A Proposed Ideal Network Design for Collaborative Workspace Businesses

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ABSTRACT

Collaborative workspace businesses are now a trend in developing countries such as the Philippines. Coworking space is a business service provision model that lets individuals and teams work independently or collaboratively in a shared office space. In the Philippines, there is a big trend in starting a coworking space business. The millennial generation, which comprises the bulk of the metropolitan sector, is the main reason behind coworking space growth. Computer networking can contribute to the improvement of sales and customer retention and service of coworking space businesses. Implementing managed network services will reduce operational, maintenance, service, hardware, software, and infrastructure costs. Managed network services can enable the coworking space business to focus on its primary business goals

In this paper, an ideal network design for collaborative workspace businesses was developed. The building floor layout is essential for the managed networks' design. It was determined that a two-story floor layout is ideal for the company and for implementing the proposed network design. Analysis of ideal network management was proposed in administration, operation, security, and maintenance. Detailed logical and physical network designs with ideal network equipment and technologies were created to improve the coworking space business's services by implementing managed networks.

Key words: Coworking Space, Network Management, Logical Design, Physical Design, Managed Networks

I. INTRODUCTION

Collaborative workspace businesses are now a trend in developing countries such as the Philippines. Coworking space is a business service provision model that lets individuals and teams work independently or collaboratively in a shared office space [1]. Even though it's a shared office space, a coworking space provides an environment that simulates the environment found in an established venture. The coworking business model of leasing offices has been exponentially growing. It means that firms and freelancers abandon their permanent office willingness and share knowledge and information independently. In this regard, coworking allows individuals from various backgrounds to work unitedly in a common space. Unlike other office spaces, the coworking space business model is a bit different. A coworking space is a startup that has disrupted the existing market scenario [2]. It makes money in rents and has widened its branches to other revenue sources like partnerships and memberships.

In the Philippines, there is a large trend in starting a coworking space business. The millennial generation, who comprise the bulk of the metropolitan sector, is the main reason behind coworking space growth. Coworking provides an alternative work environment that is conducive to work without the rigidity of a traditional office. It is observed that the demand for coworking spaces in Metro Manila is increasing from freelancers, entrepreneurs, startups, small corporations, IT firms, BPOs, and even multinational corporations [3]. Coworking spaces increase productivity, foster collaboration, cooperation, innovation, creativity, and a community spirit by exposing people to new business concepts and encouraging exchanging ideas [4].

Computer networking can improve sales and customer retention and service of coworking space businesses [5]. Implementing managed network services will reduce operational, maintenance, service, hardware, software, and infrastructure costs. Managed network services can enable the coworking space business to focus on their primary business goals. With upgraded network services have the infrastructure in place to support quicker implementations and upgrades [6]. The team strongly recommends implementing managed networks and upgraded network equipment in coworking space businesses to further improve the services and increase sales.

Salient Features of a Collaborative Workspace Businesses

Generally speaking, the definition of coworking is when people assemble in a neutral space to work independently on different projects or in groups on the same projects. It's different from a typical office workspace because the people in a coworking environment generally aren't working for the same company.

These are the assumed salient features of a collaborative workspace business:

- Coworking spaces offer the same amenities you would find in a traditional office, along with a lot more.
- A major differentiator is flexibility since you don't need to sign a long-term lease in a coworking space.
- Every coworking space will always have basics like WiFi, printers, usually some type of conference room.
- It usually offers tea, coffee, and snacks available.
- The aesthetic of the space is different from the regular office. It is more of a homey feels rather than a typical office space.
- These shared workspaces offer a suite of office-like amenities such as hot-desks, private meeting rooms, kitchens, coffee, and more.

Physical Assumptions
- The coworking space business will be ideal in a two-storey building in a strategic location of the city.
- Floor area: 80-100 sq meters per Floor.
- Lobby and counter, two long tables, two small conference room (with tv each), one large conference room (with tv each), lobby with sofa and table
- Ten cubicles with an ethernet cable
- One comfort room

Project Objectives

This project's main objective is to develop an ideal network design for a collaborative working space business. This project will design a logical and physical network framework for the company. This project will also analyze network management in consideration of the logical and physical design for coworking space businesses.

II. METHODOLOGY

Project Benefits

As a business owner, profitability may be one of those things that are constantly on your mind. The benefits of hosted and managed network services have made the service necessary to remain competitive at the enterprise level. Here are the specific benefits:

- Control Operating Costs of Entire IT Network

Implementing managed network services will reduce operational, maintenance, service, hardware, software, and infrastructure costs.

- Proactive Network Maintenance and Issue Prevention

Managed network services can enable the coworking space business to focus on their primary business goals. With upgraded network services, have the infrastructure in place to support quicker implementations and upgrades.

