, end-users (and upstream providers) have a range of technical and market-based strategies for responding to discrimination” (p. 1). From a public interest perspective, Meinrath and Pickard (2006) identify concerns about neutrality and regulation as being fundamentally questions about internet freedom, outlining ten guidelines for a “new network neutrality” intended to transcend the debates about regulation and refocus them on questions of free and open access.

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In 2007, the *International Journal of Communication* published a special issue on network neutrality, including fifteen articles discussing legal, economic, and regulatory details. In their editorial comments Peha et al (2007) note that “further discussion and research is required before broad consensus will be possible. An immediate barrier to progress is the lack of a consistent definition of network neutrality among these papers, which demonstrates both the scope of the issues included and the lack of consensus as to which problems/potential solutions are most important/likely to be effective.” (p.711). The papers generally agreed that extreme forms of network neutrality regulation would probably be counterproductive. Otherwise, expert assessments of network neutrality as a design principle contrast with the politicized perspectives of Net Neutrality advocacy work, which bridges the concepts of the common carriage established by previous generations of communication infrastructure like the telephone, with public interest perspectives dedicated to expanding access to communications infrastructure.

### *Negotiating Neutrality in Principle and Practice*

In practice as well as in theory, different interpretations of neutrality must be balanced.

As I have already explained, community and municipal wireless networks generally employ one or a combination of network models: 1) WiFi hotspots connected to backhaul bandwidth provided by sympathetic individuals or organizations and which broadcast WiFi signals to an area of 100 to 300m; 2) Hub-and-spoke systems where a single high-powered antenna can broadcast a signal from, for example, a hill to the homes of the valley below; and 3) a dynamic mesh where individual nodes act as both receivers and relays for WiFi signals. A dynamic mesh network is self-healing, and makes it

possible to share one internet connection among many users who are not necessarily all in proximity to a tower.

Of the architectural choices available to CWN, the distributed mesh network form is perceived to provide the highest level of openness, because the entire network is constructed non-hierarchically<sup>vi</sup>. Beyond deciding on the basic network architecture, network operators must decide whether to leave the network open, or whether to authenticate – track – who uses it. This is the purpose of “gateway software” like NoCatAuth (discussed by Sandvig, 2004) and WiFiDog (discussed by Powell and Shade 2006), which provide opening splash pages that indicate to people that they must register to use the network.

However, even without gateway software to provide a visual indication of authentication, the RADIUS protocol (Remote Authentication Dial In User Service) is built into any WiFi network – hotspot, mesh, or Voice over IP – that authenticates its users. The protocol manages remote authentication so that each device (wireless router, for example) does not have to authenticate each person it connects to the network. Even though it is primarily a way of authenticating who is allowed access to the network, the protocol also makes it possible to track individual users of the network. The RADIUS protocol is standard on WiFi networks like ISF’s and Fredericton’s that have a central point of management such as a central server. To provide some ability to track abuse, or even to produce statistics, such centralized management is important or even essential for CWNs. However, the necessity for this management suggests that the perfectly open, neutral

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University network<sup>vii</sup>, where open, free bandwidth is available to all, anonymously is much more of an ideal than a practical model.

Unlike the mythical wireless commons evoked by Schmidt and Townsend (2003), bandwidth on a RADIUS-controlled, centralized WiFi network is not a boundless resource. In a mesh network, the greater the number of nodes, the more robust the network, since each node opens an alternate route for information to travel. Centralized networks, however, experience declines in performance when more users are added. This means that people using more than a “fair share” of bandwidth decrease the performance of the network for all. Network managers, including the network managers at ISF, employ “traffic shaping” that limits the transfer of some kinds of data and prioritize others, or blocks the communication ports that are used to send spam, as do the Fred-eZone’s operators.

Considering these real-life constraints, network designers, even of CWNs, approach network neutrality as a principle rather than a prescription for network design. In contrast to industry-based experts who use the argument that “the Internet was never neutral” to advance the right of ISPs to control or censor content (McTaggart 2006) network designers of CWN networks (and the Fred-eZone network as well) describe network management as a balance between mitigating the problematic actions of a few people, and protecting the common good. For example, ISF volunteers decided to employ traffic shaping because they felt it was important to create a middle ground between universally rejecting certain types of traffic and allowing unlimited use of

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bandwidth that might raise costs for their hotspot hosts. After a hotspot on the ISF network was overwhelmed by one person using too much bandwidth, more powerful traffic shaping tools were used to limit the overall amount of bandwidth available to each individual user. Still, other volunteers view the use of traffic shaping as an ideological failure, admitting with embarrassment that the ISF network is not completely neutral (Field Notes March 2007). Regardless of whether it can be achieved in practice, network neutrality remains discursively important as a technical manifestation of the principles of openness so valuable in the geek conception of liberty. However, it accumulates a new political importance when it is bridged from the more hands-on technically expert context of CWN and into the politically mobilized media reform movement.

### *Bridging Net Neutrality into Media Reform*

Among media reformers, the politicized concept of ‘Net Neutrality’<sup>viii</sup> became a catch-all term for the political aspects of internet structures and capacities. Introduced and developed by CWN advocates also involved in democratic media reform, “Net Neutrality” provided a way of describing the potential political impact of technical structures and protocols that were regulated by rapidly changing telecommunication policies. The following section describes how discourses about Net Neutrality as a policy issue (rather than the design principle of network neutrality) created a point of contact between CWN and the primarily U.S.-based media reform movement.

The 2007 National Media Reform Conference (NMRC) in Memphis Tennessee, a North American but primarily U.S.-based meeting, organized by Free Press<sup>ix</sup>, assembled over three thousand people to discuss issues of public interest communications ranging from

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minority ownership of media outlets to political organizing using blogs. This was the third such event. Within the conference, CWN advocates discussed the impact of CWNs on communication policy. A panel featuring Harold Feld, a legal advocate for the Media Action foundation, Sascha Meinrath – at the time working as a policy consultant at Free Press, Michael Maranda of CTCNet, a community networking organization, Dharma Dailey of Ethos Wireless and Michael Lewis of Wireless Harlem argued that CWN projects inspired three public interest perspectives on local networks. These included “digital inclusion” (or an expansion of network access to more people, along with training programs); pervasive connectivity (internet connectivity everywhere); and the preservation of “Net Neutrality.” As frameworks for politicizing technology, the first two of these perspectives reiterate the established public interest argument that increased access and ubiquity for communications networks serves the public good. However, the third perspective argues that more accessible technical structures and protocols would also be in the public interest. In essence, this third perspective politicizes the structure and function of networks as communication infrastructures. Whereas the public interest perspective of digital inclusion concentrates on providing training and education to people who will also receive the benefits of pervasive connectivity – a perspective in line with the ubiquitous network perspective I described in the last chapter - securing Net Neutrality as a public interest goal focuses not only on the benefits of internet connectivity, but on the political significance of its design and technical structure.

