Technology in satellite internet

Technology

Technologyis getting better each day. The Internet is one of the best, if not the best, technology that was invented on this century. Internet allows us to see the world that we have not seen. Internet widens our knowledge on certain perspectives and information. Internet makes learning easier and more accessible as compared to the past century before it was invented. It allows us to see places that we cannot see physically. In short, it gave us the world of easier and more accessible pool of knowledge. Dial-up Internet access was the first innovation that was used to connect to the Internet.

This type of Internet connectivity connects through the Internet using the customary telephone line. The telephone line is then connected to a modem, a device that needs to be attached on the computer to allow internet access. By configuring the computer to dial up a specific telephone number of an Internet Service Provider (ISP), Internet is already accessible. The next innovation used to connect through the Internet was the Digital Subscriber Line (DSL). This type of Internet connectivity was the widely used type of Internet connectivity on these days.

Compared to a dial-up connection, DSL is faster as they are designed for use with high-speed DSL connections. Recently, another innovation in Internet connectivity was introduced to the market, the satellite Internet. Satellite Internet, from the name itself, connects to the Internet using satellite. The outgoing and the incoming data are sent and arrive at the computer through the satellite. Hardware that is needed to be installed on the computer to have this type of internet connection includes satellite dish antenna and a transceiver which works in the microwave portion of the radio spectrum.

This type of Internet connection is recommended for residents and business establishments that do not have access on DSL or cable internet on their location. This research paper aims to take a closer look on the technology behind satellite Internet. What is satellite internet? Satellite Internet provides Internet through satellite. It is connected to a dish network subscriber service. The speed that satellite internet provides is just the same as those provided by other broadband technologies. However, not all locations have DSL or cable internet providers. Some rural areas lack DSL and cable internet service.

Satellite Internet solves this problem for it can be connected anywhere as long as there is electricity to power a computer system. There are three types of services offered in satellite internet: (1) One-way multicast; (2) One-way with terrestrial return; and (3) Two-way satellite access. IP multicast-based data, audio, and video distribution are the usage of one-way multicast satellite Internet systems. This type of service is recommended for TV and radio contents as they need modest user interface. This happens because full interactivity is not possible for this type of service.

FCC license is a requirement in the United States for the uplink station though there it is not needed for the users. Because of this, most Internet protocols does not work adequately on one-way access because a return channel is needed. By pushing to a local storage at end user sites, webpage can still be distributed on the Internet. Interface to the Public Switched Telephone Network for squawk box application is a system hardware component needed for this type of service. On the other hand, custom

programming at the remote site is needed for the system software component.

Filter, store, present a selection interface to, and display data are the tasks needed to be performed by the software at the remote site. While provision of access control, priority queue, sending, and summarizing of data are the tasks needed to be performed by the software at the Teleport. Used with a dial up access to the Internet, together with outbound data traveling with the use of a modem, one-way terrestrial return satellite Internet systems downloads are sent through satellite having the speed almost the same as those offered speed by other broadband Internet services.

The transmitting station or the Teleport is needed component of system hardware. This transmitting station has two components: (1) Internet connection and (2) Satellite uplink. Minimum programming that can provide authentication and set Proxy server settings are needed by the remote sites, which is the system software component. Compared to a dial up modem, this type of satellite Internet service’s speed is faster and latency is higher. Speed of download is faster than dial-up modem but slower than terrestrial broadband methods. According to sattellitemaps. om, two-way satellite Internet sends data from remote sites via satellite to a hub, which then sends the data to the Internet. To avoid obstruction with other satellites, the satellite dish must be accurately positioned on each location. Obstruction with these systems can be caused by oscillators in various radar detectors. To adjust the amount of transmit power, each location is required to use power management. TDMA and SCPC are the two types of two-way satellite

Internet. Internet speed for this type of service uncommonly exceeds one megabit per second and the latency can reach up to one second.

