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CT264 – Fundamentals of Defensive Security

Final Project Part 1 – Creating a Business Network

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Overview

The business created for this project will be a small Veterinary clinic that is completely fictional but based on real companies such as the veterinary clinics in Indiana.

Before considering any planning, it's important to note the needs of this business to ensure a secure network design. A standard small/medium-sized veterinary office has multiple positions and departments, such as Reception, Examination, Laboratory, Radiology, Pharmacy, (sometimes) Dentistry, Critical Care, and (sometimes) Kenneling. It's important to note that Veterinarians are healthcare specialists, which is important for the integrity of the secure design of this network as there are confidential files such as patient records and client information.

Company Description

For this scenario, a small animal Veterinary clinic named "Wet Noses Animal Hospital" resides in a small town in Indiana and offers pet care services such as examination, emergency care, and an overnight kennel to hold pets/animals. The stated mission of this clinic is: "Here at Wet Noses Animal Hospital, we make it our goal to offer safe and affordable care for any small pet and to foster caring relationships for pet owners near and far."

Since this clinic consists of multiple sects within the examination, emergency care, and an overnight kennel, each position for each sect will be highlighted. Examination and emergency care consist of at least: a veterinarian – who is the leading staff for the clinic, a veterinarian assistant – who works to assist with examinations and pet owners under vet supervision, and a veterinarian technician – who works with medications, diagnostics, lab work, surgery, and other medical procedures. Reception often only contains receptionists to take calls and manage appointments. Laboratory work is covered by vet technicians and vet assistants. An overnight

holding/kennel is usually managed by kennel attendants and assistants who both work to maintain the kennel and the animals being held and a manager who manages the entire kennel and staff. The entire clinic is managed by a veterinary practice manager, who works on this with the leading veterinarian(s). Other staff such as veterinary volunteers or student staff should also be considered for this design. Student staff often work similarly to vet assistants, but voluntary staff often work with basic things such as feeding and maintaining some of the animals and the office.

When designing this clinic, it's important to keep in mind that there is a 50-employee headcount, and this is a small-town vet clinic. Using the American Veterinary Medical Association's article "Just One Thing: Getting to the Right Staffing Ratio", it's stated that on average, 2.7 technicians/assistants should be hired per full-time veterinarian, which will be rounded up to three. It would be safe to have 5 veterinarians in the clinic as it is an emergency vet on top of providing examination services, which means that there would be 15 veterinary assistants/technicians and 20 total staff for emergency/examination. Having 6 receptionists for 3 receptionist seats on staff will account for shift rotations, along with 1 practice manager. There will also be 1 kennel manager, and according to the National Animal Care and Control Association's article "Determining Kennel Staffing Needs", there should be at least one kennel staff per 10 pets. If there are about 100 kennels, it would be safe to hire 10 kennel attendants and 5 assistants, making 16 total kennel staff. This totals 43 main staff, with the rest of the 7 being part-time/student staff or volunteers.

Regulatory Compliance

Since Veterinary clinics are a healthcare profession, regulatory compliance is especially important to highlight here. According to the US Department of Agriculture (USDA) and the

National Veterinary Accreditation Program (NVAP) in the US, all accredited veterinarians must abide by the Animal Health Protection Act (AHPA). These standards are also highlighted in CFR 160 and 161; examples include 161.4 (j) which is "Failing to ensure the security and proper use of official certificates, reports, tags, and similar items or documents issued to you. Allowing an unauthorized person such as an owner or a broker to issue official certificates is a violation." Understanding these standards is going to be important when securing this network topology.

IT Planning

IT Services

Some services to consider for this business would be Active Directory (AD) to ensure that the correct authorized users have access to information. An Electronic Health Record (EHS) is also useful to create and maintain patient data in the database for easy access and sharing among authorized employees. Having a system to store pet owner data and appointment scheduling for the clinic/kennel also needs to be considered, along with billing and invoicing. If there are pharmaceutical services, which there usually are, there also needs to be a service to keep inventory. If there's a need for a website for things like booking (which can also be done over the phone) a DNS is useful for that, along with accessing communications and other websites. A DHCP will also help with secure device communication on the network.

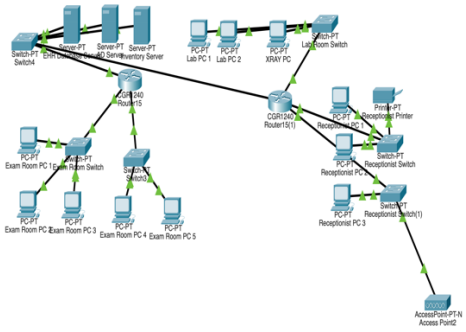
Patient info is confidential, so all devices on this network will be in-office only. Since this is a small clinic, around 5 exam rooms would be needed with one workstation computer per room. If there are 3 receptionist seats, there should be 1 workstation per seat along with an office printer for things like paperwork and billing. There should also be 1 workstation for the X-Ray, with 2 workstations in the lab room. This will total the workstations to 11.

