

**Cybersecurity Internship Course Final Paper at Keesler AFB**

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81st TRW/338th TRS/VED "Dark Knights"

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## **Cybersecurity Internship Course Final Paper at Keesler AFB**

### **1.0 Introduction**

I interned with the United States Air Force (USAF) under their Premier College Internship Program (PCIP) to gain hands-on experience with the Air Force and DOD. Unlike other Federal organizations, most agencies, and units under the DOD work in conjunction with the armed services and their uniformed military members. The location I interned was at Keesler Air Force Base (AFB) on the Mississippi Gulf Coast for the 338th Training Squadron (338th TRS/VED) as an Information Technology Specialist/Student. There, I performed work as a technical teaching assistant shadowing the technical instructors and students (USAF Airmen, prior servicemembers, officers, and servicemembers from the other armed services) throughout the course. I was joined by three other PCIP interns who were also IT specialists/Students performing technical teaching assistance duties. My time at Keesler for the 338th was an unexpected but unique experience. I achieved all my objectives, though I intended to complete them differently. Instead, I shadowed and learned from the Network Systems Operations Course that teaches Airmen to become Cyber Transports Specialists – the USAF’s network engineers, administrators, and operators.

Over the course of my 12 weeks at Keesler, I shadowed the Block 2 class of Team 2, monitored the testing centers of Team 1 and 2, reviewed the technical training materials of the Network Systems Operations Course, specifically in Block 2 – Basic IP and Subnetting – and collaborated with the other interns on a set of videos to aid students in the critical concepts of IP subnetting and binary conversions. For my onboarding, I was sent to Hill AFB in Utah for a week of Temporary Duty (TDY) for the PCIP Symposium, run by the Air Force Civilian Service (AFCS). There, I interfaced with my Career Field Team – Cyberspace and Information Technology (Cyber/IT), met other fellow PCIs (shorthand for interns in USAF’s PCIP), toured Hill AFB, and learned all about the Palace Acquire program (PAQ), the Air Force’s post-graduate internship for civilians.

### **1.1 Objectives for Internship**

My objectives for the internship are broken down along with personal goals coming into the internship. Both objectives are a snapshot of my expectations before entering the internship and after I started. Critical to my personal goals was a strong desire to apply my skills, knowledge, and abilities gained from other internships and at ODU to relevant work.

#### ***1.1.a Personal Goals Coming into the Internship***

My four personal learning outcomes for the internship were to:

1. Gain relevant experience working for the USAF as one of the armed service branches as a civilian.
2. Apply my knowledge, skills, and abilities (KSAs) to real-world Cybersecurity and Information Technology applications.
3. Learn more about the Palace Acquire program and advance under the PAQ program if desired.
4. As part of the CyberCorps®: Scholarship for Service (SFS) and ODU’s Cyber LeADERS program [1]:
  - a. Complete my Summer internship requirements (including for my degree through this course).
  - b. Find a post-graduate commitment suitable for my goals and the SFS program.

## 2.0 Introductions and Onboarding at Keesler AFB

My internship started with a formal onboarding to the USAF. The goal of the onboarding was to familiarize me (and others) with the Federal service and Keesler's place in it, including rules, regulations, and other requirements to become successful. I also had a more informative onboarding during the USAF's PCIP Symposium at Hill Air Force Base a few weeks after my start. I also familiarized myself with the 338th TRS/VED and 81st Training Wing's (TRW) mission and history and used that to understand how I potentially fit into their goals.

### 2.1 Brief History of Organizations

#### 2.1.a Keesler AFB and the 81st Training Wing's Mission

The 81st Training Wing (81st TRW) is the USAF 2<sup>nd</sup> Air Force unit hosted at Keesler Air Force Base in Biloxi, Mississippi. The 81st TRW and Keesler are the largest employer on the Mississippi Gulf Coast, which trains over 28,000 students annually [2]. In addition, the 81st:

*"Acts as a lead Joint Training Installation, instructing not only Air Force but Army, Navy, Marine Corps, Coast Guard, and civilian federal agency personnel... in over 160 career field(s)... not only to technically train warfighters but to develop and inspire them" [2].*

The 81st mission, vision, and priorities are to "Train, develop, and deliver focused, driven warriors" (mission), cultivate a culture of excellence in technical training (vision), and through people, installation (modernized infrastructure, quality, and safe/secure housing), community, and mission produce high-quality warfighters (Airmen, etc.) capable of tackling present and future high-end threats [3]. The 81st's motto is "Be focused, be driven, be warriors" [3]. Their mission is to prepare the next generation of Airmen and the warfighter for the technical challenges of now and tomorrow.