Speed, in general, for satellite Internet can be two-megabits per second (Mbps) for downstream and one-megabit per second for upstream. On the other hand, a typical dial-up Internet connection speed reaches only 53 kilobits per second (Kbps). Therefore, satellite Internet is by far faster than a dial-up Internet connection. Though satellite Internet solves the problem of those who live in areas that do not have DSL or cable Internet services, it still has its drawback. It is generally expensive as compared to dial-up and DSL connection.

High latency, which means signal delay, is another drawback of satellite Internet. A request for a webpage from a satellite Internet subscriber travels 22, 300 miles to reach a satellite in a geostationary orbit. Another 22, 300 miles is traveled by the signal upon reaching the geostationary orbit back to the earth. Lastly, another 22, 300 miles must be traveled for the signal to reach the user. All in all, the total distance traveled by the information is 89, 200 miles. The total distance is what the user is paying for this type of Internet connection.

Average latency, on the other hand, is approximately 500-700 milliseconds. In short, latency cannot be avoided in satellite Internet. Thus, it is not recommended for some Internet activities such as multiplayer online gaming. In general, satellite Internet is by far faster than a dial-up connection but still slower as compared to other broadband technologies such as DSL and cable internet connection. How does satellite internet

works? The Technology behind the Innovation The large satellite dish is the hub station. Its average diameter ranges from 6 meters to 32 meters.

Receive gain is dependent on the size of the satellite dish. The large size of the satellite dish brings high receive gain and sensitivity. Transmit power is minimized through the large dish. The large size also brings high transmit gain at the same time minimizes the transmitter power at the hub. A router to interface to the external ISP network, DVP-IP encapsulator that will insert the IP data into a format of MPEG-2, DVB multiplexer, continuous modulator, timing clock, up-converter, and high power amplifier are the transmit Hub Common Equipment (HCE).

Meanwhile, low noise amplifier, down-converter, timing and distribution of MF-TDMA demodulator unit and multiple MF-TDMA demodulator units for each inbound carrier to be received simultaneously are the components of receive HCE. Having high sensitivity is a requirement for the satellite uplink so it can function well in small dish transmits services. If the uplink beam coverage area is small, high sensitivity is easily achieved. Adequate high gain setting is also a need for the satellite transponder.

This will be easily achieved but it should be specified fist before satellite construction begins. Through a remote control of a gain step attenuator, adjustment of the gain of satellite is possible. On the other hand, a lower gain setting is preferable for large dish services. Frequency bands for satellite internet can be any of the following: (A) C band 4/6 GHz; (B) Ku band 10-12/14 GHz; or (C) higher Ka band. Among all the customer

terminals, a large outlink carrier from the hub is shared. It has a bit rate of 60 Mbits/s rate. It is also ETSI-compliant for modulation and FEC.

Quadrature or 8 Phase Shift Keying (QPSK or 8-PSK) is the format of the outlink carrier. The following are the ways of transmitting digital data. For a particular bit rate, both need the approx and the same power from the satellite but 8-PSK concentrates the power into half the bandwidth (VSAT, 2005). 8-PSK becomes viable with dual satellite transponder bit rate capacity if there is a powerful satellite and maybe larger remote terminals. A series of symbols, where each symbol has four to eight possible states, form the carrier. Thus, each symbol conveys two to three binary bits per symbol.

Forward error correction systems are used, which add extra bits to form a higher transmission bit rate, to attain an insignificant bit error rate for the information. A pragmatic Trellis type is the inner code together with the 8-PSK. MPEG-2 with DVB Multi-Protocol Encapsulation (DVB-MPE) format for IP data is the data stream format. The extra forward error correction bits, found at the customer receiver, are utilized to perceive errors and basically correct all of them. Another important component in satellite Internet is the Return Channel Satellite Terminals (RCST) outdoor unit (ODU).

