What Works Case Study

WHAT WORKS: n-Logue's Rural Connectivity Model

Deploying Wirelessly-Connected Internet Kiosks in Villages Throughout India

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December 2004

Executive Summary

In a country where rural telecommunications infrastructure has traditionally been installed only through licensing obligations, n-Logue Communications Ltd. has created a for-profit business model designed to affordably meet the latent demand for rural connectivity. The company was incubated by the Telecommunications and Computer Networks (TeNeT) Group at the Indian Institute of Technology in Madras, as part of the group's mission to create appropriate and cost-effective technology solutions designed for developing countries. n-Logue aims to fulfill its stated mission of "significantly enhancing the quality of life of every rural Indian" by setting up a profitable network of wirelessly-connected Internet kiosks in villages throughout India.

Business Model

To enable its rapid expansion, n-Logue has employed a three-tier franchise business model that pushes the delivery and management of Internet services closer to the end user. Each tier consists of independent, financially self-sustaining entrepreneurs operating interdependently with one another.

At the top level is n-Logue, responsible for overall management of the network. The company facilitates relationships between its upstream partners – banks, governments, hardware and solution providers – and its business franchisees.

On the second tier are the Local Service Providers (LSPs), responsible for managing the project at the local level. In coordination with n-Logue, the LSP invests in and sets up an Access Center that provides last-mile access to subscribers in the project area.

On the bottom tier of n-Logue's business model are the local entrepreneurs that are recruited by the LSP to invest in and set up Internet kiosks in their villages. The kiosk owners purchase the computer equipment through n-Logue, who also provides training, support and technical assistance. These locally-owned franchises offer a variety of Internet and computer-based services aimed at the rural market.

Technology

n-Logue currently relies on corDECT, a fixed Wireless Local Loop (WLL) technology, to provide the backbone of its IP network. Developed by the TeNeT Group, corDECT provides the most cost effective per-line cost available to n-Logue's networks. The point-to-multipoint wireless radio frequency technology supports simultaneous voice and data channels of 35-70 kbps to subscribers within a 10 km radius of its broadcast location. Coverage is extendable up to 25 km through the use of a repeater. Its low costs, ease of deployment, and minimal maintenance requirements make corDECT ideally suited for rural use.

Enterprise

n-Logue facilitates a variety of relationships between its upstream and downstream partners. The company takes care of regulatory and licensing issues, and manages relationships with both incumbent telcos and relevant government agencies. n-Logue has also partnered with banks and hardware suppliers, giving kiosk owners favorable access to loans and low cost computer equipment. Finally, n-Logue and its partners have developed relevant local language content and services aimed at making the kiosk useful to all sectors of rural society. As such, the company functions as more of a full-service provider, rather than as a traditional ISP.

Challenges

n-Logue faces a number of challenges to maintaining its aggressive growth rate and creating a kiosk-based ecosystem that realizes the benefits of IT for rural development. Finding the right personnel at each level of the franchise model is critical. The biggest determinants of the profitability of a kiosk are the

talents of its operator, who must perform many roles, including salesperson, marketer, teacher, service provider, and computer professional. The LSP, too, must understand the nature of the business and be aggressive in marketing its services and expanding its subscriber base. As n-Logue expands, its ability to hire and retain enough qualified employees capable of performing well in this emerging market will help to set the pace of the company's growth.

As the company scales, it also faces internal challenges typical of fast growing enterprises. The company's success depends on its ability to quickly put in place the systems and processes necessary to effectively manage its growth. n-Logue must also minimize the impact of external factors that could impede its growth, such as village size and availability of electricity in rural areas.

Although the threat of competition does exist, it is minimal. Despite having the necessary licensing, the incumbent Telcos have chosen not to aggressively expand their presence in rural areas. By relying on its own infrastructure and investment at the local level, n-Logue is also in a better position to scale than other kiosk networks operating in India. n-Logue retains a competitive advantage over its potential competitors because of its proven experience to leverage relationships between its upstream and downstream partners.

Conclusions

n-Logue has developed a viable and scaleable model for delivering information-based services to rural areas. Through its three-tiered franchisee business model based on corDECT technology, the company is able to quickly and cheaply scale its network. Moving forward, n-Logue is well positioned to capitalize on progressive uses of technology that enable rural development. As the company scales, there is enormous potential to leverage n-Logue's rural networks in ways that take advantage of both existing and new technologies in the areas of health, finance, agriculture, e-government, and civil society empowerment. Significant opportunities also exist for the creation of new partnerships with corporations, governments, and NGOs whose use of n-Logue's networks brings further benefits and development to rural areas.

There will be challenges as the company continues its aggressive expansion, most notably in finding, training and supporting the right personnel at all three tiers of its business model. The company must work to put in place all the systems and processes necessary to effectively manage its growth and replicate its successes. Although the potential for competition continues to exist, n-Logue's experience in creating and managing a diverse set of partnerships gives it an advantage as it develops rural ecosystems that bring benefits to all sectors of society. The next 12 months will be the most demanding for the company since it was founded, and will be a critical test of the viability of the company's business model on a national scale.

Company Profile

n-Logue's stated vision is "to significantly enhance the quality of life for every rural Indian by driving the digital revolution profitably." The company aims to fulfill its mission by setting up a network of wirelessly-connected Internet kiosks in rural villages throughout India. It has employed a three-tiered franchisee model that empowers local entrepreneurs to invest in and help run the network. At the top is n-Logue, which manages overall operations. On the second level are the Local Service Providers (LSPs), who set up the infrastructure that provides connectivity. At the village level, kiosk owners provide information-based services to rural populations.

Unlike other government or NGO attempts to bridge the digital divide that fail when funding or political will dries up, n-Logue is building its business to be both financially viable and scaleable. By ensuring the profitability of both itself and its downstream partners, n-Logue aims to build rapidly a sustainable rural Internet network that will extend the benefits of digital technology to all sectors of society.

To achieve this goal, the company has built in several key aspects to its business model:

1. *Decentralization:* n-Logue's three-tiered franchisee model pushes the management of its service delivery closer to the consumer. By enabling and then relying on entrepreneurial investment at the local level, the company is able to rapidly scale its network.

2. *Appropriateness of technology:* With its low-cost deployment over sparse areas, and ease of installation and maintenance, corDECT technology is ideally suited for rural use. The point-to-multipoint wireless access system is able to connect hundreds of subscribers in each project area.

3. *Relevance of services*: n-Logue and its partners have developed relevant local-language content aimed at all sectors of rural society. Services offered include agriculture, health, e-government, education, astrology, and entertainment.

4. *Income generation*: Services supplied by the kiosks bring financial benefit to the rural population. Villagers can obtain timely information, such as the latest crop prices or currency exchange rates (for those receiving remittances), or save money by not having to travel to obtain similar services. The network also creates jobs at the local level.

5. *Strategic partnerships*: n-Logue leverages a variety of strategic partnerships to provide access to capital, equipment, connectivity, and services in the village kiosks. These relationships allow n-Logue to function as a full service provider, rather than as a typical ISP.

Company Origins

With the support of the Telecommunications and Computer Networks (TeNeT) Group[1] at IIT, Madras, n-Logue Communications Pvt. Ltd was established in April 2000 to meet the huge and largely unmet demand for connectivity in rural India.

TeNeT is dedicated to developing appropriate and cost-effective technology solutions designed for developing countries. Several other TeNeT-incubated companies provide technology that is used by n-Logue. These include Midas Communications, which markets the corDECT Wireless Local Loop technology that is central to n-Logue's business model, and Banyan Networks, developer of the RAS Internet switching technology.

[1] **http://www.TeNeT.res.in/**

Through a non-profit company called Vishal Bharat Comnet, the TeNeT Group currently holds a controlling share in the company. Through its ongoing research, the Group continues to develop new technologies of use to n-Logue.

Context

Current Infrastructure

Voice

The first telephone exchange in India began operating in January, 1882. Since then, the network has grown into one of the ten largest in the world, primarily by providing services in urban and peri-urban areas. Infrastructure in rural areas is limited, and has been developed primarily by BSNL, the former government monopoly, through a fund set up to provide connectivity to unprofitable areas. Historically, teledensity has remained low and service has been unreliable – trends that continue today.

Recognizing the importance of adequate telecommunications infrastructure to economic development, the government of India began modernizing its telephone system in 1986. To accelerate this process, the government issued its National Telecommunications Policy in 1994, opening up the market to private competition. Today, there are 7 Basic Service Operators (BSOs), 35 cellular operators, and 11 VSAT (Very Small Aperture Terminal) satellite providers.

The government also overturned a statute in the 1951 Telegraph Rules, allowing the creation of shared-access "Subscriber Trunk Dialed Public Calling Offices" (STD-PCO). Now numbering in the tens of thousands, these manned payphones are set up and operated by a local entrepreneur who acts as a BSNL franchisee. Through a revenue sharing arrangement, BSNL provides connectivity to the Public Switched Telephone Network (PSTN), and the STD-PCO operator makes a 20% commission on the phone time he resells.

