

PROJECT PURPOSE

Problem

As technology evolves and increasingly becomes a core part of business and home life, those without access to it and the skills necessary to utilize it will be unable to fully participate in society. From the recent technological revolution that has unfolded over the last generation, the internet has emerged as its most powerful and transformative tool. According to one prominent sociologist, Manuel Castells, “core economic, social, political, and cultural activities throughout the planet are structured by and around the internet and other computer networks. In fact, exclusion from these networks is one of the most damaging forms of exclusion in our economy and in our culture.”ⁱ Studies substantiate the enormous economic and educational impact technology is having on various facets of life:

- US businesses that have deployed internet-based business solutions have seen a cumulative savings over three to five years of \$155.2 billion;ⁱⁱ
- Jobs involving computer use pay, on average, 43 percent more than jobs that do not;ⁱⁱⁱ
- Access to computers and the internet at home correlates with academic success in math and science.^{iv}

Not surprisingly, those most likely to be without home computers and access to the internet, and therefore unable to take advantage of the many opportunities—economic, social, political—afforded by them, are low-income and minority households and communities, as well as households and communities in places where the market has failed to provide the necessary technological infrastructure. According to the most recent report by the National Telecommunications and Information Administration,^v

- 75 percent of households with less than \$15,000 annual income and 67 percent of households with income between \$15,000 and \$30,000 do not use the internet, while 86 percent of households with an income of \$75,000 or above use the internet.
- 68 percent of Latinos (86 percent of Spanish-only speakers) and 60 percent of African-Americans are not online, while 55 percent of Whites are online.

Similarly, the just-released report from the Pew Charitable Trusts^{vi} reports that race/ethnicity, income, and education level are three primary determinants of who is online in America; African-Americans or Latinos, those lacking a high school diploma, and those who earn under \$30,000 annually are less likely to be online. The survey also found that 30 percent of respondents who were not online cited economics: “Women, Hispanic and African-Americans, poorer Americans and those who live in rural or urban areas are most likely to point to cost pressures as a major reason why they aren’t online.” Furthermore, a report from the US Departments of Commerce and Agriculture reveals that more than 56 percent of cities with a population over 100,000 have access to DSL service, while less than 5 percent of cities with a population under 10,000 do.^{vii}

We know the four communities in this project are representative of the demographics of communities adversely impacted by lack of access. Pilsen is a largely low-income Mexican-American community on Chicago’s near southwest side. North Lawndale is a low-income primarily African-American community on Chicago’s westside. Elgin is a working-class community about forty miles northwest of Chicago that is becoming increasingly Latino. And West Frankfort is a very poor, remote former coal mining community in downstate Illinois. (See Appendix 1: Pilot Communities.)

Despite the incomplete data available, we nonetheless have reason to believe that these communities are among the adversely impacted by lack of access to technology. In Pilsen and North Lawndale, only 33 percent of households reported to have home internet usage, compared to 60 percent for the total metropolitan area.^{viii} A client survey by El Valor, a community-based social service agency in Pilsen, found that only 5 percent had a household computer.^{ix} According to a survey by the City of Elgin, 47 percent did not have computers/internet access.^x We believe there are two reasons why communities remain underserved—high costs of both

computers and access and poor or absent infrastructure. In many rural areas, infrastructure is completely absent. In West Frankfort digital switching—therefore DSL—is unavailable to households and small businesses,^{xi} and broadband access, if available at all, is only available through costly T1 lines. Even in communities where DSL is available, our experience and the experience of our partners indicate that getting service is a time-consuming and difficult process.

As one remedy to the poor data available on technology usage at a local level, CNT conducted its own market research, including surveys and focus groups among a sample of its 7,000 Community Energy Cooperative (a project of CNT) members in Pilsen and Elgin. Seventy-one percent of those surveyed from Pilsen responded that they do not have home internet access and 41 percent never use the internet—anywhere. In focus groups at both sites, participants overwhelmingly indicated that while they understood that having access to technology would improve the quality-of-life of their families, they considered current market rates unaffordable. From this market research, CNT began experimenting with an actual wireless community network; a Pilsen network of neighborhood residents is currently in place, and a working group is building one in Elgin. From these experiments we have learned: 1) the technology works—ten participants are presently on a small “mesh” network in Pilsen; and 2) there is widespread community interest in the potential power of community networks and their value as community assets.

