

“The State of the Internet in Iowa”

An Internal Report from Iowa Network Services Regarding the Condition of the Internet in Iowa and its Future Impact on Society

About INS:

Established in 1988, Iowa Network Services (INS) is privately owned by a group of 122 Iowa Independent Telephone Companies that serves over 500,000 Iowans and local businesses. The INS Network has been delivering the latest in telecommunications services, utilizing its vast resources to research and deliver cutting-edge technologies and delivery systems for its customers. Telephony, core network transport, Internet Protocol video and Internet services are among the products offered by INS to telephone companies across the state of Iowa and to enterprise customers throughout the nation. INS' operating subsidiaries are Iowa Wireless, a statewide T-Mobile cellular partner with 300 employees; and Alliance Technologies, Inc., a Des Moines-based information technology company with 100 employees.

About the Report:

The purpose of the report is to help educate Iowans about where the Internet is at now in terms of services and performance and how it will evolve over the next 10 years. As one of the largest provider of Internet services within the State of Iowa, INS is at the forefront of cutting-edge technology research that will eventually be deployed within the state. This report will examine three primary areas of interest relating to the Internet: 1) What is the current status regarding the digital divide between rural and urban centers with the state?; 2) Within the next few years, how will the Internet evolve and what new services and/or products may be offered?; 3) How will the Internet, through the use of new technologies, change our lives as Iowans 10 years from now?

Digital Divide Back Story (1993 to 2009):

INS was created in the 1980's by independent local telephone companies who saw the advantage of pulling their resources together in order to provide their customers with timely products and services under one umbrella. In 1988, INS began delivering services and since that time the company has helped eliminate the imbalance between rural and urban communities by providing rural Iowans with the same if not better Internet connectivity and speed.

In 1992, an INS employee approached the executive team about the “Internet.” From that conversation, INS embarked on a multi-million dollar effort that spawned netINS, a subsidiary of INS that focuses exclusively on the Internet. Under netINS, the company utilized its downtown Des Moines datacenter and

statewide fiber optic network to offer the Internet to hundreds of thousands of Iowans. Through netINS' efforts, rural Iowa communities remained as one of the few populations in the U.S., to receive better and faster Internet services to its customers than more densely populated areas within the country. In fact, INS was well ahead of the Baby Bells in terms of offering the Internet to its customers. The first Internet prototype system developed by INS was in 1993, which originally consisted of 8 modems that ran on a 56K Internet connection to the backbone. During that year, INS' backbone utilization was at 30-40Kbps, or not even 5% of the average broadband connection to a single home today.

To put 1993 in perspective, between 2008 to 2009, backbone utilization grew from 3.9 gigabit in January 2008 to 5.2 gigabit in December 2009. This represented nearly 33% growth in backbone utilization in 2009. The compound annual growth rate (CAGR) from 1993 to 2009 was 96%. To accommodate this growth in demand, in February 2009 INS upgraded from a single gigabit to a 10 gigabit Ethernet connection at their downtown facility. In September, INS moved the 10 gigabit Ethernet (GigabitE) connection to the new Westown Communications Center in West Des Moines. This move added further site diversification and added to INS' over all redundancy capabilities.

The addition of INS' Westown Communications Center further enhanced its capacity to serve not just rural Iowa communities but also urban centers like Des Moines that were in need of state-of-the-art technology and services to help sustain and grow their business in the 21st century. With the upgrade to 10 GigabitE in 2009, INS was able to offer its plethora of services with scalable bandwidth and the security of a 3-node Internet backbone. In addition to INS' IXP services, the company also offers the following business services:

Business Services:

- 1) Voice and Data Transport
- 2) Data Network Management
- 3) Business Continuity and Disaster Recovery
- 4) Web Development
- 5) Web and Email Hosting
- 6) Virtual Network and Remote Worker Solutions
- 7) Hosted VoIP

The capacity of Internet access provided by INS grew from a single 56 kilobits per second to multiple gigabits per second. The highest growth occurred between 1993-2000, with the early adopters, and 2006-2010 with the advent of video delivered over the Internet. By switching from dedicated telecommunications lines to Ethernet, INS is positioned to grow the network to many 10 gigabit

connections and beyond. According to Cisco, the amount of capacity used by 10 homes in 2012 will be equivalent to the entire Internet of 1995. In 2020, INS expects to be required to deliver 1 Tbps of connectivity to the Internet, which represents approximately the entire content of 1 blu-ray HD DVD movie every 4 seconds.