India's teledensity has increased rapidly in the past few years, primarily through growth in wireless subscriptions. By the end of February 2004, the country had more than 74 million connections, including 42.4 million fixed-line and 31.6 million mobile lines. With the addition of another 20 million subscribers in 2003 alone, India achieved its teledensity target of 7 per 100 more than a year ahead of schedule.

Mobile connections accounted for 83 percent of overall growth in 2003, and will soon outnumber landline ones. The number of subscriptions added in 2003 was 3 times higher than the previous year, and the average monthly growth was 14 times higher than the previous 8 years'. Subscribers increased more than 12 percent in the first two months of 2004 alone, compared to only 1 percent for fixed-line telephones during the same time period.[2]

Cellular growth has been aided by a 95 percent decrease in call charges over the past decade, from US$0.32 (Rs 14) per minute in 1995, to US$.02 (Rs 1) per minute in 2003.[3] Today, the effective local call charges for fixed and mobile lines have converged.[4]

Despite its improvements, India's telephone network still excludes vast rural sections of the country. Deterred by high deployment costs and uncertain returns in poor, geographically dispersed areas, BSO and cellular operators have tended to avoid entering these markets, and have done so recently only under pressure from rural service obligations built into their licenses by the government.

[2] **http://www.trai.gov.in/**
[3] Currency conversions based on data available: **http://finance.yahoo.com/currency?u**
[4] **http://www.coai.com/telephny.htm**

Data

Internet service was first offered to the general Indian public in 1995, and today the country has a total of 45 nationwide Internet Service Providers (ISPs), as well as several regional providers. In areas where it is available, the Internet is accessed mainly through fixed telephone lines using dial-up, but only at an average throughput of 10 kbps and a charge of approximately $.56 (Rs 26) per hour. Broadband use is growing in urban areas, and is currently used by almost half of all small businesses.[5]

Total Internet subscriptions have grown 231.6 percent since 2000, from 5,000,000 to more than 16,500,000, and shared-access cyber cafes can be found readily in urban areas throughout the country. Despite this rapid growth, overall Internet penetration is a meager 1.5 percent, compared to 7.2 percent for all of Asia. Service is almost non-existent in rural areas.[6] The International Telecommunications Union (ITU) recently ranked India 119th among 178 countries – fourth worst in its classification category - in the ITU Digital Access Index, a survey that measures nationwide access to information and communication technology (ICT) services.[7]

Business Structure

Technology

The Basics

n-Logue employs a service-based business model that is technology neutral. While the company continuously seeks out new technologies to better enable its delivery of services, it currently relies on corDECT to provide the backbone of its IP network. The technology provides the most cost effective per-line cost available to n-Logue's networks.

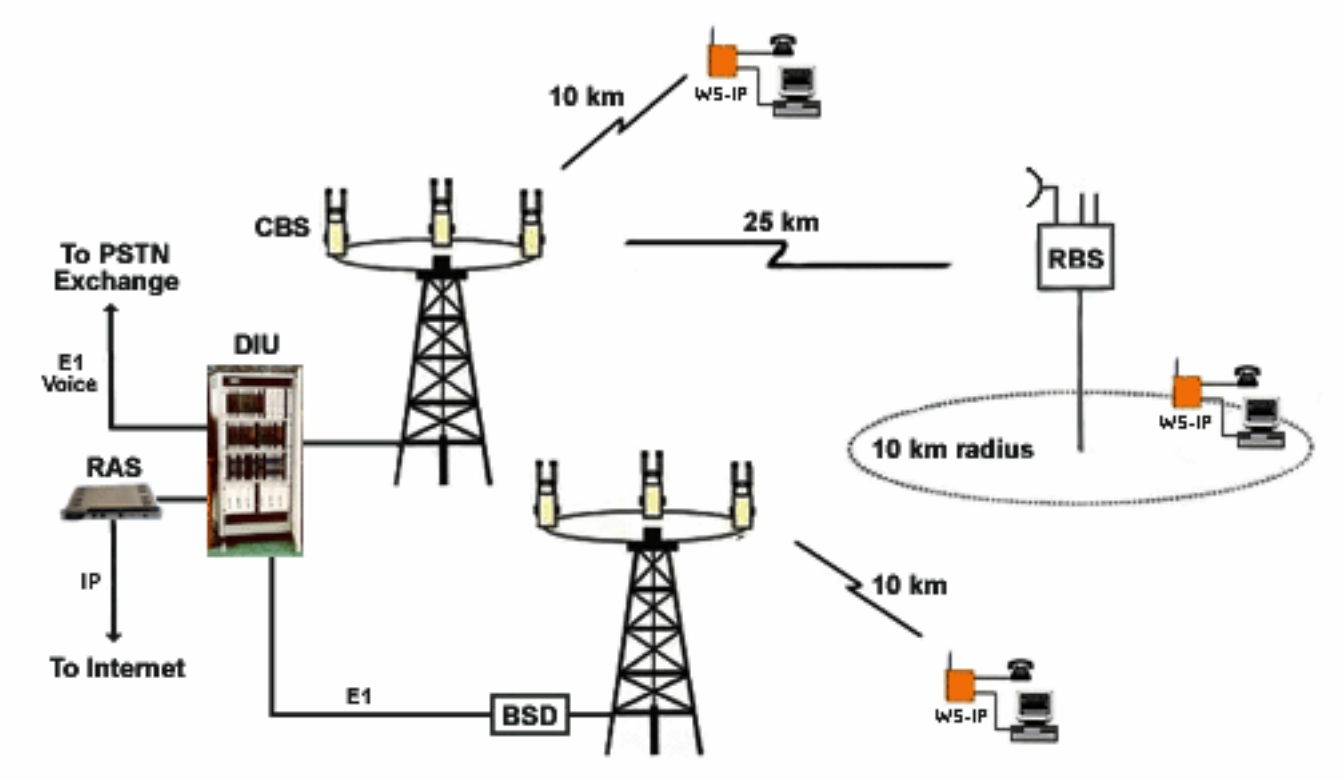
corDECT is a fixed Wireless Local Loop (WLL) technology developed by the TeNeT group at the IIT Madras, in association with US-based Analog Devices. The point-to-multipoint wireless radio frequency technology is based on the European DECT standard specification, and supports simultaneous voice and data channels of 35-70 kbps to subscribers within a 10 km radius of its broadcast location.

Central to the corDECT system is the DECT Interface Unit (DIU), which allows n-Logue to provide service to up to 1,000 subscribers. The signal is broadcast from the DIU to the remote subscriber via a Compact Base Station (CBS) located on a nearby tower. The line-of-sight connectivity is extendable to up to 25-35km or more with the use of additional Relay Base Stations (RBSs), which receive the signal from the DIU and then send it on to the subscriber's Wall Set (WS-IP). The WS-IP contains two ports, allowing the subscriber to simultaneously receive both voice and data services. A Base Station Distributor can also be used in hilly areas where establishing line-of-sight is difficult. Full details are included in Appendix B.

Marketed by Midas Communications, the technology has also been exported to 16 other countries. Research and development geared towards improving connectivity speeds, simplifying interfaces, and lowering costs is ongoing. The next generation, CorDECT 2.5G, offers 80-200kbps and is currently under deployment.

[5] **http://broadband.org.in/reports/F5653D3E-2F4C-4145-995F-0407D21528B9.asp**
[6] **http://broadband.org.in/reports/BF58AAF2-F2F4-44F4-AD17-6105D3E83211.asp**
[7] **http://www.itu.int/newsarchive/press_releases/2003/30.html**

Figure 1. corDECT Design
There are three ways that the DIU connects to the subscriber's wall set: 1) directly to subscribers within a 10 km radius of the DIU, 2) through an RBS located up to 25 km from the DIU, and 3) through a remotely located BSD that connects to the DIU through an E1 (fiber) line.



Appropriateness of Design

corDECT was designed keeping in mind the economic realities of bringing telephony and Internet to sparsely populated areas. Its low costs, ease of deployment, and minimal maintenance requirements make corDECT ideally suited for rural use. The DECT Interface Unit (DIU) contains all of the features of a traditional telephone exchange switch, but is scaled down to meet the subscriber requirements of rural areas. Its built-in Operation and Maintenance Console (OMC) allows real-time monitoring and management of the entire system, reducing the staff requirements necessary to operate and maintain the unit.

corDECT makes good use of existing infrastructure. Almost all district headquarters in India today are connected by fiber to the PSTN backbone, eliminating the need to use unreliable legacy copper wire infrastructure. The technology is also energy efficient. The DIU consumes less than 600 watts of power, and the wall sets are capable of being powered by a solar panel. An RBS located on a remote hilltop can also be powered by solar energy, maximizing the potential subscribers it can reach.

Business Model Overview

n-Logue has employed a three-tier franchise business model to enable rapid expansion. Drawing on the success of cable TV operations in India, the decentralized model pushes the delivery and management of Internet services closer to the end user. Each tier consists of independent, financially self-sustaining entrepreneurs operating interdependently with one another.