Solution: Wireless Community Networks: Promoting Access to 21st Century Technologies for Underserved Communities (WCN)

We propose to build on the existing networks by developing four networks that will serve as a new infrastructure to deliver high-speed, low-cost, household-based internet access. The delivery mechanism will be built around one partner institution in each community, each of which possesses a strong institutional presence; technical know-how; and a training capacity. Each pilot will harness the creative potential of the network model as a way to advance the unique service delivery missions of each institution; sometimes this will involve job training and skill-building, other times education and training, and other times civic engagement and community development. (See Appendix 1: Pilot Communities for more information on potential applications of the network in each community.) This strategy allows partner institutions the freedom to use their imaginations about how the community network might best serve their clients, while at the same time serving a new goal: understanding how, at what cost, and under what conditions the community network model can gain scale, achieve sustainability, and be replicated elsewhere.

The demonstrations will rely on a “mesh” network model using Wi-Fi (the 802.11b networking standard) technology. Signals broadcast from an antenna located in each community will be received both by Wi-Fi cards installed in network members’ computers and “repeating” access points strategically placed at different locations within the community.

While lack of access to technology is of course not a new issue, we believe that the current strategy—centralized access to technology in the form of community technology centers (CTCs)—has limitations. CTCs have been challenged both to become self-sufficient, and to meet the demands of society at-large, which increasingly requires an integration of technology into daily life—i.e., computer and internet access at home. The wireless community network strategy builds on the CTC model and has the potential to address these two challenges by: 1) providing CTCs with a sustainable new business model; and 2) extending the reach of CTCs beyond their walls and into the homes and businesses of community members. At the same time, this strategy takes advantage of today’s most current technology—broadband. While most home users still do dial into the internet using a modem, by the end of 2003 it is estimated that 20 million homes in the US will have broadband access.^{xii} While this segment of the market was slow to develop, it has rapidly picked up speed in the last year. Paraphrased in a Ford Foundation report, community technology expert Lisa Servon states that digital

“inequities...will only increase as broadband, which enables users to access a higher volume of information increases among those with high incomes.”^{xiii} As with other new technologies, as they have gained market share, content and application developers will increasingly target those users.

Outcomes

The planned outcomes of this project are: 1) increased capacity of partners to better serve their clients by extension of services; 2) the creation and testing of four dense “mesh” networks serving approximately 1,000-1,200 households, small businesses, and other community institutions—*any of whom will receive donated and reconditioned computers, as needed*; and 3) a replicable, sustainable business model that builds a new community asset and reconnects participants to the mainstream economy. (See Appendix 5: Outcome Model.)

INNOVATION

Based on our own research and conversations with groups working in this field, while we know there has been a proliferation of wireless community networks across the country, most of these have been developed by technically-savvy professionals primarily interested in the application of cutting-edge technology. Examples include Seattle Wireless, Bay Area Wireless Users Group (BAWUG), College Terrace, and NYCWireless. These efforts, though notable, were never designed to address both the specific circumstances of low-income communities and the support required to end-users.

We also know that many others with an orientation toward community-based technology solutions specifically for low-income communities are also looking beyond the CTC model. In 2002, the Annie E. Casey Foundation convened a group of practitioners, funders, and experts in the field to discuss the challenges facing CTCs. They observed that not only are there few dedicated and long-term funding sources available to support both capital and operating costs, there is a lack of capacity within organizations to both sustain technology and develop leadership within the field on technology issues.^{xiv} Other efforts in practice include the United Way’s wireless community network in West Philadelphia, the Community Connections project in Boston, and the national work of the One Economy Corporation. None of these, however, combine the following three innovations:

1. Technological

This project relies on new technology developed to address the need for decentralized wireless networks. Traditionally, Wi-Fi networks have been based on a “hub-and-spoke” model. A “hub-and-spoke” network relies on a large antenna installation and expensive connectors, and access is limited to line-of-sight and the range of the signal. Our new technology combines consumer-grade Wi-Fi cards and commodity PC hardware with open-source software—customized by Earl Levine, who developed it for his Wi-Fi network in Palo Alto, California—to create “repeating” access points. These “repeaters” comprise a “mesh” network, which reduces the limitations of the traditional “hub-and-spoke” network model. In a decentralized “mesh” network, inexpensive, strategically-placed “repeaters”—which can either be made from recycled computers or customized low-cost aftermarket components—connect to each other and provide multiple points of access. This placement allows the network to grow organically as demand grows, and provides more complete coverage by “bouncing” the signal to areas obscured from direct line-of-sight. The foundations for this technology and the networks created by it have developed amongst Wi-Fi hobbyists; to date, to our knowledge, their application as a strategy for addressing the digital divide in low-income communities is unique to this project. (See Appendix 2 & 3: Technical Overview & “Mesh” Network Model Diagram.)

