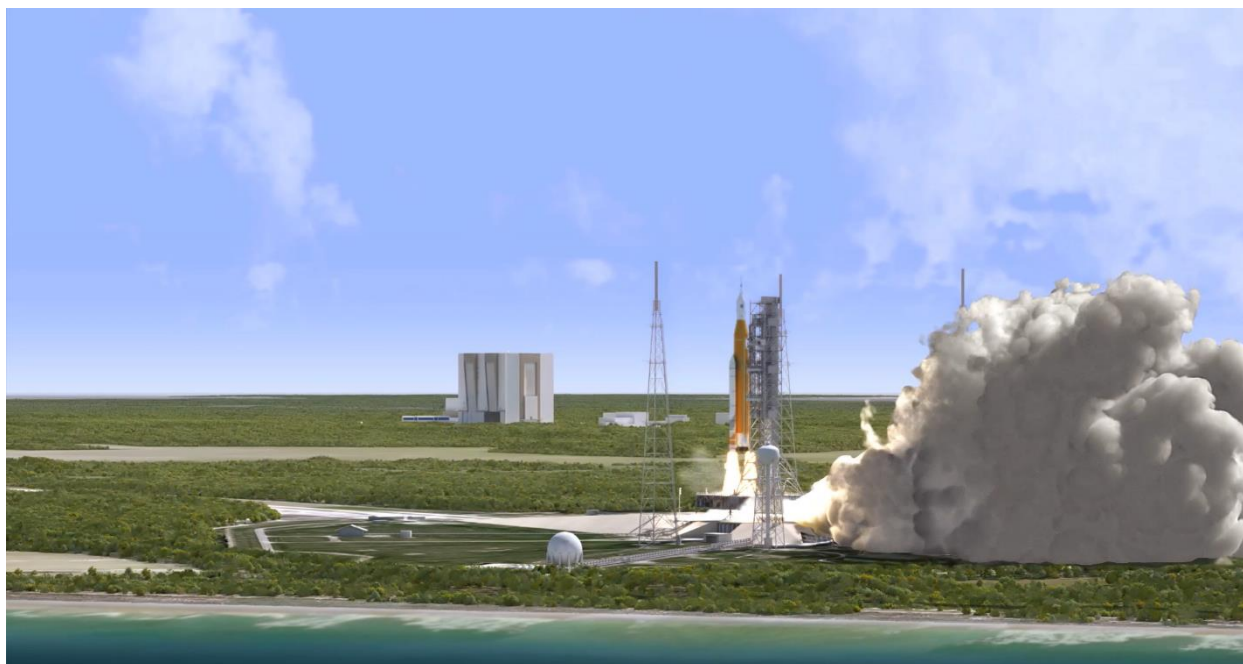




Computer and Network Engineering Intern

Antonio Teijeiro
Kennedy Space Center
Major: Electrical Engineering
Summer 2017 session
Date: 07.19.2017



I helped the Launch Control System (LCS) hardware team sustain the network design of the Spaceport Command and Control System. I wrote the procedure that will be used to satisfy an official hardware test for the hardware carrying data from the Launch Vehicle. I installed hardware and updated design documents in support of the ongoing development of the Spaceport Command and Control System and applied firewall experience I gained during my spring 2017 semester to inspect and create firewall security policies as requested. Finally, I completed several online courses concerning networking fundamentals and Unix operating systems.

Nomenclature

LCS = Launch Control System
SCCS = Spaceport Command and Control System

I. Introduction

The development of the Spaceport Command and Control System (SCCS) at the Kennedy Space Center (KSC) is underway. SCCS is a system that will be responsible for checkout and launch of next generation launch vehicle from KSC. KSC has provided numerous opportunities for interns to contribute to the development of SCCS. The purpose of this internship is to aid in the design and implementation of the network that will support the SCCS. Throughout the course of this internship, my time was spent installing cable, updating network design documents, writing test steps for official hardware tests, and aiding with the closure of work tracking tickets. Upon completion of this internship, I will have personally contributed to the implementation of the network that will support NASA launches.

II. Approach

This internship required me to learn network performance metrics, methods of testing networks, and Unix. My approach was to seek as much knowledge as possible from the experienced mentors with whom I interacted daily and to complete coursework that was suggested to me. I accompanied my mentor on familiarization walkdowns of the firing rooms; he showed me how to use schematics, how to use cable running lists, and how to write hardware test

procedures. He worked with me until I felt comfortable with the job. I completed an online course in networking fundamentals and several courses on Unix Operating Systems. All of this made me confident in my ability to do my job well.

III. Tasks

A. SCCS Development

a. Hardware Tests

There are data lines coming from the launch vehicle. The connectivity and performance of these datapaths will be inspected in the form of an official test. I wrote the test procedures that will be executed (at some later date) to satisfy the requirements of this test.

The RFC 2544 standard outlines a methodology for measuring network performance. I researched and inquired about the RFC 2544 test suite provided on our test units, configured the tests, configured the two test units to run the tests, and conducted numerous dry runs. I wrote a test procedure document that lists the exact steps that will be followed during the hardware tests. The test configurations and test unit configurations were saved so that the people who conduct the tests may simply load the configurations. In addition, I wrote a 7 page manual explaining how to manually replicate our configurations if necessary.

In addition to studying the RFC 2544 test suite, it was necessary to use a work tracking system to look for and identify the appropriate documents that will be referenced when verifying rack configurations during the test. Some of the requirements depend upon a remote connection that is to be established with a media converter chassis management module. This made it necessary to learn about the chassis, management module, and media converter cards being used.

b. Firewall work

I gained experience with configuring firewalls through significant contributions to an official firewall design test during my spring 2017 internship with NASA. The knowledge gained from that past experience was utilized this summer session as I worked to edit security policies and to provide firewall information to requesters.

My first instance of work with firewalls this semester consisted of working collaboratively to use the web interface of the firewall to enable extra services to satisfy client requests. Later, we gathered a list of services allowed through a particular firewall, as well as created a new security policy which allowed through several new services.

c. Connectivity

I installed cables and made connections in the firing rooms, redlined cable running lists, and calculated cable lengths to order cable for later installation. I also used a cable analyzer to trace cables.

IV. Conclusion

This internship has provided me the opportunity to learn about networking from the ground up. I learned in detail how networks were initially structured and how they evolved to keep the amount of devices competing for access to network segments low. I applied previously acquired knowledge of firewalls to make basic configuration changes and inspections. Through research, asking questions, and teamwork I became knowledgeable enough to write network performance test documents. This experience has given me a foundation for a career in network engineering, cyber security, and communications in general.

Acknowledgements

I have had terrific colleagues throughout the course of this internship. For his genuine interest in making me a better engineer, I would like to first thank Kelvin Ruiz. He went above and beyond to provide me with challenging work, daily help, coursework to complete, and even life advice. I would also like to thank Allan Villorin for his interest in helping me finish a firewall design test, where he took the time to look up and provide courses for me to complete in

order to better understand the work I was doing. Kyle Otsuka was an outstanding co-worker to have, and I am grateful to have worked with him as much as I did. Michael Swain and Gregory Nelson were instrumental to my completion of the ML-to-LCC HVTs.