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Computer Networking

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Mini-Research Project

For this project, we were required to interview a friend. I chose a good friend of mine that doesn't have much technical experience aside from Microsoft Office. My discussion with my friends with was very informal, hearing another person opinion on the network that doesn’t have a large technical background. Throughout the interview, the interviewee stressed the unreliability of the campus network, as well as how he feels neglected in his residential hall “since my issue isn’t on campus there overlooked”. From his point of view; the “hotspots on campus” are said to be Memorial Hall, The Library & The Martin Luther King building. Off campus is a different case, according to the information I gathered, the yard’s network speeds are “abysmal”. Student’s in different building experience the network differently. Reports from residents of building two in the University Courtyards report that overall their connection is unstable at certain points in the days. Limited on where in the apartment they would attempt to complete assignments, some students would have stationed either in their room if the network permits’ them or in their common area. With the delay, I’ve received some report that some students would rather use there LTE “hotspot” or go to the library to complete time assignments.

These three questions I used to format the problem I would like to address:

1. Where do you the complete majority of your assignments?

• This question allowed me to analyze where the student preference on where they rather are studious.

2. If the Library, why there? If your dormitory, do you feel the network affects your productivity?

• This is my follow up question, which gives more of an understanding of the student and where the interview may go. The follow-up question about the network I generally get the same answers: “DSU Wifi is trash” or “It unreliable”.

• Purpose of this question is to figure out if they're affected by network issue to see if these questions are something relatable to them.

3. Do you feel like DSU’s network have peak and down times? Certain times of the day where the network is slower?

• This question opens the opportunity to allow the interviewee to discuss where and when they had to deal with network issues.

These questions allowed me to develop my problem I would like to address: DSU’s network is widely spread among the university, located on campus but also accessible off campus at two different locations such as the University Court Yards and Living Learning Commons. Student’s with off-campus housing feel as if their network needs/requirements that their paying for aren’t’ being met.

During the duration of this experiment, I will utilize Wireshark and its multiple functionalities as well as Excel. I will be using Wireshark to measure different packets that are traveling across the network, checking the performance of the network looking for delays between packets, duplicate Acks, examining all protocols and packets to see if they interfere with network’s performance. I will be traveling all over DSU’s campus visiting multiple building on campus such as: The Martin Luther King building, The Administration building, The Oscar Building, The Bank of America Building, The Library, The Science Center, The University Village, Everes Hall, Jenkins Hall, Conwell Hall and The Living Learning Commons. I choose these locations because aside from two they’re all on campus, plus some building has facility in them so I would like to see their connection compared to students. I will collect these packets at a different time of the day, Morning 9am-11am, Afternoon 1pm-5pm, Night 8pm-12am. I’m focusing on different time frames to see abnormal changes in the network when do they occur. The steps I will take to Analyze this issue is utilizing Wireshark’s different tools such as Expert Information Log, I/0 Graphs, also examine protocols to see if they interfere with network performance and Create Network Baselines based on different time frames.

The three bar graphs are Network Baselines on separated by different times of the day, measuring the total amount of Bytes accumulated during a 600 second times interval throughout its respected time frame. Within one 600 second interval Campus during the evening accumulated the most intervals, but overall Byte accumulated will be Campus during the afternoon as you can see. Graphs with the name “Dorm-Packets” refer to Afternoon traffic collected from Dormitories, “Campus-Packets” refer to Afternoon traffic collected on various buildings on campus and “Morning-Packets” refer to packets collected on Campus during the Morning. Looking at the line graphs you can see “Dorm-Packets” has the largest delay caused by various things: mDNS (multicast Domain Name System) This protocol resolves the hostname to IP address within small networks that don’t include a local name server. DNS retransmitted responses and failed query attempts come to a total of 3,797 failed attempts on the network. TCP (Transmission Control Protocol) Where it enables two hosts to establish a connection and exchange data. TCP reset its connection with the host, sent duplicate ACK’s, out of order segments and retransmitted packets come to a total of 7,143 failed attempts on the network. Another thing that can affect a network is but doesn’t have a large impact here ARP. Address resolution protocol used to map IP network addressed to hardware. Delays can be caused here when unable to assign an IP address here we only have a total of 176. Internet Protocol Version4 (IPv4) is the fourth version of Internet Protocol. During my search, I encounter multiple “Time to live” notes, depending on how much it may not cause any effect to the network but in this search, I encounter 4921 different warnings. Aside from all the errors or warning collected I have a few completion packets meaning that a successful connection was established, mainly collected TCP’s but we have a few webpage completions using HTTP. Hyper Text Transfer Protocol is used by the world web to define and formatted actions Web servers and Browser should take. In totals there are only a total 270 packets, so we can guess that there isn’t much studying going on but there is a lot of streaming being done on the network at this time.

One way we can go forward toward addressing this issue is possibly looking into a Content Delivery Network. When a CDN is used all content will be delivered by the closest Point of Preference (POP) from the geographical location of the request. When a CDN is not used all content will be delivered by a single server no matter the geographical location of the request. This means that if an origin server is located in Switzerland users from both Australia and Canada will receive content from the same single location. Increased performance is by far one of the most important benefits from implementing a CDN. Content is cached in POPs all around the world bringing content closer to the user. The shorter distance will not only reduce latency but also minimize packet loss. Offloading traffic to a CDN will make it easier to manage traffic spikes and scale up or down within a short amount of time. This will result in less load on an origin server and help minimize any downtime.

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