An Exploration on Company Network Infrastructure

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Abstract- Network infrastructure is the main commercial asset of organizations that rely on geographically dispersed data centers and cloud computing for business line applications. You must maintain consistent performance in links and between sites to ensure timely access to data, allowing real-time results to make decisions. The industry has recently begun research aimed at integrating software-defined network (SDN) technologies into the next generation of networks. In this model, SDN transfers the control function of traditional distributed network equipment to manageable computing devices, resulting in the extraction of basic network infrastructure from network services and applications.

Keywords- Network infrastructure, SDN, network services, IT infrastructure, Company network virtualization

I. INTRODUCTION

Network infrastructure is part of the organization's IT infrastructure. While IT infrastructure is essential for the company's business continuity, network infrastructure is critical to the success of IT infrastructure in general. The company's IT infrastructure includes all components that enable the company's IT and IT operations, including internal business processes and business solutions from external customers. As a general rule, IT infrastructure consists of the following components:

- Hardware such as servers, computers, switches, hubs, data centers and routers.
- Software applications such as customer relationship management (CRM), enterprise resource planning (ERP), productivity and data management applications.
- Networking, including network enablement, firewall and security, and internet connectivity. This component is known as the network infrastructure.

Human resources, such as developers, programmers, business analysts, human resources, software program specialists, IT professionals, IT support, user interface designers and graphics. The corporate network affects all aspects of your business and cannot allow persistent problems to slow down your activity. Disruption due to network infrastructure problems equals lost time and lost revenue. TNS has partnered with industry leaders to deliver dynamic solutions that not only improve the integration of your network infrastructure, but ultimately benefit from the end result to give you the competitive advantage you need to succeed in the business world from today's accelerated pace.

Network Infrastructure services include: routers, switches, load balancing, secure remote access, servers, back-office software, storage, and IP telephony.

Our services include the design, installation, support, training, and securing of network systems. Technology is obviously a critical component all business and TNS is on the leading edge of both equipment and services to maximize the results for all of its clients.

Fig.1: Company network Infrastructure

A company's network infrastructure includes all the components that allow communication, operations, network management, and business networking. The network infrastructure is responsible for maintaining internal and external communication of internal and external systems. For example, when an external system tries to access the product feature with the help of the API, the network infrastructure is responsible for ensuring that the connection is ideal. It also maintains communication between program structure levels. As a general rule, the network infrastructure consists of the following components:

- Networking hardware which comprises routers, switches, LAN cards, wireless routers, cables
- Networking software such as operating systems, network operations and management, network security applications and firewall
- Network services such as IP addressing, DSL, satellite, T-1 Line and wireless protocols

Therefore, network infrastructure is a component of IT infrastructure, but both are critical for a successful IT implementation and its operation.

Here are some project ideas in networking. Some are new and others are ideas that have been implemented before but can be implemented again. Keep in mind that, unlike regular project

ideas, these ideas have no connection against them. They are there to give their ideas about what kind of things can be done. If the project idea is interesting and you want to follow up, you should discuss it with a professor with networking experience.
They may not be able to help you directly, but at least they can direct you to a better place, perhaps because their specialized knowledge is in the project area. These basic concepts behind networks using the Internet and its protocols provide examples.
There are two goals:
(1) To give you an understanding of how networks, especially the Internet, work,
(2) To teach you network programming.
It will cover the first five chapters of Kurose in detail, working our way down the network stack from the application layer to the data-link layer. Concurrent with the lectures, you (in groups of two) will be building a functional TCP/IP stack and a small web server that will run on it. What you build will be "real" – your code will interoperate with other TCP/IP stacks and you'll be able to talk to your web server using any browser on any TCP/IP stack.

II. The goal of the networking project is to enable you to do the following

- Build implementations of the Internet protocols
- Generalize this knowledge to other networking protocols.
- Be a competent network and systems programmer.
- Think like a networking practitioner Read and judge articles on networking in trade magazines
- Begin to read and judge research and technical articles on networking
- Create simplicity and reliability out of complexity and unreliability
- Structure and design software systems to achieve that simplicity and Reliability

III. COMPANY NETWORK VIRTUALIZATION

Since the advent of Virtualization, the world of IT has undergone a massive paradigm shift in the way organizations operate, allowing them to cut costs, reduce downtime, and get their ideas to market faster than ever.

