REPORT TO THE LEGISLATURE

on

INTERNET ACCESS

K.S.A. 66-2011(e)

OUTLINE

I Introduction

This report to the Legislature has been prepared by the Commission's staff and is made in response to K.S.A. 66-2011(e), which states:

> "During the 1999 session of the Kansas legislature, the commission shall transmit a report to the chairperson, vice-chairperson and ranking minority member of the house standing committee on energy and natural resources, the senate standing committee on transportation and utilities and the joint committee on computers and telecommunications concerning implementation of this section. The report shall include recommendations for revisions in this section necessitated by technological innovation or market changes in the telecommunications industry. The report also may include an expiration date for this section."

For the reader's convenience, a complete text of K.S.A 66-2011 is included as Attachment A.

II Scope of report

This report is limited to a discussion of the adequacy of *dial-up access* to the Internet via the Public Switched Network in Kansas. Developments of new applications within the Internet itself and the many enhancements currently underway are beyond the scope of this report.

III Brief background[1]

In reviewing the development of the Internet it should be noted that the Internet is a completely separate and distinct network from the Public Switched Network. However, the end user (typically) must use the Public Switched Network to dial-up and gain access to the Internet. In addition the Internet is not subject to either state or federal regulation.

[1] For a more comprehensive historical discussion see the Internet Society's web site, http://www.isoc.org/internet/history/brief.html
For a time line oriented discussion of the Internet's evolutions see http://www.pbs.org/internet/timeline/index.html

III Brief background *(continued)*

In the late 1960's and early 70's, a Defense Department agency named the Advanced Research Projects Agency funded a network called ARPANET. It was an experimental network intended, in part, to support research into the development of secure and efficient data exchange networks. Several protocols and architectures were developed during this effort. By today's standards and conventions, working with ARPANET was challenging and certainly not "user friendly". Lack of centralized information indexing, lack of standardization and detailed address schemes contributed to the early difficulties of accessing and retrieving information.

In 1985 the National Science Foundation (NSF) funded five supercomputer sites across the country to provide high-speed computing resources to the scientific research community. To facilitate access to these supercomputer sites, the NSF also funded a high capacity backbone network linking them and smaller regional networks together. This network of regional networks, supercomputing sites and the high capacity interconnecting facilities came to be known as the NSFNET.

During the 1980s The High Performance Computing and Communications Initiative (HPCCI) evolved to advance many of the (then) ambitious developments in computing and communication technologies. This initiative received added impetus and a more formal status when Congress passed the High Performance Computing Act of 1991. Development of the World Wide Web (WWW)[2] in 1991 and passage of the High Performance Computing Act of 1991 were significant developments opening the Internet to commercial applications and leading to the unprecedented interest that we are experiencing today.

Access to the Internet is provided through the services of an Internet Service Provider (ISP). An ISP is a company that connects members of the general public to the Internet, via either dedicated or 'dial-up' connections. These companies are <u>not regulated</u> and offer a wide range of services under a variety of pricing plans, responsive to their respective marketplaces. Many offer 'hourly plans', where the customer pays a small monthly fee (~$10.00) for 5-20 hours of connect time. Additional usage is billed at, typically, $1 to $2 per hour. So called 'unlimited' plans are very common, where the customer pays a fixed fee (in the $15 to $20 range) for an unlimited number of hours per month. Each ISP packages its services somewhat differently and uniquely, again in response to its respective marketplaces.

[2] The WWW, very simplistically stated, is a network of software providing standard protocols for cataloging, indexing, addressing and retrieving information from the Internet. It was developed at the CERN, the European Laboratory for Particle Physics in Switzerland and was initially deployed in 1991.

IV Current status of Internet access

Access to the Internet is provided in a number of different ways. A large business will often use a dedicated broadband arrangement with bandwidth[3] capacities ranging from 56 Kbps to 1.54 Mbps. Others may use Basic Rate ISDN service which offers bandwidths of either 64Kbps, 128Kbps or 144Kbps. In addition to traditional Telephone Company offerings, various Cable operators are also providing high speed Internet access to a number of schools throughout Kansas. See Attachment B, provided by Kansas Cable Telecommunications Association, for additional detail. These and other similar services meet the needs for higher bandwidth (faster) transfer of data.

