

Mathew Hazel
Mack Srivieng
Christopher Holley
Dehon Williams
Ira Nicks
John Healy
CIS 319
Professor James Lucas
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Wireless WAN Project

The idea behind this project came from a real life problem based on the island of Mindanao. A high school located on this island had a need for Internet access. A great deal is involved in bringing internet access to this school, and further more, this island. In the trials and tribulations behind negotiations and attempts to bring this school Internet access, an idea was born. The idea was not to only bring Internet access to this one school, but to all schools on the island totally nearly 1,000 schools. From the foundation laid by the scholastic network, we plan to expand into an Internet Service Provider.

The goal of connecting the school system on a WAN is an ambitious one; but if accomplished, would have a greater effect than education alone. Based on the origination of the Internet and how it started by connecting universities in California, the WAN on this island would allow the economy to grow, help the government govern, and improve the overall quality of life on the island. Similar to the origination of the Internet, our

organization hopes to lay the foundation of our project with the schools. Once we have that foundation laid, we can include local government and businesses on the island. A potential also exists for a great deal of profit for investors and businessmen with enough for site to attempt this project.

To bring Internet access to this size of a community and begin the endeavor by training the future of this island on how to use computers and the Internet would mean the opportunity for a great deal of profits in the future. In essence, we would be building a community of Internet users and this company, along with its investors, would be the sole Internet Service Provider on the island.

Situated in the southernmost section of the Philippine archipelago, Mindanao is the second largest island in the Philippines. With a land area of 102,043 square kilometers, it occupies one-third of the Philippines' total land area and is larger than a number of Asian countries like Taiwan or Singapore. (CIA). Mindanao is strategically located within the East ASEAN region, almost equidistant to the eastern sections of Indonesia, Malaysia and Brunei Darussalam. This key geographic location underscores its potential to be a major transshipment point and center of trade in the region. Mindanao is comprised of five (5) administrative regions (Regions IX, X, XI, XII, and XIII) and one autonomous region (Autonomous Region in Muslim Mindanao or ARMM). The regions are divided into provinces and cities; each unit headed by a duly elected governor or duly elected city mayor, respectively.

Recently, these administrative regions were reorganized through Executive Order No. 36 to better facilitate supervision of local governments and direction of the executive

departments. (Regional Profile). Agriculture is the driving force behind Mindanao's economy. Close to a third of its land area is devoted to agriculture. More than one-third of the island's labor force is employed in the agriculture, fishery and forestry sectors. Mindanao accounts for over 40 percent of the Philippines' food requirements and

contributes more than 30 percent to the national food trade. Mindanao's evenly distributed tropical climate makes it ideal for year-round crop production. If wisely harnessed, Mindanao's rich agricultural resources can serve as the Philippines' foundation for sustainable growth. The primary asset of Mindanao is its people. Based on the year 2000 census, 18.1 million people or a quarter of the Philippines' total population reside in Mindanao. (Mindanao Business Council). The island is home to some 27 indigenous cultural communities, as well as migrants from Luzon and the Visayas. Rather than an impediment, the pluralism of cultures in Mindanao is a major source of strength, particularly in trading with its multi-cultural neighbor countries in East ASEAN. Mindanao has a relatively young albeit highly literate population. One-third of its population is aged 15 to 19 with a literacy rate of 90%. (Number of Households and Literacy Rates). The island also boasts a versatile, adaptive and English-speaking work force. Generally, Mindanaoans are known for their positive outlook, pleasant disposition and warm hospitality. In its drive towards economic development through global trade competitiveness, Mindanao's leaders must not lose sight of social issues such as poverty and peace and security. These likewise need to be urgently addressed to ensure the island's sustainable development. Economic development programs should be

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undertaken hand in hand with programs targeted at alleviating poverty and installing conditions that would lead to long-term peace.

