AN ANALYSIS OF SECURITY – PROBLEMS IN VIRTUAL NETWORKS

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Abstract

Virtual networks have changed the face of the information technology in current world. Many organizations today cooperate in virtual networks in order to meet the competition and the increased demands on technological development. Our focus in this thesis is on the information interchange in inter-organizational virtual networks. In this case the problem is related to the efficiency of the virtual networks for information interchange. This paper aim is to identify and discuss the possible aspects in the virtual networks efficient information interchange. This paper provides the detail information about the security aspects and its improvement and use of the efficient information interchange in inter organizational virtual network. This paper also provides the information that is helpful for improving the security in the virtual network so that the work in virtual network or the work via virtual network is efficient

Keywords: Virtual Network, Security, Efficiency, Organizations, Information interchange.
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1. INTRODUCTION

1.1 Background:

The world has created a new society with the help of the information technology and is named as the networks. The physical computer network is defined as “A computer network, often simply referred to as a network, is a collection of computers and devices connected by communications channels that facilitates communications among users and allows users to share resources with other users” (Gupta, 2003, “building a virtual private network”). After the formation of the physical network again another network has been created in the field of information technology which is called a virtual network and it is defined as “A virtual network is a computer network that consists, at least in part, of virtual network links. A virtual network link is a link that does not consist of a physical (wired or wireless) connection between two computing devices but is implemented using methods of network virtualization” (Cisco press, 2005). The virtual network is one of the important aspect in the field of information technology with the increased popularity because of sharing the information and getting the solution with the help of the expert in that field. But in the terms of interorganizational format there is a lack of efficiency in the process of interchanging the information via the virtual network.

The use of computer has been increasing day by day. Today the world is technologically advanced in which the computers play a dominant role, the importance of computer is increased even further with the introduction of internet. The internet connection deals with the networking of the computers which may lead to many problems as well. When the computers are connected to the internet, it is physically linked to unknown networks and there user too (Bishop, 2003). After being linked it is vulnerable to many back impacts that may be layer attacks, passwords attacks, virus attacks, malware attacks so on.

So to prevent the computer from these kinds of attacks there is the need of the network security, the importance of network security is that it is essential for the network management and implementation of the effective networking process. The computer network security is the critical issue, only protecting the system is not the solution but protecting the networking of that particular system is important. The computer network is responsible for the sharing information, while sharing the information in-between there are few aspects that has to be taken in consideration and they are integrity, confidentiality and availability (Bishop, 2003).
There are many kind of threats that will hampers the complete computer network system, while the system is hampered its efficiency decreases. There are three network security components: requirements, policy and mechanism (Bishop, 2003), requirements defines the security goals, policy defines the meaning of security and mechanism enforces the security. These components are used to develop and secure the computer networks. When the network is not secure it will be problems which will affect the efficiency of the information sharing between the networks. The problem that may arise with the problem in security might be, the outside attacks like viruses and spyware, the inside attacks, the loss of key which may lead to the loss of data. The problem in controlling the user access can also occur. With the secure network the information sharing will be efficient in the networks. The network security is the important part of the computer and the internet combination which has made the whole world a global village. The implementation of the efficient virtual networks requires the security issues. The security is the need of desired result of the information interchange in virtual networks.

1.2 Statement of problem

The efficiency of the information’s interchange is mostly different in various kind of virtual networking background. Some networks are very successful whereas the other networks experience the efficiency problem. When it comes under the inter-organizational concept the problem is even more complicated and bigger. The efficiency of the information interchange is different in “virtual individuals networks” and virtual organization networks.

1.3 Purpose of the study

Some organizations are successful in creating an efficient virtual network as far as security is concerned. Other organizations are less successful. The purpose of our research is therefore to create an understanding for problems that may arise due to the lack of security in virtual networks. This, as the virtual network works as the connector between the different organization for the information interchange and how the organization will be protected from virtual attacks.
1.4 Research questions:

The organizations are collaborating due to the rise of competition and demand. Collaboration is taking place mostly via virtual networks but there are some problems in the information interchange in virtual networks that causes the lack of efficiency.

Our main research question is “What problems related to security may affect the efficiency in virtual networks during information interchange between organizations?”

After the main research question we also have the sub-questions, which are as followed:

- “How can User access control be solved?”
- “How can the network be protected from outside attacks?”
- “How can the network be protected from inside sabotage?”
- “How can we get key recovery?”
- “How may attacks be identified?”

1.5 Target Group

The groups those will be targeted are:

A. Practitioners:

The internet service providers targets a Virtual Networks groups in the research field of academia.

A smaller “INTERNET SERVICE PROVIDERS (ISP)” is competing with the larger providers offering the “Virtual private Networks” services. An organization or a company manages thousands of VPN connection, which wants to consider an organization devices and in the mean time which should also check the software performance statistics first .ISP’s are also testing the latest VPN tunneling and security protocols that will be used on the internet in the future. The three main protocols are “Layer 2 forwarding protocol (L2F), Point to Point tunneling protocols (PPTP) and the internet security protocols (IPSec).(Brown,1999)
Another major concern for customers is performance latency and security. While many ISP’S are looking for ways to offer their customers service level agreements (SLAS) and Quality of Service (QoS) contracts, they are relying on standards for the security issues. (Steven brown, 1999)

B. Academics: The students, who are interested in study of collaboration of organization virtual network technology and security management, will get the benefit from our work and also this upcoming researcher.

1.6 Delimitations:
According to our research question, what problems are related to security may affect the efficiency in virtual networks during information interchange between organizations, We are not explaining the virtual networks types. Like physical layer’s, TCP/IP networks and we have not done any research of technical aspects in virtual networks.

1.7 Expected Outcome:
Our research question is “what problems related to security may affect the efficiency in virtual networks during information interchange between organizations”. Security is the main issue of our research to provide efficient information interchange. The security aspects should be maintained and improved to receive an efficient virtual network connection between the organizations. How the security can be improved and maintained will be our expected outcome.
The “company or organization” needs a “Virtual networks” because these Virtual networks are helpful for business organizations to expand and grow.
1.8 The authors’ own experience and background:

Now a day’s technology changing every day, so VPN’s and security is expect security breaches to happen. So you can protect yourself lot of hard work and up to date standards. Even though VPN’s are very complex technology to understand and implemented and Maybe VPN’s are suitable for your organization or not, but most cases some sort of VPN’s implementation is right for every organization. and some organization may not be use “encrypted data” even you always need to save cost savings and VPN technology is one way to obtain them. Many organizations most probably are likely to be using a VPN in the next few years.

I did my bachelors in information technology, being a computer science student I have always an interest in the networking area. I have taken few courses in my bachelor study like computer networks, high end computer architecture, network programming, computer organization and architectures. So I have always been keen to know more about the computer networks. After completing my bachelor’s degree I have worked as the network administrator post in a private software company named as Asterisk in Nepal. So here I got a chance to do research for my thesis and I chose the virtual network topic to explore my gained knowledge and to gain more knowledge that I have not yet known. And also my thesis partner did a bachelor’s degree in computer science in INDIA. He also had a same course like Computers networks, Computer organization and he very much interested to some networking topics, so we both are decided to do work on a thesis in virtual networks.
1.9 Outline of the thesis

1. Introduction
   - Background to the subject and starting point for

2. Method
   - Give directions for
   - Starting point for

3. Theoretical Study
   - Supports
   - Contributes to
   - Underlie

4. Empirical Study
   - Supports
   - Contributes to
   - Underlie

5. Analysis and Result
   - Gives
   - Underlie

6. Discussion

Appendices
2. Research Design

2.1 Research Perspective

In this part we have described our perception of science; we have explained our perspective of knowledge and our view of the world.

