



**National Competency Standards
for
“Computer Networking and Cloud Computing”
(Network and Cloud Configuration Expert)**

Level-5



**National Vocational and Technical Training Commission (NAVTTTC),
Government of Pakistan**



ACKNOWLEDGEMENT

National Vocational and Technical Training Commission (NAVTTTC) extends its gratitude and appreciation to representatives of business, industry, academia, government agencies, provincial TEVTAs, sector skill councils and trade associations who spared time and extended their expertise for the development of National Vocational Qualifications for the trade of **Computer Networking and Cloud Computing**. This work would not have been possible without the technical support of the above personnel.

NAVTTTC initiated development of CBT&A based qualifications for 200 traditional / hi-tech trades under the Prime **Minister’s Hunermand Pakistan Program**, focusing on Development & Standardization of 200 Technical & Vocational Education & Training (TVET) Qualifications. NAVTTTC efforts have received full support from the Ministry of Federal Education and Professional Training which highly facilitated progress under this initiative.

It may not be out of place to mention here that all the experts of Industry, Academia and TVET experts of TEVTAs, BTEs and PVTC work diligently for making this qualification worthy and error free for which all credit goes to them. However, NAVTTTC accepts the responsibility of all the errors and omissions still prevailing in the Qualification document.

It is also noteworthy that development of Skill Standards is a dynamic and ongoing process, and the developed skill standards needs periodic review and updating owing to the constant technological advancements, development in scientific knowledge, and growing experience of implementation at the grass root level as well as the demand of industry. NAVTTTC will ensure to keep the qualifications abreast with the changing demands of both national and international job markets.

**Dr. Nasir Khan,
Executive Director,
NAVTTTC**



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1. Introduction

In an enterprise, IT infrastructure is needed to provide employees with the necessary hardware and software to do their job. The key component of the IT infrastructure is the network that connects servers, desktop computers, and mobile devices. The IT infrastructure in an enterprise is a high-cost and high-maintenance unit. It requires expensive hardware and software and skilled IT service staff members to keep it running.

Cloud Computing is the delivery of computing services such as servers, storage, databases, networking, software, analytics, intelligence, and more, over the Cloud (Internet). Cloud computing has become the new trend in delivering business applications and services. The cloud is a cost-effective, flexible, reliable IT infrastructure to support e-commerce and e-learning. Cloud computing can also provide a collaboration platform for developers to participate in an application development project from anywhere and anytime. The cloud resources that are owned and operated by a third-party cloud service provider are termed as public clouds. It delivers computing resources such as servers, software, and storage over the internet. The cloud computing resources that are exclusively used inside a single business or organization are termed as a private cloud. A private cloud may physically be located on the company's on-site datacenter or hosted by a third-party service provider. The combination of public and private clouds, which is bounded together by technology that allows data applications to be shared between them. Hybrid cloud provides flexibility and more deployment options to the business.

Since a cloud can be considered an online IT infrastructure, the network is also a key component of the cloud. Networking theories and practice have been widely used in cloud computing. To understand the usage of the cloud in an enterprise, one has to have a thorough understanding of networking theories and practice.

Being cognizant of this fact, National Vocational & Technical Training Commission (NAVTTTC) developed competency standards for Computer Networking and Cloud Computing under National Vocational Qualifications Framework (NVQF). These competency standards have been developed by a Qualifications Development Committee (QDC) and validated by the Qualifications Validation Committee (QVC) having representation from the leading development houses and research labs of the country.



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2. Purpose of the Qualification

The competency based NVQ has been developed to train the unskilled men and women of Pakistan on the technical and entrepreneurial skills to be employed / self-employed and inevitably set sustainable impact on their lives by enhancing their livelihood income.

The purpose of these qualifications is to set professional standards for upcoming experts, who will serve as key elements enhancing quality of Pakistan’s networking, cloud computing & network security sector. The specific objectives of developing these qualifications are as under:

- Improve the professional competencies of individual in computer networking and cloud computing
- Capacitate the local community and trainers in modern CBT trainings, methodologies and processes as envisaged under NVQF
- Provide flexible pathways and progressions in computer networking and cloud computing
- Enable the trainees to perform their duties in efficient manner
- Establish a standardized and sustainable system of training in Pakistan
- Enabling the youth with greater employment opportunities



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3. Date of Validation

The level 5 Computer networking and cloud computing qualification has been validated on 4th to 8th August, 2020 at PITAC, Lahore, by the qualification validation committee (QVC) members.