Users who do not require the higher bandwidth services typically access the Internet on a 'dial-up' basis. With a modem equipped Personal Computer (PC), using the Public Switched Network, they place a call to their selected Internet Service Provider (ISP), much the same as placing a normal telephone call. If the ISP is local they merely make a 7-digit local phone call. If the selected ISP is not local a 1+ long distance call (with the resulting long distance charges) is required for access to the selected ISP. Some ISPs offer access via toll free 800 service. However, with 800 service an additional ISP charge is incurred, typically in the $5.00/hour range.

Pursuant to K.S.A. 66-2011 if there is no *local* ISP available, the customer will have access to a $15/$30 flat rate long distance plan provided by the incumbent local exchange carrier. Attachment C provides a summation of the availability of ISP services within local calling scopes; 96% of Kansas access lines have local access to an Internet Service Provider.

As of October, Southwestern Bell reports 319 subscribers on the $15/$30 plan and Sprint/United reports 1,767 subscribers in the month of November.

V Quality of service provisions

The current statute contains two quality of service criteria for internet access providers: 1) the service must support a minimum speed of 14.4 kbps (increases to19.2 kbps on July 1, 1999); and 2) there must be no more than 5% blockage during the service's busy hour. The Commission monitors these standards upon complaint. A summary of complaints received and handled by the Commission's staff is provided in Attachment D.

[3] The term bandwidth refers to the range of signal frequencies that can be carried on a communications channel. The capacity of an analog channel is measured in cycles per second, or Hertz (Hz), and is expressed as the difference between the highest and lowest frequencies carried. The capacity of a digital channel is measured in the number of 'bits per second' that the facility can carry. A digital channel's capacity is typically expressed in units of thousands, or kilo, bits per second (kbps) or million, or mega, bits per second (mbps). Bandwidth will vary according to the sort and method of transmission.

VI Emerging alternative services

While the focus of this report centers on dial-up access to the Internet, a brief discussion of at least some of the emerging new services for use in accessing the Internet is in order.

Cable services. After years of technology trials and evaluations CableLabs, a research and development consortium of cable television system operators, announced standardization on technical specifications (known as Data Over Cable Service Interface Specification (DOCSIS)) for Cable TV modem devices in early 1998. This development, along with the distribution upgrades, are positioning the Cable industry to offer very high bandwidth services, including access to the Internet, in the near future. To advance the development and deployment of this expanded cable capacity, leaders from within the industry have formed the Cable Broadband Forum, Inc. (CBF). Current information concerning the CBF may be found at their web site http://www.broadbandforum.com. However, specific service availability dates and pricing structures are not generally available, at this time. Attachment B, prepared by the Kansas Cable Telecommunications Association, provides additional detail.

xDSL service. xDSL refers to a growing family of Digital Subscriber Line (DSL) services. DSL service is delivered over existing copper loop facilities through advanced electronic terminal equipment providing transmission rates much higher than what can be achieved with current modems (ie. 28.8kbps). Of the xDSL family, Asymmetrical Digital Subscriber Line (ADSL) service is receiving most of the attention. ADSL provides a downstream (from the internet toward an end user) bandwidth of 1.5 to 8 Mbps and an upstream (from an end user to the internet) bandwidth of 64 to 640 Kbps. The Commission now has pending two applications for Local Exchange Carrier certification from companies proposing to offer ADSL services. However, at this time specific service availability dates and pricing structures are not generally available. The FCC, in an Order dated October 30, 1998, (FCC98-292) found ADSL service to be interstate in nature and, thus, under federal jurisdiction.

Satellite services. In a June 30, 1998, Order (FCC89-142) the FCC authorized the 47GHz band for satellite and stratospheric platform services. Several companies are pursuing the use of this newly assigned spectrum, as well as the previously assigned spectrums, for the delivery of high bandwidth services (ie. Internet access); Sky Station International, Inc. and Teledisic LLC are two such ventures. Attachments E and F provide insights to these development efforts.

