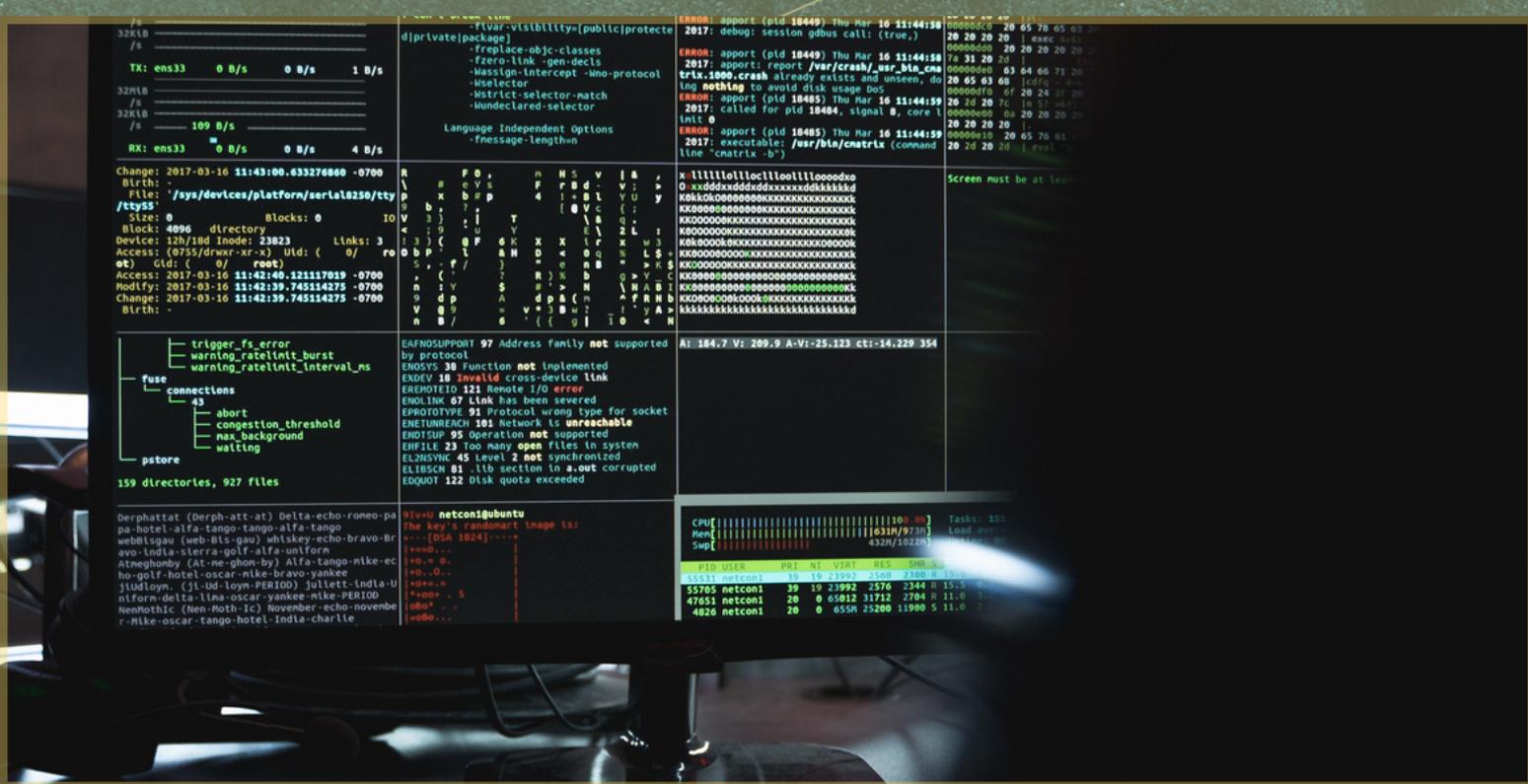


# UNIVERSITY OF TECHNOLOGY, JAMAICA

Accredited by the University Council of Jamaica (UCJ)

School of Computing and Information Technology



## Bachelors of Science in Computer Networking and Security Programme Prospectus

"EXCELLENCE THROUGH KNOWLEDGE"

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# UTECH 'JA' S MISSION & VISION

WELCOME

## MISSION

To positively impact Jamaica and the wider Caribbean through high-quality learning opportunities, research and value-added solutions to government, industry and communities.