It is important for the reader to know what kind of approach this has been characterized of. When reading, the text is planned to be understood in a certain way, and it is essential to see what the information is based on. There are two mainly different scientific perspectives, the positivistic and the hermeneutic perspective. The positivistic perspective is to explain how something is proportioned to something else, expressed in numeric terms. The hermeneutic perspective can generally be translated as a theory of understanding or a theory of interpretation with importance on the entirety. (Diana & Maria, 2005)

The hermeneutic perspective strives towards a deeper understanding for the different elements. The goal of this perspective is to get a deeper understanding for the different elements in order to create the big picture. This perspective also stands for interpretation and comprehension rather than prediction. (Diana & Maria, 2005) We believe that comprehension for, and interpretation of the obtained information is significant in this thesis. Therefore we believe that use of a hermeneutic perspective will facilitate a better understanding for the subject we wish to study.

There are two approaches for the research design perspective, qualitative and quantitative. Qualitative research is a set of research technique in which data is maintained from a relatively small group of respondents and not analyzed. Quantitative research refers to the systematic empirical investigation of the quantitative properties phenomenon.
<table>
<thead>
<tr>
<th></th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General framework</strong></td>
<td>Seek to confirm hypotheses about phenomena. Use highly structured methods such as questionnaires, Surveys, and structured observation</td>
<td>Seek to explore phenomena. Use semi-structured methods such as in-depth interviews, focus groups, and participant observation</td>
</tr>
<tr>
<td><strong>Analytical Objectives</strong></td>
<td>To quantify variation. To predict causal relationships. To describe characteristics of a population</td>
<td>To describe variation. To describe and explain relationship. To describe individual experiences. To describe group norms</td>
</tr>
<tr>
<td><strong>Question format</strong></td>
<td>Close-ended</td>
<td>Open-ended</td>
</tr>
<tr>
<td><strong>Data format</strong></td>
<td>Numerical (Obtained by assigning numerical values to responses)</td>
<td>Textual (Obtained from audiotapes, videotapes, and field notes)</td>
</tr>
<tr>
<td><strong>Flexibility in study design</strong></td>
<td>Study design is stable from beginning to end. Participant responses do not influence or determine how and which questions researchers ask next. Study design is subject to statistical assumptions and conditions</td>
<td>Some aspects of the study are flexible (for example, the addition, exclusion, or wording of particular interview questions. Participant responses affect how and which questions researchers ask next. Study design is iterative, that is, data collection and research questions are adjusted according to what is learned.</td>
</tr>
</tbody>
</table>
In our paper we are using the process of understanding the knowledge and the knowledge is about the information interchange in inter-organizational virtual networks. There are different aspects we are covering in our paper, for example virtual networks, information interchange, security, organization etc. so we will have different aspect to consider giving a complete and attractive result. As described in the perspectives the hermeneutics is the perfect platform for our paper to work on as we are using the different aspects in our paper to give a complete picture with effective result that leads to understanding of the knowledge, on the other hand as described above we have the two different kind of research approaches qualitative and quantitative , here again the approach we will choose is the qualitative because we are considering the different aspects and field to get a single picture with effective results which definitely matches the qualitative approach, as the qualitative approach also relates to the data which is collected from the small respondents. These small respondents’ represents are the small fields in our paper and after these small fields are combined we get a single picture or result, so the choice of our research will be the qualitative.

2.2 Research Strategy
Research are performed to solve many problems or to aim different purposes, while performing a research the collection of information is required so that the research is monitored. The research strategy we follow will be the collection of information through theoretical study and interview as empirical study.
There are two types of research strategy approaches exploratory research and descriptive research, the exploratory research is the study which may create a better understanding, test the feasibility of further research or to develop a method for further research (Ann Lind, 2005) whereas the descriptive research is the statistical research which aims to describe the data and the characteristics of what is being studied.
In our research we will follow the exploratory research because we want to create a better understanding of the knowledge that we are going to approach. Applying the exploratory research strategy we will be able to create the understanding of the knowledge.
The theoretical part of research is used to identify the key points and suggestion that will help to explain data that the researcher has collected (Oates, 2006). The role of the theoretical part of our research will be to create a base for our empirical study which will be implemented later as the interview based on our theoretical study.
On the other hand after we create the knowledge of understanding with the help of the theoretical study some real time practical knowledge we want to create in our research will be done with the empirical study in form of interviews. The interviews will be conducted with the people of networking field, who have the actual experience about the work in virtual networks and who have faced and tried to overcome the problem we have in our research question. So the empirical study will help to create a practical knowledge that is required to support our research.

### 2.3 Data collection procedures

We will work on the research in two categories theoretical study and the empirical study. The data collection procedure of the theoretical study will follow a process in which we have some relevant research area from that area we will consider the text which explains the useful knowledge that is required to move forward in our research work. The data from the previous research articles, textbook, journals etc. should meet the criteria so that we can use it in our research work. The knowledge we want to gain from the text should contain an author with the background in the computer science. After going through many literatures we have got some genuine literatures which are according to our research field. We have selected the interview for our empirical study. the main reason for the use of interview is that it suits our research work in the form of empirical study because we are using the qualitative approach in our research design, so according to one of the criteria of qualitative approach the questions format should be open ended which is only possible in the interview. The analytical objective of the qualitative approach is to describe the variations, to describe and explain the relationships and to describe individual experiences, which are the part of the interview, so the analytical objective of the qualitative approach also supports the interview for our empirical study. The qualitative approach provides the flexibility in study design which is very helpful for the interview in such way that some aspect of the interview questions can be adjusted by adding or excluding some questions according to the response or background of the respondents.
Criteria for theoretical study

The text are related to our research area which contains the deep knowledge and understanding of the required field

- The literature sources we will try to find will be through our library access because our university has a number of databases which meets the requirement of our research work.
- The keyword that we will use when searching for the literature will be virtual networks, organization, security efficiency etc.
- As the information technology have made the world a global village we will not get contained with only certain geographical part, we will explore wherever we get our required knowledge about the virtual networks and its security
- We will also follow the cognitive theory and that is people construct knowledge in two different ways : based on firsthand experience or on what they have learned second hand from others Patrick Wilson(1983)

Criteria for empirical

- It will be balanced according to the theoretical study.
- It will contain interview according to research question an within in the research area

The selection of the respondents will depend on the knowledge of the respondents in that area like working in the virtual networks working on the organization which use virtual network collaboration, real practical knowledge three respondents should be able to answer the open ended interview questions so that the respondents should have enough and practical knowledge about virtual networks.

### 2.4 Data analysis procedure

We will formulate a clearer sense of the data that are required for our research. After being clear then data collection from empirical research and theoretical research takes place, for theoretical study we will collect the data from different fields like journal books, e-books, and previous research papers and in empirical research like interviews, and we will compare the data from where we have collected it. We have to describe our procedure for analyzing our data planning and usually reformulation of codes and further analysis plans will take place.
After this process we will make the interim summary of everything that we have collected so far.

As we are two people working together, the exchange of the information between us will take place as the exchange is a good occasion to subject our emerging constructs or recurrent themes to a critical review. Exchanging and discussion interim summary will help the cross case analysis.

2.5 Strategy for validating findings

There are different methods introduced by different author for suitable qualitative and quantitative methods of validating the findings of the research. As our research is qualitative we will follow the alternative criteria for judging our research which is followed by the following four steps.