#### 2.1.b 338th TRS/VED "Dark Knights" Mission

The 338th Training Squadron "Dark Knights" is a training unit under the 81st TRW responsible for ground electronic technical training in the Air Force, once encompassing computer network systems operations (NSO), radio communications (RF transmissions), satellite, ground radar, meteorological navigation, and visual imagery and intrusion detection systems training [4]. Today, the 338th TRS/VED focuses primarily on computer networks through the Network Systems Operations (formerly Cyber Transports Systems) and RF transmission courses [5,6]. Currently, the 338th TRS is focusing on the Air Force's *Accelerate Change or Lose* strategic directive by partnering with the University of Central Florida to create gamified material that permits the squadron to modernize education and training in a cost-effective manner [6,7].

### 2.2 Onboarding Experience at the PCIP Symposium

The PCIP Symposium was the most informative and transformative experience of the internship. There were two symposiums, one at Wright-Patterson AFB, OH, and one at Hill AFB, UT. As a week-long symposium, they aimed to inform and inspire us about the world of civil service in the Air Force. There we connected with our peers, performed team-building exercises, socially networked, and learned about the benefits and challenges of the U.S. Air Force and our future roles. The symposium at both locations was broken up over three days. Each day covered a different theme at the symposium. I was required to go only to the symposium at Hill AFB, but both locations covered the same things. At the symposium, I learned about the Air Force, its mission, the goal of PCIP, and the Air Force Civilian Service (AFCS), connected with my peers, and networked with professionals and students alike. Ultimately, I learned more about the Palace Acquire program (PAQ) and became interested in pursuing it as it would fulfill my post-graduate commitments at ODU.

### **3.0 Experience with Management Environment**

My overall experience with the PCI program and my organization's management has been positive. My Career Field Team manages the general aspect of PCIP and reviews performance, including acceptance into the PAQ program, and has been very informative and responsive to my inquiries. My supervisor and local chain of command at Keesler have benefitted my success at the internship, despite initial confusion and obstacles to achieving my internship.

#### **3.1 Experience with PCIP Career Field Team**

My career field team, Cyber/IT, is the primary group within the USAF/AFCS that I interfaced with throughout the internship. As the point of contact (POC), they served as the primary source of information about the internship and PAQ. They coordinated all PCIs under their team for the Symposiums and selection into the PAQ program, including handling all situations to ensure each PCI was given a good chance of success. The Cyberspace and Information Technology Career Field Team is responsible for all Information Technology Specialists/Students, covering computer engineering, network specialists, security specialists, data managers, and cybersecurity [8]. The career field team was my first official contact within the Air Force, contacting me about this internship and informing me of the PAQ program's benefits. From them, I learned how being a PCI would prepare me for a future civilian career in the Air Force. They are also helping me find something closer to what I want to do for the PAQ program, as being a technical teaching assistant is different from what I plan on becoming.

#### **3.2 Experience with 338th TRS/VED Management**

My overall experience with my local management at Keesler AFB has been mixed in expectations and results but has been equally positive. First, coming into the internship, there needed to be more communication and understanding about how I would be utilized as an intern. It became apparent that this was their first foray into the PCI program, and never had interns before. We would not be doing "traditional" Cyber/IT work, hence the role of a technical teaching assistant.

The management leadership of the 338th TRS initially envisioned interns (in this situation, myself and the three other interns) going through the instructor course, which would have taken about six weeks to complete and act as Instructors. However, their plans changed, as that would have essentially used up half of our 12-week internship and been a potential waste of resources and time, both for the squadron and the interns. From there, we became teaching assistants who could assist student teaching and learning but were forbidden to instruct for professional and regulatory purposes.