While the discussion introduced by this panel focused on harnessing the technical potential of WiFi technology in order to design open networks, the rest of the media

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reform movement framed the internet – like other forms of media – as under threat from large corporations and power-hungry telecom and broadcasting lobbyists. At the 2007 NMRC, community wireless networking and Net Neutrality were discussed in three panels, one each in the Media Policy track (“The Growth of Wireless Internet: From community to municipal to corporate”), the Independent Media track (“Owning Our Own Media Infrastructure”), and the Media, Civil Rights and Social Justice track (“Bridging the Digital Divide”). Net Neutrality was also mentioned in the keynote speeches at the conference, which even featured a “Save the Internet” party where music videos and invited speakers encouraged participants to join the “Save the Internet” coalition, explained below. Net Neutrality was compared to the civil rights movement in terms of its potential to inspire democratic participation and equal representation in media. The NMRC established the concept of an “open internet” as a rallying point for democratic media advocates. However, the political framing of “Net Neutrality” conflates the technical compromises required to negotiate neutrality as a network design principle with public interest arguments for increased access to and control of communication media and infrastructure. It also brings together strange bedfellows.

### *Saving the Internet – Net Neutrality as Political*

The Save the Internet campaign, funded by Free Press, MoveOn.org and the SavetheInternet.com coalition framed Net Neutrality as one of the most pressing public interest issues of 2006. During that year, the U.S. Congress voted on several bills that defined the ability of telecommunication operators to control the transfer of information over their networks. Organizing through local and national coalitions supported by Free

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University Press, as well as through the online advocacy program MoveOn.org, a petition signed by 1.3 million people was delivered to Congress, along with 50,000 phone calls to Congressional representatives (Free Press 2006). As the diversity of the literature discussing network neutrality suggests, the Net Neutrality coalition was composed of strange bedfellows: charter members include trade union Teamsters, the American Civil Liberties Association, P2PNet, and numerous local and regional community networking organizations. Like the CWN movement, this coalition focused members with competing ideologies on the single shared goal of changing regulatory legislation. This bipartisan and cross-ideological pressure led to a variety of bills appearing in the U.S. Congress in 2006 and 2007, many of them supporting principles of network neutrality (Wyden 2006).

In Canada, organizing to represent Net Neutrality as a public interest policy issue has so far attracted less attention. Canadian advocates have mobilized through a coalition similar to Free Press, the Campaign for Democratic Media (Campaign for Democratic Media 2007), which focuses on opposing consolidation of media ownership and foreign ownership of Canadian media, but which also provides information on network management and neutrality. Partly, media consolidation itself limits the ability of Canadian media reform advocates to lobby for Net Neutrality as a political issue: Canadian media consolidation has been paralleled by consolidation of its internet service providers, who are often owned by the same large media conglomerates – Bell Canada and Rogers Communication. These two companies own the majority of the country's television and radio stations. Therefore, the “Fight Big Media” campaign attracts more

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Canadian attention and action than neutrality issues, which are perceived as being more technical, although a major mobilization called Save our Net began in aimed at influencing legislation. This mobilization has included public events including a rally on Parliament Hill in Ottawa. Despite these mobilizations, the small number of political allies for Canadian media reformers and the consolidated ownership of telecommunications and media companies in Canada have perhaps limited public interest involvement in Canadian telecommunication policy reform (Longford and Shade 2007).

Some new intermediary institutions are beginning to evolve in Canada. In 2006 Leslie Shade and Marita Moll convened an Alternative Telecommunications Policy Forum (the Alt. Telecom Forum) in response to the 2006 Telecommunications Policy Review Panel (TPRP) proceedings, which had been dominated by industry and commercial representatives. The recommendations of the TPRP included passing a network neutrality provision, thus securing in law the technical openness of networks. However, the TPRP failed to recommend any type of regulation for the internet or digital communications in Canada, instead arguing that Canada's telecommunications regulation should depend primarily on market forces (Telecommunications Policy Review Panel 2006)

The Alt. Telecom Forum was an effort at creating the kind of broad citizen and community based coalition that emerged around Net Neutrality in the U.S. and bridged technical and economic questions about network structures into public interest questions of equal access to communications. It convened academics, policy advocates and

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members of community networking organizations including Mike Richard from Fredericton and Michael Lenczner from ISF. Ben Scott, the policy director from Free Press, and Sascha Meinrath also attended. The Alt.Telecom Forum participants drafted a proposal for a Canadian government guideline on network neutrality: "network operators shall not discriminate against content, applications, or services on broadband Internet services based on their source or ownership" and called for amending references to market forces to account for situations in which market forces fail (Alternative Telecommunications Policy Forum 2006).

Despite this mobilization and the increasing interest in the Save the Net campaign, Net Neutrality legislation continues to be contested in both the United States and Canada. In September 2007 the United States Department of Justice submitted a statement to the FCC disagreeing with Net Neutrality and saying that they would "support . . . a system that would allow Internet service providers to provide quicker download times or site access for those willing to pay for it" (United States Department of Justice 2007). In November 2007 Free Press and MoveOn.org reported that Internet Service Provider Comcast was blocking BitTorrent, the popular file-sharing application that is also throttled over the Fred-eZone network and by Rogers Communications. The U.S. FCC is investigating, but determining the level of government oversight of network management is difficult, and heavily influenced by the incumbent telecommunication lobby.

In Canada, where ISP Telus blocked its subscribers from accessing pro-union websites during a labour dispute, the government seems uninterested in regulation of any kind,

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University continuing to rely on the discourse of “market forces” (Longford 2007a). In addition to ignoring Telus’ site blocking, Canadian regulators including the Canadian Radio-Telecommunications Commission, Industry Canada and the Competition Bureau took no action whatsoever when Rogers Communication reported in an industry meeting that it limited the rates of peer to peer (p2p) internet traffic, and Bell Canada has confirmed that it will fully throttle p2p services by early April 2008, despite the fact that the Canadian Broadcasting Corporation uses p2p service BitTorrent to distribute its content (Geist 2008). Geist claims that Canada is already in a “slow lane” with respect to mobilizing political debates about Net Neutrality and other telecommunications policy issues, although the introduction of a private members’ bill by the New Democratic Party representative Charlie Angus in Spring 2008 may succeed in creating a regulatory framework for these issues in Canada. In addition, CRTC chairman Konrad von Finklestein recently called for a hearing on Net Neutrality in Canada, which may effectively reopen the debate.

As the technical challenges of network management indicate, network neutrality is primarily a principle, rather than a prescription. However, the bridging of Net Neutrality as a political issue from CWN and into media reform conflates the technical potential of creating open networks with the political aims of creating more open systems of communication. In the broader political arena, some of the issues that geek designers of CWN networks negotiate from a more technical perspective are recast by a diverse group of advocates seeking to convince governments to regulate communications in the public interest. This establishes a political slant to the technical negotiations of the principle of

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neutrality, creating a movement towards “Net Neutrality,” which became politicized in the U.S. and Canada. In the U.S. context, media reform actors who gained experience from direct involvement with CWN groups helped to establish Net Neutrality as a central media reform issue. In Canada, where CWN projects have been more oriented towards community media applications and less towards policy changes, the same momentum is still developing.

In the following section, I describe how the municipal WiFi industry, like the political mobilizations that transformed principles of network neutrality into the more politicized Net Neutrality, also resulted from bridging discourses and practices from technically skilled participants to policy advocates. I focus primarily on the United States context<sup>x</sup>.