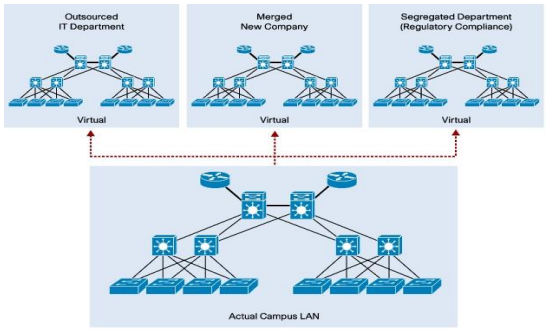

Fig.2: company network virtualization

In the "old days", when a new server was wanted, managers had to go through an arduous process: ask the machine, wait for it, assemble it, and install it in the data center and run it. It may take weeks to deploy new servers. Each application had to have its own virtual server to avoid costly server locks, so if the company had 100 applications to run, it would have to run 100 virtual servers. All these physical servers consume energy and produce heat throughout the day, whether they use 4% or 90%. It also consumes valuable space in the data center. Data center power bills were huge, and the implementation of new applications took a long time. The engineering, sales and marketing teams had to add weeks or months of waiting time before they could market their products and ideas, and when the server came out, it could take hours or even days before they could reconnect and recover everything from the data.

Enter virtualization: Individual virtual machine hosting applications are implemented as divided silos, all coexisting in physical server, exchange process, and computing power. Groups of these servers are groups, or private clouds, where they share pooled resources. Management requests an application, and within minutes, the servers are set up, assembled and run, and are provided from the enterprise cloud. Instead of owning a certain number of servers, your organization has a private cloud network and a wide range of computer resources, memory, and storage that you can partition and assign to any section of your organization as you want. Workloads that require only 100 servers or computers today may require only a few. By the way, these virtual machines can move, as data files, over the LAN or even the Internet, opening the door to modern technology for business continuity and disaster recovery.

For Management Teams, these new changes translate to increased cost savings, true business agility, and reduced downtime. Power bills and recurring expenses such as hardware support contracts are shrunk to fractions of their previous cost. Project lead times are greatly reduced, allowing businesses to get their products and ideas to the marketplace faster than ever. Many common outages that used to halt productivity can be eliminated entirely.

Changing the way your organization delivers applications and digital resources can be a daunting task. Trusted Network Solutions, with their business partners Microsoft and VMware, have the expertise and experience to help your organization "Virtualize" much or your entire digital environment.

IV. COMPANY NETWORK DATA CENTRE

Trusted Network Solutions specializes in creating high-performance, energy-efficient data centers that keep IT staff up-to-date 24 hours a day. In addition to providing all the servers and network devices your organization operates on, TNS has extensive experience in building the infrastructure that you maintain, operate and cool.

Technology executives and facility managers know that in addition to equipment costs, the continuing costs of general energy and cooling services can be enormous. In addition, they know that the cost of downtime (when they cannot access the network and data servers) can prevent important transactions and sales, as well as damage the reputation of the organization. This Trusted Network Solutions understands that, through its consultants and engineers, it can help you build a data center for energy efficiency that protects against downtime and enables companies that have lower running costs.

Trusted Network Solutions assists you in accomplishing your goals by providing:

- "Green" data centers with hot and cold aisle containment, energy-efficient power and cooling systems and custom-designed airflow systems to keep utility costs down.
- Environmental control and security systems that record and monitor the data center, sending alerts based on urgency via text message or e-mail to data center managers. This can be based on criteria such as physical movement, water leaks, humidity, temperature, or any number of additional items.
- Uninterruptable Power Systems and Cummins Diesel Generators to ensure that your data center runs as long as you need it to in the event of a power outage.
- Remote system control with IP KVM, putting the entire data center at your fingertips, no matter your geographic location.

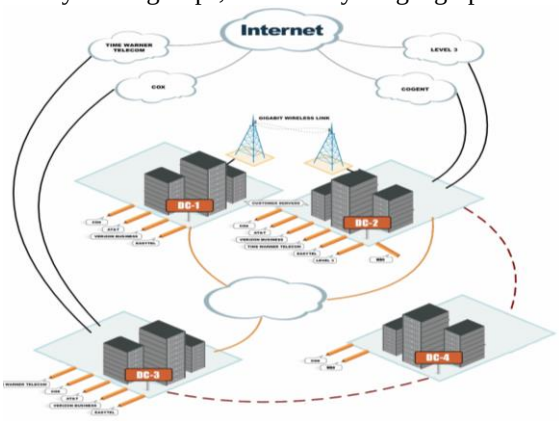

Fig.3: Company Network data center

V. COMPANY NETWORK WIRELESS ACCESS

Wi-Fi mobile devices are beginning to bypass desktops, and corporate networks are changing from wired to wireless as the primary way to connect. Whether a wired or wireless network is becoming irrelevant today, organizations must be able to provide secure access to networks and resources, regardless of the mechanism of incorporation. With our modern wireless systems, access privileges can be linked to the user ID or device type, leaving its digital ownership secure regardless of how you grant the network connection. Employees want the freedom to bring their own devices to work and access their data. This provide staff with a mechanism to achieve this, while minimizing the amount of work they need to do to achieve this goal.