2.5.1 Credibility

The credibility criterion, which involves the results of qualitative research are credible or believable from the perspective of our work in the research. According to this perspective, the purpose of our research is to describe or understand the phenomena of interest from our point of views; we are the only ones who are able to judge the credibility of the results that we present in our thesis. (Source web, Social research)

2.5.2 Transferability

Transferability refers to the results of qualitative research can be generalized or transferred to other circumstance. From the qualitative perspective transferability is primarily the responsibility of the generalization .We will try to develop transferability by attempting a thorough job of describing the research prospects and the assumptions central to the research. The person who wishes to "transfer" the results to a different situation is then responsible for making the verdict of how sensible the transfer is. (Source web, Social research)

2.5.3 Dependability

The thought of dependability will accentuate the need for us to account for the ever-varying circumstance within which research occurs. The research is responsible for recitation the
changes that occur in the setting and how these changes affected the way the research approached the study. (Source web, Social research)

2.5.4 Conformability

Qualitative research tends to suppose that each researcher brings a exclusive perspective to the study. Conformability here is the process in which the results could be confirmed or corroborated by others. There are a number of strategies for enhancing conformability but we will consider documenting the procedures for checking and rechecking the data throughout the study. And, after we study, one can conduct a data audit that examines the data collection and analysis procedures and makes judgments about the potential of the generated result. (Source web, Social research)

2.6 Result presentation method

We will have three phases in our thesis. The first one, we will design for understanding what the virtual network technology is and when it comes to the second one, how can this technology be installed. The third one is how this technology can be protected and more secured. We will present diagrams, prototypes, modules, texts, statistics etcetera. Since different network infrastructure and different organizational requirements for different types of architectures as there are too many to choose between we might find it difficult to decide which one is right for the organization and choice of the right one depends on different factors. VPN will continue to grow. The electronic commerce and other businesses being conducted over the internet, the need for a secure environment must be established.

3. Theoretical Study

3.1 Key concepts

Virtual Private networks: A Virtual network is created used to connect offices user are able to share information over a public infrastructure but data sent a across the internet is encrypted.(Source web, fire line)
Quality management: The development, implementation, and administration of the quality-control system by the contractor. (Source web, Answers. Yahoo)

Collaboration of organization: Collaboration is recursive process where two or more people or organizations work together to realize shared goals. (Source web, Wiki)

Network Security: The specialist area of network security consists of the provisions made in an underlying computer network infrastructure, policies adopted by the network administrator to protect the network and the network-accessible resources from unauthorized access, and consistent (Source web, Wiki).

Network protection: Network protection for controlling network access of a computer host based on the system health of the host (Source web, Microsoft).

3.2 Previous research

Our relevant research areas are “Collaboration IN Virtual Network and Content Oriented Virtual Domains for Secure information Sharing Across organizations.”

3.2.1 Collaboration IN Virtual Network: Our focus in this paper is collaboration of organization via virtual networks and the security of virtual networks. In this case the problem is related to the development of software applications (co-design). In a Collaborated organizations people thus come together in order to cooperate for a more efficient development of new solutions. Some networks are very successful in their cooperation whereas others have difficulties to get the cooperation work smoothly. (Ann Lind, 2007)

There are of course many obvious advantages with cooperation in networks. (Castells, 2000) writes for example that the cooperation offers a possibility to share costs and risks and keep in touch with constantly changing information. The networks also have a role as gatekeepers. New possibilities are constantly created within the network sand it becomes more and more difficult to survive in the outside world. The basic Units today are not the companies or organizations – it is the networks. (Castells, 2000) (Ann Lind, 2007)
We used Ann Lind paper in collaboration in virtual network; it has been very helpful for us in our research. Like obvious advantages with cooperation in networks and solution groups and globalization trend.

To reduce the problem that occurs in efficiency in information interchange the security of the virtual networks has to be improved and with the improvement of the security the organization can receive advantages like:

a. Cost management for the I.T solutions
b. All the time availability of the required applications
c. Significant enhancements to the overall security of the network infrastructure
d. Operation efficiency gained by the centralization of the data in virtual networks
e. The quality to regulatory compliance standards via an architectural approach to network security and business continuity.(Ann lind,2005)

3.3 Relevant literature sources

We used subject areas as a basis to identify relevant texts within the areas “Collaboration In virtual Networks, virtual private networks and network Security”. Many companies and institutions cooperate today in virtual networks. This is something that becomes increasingly common in order to meet competition and increased demands on technological development. Our focus in this paper is on virtual network security. In such networks organizations share knowledge and resources around a solution to a specific problem in their environment, in this case the problem is related to the development of software applications (co-design). Some networks are very successful in their Cooperation whereas others have difficulties to get the cooperation work smoothly. (Ann Lind, 2007)

Managed security Monitoring: Network Security for the 21 century

The internet is scolding to business. Most of all organizations have no choice to connect their internal networks to the rest of the global: Like (Customers, Partners, Suppliers and own Employees) But unfortunately these connections comes new threats: Malicious hackers, criminals. These network hunters regularly steal corporate assets and intellectual property, cause service breaks and system failures, corporate brands, and frighten customers. (Bruce, 2005)
The importance of security:

Computer security is major technology of the internet this is academic serious business tool. Companies have no choice without taken a security and new business models are just so great that companies will collection to the internet regardless of the risk. Here the meaning of limits of security is a limit of internet. Without security is unnecessary to need a business. (Bruce, 2005)

The failure of security:

Network security is a just like arms race, and the attackers have all the advantages. First, the defender has to ready to defend against every possible attack, at a short time the attacker only has to find one weakness. Second, the complexity of modern networks makes them impossible to properly secure. And third one is skilled attackers can they cover attacks in software, allowing people with no skill to use them. (Bruce, 2005)

Implementing virtual private networks:

The operation and management of virtual private networks it is a fast growing technology that lets organization use the internet as their own secret networks. The pieces of virtual private networks architecture is encryption, special network security consideration and authentication and more. To follow step by step virtual private networks implementation, trouble shooting, Maintenance, and going security. (Steven Brown, 1999)
3.4 Relevant subject areas

In our research paper, we identify some relevant subject areas, and also we are using our key concepts for finding subject areas and relevant areas. The relevant sources that we are using for our approach in research are the articles, journals and books. While doing the research we have followed the book called “Implementing virtual private networks” by Steven Brown, the book is about VPN suitability and constructing a VPN and presents various off-the-shelf solution.

In the picture below, we relate the subject areas to our research question. Our subject areas are; Network virtualization, Virtual machine, Security and research question are ‘How the networks can protect the inside outside attacks.
3.5 Security:

Network Security covers an incredible array of services, process, and requirements for an organization. This is evident from the number of books and articles published on the subject. Sample of books and articles (“Implementing virtual private networks”, “Managed security monitoring network security for the 21 century,” “Network Security is one of the biggest threats we are facing”) the network security is the security that is placed on the organizations network components, like Routers, gateways, servers, and so on. It can also be used to describe processes that are needed for the safe implementations and maintenance of an organization’s network. (Brown, 1999)

What is Network Security—Network security should be considered a part of total overall security for an organization. The information security encompasses network security, computer security, access security, physical security and so on. With all this security, who decides which information is critical and which is noncritical. Is every single piece of email, every document, and every single object in a database a critical business mission asset? In the case upper management must decide what value is placed on what information and provide the needed resources to protect that information. (Brown, 1999)

The security of virtual private networks:
In this paper we will discuss cryptography or the art of solving difficult problems. Virtual private networks security relies on the cryptographic strengths of the encryption algorithm. Here we read and look at the different types ciphers, blocks and streams that take your message and output it as cipher text. We will also look at public versus private key cryptosystems, digital signatures, hash function. Cryptography is the art of keeping things secret it is a mathematical algorithm. On the other hand encryption it is frame work. Pretty good privacy is the encryption. Also International data encryption algorithm (IDEA) is the cryptography; even IDEA contains the word encryption.(Brown, 1999)

Cryptography—A cryptographic process takes a plain text or clear text files and converts it into “cipher text” it’s an encryption process. (Brown, 1999)
Encryption is nothing more than talking a message, such as “I’ll be late,”
and converting it into some gibberish, say,
Example:

“2deR56Gtr2345^hj5Uie04.” The other end of the process is called Decryption, and it’s the reverse of encryption, for instance, taking “2deR56Gtr2345^hj5Uieo4” and converting it back to “I’ll be late.” (Brown, 1999)

Here cryptography is a branch of applied mathematics. Everything in cryptography is related to mathematical operations on finite numbers.