### ***Muni WiFi***

Political action over issues like network neutrality resulted from bridges built between CWN and the media reform movement. Similarly, the boom in municipal wireless was influenced by CWN innovations in technology and organization. In 2006, WiFi became framed as the technology of the moment for municipal governments creating broad-scale networks (Lehr, Sirbu, and Gillett 2006), particularly in the United States. This can be interpreted as indicating the extent and the limitations of CWN’s influence on the structure and organization of communications. On one hand, the municipal WiFi bubble drew from the success of community WiFi actors in developing functioning technologies: not only did these projects provide proof-of-concept for WiFi development companies, they also often released their open-source software to be freely reused. Île Sans Fil’s WiFiDog served as a captive portal for small municipal WiFi projects including the

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CapeWiFi project in Cape Cod, Massachusetts, and CuWiN's experiments with mesh routing protocols established the feasibility of this network form for broader-scale applications<sup>xi</sup>. On the other hand, the organizational structures and culture of grassroots experimentation and knowledge exchange that had evolved along with community WiFi technologies was decidedly not part of the first explosion of municipal WiFi projects, which were put forward by corporate consultancies and telecommunications companies.

Regulatory changes, especially in the U.S., opened up municipal networking as a potentially lucrative new industry. After the Supreme Court ruled that telecommunications companies were not required to let third-party providers sell service from their leased lines (Supreme Court of the United States 2005), any U.S. ISP delivering information services had to own its own infrastructure<sup>xii</sup>. For ISPs like Earthlink, whose business model was based on re-selling internet service it leased from other companies, becoming a municipal WiFi provider created an opportunity to own infrastructure and thus to stay in business. Further, other state and national policy shifts meant that cities took on more responsibilities for service provision (Strover and Mun 2006) as United States government legislation that prevented cities from owning telecommunications companies began to change. As well, the representation of WiFi by CWN and media justice advocates as a cheap and flexible way to provide broadband connectivity emerged as the United States slid in the Organization for Economic Cooperation and Development (OECD) international broadband connectivity rankings (Organization for Economic Cooperation and Development 2007), from 4<sup>th</sup> in 2001 to 12<sup>th</sup> in 2006, behind the Nordic countries, Korean, Canada, France, Belgium, and

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Luxembourg, among others. This slide in international rankings focused attention on the poor broadband connectivity in many parts of the United States.

Since the United States, unlike Canada, never developed a national broadband or connectivity policy like those discussed above, many cities and isolated areas were left without a means of guaranteeing affordable access to communications infrastructure.

WiFi came to be represented as the magic bullet – and if it was not yet perfectly technically sound, community-based WiFi projects had demonstrated what the industry saw as “proof-of-concept” networks. However, the development of the municipal WiFi industry, as much as it drew from some of the CWN ‘hacks’ and the representation of WiFi as a tool for social justice through expanded connectivity and local ownership, developed in a different direction.

### *Ubiquity? Accessibility? Responding to the Muni WiFi Boom*

The rapid expansion of municipal wireless projects in 2006 featured corporate WiFi providers proposing fairly similar public-private partnership models to municipalities: in all, over 350 new projects launched in the United States that year, according to Tapia and Ortiz (2006). In Canada, Toronto Hydro Telecom’s wireless OneZone also launched in the same year. Most of the U.S. projects were large-scale connectivity projects that focused on “secondary” outdoor access that was not meant to cover inside buildings nor to provide adequate quality of service to be used as a primary internet connection (Middleton, Longford, and Clement 2006). Others attempted to boost WiFi signals using high-powered antennas to create home service delivered to customers. These were often very wide-scale projects that used proprietary equipment, some of which home users

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were required to purchase. Many public-private partnership models depend on municipal governments to provide financing up-front, along with access to infrastructure, and base their business models on fees from consumer access, advertising, or anchor tenants like universities or municipal utilities.

Potter (2007) outlines eight possible business models for local networks: public utility, non-profit, publicly owned/privately operated, consortium, public-private or franchise, subscriber-based, ad-based, or ownerless<sup>xiii</sup>. Regardless of this potential diversity of ownership and governance models, many of the municipal wireless projects announced in 2006 were either public-private partnership or franchise models that depended on municipal government financing or anchor tenancy, and directed revenues to the companies developing them, often through exclusive contracts. The bidding process for municipal contracts favoured large companies since owning communications infrastructure was illegal, organizationally difficult, or too expensive for most municipalities. This was a far cry from the community owned and developed infrastructure advocated by CWN and media reform actors.

Initially, municipal WiFi projects drew on the discourse of greater accessibility to communications. Tapia and Ortiz (2008) describe how the discourses of requests for proposals and other official documents included claims that WiFi would improve business and reduce poverty. However, most final project proposals submitted by ISPs like Earthlink, MetroFi, and Clearwire designed public-private partnerships that would allow companies to lease or gain access to municipal infrastructure like light posts while

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University according to their ownership of the WiFi network itself – including the right to charge market price for access to the network. Many municipal WiFi plans also included franchise fees similar to those developed in the cable television industry. The profits from these franchise fees were meant to fund public interest projects through funds called Community Benefits Agreements (Digital Inclusion Coalition 2006).

### *The Collapse of Muni WiFi*

Many municipal WiFi projects spectacularly collapsed in 2007 after providers realized that consumer spending on secondary internet access would not provide a viable revenue stream, even when advertising supported the model. Since many municipalities and community organizations had lobbied for providing broadband to underserved areas, most municipal WiFi proposals contained some free or low-cost element – but people receiving free, low-quality connectivity were perhaps not a desirable market for advertisers. In the United States, public-private partnership networks owned by telecom providers often failed to find an appropriately scalable, inexpensive technology and a business model that permitted them to make profit while still covering some areas free of charge. Providers scaled back their networks (for example, the Wireless Philadelphia project was not completed), laid off employees (as Earthlink did) or changed the terms of their network provision, (as MetroFi did in Portland, OR). Meinrath and Breitbart (2008) describe the political and social machinations that influenced the decline of the Philadelphia network. At the end of 2007, only four large North American cities had WiFi build-outs still in progress: Toronto, Philadelphia, Minneapolis, and Portland. Aside from Minneapolis, all of these projects were significantly scaled back from their original plans. Only the Minneapolis network has continued to consult community

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University stakeholders as part of its network development, and this project’s Community Benefits Agreement is considered a benchmark in creating and maintaining community participation. As of June 2008, the Portland network will be disassembled and its components sold to the city.

The Toronto network, Toronto Hydro Telecom’s One Zone Wireless (THT), resembles some American municipal WiFi projects in that it is a commercial network that charges a market rate for wireless broadband access. However, since Toronto Hydro is a public utility, the network is also constructed upon publicly owned infrastructure. Clement and Potter (2007) argue that THT is missing an opportunity to use the municipal ownership of its infrastructure to public advantage: “basic broadband service could be provided in a sustainable manner to all of Toronto’s one million households, as well as the 80,000 businesses, for roughly \$10/month, giving an average annual saving of over \$300 each to the 60% of Toronto households that currently subscribe to broadband. This saving is so significant that it could even make it politically attractive to include basic internet service in property taxes and offered as part of the city infrastructure in the way that many other popular but costly city services are currently handled collectively (e.g., sidewalks, street lighting, schools and libraries)” (p.?). Unfortunately, THT is unlikely to ever become a public service network: in June 2008 it was sold to cable operator Cogeco. This sale contributes to the divestment of public properties into the private sector.