- Enhanced Network Security

Managed network services provide enhanced security for the entire voice and data network. In this policy-secured

configuration, all transactions, business-critical applications, and data are kept safe and *secure.*

- Enables a High Level of Network Availability

It is important to consider the level of network availability required for streaming, voice, and data access, which are the customers' basic needs in a coworking space business.

- Maximized Performance and Increased Productivity

Through a comprehensive managed network service solution, the business can cater to the customers' needs with a fast internet connection with less lag time and increase the server's productivity in monitoring.

- Improved Quality of Service (QoS)

Other benefits enterprises can experience with the right managed network services company include: improved voice quality, enhanced call routing, and better network management from built-in Quality of Service (QoS).

Proposed Capital and Operating Expenditures

Table 1. Capital and Operating Requirements Summary

Capital Expenditures	
Particulars	**Estimated Cost**
Network equipments (hardware)	460,000.00
Storage	140,000.00
Installation and Delivery	30,000.00
Office Supplies	15,000.00
Office Peripherals	100,000.00
Cabinet Enclosure	10,000.00
Total Capital Expenditures	**755,000.00**
Operating Expenditures	
Subscription and Communication Expenses	95,000.00/year
Electricity Expense	120,000.00/year
Salaries and Wages	480,000.00/year
Training	20,000.00
Total Operating Expenditures	**715,000.00**
TOTAL CAPITAL AND OPERATING EXPENDITURES FOR THE FIRST YEAR OF IMPLEMENTATION	**1,470,000.00**

Network Management

Network management is defined as essentially the process of setting up, administering, and troubleshooting a network, whether for home or business purposes [1]. This management's main purpose is to ensure that the IT side is set up in a resilient, sensible way, which can minimize disruptions, ensure high performance, and help avoid security issues. Moreover, the International Organization for Standardization (ISO) network management model defines five main areas of network management: network administration, network operation, network maintenance, network provisioning, and network security. These five areas should be part of any ideal and effective network management in an organization as shown below.

First and foremost, the organization shall hire a network administrator responsible for overseeing the network efficiency and effectiveness. The five areas mentioned above are his tasks and main concerns. On top of that, it is his responsibility to design and plan the network, set up and maintain the network, and expand it. Figure 1 shows the five areas of network management as managed by the network administrator.
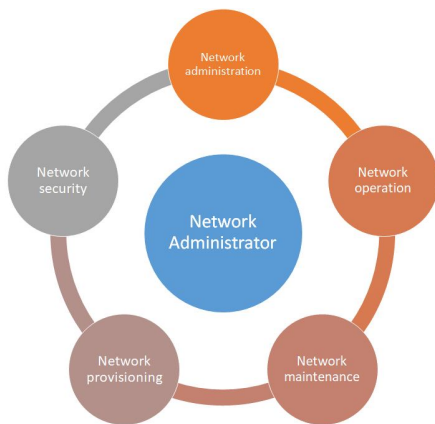

Fig 1. Network Management

III. RESULTS AND DISCUSSION

Analysis of ideal network management for the company

As mentioned in the methodology, there are five network management areas, namely: Network Administration, Network Operation, Network Maintenance, Network Provisioning, and Network Security.

Network Administration

Administration of a network includes keeping an inventory of network resources and equipment used in the organization. Below is the inventory list for the proposed collaborative workspace business.

Table 2. Proposed Network resources and equipment

Network Resources and Equipment	Quantity	Specifications/Descriptions
Workstations	7	These stations are equipped with the latest Office software and multimedia package.
Printers	6	Printers are network, multi-use printers
Server	2	File and Database server
Access Point - Ruckus R310 BoofGround	5	The RUCKUS R310 delivers consistent, reliable 802.11ac wireless networking. The R310 provides an ideal combination of features and performance for smaller environments. Additionally, it supports up to 100 clients per AP.
1u Cat 6 48-port Unshielded Dual IDC Patch Panel c/w rear Wire Manager	1	Dual IDC allows both 110 and krone tools to be used for termination, support both T568A and T568B wiring and gigabit Ethernet application
Ethernet Switch - Juniper EX3300-24T PoE	1	Either 24 or 48 built-in network ports with 10/100/1000BASE-T Gigabit Ethernet connectors (ports labeled 0 through 23 or 0 through 47) Four uplink ports (ports labeled 0 through 3)
Gateway Router with Firewall - Juniper SRX300	1	1-Gbps firewall with 300-Mbps IPsec VPN. This device consolidates security, routing, switching, and WAN connectivity in a small, fanless desktop device ideal for retail-type offices with up to 50 users. (www.juniper.net)

Network Operation and Monitoring

Network operation and monitoring is the most critical function of network management. In this aspect, the network admin must know if everything on the network is operating. Thus it should be monitored continuously. To see things clearly and quickly, the Colab needs to display this data: a network map, report data, alerts, historical information, problem areas, and other useful information using a network operating center (NOC) dashboard. NOC is a centralized location where IT technicians directly support remote monitoring and management (RMM) software efforts.