Therefore, at least initially, my local management leadership proved they needed to learn what they were doing and were essentially operating under a learning curve. That is no problem, as they have improved considerably at making our time at Keesler a positive experience. The only primary issue remains their general need for more understanding in transitioning myself and the other interns successfully and smoothly into PAQ. So far, they are willing to learn and make it work rather than do what is easiest for them and make it harder on us, the interns.

##### ***3.2.a Supervisor Effectiveness***

My supervisor (who initially accepted the PCIs and oversaw our activities) was hands-off in managing our time. He handed out tasks and proposed assignments/projects for us to complete but allowed us leeway to pursue projects we thought would help the squadron. He initially assigned us the Block 2 project but did not specifically ask for it to be done in a certain way, allowing us to pursue it as necessary. When required, he made suggestions to help us alter our plans to accommodate the squadron's needs better. Throughout the internship, he was also straightforward regarding the realities of the internship. He also was open about the squadron's lack of direction and greenness to the PCI Program and the handling of interns. His forthrightness about our

internship has gained my respect and trust from him as he did not sugarcoat the issues facing instructors, the course, and the squadron. This has allowed me to evaluate my potential career opportunities with the squadron and determine that I must remain in the 2210 – Information Technology Specialist job pathway as my instructor was honest about the circumstances of our internship and accepting of our apparent willingness to stay in the field.

#### **4.0 Internship Work Duties, Assignments, and Projects**

Due to the new internship program at the 338th TRS, my expectations and duty plans changed as they progressed, and we pursued our initial project assignment. Critically, our purpose was to learn all about how the 338th taught students within the Network Systems Operations Course to become Cyber Transport Systems specialists. My focus has been primarily on the Block 2 course material with the other PCIs at Keesler.

##### **4.1 Block 2 – IP Basics and Subnetting Class**

Block 2 (Class 2) is the 338th's IP Basics and Subnetting class. In this class, students learn IP fundamentals and Subnetting concepts, which is critical for the Network Systems Operations Course, especially when entering the capstone courses. Our overall project was to review the class materials and learning methods and determine how the material/learning methodology could improve and execute that proposed improvement. Initially, we (the other PCIs and I) reviewed the material and made a series of proposals to change course materials. However, upon submission of such proposals, it became clear that we needed a better form of improvement on the course materials. This is where the Block 2 IP Subnetting and supplementary video aspect of the project came to be. We also sat in the classroom and assisted students in basic subnetting and IP-related questions about their work and how to do it successfully.

##### **4.1.a Assisting the students of Block 2**

Our duty in Block 2 was to learn how students proceeded through the course by examining their issues in the block. As Block 2 was the most critical aspect of the Network Systems Operations Course, a student's understanding of the material and concepts was essential to passing the entire course. The class itself served as a basic litmus test of student academic capabilities. If the student, even after every form of viable assistance, failed to understand or did not make efforts to understand the material properly, this was the class that would help the student and the course instructors make necessary course corrections.

We were authorized to aid the students with limited capabilities. This included answering basic questions and assisting them in learning how to perform IP subnetting correctly. Over my time at Block 2, I assisted students in understanding of how-to subnet by host requirements (the number of computers/systems on a given network) or by subnet (the number of networks needed by the organization) and how to discern subnets and hosts using binary, as well as some necessary knowledge of binary conversion and calculations to help them efficiently perform subnetting.

##### **4.1.b Basics Subnetting and Binary Videos Project**

To execute the filming of the videos, we utilized Keesler's media center, which had all the resources and support necessary to support our activities. We then wrote the script to support the video and keep the videos organized and relevant (Appendix B.1). The script had to include as much as possible to inform students and teach them the basics so they could operate on their own. For IP basics, we discussed subnetting IP addresses based on host requirements, the number of subnet requirements, and how to perform pertinent binary conversions to devise subnets by binary, find the subnet/network address and broadcast address of a subnet. We also covered binary conversion from binary to decimal and decimal to binary to teach students how to understand binary and how it relates to decimal. It was done to show them the connection in subnetting IPv4 addresses represented in dotted decimal notation (DDN) done with binary.