### ***Hacking Muni WiFi: Portland and Philadelphia***

Through the rise and fall of municipal WiFi projects in the United States (and to a lesser extent in Canada), the involvement of community actors remains important not just as a

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method of experimental pre-testing and preparation of a market for free WiFi. Two brief examples illustrate how CWNs continue to present critiques of the very institutions they helped to inspire. In the following section I consider CWN responses to municipal networks in Portland, OR and Philadelphia, PA. These examples illustrate how policy hacking continues to draw from the hands-on practices of hacking, even when the original “device hacks” of the early WiFi geeks have been institutionalized into municipal WiFi projects.

Portland, OR had one of the first community wireless networking projects, PersonalTelco, which began in 2000 with geeks installing nodes in their own homes. Like ISF, PersonalTelco’s members set up WiFi hotspots in bars and restaurants and created a location-based social software application. In 2005 Portland’s municipal government contracted with MetroFi to build a municipal wireless network. In summer 2007 the promised proof of concept network was completed, and MetroFi requested bids for an assessment. PersonalTelco members submitted a bid, but it was not accepted. Since some of the members of the group were still interested in measuring the municipal network’s performance, they volunteered to conduct a network assessment, which indicated that the coverage was weak and not as reliable as the company had promised. In fact, the MetroFi network was almost unusable for regular internet access.

CWNs can establish community expertise that challenges the exclusive control of knowledge and technology by corporations. The PersonalTelco survey of the MetroFi network was conducted by volunteers, using independent metrics and without relying on

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data from MetroFi. This may have led the local media to portray the community  
surveyors as acting in the public interest, since they had no economic ties to MetroFi.

The results of the survey, as Senior (2008) indicated, suggest that the network assessment  
produced by contractors hired by MetroFi, who used assessment indicators provided by  
the company were flawed. This assessment claimed that the network was accessible 95%  
of the time within the coverage area (based on the ability of a measuring device to obtain  
a signal from a MetroFi antenna), whereas PersonalTelco's assessment suggested that its  
functionality was closer to 60%, based on the ability to establish a connection to the  
internet using the MetroFi network.

The PersonalTelco methodology is based on how Portland's citizens might actually be  
expected to use the MetroFi network. Skilled volunteers provided their expertise to  
critique misleading information and establish alternative information that might be more  
valuable. PersonalTelco's "community" orientation distinguishes it from any company or  
organization that would be in competition with MetroFi. This comment frames the  
volunteer network survey as part of learning and having fun with wireless. The  
organization's president adds this comment: "Many people in our tech community and  
especially those working with wireless networking continue to look on PersonalTelco and  
its membership as very well educated, experienced experts on wireless technology"  
(Michael Weinberg on Personal Telco Wiki, 2007). Focusing on PersonalTelco as a site  
of expertise, Weinberg establishes the legitimacy of the volunteer survey as an expert  
critique of MetroFi's inadequacies. Curiously, due to circumstances unrelated to  
measurement issues, the entire MetroFi network was up for sale as of July 2008.

Other types of community-based knowledge production indicate how politicizing technology through CWN can shift understandings of where knowledge comes from and whom it serves. The Wireless Philadelphia project, one of the first large-scale networks planned in the U.S., was meant to draw heavily on participation by community-based organizations in the political and organizational process of network deployment.

According to Breitbart, et al (2008), the city's executive committee held a public consultation and stakeholder assessment, and then voted to construct a "Cooperative wholesale" network owned by a non-profit company who would outsource construction, management, and retail service. This nonprofit, called Wireless Philadelphia was established in 2005. However, in early 2006 the Philadelphia city council voted to contract Earthlink to own and operate the network, arguing that this would prevent the city from spending public funds. The failure of the Philadelphia project to follow through on its non-profit ownership might not have become an issue of public interest. However, because the main source of information on the planning and development process of the Wireless Philadelphia project was a blog written by journalist and media reform advocate Josh Breitbart, the project's public interest potential became more widely discussed.

The citizen journalism approach that Breitbart used to chronicle the development of the Wireless Philadelphia also establishes community-based expertise about networks – in this case, critical perspectives from a community member participating in the organizational process. Breitbart's aim in blogging the Wireless Philadelphia story was to

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provide better information about the network's development, and thus to ensure that the network would be developed with community participation. These goals are more oriented towards media reform than the volunteer measurement project at PersonalTelco, but they also establish community criticism of many aspects of the network development process, particularly the relationship between Civitium, the consulting company who had helped to craft the RFP, and Earthlink, which eventually won the contract. With other activists he met through participation in CWN Summits, Breitbart decided to try and develop a way of intervening in this process, especially as a way of providing a citizen's point of view in a process which had garnered positive media attention as a best practice example for building a municipal network that could address the digital divide (Hellweg 2005).

These examples suggest that the expertise generated by participants in CWNs not only influence media reform movements by bridging expertise from geeks to policy advocates, but that they also establish a certain type of community technology expertise that can be channeled to act in the public interest. In the case of PersonalTelco, this expertise was primarily technical, and challenged the knowledge and information generated using data provided by MetroFi. In the Philadelphia case, knowledge about community organizing established public interest perspectives as centrally important for the development of the project.

From the perspective of computerization movements as new social movements, the expansion of these forms of community-based knowledge are important, because they

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situate expertise within specific community contexts and destabilize the control of information – not to mention technology and media – by entities concerned primarily with profit-making. Creating these forms of knowledge may be one way of transcending the dialectic between technical expertise and accessibility of technology that seem to characterize computerization movements. In the following section, I continue to explore how bridges are built between expertise generated within CWN and the media reform movement, examining how key players in the two areas worked together to create a non-profit consultancy.

***Public Interest Consultants: Ethos Wireless as a Bridge between CWN, Media Reform, and Muni WiFi***

Sascha Meinrath, Dharma Dailey, and Joshua Breitbart formed a non-profit consulting company called the Ethos Wireless Group (or “Ethos”) <sup>xiv</sup> in 2006. Focusing on “thoughtful infrastructure” the partnership “promotes universal access to high-speed Internet by supporting the development of new community-controlled infrastructure” (Meinrath, Breitbart, and Dailey 2006). Ethos focuses on community ownership of infrastructure – an interest that Meinrath developed in 2001 when looking for a distribution channel for some of the media content that the Champaign-Urbana Independent Media Centre had developed. At around the same time Dailey had been working with the Prometheus Radio Project in Philadelphia, a non-profit organization that taught community members to build and operate low-power radio stations, as well as being involved in lobbying for more access to radio waves for community radio stations. Like CWNs, Prometheus connected hand-on experimentation and modification of radio equipment with policy advocacy about political-technical issues, including expanded access to radio spectrum (Dunbar-Hester 2008). In policy circles, Prometheus is well

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known for having contributed to lobbying that opened the U.S. airwaves to low-power community radio stations (Prometheus Radio Project 2008).