VII Conclusions

The 1996 session of the Legislature introduced and passed the initial version of K.S.A. 66-2011 instituting a cost effective alternative for rural Kansans to access Internet services. The 1998 session provided needed clarification, as highlighted in Attachment A. This Commission's experience in administering the provisions of 66-2011 indicate that the plan does, in fact, offer a reasonable alternative for Kansans; 116 registered ISPs provide local, 7-digit, access to approximately 96% of the access lines in the state and, in addition, over 2,000 customers receive access by means of the discounted $15/$30 plan. The quality of service provisions of the statute, although not perfect, do provide for a cost effective approach for assuring access to the Internet.

VII Conclusions *(continued)*

This report includes a cursory discussion of emerging alternative services for use in accessing the Internet. While absolute time frames or specifics concerning deployment of those services in Kansas is not yet available, it is clear that significant developments are underway and will be available in the near future.

It is this Commission's opinion that the provisions of 66-2011 are reasonably effective in meeting the needs of Kansans for an economical alternative in accessing the Internet and that such an alternative will continue to be needed for the next two to three years, during which time one or more of the emerging alternative services will, no doubt, become widely available. We are therefor, recommending no changes in the existing statute. This is consistent with the recommendation made to you from the KUSF-Working Committee.

Attachments:

A. Existing Kansas Internet access legislation, House Sub. for Senate Bill 212, Sec. 3.
B. Kansas Cable activity, as of Nov. 30, 1998
C ISP Service Summary, as of Nov. 19, 1998
D. Summary of Complaint Activity
E. Sky Station
F. Teledesic, LLC

House Substitute for SENATE BILL No. 212

** Excerpts **

An Act concerning telecommunications services; relating to enhanced universal service and internet access; amending K.S.A. 1997 Supp. 66-2005, 66-2008 and 66-2011 and repealing the existing sections.

Be it enacted by the Legislature of the State of Kansas:

Sec. 3. K.S.A. 1997 Supp. 66-2011 is hereby amended to read as follows: 66-2011.

(a) As used in this section, ``the internet" means the international network of interconnected government, educational, and commercial computer networks. An ``internet service provider" means an entity that provides end user access to the internet. Nothing in this section shall be construed to mean that the commission has any regulatory jurisdiction over internet service providers. The provisions of this section apply only to those locations of the state where local (7-digit) internet access, which supports at least 14.4 kilobits per second service with no more than 5% blockage during the busiest hour of the service, is not available on *or after* October 1, 1996. ~~The provisions of this section also apply to those locations where local access has been discontinued as of October 1, 1996, or access to the service deteriorates to more than 5% blockage during the busiest hour of the service.~~

(b) On or after July 1, 1996 and prior to October 1, 1996, rural telephone companies shall file concurring tariffs to offer internet access in locations identified in subsection (a) to an intraLATA internet service provider of the customer's choice. All rural telephone companies, including local exchange carriers pursuant to subsection (c), shall provide dial- up access to support at least 14.4 kilobit per second service ubiquitously throughout the exchange service area, with ~~28.8~~ *19.2* kilobit per second service ~~made available to any requesting customer on or~~ *on and* after July 1, 1999. *The commission shall increase the 19.2 kilobit per second requirement when the commission determines that more advanced technology is both technically and economically feasible.*

(c) On or after July 1, 1996 and prior to October 1, 1996, all local exchange carriers, other than rural telephone companies, shall file tariffs with the commission for two flat-rate dial-up plans, which would provide internet access in locations identified in subsection (a) to an intraLATA internet service provider of the customer's choice. All such plans shall be approved by the commission if they meet the criteria established in this section. The first plan includes:

(1) For off-peak users, a monthly rate of not more than $15 per line for the hours of 5 p.m. through 7:59 a.m. weekdays and all hours on weekends and federal holidays. Calls placed outside this specified off-peak period shall be billed at prevailing toll rates.

(2) For unlimited usage, the rate shall not exceed $30 per line per month. The commission shall waive imputation considerations in reviewing and approving these service offerings.

(d) If a location was previously eligible for the plans provided in sub-section (c) and a new internet service provider establishes a local presence in that location, the local exchange carrier serving the location shall:

(1) Notify all subscribers of the discounted internet access service that a local internet service provider is now available;

(2) continue to make the discounted internet access service available to existing subscribers of such service with no deterioration of such service; and

(3) allow no new subscribers of the discounted internet access service.