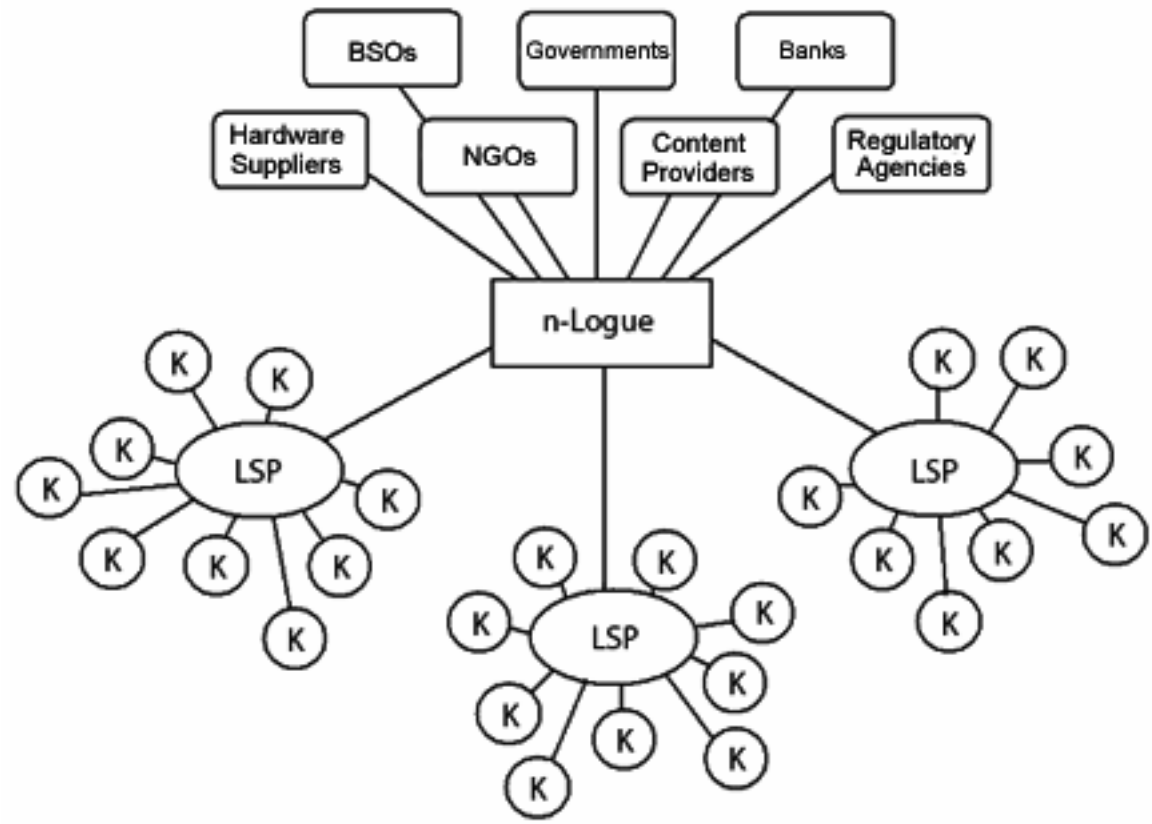
At the top level is n-Logue, responsible for overall management of the network. The company facilitates relationships between its upstream partners – banks, governments, hardware and solution providers – and its business franchisees.

On the second tier are the Local Service Providers (LSPs), responsible for managing the project at the local level. In coordination with n-Logue, the LSP invests in and sets up an Access Center that will provide last-mile access to subscribers in the project area.

On the bottom tier of n-Logue's business model are the local entrepreneurs that are recruited by the LSP to invest in and set up Internet kiosks in their villages. Modeled after the ubiquitous STD-PCO booths that have covered India in the past decade, these locally-owned franchises offer a variety of Internet and computer-based services aimed at the rural market. The kiosks and their services are marketed under the brand name 'Chiraag', which means 'enlightenment.'

As franchisees, both the LSPs and kiosks are business entities independent of n-Logue, each having a financial stake in their own success, and each responsible for paying back any loans they take to begin their businesses. Although there is currently no annual franchisee fee, n-Logue continuously supports its franchisees in a variety of ways to ensure their, and its own, success.

Figure 2. Business Model



Enterprise

Upstream Partnerships

Regulatory & Licensing

The Department of Telecommunications granted n-Logue a Class A ISP license in November 2001, allowing it to provide Internet services nationwide. Since n-Logue uses wireless technology, each project must also obtain a local frequency license, as well as receive approval for the location of the Access Center.

With the help of Dr. Ashok Jhunjhunwala and the TeNeT group at IIT Madras, n-Logue is now lobbying for the establishment of a Rural Service Provider license which would allow the company to provide both voice and data services in rural areas where BSOs already have a license to operate but are not currently providing service. There is no precedent in India for such a license, and it will take time to overcome the regulatory and bureaucratic barriers to its establishment before it directly affects n-Logue's rollout. A current proposal for "Niche Operators" enabling small operators to offer telecom services in low teledensity areas as been tabled by the Telecom Regulator.

Liaison with Incumbent Basic Service Operators (BSOs)

n-Logue relies on established relationships with incumbent telephone and Internet providers to provide connectivity to its network. Satyam Infoway, India's dominant bandwidth supplier, provides a 64 kbps connection to all of n-Logue's projects for a rate that is negotiated annually. India's largest telco, BSNL, provides the leased-line connectivity between the Access Center and the nearest Satyam PoP Node (Point of Presence) in the majority of n-Logue's projects. BTNL covers the rest.

In 2003, n-Logue signed an agreement with Tata Teleservices Ltd. that would have allowed it to provide telephony in 25 to 30 of its projects, covering 2,000 villages in Maharashtra and Tamil Nadu. Through the revenue sharing arrangement, n-Logue would have operated under the umbrella of Tata's Telephony License, and in doing so, help to fulfill the company's rural service obligations. In December 2003, when Universal Access Service Licensing went into effect, those rural obligations were dropped, and the plan has since been scaled back to only 15 projects covering 1,000 villages. Future expansion of the agreement, and the establishment of similar agreements with other BSOs, will depend on the financial results of the telephony pilot, as well as any regulatory changes that re-establish rural obligations.

Government Agencies

Government agencies have provided n-Logue with financial, regulatory, and content support. For example, under a scheme called Krishi Mahiti Kendra (Agricultural Information Center) that was meant to establish agricultural information hubs in Maharashtra, the Government of Maharashtra agreed to provide a grant that covered 50 percent of the capital costs of the first 20 kiosks in Baramati. The Government identified which villages were to be covered, and those entrepreneurs who would receive the subsidy. The results have been mixed. Although some kiosks were able to take advantage of the discount, several of the packages went to individuals who were already well off and used the hardware for their private use.

More recently, n-Logue has signed an MOU with the Gujarat Informatics Limited (GIL), a Government of Gujarat company, to greatly expand rural connectivity in the state. Through the Gyan Ganga Project, 16 new projects will be established in Gujarat during 2004, each connecting villages within a 25 to 30 km radius. n-Logue is working closely with GIL and other branches of the Gujarat government to develop new services and create local language content relevant to villagers. The tie-up between n-Logue and GIL is the first active public-private partnership in the digital divide space where both the parties have investment stakes, and the collaboration is expected to be role a model for other states.

Local governments have also taken advantage of n-Logue's network. In Theni (Tamil Nadu), for instance, the district's police department has computerized its operations. It uses Web cameras and Internet connectivity to rapidly share data on suspected criminals. The government of Andhra Pradesh is also utilizing n-Logue to provide digital connections to its eSeva network. Though eSeva kiosks, rural villagers are able to access a variety of citizen-to-government and citizen-to-citizen services.

Development Agencies and Foundations

n-Logue has also partnered with development agencies and foundations. For instance, in Melur, Tamil Nadu, n-Logue signed an MOU with the Dhan Foundation. Through the partnership, n-Logue has provided connectivity for 50 kiosks funded through the Sustainable Access in Rural India (SARI) initiative. The project was set up to demonstrate the viability of the kiosk model. Dhan has also assisted n-Logue in conducting its local research.

Access to Capital

Most kiosk owners require a bank loan to cover the initial costs of opening their business, but because they are typically young and rurally based, often do not have the credit history or collateral necessary to obtain a loan approval. To overcome this lack of access to capital, n-Logue has partnered with the State Bank of India (SBI). Through its "Chiraag-Cyber Plus" program, kiosk loans are short-listed for approval and receive expedited access to funds.

The Small Industries Business (SIB) loan is limited to US$1,115. To purchase the US$1200 kiosk kit, the entrepreneur must provide seed capital of US$85, or 7% of the purchase amount. This is less than the 10-15% typically required for such a loan. The loan is given for 60 months, at a 9% rate, resulting in a monthly payment of US$23. There is a 3-month moratorium on the loan, giving the kiosk owner time to establish his business before his overhead costs increase.

Based in Chennai, SBI is currently providing loans to kiosk operators in Tamil Nadu and Karnataka. 268 kiosks have already been funded in Tamil Nadu alone. SBI began to fund kiosks in April 2003, only after completing a 5-month study of n-Logue's project in Melur that examined the viability of the kiosk model. Before that time, getting a bank loan was a long and tedious process. Although in some instances state governments did provide limited subsidies, the lack of a banking partner hampered n-Logue's early plans to scale.