Each of the founding members of the Ethos Group describes the application of practical knowledge about technologies as important in their advocacy work. Dailey explains that she's driven by a "DIY instinct" that has pushed her to learn how to build radio stations and hack wireless routers. Breitbart's experiences in Philadelphia suggest that local ownership and a broader community level understanding of technical and policy issues was essential. Dailey echoes these calls for local ownership of telecommunications, describing local media as a tool used to draw together people living in the same area who may not have shared interests. She reflects: "networking technology is really good at organizing or integrating vertical communities, people with a specific interest, and good at vertical integration . . . so large corporations like Wal-Mart can use it for supply chain management. But to connect together vertical communities in a shared geographic space still needs a lot of work" (Dharma Dailey, Interview Feb 20, 2008). Similarly, Meinrath's work at CuWiN has exposed him to local "geek" expertise in creating technical solutions to what he and others originally perceived as limitations in media distribution. Together, they have created a loose institutional framework that helps to put into practice some of the goals expressed by both geeks and media reform advocates into policies.

### *Ethos Policies – Public Interest Framing of "Openness"*

A core Ethos document, the group's policy statement, frames CWN goals in the context of struggles against increased media convergence and the spread of wireless internet. It

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University reads, “new technologies offer one of the most significant opportunities we will have in our lifetime to completely redesign how we communicate and exchange media”

(Meinrath, Breitbart, Dailey 2006). To capitalize on this opportunity, Ethos has defined a set of policies, using discourse that are familiar to CWN advocates but that also include a decided public interest slant:

1. Open access: our communication systems are now closed – the owners of the wires control who uses them and what travels over them. Net neutrality does not go far enough . . .it does not address the divide in ownership of and access to infrastructure;
2. Open source/open standards: Open source allows for fast, inexpensive innovation and adaptation. Open standards allow different devices, whether from a major corporation or hobbyist, to communicate with each other;
3. Open airwaves: the current, closed licensing regime restricts public access to the airwaves. In contrast, unlicensed spectrum lowers the barrier to participation in our communication networks and promotes innovations like wireless Internet access. (Meinrath, Breitbart, Dailey 2006).

These policy statements illustrate how concerns of CWN actors, including the more technical principles of openness, can gain influence within media reform when they are framed in a way that highlights their public interest potential. This bridging discourse connects open-source software development and technical innovation with social justice aims such as increased access to media and communications. The centrality of “openness” in the policy statement suggests a focus on disruptiveness or innovative potential more in keeping with the geek focus on the political implications of technical structures. At the same time, the implications of openness are all expressed in terms of accessibility, which draws more on social justice. Most significantly, while these policies refer to ways of configuring and governing wireless networks, they make a broader gesture towards these networks as elements of an entire media system that Ethos argues must be restructured.

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### *Developing and Bridging Expertise*

The consultancy hoped to provide cities with another route to developing municipal WiFi, a route that would make public interest and community ownership central.

Initially, the partnership planned to consult with municipalities to help build municipal networks based on their policy statements, but this did not occur, for reasons that I discuss below. Instead, all three founding members found themselves in new professional positions where their expertise in bridging wireless networking and policy played important roles. The consultancy as a whole was reoriented to provide research and organization support to non-profit organizations. The occupational changes of the three core Ethos members allowed them to use the expertise they had gained through involvement in CWN on projects more directly connected to policy advocacy.

Meinrath moved from Free Press to the New America Foundation and began a “whole life spent doing telecom policy and media reform” (Interview Feb 22, 2008). Dailey began representing community interests at high-level policy-making bodies like the Internet Company for Assigned Names and Numbers (ICANN) and directing an Ethos research project on local broadband infrastructure and research needs for community networking advocates. Breitbart moved to New York City and began managing a project for People’s Production House (also funded by the Social Sciences Research Council) linking technical training in new media to popular education about communication issues: one strand of the project conducts a needs assessment for internet infrastructure, while another creates a video describing the physical and communication infrastructure of New York City. This project links hands-on experience of media production with empirical research to build telecommunications knowledge within inner-city

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University communities. Breitbart, who has testified to FCC commissions on issues of access to communication, says the project is about “creating a way for other people to become experts so it is not me giving testimony” (Interview Feb. 22, 2008).

For her part, Dailey felt that her ability to work in high-level abstract policy spheres, which included not only ICANN but also tracking policy issues in state legislatures, drew directly from her hands-on experience. She said,

I’m getting lots of opportunities to do work in national international work on abstract technical issues because I’m perceived as someone who is authentically representing community interests. It’s somewhat ironic and there’s always this schizophrenic feeling that I’m working on things that aren’t very connected to a canned food drive (Interview Feb 20, 2008).

The three founding members of Ethos Wireless all reflected that they felt like “accidental” WiFi experts. Having all worked in grassroots media backgrounds, they learned about WiFi technology by spending time with people who shared technical expertise with them. They were able to bridge this expertise into the media reform and advocacy spheres by reframing the discourses and expanding the practices of the hands-on learning – hacking – they encountered in CWN and in other DIY media contexts. Ethos Wireless members also worked at hacking the municipal wireless bidding process, one of the original aims of its principals, who had hoped to establish ways of breaking down the corporate consultant’s monopoly on municipal WiFi contracting.

### **Engaging with the RFP Process**

Ethos’ intervention in the municipal WiFi bidding process was not as extensive as hoped. Despite developing a strong partnership with municipal network proponents in Oakland, CA, Ethos did not succeed in hacking the municipal WiFi consulting market. The

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Requests for Proposals (RFP) process, which requires organizations interested in constructing a municipal network to respond to a written request that details the specific requirements for the network, created a significant barrier. Often, organizations draft RFPs based on earlier submissions to Requests for Information (RFI) documents. RFIs are non-binding suggestions offered by a variety of interested parties, not all of who respond to the RFP. Being involved in creating or responding to an RFP structures expectations for how municipal wireless networks will be built. However, in the municipal WiFi boom of 2006 and 2007, the scale of the RFP process prevented all but the largest and best connected consulting groups – such as Civitium, the company who built the Philadelphia network – from participating in the process. As Breitbart reflects, “being corporate consultants to cities – that is a very specific kind of business . . . the RFP process is a huge barrier to entry, and is only really set up if you are prepared to do hundreds of RFPs, it doesn’t work if you have a particular commitment to one city” (Interview February 22, 2008).

The institutional structures of RFP production limited the potential for hacking the municipal WiFi development process by establishing a consultancy, even when it created opportunities to route around the corporate ownership of dominant ISPs and the vested interests of consultants. Still, Ethos has continued advocacy work based on its policies. Meanwhile, CWN geeks at the 2007 Summit developed another hack of the RFP process. Drawing from a strategy workshop, they created a volunteer-led submission to the RFI for the municipal WiFi project in Boston, MA. The Boston government’s Wireless Task Force requested information on building a network based on a model of nonprofit

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ownership of physical infrastructure. The RFI was to address six components of the digital divide: 1) awareness of the benefits of broadband; 2) motivation to take advantage of technology; 3) affordability of internet access; 4) affordability of equipment; 5) training; 6) technical support (Boston Wireless Task Force 2007). The network was also to be built with open access in mind and in a way that supported open standards. The city-owned non-profit, OpenAirBoston, developed an RFI document to which a coalition of CWN members responded. Beginning at a breakout session at the 2007 Summit and continuing online, a small group of people produced a document that was submitted to the official RFI competition.

