BANDWIDTH PERFORMANCE ANALYSIS OF A REMOTE MONITORING SURVEILLANCE SYSTEM

By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

March 2006

For my parents,
Syed Nor Azlan & Normah Abdullah

and for my best friend,
Sazli Zulkifli

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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Conventional security surveillance systems require the constant attention of security personnel, to monitor several locations concurrently. With the declining cost of computing power and widespread acceptance of the Internet as a viable communication medium, a low-cost and effective web-based surveillance system becomes an attractive alternative to conventional system.

Apart from the increased availability of inexpensive computing power and image sensors, the inefficiency of manual surveillance and monitoring system has also become the contributing factor towards the growth of motion detection application.

The aim of this research is to study and develop a web-based surveillance system consisting of a motion detection technique. By adopting WebCam Monitor as the motion detection tool, the thesis describes the construction of the remote monitoring surveillance system consisting of webcam technology.

This thesis discusses the system and network performances evaluated from the developed surveillance system. Network Quality of Service (QoS) is implemented in system design, by means of bandwidth management appliance, Packet Shaper. The research results describe the findings in the QoS implementation on the proposed system, focusing on bandwidth requirements, bandwidth utilization, and network efficiencies.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

ANALISA PENCAPAIAN LEBAR JALUR BAGI SEBUAH SISTEM PENGAWASAN PEMANTAUAN JAUH

Oleh

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Sistem pengawasan keselamatan konvensional memerlukan perhatian berterusan daripada kakitangan keselamatan, yang memantau beberapa tempat pada masa yang sama. Dengan penurunan kos kuasa pengkomputeran dan penerimaan Internet yang meluas sebagai pengantara komunikasi berdaya maju, sistem pengawasan berasaskan web yang berkos rendah dan berkesan menjadi alternative yang menarik untuk menggantikan sistem konvensional.

Selain daripada peningkatan ketersediaaan kuasa pengkomputeran an pengesan imej yang murah. Ketidakcekapan sistem pengawasan dan pemantauan manual juga menjadi fakto penyumbang pada pertumbuhan aplikasi pengesanan pergerakan.

Tujuan kajian ini adalah untuk menyelidiki dan membangunkan sistem pengawasan berasaskan web yang mempunyai teknik pengesanan pergerakan. Dengan menggunakan perisian WebCam Monitor sebagai alat pengesan

pergerakan, tesis ini menghuraikan binaan sistem pengawasan jauh yang mengandungi teknologi kamera web.

Tesis ini membincangkan pencapaian sistem dan rangkaian yang dinilai daripada sistem pengawasan yang dibina. Kualiti Servis Rangkaian dilaksanakan dalam reka bentuk sisstem, dengan menggunakan alat kawalan lebar jalur iaitu PacketShaper. Hasil kajian menghuraikan dapatan daripada pelaksanaan Kualiti Servis ke atas sistem yang disyorkan dengan memfokus pada keperluan lebar jalur, penggunaan lebar jalur, dan kecekapan rangkaian.

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Finally, I wish to thank my husband for his moral support and tremendous help to achieve this prestigious degree.

I certify that an Examination Committee has met on 14th March 2006 to conduct the final examination of Syarifah Ezdiani Syed Nor Azlan on her Master of Science thesis entitled "Bandwidth Performance Analysis of a Remote Monitoring Surveillance System" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

_____

SYARIFAH EZDIANI SYED NOR AZLAN

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TABLE OF CONTENTS

Page

DEDICATION ii
ABSTRACT iii
ABSTRAK v
ACKNOWLEDGEMENTS vii
APPROVAL viii
DECLARATION x
LIST OF TABLES xiv
LIST OF FIGURES xv
LIST OF ABBREVIATIONS xvii

CHAPTER

1 INTRODUCTION Error! Bookmark not defined.
1.1 Overview Error! Bookmark not defined.
1.2 Problem statement Error! Bookmark not defined.
1.3 Scope of Project Error! Bookmark not defined.
1.4 Objective Error! Bookmark not defined.
1.5 Thesis Organization Error! Bookmark not defined.

2 LITERATURE REVIEW Error! Bookmark not defined.
2.1 Introduction Error! Bookmark not defined.
2.2 Remote Monitoring Surveillance System Error! Bookmark not defined.
2.3 Remote Monitoring Error! Bookmark not defined.
2.3.1 Computer Network Error! Bookmark not defined.
2.3.2 Bandwidth Error! Bookmark not defined.
2.3.3 Quality of Service (QoS) Error! Bookmark not defined.
2.3.4 Remote Monitoring Application Error! Bookmark not defined.
2.4 Motion Detection Error! Bookmark not defined.
2.4.1 Different Types of Motion Detection Techniques Error! Bookmark not defined.
2.4.2 Different Types of Motion Detection System Error! Bookmark not defined.
2.5 Surveillance System Error! Bookmark not defined.
2.5.1 Security Remote Monitoring Techniques Error! Bookmark not defined.
2.5.2 Computer Network of Surveillance System Error! Bookmark not defined.
2.5.3 Network Architecture Error! Bookmark not defined.
2.6 Performance Issue Error! Bookmark not defined.