Encryption - Encryption is a converting some readable text into nonreadable text. The main goal is to only allow that person for whom it is meant to return it back into readable text.

Private versus public key cryptography - In the historical cryptography, the sender and receiver of a piece of text use the same key (the “secret key”). The sender uses the secret key to encrypt the message, while the receiver uses the same key to decrypt the message. This method is known as secret key cryptography or symmetric cryptographic. These keys are of extreme importance, its importance to safety, especially in large organizations.

‘Whitfield Diffie’ and ‘Martin’ Hellman introduced the concept of Public-key cryptography, each party gets a pair of keys, a public keys, a public key and a private key. The public key is made known to everyone, whereas the private key is kept secret to the party. (Brown, 1999)

The disadvantage of using public-key cryptography is speed. Many secret-keys encryption algorithms are significantly faster than public-keys encryption algorithms.

How fast data can be exchanged? Public-key cryptosystems are slower than private-key cryptosystems, so public-key systems may slow down the network performance, particularly on low speed network devices. Cryptography is such a vast topic and various mathematical techniques and methods.

In the field of networking, area network security consists of the provisions and policies adopted by the network administrator to prevent and monitor unauthorized access, misuse,
modification, or denial of the computer network and network-accessible resources. (Brown, 1999)

Security management: It is different for all kind of situations. It depends upon organizations and small homes. For example small homes or an office would only require basic security while large business requires high maintenance and advanced software and hardware to prevent malicious attacks from hacking.(source web, Wiki)

Small business: Using a basic firewall or a unified threat management. Using a wireless connection, use a robust password. Also try to use the strongest security supported by your wireless devices. (Source web, Wiki)

Medium business: Fairly strong Firewall or Unified Threat management system. And provide Strong antivirus software and internet security software. For authentication use strong passwords and change it on a bi-weekly/monthly basis.

Large business: For authentication use strong passwords and change it on week/bi-weekly basis. Using wireless connection, use a robust password and provide security fencing to mark the company’s perimeter and security guards can help to maximize security.(Source web, Wiki)

Large government:
- A strong firewall and proxy to keep unwanted people out.
- Strong Antivirus software and Internet Security Software suites.
- Strong encryption.
- White list authorized wireless connection, block all else.
- All network hardware is in secure zones. (Source web, Wiki)
3.6 Attacks on virtual network systems:

Virtualization provides the ability to run multiple virtual computers, several different operating systems, or multiple sessions of the same operating systems can run concurrently on same single physical Machine (either a server or desktop). There is several advantages to virtualization. Many data centers are turning to virtualization to consolidate multiple physical servers running different operating systems into one single server, effectively reducing the floor space needed for multiple servers as well as reducing electrical and air-conditioning costs. Virtualization can also be beneficial in providing uninterrupted server access to users. Data centers need to have the ability to schedule planned Downtime for servers to perform maintenance on the hardware or software (Ciampa, 2009).
Common major network security problems

The virtual networks security attacked from inside and outside attacks? What is the inside and outside attacks.

Employees: The most of the common network security problems from outside threats-It has to do with a company’s own employees and their human errors or failures. A human make mistake like improper training and sometimes incorrect assumptions was reached.(Source web, bright hub)

Piracy a problem: A common network security problems are piracy or copyright infringement. There have technical mechanisms (Copyright codes, digital watermarks) that can aid in enforcing copyright laws. (Source web, bright hub)

Information’s extortion and Hackers: Information extortions means blackmail or information disclosure to the destroying a network system or illegally acquiring network information this are all common network security problems.(Source web, bright hub)

Software attacks: Another common network security problem is of software attacks like worms, viruses and macros. This network security problems are destroy a targeted system and thus deny it’s users a service. (Source web, bright hub)

A Natural problem: Nature

Actually the common network problem isn’t the result of human error or intent; it is due to the force of nature: lightning flood, fire and earthquake (Source web, bright hub)

Most of internet security problems are “user access control” it is a mechanism where if x user only needs files in a certain directory they will be granted that authorization. At the same time another user access in a different directory they will be granted authorizations in that directory.UAC is extremely important to implementing virtual private networks because of lot of chance to someone hacking and access the organization directories.

Another problem in network security is key recovery- what is key recovery? It is a special feature of a key management scheme that allows messages to be decrypted even if the original key is lost. (Source web, crypto) we already briefly explained in network security
about cryptographic, encrypt, decrypt and public key private keys. For example what happens if an employee quits or dies in an organization? What about the files and data that have been encrypted by that employee’s private key? How can an organization gain access to those files? This is the type of key recovery business wants.

Network Protection: Using a system health requirements are whether the computer has the most recent operating system updates installed, and computer has the latest version of the anti-virus software signature, or whether the computer has a host-based firewall installed and enabled. (Source web, Wikipedia)

3.7 Virtual Networks: In the virtual environment these virtual networks are highlighted. Because of their flexibility offering a wide variety of possibilities and provide a network infrastructure offering almost everything one needs and at much lower costs. Also have a test space or “play area” available where you can safely try at new ideas, and easily throw out the bad ones with just a few clicks. (Zimmer, 2006)

V.N Definition: An interconnected group of networks (an internet) that appears as one large network to the user. The virtual networking system, defined virtual networking as “the ability for users to transparently communicate locally and remotely across similar and dissimilar networks through a simple and consistent user interface”. (Source Web, Pcmag)

Virtual networking related terms:
- Network virtualization
- Virtual LAN
- VNC
3.7.1 **Network virtualization:** Network virtualization an entire network managing and monitoring form a single network administrator’s console and these network virtualizations begins with monitoring the network and storage vitalization. This network virtualization storage a single resource and treats all servers and services in the network single pool of resources. It can be changed and redeployed in real time transaction requirements (Source web, Pcmag)

3.7.2 **Virtual LAN:** It is also called a “VLAN” is logical sub group within a local area network i.e. created via software manually moving cables in the wiring closet. Unit network devices and user stations are attached in a single unit and allow the traffic to flow to the more efficiently. The VLANs are reduced the time because it take to implement moves adds and changes. These are implemented in port switching hubs. (Source web, Pcmag)
Virtual LANs solve the problem of containing traffic within workgroups that are geographically dispersed. They allow, adds and changes to be performed via software at a console rather than manually changing cables in the wiring closet. (Source web, pcmag)

### 3.7.3 VNC (Virtual Network Computing):

“It is a open source remote control software. They can control of another user’s computer in an another location with a popular operating systems like as a “java” and virtual networking computing applications. They are free and commercial.”

Examples: Team viewer, Ultra VNC, Show My PC, etc. The latter maintained by some of the original developers of the software (Source Web, Pcmag).

“Developed at olivetti& oracle research labs in the U.k in the late 1990s, the labs were acquired by AT&t in 1999. (source web, Pcmag)

![VNC Remote Control Diagram](Image)

*Fig 3: VNC(Source web, pcmag)*

### 3.7.4 Remote control software:

“Software they can control of another user’s computer in an another location. only keystrokes, mouse movement and screen changes are passed
between the client “Controling” Computer and host “Controled” computer. All application processing takes place in the host (See illustration below).