Those LSPs that are not self-financed can take a loan through SBI. The Tamil Nadu Individual Investment Corporation (TIIC) also provides loans to LSPs within the state. Unlike the kiosks, the LSPs must provide collateral for the loan, typically in the form of Access Center equipment.

In September 2004, n-Logue also partnered with another national bank, ICICI, to provide similar loans to its downstream partners. The kiosk loan differs from SBI's in that it is given for only 36 months, resulting in a higher monthly payment of $36. It also has a 6-month moratorium on initial repayment.

Facilitating Hardware Purchases and Maintaining Hardware

All hardware for both the Access Centers and kiosks are sourced through n-Logue. Although n-Logue does not have any MOUs with its hardware suppliers, it is able to negotiate favorable prices based on its volume purchases. As n-Logue grows, the economies of scale achieved from its sizeable purchases will yield additional savings that can be passed along to its downstream partners.

n-Logue sources hardware from several suppliers:

- Midas Communications: corDECT technology
- Banyan Networks: RAS
- HCL: branded PCs
- Consul and Alacrity: UPS with battery

- UMAX: digital camera
- HP, Epson, and Wipro: printers
- Cygnus: modems
- Dax Networking: switches
- Nortel and Cisco: routers
- Honda: generators

Through its affiliation with IIT, n-Logue maintains a special relationship with Midas Communications and its affiliate Banyan Networks, both of which were also incubated at the university. The association ensures that n-Logue will have continual access to its most critical technologies.

Content

Demand for kiosk services are driven by their usefulness in a rural context. Literacy rates, language barriers, and income levels all affect the types of IT-enabled services that kiosks can offer. To overcome these obstacles, n-Logue and its partners have developed relevant local language content and services aimed at all sectors of rural society.

Marketed under the brand name Chiraag, n-Logue has created computer education modules for each level of proficiency, from young children who are being exposed to IT for the first time to professionals looking to improve their job skills. Agriculture, government, and health services are available through a variety of local-language portals and via relationships with regional partners. Many of these take advantage of iSee, a low-bandwidth multiparty videoconferencing software that allows villagers to interact directly with remotely located experts. Astrology and matchmaking services are frequently offered, and entertainment is provided through video games, movies, and music. Offline applications, like desktop publishing or photo studio, are also popular, saving the consumer travel time and money by locally replicating services that are already offered in areas with larger populations. Full details on all of n-Logue's services, including a breakdown of their earning potential, can be found in Appendix A.

Particularly entrepreneurial kiosk owners have launched their own services as well. One has become the database manager for a local company, earning additional revenue through regular data entry. Another provides the latest exchange rates to a village that has a high percentage of people receiving remittances from abroad. An inter-village courier service has also been started in Tamil Nadu, whereby messages are sent between villages via e-mail, and then printed out for local delivery.

Large corporations, intending to expand their distribution networks, are also adding services to the kiosks by partnering with n-Logue. One such partnership is with ICICI, India's largest bank. Government restrictions and lack of infrastructure make setting up brick-and-mortar branches in rural areas both costly and time consuming. To overcome this problem, the bank, in coordination with the IIT, Madras, has developed a low-cost ATM that will allow it to expand its offerings to villagers. The ATM takes advantage of the kiosk's computer and connectivity to save costs, and will allow ICICI to provide insurance, investment plans, loans, and stock trading to kiosk patrons. The ATM is expected to cost about $1,000 and includes bio-metric verification and ability to handle soiled notes. The machine is expected to be deployed in rural Chiraag kiosks by early 2005.

Downstream Partnerships

Local Service Providers

n-Logue identifies and partners with a Local Service Provider (LSP) in each area in which it operates. In most instances, the LSP is already an established small business owner, such as a local cable TV operator. In coordination with n-Logue, the LSP sets up an Access Center that provides wireless voice and data connectivity to villages within a 25-35 km radius of its location. 300-500 villages are typically covered inside this 2,000-3500 square kilometer area.

Once the Access Center is constructed and its staff has been trained, the LSP is responsible for the recruitment of local entrepreneurs that will set up the village kiosks. The LSP is also responsible for marketing its services to private and government subscribers, and is in charge of collecting payments. The ease of setup and use of corDECT technology allows the LSP's small staff to focus primarily on increasing its subscriber base, and less on maintaining the Access Center's equipment. To ensure consistency and quality of service, a technician is employed to troubleshoot any technical problems on the subscriber end.

n-Logue supports the LSP in a variety of ways. It supplies technical assistance for setting up and maintaining both the Access Center and village kiosks. This includes field surveys to identify the optimal location of the center, determined by both its height and its distance to the nearest PSTN access point. The company also provides training to both the Access Center staff and kiosk operators. Additionally, through its upstream partnerships, n-Logue takes care of regulatory and connectivity issues.

Each project costs from US$93,000 to US$100,000 to set up. The LSP and n-Logue share these initial costs. The LSP has two financing options, each with a different revenue-sharing arrangement:

Scenario A: The LSP invests US$26,667

- Agency fees: US$4,444
- Refundable security deposit: US$11,111
- Equipment costs: US$11,111

Gross revenue is shared 50-50 between n-Logue and the LSP

Scenario B: The LSP invests US$17,777

- Agency fees: US$4,444
- Refundable security deposit: US$11,111
- Equipment costs: $2,222

Gross revenue is shared 70-30 between n-Logue and the LSP

Scenario A is the most popular. Under both arrangements, n-Logue and the LSPs share both statutory and Access Center expenses, and the majority of Access Center equipment remains in n-Logue's name.

The LSP's return on investment is dependent primarily on how quickly it can scale its customer base, and whether or not he can offer telephony. n-Logue's four newest projects in Tamil Nadu had an average kiosk growth rate of 125% during the first quarter of 2004. Assuming an annual subscriber growth rate of 200%, the LSP would be left with the following returns:

Table 1. LSP Profit Potential (US$)

Subscriber Growth Rate	200%	100%	50%
5-Year ROI w/ Voice	365%	279%	121%
NPV w/ Voice	97,225	74,273	32,166
5-Year ROI w/out Voice	199%	136%	23%
NPV w/out Voice	53,177	36,315	6,109

LSPs have the potential to make additional revenues through value-added services such as hosting web pages and providing local content, and through franchisee service agreements with third-party vendors.

Kiosk Entrepreneurs

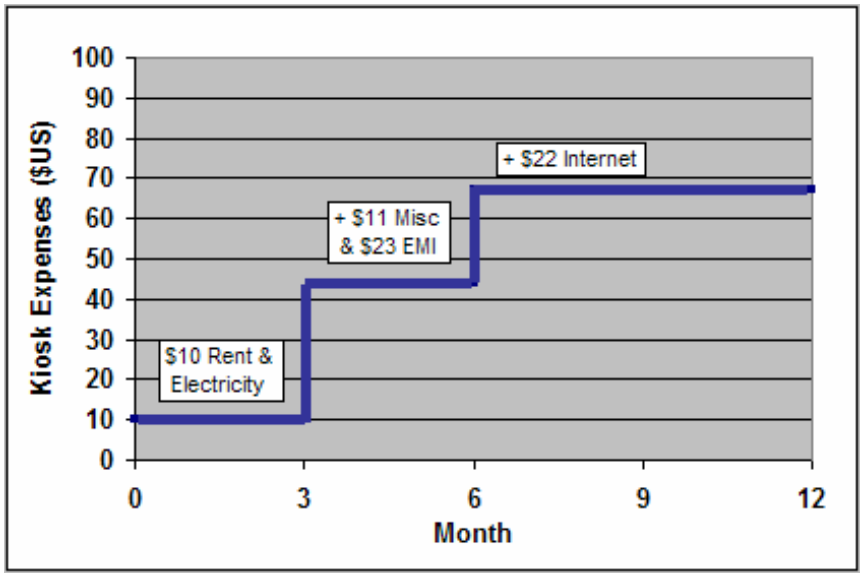
Kiosk owners are recruited by the LSP and then trained by n-Logue. To recruit the entrepreneurs, a local newspaper advertisement is typically placed once the Access Center is set up. Depending on the response, one or more information sessions are held to explain the business opportunity and answer any questions. One-on-one meetings at the Access Center are also common. Selection of the kiosk operator is a critical part of the process, and often candidates are turned away if there profile is not suitable.

Once their start-up loan is approved, kiosk owners purchase all the equipment they need to set up their business directly from n-Logue, who has established relationships with hardware suppliers that help keep costs low. Prices are expected to drop further as technology improves, and as the volume of hardware purchased through n-Logue increases.

The initial investment requires US$1200, and includes a complete HCL Multimedia PC with 15 inch monitor and 52x CDROM, a UPS with battery, a Umax digital camera, an HP Inkjet printer, and all necessary cabling. The voice-enabled kiosk kit (US$1300) also includes an STD-PCO meter and related telephony equipment. With both packages, the kiosk owner receives insurance, a marketing kit, local language software, training, and an Internet connection for the first 6 months of operation.