## 4.2 Monitoring and Administrating Exams

My other duties included monitoring the exam room and administrating tests. This means logging them into the test to begin the examination. Once logged in, students must finish the tests within the time limit and only remain in the room for a short time due to limited seating availability and to prevent cheating. Students are required to follow a set of procedures when entering and taking exams:

1. Students enter the exam room only when there is seating available.
  - a. Students are forbidden from remaining in the exam room unless they are moving from one block to the next (completed one class, going to another) and therefore report to the lead instructor at the exam room for orders.
  - b. They are forbidden from bringing any electronics into the exam room. If they are discovered with any electronic device not sanctioned for use in the exam room, students receive an automatic failure, and the discrepancy is reported.
2. They log in to the Learning Management System (LMS) using their account information to access the test they must take.
  - a. Under no circumstances can they write down notes for the test until the exam administrator logs them into the test.
  - b. Once they select the test, they stand at attention, irrespective of rank, and await the exam administrator to log them in.
3. Once there is confirmation from the instructor/exam admin, they may sit down, take the test, and write notes.
4. When they finish their exam, they log out, push the chair neatly in, and shred any notes they have written.

## 5.0 Application of Knowledge, Skills, and Abilities

The internship required communication skills, abilities to perform administrative work and possession of technical knowledge. As a teaching assistant, the most essential skill is communication, as you are required to communicate with students to give them instructions and answer their questions. Within communications as a skill, the internship required exploring a personal teaching philosophy – a way of effectively communicating with students to convey information. The 338th TRS's mission is to impart essential technical knowledge, skills, and abilities to students in a manner for them to learn and grow. Because we could not teach as we were not rated instructors, training students meant answering technical questions about the topic they were studying.

For technical knowledge, I had some prior internship experience as an IT Intern and knowledge gained from ODU and community college classes, and certification training and obtainment. Applying it to the internship was limited to the Network System Operations course and my CCNA knowledge to the Block 2 class, primarily IP basics, and subnetting. My technical knowledge had to be combined with an effort to communicate effectively with students. This meant I had to know the material the students were being taught and the ability to distill information to students in a manner that enabled them to learn.

I used analogies, allegories, and demonstrations of topics I was assisting them with to show them how a technical concept may relate to something they already know and to help them come to conclusions that enabled them to learn the material correctly. My best advice for IP subnetting and binary was hammering that each successive binary bit from right to left will always be double the last value when it is on, starting from one. Then I would demonstrate it with a visual representation, such as drawing it on the board and showing them the concept. I would ask for their input, letting them learn by seeing the concept I explained to them, see if they understand, then let them attempt to solve the next part of the problem themselves.



## **6.0 Internship Preparation using ODU Curriculum**

Because my job duties are not technical but rather administrative and instructional, it may appear that ODU's curriculum has not prepared me for work as a technical teaching assistant. However, I will argue that it has in the materials and instruction being learned at ODU and how that instruction was executed to then apply to my teaching assistant duties. My projects involve utilizing the technical knowledge and skills learned through ODU's coursework and dissecting the instructional methodology that ODU instructors employed to disseminate said knowledge and skills. By examining the Block 2 IP basics and Subnetting class project, it is clear I am applying what I have learned, but in a manner as a teaching assistant, not as a Cyber/IT professional.

### **6.1 Block 2 Project: Compare and Contrast to ODU Curriculum**

The Block 2 IP basics and Subnetting Class project involved thinking about how we were taught as students in relevant courses at our perspective schools. Their course structure in terms of their blocks is like higher education. Some blocks students start and finish in are not necessarily in series, meaning, e.g., in Block 1, they learn about troubleshooting fundamentals. Next, they learn about IP subnetting before learning about something else before returning to IP subnetting in a class that builds off it. Through observation and feedback from students and instructors, I have noticed that students will forget a lot of information when they reach the capstones and when they graduate. This is not too dissimilar to typical higher education like at ODU, and so ODU in terms of being a student, not what I have learned there, and my observations of others is what is helping thus far in this internship. As an aside, not having a 1:1 match with my desired skillset to utilization is a discouraging aspect described later.