Trusted Network Solutions has built and fine-tuned some of the largest wireless networks in the Rocky Mountain Region. The expertise includes:

- WLAN installations of all sizes, from a single Access Point to hundreds
- Military-grade security, authentication and encryption
- Access Control down to the User or Device level
- Ultra high speed transmission rates with 802.11ac (Gigabit Wireless) and 802.11N MIMO
- Hard to cover areas, Wireless Point-to-Point Links, and Outdoor Mesh

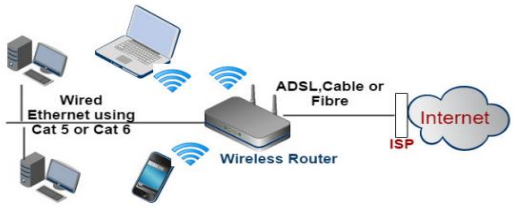

Fig.4: Company network Wireless Access

VI. COMPANY NETWORK IP TELEPHONY

VoIP is the transmission of voice telephony through data lines (Ethernet, Internet, LAN / WAN, etc.). With VoIP, today's companies are getting great rewards for reduced support costs, ease of administration and advanced features. Due to the complexity of the telephone system installation and the importance of the ring tone for most companies, certified and experienced value added providers are requirements. Reliable network solutions can help your business obtain multiple rewards while minimizing the risk of a successful VoIP project.

VII. COMPANY NETWORK'S ROUTER AND SWITCHES

Routers and switches are the basic components of any business class network. Routers are the "gateway" between networks, and switches make up the network. More intelligence (security, QoS, VLANs, etc.) is being built into the network than ever before. Even these well understood technologies need the expertise of an experienced VAR.

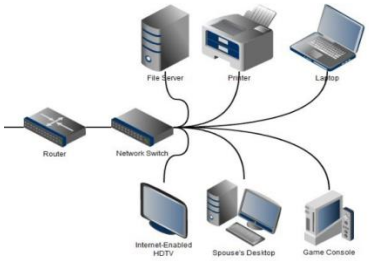

Fig.5: Company network's Router and Switches

VIII. BACKGROUND

Petrenko et al. (2019) provides an exploratory study on the impact of the threat of quantum computing on the components of the infrastructure for modern routing and switching of IT infrastructure in a large financial institution. Their determine whether the IT infrastructure for common switching and routing, including hardware and software components, has enough encryption to adapt to changing cryptographic algorithms to those that are not susceptible to quantitative computing and those that are consistent with the security of the National Agency Protocols Group B (NSA). This describe in detail the initial or perceived effects of any change in cryptographic algorithms on various IT infrastructure components in terms of the effort required to achieve this transition.

This study is one of the first studies to examine quantum cryptography from a hardware perspective of routing and switching techniques using the dissemination of the theory of innovation. The study integrates corporate governance to meet the challenges posed by quantum computing with a focus on speed coding.

Rahimi (2016) identified network software revolutionized the world of network technology, which replaces most of the physical devices and control layer of the cloud computing reference model that controls many network devices. The default adapter is a program through which many virtual machines communicate. Unlike the actual adapter, it not only redirects data packets, but it also checks the security of data before forwarding it to other virtual machines. Component components of the program components work together to form a virtual network infrastructure. Outside of the program components, the focus is on the default adapter functionality and how it differs from traditional adapters.

Ushakov and others. (2017) There is a problem in creating models of the modern infrastructure components identified by the program and configurable by the program. Many simulators do not have tools to implement these models. This document describes the default corporate network infrastructure properties. Consider the approach to the creation of an abstract model for a part of the infrastructure based on the virtual prototype studies, and propose a simulation scheme for the transformer and a programmable infrastructure controller.

Png*et al.* (2001)Corporate adoption of information technology (IT) infrastructure is a critical management issue that may be affected by national culture. Prior research has shown that dimensions of national culture affect development of national IT infrastructure as well as adoption and impact of IT applications. This study explores the impact of two dimensions of national culture (uncertainty avoidance and power distance) on the adoption of a type of IT infrastructure (frame relay). A multinational survey was carried out, and it yielded useable responses from 153 businesses from 24 countries. The results demonstrated that businesses from higher uncertainty avoidance countries were less likely to adopt frame relay. A one-point increase in Hofstadter's uncertainty avoidance index for the country of incorporation was associated with a 3% lower likelihood of adopting frame relay. Power distance was not significantly correlated with adoption of frame relay. These results highlight the relevance of dimensions of national culture as factors affecting corporate adoption of IT infrastructure. Implications for practice and further research are presented.