4. Date of Review

The level 5 in Computer networking and cloud computing qualification has been reviewed on 20th Dec 2021, by the qualification validation committee (QVC) members.

5. Codes of Qualifications

The International Standard Classification of Education (ISCED) is a framework for assembling, compiling and analyzing cross-nationally comparable statistics on education and training. ISCED codes for these qualifications are assigned as follows:

ISCED Classification	
Code	Description
061304	National Certificate of level-5 Qualification, in “Computer Networking & Cloud Computing “(Network and Cloud Configuration Expert)



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6. Members of Qualification Development Committee

The following members participated in the qualification development process at PITAC, Lahore.

Date: 6th to 10th July'2020

S#	Name	Designation
1.	Dr. Adnan Noor Mian	Professor – ITU, Lahore
2.	Muhammad Yasir	Deputy Director - NAVTTC
3.	Kashif Babar	Manager – KICS, UET,Lhr
4.	Fahmeed Akram	Manager – KICS, UET,Lhr
5.	Engr. Tayyaba Amin	Sr. Instructor – Tevta, Lahore
6.	Imran Akhtar	Network Lecturer - PUCIT
7.	Mazhar Javed	Assistant Professor - UMT, Lahore
8.	Amir Amin	HOD Electrical – Malaysian Institute
9.	Hafiz M. Ishtiaq Rafique	Asst. Manager IT – ITU, Lahore
10.	Shoaib Bhatti	Manager IT – ITU, Lahore
11.	Ehtasham-ul-Haq	Administrator – LEADS
12.	Ayyaz Ahmed	Research Officer – KICS, UET Lahore
13.	Mushtaq Ahmed	AM (Trainings) – Tevta, Lahore
14.	Faisal Sarwar	PBTE Representative, Lahore
15.	Muhammad Hassaan	GIZ Consultant, Daccum Facilitator



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7. Members of Qualification Validation Committee

The following members participated in the qualification development process at PITAC, Lahore.

Date: 4th to 8th August, 2020

S#	Name	Designation
1.	Dr. Adnan Noor Mian	Professor, ITU, Lahore
2.	Muhammad Yasir	Deputy Director - NAVTTC
3.	Hafiz M. Ishtiaq Rafique	Asst. Manager IT – ITU, Lahore
4.	Muhammad Akram	Regional Project Manager, ZTE, Faisalabad
5.	Amal	Support Engineer, Oracle Pakistan
6.	Sumera Parveen	Instructor, GCTW, Bahawalpur
7.	Kashif Babar	Manager – KICS, UET, Lahore
8.	Muhammad Zubair	Manager Research, KICS, UET, Lahore
9.	Engr. Naseebullah	Lecturer IT – GPI Quetta
10.	Shoaib Bhatti	Manager Network, ITU, Lahore
11.	Hammad Ameer	Corvit System, Lahore
12.	Faisal Sarwar	PBTE Representative, Lahore
13.	Muhammad Hassaan	GIZ Consultant, DACUM Facilitator



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8. Entry Requirements

Entry requirement for this level 5 qualification would be Level-4 in Computer Networking & Cloud Computing

9. Regulation of the Qualification and schedule of units

Not Applicable



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10. Summary of Competency Standards

Sr No	Competency Standards	NVQF Level	Category	Estimated Hours			
				Th	Pr	Total	Cr Hrs
<u>Level 5</u>		(Network and Cloud Configuration Expert)					

1. Manage Repositories on Cloud Side	Level 5	Technical	20	30	50	5
2. Configure Tools for Continuous Development (Dev Ops)	Level 5	Technical	28	42	70	7
3. Manage Web Applications on Cloud	Level 5	Technical	28	42	70	7
4. Manage Public Cloud Services	Level 5	Technical	32	48	80	8
5. Set High Performance Computing (HPC) Environment on Public Cloud	Level 5	Technical	28	42	70	7
6. Set up Environment for Big Data and Blockchain on Cloud	Level 5	Technical	32	48	80	8
7. Perform Network Cloud security	Level 5	Technical	40	60	100	10
8. Deploy hardware/software protection	Level 5	Technical	20	30	50	5
9. Configure Virtual Private Networks (VPN)	Level 5	Technical	28	42	70	7
10. Perform Traffic Filtration on Next Generation Firewall	Level 5	Technical	28	42	70	7
11. Perform Cyber Security Functions	Level 5	Technical	28	42	70	7