The closest experience I had at ODU that matches Block 2 was the IT 315 Basic Networking and Security course in the Fall semester of 2022. This course taught us about modern networking concepts and technology, including "fundamental concepts, technologies, components and issues related to communications and data networks" [9]. In Keesler's Network Systems Operations Course, students learn the same materials as IT 315. As I observed in my first reflection paper, it is like that of a technical community college course [10]. Of course, students gain hands-on and practical experience, unlike IT 315, which is primarily a lecture-based course with no hands-on exercises.

## **7.0 Objective/Outcome Fulfilment**

The four objectives I outlined as my learning goals were partially achieved. Gaining experience with the USAF was important in how civilians are integrated into the military. I learned that civilians are critical to the overall function of the military, not just the Air Force. Civilians are IT personnel, human resources, accounting, resource managers, auditing, intelligence, chaplain, social services, and more [11] to support the warfighter's overall well-being and fighting capability. Civilians provide oversight and services that maintain the viability of the armed services, allowing them to be focused and driven to fight the battles we cannot as warfighters [3].

The 81st TRW's motto represents the role I am currently in as a teaching assistant. My duties are to ensure the warfighter is ready and capable of performing all tasks, ranging from network operations, cybersecurity, and cyber operations to RF communication maintenance and operations and more. As a training assistant, I monitor the students as they take quizzes and tests, ensuring they are offered a fair, quiet environment to test their knowledge and advance in the Network Systems Operations Course. When they need assistance, I ensure their instructors are notified so they receive the appropriate level of assistance. When possible, I offer limited assistance by listening to their problem with the question and acting as a soundboard, reflecting not the answer but fundamental questions they may be too stressed to remember to ask themselves.

Sitting in the labs, I experienced the technical training materials and instruction students must go through (see Appendix A.1 and A.2) to ensure that I can properly assist them and potentially teach them in the future. The other way I assisted them was with the supplemental video for Block 2, where three other interns and I devised a set of videos that would aid them in IP subnetting and binary conversion (Appendix B.1). This project was significant because students, as noted in my previous reflections, struggled to understand and retain the knowledge in Block 2 [12]. They then would run into problems in the capstone classes because they needed to remember or understand subnetting concepts they forgot or never truly understood.

### **8.0 Highly Motivating Aspects of the Internship**

The most encouraging aspect of my internship was learning to serve alongside the armed services and provide vital essential services. In the Air Force, civilians are called Civilian Airmen, which was reaffirmed at the Hill Symposium because we work shoulder to shoulder with the military Airmen in achieving the same goal: to protect and defend the United States and the Constitution against all threats, foreign and domestic [10]. We both take the same oath and choose to serve our country, one as support and aid, the other the warfighter on the ground and in the skies. This creed and shared goals apply to all civilians and warfighters in all the branches of the U.S. military, be it Air Force, Army, Navy, Marines, Coast Guard, the National Guard, etc.

Another encouraging aspect was partially applying my knowledge and abilities in Computer networking gained through the Cisco Network Academy again as a teaching assistant, mainly helping students understand IP. It was only once before, when I was in the course as a student and lab assistant at the Network Academy, learning and aiding students to the best of my ability in learning and comprehending fundamental network concepts. I am glad to have done it again.

Another encouraging aspect was the Hill Symposium or Premier College Internship Program Symposium. It was inspiring to have the Air Force plan and pay for getting the various PCIs across the continental US to fly to the symposium for three days of education, networking, socializing, and exploring one's career potential in the Air Force. We experienced team-building exercises at the symposium to connect with the AFCS personnel and fellow interns. We got to listen to and ask questions from a panel of experts and former interns who joined the Air Force's PAQ program. I also got to network in a greater capacity than I have ever done up to that point, meeting two senior leaders of Hill's Cybersecurity and Network/Comm management teams and meeting fellow interns who gave me advice and references to follow up on. The PAQ program, which may lead from the PCI program that which I am a part of, is incredibly inspiring and advantageous, given it gives you a full-ride to a Master's, training to become a premier civil servant, and a pay-scale progression in the government of going from GS-7 (year 1) to GS-9 (year-2) then to GS-11 or GS-12 (year 3) with the opportunity to outpace as GS-12 or GS-13 (year 4). This includes becoming fully tenured into the government at the end of the PAQ program, giving protections and job security unheard of in the private sector. That can provide hard workers and honest civil servants the peace of mind to do what is right for the country and not kowtow to a bottom-line other than service before self and the country.