Timeline 1993 to 2009:

- 1993 – Text on a terminal
- 1994 – Switched to GUI interface
- August 1998 – 25K people dialed Internet
- Q4 1998 – Transition to broadband
- 2000 to 2001 – Network capacity upgrade – gigabit Ethernet (transition from megabytes to gigabytes)
- 2005 to 2006 – Internet redundancy backbone launched
- 2009 – 3-node 10 GigabitE deployment allowed INS to be more flexible and expand Internet capabilities

Internet's Changing Face Three Years from Now

Within the next few years, Iowans will witness an Internet revolution where such services as Internet Protocol Television (IPTV) will take shape. These types of new services will require huge amounts of bandwidth to support the speed and capacity to which these services will be offered through the Internet. Some of these new services and projects that Iowans will witness within this decade include the following:

- IP Video
IPTV (Internet Protocol Television) is a method of delivering subscription-based television services, similar to those offered via cable or satellite, over broadband. This allows many companies, in particular telephone companies, with broadband infrastructure to offer new television services to their customers. IPTV is also especially suited for the development and integration of interactive TV. Interactive TV allows viewers to use features that in the past have been more associated with a computer experience such as games, news and information, and shopping. Instead of content being spoon-fed to viewers, interactive TV changes viewers into users by giving them the freedom to navigate and choose with their remote.
- Broadband Expansion
 - The speed of the connection entering the home is going to increase at a high rate as higher capacity connections are made to the home. This will range from hundreds of megabits per second to perhaps gigabit. This speed will be facilitated by the construction

- To support the increased capacity and utilization by broadband subscribers, the backbone of the network will need to be significantly upgraded. 10-40 gigabit per second technology will be required to support the enormous amount of data being exchanged.
- Hybrid Applications

The applications that a subscriber uses on a daily basis will be a combination of applications ran on the user's PC, and those that run as a service within the network or "cloud". Users will use these applications through a growing number of Internet enabled appliances, such as iPhones/iPads/XBox/PS3s.
- IPV6

The Internet utilizes an address scheme that is several decades old, which only supports 4.2 billion addresses. While several steps have been taken over the last 15 years to better use these addresses, it is becoming a requirement to migrate to a newer scheme with more addresses. The transition to IPv6 should be transparent to end users if it is managed correctly. INS has been lab testing this technology since 2003, and expects to begin testing with partners and clients by 3Q2010. General availability of IPv6 service from INS is approximately 1Q of 2011.
- Video Conferencing

The availability of bandwidth enables high quality video communications. By using video, communications are more engaging and interactive. It also enables collaboration between workers who may be in disparate locations. INS has started using a next generation TelePresence solution which enables video communication for any location with quality broadband.
- Expanded Remote Worker Capability

Many applications are migrating to the "cloud", where they are run computers hosted at the data center or co-location facility. By enabling remote workers to securely access these applications, coupled with telepresence, they are able to perform their work duties from anywhere.
- Expanded IP Video

The ability to deliver high quality video communication over the Internet will result in more video being communicated, both from content on the Internet as well as those created by consumers. The concept of a video message is likely to become more ubiquitous.

20/20: The Internet in Year 2020:

At the pace the Internet is growing now, INS' fiber optic network will need to be able to accommodate larger amounts of data in order to support services such as "smart home" technologies, IPTV, etc. The only limitation to the reach and depth of the Internet by 2020 will be the capacity to which INS can expand broadband from 40 GigabitE to 100 GigabitE. Below are some services and features INS' anticipates will occur by the year 2020.

- **Broadband Expansion 40 GigabitE expanding to 100 GigabitE**
The amount of connectivity to every home will continue to grow, requiring additional capacity in all parts of the network. INS continues to monitor the technology to ensure platforms will scale to the needs of the Internet in 2020.
- **The "Cloud"**
Consumers of the Internet will be truly "always-on", with connectivity to their information, content, and applications from anywhere and on any screen. Most tasks on the Internet will be over purpose built appliances, rather than general computers. INS believes that its Westtown Communications Center co-location facility will be a key location for hosting these services in Iowa.
- **HyperConnectivity**
Always-on connectivity from every screen will allow for consumers to be connected with their friends, family, and property. Your "presence" will become a part of daily life, as it conveys your location and availability to your important contacts. Contacting your friends and family by video from anywhere will be a daily occurrence. Video monitoring and home information will allow for a new wealth of information about your home, energy use and security. By building high capacity networks, and enabling technologies such as IPv6, INS is positioned to provide the always-on connectivity required.
- **Expanded IP Video services including**
 - **PPV**
The concept of broadcast TV will be replaced by an immediate access to your programming. This allows users to access the entertainment they want, when they want. How these services are acquired will be through new and innovative advertising models, such as on screen placement and up sell, or through micropayments.

- Over-the-top Video

The Internet will be a continuous source of innovation in the video services area. By 2020, video will likely be more interactive, with consumers having more control to direct the story or to participate in it as if it were an online game.

Summary:

Iowa Network Services is dedicated to improving the quality of more than a half-million Iowans and the 122 independent telephone carriers who rely on us as their Internet carrier. As the World Wide Web continues to exponentially expand, in some cases, areas we've never considered, INS will be helping lead and implement that innovation. As a profitable, leading edge technology services company, INS is utilizing its vast pool of resources to improve our state's Internet infrastructure while investing in new technologies that will change Iowans experience, both at a personal and business level, regarding the use of the Internet. In the next ten years, INS is committed to forging new territory in the development of new Internet technologies while ensuring its speed, bandwidth and reliability are competitive with the most technology advanced epicenters within our country.

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