The following are its components: (1) Parabolic antenna reflector; (2) Feed; (3) Ortho-mode transducer; (4) Filters; and (5) Transmit/receive radio frequency modules. The received downlink from a satellite is normally collected by the reflector. It is better to have a bigger size of the reflector. Most dishes used are of offset front fed parabolic shape with the feed at the bottom on an arm (VSAT, 2005). Appearance of radio signal from the radio

equipment until it reaches the air functions in the feed. To allocate power across the dish area is its primary function.

It should also be considered that the position of the dish must be at the focus of the parabolic dish shape. Division of the two polarizations positioned at linear and right angles are performed by the Ortho-Mode Transducer (OMT). The function of the two polarities is for the other to transmit and the other to receive. To avoid the transmitter from obstructing the receiver, filters are inserted. It is also used to attach the transmitter and receiver. Up-converting of the signals to transmit frequencies and amplifying them before transmission is the function of transmit module.

Powers are directly proportional to transmit bit rates. The higher the power, the greater is the transmit bit rates. If there is RCST-ODU, there is also Return Channel Satellite Terminal (RCST) Linkstar indoor unit, which is an integrated unit that has connections for two coax cables to the antenna and a CAT5 10/100 Base-T connection for an ethernet cable that is linked to the subscriber’s computing equipment. The received MPEG-2 stream is recovered from the outbound signal by an integrated circuit consisting of a DVB-S demodulator and de-multiplexer (VSAT, 2005). The outbound signal is demodulated by this logic.

The IP packets that are aimed for precise customer terminal are recovered by the demux, which is then delivered to the external network via the ethernet interface. RCST is responsible in preparing the data into short packets or bursts that are conveyed according to a Time Division Multiple Access (TDMA) system. If you are interested in connecting your personal

computer or a local area network, the least complex installation will involve a single computer that is connected with ethernet cable. The basic task is to set the IP address and subnet mask. On the other hand, local area network can be connected through the use of a local router.

This will allow many computers on a local area network, cafe, and wireless LAN to be connected. Future Trends in Satellite Internet As we all know, satellite Internet is just a recent innovation for Internet connection. Thus, it still needs to be improved and developed further to allow more people to benefit from this innovation. In the near future, IP protocols are expected to improve at the same time compatible to SAT channel. Voice over IP is also a future trend for satellite internet. Since satellite Internet is costly these days, it is expected to have a lower cost specifically in storage devices in the near future.

Traffic over satellites is one of the drawbacks of satellite Internet. However, it is an expected trend in the future to have a more advance hardware and software that will handle and improve traffic over satellites. New networks and traffic management systems is also expected. Innovation in antennas, switching, MMIC, and bandwidth use are expected to get better as satellite internet attracts more market share. Lastly, new satellite systems that use new frequencies such as Ka, V, and Optical systems are also expected to occur in the near future for satellite Internet.

Companies Involved in Satellite Internet Teleglobe is one of the largest Internet backbone access providers to Latin America. Recently, it just closed the deal of providing satellite access to content located on Teleglobe’s global

Internet backbone network to the University of Costa Rica. It is the leading provider of Internet backbone access services to carriers and ISPs all over Latin America. In addition to its services, it also provides access services for research andeducationnetworks throughout the world. Another satellite Internet provider is the Panamsat Corporation.

It is included among the world’s top three satellite operators. It manages a global fleet of 30 satellites, which 23 of these satellites are owned by the company. It also supports the largest satellite-based business networks in United States. Its services benefits cable television systems, broadcast affiliates, direct-to-home operators, Internet service providers, and telecommunication companies. One of the global leaders in the market of broadband satellite networks and services is Hughes Network Systems. It provides its services to enterprises, governments, small businesses, and consumers.

Globecomm Systems Inc. acquired all the shares of Netsat Express Inc. in June 2001 and decided to combine the services offered by both companies. This acquisition improved Globecomm’s position in the field of satellite-based communications and Internet solutions. Another satellite-based company is the Intelsat. It is the largest provider of fixed satellite services all over the world. These are just some of the companies using satellite for the services that they are offering to the market. Another provider of satellite Internet in Australia and other countries in Asia is Orion Satellite Broadband.