2. Economic

From its inception this project was designed to test the concept of a financially self-sufficient community-based network. In an era of dwindling philanthropic assets and constricted government budgets, economic

sustainability may be the most critical component of any new community endeavor. While CNT and its partners recognize the difficult financial circumstances in which many of the target households already find themselves, our experience based on the specialized market research we sponsored has also taught us that many of these same households might be willing to re-budget to support a network in their community that delivers affordable access. Our preliminary break-even analysis indicates that a network would be self-sustaining at between 1,500 and 2,000 members paying approximately \$10/month. Given that household density in many of the poorer urban areas in the US range from 3,500-10,000 households per square mile, the economics are quite realistic. By the end of year three the project will have determined the business model and put in place the support systems needed for the community networks to achieve proper scale and sustainability.

3. Social and Organizational

This type of network strengthens both communities and anchor institutions. A community with a wireless network is akin to a community with a lively park or thriving retail district, i.e., an asset that can contribute to the economic health and attractiveness of the neighborhood, as well as its social cohesion. As such, this idea has strong grounding in the asset-based community development movement.^{xv} Hotels and developers are already recognizing wireless networks as an asset and feature that will give them an edge on the competition, and the same is possible in the context of a neighborhood.^{xvi} Networks also strengthen the anchor institutions, themselves community assets, by expanding their capacity and reach into every home or business served by a wireless network, making it much easier to link community clients to already existing services and opportunities. For example, local institutions can bring services into the homes of their clients or aging residents can be kept informed of community public safety incidents. This conceptual framework—the asset-based community development framework nested within the larger social organizational framework—is unique to this project.

COMMUNITY INVOLVEMENT

Partnerships: Origins, Dynamics, and Responsiveness to Community Needs

The four anchor institutions (See Appendix 1: Pilot Communities) serving as partners in this project are:

- **Gads Hill Center**, a 100+ year-old family resource center and settlement house, which partners with the Pilsen community to develop the assets of its children, youth, adults, and families. Gads Hill Center operates a CTC.
- **Homan Square Community Center Foundation**, the operator of the Homan Square Community Center, which provides comprehensive social services—health, family support, educational, economic, and recreational—to the North Lawndale community. Homan Square, the result of a vision of a mixed-income community by developer Charlie Shaw, also operates a CTC.
- **School District U-46**, the second largest public school system in Illinois. This is also the lead partner in the Wi-Fi working group, which includes the Chamber of Commerce, Police Department, Boys and Girls Club—which operates a CTC—neighborhood organizations, and other local stakeholders.
- **John A. Logan College**, an open-enrollment community college that serves five rural Southern Illinois counties marked by chronic poverty, high unemployment, low mobility and low educational attainment. Logan has a technology mission and operates a distance-learning program.

These partnerships had several origins. In Elgin and Pilsen, CNT's Community Energy Cooperative had been working to build a community presence over the last several years. The result was that CNT had built partnerships with numerous institutions and stakeholders in these communities, among them Gads Hill Center and School District U46. Both of these organizations not only have deep roots in their communities, they also were very excited early on about the Wi-Fi technology and instrumental in already putting in place a base of community support for this project. In both Pilsen and Elgin, CNT conducted surveys of a sample of Cooperative members regarding their usage of technology and interest in community networks and broadband

access. Those surveys led to the establishment of a Wi-Fi working group in Elgin last autumn, composed of many community stakeholders, to plan for the establishment of a community network there. In Pilsen, a cadre of community residents has attended community meetings over the last several months about a wireless community network and ten are presently on the small network CNT has already built there.

The Homan Square Community Center Foundation in North Lawndale and John A. Logan College in West Frankfort are newer relationships. Both organizations have intimate knowledge of, and connections to, their communities, and immediately grasped the potential of wireless community networks in the context of their programming as a strategy for furthering their missions.

