A STUDY OF SECURITY LIMITATIONS IN VIRTUAL LOCAL AREA NETWORK IMPLEMENTATION

By

ARUMUGAM BALASUNDARAM

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

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DEDICATION

This thesis is dedicated to
my loving parents, brothers and wife

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

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December 2003

Chairman: **Associate Professor Abdul Rahman Ramli, Ph.D.**

Faculty: **Engineering**

Virtual Local Area Network (VLAN) in simple terms is defined as a group of Local Area Network (LAN) that has different physical connections, but communicates as if they are connected on a single network segment. VLAN was developed mainly for the need in network segmenting solution, since network traffic increases in proportional to the network size in the same time to offer additional network security.

This technology has now become possible by the advancement of various LAN Switches which offer the VLAN feature. Few researches has been carried out which explain the technology part of the system. This thesis provides a study on VLAN mainly covering the implementation of the system and the security weakness present in certain conditions of implementation.

For the VLAN system, an onsite study was conducted to explore the implementation of the system in real life environment followed by a practical test conducted to

examine the weaknesses part of the system. The results obtained from the test showed that under certain type of implementation, the security features of the VLAN system can be exploited. Solutions are proposed to further improve the security of the system in which certain part of the solution was gathered upon verifying the issue with the switch manufacturer.

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

KAJIAN KESELAMATAN KEKANGAN DALAM PENGIMPLIMENTASIAN RANGKAIAN KAWASAN SETEMPAT MAYA

Oleh

ARUMUGAM BALASUNDARAM

Disember 2003

Pengerusi: **Profesor Madya Abdul Rahman Ramli, Ph.D.**

Fakulti: **Kejuruteraan**

Rangkaian Kawasan Setempat Maya ("Virtual Local Area Network (VLAN)") didefinisikan sebagai satu kumpulan rangkaian kawasan setempat (LAN) yang mempunyai sambungan fizikal yang berbeza, tetapi berkomunikasi seperti ia disambung pada rangkaian segmen tunggal. VLAN dibangunkan kerana ia amat diperlukan dalam penyelesaian pengasingan rangkaian. Ini adalah kerana trafik rangkaian meningkat sejajar dengan pertambahan saiz rangkaian dan pada yang sama untuk memperbaiki lagi keselamatan rangkaian.

Kini, teknologi ini menjadi nyata dengan adanya pelbagai suis rangkaian kawasan setempat (LAN) berteknologi tinggi yang mempunyai ciri-ciri VLAN. Beberapa kajian telah dijalankan yang menerangkan ciri-ciri teknologi sistem tersebut. Tesis ini merupakan kajian terhadap VLAN terutamanya bagi membincangkan perlaksanaan sistem dan kelemahan keselamatan pada masa sekarang.

Bagi sistem VLAN ini, kajian telah dijalankan untuk mengkaji perlaksanaan sistem ini dalam persekitaran yang sebenar diikuti dengan ujian praktikal yang dijalankan untuk menguji bahagian kelemahan dalam system ini. Daripada keputusan yang diperolehi dari ujian yang dijalankan, didapati ciri-ciri keselamatan sistem VLAN boleh dieksploitasikan. Beberapa penyelesaian didapati untuk memperbaiki lagi keselamatan sistem di mana beberapa bahagian penyelesaian telah digabungkan bagi mengesahkan isu ini dengan pembuat suis (switch manufacturer).

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I certify that an Examination Committee met on 26th December 2003 to conduct the final examination of Arumugam Balasundaram on his Master of Science thesis entitled 'A Study of Security Limitation in Virtual Local Area Network (VLAN) Implementation', in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommended that the candidate be awarded the relevant degree. Member of the Examination Committee are as follows:

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This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the partial requirements for the degree of Master of Science. The members of the Supervisory 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 currently submitted for any other degree at UPM or other institutions.

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ARUMUGAM BALASUNDARAM

Date: 23rd April 2004

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