Remote control software is the only effective way support representatives can troubleshoot serious problems with a user’s computer in another location. The Internet has made simple. The software must and should be installed at both ends, so they can easily see the same screen and run the machine. These remote controls are also useful for providing training for remote users; they can watch and imitate the actions on screen by the remote instructor. In addition, remote control provides desktop sharing that lets two users collaborate on drawings and other visual objects.” (Source: Web, PCMag)

Also called “Remote access software,” “Remote desktop sharing,” “desktop sharing” and “application sharing.” (Source: Web, PCMag)

Remote control software lets a computer be shared with someone else simultaneously.

Example of remote control software: Team viewer

1. The company / the software:
   About us - The Team Viewer GmbH is based in the south Germany city of Goppingen (near Stuttgart) and was founded in 2005. The main was dealing with the developing and selling secure systems for web-based collaboration. This Team viewer has fast rapid growth led to several million installations and use in more than 200 countries around the globe within a short span of time and also this software currently available in 18 languages.
The Team Viewer GmbH is privately owned and has been profitable since its foundation. (Source web, Team viewer)

2. Our Understanding of Security:- Team viewer is used a million time around the world for giving Spontaneous Support over the internet or for accessing unattended computers (e.g. Remote Support for Servers). The unsafe internet has to be protected against attacks in various ways. Security dominates all our development goals in order to make the access to your computer safe and also to save our very own interests. Millions of users worldwide only trust a secure solution and only a secure solution secures our long-term success as a business. (Source Web, Team viewer)

3. Quality Management:- The team viewer gets certified quality management in accordance with ISO 9001. The team viewer quality management is internationally recognized standards. (Source Web, Team viewer)

4. Security-related inspections:- Team viewer Underwent Security-related inspections by the German companies FIDUCIA IT AG and GAD eG (both are operators of data processing centers for around 1200 banks) and has been approved for use at bank workstations. (Source Web, Team Viewer)

5. References:- Currently team viewer is in use more than 100,000,000 computers. Especially top corporations like sensitive banks and other financial institutions are successfully using team viewer. (Source web, Team viewer)

Creation and operation of a Team viewer session

Encryption and authentication:- It works on complete encryption based on RSA public/private key exchange and AES (256Bit) Session encoding. Technology is used in comparable form for https/SSL and can be considered completely safe today’s standards and private key never lives the clients computer. Each Team viewer clients has already implemented the public key of the master cluster and encrypt message for the master server and check the signature for the master server.
Fig 5: Team viewer encryption & authentication (Source web, Team viewer)
Validations of Team Viewer IDS:
The Team viewer Id’s are automatically generated by itself based on hard ware characteristics and the team viewer servers check the validity of the ID before every connection so that is not possible to generate and use fake IDs.(Source web, Team viewer)

Data Center& Backbone: data center and backbone concern the availability as well as the security and the team viewer server highly modern data center with multi-redundant carrier connection and redundant power supply especially brand-name hardware (Cisco, foundry, juniper) is being used.(Source web, Team viewer)

Application Security in Team viewer:
Black-&white list
Especially if Team Viewer is used for maintaining unattended computers (i.e. Team Viewer is installed as a Windows service) it can be interesting - in addition to all other security mechanisms - to restrict access to this computers to a number of specific clients. (Source web, Team viewer)

Password Protection
For spontaneous customer support Team Viewer (Team Viewer Quick Support) generates a session password (one-time password). Here the only one way to access another customer computer like they user his/her give password then you can connect. In time any problems like power cutting or maybe you reboot system again new password will be generated.(Source web, Team viewer)

When deploying Team Viewer for unattended remote support (e.g. of servers) you set an individual fixed password which secures the access to this computer (Source web, Team viewer).
Team viewer diagrams:

Fig 6: Team Viewer quick support (source web, Team Viewer)
Fig 7: Team Viewer ready to connect (Source web, Team Viewer)
Fig 8: Team Viewer main page display (Source web, Team Viewer)
Fig 9: Team Viewer video share (Source web, Team Viewer)
3.7.5 Virtual private networks: This is the way to approach a private network and public network in an internet. This is called “virtual” because the use of virtual connections is temporary connections they don’t have real physical presence but consists of packets routed all over various machines on the internet. These connections are created between two machines a machine and a network or two networks (Gupta, 2003)

Remote access: Choosing Remote-Access virtual private networks technologies, securing the virtual private network deployment.

Defining Remote-Access Virtual Networks: “Remote-access virtual private networks allow secure access to corporate resources by establishing an encrypted tunnel across the internet. The internet combined with virtual private network technologies allows organizations too securely and cost effectively extends the research of their networks to anyone for using remote access.(Source web, Cisco) These VPNs help to improve business productivity any place and any time network access gives great flexibility regarding when and where they perform their job functions. (Source web, Cisco)

3.7.6 Collaboration of organization: Beside the book we are following some of the articles written by Ann Lind at University of Boras, the article “Collaboration in the Virtual Networks: Reasons and Benefits”. The paper explains the reasons and benefits of collaboration of the organization in virtual networks with the mutual understanding and sharing the knowledge, it also states the problem that occurs in that process and those problems is also the part of our research.

Advantages and Disadvantages of Collaboration: To be able to discuss advantages and disadvantages with collaboration in solution sharing network it is important to also analyze to research that has been performed in relation the groups. In 1997 ‘Katz &Martin” ask why collaboration in research environments has increased. (Ann Lind, 2007)

And they identify several aspects that may have contributed to this development as for example costs. The rapid technical development makes it difficult for individual organizations to repeatedly invest in the resources that are necessary to meet demands from
customers, society or authorities. Therefore an increasing number of organizations come together in virtual networks which Castells (2000) regards as atypical characteristic for informational societies. An example of that development is that local authorities collaborate in a network to create CRM-systems as demanded by the central government (Lind, 2005).

**3.7.8 Virtual private network diagrams:**

![Virtual Private Network Diagram](image)

**Fig 10:** Virtual Private Network (Source web, Google)
Fig 11: Virtual private network (Source web, Google)
**Fig 12:** Cisco ANA gateway & Cisco Unit server (Source web, Google)
3.8 Virtual machine:
Definition- A virtual machine (vm) is an environment, usually a program or operating system, which does not physically exist but is created within another environment. In this context, a VM is called a “guest” or “host”. Virtual machines are often created to execute an instruction set different than that of the host environment. One host environment can often run multiple VMs at once. Because VMs are separated from the Physical resources they use, the host environment is often able to dynamically assign those resources among them. (Source web, VMware)

Fig 13: Virtual Infrastructure (Source web, VMware)
Transform your organization with virtualization: To improve the efficiency and availability of IT resources and application through virtualization. To avoid the old one server and one application model, run multiple virtual machines on each physical machine. The IT administrators don’t want to spending so much time managing servers rather than innovating. (Source web, VMware)

- Run multiple operating systems on a single computer including Windows, Linux and more.
- Reduce capital costs by increasing energy efficiency and requiring less hardware while increasing your server to admin ratio. (Source web, VMware)
Why your organization should be virtualized: The virtualization of IT infrastructure to reduce IT costs and increasing the efficiency and flexibility of your existing assets.

What is a virtual machine?

It is a tightly isolated software container it can runs own operating systems applications if it were a physical computer. Virtual machine looks like a physical computer and it contains it own virtual like software-based RAM CPU hard disk network interface card. (Source web, VMware)

Virtual machines Benefits:

VM ware virtual machines possess four key characteristics that benefit the user.

- Encapsulation: Virtual machines encapsulate a complete computing environment.
- Hardware independence: Virtual machines run independently of underlying hardware.
- Compatibility: Virtual machines are Compatible with all standards x86 computers. (Source web, VM ware)
3.9 Summary of the theoretical findings:

Collaboration of different organization has virtual networks in order to meet competition and increased demands on technological development.