2.6.1 Performance Issue on the Internet Link Error! Bookmark not defined.
2.6.2 Network Efficiency Error! Bookmark not defined.
2.6.3 Bandwidth Management using PacketShaper Error! Bookmark not defined.
2.6.4 PacketShaper Technologies Error! Bookmark not defined.
2.7 Image Compression Standard Error! Bookmark not defined.
2.8 Internet Technology Error! Bookmark not defined.
2.8.1 Protocols for Internet Communications Error! Bookmark not defined.
2.8.2 Internet Security Error! Bookmark not defined.
2.9 Web Environment Error! Bookmark not defined.
2.9.1 Basic Components of the WebError! Bookmark not defined.
2.9.2 Web Browser Error! Bookmark not defined.
2.9.3 Web Programming Error! Bookmark not defined.
2.9.4 Web Server Error! Bookmark not defined.
2.10 WebCam Technology Error! Bookmark not defined.
2.10.1 Client Pull/ Server-Push Error! Bookmark not defined.
2.10.2 WebCam Software Error! Bookmark not defined.
2.10.3 WebCam Hardware Error! Bookmark not defined.
2.10.4 Web Camera Application Error! Bookmark not defined.
2.10.5 Webcam Application for Security Purposes Error! Bookmark not defined.
2.11 Summary Error! Bookmark not defined.

3 METHODOLOGY Error! Bookmark not defined.
3.1 Introduction Error! Bookmark not defined.
3.2 Web-based Surveillance System Error! Bookmark not defined.
3.2.1 System Execution Error! Bookmark not defined.
3.3 Design Requirements Error! Bookmark not defined.
3.3.1 Operating System Error! Bookmark not defined.
3.3.2 WAN Connection and Bandwidth Error! Bookmark not defined.
3.3.3 IP Address Configuration Error! Bookmark not defined.
3.4 Web Cam Hardware Installation Error! Bookmark not defined.
3.5 WebCam Software Installation Error! Bookmark not defined.
3.5.1 WebCam Monitor Configuration Error! Bookmark not defined.
3.5.2 Local Save of Files Error! Bookmark not defined.
3.6 Web Server Activation Error! Bookmark not defined.
3.7 FTP Server Configuration Error! Bookmark not defined.
3.8 Web Page Development Error! Bookmark not defined.
3.9 Web Page Security Error! Bookmark not defined.
3.10 Client-Server Architecture Error! Bookmark not defined.
3.10.1 Remote Client Computer Error! Bookmark not defined.
3.10.2 Streaming Stored Video from Remote Client Computer Error! Bookmark not defined.
3.11 Quality of Service (QoS) Implementation Error! Bookmark not defined.

3.11.1 Bandwidth Management using PacketShaper Error! Bookmark not defined.
3.11.2 Packet Shaper Configuration Error! Bookmark not defined.
3.11.3 Link size simulation Error! Bookmark not defined.
3.12 Summary Error! Bookmark not defined.

4 RESULT AND DISCUSSION Error! Bookmark not defined.
4.1 Introduction Error! Bookmark not defined.
4.2 Web Cam Software Error! Bookmark not defined.
4.3 The Developed Web Site Error! Bookmark not defined.
4.3.1 Viewing WebCam Page from Server Error! Bookmark not defined.
4.3.2 Viewing WebCam Page from the Remote Client Error! Bookmark not defined.
4.4 Performance Evaluation of the Internet Link Error! Bookmark not defined.
4.5 Discussion Error! Bookmark not defined.

5 CONCLUSION AND RECOMMENDATION Error! Bookmark not defined.
5.1 Introduction Error! Bookmark not defined.
5.2 Performance Evaluation of the Internet Link Error! Bookmark not defined.
5.3 Future Research Suggestions Error! Bookmark not defined.

REFERENCES 107
APPENDICES 110
BIODATA OF THE AUTHOR
114

LIST OF TABLES

Table		Page
2.1	Graphic File Format	31
3.1	Configuration Parameters on PacketShaper	77
4.1	Bandwidth Utilization and Network Efficiency (Different Number of Clients)	96
4.2	Bandwidth Utilization and Network Efficiency (Different Bandwidth)	99
4.3	Bandwidth Utilization and Network Efficiency (Bandwidth Size: 64kbps, 128kbps, 256kbps, 512kbps, 1Mbps, 2Mbps and 8Mbps)	101