### *“Hacking” RFPs*

Immediately after forming this ad-hoc coalition, the participants called the RFI project “a hack”, and themselves “we . . . the hackers.” They talked about “pushing the envelope” (Field Notes, May 19, 2009). These comments seemed to indicate that they shared a common identity despite the fact that their expertise ranged from hardware construction to social and policy research. Coming just a few hours after the first mention of ‘policy hacking’ this meeting brought together a range of CWN participants with different backgrounds, including hardware hackers from SeattleWireless, software developers from CuWiN and ISF, network designers including some of the founders of the FunkFur citywide mesh network in Austria, as well as Meinrath, Breitbart, Laura Forlano, and myself. The RFI proposed the use of use open-source equipment, grassroots expertise, and horizontal organization to respond to the challenge of constructing a municipal network with an open platform, broad coverage, and adequate bandwidth, that could be used for conducting research on network use, and that would allow for innovative

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University experiments in application development. The submission focused on the fact that its authors were not only volunteers representing community and public interests, but also experts with important hands on knowledge of WiFi.

The RFI response was not intended to outline a perfect response to all of the needs of OpenAirBoston: one of the contributors felt that the large number of demands in the RFI document suggested that the Task Force wanted a “WiFi dreamland”(Kaplan 2007). Instead, the document outlined how open-source solutions and horizontal organizations of volunteers could produce a reasonable alternative to commercial proposals by recommending different hardware and software configurations, and providing actual, as opposed to artificially low, costs for purpose-built open-source equipment. More profoundly, though, the RFI “hack” bridged a significant amount of CWN expertise into the municipal world by creating a document meant to influence the discourse of an RFP for a large municipality. However, reflections by some of the participants at the 2008 Summit bemoaned the fact that the review of the RFI concentrated primarily on the cost of the network rather than being concerned with whether the proposal satisfied the various criteria for openness or accessibility.

## **Conclusion: Bridges and Barriers**

### ***Bridges***

The examples in this chapter reveal the possibilities for bridging the values and ideas of CWN into advocacy and policy spheres using the discourses and practices of ‘policy hacking.’ Within geek culture, hacking creates a way of critiquing technical and organizational structures by drawing attention to failures, creating alternatives, or

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University proposing radically new structures. In the ISF case, the geek-public suggested that hacking could extend out into the city. Similarly, the CWN movement bridged hacking into the policy sphere with the intention of criticizing existing media and communication structures and proposing new ones. Bridging the discourse and practice of suggests that hacking can route around the current (damaged) media system by contributing to the development of new organizational forms and discourses linked with WiFi technology. This bridge also establishes a way of resolving the dialectic inherent in computerization movements by connecting technical issues with political ones. The examples discussed above illustrate the consequences of this bridging. For example, presenting Net Neutrality as a political issue reiterates the importance of the concept of common carriage. In addition, creating the Ethos consultancy addresses the weaknesses of the municipal WiFi consultancy process through a kind of institutional hack, as does the CWN contribution to the OpenAirBoston RFI process. Free Press, Ethos, and the community participation in the municipal wireless sphere all construct different types of intermediate institutions – neither ad-hoc like local CWN projects, nor broad-scaled like state-level regulations where discourse and practice are bridged from grassroots spheres like CWN. According to Touraine (1992; 1999), the appearance of new institutions is one of the final stages of a new social movement, and it indicates that the insights and struggles of the movement have established a new historicity.

### ***Barriers***

Despite the social transformations suggested by the bridging of expertise and the development of new institutions, barriers still remain. The scale of many media institutions limits the effectiveness of smaller-scale policy hacks. For example, WiFi

Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University projects have contributed to reforms of radio spectrum allocation. The success of WiFi has in part been influenced by the fact that no license is required to operate or modify a WiFi device, and that all devices using the 802.11 technical standard are interoperable (Snider 2006). As interference increases on the tiny portion of unlicensed spectrum available – 2.4 GHz – open spectrum advocates lobby for the removal of licensing regimes that regulate access to the airwaves (Longford 2007b). As with the expansion of community networking, expansion of open spectrum establishes access to the radio spectrum as part of a set of broader communication rights (O Siochru 2006). Open spectrum advocates lobby the FCC in the United States and Industry Canada for the expansion of unlicensed radio spectrum – estimated as currently making up less than two per cent of available radio spectrum in the United States. These advocates often use examples of community media using unlicensed spectrum in their arguments (Best 2006). In 2006 the FCC ruled that 50 MHz of radio spectrum in the 3650 – 3700 MHz band could be shared between license holders and municipal broadband projects. Harold Feld, a lawyer lobbying for spectrum reform, announced to the CWN community: “We Win” (Feld 2007).

However, these spectrum auctions have been overshadowed in the past year by the bidding process on the 700 MHz band of spectrum – a much more powerful lower-frequency band that, unlike the unlicensed spectrum at 2.4GHz, travels through buildings and over long distances. This radio spectrum will be available for use once terrestrial television stations, which are currently using bands adjacent to it, begin digital broadcast<sup>xv</sup>. In the United States, the 700MhZ band has been split into five blocks, some

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of which require that spectrum within the block must be left open to competing devices.

The total of high bids on the first day of auction of this spectrum was \$2.78 billion and as of March 2008 the total top bids for all blocks of spectrum was over \$15 billion. Finally, telecommunication giants Verizon and AT&T purchased the rights to the most desirable spectrum, frustrating hopes for a wireless “third pipe” other than the cable companies and former telephone companies. All the public interest policy hackers could do was watch – Meinrath posted regular updates on his blog that speculated on the likely outcome of the auction based on the bidding pattern (Meinrath 2007).

The values and ideas held by public interest communications activists have influence – but it is harder to see them at the institutional level of the FCC spectrum auctions. It may be possible to influence the language of a piece of legislation as occurred with the politicization of Net Neutrality, or influence the requirements of one municipality’s WiFi network RFP, but this does not mean that it is possible to put in a competing bid against a telecommunication operator in a spectrum auction. Since the winners of the auction were incumbent telecommunications operators, the shape of a wide-scale wireless network in the United States will be determined by how astutely the FCC apply the regulations governing the use of the new radio spectrum. This might seem to suggest that the era of the grassroots WiFi hackers building devices that were disruptive to the existing incumbent telecommunications providers has ended, or that CWN as a computerization movement has primarily served to create demand for free municipal WiFi. However, given the impact that the values and ideas of CWN geeks and policy hackers have had,

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perhaps the influence will be less visible but equally important. After all, hackers are  
said to like unfriendly spaces.