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12. Manage and Supervise the Job Activities	Level 5	Generic	32	48	80	8
13. Develop Entrepreneurial Skills	Level 5	Generic	16	24	40	4
14. Practice Professionalism	Level 5	Generic	100	200	300	30
Total			460	740	1200	120



11. Detail of Qualification and its Competency Standards

Level 5

061304 -A Manage Repositories on Cloud Side

Overview: After this competency standard candidate will be able manage repositories n Cloud.

Competency Unit	Performance Criteria
CU1. Setup Version	P1. Setup version control system to store repositories P2. Setup / add user accounts P3. Install / Setup local copy of repository on developer's systems
CU2. Control Versions of code repository	P1. Integrate the local copy with development environment P2. Create branches and sub branches of code repository

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Explain the need of version control system
- Understanding of **AWS** Code Commit and **source control system**
- Understanding of **Azure Repos**, **Azure** Pipelines, **Azure** DevOps Server,
- Explore and compare different sub-versioning system like git / svn etc.
- Managing users and on version control system
- An understanding of DevOps and the modern DevOps toolsets
- The ability to automate all aspects of a modern code delivery and deployment pipeline using:
 - Source code management tools – CVS, Git
 - Build tools – Apache Ant, Maven
 - Test automation tools – JUnit
 - Continuous Integration Tools – Jenkins, Team city
 - Configuration management tools – Chef, Puppet, Ansible
 - Introduction to Azure Container Service
 - Overview of Containers
 - Introduction to Azure Container Registry
 - Azure Kubernetes Services

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System min 5th generation with 8 GB ram



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2.	Internet Connection
3.	Web Browser, SVN
4.	Development kit

Critical Evidence(s) Required

The candidate needs to produce following Critical Evidence(s) in order to be competent in this competency standard:

- Manage version control system to store repositories on cloud side



061304- B Configure Tools for Continuous Deployment (DevOps)

Overview: This competency standard covers the skills and knowledge required to improve collaboration between all stakeholders from planning through delivery and automation of the delivery process

Competency Unit	Performance Criteria
CU1. Deploy Continuous Integration System	<p>P1. Automate the build by integrating the code of different developers</p> <p>P2. Automate the posting of software packages to different repositories.</p> <p>P3. Deploy across different environments</p> <p>P4. Automate the creation of environment (Dev/QA/Staging) images for facilitating development and testing</p> <p>P5. Automate the deployment across different environments</p>
CU2. Deploy Continuous Delivery and deployment system	<p>P1. Build Automation push a Docker image to the repository.</p> <p>P2. Release Alpha version to collect feed.</p> <p>P3. Release Beta version to perform testing</p> <p>P4. Release Production version after necessary changes</p> <p>P5. Deploy Manual to production server</p> <p>P6. Use tools to Automatically deploy to the production</p>

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Explain the need of version control system
- Understanding of **AWS** Code Commit and **source control system**
- Understanding of **Azure Repos**, **Azure Pipelines**, **AzureDevOps** Server,
- Explore and compare different sub-versioning system like git / svn etc.
- Managing users and on version control system
 - An understanding of DevOps and the modern DevOps toolsets
 - The ability to automate all aspects of a modern code delivery and deployment pipeline using:
 - Source code management tools – CVS, Git
 - Build tools – Apache Ant, Maven
 - Test automation tools – JUnit
 - Continuous Integration Tools Jenkins, Team city
 - Configuration management tools Chef, Puppet, Ansible
 - Introduction to Azure Container Service
 - Overview of Containers
 - Introduction to Azure Container Registry
 - Azure Kubernetes Services

Tools and Equipment



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The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System min 5th generation with 8 GB ram
2.	Internet Connection
3.	SVN
4.	Azure, Amazon Accounts
5.	Git master, Slack, jenkins, docker, Nagios,

Critical Evidence(s) Required

The candidate needs to produce following Critical Evidence(s) in order to be competent in this competency standard:

- Configure Tools for Continuous Deployment (DevOps)



061304- C Manage Web Applications on Cloud

Overview: After this competency standard candidate will be able to configure, host and manage web applications on cloud.