LIST OF FIGURES

Figure		Page
2.1	Differencing Technique	13
2.2	LAN Architecture	21
2.3	WAN Architecture	22
2.4	Network Efficiency Graph	26
2.5	PacketShaper General Deployment 27	
2.6	PacketShaper TCP Rate Control	29
2.7	Internet Communication Protocol	33
2.8	TCP/IP architecture	34
2.9	Simple HTTP Communication	37
2.10	Real-time Video Transmission Over the Internet	38
2.11	Webcam Hardware: (a)PNP camera (b)digital camera (c)network camera (d)PNP camera 55	
3.1	Web-based Surveillance System	60
3.2	System Operational Overview Flowchart 61	
3.3	IP Address Configuration	63
3.4	Alert Configurations on WebCam Monitor 66	
3.5	Local Save of AVI Files	67
3.6	SimpleWebServer Activation 68	
3.7	Password Configuration on FTP Server	69

3.8 Image Refreshing Rate in JavaScript 71

3.9 Basic Client-Server Architecture for Proposed System 74

3.10 Client-Server Network Diagram with Packet Shaper 76

3.11 PacketShaper Login Page 78

3.12 Packet Shaper Information Page 79

3.13 Client-Server Traffic Classification 80

3.14 Defining Class Based on IP Address 81

3.15 Defining Class Name 82

3.16 Adding QoS for Remote Monitoring Class 83

3.17 Bandwidth Reservation 84

4.1 WebCam Monitor Running on Server 88

4.2 GUI to Start Monitoring and Activate Alerts 89

4.3 WebCam Page with URL http://localhost/webcam page.htm 90

4.4 WebCam Page with the URL http:// 202.75.44.254/webcam page.htm 91

4.5 HTTP Request 92

4.6 Remote Monitoring Surveillance System Homepage 93

4.7 Bandwidth Utilization (with Different Number of Clients) 95

4.8 Network Efficiency (with Different Number of Clients) 96

4.9 Bandwidth Utilization for 3 Clients (with Different Size of Bandwidths) 97

4.10 Network Efficiency for 3 Clients (with Different Size of Bandwidth) 98

4.11 Bandwidth Utilization for 3 Clients (Bandwidth Size: 64kbps, 128kbps, 256kbps, 512kbps, 1Mbps, 2Mbps and 8Mbps) 100

4.12 Network Efficiency for 3 Clients (Bandwidth Size: 64kbps, 128kbps, 256kbps, 512kbps, 1Mbps, 2Mbps and 8Mbps) 100

LIST OF ABBREVIATIONS

ANN	**Artificial Neural Network**
ASP	**Active Server Pages**
ATM	**Asynchronous Transfer Mode**
BMP	**Bitmap**
bps	**bit per second**
CCTV	**Closed Circuit Television**
CGI	**Common Gateway Interface**
CPU	**Central Processing Unit**
DNS	**Domain Name System**
DoS	**Denial-of-Service**
DOS	**Disk Operating System**
fps	**frame per second**
FTP	**File Transfer Protocol**
FTP	**File Transfer Protocol**
GIF	**Graphic Interchange Format**
GIF	**Graphic Interchange Format**
GUI	**Graphic User Interface**
HTML	**Hypertext Markup Language**
HTTP	**HyperText Transfer Protocol**
IP	**Internet Protocol**
IR	**Infrared**
ISDN	**Integrated Service Digital Network**
ISM	**Intelligent Scene Monitoring**
ISP	**Internet Service Provider**

JPEG	**Joint Photographic Expert Group**
LAN	**Local Area Network**
Mbps	**Mega bit per second**
MPEG	**Motion Photographic for Expert Group**
NCSA	**National Centre for Supercomputing Applications**
NNTP	**Network News Transfer Protocol**
OS	**Operating System**
PC	**Personal Computer**
PCD	**Photo CD**
PCI	**Peripheral Component Interconnect**
PCT	**Macintosh PICT (PICTure)**
PIDS	**Perimeter Intruder Detection Systems**
PIR	**Passive Infrared**
PnP	**Plug and Play**
QoS	**Quality of Service**
RTCP	**Real-Time Control Protocol**
RTP	**Real-Time Transport Protocol**
RTSP	**Real-Time Streaming Protocol**
SMTP	**Simple Mail Transfer Protocol**
SSL	**Secure Socket Layer**
TCP	**Transport Control Protocol**
TIF	**Tagged Image File Format**
UDP	**User Datagram Protocol**
URI	**Uniform Resource Identifier**
URL	**Uniform Resource Location**
URN	**Uniform Resource Name**

USB	**Universal Serial Bus**
UTP	**Unshielded Twisted Pair**
VCC	**Video Capture Camera**
VCR	**Video Cassette Recorder**
VGA	**Video Graphic Accelerator**
VMD	**Video Motion Detection**
VoIP	**Voice over Internet Protocol**
WAIS	**Wide Area Information Server**
WAN	**Wide Area Network**
WRSS	**Web Based Remote Security System**
WWW	**World Wide Web**