Lastly, despite the internship not being what I initially expected, it has helped me to understand my role as a civilian in the armed services and how I can have a fruitful career working alongside the warfighter. My other experiences never allowed me such an experience, let alone insight. At times I was concerned that I did not have the fundamental aptitude to properly comprehend and empathize with uniformed members of the armed services. Though my parents served in the Air Force, and I was only about 8-9 years old to see my dad serve and retire from the Air Force as Master Sergeant (MSgt), I never really interacted with serving uniformed military members. My reasons for such concern are based on how civilians may not fully comprehend what it means to serve, nor what sacrifices uniformed members make to protect our lives, liberties, and

happiness to preserve the Constitution. This experience with the 338th has affirmed that I can work shoulder-to-shoulder with the military and have an impact on uniformed service members. I can confidently pursue civilian service with any of the armed services with confidence that I can serve effectively.

### **9.0 Highly Discouraging Aspects of the Internship**

The most discouraging aspect of the internship was that it was different from what I initially expected. I originally assumed that I would work under computer network systems operations as my organization was labeled as a communications squadron, which it is. I only knew once the internship began that the 338th TRS/VED was a training squadron structured like a communications squadron whose primary function was to train students in computer network systems and RF communications.

There was also the matter of my job title being an Information Technology Specialist (in which I am an IT Student Intern, not a specialist, but the point remains) but working as a teaching assistant, which means my skillsets are not entirely matched the task. I understand their reasons for hiring IT/Cyber students as interns were to ensure teaching assistants and potential future instructors had the technical abilities to train students in the materials. Nonetheless, I would have preferred to know that is what I was doing if they had communicated that sooner, which they did not.

### **10.0 Challenging Aspects of the Internship**

The internship's most challenging aspect was learning how to work with students. Being of similar age yet as a Civilian Airman and of equivalent ranking to a Senior Airman (E-4) at the GS-04 level or higher meant I was often their superior, not equal [11]. To add to the confusion of my responsibilities, there was the matter of National Guardsman and Prior Service members to consider. Some Guardsman and Prior Service (colliculi known as "Priors") are sometimes equivalent to my ranking or higher. Given my position as a teaching assistant in an educational environment, I had to remember that they had to play by the rules just like everyone else. Most students are Airman First Class (A1Cs).

A1Cs are the most numerous but also the greenest of students. Fresh from training and entering the course, they are new and adjusting to life as an Airman in the Air Force. As a member of the 338th TRS, we must ensure they exemplify the highest levels of quality and professionalism. This means enforcing codes of conduct and identifying and neutralizing cheating in all forms, degradation of conduct and professionalism, and identifying and responding to situations of student distress.

Neutralization of cheating is among the most critical aspect of this job. Cheating in all forms by any person, student, or instructor compromises the military's integrity, professionalism, and combat readiness. Even something as minor as bending a rule or displaying minor forms of favoritism is unprofessional and a violation of the academic and professional integrity of the military.

### **11.0 Recommendations for Future Interns of the PCI Program**

Future interns incoming to the Air Force's Premier College Internship Program must remember that as an internship, it often will not go how they expect it to. For example, I expected it to be an internship with a track to a job I wanted to explore: working in a Comm Squadron. The reality was that I became a teacher assistant due to the needs of 338 TRS needing potential instructors with some Information Technology/Cyber background to aid in training the future technical warfighter. My experience is nonetheless an outlier as chances are most will land a job of their expected job series; I did not. My only benefit is that I am still classified under the IT series as a 2299 (Information Technology Student Trainee) [13]. Most interns will do IT/Cyber work but not

what they want to do. Future interns to the PCI program need to keep the following in mind: the PAQ program, developmental opportunities, and future placement into government service under the DOD/Federal government.