Financially speaking the Mindanao Wireless WAN Project is going to take a lot of negotiating and planning to raise and generate enough money to be successful. We

need to raise approximately 250 million to 500 million dollars. The desktop computers installed in the schools will be Compaq computer with Pentium 4 processors, 256 Megabits RAM, 60-gigabyte hard drive, and 17-inch monitors. The software will be Microsoft XP with Microsoft Office Suite. We estimate we will need 100,000 desktop computers, which will cost approximately \$50,000,000 dollars. We will also need 1000 Microwave dishes and the equipment to control them. That cost will be approximately \$30,000,000 dollars. A 10-foot single dish will also be needed for a communication satellite and one main frame computer that will cost approximately \$160,000. The additional money we obtain will be used for additional classroom, training, and security, shipping and handling cost, building of a warehouse and storage unit.

We sought to apply for the Fulbright-IBM Haifa Research Laboratory Computer Science grant. This grant is for researchers that will do computer science work in one of subfields. (Ben-Gurion University of the Negev) Fulbright has the capability to fund our whole project, but we decided to offer this opportunity to independent companies like IBM, AT&T, Hewlett-Packard, MCI and Texas Instruments. We proposed the benefits for sponsoring such a project in a philanthropic theme. They would also be putting their names as well as their products in a whole new market. Now that we have the financial support from grants and

independent companies, there is one major obstacle that we need to overcome; dealing with the governments, money transfers, and control of monies.

After 9/11 it has been hard to do international business especially when it comes to technology and things that can be encrypted. In discussing the encryption laws with our designated diplomatic representative in Mindanao and allow our government to evaluate the equipment purchased we must know lobby for the reason why it would be advantageous for U.S. government to allow us to do business in Mindanao. Currently the natives favor U.S. support of Combat troops in Mindanao to help in the fight Abu Sayyaf and MILF terrorists. We would have a problem including military personnel in our team for installation and teaching in Mindanao. We then would have to go to the Mindanao government and negotiate insurance against any risk we might accrue do to the currency fluctuations. We would negotiate a “spot exchange rate”. Spot exchange rate is the rate at which a foreign exchange dealer converts one currency in to another currency on a particular day. (Hill, et.al 281). The U.S. dollar is more stable than the Paco and the going exchange rate is 52.64 Paco to 1 U.S. dollar. We need to make sure we get the most for our money because we are going to be buying supplies and using their resources to build our warehouses and classrooms. To ensure the Mindanao government that we are here to educate and help their economy we would negotiate the payment process by using an “irrevocable letter of credit”. An irrevocable letter of credit is a banking mechanism that allows importers to offer secure terms to exporters. (Mantissa E-

Learning) That means we would apply for a letter of credit from a bank in the U.S. and then the bank would send the money to a designated bank in Mindanao.

Before the money can be sent to the bank in Mindanao the issuing bank in the U.S. sends the letter of credit to the advising bank in Mindanao by electronic means such as telex or SWIFT to establish authenticity. (Mantissa E-Learning) We would also ensure the method of delivery of the equipment. The method used would be Free on Board (FOB). FOB means that the group delivers when the goods pass the ship's rail at the named port of shipment. This means that they will bear all costs and risks of loss damage to goods from that point. (Mantissa E-Learning) The last thing we would do to financially secure the transaction is let the Catholic Church of Mindanao handle the money once it is transferred.

Once any company establishes a satellite link for international communications, it finds it cost-effective to expand the link's capacity and support other services. (Nickerson 143)

The receiving area in the U.S. holds the purchased machines and networking equipment. The equipment is carefully inventoried and housed until it is ready to be shipped. The equipment is then transported via diesel trucks and brought to the docks of Butuan by ship from the San Francisco harbor. Transportation of the materials is sealed in a locked down container and delivered to the main storage area until deployment. Each shipment of equipment is accompanied by a member of the project team.

The personal computers and servers components are selected and built with cost efficiency and quality in mind. The architecture is built around the Intel processor and

compatible motherboard system. Computer systems do not do well with extreme temperatures or moisture. Undesirable island conditions concerning those extremes are

considered part of the selection process. Software for each of the systems will consist of Windows XP for the desktops and Windows 2003 Server for the server machines. Applications that are installed on the desktops will be primarily Microsoft Office Suite along with Norton antivirus software.