## VISION

We are the #1 University in the Caribbean for work-ready leaders, committed to transforming students and society through high-quality teaching, research and value-added services.



# Programme Information

## WHAT MAKES US DIFFERENT?

**University of Technology, Jamaica is accredited and well ranked on a global scale in the work world and industry.**

WELCOME TO CNS

- **Our modules were created with input from the industry to give the students insight to what they will be doing in the industry**
- **The degree is filled with practical exercises that encourage students to develop skills that they would use in the industry**
- **This degree also has a focus on developing the soft skills needed to communicate and manage professionally**

- **Students also have the opportunity to join SAPNA. An initiative to enhance its student members' knowledge and technical skills through participation in enterprise software application development and deployment.**

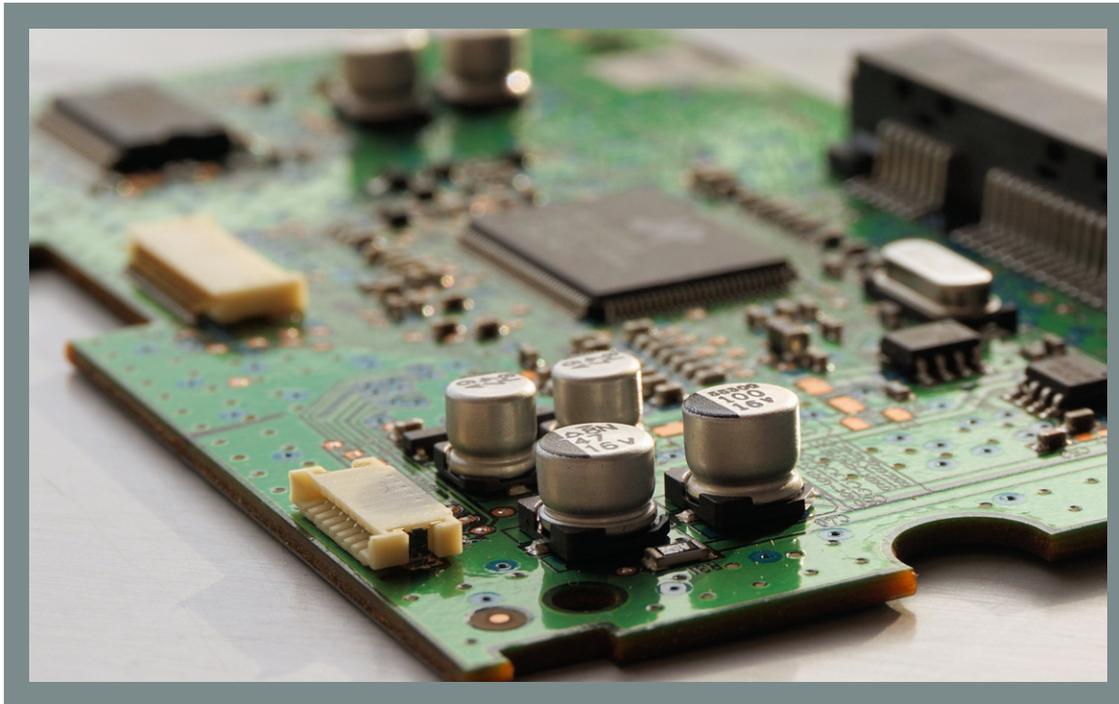
**SAPNA was inspired by a dream or desire for SCIT to produce an excellent calibre of graduates who would be dominant on the world stage in their abilities to perform at a very high level on any software development project in anywhere in the world.**

