LIBERTY IMAGING, LLC –"DUAL-USE BROADBAND"

AN INNOVATIVE SOLUTION TO IMPLEMENTING BROADBAND SERVICE TO PUBLIC SCHOOLS AND LOW INCOME RESIDENTS

Executive Summary

Liberty is a New York pre-revenue innovator company that is developing an HDTV security camera that can be modified to be a wireless product.

WiMAX is a fixed position and mobile wireless technology which is the next generation beyond Wi-Fi offering much higher speed broadband service.

Combining the two technologies will produce an innovative Dual-Use application for public schools, low income public housing, libraries, computer centers, senior centers.

In addition the WiMAX equipped camera can be an enabling technology that facilitates advancing high data rate broadband innovation across multiple industries like Medical, Automated Manufacturing, Precision Farming, Major Airports, Sea Ports, Rail Stations, Commercial and Government Infrastructure, Construction Robotics, and DHS *(Border and Port Security).*

Internationally there are numerous unique opportunities on the near horizon like the Olympic Games *(Golden Age of Sports)* in London in 2012 and Brazil in 2016 along with the same cross industry applications mentioned above. Industries and countries worldwide look to America to provide the R&D, product development and integrated systems design that implement these new ideas responsible for essential productivity gains.

Intellectual Property: Recently Liberty filed a Patent Application No. 61/294,346. Title: "ARCHITECTURE FOR WIRELESS COMMUNICATION AND MONITORING" to protect a Dual Application system designs. The filing is to protect the innovation of this Dual-Use application in conjunction with 4G embedded cameras not the component camera technology.

This dual-use WiMAX system provides synchronous wireless broadband service for the camera and for internet connectivity to laptop computers. The end product will feature HD and SD video and microphone audio pickup security, plus wireless broadband internet connectivity. Liberty will develop common access point for both services to pass through simultaneously. In this system Broadband speeds are scaled up from a starting point of 5Mbits/s to requirements set by the customer for each location. This is a fixed wireless system, avoiding the technical issues associated with mobile services.

Liberty has begun to merge the two technologies to produce this innovative camera product. The dual use of the Liberty HD video/audio digital camera with WiMAX wireless broadband ISP technology constitutes an innovative approach by introducing a cost-

effective solution for high-density public and private infrastructure broadband installations and, by extension, alternative applications.

At this time in major US cities inadequate of no broadband internet service is available in public schools or to low income families, particularly in public housing. Implementing a wireless system will facilitate overbuilding (leapfrogging) antiquated analog security systems quickly, at much lower combined cost, in both schools and public housing. Attempting to replace the installed coaxial cable with fiber-optic cables to facilitate a fully digital system and enable viewing of HD-quality video is cost-prohibitive for municipalities. Implementing a dual-use wireless system will forego most of the cost and time of installing two separate wired networks, one for internet service and another to upgrade security systems.

Implementation Details

The federal stimulus package appropriated $7.2 billion for the Department of Agriculture's Rural Utilities Service (RUS) and the Department of Commerce's National Telecommunications Information Administration (NTIA) to expand broadband access to unserved and underserved communities across the U.S. Within that program, the Broadband Technology Opportunities Program (BTOP) allocates only $200 million for large urban areas. Major cities will have to find other funding to install broadband, a huge barrier with local and state budgets being cut drastically.

Liberty proposes to fund this implementation in major cities like New York using any funds currently available for broadband implementation supplemented by government to government grants available through the Department of Homeland Security to upgrade security systems in schools and federally-subsidized low-income housing. Our research indicates that about $700 million is authorized in the federal budget for school security. We believe that, as school security will remain a high priority, these funds are less likely to be reduced during any budget cuts in fiscal year 2011 and beyond.

Further we believe that because video security systems in general have a higher installation cost then broadband, much of the funding for the dual-use system can be provided by each state’s allocation from the federal security budget authorization.

Digital wireless security systems using Wi-Fi are now being rolled out, but they feature low-quality video formats and are not capable of offering even dial-up ISP service. WiMAX is based on the newly-implemented IEEE 802.16e standard, which some vendors are now rolling out globally.

The minimum internet speed to schools is 768k dial-up service by ISP providers like Verizon. Broadband by ISPs and Cable companies generally does not exceed 3Mbps downstream and less upstream. This is inadequate to enable students to understand the power of the internet for learning, research, and computation - to say nothing of becoming comfortable enough with the internet to prepare for college and the highly-skilled jobs necessary to compete in the 21st century. Currently, due to lack of funding, most students in urban schools are led to a special ‘computer classroom’, or a rack of computers is wheeled into the classroom for a ‘computer lesson’, rather than having access to computers and the internet continually in the normal course of the school day.

Additionally, with the installation of Liberty's dual-use system in low-income housing projects, not only will city housing authorities get the same benefits as the school, children equipped with notebook computers can bring them home and teach their families how to use the internet, giving them access to local, state, and federal programs more easily and cheaply.

Leveraging these two urgently-needed projects at a lower cost, in less time, and with a better technical approach is a solution we think that major municipalities will embrace.

Note that:

- ✓ A command and control system is required to manage this system. There are a number of integrator companies, many in New York State, that either have an existing CCTV system that can be adopted, or can build one.

- ✓ The installation of the Liberty dual-use system will require local installers and technicians providing a number of good-paying jobs that don't require a college degree.

- ✓ The installation of a modern digital HD video/audio security system is highly desirable to protect the Broadband infrastructure and computer equipment investment required to implement educational programs.