Kiosk expenses are phased in over the first 6 months, giving the owner time to develop his business before his overhead costs increase. Initially, the owner covers only rent and electricity, followed by his monthly loan payment (EMI) and miscellaneous expenses (printer cartridge refills, paper, etc…) starting in month 4. Internet charges begin during month 7.

Chart 1. Kiosk Monthly Expenses



Financial viability at the end of the first year requires earning a minimum of US$66/month to cover loan payments and operating expenses. Many of n-Logue's current kiosks average this amount from data services alone by month 6. The particularly entrepreneurial operators regularly exceed this sum by aggressively marketing and selling add-on services that exploit the kiosk's central role in the community. Based on current project data, once a kiosk owner begins earning enough to cover his monthly operating expenses, he will continue to do so consistently over time.

For a kiosk purchasing the data-only kiosk kit for US$1200, the owner must provide seed capital of US$85, or 7% of the purchase amount. This is less than the 10-15% typically required for such a loan. The loan is given for 60 months, at a 9% rate, resulting in a monthly payment of US$23.

A kiosk whose annual revenue from data services grows by 50% can expect the following returns:

Table 2. Kiosk Economics (US$)

Kiosk Economics	Year 1	Year 2	Year 3	Year 4	Year 5
Investment					
	With Voice		Without Voice		
Bank Loan	1111		1111		
Seed Capital	192		85		
Total Investment	1303		1196		
Revenue Generation					
Revenue from Data	667	1000	1500	2250	3375
Revenue from Voice	113	261	300	345	396
Gross Annual Kiosk Revenue	780	1261	1800	2595	3771
Less Expenses					
Kiosk Loan Payment	210	280	280	280	280
Rent & Electricity	120	128	137	147	157
Payment to Access Center	133	288	311	336	363
Maintenance @ 4.5%	48	51	53	56	59
Miscellaneous Expenses	100	167	208	260	326
Total Expenses	612	914	990	1079	1184
Profitability					
Net Profit	168	347	810	1516	2587
Profit: Discount Rate of 15%	146	302	704	1318	2250
Profit: Cumulative	146	448	1152	2470	4720

Revenue Growth Rate	50%	40%	30%
5-Year ROI w/ Voice	362%	269%	191%
NPV with Voice	4720	3509	2487
5-Year ROI w/out Voice	299%	198%	113%
NPV without Voice	3579	2368	1347

An additional PC may be necessary in Year 4 or 5, depending on the growth in demand for kiosk services. Owners of kiosks that hire an operator on salary will also have higher expenses.

Marketing – n-Logue & Kiosk

A sustained marketing effort is necessary to demystify the technology and raise awareness about its potential benefits. To accomplish this, n-Logue, in coordination with the LSPs and kiosks, employ a variety of promotional techniques.

All kiosks have a formal inauguration that includes an auto campaign[8]. Flyers and leaflets that contain discount coupons are frequently distributed, and radio advertisements have been broadcast in the southern states. The most effective (and time consuming) marketing is door-to-door canvassing. Computer-based competitions between school-aged children of different villages, and video-conferencing sessions with popular television celebrities have also been used to drive traffic to the kiosks.

Another marketing concept n-Logue is now piloting in Tamil Nadu is the publication of a community newspaper. The paper is distributed for free by kiosk operators who frequently insert flyers advertising their business. Each paper includes local content generated by a network of volunteer village reporters, as well as information on kiosk services and success stories. Advertisements purchased by local villagers and businesses, along with a nominal fee paid by the kiosk, cover the costs of printing.

Training

Once the kiosk is set up, n-Logue provides owners with introductory training that familiarizes them with both the computer and the services that will be offered. Guidance on marketing and managing the kiosk is also provided. Following the training, the owner completes an online evaluation of kiosk performance. Targeted training can then be given to improve upon weak areas. Further instruction is also given as new services are phased in.

Kiosk owners get added support through monthly operator meetings. Organized with the help of n-Logue, the meetings allow operators to share experience and advice with one another. They also give n-Logue the opportunity to introduce new services and promotions, or conduct supplementary trainings. Each meeting features a guest speaker, usually a business professional or service provider, who provides additional teaching aimed at increasing the kiosk's earnings.

Growth

With 52 active or planned projects, n-Logue currently has a presence in seven states and is expanding rapidly, primarily in the states of Maharashtra and Gujarat. As of Oct 2004, 31 projects were live with 1900 villages connected. All of the projects in Table 3 are expected to go live by March 2005, each having the capability of providing connectivity to at least 200 villages.

[8] During a typical autocampaign, details about the kiosk and its services are spoken through large speakers attached to the roof of an autorickshaw that is driven through the village. Spot interviews with potential customers and small skits demonstrating the usefulness of services are also performed.

Table 3. Project Locations

Maharashtra		Gujurat		Tamil Nadu	
Town	**District**	**Town**	**District**	**Town**	**District**
Baramati	Pune	Palanpur	Banaskantha	Melur	Madurai
Pabal	Pune	Vyara	Surat	Theni	Theni
Rajgurunagar	Pune	Patan	Patan	Thirupattur	Sivagangai
Bhor	Pune	Mehmedavad	Kheda	Nellikuppam	Cuddalore
Achalpur	Amravati	Visnagar	Mehsana	Tiruvallur	Tiruvallur
Panhala	Kolhapur	Amreli	Amerli	Mayiladuturai	Nagapattinam
Ghatanji	Yewatmal	Palitana	Bhavnagar	Vaniyambadi	Vellore
Pusad	Yewatmal	Prantij	Sabarkantha	Alagumalai	Coimbatore
Kalamb	Yewatmal	Wagodia	Vadodara	Bhavani	Erode
Mangrul Pir	Washim	Dahod	Dahod	Arantangi	Pudukottai
Ashti	Beed	Shehera	Panchamals	Yercaud	Salem
Rahuri	Ahmednagar	Limbdi	Surendernagar	**Madhya Pradesh**	
Sakri	Dhule	Jasdan	Rajkot	**Town**	**District**
Shahapur	Thane	Dhoraji	Rajkot	Dhar	Dhar
Parola	Jalgaon	Wankaner	Rajkot	Dewas	Dewas
Murtijapur	Akola	Viramgam	Ahmedabad		
Paithan	Aurangabad	**Karnataka**		**Andhra Pradesh**	
Manmad	Nashik	**Town**	**District**	**Town**	**District**
Rajasthan		Mandya	Mandya	Khammam	Khammam
Town	**District**	Kundugol	Hubli	Tadepallegudem	West Godavari
Shahpura	Jaipur				

In the near term, n-Logue plans to focus on scaling up the number of subscribers in its current and planned projects. Future growth in the total number of projects will be dependent on how quickly the current expansion is completed.

Challenges

n-Logue faces a number of challenges to maintaining its aggressive growth rate and creating a kiosk-based ecosystem that realizes the benefits of IT for rural development. These include finding the right people, managing its internal growth as a company, minimizing impediments to scalability, staying ahead of the competition, and increasing the relevance of services through its partnerships.

Human Capacity

Kiosk Operator

The biggest determinants of the profitability of a kiosk are the talents of its operator. Entrepreneurs are attracted to the opportunity of kiosk ownership not only by the potential for significant financial returns, but by the local prestige that comes from helping to diagnose a crop disease or by getting village farmers a better rate for their produce. By bringing benefits to the community, the operator's status is elevated, often in spite of prevailing gender or caste discrimination. Examples of such success stories are included in Appendix C.

To be successful, the kiosk operator must perform many roles, including salesperson, marketer, teacher, service provider, and computer professional. To meet these requirements, N-Logue and its LSP operators seek entrepreneurs who have the ability and ambition to operate and grow an Internet-based business.

These are typically a young men or women who have at least a 12th standard education. Several kiosks are also run by Self Help Groups (SHGs)[9].

Due to the novelty of IT in rural areas, a great deal of awareness building must take place in order to build a customer base within the village. The most successful operators aggressively augment and promote their services, developing the kiosk's central importance to community life. Many have leveraged this position to market complementary services that enhance profitability.

It takes a great deal of time and effort to make a kiosk live up to its potential. In some instances, kiosk owners have enlisted the help of others, such as a family member or a paid assistant, to better meet the various demands of the business. Several of the tasks require the operator to leave the kiosk during business hours, potentially resulting in lost revenue.

When a kiosk has under performed, it is most often due to some type of operator problem. Kiosks will be slow to turn a profit if the operator does not make the necessary marketing effort. For example, a former STD-PCO operator who is used to getting customers without having to promote may not be aggressive enough in building their business. Likewise, kiosks that do not keep regular hours have tended to fair poorly when compared to others whose hours are standardized and well-known.

There have also been problems in cases where the kiosk owner has hired a salaried operator. Besides adding additional overhead costs to the business, salaried operators may not be capable of effectively running the kiosk, and since they do not have a direct financial stake in the business, are less likely to be proactive in promoting the services. They also receive a great deal of computer training, providing them with upward mobility in an expanding job market for those with computer and IT experience. Kiosks that have had a high turnover in operators have earned less over time than those that have not.