(e) Nothing in this section shall be construed to imply that the commission has any regulatory jurisdiction over the internet or internet service providers with respect to quality of service, rates, billing and collection practices, end-to-end bandwidth, technical support or any other aspects of the business of providing internet access service. However, the commission shall monitor the adequacy of connectivity to internet service providers. Upon complaints of inadequate access, commission staff shall request a seven-day traffic busy line study from the local exchange carrier serving the internet service provider. Commission staff shall analyze the study results to determine whether there is more than 5% access blockage and shall provide the analysis to the internet service provider for consideration and possible action. If the analysis indicates a need for additional capacity and the internet service provider fails to take a corrective action within 45 days after the analysis is provided to such provider by the commission staff, the internet service provider shall be removed from the commission's internet service provider registry and subscribers of such internet service subscriber shall be eligible for the plans provided in sub-section (c) if there is no other local internet service provider serving the location.

(~~d~~) (*f*) All internet service providers operating in the state shall register with the commission. Such registration shall include the name of the internet service provider and the provider's address, contact name, phone number, and access line numbers. This information shall be maintained by the commission ~~and disseminated to all local exchange carriers and rural telephone companies providing access to internet service providers in accordance with provisions of this section. This information shall be used to validate customer service requests~~ *at the commission's internet home page (http://www.kcc.state.ks.us). This information shall be used to determine a requesting customer's eligibility for the plans provided in subsection (c) and to provide a single authoritative listing of internet service provider access numbers for local exchange carriers to use in processing service orders. Absent complaints to commission staff,*

internet service providers shall be assumed to provide service with 5% or less access blockage upon registration. If, upon complaint and subsequent investigation, access blockage is determined to exceed 5%, the provider shall be removed from the commission's registry.

(~~e~~) (*g*) During the 1999 session of the Kansas legislature, the commission shall transmit a report to the chairperson, vice-chairperson and ranking minority member of the house standing committee on energy and natural resources, the senate standing committee on transportation and utilities and the joint committee on computers and telecommunications concerning implementation of this section. The report shall include recommendations for revisions in this section necessitated by technological innovation or market changes in the telecommunications industry. The report also may include an expiration date for this section.

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This Bill was signed into law by the Governor on April 23, 1998. It is presented here in 'marked up' Bill form for the reader's convenience in identifying revisions that were introduced in the 1998 session.

A Cable Online Summary, by the
Kansas Cable Telecommunications Association

Cable System Upgrades

Cable television systems, since the 1970s, have been two-way capable, analog transmission systems utilizing coaxial cable. By adding fiber-optic and two-way equipment cable system architecture becomes hybrid fiber-coax (HFC) and supports offering analog video, digital video, high-speed data and voice services. Furthermore, once stand-alone cable systems, are being interconnected with fiber-optic technology to bring the benefits of new products and services to communities of all sizes on a regional basis. Kansas cable operators are in the midst of such upgrades. Some communities such as Ellis, Goodland, Hays, Kansas City area systems, Liberal, Olathe, Salina, Topeka and Wichita are already served by HFC systems. Many others will follow in 1999 – 2000. HFC upgrades have been announced for Arma, Caney, Cherryvale, Coffeyville, Dodge City, Erie, Fredonia, Garden City, Gas, Humboldt, Iola, Junction City, Lawrence, Manhattan, Ogden, and Yates Center.

A New Technology Standard

In 1995 cable operators were installing proprietary and non-interoperable cable television modems and envisioned the need for interoperability. Cable operators, equipment manufacturers and Cable Television Laboratories, Inc. (CableLabs) announced an agreement to specify some of the technical ways cable networks and data equipment talk with one another. CableLabs was asked to coordinate the Multimedia Cable Network System (MCNS) Data Over Cable System Interface Specification (also know as Data Over Cable System/Interoperability Standard) (DOCSIS) process. Such interface specifications will benefit consumers and cable operators by providing multiple sources of interoperable modems, thereby encouraging marketplace competition, enabling economies of scale and reasonable prices. Multiple suppliers building to the industry specification, but adding unique capabilities, will give consumers a wide selection of high-quality recognizable products from which to choose. In late March 1998, MCNS DOCSIS was approved as an international standard for transmitting data over cable. In December 1998 CableLabs is evaluating external two-way DOCSIS 1.0 modem certification tests with the expectation of certifying some manufacturers in the next several months. Participating vendors include 3Com, Askey, Broadcom, Cadence/Daewoo, Cisco, Com21, E-Tech, General Instrument, Motorola, NEC, Nortel/Bay Networks, Samsung, Sony, Thomson/RCA, Toshiba, and Zenith. Internal DOCSIS cable modem card testing and development of DOCSIS 1.1 which will support toll-quality Internet Protocol (IP) telephony are also underway.