## Bibliography

- Alternative Telecommunications Policy Forum. 2006. "Background",  
<http://www3.fis.utoronto.ca/research/iprp/cracin/alttelecompolicyforum.ca/Background.html> (accessed March 24 2008).
- Aronson, Jonathan, François Bar, and Simon Wilkie. 2006. Towards neutral ground on net neutrality. Paper presented at TPRC 2006: Research Conference on Communication, Information, and Internet Policy, September 29-October 2 in Arlington, VA.
- Barratt, Neil, and Leslie Regan Shade. 2007. Net neutrality: Telecom policy and the public interest. *Canadian Journal of Communication* 32 (2): 295-305.
- Best, Michael. 2006. A global survey of spectrum license exemptions. Paper presented at TPRC: Research Conference on Communication, Information, and Internet Policy, September 29-Oct 1, 2006 in Arlington, VA.
- Boston Wireless Task Force. 2007. "Final report" *Wireless in Boston*,  
<http://www.cityofboston.gov/wireless/Boston%20Wireless%20Task%20Force%20Report%20-%20Final.pdf> (accessed April 3 2008).
- Breitbart, Joshua, Naveen Lakshimipathy, and Sascha Meinrath. 2008. The Philadelphia story: Learning from a municipal wireless pioneer, edited by Wireless Futures Program: New America Foundation.  
[http://www.newamerica.net/publications/policy/philadelphia\\_story](http://www.newamerica.net/publications/policy/philadelphia_story).
- Campaign for Democratic Media. 2007. "Campaign for democratic media",  
<http://democraticmedia.ca/front> (accessed March 24 2008).
- Digital Inclusion Coalition. 2006. Recommendations for the wireless Minneapolis community benefits agreement. Minneapolis, MN: Community Computer Access Network, and the Alliance for Metropolitan Stability.
- Dunbar-Hester, Christina. 2008. *Propagating technology, propagating community? Low-power radio activism and technological negotiation in the U.S., 1996-2006*. PhD Thesis, Science and Technology Studies, Cornell University.
- Feld, Harold. 2007. "We win again on 3650-3700 mhz. So what does it mean?" *Tales from the Sausage Factory*, <http://www.wetmachine.com/totsf/item/818> (accessed March 24 2008).
- Free Press. 2006. "One million americans urge senate to save net neutrality". Press Release, <http://www.savetheinternet.com/=press11> (accessed April 3 2008).
- Frieden, Rob. 2006. Network neutrality or bias? Handicapping the odds for a tiered and branded internet. Paper presented at TPRC 2006: Conference on Communication, Information, and Internet Policy, September 29-October 2 in Arlington, VA.
- Geist, Michael. 2008. "Bell secretly throttling wholesale internet services" *Michael Geist's Blog*, <http://www.michaelgeist.ca/index.php> (accessed March 24 2008).
- Hackett, Robert A., and William K Carroll. 2006. *Remaking media: The struggle to democratize public communication*. London and New York: Routledge.

- Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University
- Hellweg, Eric. 2005. "Wi-Fi for the masses" *Technology Review*. MIT, <http://www.technologyreview.com/Infotech/14705/> (accessed March 24 2008).
- Kaplan, Aaron. 2007. Reply to [boston-wifi-party] re: [fwd: Boston RFI response document], June 4, 2007.
- Kidd, Dorothy, and Bernadette Barker-Plummer. 2006. "Media democracy from the ground up: Mapping communication practices in the counter public sphere" *Necessary Knowledge for a Democratic Public Sphere Background Papers*. Social Science Research Council, <http://programs.ssrc.org/media/background/> (accessed March 24 2008).
- Lehr, William, Marvin Sirbu, and Sharon Gillett. 2006. Wireless is changing the policy calculus for municipal broadband. *Government Information Quarterly* 23 (3-4): 435-453.
- Lehr, William, Marvin Sirbu, Jon Peha, and Sharon Gillett. 2006. Scenarios for the network neutrality arms race. Paper presented at TPRC 2006: Research Conference on Communication, Information, and Internet Policy, September 29-October 2 in Arlington,, VA.
- Levy, Steven. 1984. *Hackers*. Garden City, New York: Doubleday.
- Longford, Graham. 2007a. 'network neutrality' vs 'network diversity': A survey of the debate, policy landscape and implications for broadband as an essential service for ontarians, edited by Ministry of Government Services: Government of Ontario.
- . 2007b. Open spectrum and community wireless networking in Canada: A preliminary review of the policy and regulatory landscape. In *Social Science Research Council and Free Press Media Policy Research Pre-conference*. Memphis, Tennessee.
- Longford, Graham, and Leslie Regan Shade. 2007. Telecom policy reform north of the 49th. In *National Media Reform Conference Media Research Pre-Conference*. Memphis, Tennessee. <http://programs.ssrc.org/media/events/researchconf07/postersession/>.
- Markoff, John. 2005. *What the dormouse said: How the sixties counterculture shaped the personal computer industry*. New York: Viking Books.
- McTaggart, Craig. 2006. Was the internet ever neutral? Paper presented at TPRC 2006 Research Conference on Communication Information, and Internet Policy, September 29, 30, and October 1, 2006 in Arlington, VA.
- Meinrath, Sascha. 2007. "Watching the C block spectrum auction in real time: Just like E-bay (if the item was worth about \$5,000,000,000" *Sascha Meinrath.com: Public Ponderings*, <http://www.saschameinrath.com/node?page=2> (accessed March 25 2008).
- Meinrath, Sascha, Joshua Breitbart, and Dharma Dailey. 2006. "Thoughtful infrastructure as a platform for media reform: The Ethos group", <http://ethoswireless.com/thoughtful-infrastructure-platform-media-reform> (accessed).
- Meinrath, Sascha, and Victor Pickard. 2006. The new network neutrality: Criteria for internet freedom. Paper presented at TPRC 2006: Research Conference on Communication, Information, and Internet Policy in Arlington, VA.