### **11.1 The Palace Acquire Program**

The end goal (at least for the U.S. Air Force/AFCS) of the PCI program is the Palace Acquire Program (PAQ). PAQ is a post-graduate training program that takes graduated undergraduate and graduate students as actual employees of an Air Force organization, where they are given real work and expected to perform. My future in the PCI program is to transition into PAQ if I desire to. Currently, that is so because, so far, everything I have learned about PAQ makes it worth the experience at Keesler AFB. As part of the PAQ program, I can rotate into different jobs under my job field, meaning my work will vary, and I will gain training and experience in differing fields [14]. In addition, being a PCI in the PCI program guarantees, upon successful completion of the internship, selection, and first placement into the PAQ program. If a college student wants a post-graduate job through PAQ, the best chance of getting selected is to be in the PCI program.

### **11.2 Developmental Opportunities**

PAQ is also a developmental opportunity, with two tracks I learned at the PCIP Symposium for the Cyber/IT field: a Program Leader or a Technical Leader. A Program Leader gains cross-organizational skills from more than one field and career track to become a leader adept at leading an organizational program and people. A Technical Leader gains a deeper understanding, skills, abilities, and experience in a selected career field/track and applies those skills towards becoming a subject-matter expert (SME) in their given career track. The opportunity through PAQ, both post-graduate work, gaining my master's degree, and formal training opportunities towards becoming a Technical Leader is my desired end goal out of the program. As a Technical Leader, I would still gain some diverse experiences and opportunities with the Air Force but apply them to work as an SME.

### **11.3 Promise of Future Government Service**

Other interns entering the PCI program should also remember that the best way to take advantage of this opportunity is to see where they would like to be 2, 3, to even five years from now. If they do not see themselves in government post-graduate, the internship program wastes their time as they gain exposure to something they do not want to do. If they, however, want to serve in government, irrespective of remaining in the Air Force as a civilian or in the DOD itself, then the PCI program is the perfect opportunity. They will gain experience in the Federal government and the opportunity to progress in their potential through PAQ, which can lead them on for the rest of their career.

## **12.0 Conclusion**

My experience at Keesler has been constructive, informative, and unique. As an experience, I learned about the U.S. Air Force, the integration of Civilian and Military personnel in the DOD, the 81st TRW, and the 338th TRS's mission. I acclimated to my role as a technical teaching assistant. The internship's beginnings were unexpected but welcoming, as I will never forget my experiences at the 338th's Network Systems Operations Course. The experience gave me unparalleled access to the teaching philosophy and training of the technical warfighter in the Air Force and DOD. While there, I, along with three other interns, contributed to the mission of the 338th through our teaching assistant roles and learned and aided the technical training of the student body. The IP basics and subnetting video project was one way I could contribute substantially to the mission of the 338th. I also intend to use this experience to channel it into entering the Air Force's premier Palace Acquire program (PAQ), where I plan to advance under federal service.

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## Appendix A: 338th TRS/VED Technical Training Material Samples

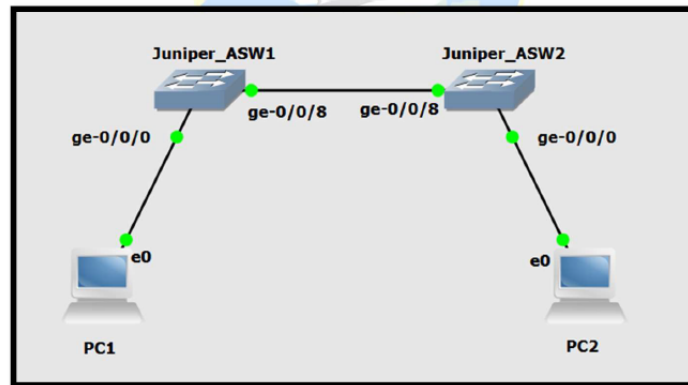
### A.1: Block 3/5 Juniper Lab Training Document

#### PROCEDURES

Open GNS3 and open your project library. Select the project **Juniper Basic Lab 2 Demonstration**.

Click the **green play button** towards the top of the screen to turn all devices on.

While you wait for the devices to boot up, connect your devices to reflect the image below:



Note that the green lights on your devices only signifies that the device is turned on. They do not confirm that the device is functioning properly.