The Cable Modem

A cable modem is a device that allows high-speed access to the Internet via a cable TV network. A cable modem will typically have two connections, one to the cable wall outlet and the other to a computer (PC). Cable modem customers access the Internet at a fraction of the time it takes traditional telephone modems because cable's broadband plant makes the connection up to a hundred times faster and allows the service to be always on. Unlike telephone modems, cable modem customers keep their telephone lines free. Internet browsing using a telephone line can be painfully slow, especially when photographs, graphics or video images are encountered. Cable modem users not only get online faster but also can move around quickly allowing information providers to offer better quality content.

Comparative data transmission speeds

Time required to transmit a single 1 megabit graphic image:

Telephone Modem @ 28.8 kbps ..... Approx. 5 minutes
ISDN @ 64kbps ..... Approx. 2 minutes
Cable Modem @ 10 mbps ..... Approx. 1 second

Time required to transmit a 5 megabit audio/video clip of approximately 1.5 minutes in length:

Telephone Modem @ 28.8 kbps ..... Approx. 22 minutes
ISDN @ 64kbps ..... Approx. 10 minutes
Cable Modem @ 10 mbps ..... Approx. 4 seconds

kbps = kilobits per second mbps = megabits per second

Cable Online Services

Cable modem customers enjoy 24-hour instantaneous access to the Internet and other on-line services such as Time Warner's Road Runner. Road Runner is an easy-to-use broadband online service that integrates multimedia programming, communications and personalized services such as e-mail, home page hosting and chat events. The service contains world, national and local programming and information. Road Runner is deployed over a regional network architecture the center of which is a Regional Data Center (RDC). RDC's contain computer systems to deliver Electronic Mail, UseNet News, Web Caching, and Directory services to users in the region. RDC's also contain network management and monitoring tools, and house a professional staff to manage the system. Content is distributed from content servers located at the RDC. Kansas City is home to a Road Runner RDC. All regions are joined by a national backbone infrastructure. The national backbone provides high speed region-to-region connectivity and direct access to the Internet and allows visibility of the regional systems by a National Operating Center.

Cable Online Services (continued)
Service prices vary from market to market but are generally less than $50.00 per month. The monthly fee includes unlimited, connectionless access to the online service and the Internet (without hourly fees) and the rental of the cable modem.

Internet connection services will also be offered to businesses.

Internet Access Without PCs
Cable operators may also offer cable services that enable low cost Internet access for consumers through the cable system without the need for a PC, modem, or any additional in-home equipment. For example, WorldGate is an interactive Internet service, which uses an advanced analog or digital cable converter, the existing TV set, and a remote control. Using the vertical blanking interval, a normally unused portion of the video spectrum, the existing cable infrastructure will allow WorldGate to offer data rate speeds of 128,000 bps. WorldGate has pioneered Channel Hyperlinking, the ability of subscribers with a single keystroke, to connect directly to a Web site associated with a TV show or commercial announcement. Logging on to the service, for E-mail, Web browsing or Channel Hyperlinking, requires less than 5 seconds.

Education Commitment
Cable television operators are committed to serving schools. Of the 1,622 public and private elementary and secondary schools in Kansas, 1,264 or 78%, serving 86% of K-12 students, are connected to cable television systems free of charge. In addition to Cable in the Classroom, which offers 525 hours of copyright cleared programming and curriculum assistance to schools each month; Kansas cable operators are assisting schools with distance learning and online projects. Multimedia, for example, began providing high speed Internet access to schools in 1998 using cable modems and currently has over 50 schools connected. Some of these include: Sedgwick Public Schools, Circle High School in Towanda, Burrton Public Schools, Newton Schools, Eldorado Public Schools, Blessed Sacrament, Catholic Diocese, Sunrise Christian Academy, and Rainbows United. For USD 259 Multimedia has connected Sowers, College Hill, Colvin, SE High, Wilbur, South High, School Service Center, Instructional Support Center, Mayberry, North High, Metro Meridian, Metro Mid-Towne, Benton, Heights High School, and Washington, as well as, Hutchinson Community College, Hutchinson City Hall, and Derby City Hall.

