13. Competency Profile Chart (CPC)

SECTION	(J) INFORMATION AND COMMUNICATION		
GROUP	(619) OTHER TELECOMMUNICATIONS ACTIVITIES		
AREA	COMPUTER NETWORK SYSTEMS		
NOSS TITLE	COMPUTER NETWORK SERVICES		
NOSS LEVEL	THREE (3)	NOSS CODE	J619-003-3:2023

↤COMPETENCY UNIT↦		↤WORK ACTIVITIES↦			
CORE	PERFORM COMPUTER SYSTEM INSTALLATION	PREPARE COMPUTER SYSTEM SET-UP COMPONENTS	CARRY OUT COMPUTER SYSTEM HARDWARE INSTALLATION	CARRY OUT COMPUTER OPERATING SYSTEM (OS) SOFTWARE INSTALLATION	CARRY OUT COMPUTER APPLICATION AND DEVICE DRIVER INSTALLATION
	J619-003-3:2023-C01	J619-003-3:2023-C01-W01	J619-003-3:2023-C01-W02	J619-003-3:2023-C01-W03	J619-003-3:2023-C01-W04
		PREPARE COMPUTER SYSTEM INSTALLATION RECORD			
		J619-003-3:2023-C01-W05			

↤COMPETENCY UNIT↦		↤WORK ACTIVITIES↦			
CORE	INSTALL COMPUTER NETWORKING STRUCTURED CABLING SYSTEM	IDENTIFY NETWORK CABLING REQUIREMENTS	SET UP NETWORK CABLING TOOLS, EQUIPMENT, AND MATERIALS (TEM)	CARRY OUT NETWORK CABLING INSTALLATION WORKS	IMPLEMENT FIBER OPTICS SPLICING WORKS
	J619-003-3:2023-C02	J619-003-3:2023-C02-W01	J619-003-3:2023-C02-W02	J619-003-3:2023-C02-W03	J619-003-3:2023-C02-W04
		CARRY OUT COMPUTER NETWORK CABLING TEST			
		J619-003-3:2023-C02-W05			
	INSTALL COMPUTER NETWORKING EQUIPMENT	CONDUCT NETWORK EQUIPMENT INSTALLATION SITE SURVEY	CONDUCT WIRELESS NETWORK SITE SURVEY ACTIVITY	PREPARE NETWORK EQUIPMENT INSTALLATION PLAN	CARRY OUT WIRED NETWORK EQUIPMENT INSTALLATION WORKS
	J619-003-3:2023-C03	J619-003-3:2023-C03-W01	J619-003-3:2023-C03-W02	J619-003-3:2023-C03-W03	J619-003-3:2023-C03-W04

↤COMPETENCY UNIT↦	↤WORK ACTIVITIES↦				
CORE		CARRY OUT WIRELESS NETWORK EQUIPMENT INSTALLATION WORKS J619-003-3:2023-C03-W05	CARRY OUT NETWORK END NODE INSTALLATION WORKS J619-003-3:2023-C03-W06		
	CONFIGURE COMPUTER NETWORKING EQUIPMENT J619-003-3:2023-C04	PRODUCE NETWORK INTERNET PROTOCOL (IP) ADDRESSING TABLE J619-003-3:2023-C04-W01	APPLY LAYER 3 ROUTER CONFIGURATION PARAMETERS J619-003-3:2023-C04-W02	APPLY LAYER 2 SWITCH CONFIGURATION PARAMETERS J619-003-3:2023-C04-W03	APPLY NETWORK FIREWALL CONFIGURATION PARAMETERS J619-003-3:2023-C04-W04
		APPLY WIRELESS ACCESS POINTS (AP) CONFIGURATION PARAMETERS J619-003-3:2023-C04-W05	PREPARE COMPUTER NETWORK CONFIGURATION RECORDS J619-003-3:2023-C04-W06		

↤COMPETENCY UNIT↦		↤WORK ACTIVITIES↦			
CORE	CONFIGURE COMPUTER NETWORKING APPLICATION SERVICES J619-003-3:2023-C05	IMPLEMENT SERVER HARDWARE INSTALLATION WORKS J619-003-3:2023-C05-W01	IMPLEMENT SERVER SOFTWARE INSTALLATION WORKS J619-003-3:2023-C05-W02	INSTALL NETWORKING APPLICATION SERVICES J619-003-3:2023-C05-W03	INSTALL NETWORK MONITORING SYSTEM SOFTWARE J619-003-3:2023-C05-W04
		INSTALL NETWORK AUTOMATION SYSTEM J619-003-3:2023-C05-W05	INSTALL NETWORK ATTACHED STORAGE (NAS) SYSTEM J619-003-3:2023-C05-W06		
	PERFORM COMPUTER NETWORKING SECURITY HARDENING J619-003-3:2023-C06	PREPARE NETWORK SECURITY HARDENING PLAN J619-003-3:2023-C06-W01	IMPLEMENT NETWORKING EQUIPMENT SECURITY HARDENING J619-003-3:2023-C06-W02	IMPLEMENT NETWORK END NODE SECURITY HARDENING J619-003-3:2023-C06-W03	