Networking equipment for each school site consists of twisted pair wiring for each of the building. The equipment in each building will consist of one microwave dish, a single tape library, and numerous hubs, routers, and switches for the LAN connection to each of the desktop computers and servers. Each site will also have a single 10-foot satellite dish mounted atop a 100-foot network tower, and coax cable wiring for the digital interconnects.

Installation is the tie that binds the total package of this project together. You may be asking yourself how this enormous project will be installed within reasonable cost and efficiency. The response to this question would be the high standard of quality that will go into training for the local employees. This aspect will make this implementation an efficient process. Each school satellite location will have a local administrator to maintain the equipment along with the help of an American technical support member that will be able to access the site remotely. Installation will require the use of various tools for networking, repairs, or construction in disaster recovery, which are purchased for each school. A standard suite of applications and customized layout for the desktops will be configured for each location and deployed via a central server.

Cost analyst shows that the Satellite service would be the most cost effective way of delivering internet access to the island. There are some advantages and limitations to

Satellite broadband access. Because satellites are accessible from all over the world, the option of getting satellite Internet access is available to nearly anyone with a clear, unobstructed view of the sky. The limits are the high latency of satellites that causes a half-second delay between mouse click and receipt of data due to data travel time between earth and the geostationary (GEO) satellite and the fact that inclement weather (rain, snow, high wind) may cause periodic lapses in service.

The next step was deciding which type of satellite service would be best. Currently there are two types of Satellite broadband solutions available and they are one-way and two-way.

One-way platforms differ from two-way in the fact that data can only flow downstream from the satellite down to the dish. If upstream is needed, a separate analog modem is required. With a one-way solution, your Internet requests travel via the Internet to the requested server located on the Internet that contains the information you wish to view. Instead of sending the data back over a twisted pair line, or a phone line, it will be routed to the ISP's network operations center (NOC) and relayed up to the orbiting satellite where it is then relayed down to the dish and into the computer. For a home with a single computer this may be sufficient, but for a project of this magnitude, a one-way solution would not be feasible.

With the inherent disadvantages of a one-way platform, the two-way platform appears to be the only solution. Unlike the one-way platform, data can be sent back and

forth from the satellite to dish. WLAN will provide the service to the island with a 10 gigabit connection speed. (Wireless LAN China) One main frame computer will also be

placed in the same compound as the satellite dish to handle all of the traffic from the schools onto the satellite dish.

The next step is determining how each school site would be connected to the satellite service. Laying fiber-optics from the compound to each site would be a perfect solution but because 1000+ schools need to be connected and the cost of fiber plus laying it made it an unattractive solution to our problem. The best solution for this problem is to use microwave dishes to connect each school site to the compound.

Microwave dishes require line of site to function properly. The microwave signals do not bounce off or penetrate obstacles such as trees, buildings or terrain. Service is delivered using the IEEE 802.11b standard, also known as Wi-Fi, operating in the 2.4 gigahertz (GHz) frequency. The 2.4 GHz band of spectrum has proven to be an effective way to offer high-speed wireless services to fixed locations. The 2.4 GHz band supports the high data rates needed to provide broadband Internet services comparable to other high speed Internet services like DSL.

What this project will do is bring Internet classes and computer training to a place where their own county thinks they are not worth the trouble. This tool will enable the people on the island Mindanao to gain the needed knowledge to improve the quality of life on the island. The completion of this project is significant because once my team proves the technology is available and is capable of being used in this way we will be able to go to any place on this planet and accomplish the same thing. This will bring the

needed publicity my team needs in order to bring the Internet with money backing us into third world country, no matter what the weather or political climate may be. With the proper financial backing the team foresees this type of network being used in every third world country in the world and at that point the Internet will truly be a global community.

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