Cable modems can also be used to cost effectively network schools together and Multimedia currently provides this technology to the McPherson School District, the Great Bend School District, the Newton School District and is working with the Eldorado School District and the City of Hutchinson. Cable modems allow for an Ethernet Wide Area Network to be established between each remote site. In addition to cable modem technology, cable operators continue to work with educators to create Interactive Distance Learning Networks by utilizing capacity on fiber optic networks. Multimedia has a network operating between Hutchinson Community

College, Burrton, Sedgwick, Fairfield and Hesston, Kansas. Galaxy Cablevision has a network connecting Basehor-Linwood. Classic Cable is at work in Phillipsburg, Oberlin, and Paola/Osawattomie, Kansas.

Finally, the cable industry has created an online Internet tutorial for teachers called webTeacher. We encourage everyone interested in using the Internet to visit the site at http://www.webteacher.org

ISP Service Summary

a/o November 19, 1998

-- Number of -- ISPs	Localities	Total Network Access Lines	Ave. # of NALs	% of Total NALs	% of Rural NALs
0	127	64,965	512	4.1%	8.4%
1	330	275,448	835	17.4	35.8
2	51	114,139	2,238	7.2	14.8
3	12	61,707	5,141	3.9	8.0
4	4	37,259	9,315	2.3	4.8
5	4	34,053	8,513	2.1	4.4
6	3	18,773	6,258	1.2	2.4
7	2	52,686	26,343	3.3	6.8
8	1	Note: Line count information is considered proprietary			
9	1	by at least one of the LECs in the following locations.			
10	1				
11	1				
14	1				
20	1				
25	1				
26	1				
Totals	540	1,582,614		100%	100%

Total Rural NALs == 769,760
Total Metro NALs == 812,854

Notes: 1. Network Access Line (NAL) counts are taken from the Dec. 1997 Annual Reports.
2. ISP data taken from the KCC's Registry, dated November 10, 1998.
3. Metro areas are defined as Kansas City, Topeka and Wichita.
4. Rural areas are defined as all areas other than Kansas City, Topeka and Wichita.

As identified in the above summation, there are 127 localities or communities in Kansas with no ISP within their local calling scope. These 127 locations account for 64,965 Network Access Lines, or 4.1% of the state; 96% of the access lines in Kansas have local access to an ISP.

Specific locality information is maintained in the KCC's Registry of ISPs and is available at http://www.kcc.state.ks.us.

Complaint Resolution Activity

K.S.A 66-2011 provides for the following quality of service monitoring and complaint investigation procedures:

(e) Nothing in this section shall be construed to imply that the commission has any regulatory jurisdiction over the internet or internet service providers with respect to quality of service, rates, billing and collection practices, end-to-end bandwidth, technical support or any other aspects of the business of providing internet access service. However, the commission shall monitor the adequacy of connectivity to internet service providers. Upon complaints of inadequate access, commission staff shall request a seven-day traffic busy line study from the local exchange carrier serving the internet service provider. Commission staff shall analyze the study results to determine whether there is more than 5% access blockage and shall provide the analysis to the internet service provider for consideration and possible action. If the analysis indicates a need for additional capacity and the internet service provider fails to take a corrective action within 45 days after the analysis is provided to such provider by the commission staff, the internet service provider shall be removed from the commission's internet service provider registry and subscribers of such internet service subscriber shall be eligible for the plans provided in sub-section (c) if there is no other local internet service provider serving the location.