In each of our partner communities, support for this project extends beyond the partner institutions. Please see Appendix 13: Letters of Support.

Roles and Support of End Users

CNT and its partners have split responsibilities for carrying out this project in such a way that the strengths of each are fully maximized, and all partners have pledged significant resources to support this project, as evidenced by letters of support contained in Appendix 12: Partner Letters of Commitment and Appendix 7: Project Work Plan.

CNT's role will be to coordinate and manage the overall WCN project, including overseeing the budget; procuring and distributing equipment; developing the network technology; and overseeing the evaluation and knowledge capture processes. At the outset CNT will facilitate the collection and refurbishment of high-quality used computers for disbursement to network participants who do not own and cannot afford a computer. CNT and its partners are already developing relationships with computer recyclers and refurbishers throughout Illinois. In addition to refurbished computers, CNT will solicit donations and apply for grants from technology-based corporations and foundations for new computers. CNT and several of the partners have already applied for computers for use in this project from the Beaumont Foundation of America, and awards will be made in May 2003. At the same time, our Homan Square partner has coordinated many individual applications from North Lawndale residents to this same Beaumont program, suggesting that there will be a ready-made constituency for the community network. Throughout the WCN project CNT will provide training and support for the networks through online technical guides and regular maintenance visits to partners. CNT will manage the knowledge capture process, which will involve facilitating regular phone conferences and meetings among the partners and working with the partners to develop documentation and other processes both to track outcomes as well as share learnings and lessons.

The partners will be responsible for recruitment of participants, volunteer coordination, computer maintenance, and technical assistance. Partners will lead orientation sessions and trainings on computer and internet operations. End users will receive both written materials and access to orientation and training materials online in their preferred language. Partners will also staff a technical help desk for end users during their regular hours of operation, service that will be supplemented by volunteers, which partners will recruit and manage. Partners will tailor the content of each network to the specific needs of their communities.

EVALUATION AND DISSEMINATION

Evaluation

The Center for Urban Research and Learning (CURL) at Loyola University Chicago will act as the evaluator for the WCN project. CURL, founded in 1996, is a leader in community-based participatory research, including evaluation research, and acted as evaluator for an earlier TOP-funded program, "Every Block a Village Online" with the Westside Health Authority. CURL's director and founder, Philip Nyden, Ph.D., a professor of sociology and a founder of the Policy Research and Action Group (PRAG), will head the evaluation team. (See Appendix 8: Consultant Bios.)

This participatory evaluation (See Appendix 4: Evaluation Model) will utilize process and outcome evaluation methodologies via quantitative and qualitative tools. The process evaluation tools will document the creation of a relationship between CNT and anchor institutions as well as relationships between the anchor institutions and broader community constituents, e.g., measuring the strength of the relationship between the anchor institutions and the community residents might be assessed by conducting a satisfaction survey. In order to document the degree to which the proposed network becomes a sustainable community-based asset, outcome evaluation tools will seek to measure the extent to which the anchor institutions are better able to serve their clients.

Given the collaborative nature of participatory evaluation, the exact form of the evaluation plan will be determined with all the partners, including selection of indicators of success, how and when the data will be collected, and the target survey population.

Knowledge-Building

As a supplement to the outcome evaluation, the project will also incorporate a knowledge-capture process. This process is to ensure that there is a structured and deliberate way to draw out and document lessons learned and interim results. At varying intervals, using interviews and meetings, a consultant, Julia Parzen, will engage all network participants in the learning process. Our consultant, whose bio is included in Appendix 8: Consultant Bios, is an expert in group learning design and facilitation, learning processes, and evaluations. The primary goal of this process is to ensure that a sustainable business plan has evolved, one that can be adopted and scaled by other communities.

Dissemination

Since we intend this project to serve as a model for other lower-income communities, dissemination of our experience and findings will play a critical role. CNT will use its expertise in web design to create a website for this project as a primary dissemination vehicle. We will distribute our findings as the project unfolds not only through the web, but also through a newsletter, which will be distributed in hard copy form and online. We will make use of the national networks of which CNT is a part or with which it has relationships, including the US Conference of Mayors, Funders Network for Smart Growth and Livable Communities, the Neighborhood Funders Group, and the Brookings Institution Center on Urban and Metropolitan Policy. CNT and Brookings are currently engaged in a project exploring the role of information technologies and information infrastructures as it relates to community development. Staff from this project will also attend the yearly FreeNetworks Conference and other important conferences.