Competency Unit	Performance Criteria
CU1. Manage Files for hosting	P1. Manage Files through file manager. P2. Create a Web Disk account P3. Modify and manage images P4. Set a password to protect certain directories P5. Monitor account's available space P6. Configure FTP Accounts P7. Monitor visitors that are logged into your site through FTP P8. Create your website Backup P9. Create Git repositories P10. Manage Git™ repositories
CU2. Manage Databases and domains of hosting site	P1. Create Database on assigned cloud account P2. Create User P3. Add user to Database P4. Give Privilege to users modify Databases P5. Manage your domains P6. Create Addon Domain P7. Manage Subdomain P8. Configure your website available from another domain name P9. Manage redirects P10. Configure Zone Editor
CU3. Configure Email for Domain	P1. Create an Email Account Forwarder P2. Route a domain's incoming mail P3. Configure Email Filters
CU4. Manage Security for Domain Hosting	P1. Configure SSH (Secure Shell) Access P2. Manage IP Blocker P3. Configure SSL (Secure Sockets Layer) / TLS (Transport Layer Security)
CU5. Install open source CMS (Content Management System)	P1. Configure Installation of CMS P2. Configure Database for CMS



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Knowledge & Understanding:

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Understanding of Azure/Aws Storage, AWS/Azure DB
- Describe File System
- Describe Domain Types
- Explain Different types of Security protocols
- Describe Email system
- Define DNS Zones

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System
2.	Internet Connection
3.	Web Server
4.	Web Host Manager (Webmin, Ispconfig, vestacp)
5.	Amazon, Azure

Critical Evidence(s) Required

The candidate needs to produce following Critical Evidence(s) in order to be competent in this competency standard:

- Deploy VM in Availability set and load balancing the traffic through External Load Balancer
- Deploy Web Apps in two different regions and manage it through traffic manager



061304- D Manage Public Cloud Services

Overview: This competency unit covers the skills and required knowledge to configure virtual machine/network, perform basic security/cloud computation, create backup and restore virtual machine and deploy Provisioning and Management.

Competency Units		Performance Criterion
CU1. Configure Machines	Virtual	P1: Create and login cloud account P2: Select Operating System for server P3: Create the Virtual machine P4: Configure accessibility using FTP/SSH P5: Conduct test for verification of allocated resources P6: Install applications on the subjected machines
CU2. Configure Network	Virtual	P1. Select required specification for network P2. Select resources to create virtual network P3. Launch resources to create virtual network P4. Connect hosts with virtual network P5. Test the virtual network
CU3. Perform Basic Security		P1: Collect security level requirements P2: Inspect network design to detect security flaws P3: Select security operation as per requirement
CU4. Perform Computation	Cloud	P1: Select requirement and specification for applications P2: Launch cloud tool for required application P3: Assign resources to host P4: Install the required application P5: Test the environment
CU5. Create backup and restore virtual machine		P1: Create virtual machine image P2: Create job schedule for backups P3: Configure backup repository P4: Restore virtual machine backups
CU6. Deploy Provisioning and Management		P1: Select requirement and specification for deployment of resources P2: Launch the cloud tool P3: Create the resources for required tasks P4: Install the required application P5: Select the management tool



P6: Make the local backup on storage device

Knowledge and Understanding:

The trainee must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards, which includes the knowledge of:

- Basic knowledge of current industry-accepted Cloud Service provider services i.e EC2 Instance, Load Balancing, Auto-scaling, EBS (Elastic Block Storage), Storage in Cloud, Cloud Front, Identity Access Management (IAM), Amazon Virtual Private Cloud (VPC), Dynamo DB, AWS Management Tools, Application Services, Backup and Disaster Recovery
- Basic knowledge of Azure Virtual Machines, Azure Virtual Network and Services, Azure Active Directory (AD), Azure Backup and Site Recovery, Azure App Service, Azure Container Service, Azure Cosmos DB, Azure ARM Template
- Strong familiarity with Linux and Windows operating systems and cloud provider ecosystems like Amazon AWS
- Practical knowledge of any cloud foundation services related to compute, network, storage, content delivery, administration and security, deployment and management, automation technologies
- DevOps know-how building and deploying infrastructure with cloud deployment, build and test automation technologies

Tools & Equipment required:

Sr. No	Description
1	Laptop/Desktop system
2	Internet connection
3	Access to cloud service provider like AWS/Azure/Any VPS
4	SSH, Putty, core FTPLE, VMware

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** to be competent in this competency standard:

- Configure VM and run application on cloud server



061304- E Set High Performance Computing (HPC) Environment on Public Cloud

Overview: This competency unit covers the skills and required knowledge to configure the servers and set up the HPC-on-cloud.