Although n-Logue cannot always avoid these problems due to the nature of the franchise agreement, it has been able to mitigate them to some degree through its kiosk owner selection and training.

Local Service Providers

As with kiosk operators, a successful LSP must understand the nature of the business and be aggressive in marketing its services and expanding its subscriber base. Additionally, although they usually have local business experience, the number of partnerships required and the regulations that are to be followed in order to run the enterprise combine to present significant new challenges. n-Logue works closely with its LSPs during the initial stages of the partnership to ensure their success. To date, attracting potential LSPs has not been a significant issue impacting to n-Logue's growth.

n-Logue

n-Logue is one of a growing number of companies aggressively pursuing customers in the Indian rural market. Currently employing 125 people, its staff has grown 178% over the past year. The company's ability to hire and retain enough qualified employees capable of performing well in this emerging market will help set the pace of growth.

Employees that excel at n-Logue are those that understand the nature of working in a rapidly expanding business, and are capable of producing in a dynamic work environment. They understand the uniqueness of n-Logue's business model, and its need for innovative solutions to changing circumstances. Hiring such experienced and talented personnel will continue to be a challenge, even more so because n-Logue currently does not have the brand-recognition that easily attracts a large applicant pool.

[9] A Self-Help Group (SHG) is a small voluntary association of poor people, preferably from the same socio-economic background, that comes together for the purpose of solving their common problems through self-help and mutual help.

Managing Growth

n-Logue's rapid development from pilot project to nationwide network has brought challenges typical of fast growing enterprises. The total number of projects has increased more than 300% in the past year, and future expansion is expected to keep pace. New methods of project management are currently being implemented to adjust to this enlargement. The company's success depends on its ability to quickly put in place the necessary systems and processes to effectively carry on its growth.

To aid its expansion in the west, n-Logue established a second office in Pune in 2002, and has recently added another in Gujarat. Coordination of efforts between these offices will remain a challenge in the near-term, particularly for departments based in Chennai whose work requires translation in up to six languages. Difficulties in management and communication between these offices and the increasing number of local projects who have a fair degree of autonomy will also increase over time. n-Logue must continue to take advantage of the lessons learned from the experimentation within its projects, by providing a context where successful ideas and strategies from one project can easily be replicated in the others.

Minimizing External Impediments to Scalability

In a country as diverse as India, circumstances outside of n-Logue's control can impede its goal of nationwide coverage. For its kiosks to be viable in all areas, the company will need to continue to work to minimize the impact of these various conditions.

Village Size

Through the variety of services it offers, n-Logue has done a good job of mitigating the effects of village population on kiosk viability. n-Logue has successfully established kiosks in villages as small as 1,000 people to towns as large as 10,000 people or more. Population has a nominal effect on revenues only in the very large or very small villages.

In the smaller villages, kiosks have little competition for many of the services they offer, and can count on a higher percentage of the population as regular customers. While the reverse is true in larger villages and towns, the higher number of potential customers, many of which are better educated and can take fuller advantage of the technology, offsets the competition. Based on current reported revenues from n-Logue's kiosks, spending per capita is 5 times higher in small villages than in large ones.

Electrical Power

Vast areas of rural India remain without reliable access to electricity. To overcome this problem, n-Logue is experimenting with portable generators. Depending on the price of fuel and the use required by the kiosk, these generators may eventually become an additional source of income for the kiosk, which can sell excess electricity for a profit.

Solar energy remains too expensive to power the off-the-shelf PCs that are currently used in n-Logue's kiosks. In the future, solar may be a viable alternative, depending on how quickly the price of solar cells drop, and if equipment manufacturers design and produce an affordable desktop PC with the environmental conditions of rural areas in mind. Hand-held computers, such as the Indian-produced Simputer, have already been commercialized for this purpose.

Technology Dependency

Wireless technology is developing at break-neck speed. With its low price, ease of installation, and expansive coverage area, corDECT is currently the technology of choice for n-Logue's networks. Nevertheless, while the technology continues to improve, it may not always be the most efficient and cost

effective choice for rural connectivity, forcing n-Logue to adopt a different technology standard. Even if corDECT remains the overall technology of choice, it may not be appropriate for use in all areas, particularly where achieving line-of-sight is difficult or impossible.

Migrating to a new technology, even in isolated instances, will present short-term challenges in terms of both investment and training. However, such a challenge will not fundamentally alter n-Logue's business model, which is dependent on its partner relationships and service delivery rather than on the technology it uses.

Competition

Threats

n-Logue currently sees little threat of direct competition from either incumbent telcos or other companies setting up information kiosks. Despite having the necessary licensing, the incumbent BSOs, such as BSNL, Tata, and Reliance, have chosen not to aggressively expand their presence in rural areas. In the past, such infrastructure development was completed through obligations rather than profit motives. The cost of expanding their existing mobile data networks is currently prohibitive given the probable short-term payoffs.

The greatest threat to n-Logue from the BSOs is through their potential opposition to licensing changes. Currently, n-Logue does not have a license to provide telephony in rural areas, and must partner with the incumbent telcos to provide this service. The creation of a new Rural Service Provider license would eliminate this dependency, making n-Logue more of a direct competitor.

Other entities, such as Drishtee and Tarahaat, are also setting up sustainable information kiosk networks in rural areas of India. Unlike n-Logue, however, none function as an Internet service provider or operate with a three-tiered franchisee-based model. By relying on its own infrastructure and investment at the local level, n-Logue is in a better position to scale. Other kiosk networks, therefore, are more of a source of learning rather than of direct competition.

The largest IT-enabled kiosk network in the country has been set up and operated by ITC Ltd, a major agricultural producer. Their e-Choupal network currently covers more than 4,000 villages, expanding at a rate of 3 or 4 villages each day. e-Choupals have been set up to bring efficiencies to ITC's supply chain by reducing the dependency on middlemen to source produce from farmers. Although the operations are focused solely on agriculture right now, the company has partnered with other companies who will distribute their products through the network. ITC also recently received a grant from Britain's DFID to develop rural insurance programs through the e-choupals. If the company developed the e-choupals into community-based information kiosks offering a similar set of services as n-Logue, ITC would be a competitor in the areas where both companies operate.

n-Logue's Competitive Advantage

n-Logue retains a competitive advantage over its potential competitors because of its proven experience to leverage relationships between its upstream and downstream partners. Through these relationships, n-Logue is able to provide not only connectivity, but access to capital, equipment, and other relevant services. The company helps to manage the technical problems throughout the entire network, and helps the LSPs navigate the myriad of regulations with which each project must comply. In this way, n-Logue acts as more of a full service provider, rather than as just an ordinary ISP.

Unlike any of the incumbent telcos, the company is focused solely on expanding in the rural market. By purposely avoiding the high payoff potential of urban areas, n-Logue prevents dilution of this focus, gaining credibility among investors, governments, and private partners. As the company has scaled from pilot project to nationwide company over the past few years, it has demonstrated both its commitment to

bridging the digital divide and its ability to be successful in diverse rural areas throughout India.

In December 2003, n-Logue was recognized for its efforts at the UN-affiliated World Summit on the Information Society (WSIS) conference, where it was selected by the World Summit Award Grand Jury as one of the five best entries in the e-Inclusion category. The award acknowledges initiatives that bridge the digital divide by successfully providing sustainable access to online content and services.

Creating a Rural Ecosystem

To achieve its stated goal of doubling the rural GDP in India within 10 years, n-Logue will have to leverage its experience in managing a diverse set of partnerships to realize the potential for ICTs to enable economic development and bring benefits to all sectors of rural society.

As n-Logue's network matures, there will be a growing number of partnership opportunities that bring additional services and benefits to the villages. A larger network will attract additional partners, like ICICI and HLL, which want to use the kiosks as distribution channels. E-commerce applications that connect urban and rural areas or that connect the villages themselves also become more feasible as the network scales. Governments and NGOs stand to benefit by using the kiosks as a base for census data gathering, weather data collection, or local project implementation and monitoring. These relationships bring added stability to the entire network, bringing additional revenues to both n-Logue and its downstream partners.

The relevance of these new partnerships and services to the rural market, particularly those most marginalized, must be carefully scrutinized. n-Logue will have to work to encourage and nurture relationships with partners that allow money and resources to flow into villages, thereby creating a virtuous cycle of development at the grassroots. If successful, n-Logue will have created an entirely new infrastructure for bridging the digital divide and bringing the benefits of globalization to those that need them most.

Conclusions

n-Logue has developed a viable and scaleable model for delivering information-based services to rural areas. Through its three-tiered franchisee business model based on corDECT technology, the company is able to quickly and cheaply scale its network. Moving forward, n-Logue is well positioned to capitalize on progressive uses of technology that enable rural development. As the company scales, there is enormous potential to leverage n-Logue's rural networks in ways that take advantage of both existing and new technologies in the areas of health, finance, agriculture, e-government, and civil society empowerment. Significant opportunities also exist for the creation of new partnerships with corporations, governments, and NGOs whose use of n-Logue's networks brings further benefits and development to rural areas.