Virtual Networks are used in meaning of sharing the knowledge and resources around a solution to specific problems in their environment. The reasons of collaboration of the different organizations can be internal and external. The internal reason contains problems like economy, efficiency problems, time and competence. External reasons like pressure from authorities’ competitors and customers. On the basis of our research question, our theoretical study has been focused on the security problem for the information interchange in the inter-organizational virtual networks, the study covers the area regarding the security aspects in virtual networks like user-access control, the protection of the attacks from the outside of that network, the protection of internal sabotage, the recovery of the key and the identification of the attack.

According to our research sub questions, the user access control can be solved by Remote control access is only effective way support represents can troubleshoot serious problems and also providing the click turn user access control on or off, if you are prompted for an administrator password or information type the password or provide conformation. The network can be protected from inside &outside attacks (Employee A common problem, piracy a problem, Information extortion and hackers, Software attacks, A natural problem: Nature) using the policies for computer network system health requirements.

- Computers have the most recent operating system updates and installed.
- Using the latest version of anti-virus software.
- Computer has a host-based fire wall installed and enabled.

The key recovery can be achieved with help of the cryptography process
3. **Arguments for an empirical study**

With the help of theoretical study we have created the knowledge of understanding and for the implementation of that knowledge a practical knowledge or a practical use is required. The creation is done in the theoretical part but it has to exist in the practical world. So the need of the empirical study is to find out the implementation of the theoretical knowledge that has been created. It is necessary to gain the theoretical as well as practical knowledge so the practical knowledge is gained by the empirical study in the form of the interview to support our research.

4. **Empirical survey**

   **4.1 Purpose:**

   The purpose of our empirical study is to gain a practical knowledge about the problem statement we have in our research. The real problem and the suggestion how these problem can be overcome. The main concept of our research work has three words which are completely related to the outcome we are expecting in our research and they are information interchange, virtual networks, organization, efficiency and the security, we are doing the empirical study using these concepts. The main outcome of the survey is the improvement of the efficiency in information interchange in the inter-organizational virtual networks with the help of improvement in the security.

   **4.2 Sampling**

   Already when we were given the criteria about the empirical study, we gave the criteria about the empirical study we are working on in chapter 2, the respondents sampling we have done is according to the knowledge background they have in the field of information technology and the virtual networks. The respondent’s selection also took place according to the organization they are working for and how they are handling these kinds of problems which we have taken consideration in our research. So the sampling of the respondents is exactly the same we have described before in chapter 2.
4.3 The interviews

The interview we have carried online to the different people who are working in the field of networking in different part of the world. The intention of the interview was to gain the idea and suggestions about the problem of efficiency in information interchange in virtual networks. The preparation we have made in the selection of question that will be helpful in the process of our research. Our question to that people is totally depends on our research. The problem that we are taking into the consideration to communicate with them is the same problem that we are writing our research on. We have asked the question related to our five key concepts and they are virtual network, information interchange, organization, efficiency and security.

We have introduced ourselves to the respondents as the student working on the research for our thesis. And we also added that we will use the results of the interview for our empirical study so we need some real and practical information regarding our questions. After we received the answers from the people whom we have send the questions then we will put together the answer and we will also include the results how those interviews are helpful for us.

4.4 The First Interview

The first interview conducted with Mr. Kaushal Raj Baral, CMS Information Technology Pvt. Ltd, Sydney, Australia.

Q1. Is Virtual Network used in the organization you are working in?
A1: Yes.
We do have protocol based virtual network (VPNs and VLANs) as well as virtual devices based virtual network (virtual switches connecting virtual machines).

Q2. How the virtual networks have helped the working process of your organization?
A2: We are basically an IT support company and manage several sites all around Australia. In order to manage several sites centrally we do have VPN connection to each site. And within the organization we do have VLANs in conjunction with the virtual switches. We do have a clustered environment which is hosted in the data Centre. Virtual network (virtual distributed switches) are essential for such clustered environment.
Q3: Is your organization collaborated with other organization via virtual network?
A3: Yes, our organization is collaborated with other organization.

Q4: Do you think virtual network are better than physical networks?
A4: Yes. In short, virtual networks reduce costs. In clustered environment where you need to move virtual machines and data stores from one host to the other, virtual distributed switches come into play. Other advantages are like reliability, scalability and redundancy.

Q5: What are the security problems your company faced while using virtual network?
A5: We look after small to medium businesses and there are not any major security concerns and if it’s big then definitely the security problems will be faced.

Q6: How do you think the security problems can be overcome in the virtual networks?
A6: In virtual networks, security problems can be overcome by using IPSec tunnels, SSL VPN's, using certificates. However there are pros and cons of each proprietary VPN protocols. The choice must be yours so that it meets your security requirement.

4.5 The Second Interview

The interview conducted with Mr. Parag Parial, Bangladesh Online Ltd, Dhaka, Bangladesh

Q1. Is virtual networks used in the organization you are working in?
A1. Yes virtual network used in my organization.

Q2. How the virtual networks have helped the working of the organization?
A2. As we have different branch office in different cities in our country and it is important to use the office resources which is only available in the office environment. This why we don’t have any other choices rather Virtual network in order to communicate with HQ or with the branch office.

Q3. Do you think virtual network are better than physical networks?
A3. The basic connectivity of virtual network is physical network, so no comments about it.
Q4. Is your organization collaborated with other via virtual network?
A4. Yes, we have collaborated with other via virtual network, but those organization are also the sister concern of ours.

Q5. How efficient is the virtual network information interchange?
A5. Very Efficient.

Q6. What is the security problems you face while using virtual network?
A6. While you have entered in virtual network may be u can access various workstations within that network and with that specific domain, which is a very common problem. Therefore different org uses different security (as there are many issues in vpn security), so it may overlaps on one another. And thus the information exchange may get hampered.

Q7. How do you think the security problems can be overcome in the virtual networks?
A7. The security problems in virtual networks can be overcome with the help of the cryptography as we use the cryptography methods in our organization and with the collaborated organizations too.

4.6 The Third Interview:
The interview conducted with Mr. Lokesh Gupta, D2Hwakeye Services Pvt. Ltd, Kathmandu, Nepal.

Q1. Is virtual networks used in the organization you are working in?
A1. Yes, virtual networks are used in our organization; we use the virtual desktop application because our organization work with the organization located in USA.

Q2. How have the virtual networks helped working in the organization?
A2. VN has definitely improved the working of the organization, or we can say VN is the backbone of our organization, without VN it’s not possible to work effectively.

Q3. Do you think virtual network are better than physical networks?
A3. Yes it is.
Q4. Is your organization collaborated with other via virtual network?
A4. Yes our organization is collaborated with other via virtual network; currently we are using the link of the SUBISU.

Q5. What is the security problems you face while using virtual network?
A5. It takes 200ms to transmit a single packet, data may be loss or stolen from one network to another

Q6. How do you think the security problems can be overcome in the virtual networks?
A6. Security can be maintained by giving minimum right to access the network and using some security tool we can only try to stop but cannot be stopped 100%. Here the security tools contain the tunneling and also the cryptography.