Detlor (2000)corporate portals offer organizational users the ability to access a wide variety of information sources directly from the desktop. By functioning as an underlying Web infrastructure for information management, portals can provide "firms with a shared information work space that facilitates access to information content, organizational communications, and group collaboration. To foster the development of portals in this way requires a design approach that goes beyond traditional technological and content concerns. Utilizing ideas borrowed from both Taylor's value-added model of systems development and Davenport's concept of the information ecology of organizations, a framework for corporate portal design is presented. The framework stresses the need for developers to incorporate value-added processes that match the information needs and uses of organizational participants and improve the organization's informational context. Doing so, can help promote corporate portal designs that function as infrastructure for information access and use.

Devapriya (2006) Public–private partnership (PPP) organizational approaches to generation, management and operation of network infrastructure and services have widely followed competitive market forms under different regulatory regimes. Managerial decisions on financing of PPP companies have been governed by regulatory markets with unstable institutions in developing and emerging economies. While debt ownership in the capital structure is often shared by additional financiers like development and multilateral banks, unique agency issues seem emerging from debt and equity ownership arrangements of regulated PPP organizations. Within a theoretical framework of financing of PPP organizations explained by theory of the firm, this research looks into nature, form and unique governance issues in debt and equity arrangements in regulated PPP organizations. Analysis is supported by a survey on debt and equity arrangements in regulated PPP organizations across different infrastructure sectors and developing environments. Findings reveal that debt has not been an effective mechanism to control managers' behavior since subordinate financing also functions to address debt agency in the capital structure of those regulated PPP organizations. Thus, results suggest that tying performance of managers with the financial structure of regulated PPP organization is undermined in developing and emerging

economies. These governance issues need to be considered for alternative benchmarks to assess efficiency of infrastructure companies under different regulatory regimes for better infrastructure investment performance in developing environments.

IX. CONCLUSION

Network infrastructure is the main commercial asset of organizations that rely on geographically dispersed data centers and cloud computing for business line applications. You must maintain consistent performance in links and between sites to ensure timely access to data, allowing real-time results to make decisions. The mobile and wireless network is undergoing several fundamental changes: the mobile Internet has become an irreversible trend, while the mobile network is multimedia-oriented. However, the current mobile and wireless network can hardly be reached because of many intractable challenges, which have deep roots in the inherent design of mobile communications and the Internet. Thus, making some adjustments simply cannot solve these problems. On the other hand, the structure of a complete list is clean, not compatible with existing networks, is not a process either because operators or suppliers will not take risks so they clearly understand revenue and cost, which is almost impossible.

X. RESEARCH ISSUES

This paper identify some important research issues that need to be addressed to provide innovative WSN virtualization solutions.

a) Advanced Node-level Virtualization: Node-level virtualization has attracted considerable attention from the research community. In many ways, it is provided as part of the sensor OS. Multi-threaded OSs and applicationspecific virtual machines (VM), working on top of an OS, can support the concurrent execution of application tasks. As the trend moves towards more powerful IP-WSNs, more efforts are required to virtualize the individual components of sensor nodes, such as MAC and routing layers.

b) Network-level Virtualization: Not much work has been done in the area of network-level virtualization to support multiple applications over a deployed WSN, hence there is a tremendous opportunity to make valuable contributions. Overlay networks can provide an efficient solution as they are robust and can work efficiently without changes in the underlying network. As multiple overlay may need to co-exist, preventing them from interacting with each other in a harmful way remains a challenge. Cluster-based approaches have traditionally been used in WSN's for improving routing, energy-efficiency, management and security. Managing clusters in a virtualized WSN is not trivial, however, cluster-based solutions can be quite useful in scenarios where a deployed WSN is used to monitor dynamic events. These solutions can also be helpful in mobile WSNs, Robotic and Vehicular Ad hoc Networks

c) Discovery and Publication: The discovery and publication of resources and services in WSN is already a challenge, but it becomes even more sophisticated in virtualized WSNs. For example, it will be interesting to find out if there are certain types of relationships between physical and virtual sensors and if they can be exploited to provide quick publication and discovery solutions. Since virtual sensors are created on demand and destroyed when they are no longer needed, their publication and discovery must be efficient, robust, scalable and manageable. The discovery and publication of resources and services on the fly are very important functions, especially in the context of IoT.

d) Service Composition: Service composition using virtual sensor nodes is another important research challenge. In our view, future WSN deployments will involve multiple actors, such as WSN providers, virtual sensor providers, service providers, third party application/services providers and end-user applications.

XI. REFERENCES

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