WELCOME TO CNS

- **Participating in activities at the Sagikor Innovation Lab is another possible opportunity available to students.**

**The Sagikor Innovation Lab at UTECH is an important entity which allows government, academia and industry to move ideas to product.**

# Programme Information



## Programme Description

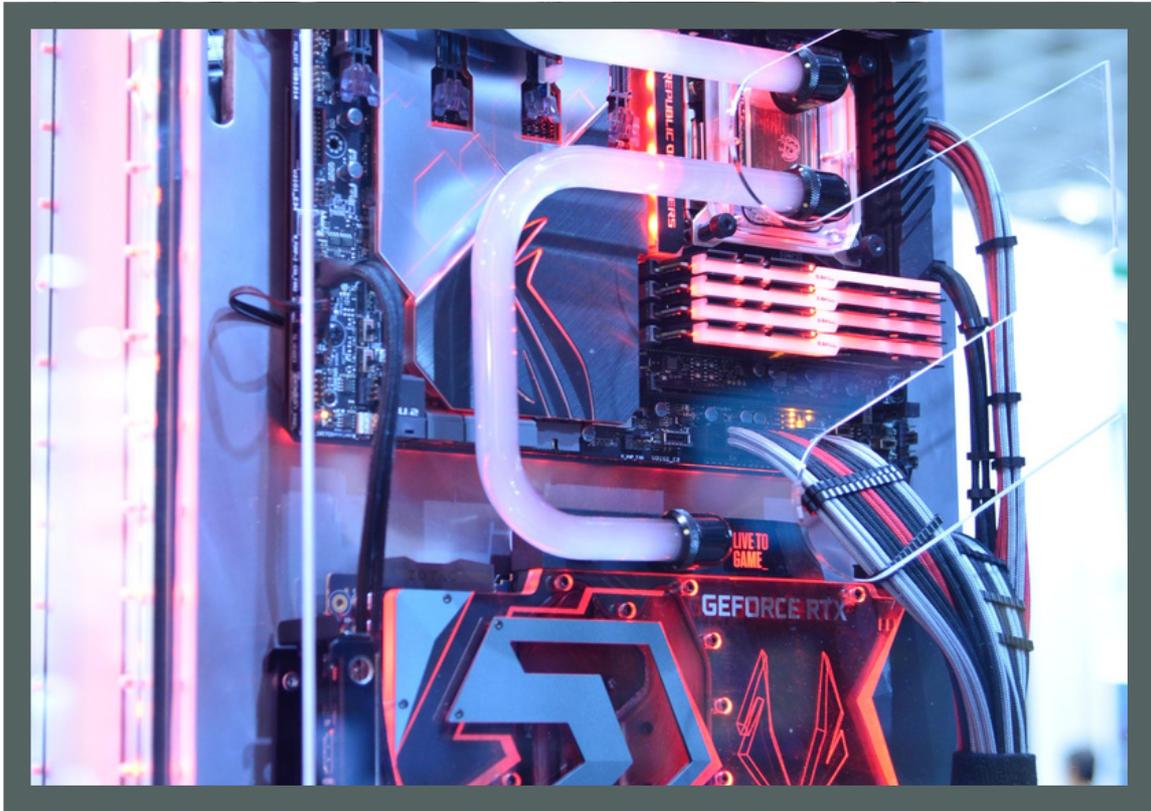
The Bachelor of Science in Computer Networking and Security (BSc CNS) will supply a pool of trained professionals to protect critical network infrastructure within an organization and ensure that networks are operational, optimal and resilient. They will function at technical and managerial levels in the computer networking and security fields.