### 4.7 The empirical research results

The collaboration has been one of the most important processes for any kind of organization. With the introduction of the virtual network the collaboration process has been effective but there are some problems because of which the information interchange lacks the efficiency. With the help of the interview conducted with the people who are working in an organization and use the virtual networks for the information interchange. The security is the problem which hampers the information interchange. The different tools are applied like IPSec tunnels, SSL VPN, Cryptography etc to provide the more secure efficient information interchange. If the information interchange is secured than automatically it will be efficient. The virtual network is better than the physical networks as there is no more complication to get connected and start. Virtual Networks also reduces the costs, is efficient in clustered environment and also the VN have the advantages like reliability, scalability and redundancy. According to our main research question, the problems related to security which affects the efficiency of information interchange between organizations are the reliability of the networks, the clustered environment, scalability of the networks, and redundancy of the networks. Other security related problems are transmission of data and access of the domain.
According to our research sub-questions, the user access control can be solved by providing the access of the domain in a secured way. The network can be protected from outside attacks using the virtual firewall. The network can be protected from inside sabotage with the help of security tools like IPSec tunnels, SSL VPN. The key recovery can be achieved with the help of cryptography process. To identify the attacks the VN should be more secured which can be made using the tools like IPSec tunnels, SSL VPN and cryptography.

5 Analyses and Result

5.1 Analyses

According to our research question “what problems related to security may affect the efficiency in virtual networks during information interchange between organizations.” In the analyses we cover and worked one organization we that were “Team viewer “company it was a selling and developing secure systems for web-based collaboration. In the organization how they face the Security problems and efficiency information’s and in this paper we explain company details.

Empirical Result Analysis:
Interview: The interview we conducted has gained us some very important data which has been helpful for our research. The interview was conducted online with the people who are working in the field of the virtual networks in an organization. The interviews have been effective as it was open ended interview. The interview was conducted according to our research question and the problem statement. The data that we collected explains the important aspects of the virtual networks in the real world of information technology. The collaboration of the organization has chooses mostly the path of the virtual networks. The effectiveness is there but it faces some problems. The problems are also indentified as the security problems in most of the virtual networks cases, so we also got the data how we can improve the security of the virtual networks, the improvement of the security will make the virtual network effective and efficient is also the withdrawn result from interviews.

Summary Analyses: According to our research question “what problems related to security may affect the efficiency in virtual networks during information interchange between
organizations”, we have found some important information regarding to our research question which is described below.

5.2 Summary of results

Summary of results of theoretical analyses:

Security:-
Virtual security is a software Ethernet switch with embedded security controls within that runs within virtual environments such as VMware, citric, Microsoft and virtual iron. The primary purpose of virtual security switch is to provide security measures such as isolation, control, and content inspection between virtual machines. (Flower, 1999)

a) Why security is so important when implementing virtual organization
b) The data must remain 100 present untouched
c) Anyone who comes across your virtual organization-encrypted stream of data must not be able to decrypt that message
d) Different organizations users must have different levels of access.
e) Ease of administration should be provided

Summary of results of the empirical research:
The result we got from the empirical research made our thesis an interesting one

a. Collaboration of organization: the collaboration of the organization at this date is very important cause of competition and demand. So the collaborating organizations are using the virtual networks mostly cause it is easy and more effective than the physical networking. The virtual network collaboration needs less time consuming and also less budget. The collaboration of the organization has improved the efficiency of the working process of the organization, with the help of the virtual networks the multi tasking of the organization took place.

b. Virtual networks v/s Physical networks: The physical network and the virtual network are the two networking process of the information technology. The virtual network is derived from the physical networks. Now the virtual networks have overcome the physical networks, as the development of the information technology has developed the virtual networks. The reason behind the development of the virtual networks is, virtual networks reduce costs. In clustered environment where we need to move
virtual machines and data stores from one host to the other, virtual distributed switches come into play. Other advantages are reliability, scalability and redundancy.

c. Security a problem for efficient virtual networks: As the virtual network have been the important aspects of the networking process the efficiency is required, the development of the efficiency can be made more improved with the help of the secure environment in virtual networks, the secure environment can be created by identifying the attacks that may hamper the efficiency, the attacks are inside attacks and the outside attacks, other part are loss of the key and the user access controlling, and the improvement of the security can be done in following ways, Security can be maintained by giving minimum right to access the network which relates the problem of user access control, and using some security tool we can only try to stop the inside and outside attacks but cannot be stopped 100%. Here the security tools contain the tunneling and also the cryptography. In virtual networks, security problems such as inside and outside attacks, key recovery, can be overcome by using IPSec tunnels, SSL VPN's, cryptography.

6. Discussion

6.1 Conclusion

Our research is based on the inter-organizational virtual networks. The problem that affects the information interchanges efficiency. We have found that the security is the main concern of every organization that is using the virtual networks. Virtual network has been an important aspect which has improved the networking part of the information technology. Virtual network has been reliable, scalable, reduces the cost and reduces the time.

The list of security problems hampering the efficiency in information interchanges these are common network security problems like as we talk about previous in attacks on virtual systems.
Common network security problems from inside & outside attacks,

- Employees-A common problem
- Piracy A problem
- Information extortions and hackers
- Software attacks
- A Natural problem: Nature
- User account control
- Close -in attacks
- Key recovering

According to the theoretical research, we have found many interesting things which are related to the empirical research. In this paper we write some comments of differences and similarities. Collaboration of organization in the theoretical research - we have analysed team viewer organization. It was totally collaborated with many companies/organizations and public user’s, they provide the remote access control a selling and developing secure systems for web based collaboration. The Team viewer maintains quality management. This software awarded a five-star quality seal by the federal association of IT experts and reviews. In the security point of view cryptography play a major role in the security. It is the art of keeping things as secrets like mathematical algorithms. Encryption method is a pretty good private method as it stores the data secured. This cryptography has two keys, one is a public key and the other one is a private key.

The public key has some disadvantage like cryptography speed for example. The other, we already explained the security in the theoretical research analysis.

According to our empirical research we have derived some conclusions. The organizations are collaborating to gain more effectiveness in their working processes; the different organizations have trusted the virtual network as the collaborating object between the organizations. With the collaboration of inter organizations via virtual networks the working has been effective but they are facing some problems in efficiency in the information interchange. To improve the efficiency there are many aspects to be considered, but we have concluded that improvement of the security is the main aspect, which will improve the efficiency of the information interchange in virtual networks.
According to our theoretical study we have identified the problem in security that hampers the efficiency of information interchange. The problems are classified as the inside and outside attacks, the user access control and the key recovery in theoretical study, the same kind of problem are also indentified in our empirical study too which are more practical in nature as it was gained from the respondents who are facing that kind of problems in real life, the outside and inside attacks can be identified and overcome with the help of tunnelling like IPSec tunnels, and also using SSL VPN, and the user access control can be overcome with the help of cryptography process. 
So the resemblance of same kind of problems in both theoretical and empirical study establishes the relationship between our both kinds of study and relates each other.

Finally, the information interchange in virtual networks can be made more efficient with help from improved security and a secure environment.

6.2 Implications for Informatics

Information technology has developed a lot and is developing continuously. The need of information technology in the current world is increasing and so are the new techniques. The new implementation is taking place and the new form of information technology is more developed and more informatics. The informatics deals with the development and use of the information system. Our research is related to the fields of informatics, as we have worked on the virtual networks which are parts of the information systems. The networking is necessary when it comes to connection of two or more information system devices together and it is used to gain effective results.

Our research has considered that developing the security of the virtual networks so that the effectiveness and the improvement of the efficiency will take place. Its been shown in our result that the collaboration of the organization using the virtual network has been successful and it has the advantages over the physical networks too, so the developers and users in practice can consider that the collaborating of organizations will be effective, using the virtual networks and there are also few reasons behind it as the virtual networks are reliable, it has scalability and redundancy.
Our research has also shown that the efficiency is the problem that is making the virtual networks less effective, so for improvement of the efficiency of the virtual networks should be provided, more secure environment and the secure environment will help the virtual network to gain effectiveness as well as having the efficiency. The developers and the user in practice should consider which kind of security who is favorable for the virtual networks as our research has provided some of the security like cryptography, TCP/IP protocols, tunneling, virtual firewalls etc.