Generally, Orion is a provider of wide-ranging telecommunications solutions. However, their primary focus is on developing innovations and approaches to

some issues and challenges in communications that cannot be solve by conventional providers. Satellite Internet is one of their services to solve the problem of Internet accessibility. It is also developed and operated by HughesNet in the United States. Another provider of satellite Internet is the partnership of Zaksat and Fantastic Corporation. Zaksat is known as one of the leaders in satellite operator in Middle East countries.

Fantastic Corporation is a Swiss-American company that focuses on software technology. The partnership of Zaksat and Fantastic Corporation aims to provide broadband multimedia services among businesses and household consumers in the Middle East, India, Asia, and Australia. In Australia and New Zealand, Netaccess Satellite is the leading provider of satellite Internet. It provides high-speed, business-grade Internet connection even on remote areas of the country. The satellite that they are using for their services, which is their own satellite Optus, covers 100% of countries Australia and New Zealand.

The benefits that they are offering their consumers include lightning-fast broadband anywhere in the country, wider coverage of Internet access, ideal Internet access backup, trusted and quality performance, 24-hours customer support, and reporting tools. In countries Iraq, Afghanistan, Iran, Lebanon, Cyprus, Israel, Palestine, Jordan, Egypt, Saudi Arabia, Kuwait, United Arab Emirates, Qatar, Bahrain, Oman, Turkey, Georgia, Azerbaijan, Armenia, Syria, and Turkmenistan iDirect is the leading provider of two-way broadband Internet access.

Their services can benefit private consumers, businesses, and institutions. Speed, performance, and flexibility is what they are offering to their services offer the market. There are others that are not mentioned here. These companies are proofs that satellite Internet can benefit and have a large share on the market of Internet providers. Regulatory Issues in Satellite Internet Just like in cable Internet, privacy and speed are the major drawbacks in satellite Internet. Another of its drawback is its susceptibility during bad weather conditions.

Redefinition and recasting of 1934 Communications Act is shown in Telecommunications Act of 1996. Its primary goal is to address the emergence of competition in previously monopolistic markets. However, many still believe that the Telecommunications Act of 1996 is not enough to solve and address the issues of the continually changing telecommunicationsenvironment. Innovations and changes in the technology of telecommunications include the advancement of Internet in supplying data, voice, and video.

Convergence in the telecommunications sector is also a factor that is considered for the need of revision of the act. Some of the issues that concerns broadband communications are as follows: (A) Traditional providers who enter new markets, which they do not hold any power; (B) Extent of existing regulations that should be imposed on new entrants while they compete for traditional providers in the same market; (C) Suitable regulatory framework that will be imposed in new and converging technologies which are not classified in the present framework.

Broadband technologies are major considerations in the policy debate. Questions on whether the present regulations are enough to address the issues concerning competition and consumer benefits and satisfaction. Global Implications of Satellite Internet The primary implication of satellite Internet is its geographically advantage over other broadband providers. It solves the problem of Internet accessibility, especially in rural areas where there are no providers of DSL or cable Internet connection.

Though innovations and technical advances are continuously arising in today's world, there are still some who do not have the access to these technologies. Internet is one of the best innovations in today's century. Though, there are still some who do not have access to it. This is where the function of satellite Internet comes in. It offers an alternative to many consumers. However, its price is generally expensive compared to other broadband providers. Other drawbacks include its delay in delivering of data and its susceptibility on bad weather. As compared to dial-up Internet connectivity, it is by far faster in terms of speed.

However, when compared to other broadband technologies such as DSL or cable Internet, it offers just the same speed and other benefits with higher price. As a summary, satellite Internet provides an alternative Internet connection to many geographically challenged areas that do not have connection for DSL or cable Internet. It is not recommended for those who have broadband connections in their area for it has higher price and delay in relaying information especially on bad weather conditions. It diversified the market for consumers in terms of Internet connection.