Competency Units	Performance Criterion
CU1. Configure the servers.	P1: Select GPU requirement P2: Select the operating system, memory and storage as per requirement. P3: Add InfiniBand
CU2. Set up the HPC-on-cloud	P1: Select tool for creating HPC instance. P2: Perform operation of HPC application

Knowledge and Understanding:

The trainee must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards, which includes the knowledge of:

- Basic Knowledge Azure Batch, Azure Cycle Cloud
- Basic Knowledge AWS Data Sync, AWS Snowball, AWS Snow mobile, AWS Direct Connect
- Strong familiarity with Linux and Windows operating systems and cloud provider ecosystems like Amazon AWS, Microsoft Azure etc.,
- Basic Knowledge of Regions and Availability Zones of Cloud service provider
- Practical knowledge of AWS foundation services related to compute, network, storage, content delivery, administration and security, deployment and management, automation technologies
- DevOps know-how building and deploying infrastructure with cloud deployment, build and test automation technologies

Tools & Equipment required:

Sr. No	Description
1	Laptop/Desktop system
2	Internet connection
3	Access to public cloud service provider



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Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** to be competent in this competency standard:

- Choose cloud server as per requirement
- Demonstrate the connectivity of cloud services
- Show cloud machine specifications and list of supported services



061304- F Set up Environment for Bigdata and Blockchain on Cloud

Overview: This competency unit covers the skills and required knowledge to configure the servers and set up the bigdata and block chain on cloud

Competency Units	Performance Criterion
CU1. Configure the servers	P1: Select GPU requirement P2: Select the operating system, memory and storage P3: Configure the bandwidth
CU2. Set up the Bigdata and Blockchain on cloud	P1: Select tool for creating Bigdata and Blockchain instance P2: Perform the operation of Bigdata and Blockchain application

Knowledge and Understanding:

The trainee must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards, which includes the knowledge of:

- Azure Batch, Azure Cycle Cloud
- AWS Athena, S3 Storage, Dynamo DB, Redshift Data Warehouse, Kinesis, Elastic search, AWS Elastic Map Reduce, Amazon, Hyperledger Fabric and Ethereum
- Hadoop technologies: Event Hubs, Cloud Services, Web Apps, Blob Storage, SQL Azure, and HD Insight. Azure Blockchain Azure Blockchain Workbench, Azure Blockchain Development Kit
- Regions and Availability Zones of Cloud service provider
- AWS foundation services related to compute, network, storage, content delivery, administration and security, deployment and management, automation technologies

Tools & Equipment required:

Sr. No	Description
1	Laptop/Desktop system
2	Internet connection
3	Access to cloud service provider
4	Tools for Big Data and Blockchain

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** to be competent in this competency standard:

- Choose cloud server as per requirement
- Demonstrate the connectivity of cloud services
- Show cloud machine specifications and list of supported services



061304- G Perform Network and Cloud Security

Overview: This competency unit covers the skills and required knowledge to perform network and cloud security.

Competency Units	Performance Criterion
CU1. Apply Secure Service Layer (SSL) in your client server applications	P1. Install OpenSSL library on server and client side. P2. Create TCP socket and apply SSL on server and client application P3. Generate SSL certificates for client. P4. Install these certificates on server P5. Establish SSL based client server communication
CU2. Perform Network and Infrastructure Security	P1. Collect security requirements and specifications P2. Inspect network design to detect security flaws P3. Select security operation as per requirement
CU3. Apply Endpoint Security	P1. Detect malware / threats on operating system P2. Protect against malware / threats found on operating system P3. Clean threat /malware using antivirus tool
CU4. Perform Data Protection and Encryption	P1. Select data for protection P2. Take the backup of data P3. Protect the data using cloud service P4. Encrypt the data using available tools in the cloud.
CU5. Monitor Logging, Threat Detection, and Analytics	P1. Identify log files for any malicious activity P2. Conduct monitoring of threat P3. Generate reporting/analysis
CU6. Apply Identity and Access Control	P1. Select Identity /rights assignment requirements and specifications P2. Enforce business user authentication P3. Apply authorization and single sign-on.
CU7. Perform Vulnerability and Configuration Analysis	P1. Inspect application deployments for security risks and vulnerabilities, P2. Scan with cloud tools to identify the vulnerability P3. Configure cloud tool solutions