## Programme Assessment

Modules are assessed using a combination of assignments, projects and examinations. Module outlines are given to students at the beginning of the semester this includes the topic, assessment weightings and text books

## Majors

- Infrastructure
- Cyber Security

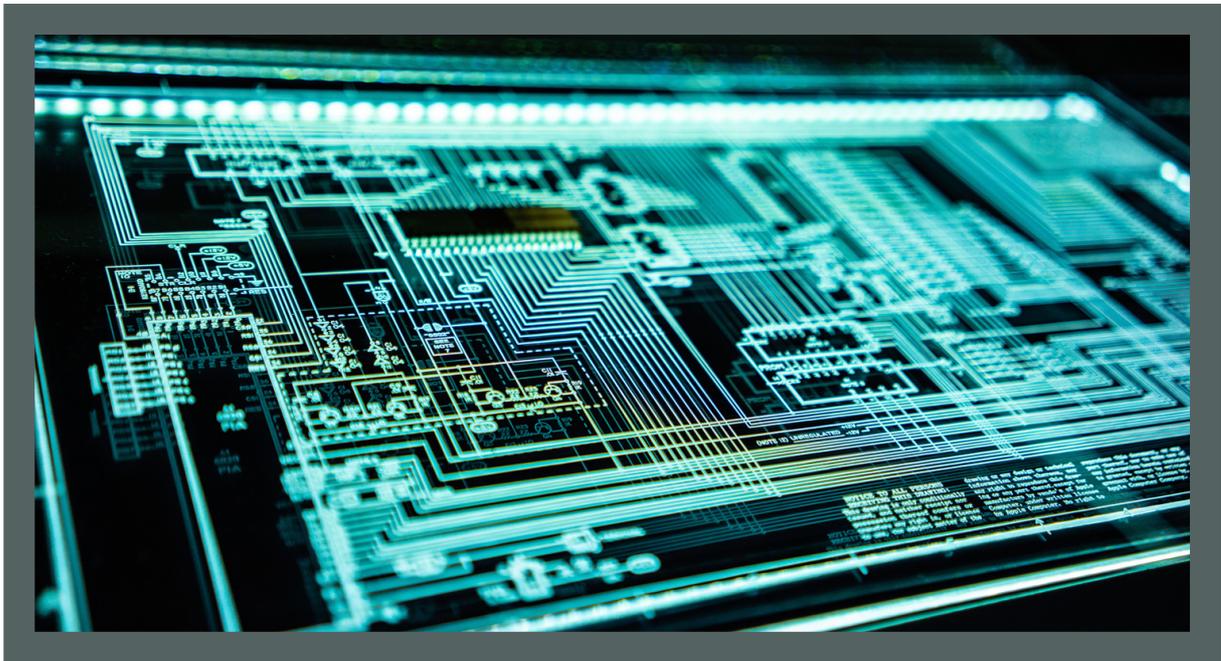


## Cyber Security

The Cyber Security major will provide graduates with the fundamental knowledge and skills required to effectively respond to the growing cyber security threats. These graduates will be equipped with the skills necessary to perform penetration testing, provision network security in both physical and virtual environments, provide cyber security governance and function at technical and managerial levels in the computer security field.

## Infrastructure

The Infrastructure computing major will provide graduates with the ability to successfully respond to an organization's need to share scarce and dispersed resources. Graduates will be equipped with the skills necessary to design, provision, secure and manage virtual resources by themselves and with accompanying physical resources.



## Delivery & Methodology

Modules (*subjects*) are taught between the hours of 8 am and 9 pm. At the moment all modules are offered using an online platform. Students desirous of working while studying are encouraged to select modules early to be able to select modules around their work schedule.

A student-centred approach is utilised. The modules offered are a combination of lectures, tutorials and laboratory-focused work. **Students are expected to do additional reading and research to supplement the instructional components.**

## Application Procedure

Applications can be made online by going to UTech's website at <https://www.utech.edu.jm>. After submission and confirmation, print or save a copy of the confirmation page. **Certified copies of the applicant's birth certificate and CSEC/GCE results, TRN, along with the application confirmation page should be submitted to the Office of Admissions and Enrolment Management.**

**SCAN ME**



## Entry Requirements

Candidates are required to have a minimum of five (5) subjects in the CSEC General Examinations or the equivalent, inclusive of Mathematics and English Language at levels 1, 2, and 3 (from June 1998) or GCE Ordinary level passes at A, B or C.

