

Socioeconomic Opportunities of Community Wireless Networks

Community wireless networks (CWNs) have evolved as collective projects to include more of the public in the information age. This was the focus of the annual International Summit for Community Wireless Networks (IS4CWN), cosponsored by the New America Foundation, the American Association for the Advancement of Science (AAAS), the Champaign-Urbana Community Wireless Network (CUWiN), and others. The summit was held May 28–30, 2008, in Washington, DC. The attendees included more than 175 people from 20 countries. They included community developers, policy makers, technology vendors, open source software developers, and innovators working to build free wireless networks.

At first, Sascha Meinrath, Director of the summit, advised, “the core interest of community wireless networks must be the public good rather than profit.” CWNs are grassroots alternatives to commercial broadband services and a complement to government efforts to achieve digital inclusion.

Socioeconomic Benefits of CWNs

Summit attendees discussed how to harness these networks to better serve their communities. Jonathan Adelstein, FCC Commissioner, stressed the importance of CWNs for reaching underserved populations, rural areas, and inner cities. He said that the free flow of information is the heart of democracy and freedom. Because of network externalities, the public benefits are greater than the benefits accrued to service providers, he added.

Adelstein calls for universal and affordable access to telecommunications, particularly for low-income people, minorities, and people with disabilities. “What we really need is more and better access to the airwaves,” said Adelstein. This is important to provide

these particular communities access to their specific online content and media outlets to enforce Internet neutrality, and to promote competition, according to Adelstein. He appreciates the role of these networks in informing citizens, enhancing citizen involvement, and promoting democracy. “This wireless movement is consistent with the American spirit which is freedom of speech,” said Adelstein. He concluded “The Internet should be open to society, not controlled by a few private entities like old media.”

Worldwide, over 1 billion people live on less than a dollar a day. Their poverty is combined with limited access to education, healthcare, energy, and clean water. Amir Dossal, Executive Director of the United Nations’ Office for Partnerships, asked “How can we use technology to address these issues?” The United Nations seeks to promote universal access to information through the Internet in order to improve people’s socioeconomic status. In this context, Dossal said that when you give people access to information “you are helping them to live better, learn better, and give better.” Adelstein warned, “We do not need the digital haves to get more and more in a way that broadens the educational and economic inequality.”

Rey Ramsey, Chief Executive Officer of One Economy Corporation, a nonprofit organization based in Washington, DC, said the goal of digital inclusion is “to make sure that everybody in the society can take advantage of the transformative possibilities of digital technologies.”

Ramsey recommended, “We should not consider it an equity or digital divide problem. . . . We should see it as digital opportunities.” In other words, components of society should compete to take advantage of these open wireless networks. The main challenge facing CWNs is that policy makers are not aware of their benefits, according to Ramsey. He emphasized that developers should design the infrastructure, applications, and content suitable for community needs.

Digital Object Identifier 10.1109/MTS.2009.934161

Abdelnasser M. Abdelaal is with the College of Information Science and Technology, University of Nebraska at Omaha, Omaha, NE 68182; aabdelaal@mail.unomaha.edu.

Anaheim, California, offers city-wide wireless Internet to enhance the competitive advantage of the city. The Airjaldi network provides VoIP service to about 100 000 users in northern India, which has no telephone infrastructure. Similarly, Aravind uses video conferencing to provide healthcare for more than 500 000 patients a year in southern India. Wireless Ghana is used for electronic education, political participation, and VoIP services in remote areas of West Africa.

Agnès Callamard, the Executive Director of Article 19 of the international human rights group, appraised the role of CWNs in boosting freedom of expression, diversity of opinion, and access to information. “The human rights movement will not be effective without you,” Callamard said. It is important to have equitable access to means of communication to foster diversity, according to Callamard.

Building social capital among the community is another key outcome of these networks. Matt Westervelt, founder of SeattleWireless, explained, “I have developed many meaningful friendships over the years with people that I have met through the project. ... I have watched other people become friends as well. Businesses have started, books have been written, and communities have been formed.”

Emerging Network Technologies

John Atkinson, Director of Wireless Ghana, said the main challenges facing Wireless Ghana are bandwidth limitation, quality of service, and power supply. Atkinson said he used Adblock, content-filtering software, to overcome the bandwidth limitation problem. With respect to power supply in these remote areas, Wireless Ghana uses car batteries to support the node when power is off.

Panelists and innovators also addressed the impact of adaptive technologies on this wireless revolution. For instance, the Green WiFi technology provides last mile broadband service to areas that lack reliable electricity. It is a low-cost solar-powered standard that runs with no power requirements. Similarly, the HomePlug technology connects computers through power lines at homes with no extension cord.

Success Factors of CWNs

As with open source software, CWNs have been developed by community contributions such as time, money, expertise, and computing resources. Win-win partnerships are crucial for their success, according to Dossal. He added that the United Nation collaborates with Intel, Microsoft, Ericsson, and M.I.T. to increase the affordability of digital technologies for needy people.

