A VIDEO SURVEILLANCE MODEL INTEGRATION IN SMALL AND MEDIUM ENTERPRISES

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Abstract: Rapid evolution of the Internet inevitably leads toward adapting to new technologies. To survive in the increasingly fierce competition, companies must keep pace with new trends and developments. Software solutions should be adapted to not change the structure of the company. A common case is the classical surveillance and monitoring system that switch from analogue to digital and from a system accessed from inside the company to a system accessed via IP. Wireless technologies are used on a large scale, are flexible, cheap, and accessible and without wiring systems or elements that disturb. The evolution of wireless communications was done in close dependence with the development of communication networks. A video surveillance and monitoring system (VSaMS) is a good tool that offers secure targets or premises or to monitor the activity of the perimeter. Access to the system will allow real time monitoring, recording and accessing records. Using a standard depends on the location and the geographical area and equipment. The aim of this paper is to highlight existing standards and solution and to propose a model for a VSaMS. Also, experimental results are presented.

1 INTRODUCTION

Evolution and diversification of the companies' activity led them to adapt to new web technologies. These inevitably force the companies to adapt and to find solutions to allow communication and progress. A video surveillance and monitoring system accessed via IP allows to view live images or to access the records without the person to move from one place to another.

In a complex work Kruegle (2007) concludes that there has been an evolution of security integration from guard, to guard and security system. This evolution has changed from a "hands on" security system using the guard as the primary source for security to one with a complex and sophisticated electronic system that removes much of the decision-making from the guard. Much of the human decision-making has been transferred to and is accomplished by the security subsystems.

The security system integration consists of layers of integration. If the security system is all at one site, it is easy to connect the various security subsystems via cable to the control console. This transmission can be accomplished using copper wire (coaxial, twisted-pair, multi-conductor), fiber optic or in special cases wireless transmission. If a site is remote or there are multi-sites, the communication link is very important. If the transmission occurs outside the boundaries of the organization, it is important that the network outside the facility is secure and that proper protection is provided so that no outsiders can tap into the communications. To obtain this, protection usually takes some form of signal scrambling or encryption (Kruegle, 2007).

A lot of authors agree that video analysis and video surveillance are active areas of research. The key technologies are video-based detection and tracking, video-based person identification, and large scale surveillance systems. A significant percentage of basic technologies for video-based detection and tracking were developed under a U.S. government-funded program called Video Surveillance and Monitoring (Tian, Brown, Hampapur, Lu, Senior and Shu, 2008).

We propose a VSaMS integration for small and medium enterprises (SMEs). The financial crisis has turned the interest of companies to a good cost management. Implementation of this system comes to support SMEs to survive in the competitive environment.

In the second section of this paper, we present

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the system modules and functionalities; in the third section we present the model standards and implementation. The fourth section is for system analyzes and system benefits. Finally, we present our conclusions.

2 THE MODEL MODULES

A video surveillance and monitoring system must contain some elementary modules as: live view module (Figure 1), recording schedule, records access (Figure 2), motion detect module, real time snapshot and recording module, system log and users management.

Figure 1: Live view module, a system using a DVD and IR cameras.

The Internet connection is an essential factor in terms of video and audio transmission via IP. Internet connection is very important in terms of data transitions. In the case of video surveillance and monitoring via IP it becomes an essential factor. We can also register on our personal computer. It is very important that the time to be listed on records.

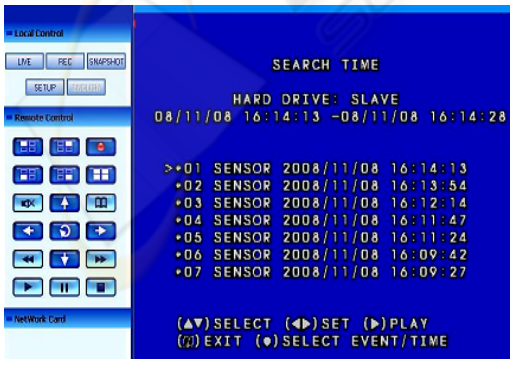

Figure 2: Playback system module, a system using a DVD and IR cameras.

Other options are also active in the system. Another important element of the system is that the system can be connected to an alarm sensor.

The key to a successful security plan is to choose the right equipment and service company, one that is customer oriented and knowledgeable about reliable, technologically superior products that satisfy the customer needs (Kruegle, 2007).

The application and integration of video into safety and security systems has come of age as a reliable, cost-effective means for assessing and responding to terrorist attacks and other life-threatening situations. Video is an effective means for deterring crimes and protecting assets and for apprehending and prosecuting offenders.