Another component of dissemination will be an advisory committee composed of a cross-section of individuals in the community and economic development fields who have expertise in the areas of economic innovation, business planning, and community development finance. The committee, which will include several experts in technology, will interpret the knowledge capture and evaluation components and advise CNT and its partners about growing the program to a larger scale. (See Appendix 6: Advisory Committee.)

PROJECT FEASIBILITY

Technical Approach

Wireless networks will utilize customized “mesh” network software and standard hardware to provide broadband access with the maximum throughput of 11Mbps and a minimum of 1Mbps (a result of instability caused by networking overhead, interference, and attenuation). Even at the lowest speed, Wi-Fi is faster than the typical DSL connection of 600kps. Wireless networks not only offer high-speed low-cost access, they require minimal infrastructure—computers with a Wi-Fi card, repeating access points, and a main access point connected to a high-speed internet source.

Using CNT's Geographic Information Systems (GIS) capabilities—to the best of our knowledge one of the largest public interest GIS groups in the Midwest—we mapped different datasets, including neighborhood density and location of community organizations, to determine probable strategic sites for repeating access points, as well as the probable quantity of repeating access points needed to provide coverage in each community. The location and quantity of repeating access points for each of the pilot networks will be confirmed using signal testing on a laptop computer.

Network operations will include bandwidth usage control and security at the server level. Bandwidth control, which maintains the speed and the robustness of the connections for end-users, will be maintained through account management and bandwidth throttling tools. Security will be provided through user authentication and authorization and bandwidth throttling tools.

As already mentioned, participants in the networks will be identified by community partners. If partners are interested in connecting additional participants and/or more community residents are interested in being a part of the network beyond the proposed 250-300 participants per community, more people can be added. Expanding the network(s) will entail that interested parties supply necessary equipment (computers and Wi-Fi cards) for their own use and identify locations for repeating access points depending on the current location and range of coverage. New participants may, however, be restricted based on network bandwidth.

Technical research and development will be a key feature of the WCN project in order to keep abreast of changes in the market, particularly related to new software developments. Technical staff will therefore have the opportunity to attend conferences and workshops in the field, as well as subscribe to trade journals and allocate significant time to software and network development. We are interested in maintaining a cutting edge and fully operational wireless community network over the life of the project.

Privacy and Security

There will be little or no sensitive information gathered from the end users that may be considered “private” information. Should it become necessary to gather such information, standard physical security precautions will be taken to ensure it is protected. The information will be kept offline and protected from unauthorized access. In relation to the Wi-Fi technology specifically, because Wi-Fi's security protocol, Wired Equivalent Privacy (WEP), is weak, we will employ stronger security measures at the network level, including user authentication for limiting access, virtual private networks (VPN) for securing transmissions, and firewalls. (See Appendix 2: Technical Overview.)

Sustainability

Partners are committed to the development of a fee-based operating structure to ensure network self-sufficiency. Recently the Neighborhood Resource Technology Center, the CTC based at Homan Square Community Center, successfully initiated an affordable fee scale for access to and delivery of its training services. Based on this commitment and experience, along with CNT's own market research, which indicated a willingness among pilot community residents to pay \$10-15 for network access, a fee structure will be tested in year two and made operational in year three. CNT already has a billing capacity. It has acquired an expertise in an industry-leading membership management system, which it uses to manage approximately 9,000 members of several other CNT projects; this could easily be adapted to this project.

Qualifications

CNT is uniquely qualified to carry out this project. For twenty-five years the Center has developed tools to enhance the viability and sustainability of low- and moderate-income communities. These tools have served a number of functions: to improve the environmental quality of neighborhoods and regions; to enhance the ability of

residents to engage, on fair terms, in the market; and to support the data and information needs of individuals and groups working to improve their communities and regions. CNT's staff of fifty-one incorporates an expertise in economics, urban and regional planning, geographic information, technology development and application, program design and implementation, and community organizing. (See Appendix 10: Staff Bios.) We work on a range of issue areas, including transportation, energy, infrastructure, and communications, and while the focus of our work is in Illinois, we have an office in San Francisco, local projects underway in San Francisco, Seattle, and Atlanta, and projects with national scope. (See Appendix 9: CNT Overview.)