14. Competency Profile (CP)

SECTION	(J) Information and Communication		
GROUP	(619) Other Telecommunications Activities		
AREA	Computer Network Systems		
NOSS TITLE	Computer Network Services		
NOSS LEVEL	Three (3)	NOSS CODE	J619-003-3:2023

CU TITLE & CU CODE	Perform computer system installation J619-003-3:2023-C01
CU DESCRIPTOR	Perform computer system installation describes the activities of installing a complete computer system which comprises of hardware and software components. The vast options of computer hardware specifications and types of software application or utilities will be selected based on the user requirements specifications. This activity typically takes place before the computer systems is connected to the network and performed other computer network related software applications. The person who is competent in this CU should be able to prepare computer system set-up components, carry out computer system hardware installation, carry out computer Operating System (OS) software installation, carry out computer application and device driver installation and prepare computer system installation record. The outcome of this CU is computer system is successfully fully installed with all the relevant hardware and software application in accordance with required computer system hardware and software requirements.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
1. Prepare computer system set-up components.	1.1 Interpret computer systems set up specifications. 1.2 Identify computer hardware components. 1.3 Identify computer software applications.	1.1 Computer system hardware and software set up specifications translated in accordance with computer system technical specifications document. 1.2 Computer hardware components including CPU (processor, motherboard, memory, storage, ribbon cable and power supply unit) and other peripherals (monitor, mouse, keyboard, and speakers) determined

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
	1.4 Check computer systems set up components.	in accordance with computer system hardware technical specifications requirement. 1.3 Computer OS, software application and system utilities, device driver and installer files determined in accordance with computer system software technical specifications requirement. 1.4 Computer system hardware and software components version and specifications confirmed in accordance with computer system technical specifications document.
2. Carry out computer system hardware installation.	2.1 Assemble computer CPU components. 2.2 Assemble computer system peripherals. 2.3 Check computer hardware installation. 2.4 Check computer system cable connection. 2.5 Boot up computer system.	2.1 Computer CPU components including processor, motherboard, memory, storage, and power supply unit connected with Electrostatic Discharge (ESD) wrist strap on in accordance with computer hardware installation manuals. 2.2 Computer system peripherals including monitor, mouse, keyboard and speakers connected to the CPU in accordance with computer hardware installation manuals. 2.3 All computer hardware CPU components firmly secured to the slot in accordance with slot specifications on the motherboard. 2.4 All computer system peripherals firmly connected to the types of ports in accordance with ports specifications on the motherboard. 2.5 Computer hardware system boot up gracefully with NetBIOS without any error indications in accordance with installed computer hardware and peripherals.
3. Carry out computer Operating System (OS) software installation.	3.1 Identify computer OS installer file. 3.2 Check computer OS installation procedure. 3.3 Install computer OS software. 3.4 Boot up computer system.	3.1 Computer OS installer or executable file determined in accordance with types of OS. 3.2 Sequence of computer OS installation procedure confirmed in accordance with OS installation manuals. 3.3 Computer OS with valid/original license key and end node identification name set up in accordance with computer information table.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
	3.5 Check computer OS software installation status.	3.4 Computer OS software gracefully boot up without any error indication message in accordance with computer OS installation manuals. 3.5 Computer OS successfully installed status confirmed without any error or warning message notification in accordance with computer OS installation manuals.
4. Carry out computer application and device driver installation.	4.1 Identify application and device driver installer file. 4.2 Check application and device driver installation procedure. 4.3 Install computer application software. 4.4 Install computer system device driver software. 4.5 Boot up computer system. 4.6 Check application and device driver software installation status.	4.1 Computer application and device driver installer or executable file determined in accordance with types of application and device driver. 4.2 Sequence of application and device driver installation procedure confirmed in accordance with application and device driver installation manuals. 4.3 Application software with valid/original license key and user identification name set up in accordance with computer information table. 4.4 Device driver software with matching specification and version set up in accordance with device manufacturer's release notes. 4.5 Application software and device driver successfully loaded during boot up without any error indication message in accordance with computer systems installation manuals. 4.6 Application software and device driver installed status confirmed without any error or warning message notification in accordance with operating system installation manuals.
5. Prepare computer system installation record.	5.1 Tabulate computer hardware installation details. 5.2 Tabulate computer application software details. 5.3 Tabulate computer device driver software details.	5.1 Computer processor, motherboard, memory, storage and power supply unit details specifications, serial number and warranty period compiled in accordance with computer hardware record procedure. 5.2 Computer OS and application software release version and license key compiled in accordance with computer software record procedure. 5.3 Computer device driver software version and release compiled in accordance with computer device driver record procedure.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
	5.4 Produce computer system installation record.	5.4 Computer system installation record generated in accordance with computer systems record procedure.