Network Maintenance and Provisioning

Network maintenance means you must do what it takes to keep a network up and running, and it includes several tasks:

Table 3. Network Maintenance

Tasks	Network Maintenance Schedule	Checking Schedule
Fault Management	Configure the network devices (routers, switches, firewalls, servers, etc.) to capture logging messages and send them to an external server. Whenever an interface goes down, or the CPU goes above 80% utilization	Every Mondays
Configuration Management	Any changes made to the network have to be logged. We will use change management so relevant personnel will be notified of planned network changes. Changes to network devices have to be reported and acknowledged before they are implemented.	Every Mondays
Accounting Management	Charge (guest) users for the wireless network usage, so they'll pay for each 100MB of data or something. It's also commonly used to charge people for long-distance VoIP calls.	Every Mondays
Performance Management	Network performance will be monitored on all LAN and WAN links, so we know when things go wrong. QoS (Quality of Service) will be configured on the appropriate interfaces.	Every Mondays
Security Management	Create a security policy and implement it using firewalls, VPNs, intrusion prevention systems, and AAA (Authorization, Authentication, and Accounting) servers to validate user credentials. Network breaches have to be logged, and an appropriate response has to be made.	Every Mondays

Network Security

The term network security emphasizes monitoring and controlling unauthorized access, misuse, and any unwanted modification in the networking system. The most common authentication process practiced everywhere is assigning an exclusive user ID and password to the user for authentication and accessing the network's resources. These includes Antivirus and Anti-malware Software, Firewalls, Access Controls, and Virtual Private Network (VPN).
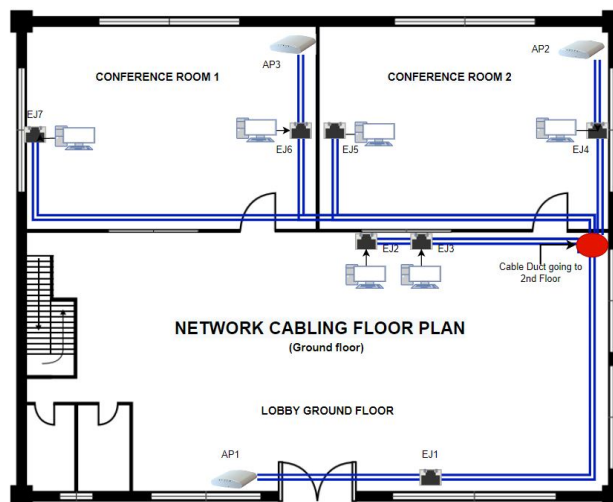
Proposed Cabling Floor Plan

Fig. 2. Cabling floor plan 1st floor

Figure 2 shows the proposed cabling floor plan for the first floor of the business location. The total Cable length is 349m (1145ft), which includes allowance.
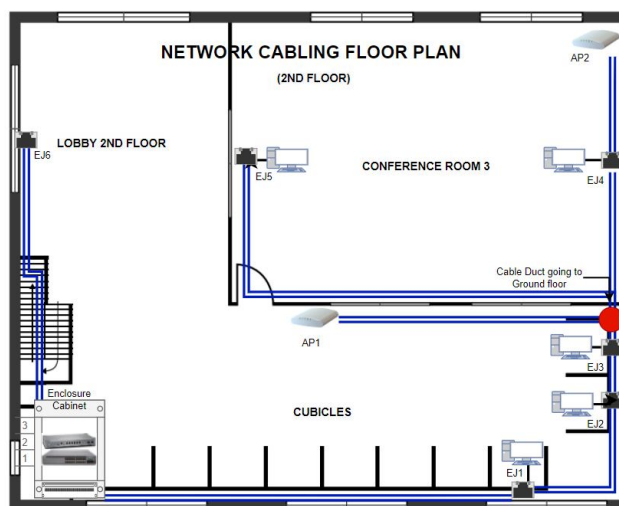

Fig. 3. Cabling floor plan 2nd floor

Figure 2 shows the proposed cabling floor plan for the first floor of the business location. The total Cable length is 205m (673ft), which includes allowance.

Proposed Logical Design

The logical network design comprises segregated networks that are implemented physically using virtual local area networks (VLANs) defined by network switches. A logical network diagram depicts how information in the network flows. In a logical diagram, you'll generally visualize the following elements in your logical network topology. Figure 4 shows the logical network design for coworking space businesses.
The enclosure cabinet located on 2nd Floor which house the Junifer SRX300 Router which serves as the Gateway(ISP) and firewall and the second equipment is the Junifer EX3300-24T which provide the DHCP and VLAN's, the third equipment is

the Database Server for the Billing System. Last essential equipment is the Patch Panel.