There will be challenges as the company continues its aggressive expansion, most notably in finding, training and supporting the right personnel at all three tiers of its business model. The company must work to put in place all the systems and processes necessary to effectively manage its growth and replicate its successes. Although the potential for competition continues to exist, n-Logue's experience in creating and managing a diverse set of partnerships gives it an advantage as it develops rural ecosystems that bring benefits to all sectors of society. The next 12 months will be the most demanding for the company since it was founded, and will be a critical test of the viability of the company's business model on a national scale.

Appendix A: Services

Current Services

Chiraag Computer Education

All Chiraag computer education courses include online exercises and practice sessions, tests and additional lessons.

Blue Book

Designed for children 6-9 years old, this 6-day self-paced learning course introduces the computer to the children, making them aware of all the interesting things that can be done with it. Blue Plus, a 26-day version of the course that includes more details and practice sessions, is also available.

Green Book

Green Book is a 10-day course for students aged 10-17 years old. It teaches the basics of Internet browsing and e-mail use, and familiarizes the student with applications such as CK Shakti, a local language office suite. Like Blue Book, a Green Plus version is also available. The course is a 26-day Internet-intensive version of the original.

Red Book

Red Book is the most comprehensive Chiraag computer training available. The 2-month self-paced course focuses on teaching the intricacies of the CK Shakti office suite, and is meant for those ages 17 and older who are interested in enhancing their job skills or improving their businesses.

Online Testing Tutorial

The 10-month course is aimed at 9th and 10th grade students wishing to improve their English grammar, in preparation for higher education exams.

iSee

The software is a multiparty video conferencing application developed by the collaborative efforts of TeNeT group and Oops Pvt. Ltd. The software was developed specifically keeping in mind the requirements and communication needs of rural areas, working reliably on low bandwidth networks with speeds as low as 12 kbps. iSee has been used to allow doctors to remotely consult with patients, government officials to interact with their constituents, and villagers to chat online with popular TV stars.

Health

n-Logue has established several partnerships with area doctors and hospitals to provide health expertise in remote areas. Using the kiosk's Web camera, villagers can send pictures for diagnosis or conduct live videoconferencing consultations with health professionals. One such partner is the Aravind Eye Hospital, an organization that has built its reputation on providing free or low-cost eye care to thousands in India. Patients are able to receive a preliminary diagnosis without leaving their village, and if further treatment is required, they are directed to the nearest Aravind hospital or free eye camp. A Web portal, WebHealthCenter.com, is also accessed through the kiosks. The site has developed several local language interfaces for n-Logue's kiosks.

Agriculture

n-Logue has also established regional partnerships that provide agricultural services to farmers. Solution providers, such as the Tamil Nadu Agricultural College and Research Institute, provide expert advice on better farming techniques and solutions to crop and animal diseases via e-mail and videoconferencing. Sales of tractors and spare parts through some kiosks have been made possible through partnerships with farm equipment manufacturing companies. In areas where many people own farm animals and pets but have no access to veterinarians, some kiosks are also providing online veterinary advice for livestock.

Agricultural portals used by kiosks to find weather information, crop prices, and best-practice farming techniques include JFarmindia.com, kvbaramati.com, krishiworld.com, and agriwatch.com. Potential future agricultural services include soil testing, online farming "schools," an early warning system on disease outbreaks, and long-term predictions on crop prices, demand, and rainfall.

E-mail and Web Browsing

Browsing, e-mail, voice mail, video mail, chat and video chat are available at all of n-Logue's kiosks.

E-governance

Kiosks provide access to government portals that contain online forms and applications for documents such as birth and death certificates. In Karnataka, Chiraag kiosks are tied to the state's Bhoomi database, allowing access to all land records in the state. n-Logue has also organized videoconferencing sessions between village kiosks and local government officials. The service has been popular with both villagers, who see their concerns addressed more efficiently, and government officials, who are able to get first-hand information from their constituents.

Chiraag Resume Maker

The Chiraag Bio-Data Maker is a bilingual online program designed to make a professional resume and cover letter. The job-seeker provides the answers to predefined questions, and the software generates the final product which can then updated with new information, or formatted to the user's preferences.

Chiraag Children's Center

Many kiosks also function as Chiraag Children's Centers (CCC). For a nominal membership fee, children can come to the kiosk for three hours on Sunday morning to participate in activities that include: reading and math, games, coloring, listening to and recording songs, chatting online and sending e-mail, watching movies, and using iSee software to chat with people from other villages. On weekdays, the children can also come twice a month and use the kiosk for an hour doing any online or offline activity. Through the addition of donated or purchased books, several of the Children's Centers have also become village libraries for the children.

Astrology

Through its partnership with Astrovision.com, villagers can receive personalized astrological predictions and horoscope charts. Matrimonial services are also available.

Offline Services

Kiosks also offer a variety of offline services. DTP (desktop publishing) is the most popular, followed by offline computer education, such as Mouse and PC Tutor. Chennai Kavigal has developed CK Shakti, a local language office suite that includes a word processor, spreadsheet, presentation software, an e-mail client and browser. For entertainment, villagers can also use the computers to watch movies, listen to music, or play video games.

Chiraag Photo Studio

Digital photographs can be taken and touched up at the kiosk. These are frequently used for government documents, such as passport applications.

Planned Services

Rural ATM

In coordination with ICICI, India's largest private sector bank, the TeNeT Group and a company called Vortex have developed a low cost ATM aimed at increasing microfinance in rural areas. The prototype costs around US$667, one-twentieth the price of a typical ATM. Designed to connect to the banking network through the Internet, the ATM will utilize the kiosk's Web camera to provide secure fingerprint identification of customers.

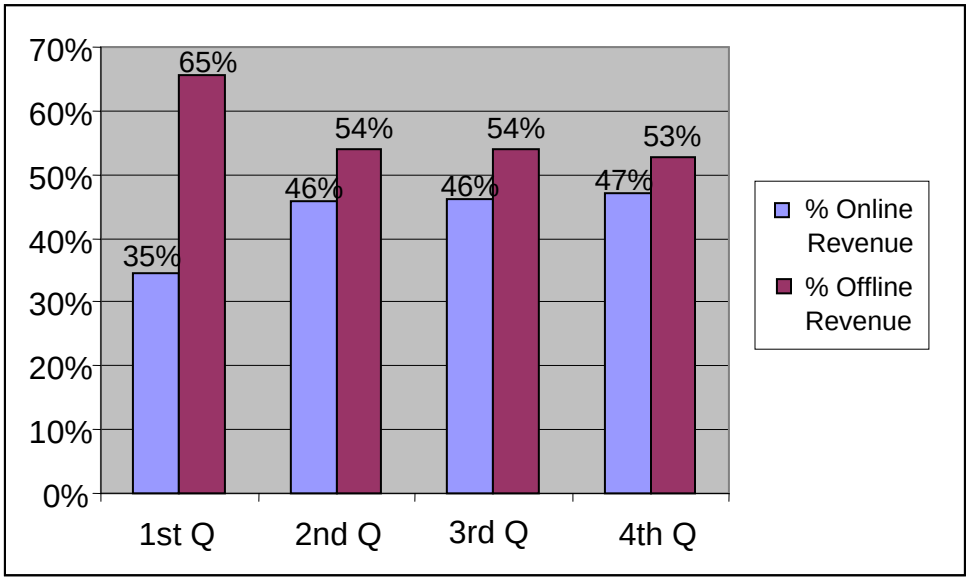
Medical Diagnostic Kit

Together with the company Neurosynaptics, the TeNeT Group has also developed a remote kit for preliminary medical diagnostics. Called project 'Vital' (Village Internet Test and Analysis Laboratory), the kit will measure blood pressure, electro cardiogram (ECG) and temperature, and transmit the readings to a doctor over the Internet. The telemedicine apparatus is expected to cost around US$267, less than a quarter of the cost of the equipment it replaces. It achieves these cost savings by taking advantage of the kiosk's computer resources, such as the monitor and sound card, to record and display the readings. Oops Pvt. Ltd. is also developing a compatible version of iSee software, allowing doctors and patients to consult in real-time while the data is being transmitted.

Online vs. Offline Revenue

This graph shows online and offline revenue as a percent of total kiosk earnings over the past year. Offline services are currently earning slightly more than half of the kiosk's monthly revenue.