## Prescribed Duration

4 Years

# CAREERS

## NETWORKING ENGINEER

A network engineer is a technology professional who is highly skilled in maintaining the connectivity of networks in terms of data, voice, calls, videos and wireless network services. These network engineers are also referred to as network architects.

### PROBLEMS

- Organizations have issues that need to be troubleshot.
- The internal network needs to be protected from internal and external threats, which means protecting data, software, and hardware from attacks.
- Maintain and run servers.
- Disaster recovery operations also may need to be performed, faulty network hardware components will need to be replaced when necessary.
- There is also the need for someone to work closely with the users of our network in order to identify potential issues and fix existing problems.

### RESPONSIBILITIES

- Maintaining and administering computer networks and related computing environments including systems software, applications software, hardware, and configurations.
- Performing disaster recovery operations and data backups when required.
- Protecting data, software, and hardware by coordinating, planning, and implementing network security measures.

### PAY RANGE

- The base salary for Network Engineer ranges from USD \$79,439 to USD \$101,600 with the average base salary of USD \$89,510
- The average salary for a Network Engineer in Jamaica is JA\$1,750,000 (figures as of 2018)

### EDUCATION REQUIREMENTS

- Bachelor's degree in information technology-related field of study with a network engineering focus.
- Strong understanding of network infrastructure and network hardware
- Ability to think through problems and visualize solutions.
- Ability to implement, administer, and troubleshoot network infrastructure devices, including wireless access points, firewalls, routers, switches, controllers.
- Knowledge of application transport and network infrastructure protocols.
- Ability to create accurate network diagrams and documentation for design and planning network communication systems.
- LAN and WAN experience.
- Ability to work with all levels of staff within and outside of IT and outside the organization.
- Dependable and flexible when necessary.

**IT SECURITY CONSULTANT**

IT security consultants assess software, computer systems, and networks for vulnerabilities, then design and implement the best security solutions for an organization's needs. They play the role of both the attacker and the victim and are asked to locate and potentially exploit vulnerabilities

**PROBLEMS**

Business need to be consulted with to ensure their data is protected, this is likely to be done remotely

**RESPONSIBILITIES**

- Maximize efficiency in protecting data and information systems, networks, and software against hacker attacks.
- Work closely with IT departments to correct specific online safety problems.
- Work with managers, engineers, and other security analysts to decrease risks for an organization.
- Oversee and conduct tests for system vulnerabilities.
- Supervise and guide security teams of managers, engineers, and other technical or security employees.

**PAY RANGE**

- The average base salary annual is approximately USD \$85,505
- The average annual base salary is approximately JA\$3,537,487

**REQUIREMENTS**

- CEH: Certified Ethical Hacker.
- CISM: Certified Information Security Manager.
- CompTIA Security+
- CISSP: Certified Information Systems Security Professional.
- GSEC: SANS GIAC Security Essentials.
- Plan and design security architectures for IT projects.
- Research cybersecurity criteria, security systems, and validation procedures.
- Probe and provide security solutions referencing business standard analysis criteria.
- Update and upgrade security systems as needed.
- Deliver official reports that summarize test findings.

# CAREERS

## CLOUD ENGINEER

Cloud Engineer is the Information Technology professional responsible for any technological tasks associated with cloud computing, such as design, planning, management, maintenance, and support.

### PROBLEMS

- **Mobility**

The more mobile your employees are, the more competitive your company can be.

- **Flexibility**

This “anywhere, anytime access” goes above and beyond mobility. It also translates into more flexibility. The only thing your employees need to access work files and business applications is an internet connection and, of course, a connected device.

- **IT Maintenance**

Say you do have parts of your infrastructure hosted offsite. The maintenance and management of these “parts” are no longer your responsibility. For a handful of reasons, this is good for your business

- **Energy Use**

Since you have all this physical hardware hosted offsite at a separate location, imagine how much energy you’re saving ...Servers require a great deal of electricity – which ultimately equates to money ... and lots of it.