Wireless Toronto has 30 hotspots built by volunteers and funded by host venues such as restaurants

and shops. “Volunteers contribute time, sometimes money and gears, and technical support. Most have nodes they share access from, and develop software for the network, and bandwidth,” said Russell Senior, manager of the Personal Telco Project. The Omaha Wireless network was built by students of the University of Nebraska at Omaha to serve as a bridge between the university and the community. In this education-centric business model, students gain experience from this “living lab,” the community obtains free Internet access, and the university gains exposure.

Ramsey said the success of these networks is subject to “AAA”: Affordability, Availability, and Adoption. He emphasized that all the three “AAA” have to be in place.

He pointed out that making the service available and free does not guarantee that it will be used. We should focus on the demand side, or the applications and content needed by people to improve their lives and solve their problems. “The most important thing is to focus on what problems we are trying to solve,” Ramsey said. He asked the summit attendees, “Is it economic development, workforce development, or childcare?”

One Economy has digital inclusion projects in the U.S., Africa, Turkey, Jordan, and Canada. It provides broadband access to low-income communities, offers them basic computer training, and creates websites focused on community needs.

Pattanaik noted that the success of these projects requires awareness and community participation, in conjunction with low-cost wireless solutions.

Challenges Facing CWNs

Many developing countries have not deregulated the spectrum necessary for this innovation. “We’ve got to find ways to identify more unlicensed spectrum,” Adelstein told the wireless summit. He called for more unlicensed spectrum, which he considered the lifeblood of the future telecommunication landscape. According to Adelstein, adopting a broadband policy that ensures open communications is important to improve economy, healthcare, education, social equity, democracy and freedom, and the environment. Michele Calabreze, Vice President of the New America Foundation, said that while we have spectrum scarcity, the available spectrum is either underutilized or unused. He argues against selling this spectrum to telecommunication companies.

The challenge is how to inspire communities to build networks using their own resources. Adelstein suggested, “The private sector alone won’t lead to an optimal investment ... Governments need to step in.”

Nonprofit and public entities are not allowed to provide Internet access in some countries like the U.S. (16 states) and India. To overcome this problem,

Ben-David said schools bought the project and provided Internet access to the community; in turn, community members donate to schools.

Another obstacle facing this grassroots movement is the lack of necessary human capital (e.g., skills and knowledge), particularly in developing societies, required to develop and use the network, according to Ramsey. Many CWNs (e.g., San Francisco Digital Connectors, Air-Stream Wireless, The Johannesburg Wireless User Group, and Nepal Wireless) accrue human capital by providing basic computer training to volunteers and community members.

Dillip Pattanaik, Director of Information Resource Management of India (IRMA-India), described CWNs as one of the technologies changing

the face of India today. According to *Internet World Stats* at www.internetworldstats.com, 78 percent of the world population does not have Internet access. Many communities do not attract telecommunication companies either because of their remote location, low income, or low population density.

CWNs are smart venues for innovation and building physical capital (e.g., software and hardware). Yahel Ben-David, Director of AirJaldi, described how they invented fiberglass antennas to prevent monkeys from destroying the equipment.

Eventually, CWNs are expected to gain momentum thanks to their cooperative nature; low cost and adaptability; and magnificent benefits for individuals, businesses, and governments.

NEWS AND NOTES

SSIT Member, T&S Contributor, and ISTAS Participant, Robert Wolk, Dies

Long-time IEEE-SSIT member Robert Wolk passed away on August 7, 2009, at the age of 60. He was Associate Professor and Chair of the Management Department at the Bridgewater State College School of Business in Bridgewater, MA, U.S.A.

Prof. Wolk co-authored one of the first published surveys on microchip implants published in *IEEE Technology and Society Magazine* in Fall 2006, "Social Acceptance of RFID as a Biometric Security Method," co-authored by Christine Perakslis.

Dr. Wolk also presented articles and attended the IEEE-SSIT International Symposium on Technology and Society (ISTAS), including ISTAS'08 in Fredericton, New Brunswick, Canada. Katina Michael, of the University of Wollongong, Australia, and Program Chair of the upcoming ISTAS'10, noted that Dr. Wolk had also worked closely with a number of her colleagues and students, and that she had written two months ago asking him to take on the post of General Chair of ISTAS 2010.



Robert Wolk

"I knew something was up when he did not reply," she said. "Sadly this is the most devastating of news."

Dr. Wolk was the recipient of the 2009 Dr. V. James DiNardo Award for excellence in teaching, and advisor for the Bridgewater State College student chapter of the American Marketing Association. He also taught at Massachusetts Maritime Academy in Bourne, MA.

Dr. Michael said, "Robert was revered by his students. He was an all-around top guy!" Many former students signed the on-line guest book for Dr. Wolk at *Boston.com*. Comments included, "He was a great teacher whom everyone loved." And "Dr. Wolk was my favorite professor at BSC. He was an awesome professor and a great person. He will be greatly missed."

Dr. Wolk is survived by his wife Maureen, daughters Wendy Wolk Ryan and Dr. Andrea Wolk Rager, and siblings Toby and Joel Wolk. Donations in his memory may be made to the Student Chapter of the American Marketing Association, c/o Bridgewater State College, 131 Summer Street, Bridgewater, MA 02325-0002.