The integration of video, intrusion-detection alarms, access control, and security guards increases the overall security asset protection and employee safety at a facility. If the security plan calls for a simple system with potential for later expansion the equipment should be modular and ready to accept new technology as it becomes available. Many larger manufacturers of security equipment anticipate this integration and expansion requirement and design their products accordingly.

Integration of security technology is a worldwide trend providing increased security benefits at a lower cost. Security integration projects often involve single or multiple sites. Security dealers, integrators, consultants, architect, and engineers, etc. must understand the technology required to effectively integrate security subsystems. There are essentially two levels of integration function: (1) security system and (2) security system plus building control system (fire, HVAC, etc.). The highest level of integration combines the security system with building control: the fire, heating, ventilation, air-conditioning (HVAC), lighting, and all facility communication functions (Kruegle, 2007).

Wireless networks have an increasing role and represents a variant which should not be neglected when you wish to achieve a network. Wireless equipment have been developed rapidly and presents viable solutions for interconnecting computers and other equipment to transfer data or to transfer video and audio, from the classical data transfer and files transfer to interactive and real-time applications via IP. The Internet was not designed for transmission of video and audio in real time so you will need to take into account several factors and when it comes to a video surveillance and monitoring system (VSaMS), the Internet connection is very important. When network performances are lower and the network operates under certain parameters, the use of such

applications via IP is impossible. Unlike the transfer of files, transmission of video and audio is much more demanding.

Resources assurance is very important and the quality of service must be optimal and the network must work properly. Resource assurance is very important and a main factor in many applications via IP. Optimal allocation of resources to ensure efficient functioning of an application via IP has become a difficult challenge.

3 THE MODEL STANDARDS AND INTEGRATION

We think that standard IEEE 802.11g standard (IEEE, 2010), with speeds of 54Mbps, is sufficient and fully meet the requirements of users of small networks, networks between two or more neighbors or networks in small companies. Rapid evolution of telecommunications will require the WiMAX standard, but the jump will be slower compared with the jump in technology from 802.11b standard to 802.11g standard. Devices with both standards (802.11b and 802.11g) are widely spread in the market.

Network performance is given by the slowest component of the network. For this reason is preferred to use wireless components of the same manufacturer and with the same standard, preferably 802.11g.

During the time, video standards have been improved to adapt them to new needs and demands of the market. In the video market there are SECAM (SECAM, 2010), NTSC (NTSC, 2010) and PAL (PAL, 2010) standards.

A number of authors agree that the rapid development of sensors, network communications and computational systems forces the researchers working in the field of advanced surveillance systems to design and develop innovative solutions for building "intelligent" systems able to support human operators in the task of making complex decisions (Micheloni, Lestuzzi and Foresti, 2008).

There are a lot of ways to choose the best VSaMS. Standards are very important because standards give the network and the system performance. It is very difficult to say that a system is better than other; it depends of a lot of factors like Internet connection, equipment, standards, locations, resources.

The presented model offers a real solution for any company at an accessible cost. For Infrared (IR) Cameras is used PAL Standard and for wireless network is recommended 802.11 g Standard (Figure 3).

IR Cameras are connected to a Capture Card mounted in a computer. IR Cameras are connected using BNC cable. The cameras can be connected using wireless technology but it is not recommended for large areas that's why BNC cable is used. There are used 12V current transformer and metal catchment systems that allows cameras to monitor the optimal angle of the perimeter.

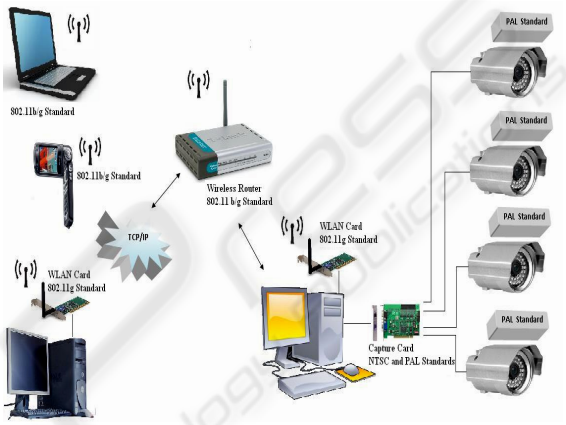

Figure 3: Standards in a video surveillance and monitoring system (VSaMS) using a computer.

A main application for VSaMS is installed on computer and VSaMS is configured. The Computer is wireless connected to a wireless router using a wireless LAN Card with 802.11g Standard. The router is connected to the Internet and configured to allow via IP access to VSaMS.