Technology has always been a critical component of CNT's work. At the time of the SBC/Ameritech merger in Illinois, the Center was one of the founding members of the Digital Opportunity Coalition, which played a key role in the development of digital divide funds in the State of Illinois. In 1995, CNT became one of the first TOP (then called the National Information Infrastructure Program) grantees. Based on CNT's community-based work, it had come to believe that the inability of low-income communities to improve their places was based in part on a lack of access to good information and data. To address this, CNT developed a neighborhood indicators tool, first available through dial-up, and later through the internet under the auspices of the Neighborhood Early Warning System (NEWS). NEWS became the model for Neighborhood Knowledge Los Angeles (NKLA), a TOP grantee. What CNT learned from this experience is that lack of information was only part of the problem; most community groups lacked the internet access necessary to get the information in the first place.

PROJECT BUDGET

The complete budget and associated justifications by line item can be found in the Budget Section of this application. The budget request of \$675,000, matched by \$675,000 (See Appendix 11: Project Match Commitments) is both reasonable and cost-effective in consideration of the large geographic area covered by the project. The partnership will match these requested funds dollar for dollar. Please refer to both the Statement of Match in the Budget Section and Appendix 12: Partner Commitments.

ENDNOTES

ⁱ Manuel Castells, *The Internet Galaxy: Reflections on the Internet, Business and Society*, p.3.

ⁱⁱ Brookings Institution, Momentum Research Group, University of California-Berkeley, *Net Impact*, http://newsroom.cisco.com/dlls/tin/pdf/NetImpact_Study_Report.pdf.

ⁱⁱⁱ The Children's Partnership, *National Fact Sheet: U.S. Kids & Families Online*, <http://www.childrenspartnership.org/youngamericans/pdf/NationalFactSheet.pdf>.

^{iv} National Center for Education Statistics, *Third International Mathematics and Science Study*, <http://nces.ed.gov/timss>.

^v NTIA, *A Nation Online: How Americans are Expanding their Use of the Internet*, <http://www.ntia.doc.gov/ntiahome/dnl/>.

^{vi} Pew Internet and American Life Project, *The Ever-Shifting Internet Population: A New Look at Internet Access and the Digital Divide*, http://www.pewinternet.org/reports/pdfs/PIP_Shifting_Net_Pop_Report.pdf.

^{vii} US Departments of Commerce and Agriculture, *Advanced Telecommunications in Rural America: The Challenge of Bringing Broadband Service to All Americans*, http://www.its.bldrdoc.gov/tpr/2000/its_tadv_tele/adv_tele.html.

^{viii} Metro Chicago Information Center, *Metro Survey 2002: Areas in Chicago*, Metro Survey CD.

^{ix} Metropolitan Planning Council, *Connecting Chicago's Communities*, <http://www.metroplanning.org/articleDetail.asp?objectID=273&keyword=el+valor>.

^x City of Elgin, *Community Survey, 2002*.

^{xi} Illinois Department of Commerce and Economic Opportunities, *Community Profiles: West Frankfort, Illinois*, <http://www.commerce.state.il.us/communityprofiles/profiles/WESTFRANKFORT.htm>

^{xii} *Wall Street Journal*, "Leading the News: Comcast Shows Broadband Hitting Its Stride," October 29, 2002.

^{xiii} Dara Meyers. "Software Problem: Closing the Digital Divide Depends More on Training and Content than Computers" in *Ford Foundation Report*, Fall, 2002.

^{xiv} Annie E. Casey Foundation, *Sustaining Technology in Low-Income Neighborhoods: A Consultative Session*, <http://www.aecf.org/publications/data/SustainingTech.pdf>, 2002.

^{xv} See John P. Kretzmann and John L. McKnight. *Building Communities from the Inside out: A Path toward Finding and Mobilizing a Community's Assets*. Evanston, IL: Northwestern Institute for Policy Research, 1993; Luther K. Snow, *Community Transformation: Turning Threats into Opportunities*, ACTA Publications.

^{xvi} See *Wall Street Journal*, "Anytime, Anywhere," March 31, 2001 and *Broadband Wireless Online*, "Broadband: Utility or Amenity?," Vol. 2, No. 05 May 2001.