- ✓ WiMAX used in this context is a competitor to telephone and cable companies who dominate internet ISP business.

Alternative Broadband ISPs

For instance, a Boston-based company, Towerstream, functions as a broadband ISP vendor in selected major cities through a different, independent pathway.

They install a base station (transceiver) on the roof of a few of the tallest buildings in a metropolitan area, then send and receive (at a symmetrical bandwidth for the uplink and downlink) at the data rate requested by a user. This bypasses the installed wired base of cable and telephone companies, using a line of sight connection. If a building casts a shadow for the signal, Towerstream can set up a relay to an active site nearby. In New York they claim they cover over 90% of the city.

Towerstream can support up to 1 GB of bandwidth service. The data rate is scalable, meaning that if a particular school (Bronx Science) wanted to maintain a 25Mb service because students were conducting collaborative experiments with NASA, Towerstream allocates that level of service to Bronx Science. Second graders, say at P.S. 8 in Brooklyn, may be served adequately with just 3Mb of service. The ability to scale and customize the service is a flexible feature of Towerstream and a powerful tool to control cost.

Of course this concept extends to high-density commercial buildings also.

For a first stage, we propose developing a Demonstration Project representing a microcosm of the total system. This would also be a test of the dual-source funding

scheme proposed. Once the system is demonstrated it can be expanded city-wide, and then ported to major cities elsewhere.

Towerstream is not the only such vendor: Rainbow provides a similar service although less robust. Clearwire is one possibility. With a demonstrable system we could approach this WiMAX network vendor to consider implementation in New York. However, as they aren't currently established in New York, that would mean a longer time for implementation. ATT has their 4G/LTE "WiMAX" wireless technology coming online in 2011. Our security system could be modified to plug into that network for internet access, but ATT is not likely to target lower-income neighborhoods for some time.

The major drawback in each of these alternatives is that they offer more limited bandwidth than Towerstream and probably are more expensive. Other than the Towerstream approach, the concept is not as elegant or as efficient but can be made to work at some level.

Bandwidth and the Market

This approach is, in any case, limited to large cities. It won't be affordable for small buildings, shops or individual homes unless current, or emerging, ISPs provide large access point fiber pipes. ISPs like telephone and cable companies currently sell standard broadband service at 1.5 Mb, with a best-case option of about 7Mb for downlink; upstream is mostly 768Kb. Most importantly, broadband internet connectivity is not available throughout most cities, and in poorer neighborhoods 768Kb is all that is offered either for downlink or uplink.

In order to remain competitive, the US has to grow bandwidth capacity to 100 Mbps over time as industrially-advanced countries like Japan, South Korea, India; many of the EU countries and especially China are already implementing such bandwidth. China has a national priority to fast-track ultrahigh broadband fiber build-out nationwide that is if competition from WiMAX or 4G doesn't seize most of the market earlier. Today there are 400 million cell phones in China. Low-cost basic mobile phone service with 4G (WiMax) is poised to roll out quickly in a country with a per-capita income of $1200 like China.

Recently the FCC announced The National Broadband Plan that establishes a goal of 100Mbps to 100 million homes by 2020. While this is a very positive, if not overdue, imitative near term funding is problematic. WiMAX is an available technology that is very suitable for many high-bandwidth applications to begin their life cycle with.

City governments, particularly in New York, know this, and know that in low-income neighborhoods where ROI is not attractive, current ISPs are not installing broadband. Consequently access by city schools, which is critical to economic development, is lagging. In New York, once high speed broadband is available students who can't afford it must be provided portable computers to do school work and port home access to the internet to their families, many of whom live in public housing. Once six year-olds begin learning computer skills at lightening speed in school and carrying their two-pound notebook computers home, the whole family is drawn into education, job search, web-based businesses, distant medical care, and the many other services and opportunities that are available through government.

Technical Notes

The product would be a digital camera outputting the new SMPTE 296M HD-720p switchable to 259M SD-480p widescreen (16 X 9) format now in use by US broadcasters, in which is embedded a WiMAX module that is able to transmit the video and audio signal from a embedded microphone wirelessly to a fixed position access point. In this case the access point serves the dual purpose of collecting wireless feeds from the camera and from laptop or desktop computers who are broadband or Wi-Fi capable.

Currently, data is transferred to an internet connection like coax or fiber. That would be possible but most internet providers like Verizon don't have the bandwidth to accommodate both a video/audio signal and the internet files from a computer.

Finally

Liberty's concept is to combine the security signal and broadband internet access in one package. A systems integrator buys a system made up of WiMAX cameras and access points. The package represents the unique proposition, which is the ability to manage both a security system and separate broadband internet access through one Access Point.

New York is not the only possible market, but it is a great opportunity:

- 1.2 million public school students in 1400 buildings
- The largest public housing authority in North America with
  - 178,466 apartments in 343 developments throughout the city
  - 2,644 residential buildings containing 3,334 elevators

Every major city in the US has the same issue facing them, although the numbers are somewhat smaller. New York is aggressively seeking an affordable concept to implement broadband internet service to public schools K-12, public housing, libraries, and community centers.

Today, adequate broadband access is nonexistent and security systems are antiquated throughout this publicly-owned infrastructure in most large cities. Our dual-use concept won't cover all low-income families, but it does cover schools and a large slice of the neglected infrastructure and the most vulnerable residents.

John Weaver
President
Liberty Imaging, LLC