*Appendix A.1: Lab Document of the 3/5 Block covering basic Juniper Switching concepts and configurations.*

**A.2: Block 2 Material Sample – IP Subnetting**

# 1. Implement/Apply IP Addressing Schema

Estimated time to complete: 2-hr(s)

Unit Objective:

<b>2b</b>	<b>Identify basic facts about internetworking. Task(s): 3.1.1, 3.1.2, 3.1.3, 3.2.1, 3.2.3, 3.2.4, 3.9.4 MEAS: PC</b>
<p>Upon completion of this unit you will be required to, when given the appropriate data, develop and apply an IP address schema for a sample network in accordance with a measurement rubric. This means you will need to be able to identify host requirements, subnet requirements, and utilize proper subnetting techniques to accomplish a progress check.</p> <p>There will be a <b>demonstration-performance</b> at the end of this unit and upon completion of the IPv4 subnetting worksheet where you must achieve a score of <b>Satisfactory</b>.</p>	

NOTE: Ensure that you download the PDF unit locally and load it in Adobe Acrobat for full functionality.

## Subnetting 101

As a Cyber Transport Systems Apprentice in the United States Air Force, you will need to be able to effectively make use of IPv4 addresses allotted to you. In order to accomplish this, it is important to understand types and differences of IPv4 addresses in greater detail. A key concept to be familiar with regarding IPv4 addresses is the difference between a **Classful** and a **Classless** address.

In your previous readings, we learned about the class ranges for IPv4 addresses and how the value of the first octet will influence the size of the network field and host field for the address. When the emphasis is strictly on the class and nothing else, this is considered classful. The limitation with a strictly classful methodology is that no matter the class of the address provided; it will only ever be one computer network. This becomes a problem when there is a need for multiple computer networks with smaller host requirements throughout an organization.

For example, let us imagine that there were 15 Airmen working in one building and only a single class A network address range that could be used for their computers. In the process of giving each Airman's computer an IPv4 address, we would waste a remaining 16,777,199 in unallocated addresses. This is extremely wasteful when you take into consideration that addresses are limited.

Now, you may wonder how that number was calculated and why it is so extreme. When calculating the total number of available host IP addresses, we examine the total number of bits available in a host field for an IPv4 address provided and use the following formula:

(Figure 1-1 shows the formula to calculate hosts)

$$2^n - 2 = (\text{total number of host IPs available})$$

n = number of bits in the host field

(Figure 1-1)

It should be noted the reason that we subtract two in the formula is due to the **broadcast address** and the **subnet ID** address which will both never be assignable to an individual host node. We get the value to plug into our variable n from the number of host bits in the IPv4 address. If you need a refresher on the host field with regards to these two types of addresses, refer back to the Fundamentals of IPv4/IPv6 Addressing unit.

(Figure 1-2 shows an example classful IPv4 address with default subnet mask)

(IPv4 Address)

# 10.0.0.0 /8

00001010.00000000.00000000.00000000

Appendix A.2: Block 2 class PDF document covering the essentials of IPv4 Subnetting concepts.

## Appendix B: Block 2 Project Work Samples

### B.1: IP Subnetting and Binary Conversion Training Script Sample

#### Basics of Subnetting

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**Person 2:** IP Addresses are grouped into *classes* based on the first octet of the address. An octet being the first 8 bits of the IP address. There are Classes A, B, C, D, and E and they are defined as described in this chart.

Address Class	1st Octet Range	Subnet Mask	CIDR Notation
A	1 - 126	255.0.0.0	/8
B	128 - 191	255.255.0.0	/16
C	192 - 223	255.255.255.0	/24
D	224 - 239	N/A	N/A
E	240 - 255	N/A	N/A

As you may have noticed, Classes are defined not only by their first octet, but also by their Subnet mask. Subnet masks are what tell a system what addresses belong to the subnet. This will be explained in more detail later, but for now know that Class A subnets have the mask of 255.0.0.0, Class B have a mask of 255.255.0.0, and Class C has 255.255.255.0

**Person 1:** The commonly used classes are A, B, and C. These are the classes you will see in general use and they are the ones that we will cover today. D and E are reserved for multicast and

*Appendix B.1: Block 2 Project Video Script excerpt covering Basic subnetting, including classful subnets (e.g., Class B), their range (e.g., 128-191), subnet mask (e.g., 255.255.0.0) and CIDR (e.g., /16).*