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CU8. Apply Application Security	P1. Assess code, logic, and application inputs to detect software vulnerabilities P2. Configure cloud tool for providing solution
CU9. Perform Security Operations and Automation	P1. Check security requirements and specifications P2. Use cloud tool to automate the security operations P3. Test the environment

Knowledge and Understanding:

The trainee must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards which includes the knowledge of:

- Strong familiarity with Linux and Windows operating systems and cloud provider ecosystems like Amazon AWS
- AWS/Azure foundation services related to compute, network, storage, content delivery, administration and security, deployment and management, automation technologies
- DevOps know-how building and deploying infrastructure with cloud deployment, build and test automation technologies
- complex enterprise environments and current technology areas like cloud and mobility Interoperability between operating systems
- Apply adept understanding and experience with systems automation platforms and technologies
- transport layer security
- Basic implementation of open SSL

Tools & Equipment required:

Sr. No	Description
1	Laptop/Desktop
2	Cloud security tools
3	Python Scripting

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** to be competent in this competency standard:

- Perform Network Security
- Perform Cloud Security



061304- H Deploy Hardware/Software Protection

Overview: This competency unit covers the skills and required knowledge to deploy hardware/software protection.

Competency Unit	Performance Criteria
CU1. Protect Computer Networking and cloud computing gateway from cyber-Attacks	<p>P1. Identify intruders in the communication network through vulnerability scans</p> <p>P2. Identify packet capture and injection in Wi-Fi attacks</p> <p>P3. Configure Computer Networking and cloud computing against cyber attack</p> <p>P4. Apply AES/TKIP on Computer Networking and cloud computing gateway</p> <p>P5. Apply MAC address filtering</p> <p>P6. Perform vulnerability test for Computer Networking and cloud computing gateway</p>
CU2. Secure device to device / end to end communication	<p>P1. Implement microservices by applying physical security</p> <p>P2. Delete, disable, or rename any default user accounts, and change all default passwords</p> <p>P3. Create additional accounts with limited privileges based on responsibilities</p> <p>P4. Update firmware's</p> <p>P5. Isolate Computer Networking and cloud computing devices by securing device to device communication through wireless PAN protocols</p> <p>P6. Secure cloud and Computer Networking and cloud computing device connection by applying SSL</p> <p>P7. Secure communication from device to gateway by encryption protocols</p>

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Understanding of information security
- Understanding of intruder knowledge
- Understanding of security threats
- Understanding of security attacks
- Differentiate between threats and attacks



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- Exemplify passive and active attacks
- Understanding authentication
- Understanding data confidentiality
- Understanding of data integrity
- Recognize security threats
- Recognize security attacks
- Demonstrate difference between physical attack, networks attack, software attack, and encryption attack with example
- Understanding of SSL certificate
- Understanding of Physical security and techniques (Deterrence, delay and detect)

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1	Windows operated Computer (PC/ Laptop)
2	Arduino IDE
3	NodeMCU / Raspberry PI

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** to be competent in this competency standard:

- Protect Computer Networking and cloud computing gateway from cyber-Attacks
- Secure device to device / end to end communication



061304- I Configure Virtual Private Networks (VPN)

Overview: This competency unit covers the skills and required knowledge to configure virtual private networks (VPN)

Competency Unit		Performance Criteria
CU1. Set up new Incoming Connection		P1. Perform network adaptor setting P2. Add new incoming connection P3. set IP addresses
CU2. Configure VPN for client		P1. Add new incoming connection P2. Set IP address for VPN client and connect

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Basic elements of VPN, IP address, Routing, Configuration and Router Logins
- Basic Knowledge of types of VPN
- Basic concepts of Integrity, encryption & Hashing
- Implementation of the settings and environment of the VPN

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1	Windows operated Computer (PC/ Laptop)
2	Internet connection
3	Routers to configure

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Configure VPN connection on router and client



061304- J Perform Traffic Filtration on Next Generation Firewall

Overview: This competency unit covers the skills and required knowledge to work on Firewalls for its basic configurations, security policies configurations, Network address translation configurations and the user management. The underpinning knowledge regarding computer operating systems and hardware will be sufficient to provide the basis for the job at workplace.