The informatics is about using the information systems and virtual networks as parts of the information systems so that the virtual networks falls in the field of informatics as it has to be developed and used for gaining the effectiveness.

6.3 Method evaluation

The theoretical research has followed some methods in our thesis. The first thing we did was to generate the actual idea of how to move forward with our thesis in theoretical point of view. In the theoretical research we have followed some text books. We have generated some very important information regarding our problem of research. The choice of the text book was difficult to make but we considered most used text books and background of the author to match our necessity of research. The book we selected has helped us all the way through our research. After the selection of the text book we had to make the selection of the journals and articles which should consist of an author who is trustworthy, and we found an important paper that is related to our research. It was written at The University of Boras by Ann Lind, the selection criteria was based completely on the trust we can have in the author and the paper should be related to our research and both of those criterions matched. Also we selected some other journals and articles since it was important for our research to gain as much knowledge as possible.

In the section of empirical research we have followed .The interview was conducted via mail and it was open ended. The selection of the questions was not so hard since the questions were centered according to our research problem. The interviews were conducted with the people who are using the virtual networks in their organizations. The organizations are located in very different parts of the world and the people in the organizations had already gained some experiences of our problem of research, which was very good. We choose the
open ended questions in the interviews, because we wanted to gain the knowledge of real problems from their point of view.

6.4 Result evaluation

We are following the alternative criteria for evaluating our result from the qualitative research we have performed in our work. The alternative criteria follow the four steps and we will evaluate our results according to those steps.

Credibility:
The credibility criteria involve establishing, that the results of qualitative research are credible or believable from the perspective of our work in the research. The research we have performed on the two basis and they are theoretical study and the empirical study. For the theoretical study first we have chosen the well known textbook, on which we can believe in from our point of view. After that we have chosen some literature from well known authors who have written some very good articles in our field of thesis, so we have judged from our point of view that the authors we have selected is trustworthy. On the other hand, we have also conducted the empirical study, in which we have first selected the case study, as the case study is done in the well know organization which have made a good impact on their fields of work and the case study is also conducted by a well known name in the field of security management, so from our point of view we believe in that author and the case study as well. After the case study in empirical study we have conducted the open ended interview , the people we have interviewed are working in the well known companies and those people have gained experiences regarding the field of our thesis work , so it helped us believe in those people and their answers to our interviews questions. So the result we gained from the theoretical and empirical study is trustworthy in our point of view.

Transferability:
It refers to the degree to which the results of qualitative research can be generalized or transferred to other contexts or settings. We have provided in our research a general idea of virtual networks security improvement. We have also found out that the efficiency is lacked due to the insecure virtual network environment. We have enhanced the transferability as we have done a thorough work in the theoretical and empirical study. We have analyzed and got the knowledge from the text we went through. In empirical study we have done the case
study which fulfills the requirements of our research and the interview answers are within the field of our research. So the result has been a sensible one and can be transferred.

Dependability:
While starting the research we had the title of our thesis and a short background of the virtual networks within us. We started the thesis as the information interchange in virtual networks and as our research approached we got interesting points of virtual networks in organizations. We started to work on the organizational virtual network. As we were working on the efficiency of the information interchange, we found out that the efficiency somehow depends on the secure environment and then our focus shifted to security problems and how the security problems can be resolved. As we approached research we had to make some changes in our view of looking towards the research. it was challenging but we went through it to make it even better. With the help of theoretical and empirical study we have generated the results which have the quality of transferability.

Conformability:
Our research has brought up the unique perspective to the study. There are numbers of strategies for enhancing the conformability. We have followed a procedure of checking and rechecking the data that we have collected. In theoretical we have taken the consideration of the trust in the author of whose text we are using. We have gone through the backgrounds and the achievement of the authors to find out the way we can trust in them and we got some positive results that encouraged us to use those texts. In empirical we have followed that procedure of checking and rechecking the data we collected from our study as well. In the case study the data seemed quite valid as the case study was performed by a well known author and in well known companies and in case of interviews the data we collected is the response of the people who have worked and who are working in well known organizations and within the field of our research area. After the study we have conducted the data audit process which has examined the data collection and analysis procedure and we soon also made the judgment about the potential of those data.

6.5 Possibilities to generalize
We have carried out our research in two phases - theoretical and empirical study. Our choices of the text we have made are according to the background and also the achievement of the authors. As we have already mentioned, the text we are using is written by a well known author. For example, we have used a text written by Ann Lind for approaching our research’s certain area. Therefore the author has proved the work and the contribution to the society in such way that it can’t be neglected, so mainly the achievement of the author helped us to use the text and to consider that it is valid. In case of textbook that we have referred throughout our thesis is also of well known authors, the background and the achievement of the author, the use of the textbook has helped us to believe in the work which has been done in those books.

In case of case study, the author is a well known analyst of the scientific literatures, and the case study is conducted on the well known company which made its impact around the world covering more than 50 countries. The case study has been published too and had a good following so it encouraged us to work with that certain case study. The interviews, as earlier explained are conducted with people who have gained enough experience about the field we based our thesis on and also they are working in well known organizations in different parts of the world. We have already provided the important information about the organizations too. So in our point of view, the data and the results we have provide using our theoretical and empirical study, are referring the different texts and also the interviews are valid outside our selection.

6.6 Ideas for continued research

According to our key concept we have some different fields in our research work. We found one interesting aspect about the organization that use the virtual networks and it was the information interchanges lack of the efficiency because of the insecure environment of the virtual networks. To gain more efficiency, the virtual network has to become more secure. But there will be other problems for the organizations project management technique as well. As the organization is always working on some kind of project, the project management technique is always important for completing every certain project. As the lack of efficiency due to security, problems in virtual network will produce some risks for the organization, and the risks caused by that problem could hampered whole projects and also lead to termination of each project, which is using the virtual networks. So for continued research, we would like
to suggest that the risks management techniques should be used. How the risk can be managed so that the whole project can be saved and the project should succeed, could in this case be done easily. On the other hand for further research the different types of security management techniques can be looked through.

6.7 Speculation for the future:

Many authors also mention globalization as an important trend in the new society (Castells, 2000 & lidden’s, 2003). This trend has lead to great consequences for people as well as for companies and organizations. The market has turned global and a new world-wide economy has been created. This trend made it possible through information technology and has brought a great change in a major part of the market but also changes in the new social practices. Information technology has created more and more complex networks with entities from the same or different cultures. The geographic distances are less important than before since the cultural and organizational proximity influenced the social practices that are formed. (Ann Lind, 2007)
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University of Borås is a modern university in the city center. We give courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

In the School of Business and Informatics (IDA), we have focused on the students’ future needs. Therefore we have created programs in which employability is a key word. Subject integration and contextualization are other important concepts. The department has a closeness, both between students and teachers as well as between industry and education.

Our courses in business administration give students the opportunity to learn more about different businesses and governments and how governance and organization of these activities take place. They may also learn about society development and organizations’ adaptation to the outside world. They have the opportunity to improve their ability to analyze, develop and control activities, whether they want to engage in auditing, management or marketing.

Among our IT courses, there's always something for those who want to design the future of IT-based communications, analyze the needs and demands on organizations' information to design their content structures, integrating IT and business development, developing their ability to analyze and design business processes or focus on programming and development of good use of IT in enterprises and organizations.

The research in the school is well recognized and oriented towards professionalism as well as design and development. The overall research profile is Business-IT-Services which combine knowledge and skills in informatics as well as in business administration. The research is profession-oriented, which is reflected in the research, in many cases conducted on action research-based grounds, with businesses and government organizations at local, national and international arenas. The research design and professional orientation is manifested also in InnovationLab, which is the department's and university's unit for research-supporting system development.