CU TITLE & CU CODE	Install computer networking structured cabling system J619-003-3:2023-C02
CU DESCRIPTOR	Install computer networking structured cabling system describes the competency to plan, install, testing and commissioning activities of a complete computer cabling infrastructure. Network cables are used to connect and transfer data and information between computers, routers, switches, firewall and storage area networks. These cables are essentially the carrier or media through which data flows. The person who is competent in this CU should be able to identify network cabling requirements, set up network cabling Tools, Equipment and Materials (TEM), carry out network cabling installation works, implement fiber optics splicing works and carry out network cabling test. The outcome of this CU is a ready to be used, neatly organised and functioning computer network structured cabling system in accordance with the types of computer network technology.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
1. Identify network cabling requirements.	1.1 Interpret network topology requirements. 1.2 Check types of network cabling required. 1.3 Check number of cable runs required. 1.4 Check network equipment and end node interconnectivity distance. 1.5 Produce network cabling schematic diagram.	1.1 Network topology requirements consisting of network architecture, topology, number of network equipment and end node determined in accordance with network cabling design procedure. 1.2 Fiber optics and Unshielded Twisted Pair (UTP) types of network cabling confirmed based on network equipment and end node port interface. 1.3 Total number of cables runs for horizontal and vertical cabling confirmed in accordance with network cabling design procedure. 1.4 Network interconnectivity distance confirmed in accordance with types of cables technical specifications. 1.5 Network schematic diagram consisting of types of cables, number of cables runs, cable routing and cables termination points created in accordance with network cabling installation procedure.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
2. Set up network cabling Tools, Equipment, And Materials (TEM).	2.1 Identify network cabling installation tools and equipment. 2.2 Identify network cabling installation materials and accessories. 2.3 Check network cabling tools and equipment operability. 2.4 Despatch network cabling installation tools, equipment and materials to work area.	2.1 Network cabling installation tools and equipment including wire cutters, RJ45 crimp tools, cable stripper, cable puncher, splicing machine and cable tester determined in accordance with network cables installation procedures. 2.2 Network cabling installation materials and accessories including fiber optics, UTP cables, faceplate, patch panel, connectors, cable tie and cable tray determined in accordance with network cables installation procedures. 2.3 Network cabling tools and equipment functions and operates in accordance with network cable installation tools and equipment requirements. 2.4 Network cabling installation tools, equipment and materials delivered to work area in accordance with network cables installation requirements.
3. Carry out network cabling installation works.	3.1 Identify network cable route plan. 3.2 Lay network cable. 3.3 Install network cable accessories. 3.4 Implement network cable termination. 3.5 Implement network cable tagging.	3.1 Network cable routing and path plan determined in accordance with network cable schematic diagram. 3.2 Fiber optics and UTP cables installed along the determined cable route in accordance with network cable schematic diagram. 3.3 Network cables faceplate, patch panel, connectors and cable tie fixed to the respective cables in accordance with network cable technical specifications. 3.4 Network cables fixed to the sequence port number on patch panel and face plate in accordance with network cable technical installation procedure. 3.5 Network cable identification using numbering or alphabetical code labelled in accordance with network cable tagging procedure.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
4. Implement fiber optics splicing works.	4.1 Identify fiber optics connection point. 4.2 Check splicing tools and fiber optics cables cleanliness. 4.3 Prepare fiber optics cables. 4.4 Cleave fiber optics cables. 4.5 Execute splicing process. 4.6 Secure united fiber optics cables.	4.1 Two endpoints of fiber optics cable to be joined determined in accordance with fiber optics splicing procedure. 4.2 Mechanical fiber stripper and splicing machine confirmed free from any dirt and loose materials in accordance with fiber optics splicing procedure. 4.3 Fiber optics cables protective polymer coating stripped using mechanical fiber stripper until fiber cores in accordance with fiber optics splicing procedure. 4.4 Clean, mirror smooth break on the fiber cores with ends perpendicular to the fiber axis rendered using fiber cleaver in accordance with fiber optics splicing procedure. 4.5 Splicing process using mechanical or fusion method executed after fiber precisely ends position/aligned together manually/automatically in accordance with fiber optics splicing procedure. 4.6 Exposed spliced fiber optics cables protected by applying recoating or splice protector including heat shrink plastic, silicone gel or mechanical crimp in accordance with fiber optics splicing procedure.
5. Carry out computer network cabling test.	5.1 Identify cabling test checklist. 5.2 Check individual cable identity. 5.3 Implement individual cable testing activity. 5.4 Compile individual cable testing status.	5.1 Cabling continuity, wire mapping and attenuation level for cabling certification checklist determined in accordance with network cabling installation and commissioning test criteria. 5.2 Cable labelling with matching identity confirmed in accordance with network cabling installation and commissioning test criteria. 5.3 Cable testing procedure including continuity test, straight and cross wire mapping test and attenuation level measurement executed in accordance with network cabling installation and commissioning test procedure. 5.4 Individual cable test result pass, fail and attenuation level readings recorded in accordance with cabling works installation, testing and commissioning documentation purposes.