- Co-productions of Culture, Technology and Policy in the North American Community Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University
- Middleton, Catherine A., Graham Longford, and Andrew Clement. 2006. ICT infrastructure as public infrastructure: Exploring the benefits of public wireless networks. Paper presented at TPRC 2006: Research Conference on Communication, Information, and Internet Policy, September 29, 30, and October 1st in Arlington, VA.
- Moody, Glyn. 2002. *Rebel code: Inside Linux and the open source revolution*. New York: Basic Books.
- Napoli, Phillip. 2006. "The broadening of the media policy research agenda" *Necessary Knowledge for a Democratic Sphere Background Papers*. Social Science Research Council,, <http://programs.ssrc.org/media/background/> (accessed March 24 2008).
- O Siochru, Sean. 2006. Communication rights. In *Word Matters: Multicultural perspectives on information societies*, edited by V. Peugot: C&F Editions.
- Organization for Economic Cooperation and Development. 2007. "Households internet access by income level, 2006 or latest available year". OECD ITC data, <http://www.oecd.org/sti/ICTindicators> (accessed February 29 2008).
- Peha, Jon, William Lehr, and Simon Wilkie. 2007. The state of the debate on network neutrality. *International Journal of Communication* 1: 709-716.
- Potter, Amelia Bryne. 2007. "Business models for local networks" *Better Broadband Toolkit by the Ethos Group*, <http://ethostoolkit.net/better-broadband-toolkit/choices> (accessed March 24 2008).
- Powell, Alison, and Leslie Regan Shade. 2006. Going Wi-Fi in Canada: Municipal and community initiatives. *Government Information Quarterly*.
- Priest, Julian. 2004. "The state of wireless London", [http://informal.org.uk/people/julian/publications/the\\_state\\_of\\_wireless\\_london/](http://informal.org.uk/people/julian/publications/the_state_of_wireless_london/) (accessed October 20 2005).
- Prometheus Radio Project. 2008. "Mission" March 24 2008).
- Proulx, Serge. 2007. "Techno-activism as catalyst in promoting social change" *Canadian Research Alliance for Community Innovation and Networking Working Papers Series*, [www3.fis.utoronto.ca/.../pdfs/workshop%205/Proulx\\_Techno-activism\\_as\\_Catalyst\\_in\\_Promoting\\_Social\\_Change.pdf](http://www3.fis.utoronto.ca/.../pdfs/workshop%205/Proulx_Techno-activism_as_Catalyst_in_Promoting_Social_Change.pdf) (accessed Nov 1 2007).
- Samuel, Alexandra. 2004. *Hactivism and the future of political participation*. PhD Thesis, Political Science, Harvard.
- Sandvig, Christian. 2006. Network neutrality is the new common carriage. Paper presented at Public Service Telecommunications Conference in University of Illinois at Urbana-Champaign.
- Schmidt, T., and Anthony Townsend. 2003. Why Wi-Fi wants to be free. *Communications of the ACM* 46 (5): 47-52.
- Snider, Jim H. 2006. Reclaiming the vast wasteland: The economic case for re-allocating the unlicensed spectrum (white space) between tv channels 2 and 51 to unlicensed service, edited by New America Foundation Wireless Future Program.
- Social Science Research Council. 2007. "Necessary knowledge for a democratic public sphere: Media research, media reform, and media Justice", <http://programs.ssrc.org/media/> (accessed March 24 2008).
- Strover, Sharon, and Seung-Hwan Mun. 2006. Wireless broadband, communities, and the shape of things to come. *Government Information Quarterly* 23 (3-4): 348-358.

Co-productions of Culture, Technology and Policy in the North American Community  
Wireless Networking Movement – Alison Powell, PhD Thesis, Concordia University

- Supreme Court of the United States. 2005. National Cable & Telecommunications association et al. V. Brand X internet services et al.: Supreme Court of the United States.
- Tapia, Andrea, and Julio Angel Oritz. 2006. Municipal responses to state-level broadband internet policy. Paper presented at TPRC 2006: Research Conference on Communication, Information, and Internet Policy, September 29, 20, October 1 in Arlington, VA.
- Telecommunications Policy Review Panel. 2006. "Executive summary", <http://www.telecomreview.ca/epic/site/tprp-gecrt.nsf/en/rx00069e.html> (accessed March 24 2008).
- Turner, Fred. 2006. *From counterculture to cyberculture*. Chicago: University of Chicago Press.
- United States Department of Justice. 2007. "Department of Justice comments on "Network neutrality" In federal communications commission proceedings: Antitrust division says regulatory proposals could limit consumer choice and deter network investment", [http://www.usdoj.gov/opa/pr/2007/September/07\\_at\\_682.html](http://www.usdoj.gov/opa/pr/2007/September/07_at_682.html) (accessed March 24 2008).
- Wu, Timothy. 2003. Network neutrality, broadband discrimination. *Journal of Telecommunication & High Technology Law* 2: 141-179.
- Wyden, R. 2006. "Internet non-discrimination act of 2006", <http://www.benton.org/?q=node/1810> (accessed March 24 2008).

## Notes

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<sup>i</sup> See the Appendices for lists of interviewees and interview scripts.

<sup>ii</sup> My focus on bridging from CWN to policy contexts may also result from bridges created between my STS-oriented work and the more policy-oriented goals of the research projects that supported it. Both the CRACIN project and the CWIRP project held as goals the production of research that could be used to comment on or improve telecommunications policy. I also participated in research partnerships with community organizations, including an SSRC Necessary Knowledge grant, and consulting work for the Ethos Group.

<sup>iii</sup> Beginning in late 2007 the FCC began to auction portions of the radio spectrum made available by the transfer of television broadcast to digital transmission. In particular, the 700 MHz spectrum auction attracted media attention because of the provision that the owners of the spectrum, suitable for mobile communications, would have to leave the network open to access by a range of devices. Industry analysts suggest that this openness may increase competition in the telecommunications sector.

<sup>iv</sup> Despite being Canadian, the authors did not mention Canada, arguing elsewhere in the article that the Canadian policy-making process is slightly more transparent.

<sup>v</sup> This research conference is one of North America’s most influential venues for discussing telecommunication policy issues and is attended by academics, policy-makers from Washington and Ottawa, and some public interest actors.

<sup>vi</sup> CWN examples of the use of mesh networks include the original CuWIN network, the MIT RoofNet project, and some very large European mesh networking projects, including Freifunk in Berlin and Leipzig, and GuiFi in Catalonia that serve thousands of people. CWNs in Canada have primarily used hotspot configurations. The RoofNet project has inspired Meraki, a company selling mesh networking routers. When CWN projects began, mesh networks were perceived as more challenging to broadcast architectures than hotspots or WiFi “clouds” that merely extended existing broadband infrastructure.

<sup>vii</sup> Even Freifunk, whose mesh intranet model creates an open network that anyone can join with the proper equipment, uses traffic-shaping to help allocate bandwidth that people contribute to the intranet. This means that a Freifunk member with an internet connection can decide how much of it to contribute to others on the network. Commercial use is also allowed, and companies can develop innovative ways of sharing costs, or providing free slow internet service while charging for higher speeds.

<sup>viii</sup> I am distinguishing network neutrality as a network management principle, from “Net Neutrality” as a political issue.

<sup>ix</sup> Free Press is a non-partisan non-profit media reform organization funded by foundations including the Ford Foundation. Its self-described mission is to establish media reform as a central issue in social justice advocacy.

<sup>x</sup> Municipal wireless networking in the United States has focused on bridging digital divides and expanding access to the internet in underserved areas. In Canada, the federal strategies of the 1990s, including the Connecting Canadians initiative, the National Broadband Strategy and Broadband for Rural and Northern Development (BRAND) helped to establish broadband infrastructure in many urban and some rural regions, tempering the expectations for WiFi and wireless technologies as primary internet infrastructure.

<sup>xi</sup> When CuWIN began experimenting with mesh routing protocols, it was assumed to be impossible for WiFi radio signals to move more than two “hops” through two nodes. Multi-hop radios are now standard equipment for large-scale mesh networking.

<sup>xii</sup> No similar regulatory decision was taken by the Canadian government, a fact that may have influenced the lesser scale of the Muni WiFi boom here. As of March 2008 the following cities have proposed or constructed municipal WiFi networks: Toronto (selected areas only; for profit); Vancouver (in planning); Regina, Saskatoon and Prince Albert (provincial initiative, selected areas only); Fredericton (see Chapter Four)

Chapleau, ON (demonstration project by Bell Canada); and demonstration projects in Calgary, AB and Hamilton, ON.

<sup>xiii</sup> These types of networks are described in more detail at <http://ethostoolkit.net/better-broadband-toolkit/choices>.

<sup>xiv</sup> I was employed by Ethos in 2007 to develop part of a toolkit on local networking technologies.

<sup>xv</sup> This digital shift will begin in 2009 in the United States and in 2012 in Canada.