Competency Unit	Performance Criteria
CU1. Login to a Firewall	P1. Login to a device through the console port P2. Login to the device through telnet P3. Login to the device through SSH P4. Login to the device using the default web mode P5. Login to the device through the web UI
CU2. Configure Basic Firewall	P1. Install firewall on operating system P2. Update firewall to the latest vendor recommended firmware P3. Delete, disable, or rename any default user accounts, and change all default passwords P4. Create additional accounts with limited privileges based on responsibilities P5. Set up firewall zones and IP addresses P6. Configure access control lists (i.e set inbound and outbound rules) P7. Configure other firewall services and logging P8. Perform testing on firewall configuration P9. Generate report from firewall logs P10. Perform vulnerability scans P11. Set a host name for the firewall. P12. Set the system time of the firewall. P13. Backup and restore the firewall's configuration file
CU3. Configure Firewall Security Policies	P1. Configure IP addresses for interfaces. P2. Add the interfaces to security zones. P3. Configure firewall security policies on the CLI. P4. Configure firewall security policies on the web UI
CU4. Perform Network Address Translation	P1. Configure security zones P2. Configure a security policy P3. Configure a NAT address pool. P4. Configure a NAT Policy A



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CU5. Configure Firewall User Management

P1. Create user groups
P2. Create user policies B

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Basic knowledge about firewall login using Console Port, Telnet, SSH and Web UI.
- Basic knowledge about how to configure basic firewall configurations.
- How to Configure firewall security policies.
- Knowledge about Network Address Translation.
- Knowledge about Firewall User Management.

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1	Laptop/Desktop
2	Internet
3	Huawei/Cisco/Fortinet/Palo alto Next Generation Firewall
4	USB Console Cable
5	Terminal Emulator – Putty / Hyper Terminal / Secure CRT (Software)

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Configure Basic Firewall
- Configure Firewall Security Policies
- Perform Network Address Translation
- Configure Firewall User Management



061304- K Perform Cyber Security Functions

Overview: This competency unit covers the skills and required knowledge about the basic concepts used in the world of information security. This is a course that is perfect as an introductory one for individuals and students who are interested in becoming cyber security or information security professionals.

Competency Unit	Performance Criteria
CU1. Configure Reconnaissance and Foot printing	P1. Perform email tracking P2. Perform whois lookup P3. Find subdomain P4. Perform ping & Tracert applications
CU2. Perform Scanning of networks	P1. Perform Host scanning P2. Perform port scanning P3. Perform running services scanning
CU3. Perform Exploitation and sniffing	P1. Perform exploit with metasploite framework P2. Perform hash cracking P3. Install sniffing tool P4. Perform Sniffing with better cap
CU4. Secure web Applications Attack	P1. Perform Cross site scripting (xss) P2. Perform authentication broken

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Basic concepts and terminologies used in the information and cyber security fields
- Differentiate between the various forms of malware and how they affect computers and networks
- Understand how hackers actually hack
- Vulnerability assessment
- Exploitation
- Sniffing and Session Hijacking
- Web Applications Attack

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
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1	Laptop/Desktop
2	Internet
3	Kali Linux
4	Windows 7,8,10 / Window Server 2012,16
5	VMWare 15.1, Metasploite framework, OpenVAS
6	NMAP, Zenmap,
7	Wireshark
8	Angryip scanner

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Configure Reconnaissance and Foot printing
- Perform Scanning of networks
- Perform Exploitation and sniffing
- Secure web Applications Attack