For the services mentioned earlier, it's important to ensure that they're each hosted on the most practical server. Active Directory can be hosted on a Windows machine as it functions as a domain controller for all devices on the network. There will also be an EHS server; one option is OpenEMR which is a distro server that runs on Linux and is completely customizable to suit the database needs. Another Linux distro server that can be used is GLPI, which is used to manage inventory and is also completely customizable. Billing and invoicing can be managed via software that can be run on a Windows machine. All workstations will also run Windows. This would bring the total amount of servers to 3 or 4.

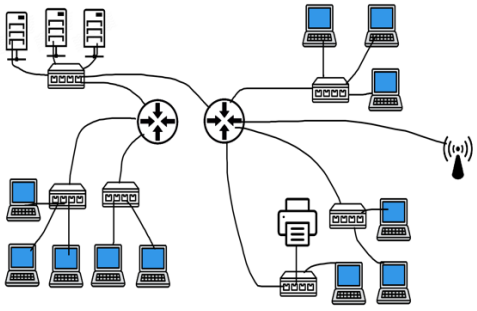
Since the topology of this network is smaller, the number of switches and routers will be fewer, with only one wireless access point being necessary for any external device connection (such as a client/visitor device) – that will be placed near the waiting room. Two switches would be implemented between all the receptionist devices, another two would be put between the exam room workstations, one would be placed for the servers, and the last one would be put between the x-ray and lab workstations. There will be a router between these workstations, the servers, and then another router between the receptionist desk and the lab/x-ray room devices.

The Network Design

Logical:

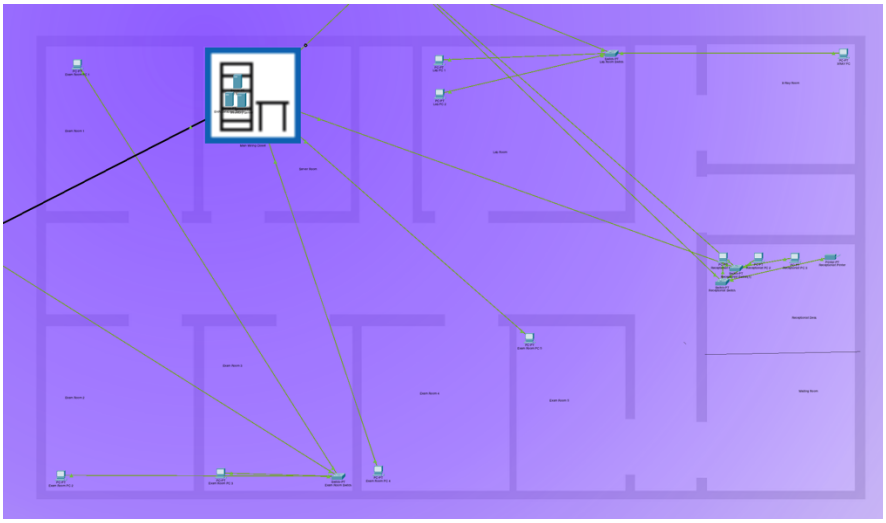


Physical:



IPv4 would be the better-addressing scheme for this design as this network is small and private; it's also easier to understand and implement/configure. Since this is a private network, it would be necessary to use addressing scheming such as 172.16.0.0/12. Subnetting wouldn't be necessary as all the workstations on here would essentially be running on the same network, but if this business expanded in the future or more devices were added onto the network, this could be useful to implement later on.

The Network Topology



The Packet Tracer file will also be attached for easier viewing.

Security Planning

Security Goals

Some goals to consider while keeping Confidentiality, Integrity, and Availability in mind are ensuring that the correct/authorized people can access the information that they need while keeping unauthorized people out, ensuring that all devices connected to the clinic network (both internal and external) have a safe and strong connection without trespassing on any private

connections, and ensuring all stored data is easy to handle for authorized employees but nearly impossible to access externally. Most of this can be accomplished by configuring the network switches, wireless access points, and routers correctly, along with configuring the EHS to be secure when storing and communicating with data. Other measures like proper employee training and strong password policies will also ensure security.

Security Plans

New things to consider will be plans in the case of an abnormal event: Business Continuity, Disaster Recovery, and Security Policies will all need to be considered for this setup to truly be effective for this business.

Sources Cited

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