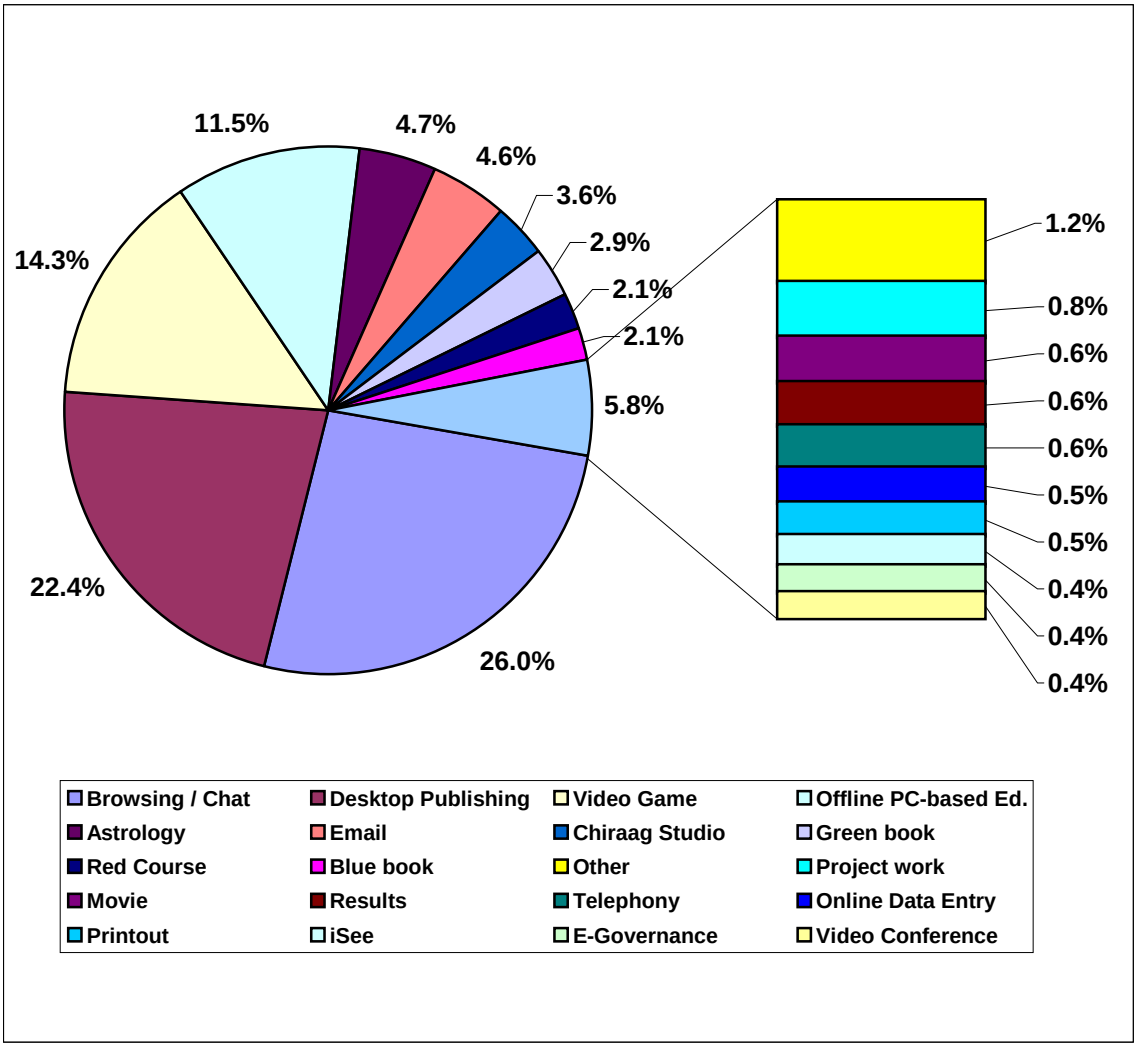
Chart 2. Online vs. Offline Revenue



Service Use

The chart below ranks the top services among all kiosks during the first quarter of 2004.

Chart 3. Top Services in n-Logue's Networks



Appendix B: corDECT Details

The corDECT system includes the following components:

- **DECT Interface Unit (DIU):** Connected by fiber to the PSTN backbone, the DIU is a fully redundant and reliable radio exchange capable of switching data and voice calls from up to 1000 subscribers. The system includes 2 corVIEW Operation and Maintenance Consoles (OMCs) that allow easy hardware and software configuration, subscriber administration, accounting, fault notification, and traffic monitoring.

- **Wall Set with Internet Port (WS-IP):** The WS-IP is installed at the end-user and receives the DECT signal. It contains two ports: an RJ11 connection for a telephone or fax machine, and an RS232C port for Internet connectivity. The wall set is powered by a 12 volt adaptor and contains a built in battery charger that provides 16 hours standby and 3 hours talk time.

- **Remote Access Switch (RAS):** Connected to the DIU using 2 E1 ports, the RAS routes up to 60 simultaneous Internet calls. The unit includes a 10baseT Ethernet port to connect to the Internet, supports RADIUS for accounting, PAP for user identification, and is managed using SNMP.

- **Compact Base Station (CBS):** Up to four CBS units are mounted on top of a 60-foot tower and provide the radio interface between the DIU and wall sets located up to 10 km away. The unit is connected to the DIU through 3 pairs of twisted pair copper wires that feed it both power and signal.

- **Relay Base Station (RBS):** The RBS is located up to 25 km from the DIU, and relays data packets to it using a two-hop DECT wireless link. Like the CBS, it provides signal to wall sets within a 10 km radius of its location.

- **Base Station Distributor (BSD):** The BSD is used to connect small pockets of subscribers in hilly areas where establishing line-of-sight is difficult. The compact unit is locally powered, supports up to 4 CBS units, and is connected directly to the DIU through an E1 line.

Appendix C: Success Stories

The following are examples of how n-Logue's information kiosks have benefited the lives of rural villagers.

Job Training

In Tamil Nadu, a 26-year-old Tenth Standard graduate was looking for a career change when he came to know about the Chiraag Internet kiosk in Poyampalayam through one of the kiosk's marketing campaigns. After speaking to the kiosk operator, the gentleman registered for the Red Book Course, Chiraag's most comprehensive computer-training program. After five weeks of training, at a cost of only US$6.67, he completed the course and quickly found a job as a Computer Operator preparing reports and sending e-mails. The computer training and new job has completely changed his life. His salary has doubled, and he has earned the respect of many for his efforts.

Health

A one-year-old Venkatachalapuram child was suffering from heart problems. His doctor said that he must have an operation within 2 months or he would die, but his parents were not financially capable of paying for the surgery. They applied to the government for assistance, but received no response. Desperate, they approached Mr. Murugesan, who operates a Chiraag kiosk in the village. On behalf of the parents, he sent an e-mail to the CM Cell explaining the urgency of the situation. Within a few days, a government official arrived to personally make sure that the proper signatures sanctioning the operation were promptly received from the local VAO. The child was taken to the Ramakrishna Medical Mission in Coimbatore, where he received the necessary operation without any time to spare. The surgery was a success, and today the young boy is recovering very well.

In June 2002, a few people in the Tamil Nadu village of Pulimalaipatti became ill from chicken pox. Without any precautionary measures in place, the disease soon spread, and by mid-July more than 200 people were infected. With the disease reaching epidemic proportions, the local Chiraag kiosk operator sent an urgent e-mail to the block development and taluk offices requesting help. The response was prompt and effective. A team of doctors and nurses arrived, and went house to house to administer vaccinations and medications to everyone in the village. Blood and water tests were also performed, and within a few days the disease was treated and eradicated.

Agriculture

In the year 2001, almost the entire village of Ulagapichanpatti in the Melur taluk of Tamil Nadu lost its okra crop to an unknown disease. The following year, the leaves of the plant again turned whitish-yellow, signaling the persistent disease's return. Only this time, the village had the assistance of a Chiraag Internet Center, set up by an enterprising 18-year old woman with the help of a loan. Like all Chiraag kiosks in the taluk, the Ulagapichanpatti center had an established relationship with the Madurai Agricultural College and Research Institute. When a farmer reported the problem, the operator sent an e-mail to a scientist at the school, who requested a picture of the diseased plant. Using the kiosk's Web camera, the operator promptly responded and had a solution a day later. The plants were infected by "yellow mosaic disease," a problem easily treated with a boron and nitrogen solution. Within a week, the treatment worked and the plants became healthy again. The entire village quickly learned about the solution, which saved more than US$3,300 worth of crops.

Governance

Using iSee software, many kiosks regularly conduct videoconferencing sessions with government officials. One such session took place in October 2003 between the Thiruvallur District Administration and 8 local village kiosks. The District Collector, District Revenue Officer, and Superintendent of Police all participated in the session, which attracted 6 to 10 villagers to each kiosk. Issues addressed by the DA included: lack of village bus services and roads, illegal possession of land, financial assistance to a

widow, and agricultural training and seed distribution to local self-help groups. One such group was ready to harvest plants, grown from seeds provided by the District Administration, but did not have a buyer. On the spot, the DC agreed to buy the plants from the SHG, earning the women approximately US$133 for their harvest.

Communication

A woman in Uranganpatti, a village in the Madurai District of Tamil Nadu, had run into financial problems a few months after her husband had died in a construction accident while working in Jeddah, Saudi Arabia. Someone advised her to seek compensation from her husband's former employer, but with no idea about whom to contact, she approached the local Chiraag Internet kiosk for help. The operator conducted a Web search to find the e-mail ID of the Indian Consulate in Jeddah, and on behalf of the widow, typed out a letter and sent it. After two weeks, a parcel arrived with documents to sign and requests for additional info. The package's receipt was confirmed over e-mail, and within a week the required documents were sent out. One month after sending the original e-mail, and after a US$0.66 total expenditure, the widow and her family received US$3,000 in compensation.