Since the inception of this service, in October of 1996, six written complaints have been filed resulting in the following the investigative actions:

Location	Traffic Study Dates	Results	Disposition
Haven	Oct. 29-Nov. 4, '97	Excessive B.H. blockage was measured at 17%. Two additional lines are Req. to meet the 5%, or less, standard.	Provider took no corrective action. Provider was removed from the Registry on Jan. 6, 1998.
Osage City	Mar. 16-22, 1998	Excessive B.H. blockage was measured at 64%. Four additional lines are required to meet the 5%, or less, standard.	Provider initially took no corrective action and was removed from the Registry on June 22, 1998. Provider subsequently rearranged serving configuration and re-registered on October 15, '98.
Meriden	Mar. 16-22, 1998	Excessive B.H. blockage was measured at 96%. Six additional lines are required to meet the 5%, or less, standard.	Provider took corrective actions and remains on the Registry.

Attachment D:
Summary of Complaint Activity

Location	Traffic Study Dates	Results	Disposition
Wellsville	June 1-7, 1998	Excessive B.H. blockage was measured at 95%. Six additional lines are required to meet the 5%, or less, standard.	Provider took corrective actions and remains on the Registry.
Scranton	Nov. 17-23, 1998	Excessive B.H blockage was measured at 36%. Two additional lines are required to meet the 5%, or less, standard.	Provider took corrective action and remains on the Registry.

B.H. = The Service Provider's Busy Hour.

To date, there have been no formalized complaints of inadequate transmission speed performance. K.S.A. 66-2011 (b) states that "... All rural telephone companies, including local exchange carriers pursuant to subsection (c), shall provide dial- up access to support at least 14.4 kilobit per second service ubiquitously throughout the exchange service area, with *19.2* kilobit per second service made available on and after July 1, 1999....". In the event that a complaint is received in this area staff will investigate the matter on an individual case basis.

Stratospheric Telecommunications Service

Note: The following was taken from Sky Station International's web site http://www.skystation.com/telecom.html, on December 10, 1998. It has been reformatted to blend with the other text of this report.

Sky Station's platforms are ideally suited to delivering telecommunications services.

Located in the stratosphere 21Km above the earth, each platform acts as the highest tower in town, providing high density, high capacity, high speed service with low power requirements and no latency to an entire metropolitan and suburban area extending out into rural areas. No other existing or proposed technology offers this combination of high density service and low cost.

Subscribers transmit directly to the platform, where on board switching routes traffic directly to other Sky Station subscribers within the same platform coverage area. Traffic destined for subscribers outside the platform coverage area is routed through ground stations to the public networks or to other platforms serving nearby cities.

A Big Pipe into Every Home

Today's telecommunications networks have become stressed by the explosive growth of the Internet. As more users tie up lines for longer periods of time, the usage patterns for which the networks were originally designed have been fundamentally altered. Consumers have become increasingly dissatisfied with the slow speed of dial-up access and are demanding higher speed solutions. Sky Station satisfies this demand by delivering personal T1/E1 broadband service to the mass market at a lower cost than existing or announced alternatives.

With data rates bursting to 2Mbps uplink and 120Mbps downlink, subscribers enjoy high speed Internet browsing and hosting, as well as other broadband services such as video conferencing.

Spectrum in the 47GHz band has already been designated globally by the International Telecommunications Union (ITU) as well as the Federal Communications Commission (FCC) for use by high-altitude stratospheric platforms, paving the way for planned commercial service to commence in the year 2000.

Telephony for the Developing World.

All developing nations need low cost access to high density telecommunications links to support accelerated economic development and inclusion in the Information Revolution. Sky Station's stratospheric platforms provide the fastest, easiest and least expensive way to bring advanced services to the developing world. One Sky Station platform alone provides telephone service for millions of subscribers at a lower cost than any current or proposed system.

Mobile Solutions

The ability to communication anywhere, anytime is an integral part of today's global culture. A worldwide standard (IMT-2000) is evolving for a broadband service for mobile, portable and fixed users. The STS system is the ideal means for low-cost rapid deployment of mobile services and Sky Station is participating in the development and delivery of third generation cellular service.

The Sky Station Advantage

There are several unique attributes that allow Sky Station to offer a broad array of services with low operating costs:

- Sky Station platforms do not require a launch vehicle, they can move under theirown power throughout the world or remain stationary, and they can be brought down to earth, refurbished and re-deployed.