The VSaMS can be accessed via IP for real time monitoring or to access records. To access the VSaMS can be used a computer connected to the wireless router or connected directly to the Internet, can be used a mobile phone with WLAN using 802.11 b/g standard connected to the wireless router or connected directly to the Internet or can be used a notebook connected wireless with 802.11 b/g standard or directly to the Internet.

The applications are diverse and can be adapted to any company. Motion detect module can start recording only when detects movement or activity, otherwise does not use storage space for records.

Via IP access allows us to view live images or access recordings. To grant access to view live images or to access records we must log into the system using a username and a password. The username and the password are saved in system configuration when we install the main application.

The IP and the port of the system/camera are set up in camera configuration.

The proposed model represents a solution for any company that wants to monitor or supervise the work of a perimeter. Costs are affordable and allow existing technologies and refining a model for such a system.

Video technology has evolved rapidly from analog to digital. New technologies and equipment allow storing data and then to access them by adding a DVR and a HDD (Figure 4). This system allows quick access to records and an easy way to use equipment, the system is limited only by the HDD capacity. If you do not want to store data for a long term you may enable to overwrite the HDD.

Figure 4: Video surveillance/monitoring system using DVD.

4 THE MODEL BENEFITS AND ANALYZES

Continuing our work, wireless technology and current standards were used to develop an optimal system. The system was implemented in a few companies from different fields like: sales, IT, consulting, accounting, production (Benta, 2009).

From our analyses, the system was a great tool for property and employees safety, for the manager satisfaction and also for monthly productivity per employee.

First of all, the system offers an increased security plan. The system can be connected to an alarm sensor and at a phone line. The access via IP and from a cell phone is useful for company managers. Also, the employees are concerned to work and not to waste time with other activities and the monthly productivity is increased (Figure 5).

Some authors conclude that a video system cannot be easily applied in remote areas with difficult access. The main problems are associated with (1) providing a long-lasting source of energy, and (2) frequent maintenance of the system (e.g. having to change videotapes). Although electric power can be supplied for several days by 12-V car batteries, changing the videotapes in a non-stop running system is a time- and labour-intensive undertaking (Pechacek, 2005).

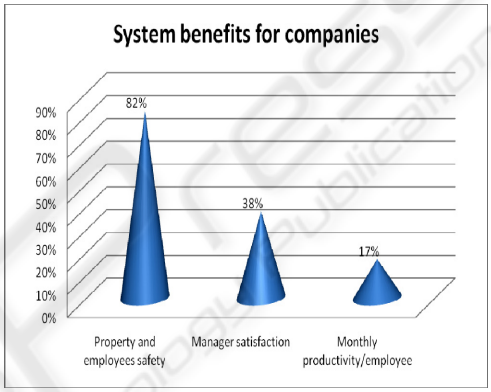

Figure 5: Video surveillance/monitoring system benefits.

One of the biggest challenges of developing a commercial video surveillance system according to Haering, Venetianer and Lipton (2008) is that the system, once deployed, has to operate robustly 24/7 in a completely uncontrolled environment, in a wide range of scenarios. Casaca, Silva, Grilo, Nunes, Presutto and Rebelo (2007) showed that a VSaMS is a great solution to resolve airport problems because airport congestion is also becoming an increasing problem for ground movements.

We also agree that a real problem for via IP access is the bandwidth because the Internet was not developed for video live streaming.

5 CONCLUSIONS

Choosing the best choices for a VSaMS depends on the location and area where it will be mounted and also from the technology on the market. We suggest the use of compatible equipment that does not affect the proper functioning of the system and its performance.

The performance of a system is given by the weakest component of the system. For the proper

functioning of such a system is recommended to meet the standards and requirements of the system.

Wireless networks are easy to achieve compared with wired networks, but require greater attention in terms of transmission and security. Any security and any network system are not entirely sure. Any system connected to the Internet can become a target for a potential attack.

A VSaMS is a great way to monitor an area or activity in an area in real time or to view records accessing the system.

Standards are varied so it is recommended to choose standard and the standards that will adapt best to the area concerned and to give maximum performance of the system.

Optimal choice depends on many factors, depends on financial factors, geographical area, the existing technologies, customer needs, the impact of the system. No need to use an expensive system that is not used to its maximum performance.

The system must match the customer needs and demands and provide more in terms of safety and security. Access via IP allows viewing of live images so we do not have to be present in that place, travel costs are eliminated.

Also, the Internet connection is very important because the connection will guarantee proper functioning of the system and via IP access to the system.

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