### EDUCATION REQUIREMENTS

- Bachelor’s Degree in Computer Science or Engineering; Master’s degree a plus.
- Certification as an AWS Solutions Architect, Cloud Security Certification, and/or OpenStack Administrator Certification a plus. (Other cloud-related certification also a plus.)
- Five years’ experience in developing software using languages such as Java, Python, C++ or Ruby.
- Experience with SOA applications and cloud-based services, preferably AWS.
- Experience working with OpenStack, Linux/UNIX, Rackspace, Docker and Microsoft Azure.
- Three to five years’ experience in a Cloud Engineer role or related position.
- Knowledge of web services, API, REST and RPC.
- Strong awareness of networking and internet protocols, including TCP/IP, DNS, SMTP, HTTP and distributed networks.
- Database experience, including knowledge of SQL and NoSQL, and related data stores such as Postgres.

### PAY RANGE

- The average annual cloud engineer salary is USD \$129,363 per year. It can go up to as high as USD \$173,500 and as low as USD \$69,000.
- Experience The average cloud engineer yearly gross salary in Jamaica is \$3,660,855 or an equivalent hourly rate of \$1,760. In addition, they earn an average bonus of \$158,515

### RESPONSIBILITIES

- Working with our engineering team to identify and implement the most optimal cloud-based solutions for the company.
- Planning, designing and developing cloud-based applications.
- Managing cloud environments in accordance with company security guidelines.
- Deploying and debugging cloud initiatives as needed in accordance with best practices throughout the development lifecycle.
- Training teams on the implementation of new cloud-based initiatives, providing associated training as required.
- Employing exceptional problem-solving skills, with the ability to see and solve issues before they snowball into problems.
- Using your extensive knowledge of APIs to design RESTful services, and integrate them with existing data providers, using JSON or XML as needed.
- Lead and develop best practices for the larger Cloud Engineer team.
- Building and designing web services in the cloud, along with implementing the set-up of geographically redundant services.

## PENETRATION TESTER

Penetration Tester also known as “ethical hackers,” are highly skilled security specialists that spend their days attempting to breach computer and network security systems. ... They do this by trying to hack into networks to identify potential vulnerabilities in the system.

### PROBLEMS

Vulnerabilities in your environment can be exploited and confidential information can be stolen

### RESPONSIBILITIES

- Perform penetration tests on computer systems, networks and applications
- Create new testing methods to identify vulnerabilities
- Perform physical security assessments of systems, servers and other network devices to identify areas that require physical protection
- Pinpoint methods and entry points that attackers may use to exploit vulnerabilities or weaknesses
- Search for weaknesses in common software, web applications and proprietary systems
- Research, evaluate, document and discuss findings with IT teams and management
- Review and provide feedback for information security fixes
- Stay updated on the latest malware and security threats

### PAY RANGE

- TAs of August 2020, PayScale reports a nationwide average penetration tester salary of \$84,690.
- A person working as a Tester in Jamaica typically earns around 81,100 JMD per month. Salaries range from 42,200 JMD (lowest) to 124,000 JMD

### REQUIREMENTS

- Systems Security Professional (CISSP) certification covers training in a number of topics, including security policies, cryptography and ethics. These are two of the certifications that are required or preferred by employers.
- Other security certifications or IT certifications, such as Global Information Assurance Certification (GIAC) or Certified Information System Auditor (CISA), may be an asset to those pursuing a career as a penetration tester.

# CAREERS

## SYSTEMS ADMINISTRATOR

System administrators typically install, upgrade and monitor software and hardware. They may also be involved in data backup and recovery. They usually maintain the essentials such as operating systems, business applications, security tools, web-servers, email, PCs, local and wide area networking both hardware and software and mid-range server hardware.

### PROBLEMS

Institutions need to have someone manage their systems. Doing so offers a whole host of benefits that can help grow your business and boost their output.