061304- L Manage and Supervise the Job Activities

Overview: This competency standard covers the skills and knowledge required to manage and supervise the job activities. You will be able to plan and supervise on-site operations / activities and doing the on -site inspection and prepare a report. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Unit	Performance Criteria
CU1. Plan for on-site operations	P1. Consult with the client to obtain required information P2. Prepare SOPs in accordance with the identified requirements. P3. Prepare the process flow diagram in order to achieve Quality outcome. P4. Break down work of activities into small achievable components and efficient sequences P5. Recognize site hazards and the personal protective equipment (PPE) and safety procedures specified for job P6. Organize site induction for support personnel as required P7. Plan housekeeping activities prior to and post completion of work
CU2. Supervise work activities to achieve desired results	P1. List and arrange required resources prior to commencement of work P2. Recognize the areas of work which could result in a delay of work, wastage of material or damage to tools. P3. Allocate responsibility to required team members to avoid conflicts P4. Review work plan in response to new information, urgent requests, changed situations or instructions from concern personnel P5. Cooperate with team members to achieve common goals
CU3. Perform on-site inspection	P1. Conduct inspection of work according to inspection plan P2. Identify defects and deficiencies at workplace P3. Record defects and deficiencies with evidence at workplace (if required) P4. Check the actions taken for rectification at workplace P5. Record the non-compliance and expected breaches at workplace



CU4. Prepare the inspection report

- P1.** Collect and review the information relevant to inspection activities for recoding inspection results
- P2.** Verify the integrity of information supplied by other party as a part of the inspection process
- P3.** Record inspection observations and findings
- P4.** Recommend the necessary corrective actions for tackling the identified problems

Knowledge & Understanding:

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Principles of planning and project management
- Roles and responsibilities for different levels of site supervision.
- Information relevant to inspection activities and work document preparation for recoding inspection results.
- Documentation and record system of the inspection body
- Different types of deficiencies in inspection activities
- Site problems and recommended corrective actions
- Awareness of environmental sustainability issues as they relate to the work task.

Critical Evidence(s) Required

The candidate needs to produce any or all of the following documents/evidences:

- Design effectively the supervision and inspection program in accordance with specifications
- Handle inspection items and samples by appropriate methods to meet the traceability requirements.
- Collaborate with the team members for allied works at site.



061304- M Develop Entrepreneurial Skills

Overview: This Competency Standard identifies the competencies required to develop entrepreneurial skills, in accordance with the organization’s approved guidelines and procedures. You will be expected to develop a business plan, collect information regarding funding sources, develop a marketing plan and develop basic business communication skills. Your underpinning knowledge regarding entrepreneurial skills will be sufficient to provide you the basis for your work.

Competency Unit	Performance Criteria
CU1. Develop a business plan	P1. Conduct market survey to collect information P2. Select the best option in terms of cost, service, quality, sales, profit margin, overall expenses P3. Compile the information collected through the market survey, in the business plan format
CU2. Collect information regarding funding sources	P1. Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate P2. Choose the best available option according to investment requirement P3. Prepare documents according to the loan agreement requirement P4. Include the information of funding sources in the business plan
CU3. Develop a marketing plan	P1. Collect information required to devise marketing plan P2. Prepare marketing plan for new business
CU4. Develop basic business communication skills	P1. Communicate with internal customers and external customers P2. Use different modes of communication to communicate internally and externally e.g.: presentation, speaking, writing, listening, visual representation, reading etc. P3. Use specific business terms used in the market

Knowledge & Understanding:

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- 7ps of marketing including product, price, placement, promotion, people, packaging and



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positioning

- 7Cs of business communication
- Different modes of communication and their application in the industry
- Business terms used in the industry
- Funding sources
- How to get loan to start a new business
- Market survey and its tools e.g.: questionnaire, interview, observation etc
- Market trends for specific product offering
- Elements of business plan
- How to fill the business plan format

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Conduct market survey and formulate business plans in terms of feasibility, investment potential, risk, and completeness.
- Effectively present business ideas and profile



061304- N: Practice Professionalism

Overview: This competency standard deal with learning the competencies needed to develop portfolio for industry. You can perform internship. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Unit	Performance Criteria
CU1. Develop Portfolio for industry	P1. Select previous assignments for portfolio P2. Work on previous selected assignments for portfolio P3. Compile variety of assignments for portfolio P4. Make Professional Portfolio for industry Develop Digital Portfolio for industry
CU2. Perform Internship	P1. Prepare for internship <ul style="list-style-type: none">• Personal Presentation• Portfolio Presentation P2. Interview preparation P3. Demonstrate Ethics for Internship P4. Identify Industry for internship P5. Perform Internship in Industry <ul style="list-style-type: none">• Fill the Performa of Internship P6. Report the performance of internship

Knowledge & Understanding:

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Importance of portfolio
- Ethics for Internship

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Professional
- Portfolio