- Once a platform is in position, it can immediately begin delivering service to its service area without the need to deploy a global infrastructure or constellation of platforms to operate.

- The altitude enables the Sky Station system to provide a higher frequency reuse and thus higher capacity than other wireless systems.

- The low cost of the platform and gateway stations make it the cheapest wireless infrastructure per subscriber conceived to date.

- Joint venture companies and government authorities located in each country will control the Sky Station platforms serving their region to ensure the best service offerings tailored to the local market. Offerings can change as a region develops.

- Each platform can be retrieved, updated, and re-launched without service interruption.

- Sky Station platforms are environmentally friendly. They are powered by solar technology and non-polluting fuel cells.

- The 21Km altitude provides subscribers with short paths through the atmosphere and unobstructed line-of-sight to the platform..

- With small antennas and low power requirements, the Sky Station system allows for a wide variety of fixed and portable user terminals to meet almost any service need.

The capabilities and low cost of the Sky Station system will revolutionize telecommunications.

Teledesic Satellite Service

Note: The following was taken from Teledesic LLC's web site http://www.teledesic.com/overview/fastfact.html *on December 10, 1998. It has been reformatted to blend with the other text of this report.*

The Company

Teledesic is building a global, broadband "Internet-in-the-Sky." Using a constellation of low-Earth-orbit satellites, Teledesic and its partners will create the world's first network to provide affordable, worldwide, "fiber-like" access to telecommunications services such as broadband Internet access, videoconferencing, high-quality voice and other digital data needs. On Day One of service, Teledesic will enable broadband telecommunications access for businesses, schools and individuals everywhere on the planet.

Timeline

1990 Company founded
1994 Initial system design completed; FCC application filed1997
FCC license granted; World Radio Conference designated necessary international spectrum for service
1998 Motorola, The Boeing Company and Matra Marconi Space join efforts to build the Teledesic system.
2003 Service targeted to begin

Principal Shareholders/Industrial Partners

Teledesic represents the vision of telecommunications pioneer Craig McCaw, the company's chairman and co-CEO. Teledesic's primary investors are McCaw, Microsoft Chairman Bill Gates, Motorola, Saudi Prince Alwaleed Bin Talal and Boeing. Motorola, one of the world's premier communications equipment manufacturers, leads the international industrial team that will develop and deploy the Teledesic system. Boeing and Matra Marconi Space round out Teledesic's founding industrial team. Teledesic is a private company based in Kirkland, Washington, a suburb of Seattle.

Customers

Teledesic will develop alliances with service provider partners in countries worldwide, rather than marketing directly to end-users. Teledesic will enable service providers to extend their networks, both in terms of geographic scope and in the kinds of services they can offer.

Network Capacity/Access Speeds
The Teledesic system is designed to support millions of simultaneous users. Teledesic will offer a family of user equipment to access the network. Most users will have two-way connections that provide up to 64 Mbps on the downlink and up to 2 Mbps on the uplink. Higher-speed terminals will offer 64 Mbps or greater of two-way capacity. This represents access speeds more than 2,000 times faster than today's standard analog modems.

User Equipment
The Teledesic system's low orbit eliminates the long signal delay normally experienced in satellite communications and enables the use of small, low-power terminals and antennas. The laptop-size terminals will mount flat on a rooftop and connect inside to a computer network or PC.

Cost
Design, production and deployment of the Teledesic system are estimated to cost $9 billion. End-user rates will be set by service providers, but Teledesic expects rates to be comparable to those of future urban wireline services for broadband access.

Regulatory Approval
Teledesic cleared its last significant regulatory hurdle when the International Telecommunication Union's 1997 World Radiocommunication Conference in November 1997 finalized its designation of international radio spectrum for use by non-geostationary fixed satellite services, such as those Teledesic will provide. The FCC licensed Teledesic in March 1997.

Frequencies
Teledesic will operate in the high-frequency Ka-band of the radio spectrum (28.6 - 29.1 GHz uplink and 18.8 - 19.3 GHz downlink).

# of Satellites
288 plus spares

Employees
More than 100 and growing

Headquarters
Kirkland, Washington; offices in Brussels, Belgium, Madrid, Spain, Ottawa and Washington, D.C.