### PAY RANGE

- The average salary for a systems administrator is \$76,814 per year in the United States.
- An entry level network administrator (1-3 years of experience) earns an average salary of \$2,438,774.

### RESPONSIBILITIES

- **Education:** Although you might be able to get a job with only a postsecondary certificate or associate degree, most employers prefer to hire job candidates who have a bachelor's degree in computer network and system administration or computer science. You might also be able to get a job in this field if you have a degree in computer or electrical engineering.
- **Certification:** Those who work in this occupation often have certifications from software vendors such as Cisco, Microsoft, Juniper, or CompTia. This demonstrates to employers that you have expertise in a particular product.

### EDUCATION REQUIREMENTS

- Provide technical oversight of a multi-site enterprise level WAN, including planning, implementation/expansion, maintenance, and troubleshooting.
- Prepare and maintain documentation of network configurations and cabling layouts.
- Design, deploy, and administer the wireless infrastructure and supporting systems.
- Recommend upgrades, patches, and new applications and equipment.
- Train team members on new hardware or software.
- Research and recommend approaches for system administration tasks.
- Analyze and monitor server security and implement patches and fixes to address potential security holes.

## SECURITY SYSTEM ADMINISTRATOR:

A security systems administrator is someone who gives expert advice to companies regarding their internal security procedures and can also help to detect any weaknesses in a company's computer network that may make them vulnerable to cyber attacks

### PROBLEMS

Networks need to be secured from hacking and virus threats

### RESPONSIBILITIES

- Installing, administering, and troubleshooting network security solutions.
- Updating software with the latest security patches and ensuring the proper defenses are present for each network resource.
- Performing vulnerability and penetration tests, identifying and defending against threats, and developing disaster recovery plans.
- Configuring security systems, analyzing security requirements, and recommending improvements.
- Monitoring network traffic for suspicious behavior
- Creating network policies and authorization roles and defending against unauthorized access, modifications, and destruction.
- Consulting with staff, managers, and executives about the best security practices and providing technical advice.

### PAY RANGE

- As of Jun 27, 2021, the average annual pay for a Security Systems Administrator in the United States is USD \$81,230 a year.
- In Jamaica the average base salary is JA\$1,900,000

### REQUIREMENTS

- An associate's or bachelor's degree in computer science, cyber security, or a related field.
- Advanced training certifications may be advantageous.
- A strong understanding and knowledge of computer, network, and security systems.
- Good teaching, interpersonal, and communication skills.
- Strong analytical, critical thinking, and problem-solving skills.

# CAREERS

## NETWORK MANAGER

A network manager is the person who oversees a company's entire computer network system. The purpose of a network is to allow a company's staff to share access to records, documents and files instantly, which would otherwise make the retrieval of these files time consuming

### PROBLEMS

- **Poor Network Performance.** Without the right equipment at endpoints and midpoints along the way, it's impossible to provide the high-speed communication needed by today's applications.
- **Security is another top challenge.** Because the perimeter of today's network is unclear, blocking unauthorized outside traffic from the internal network isn't adequate for protecting data.
- **Configuration Management.** As networks increase in size, overseeing the network configuration increases in difficulty. Devices can conflict with each other. It becomes challenging to keep the rules in firewalls up to date, and manually applying policies leads to errors and inconsistencies.

### EDUCATION REQUIREMENTS

- Evaluate the current network to identify areas that need to be enhanced or upgraded
- Oversee installation of new hardware and software
- Train staff on new equipment and applications for a smooth transition
- Monitor system to prevent lapses in service
- Line manage the ICT Support Staff Management of the curriculum and administration networks including Management Information Systems (MIS).
- Identify, plan and cost all future developments and upgrades of the ICT infrastructure.

### PAY RANGE

- Average yearly base salary USD \$88,438
- The lower range annual salary is 4000,000 JMD.