Conference room one is intended for clients who want to have a bigger space where they can conduct meetings or have a coworking environment, so the design is one(1) Access Point Ruckus310 for WiFi Connections will be installed and directly connected to the Juniper EX3300 ethernet switch located on the 2nd Floor and two(2) wall mount ethernet connections for PC's which are also directly connected to Juniper EX3300. There is no need to provide a power supply to the RUCKUS310 since it is designed as a POE(Power over Ethernet) device. The conference room2, which is located on the Ground floor, will have the same configuration as Conferences Room1 and Room2. The conference room3, which is located on the 2nd Floor, will have the same configuration as Conference Room1 and Room2 but much closer to the enclosure cabinet when it comes to the length of cabling.

The cubicle area, which is located on the 2nd Floor, is intended for the individual client or more who work as individual or groups; the design is one(1) Access Point Ruckus310 for WiFi Connections will be installed and directly connected to the Juniper EX3300 ethernet switch located at the same Floor and three(3) wall mount ethernet connections for PC's which are also directly connected to Juniper EX3300. The lobby area, which is located on the ground floor, will have the same configuration as the Cubicle area, except there will be two(2) wall mount ethernet connections for PCs. The lobby area, which is located on the ground floor, will have the same configuration as the Lobby area Ground floor, except there is no wall mount ethernet connections.
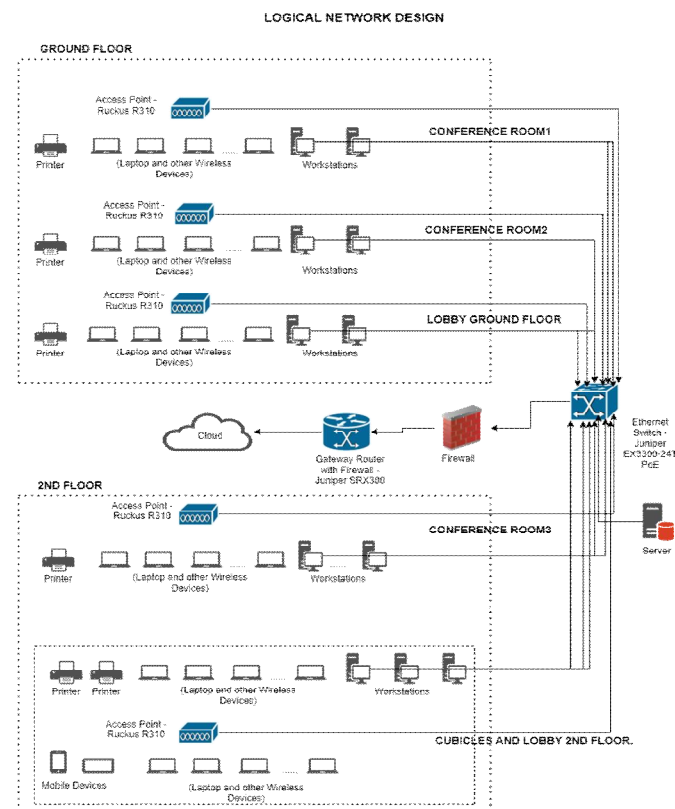

Figure 4 Proposed Logical Network Design for Coworking Space Business

Implementation

The main objective of this project is to propose ideal network management and design for coworking space businesses. With this, the team proposed network management techniques and approaches and also created an intricate physical and logical network design to be implemented in the company.

If a business adapts our ideal network design, these are the implementation description:

The office floor layout of the business must be similar to the proposal with a few customizations. The capital and operating requirements must be followed with few modifications in the hardware, storage, network requirements, subscription and communication expenses, maintenance and administration support, and training expenses. Network management analysis and solutions will be followed. The physical and logical design must be followed with a few modifications. The organization can follow 3-month planning and implementation.

IV. CONCLUSIONS

Collaborative workspace businesses are now a trend in developing countries such as the Philippines. Coworking space is a business service provision model that lets individuals and teams work independently or collaboratively in a shared office space. Implementing managed network services will reduce operational, maintenance, service, hardware, software, and infrastructure costs. Managed network services can enable the coworking space business to focus on its primary business goals.

This paper proposes an ideal logical and physical network design for coworking space businesses with network management analysis and financial components. If an enterprise adapts this proposal, there will be greater returns in customer retention, income, and sustainability. As a recommendation also, it would be best if sentiments analysis will be done from social media posts similar to the study of Buadaco et al where they scrape a micro blog social media platform to analyze the sentiments and emotions on land transport infrastructure in the Philippines [7].

V. ACKNOWLEDGMENTS

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