### RESPONSIBILITIES

- Bachelor's degree in computer science, information technology, computer engineering, or a related field
- 5+ years of networking or software engineering experience
- Experience working with networking protocols, including TCP/IP, MPLS, and MP-BGP
- Proficient in various programming languages, such as Python, C#, or Perl
- Excellent communication skills
- Attention to detail

## SECURITY ARCHITECT

A security architect is the individual who is responsible for maintaining the security of a company's computer system. They must think like a hacker would, because they must anticipate all of the moves and tactics that hackers will use to try and gain unauthorized access to the computer system.

### PROBLEMS

- point-of-sale (POS) intrusion is when an attacker tries to capture payment data by compromising the computers/servers running the POS applications.
- Insiders threats and privilege caused by easier access to critical information such as credit card numbers
- Web attacks caused by attacks range from lack of two-factor authentication to configuration errors, brute-force attacks, and lack of egress filter on traffic leading to data breaches.

### PAY RANGE

- PayScale reports security architects earn a median annual salary of \$122,676. Entry-level security architects take home roughly \$77,000 annually, while their mid-level counterparts reported salaries just under \$118,000
- A person working in IT Security in Jamaica typically earns around 116,000 JMD per month. Salaries range from 91,800 JMD (lowest average) to 136,000 JMD (highest average, actual maximum salary is higher).

### REQUIREMENTS

- Extensive experience in information security and/or IT risk management with a focus on security, performance and reliability
- Solid understanding of security protocols, cryptography, authentication, authorisation and security
- Good working knowledge of current IT risks and experience implementing security solutions
- Experience implementing multi-factor authentication, single sign-on, identity management or related technologies
- Excellent written and verbal communication skills as well as business acumen and a commercial outlook

### RESPONSIBILITIES

- Reviewing current system security measures and recommending and implementing enhancements
- Conducting regular system tests and ensuring continuous monitoring of network security
- Developing project timelines for ongoing system upgrades
- Ensuring all personnel have access to the IT system limited by need and role
- Establishing disaster recovery procedures and conducting breach of security drills
- Promptly responding to all security incidents and providing thorough post-event analyses

# CAREERS

## CHIEF TECHNICAL OFFICER

A chief technical officer (CTO), sometimes known as a chief technology officer or chief technologist, is an executive-level position in a company or other entity whose occupation is focused on the scientific and technological issues within an organization.

### PROBLEMS

Need to build manage and strategize an organization's infrastructure

### RESPONSIBILITIES

- Design and oversee implementation of end-to-end integrated systems.
- Deliver architectural initiatives that drive revenue and improve efficiency inline with business strategy.
- Cultivate relationships with IT management.
- Maintain in-depth knowledge of the organization's technologies and architectures.
- Develop and maintain current and planned state architectural blueprints.
- Develop and maintain a aspirational architectural road map for the enterprise.
- Communicate architectural decisions, plans, goals and strategies.
- Gain organizational commitment for enterprise level architecture and infrastructure initiatives.
- Provide architectural direction to Enterprise Architects, Business Architects and Solution Architects.

### PAY RANGE

- The range surrounding that average can vary between \$108,000 and \$227,000,
- Salary estimates based on salary survey data collected directly from employers and anonymous employees in Jamaica. An entry level chief technology officer (1-3 years of experience) earns an average salary of \$4,245,783. On the other end, a senior level chief technology officer (8+ years of experience) earns an average salary of \$7,881,394.

### EDUCATION REQUIREMENTS

- Strong analytical problem-solving and decision-making skills;
- Bachelor's Degree in Information Systems, Business, or Human Resources;
- Trusted and respected as a thought leader who can influence and persuade business and IT leaders;
- Ability to balance the long-term ("big picture") and short-term implications of individual decisions;
- Experience presenting briefings to senior customer management, customer stakeholders, and company management;
- Extensive experience with technical leadership, defining visions/solutions, and collaborating/driving to see them to completion;
- Ability to estimate the financial impact of EA alternatives;
- Active DoD Top Secret clearance; ability to obtain TS/SCI clearance;
- Ability to navigate complex IT and business organizational structures to accomplish goals and gain buy-in;



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