CU TITLE & CU CODE	Install computer networking equipment J619-003-3:2023-C03
CU DESCRIPTOR	Install computer networking equipment describes the competency to install networking equipment consisting of router, firewall, network switches and end node devices within a Local Area Network (LAN). The networking equipment installation also incorporates the cabling patching works between the networking equipment to the structured cabling system. The person who is competent in this CU should be able to conduct network equipment installation site survey, conduct wireless network site survey activity, prepare network equipment installation plan, carry out wired network equipment installation works, carry out wireless network equipment installation works and carry out end node installation works. The outcome of this CU is all network equipment and end node devices are installed and connected to the network in accordance with network equipment physical diagram.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
1. Conduct network equipment installation site survey.	1.1 Identify site survey checklist. 1.2 Prepare site survey tools and equipment. 1.3 Check network equipment room condition. 1.4 Check network equipment power supply readiness. 1.5 Check cabling infrastructure readiness. 1.6 Prepare site survey record.	1.1 Site survey checklist criteria covering network equipment room condition, power supply and cabling infrastructure readiness determined in accordance with network equipment site inspection procedure. 1.2 Hand tools, measuring tools and wireless site survey software set up in accordance with computer network site survey requirements. 1.3 Good ventilation and constant ambient temperature of between 21^{o} to 24^{o} Celsius for network equipment room confirmed in accordance with network equipment technical specifications. 1.4 Matching plug power supply with network equipment power supply unit confirmed in accordance with network equipment technical specifications.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
		1.5 Cabling run with proper termination on patch panel and faceplate confirmed in accordance with network site survey requirements. 1.6 Site survey outcome details recorded in accordance with network site survey documentation procedure.
2. Conduct wireless network site survey activity.	2.1 Identify wireless network requirements. 2.2 Acquire facility diagram. 2.3 Identify required wireless coverage area. 2.4 Run wireless site survey simulation. 2.5 Check wireless access point placement suitability.	2.1 Wireless network target data rates/throughput and technologies including 802.11a/b/g, 802.11n, 802.11ac or 802.11ax determined in accordance with wireless network technical specifications requirements. 2.2 Wireless network facility diagram and floor layout complete with dimensioning information retrieved in accordance with wireless site survey procedure. 2.3 Wireless coverage area within the facility determined in accordance with wireless network signal coverage requirements. 2.4 Wireless access point placement with 25% of signal propagation overlapping over target wireless coverage area simulated using wireless site survey software in accordance with wireless site survey procedure. 2.5 Wireless access point mounting suitability and power source availability confirmed based on recommended wireless access point placement.
3. Prepare network equipment installation plan.	3.1 Identify installation scope of works. 3.2 Identify key installation process. 3.3 Check installation site accessibility. 3.4 Produce installation schedule/ timeline. 3.5 Produce network equipment physical drawing.	3.1 Install, configure and testing and commissioning scope of works for network equipment installation determined in accordance with network equipment installation scope of services. 3.2 Details of network equipment installation stage, configuration stage and testing and commissioning stage activities determined in accordance with network equipment installation plan. 3.3 Site accessibility and permitted working hours confirmed in accordance with facility rules and regulations. 3.4 Network equipment installation schedule/timeline with clear indication of start date, end date and every stage timeline generated in accordance with network equipment installation plan documentation.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
	3.6 Produce network equipment rack drawing. 3.7 Produce network equipment logical drawing.	3.5 Network equipment physical drawing with clear indication of network equipment name, interconnectivity, types of cabling used and no of ports/interface connections generated in accordance with network equipment installation plan documentation. 3.6 Position of wired network equipment in network rack generated in accordance with network equipment installation plan documentation. 3.7 Network equipment logical drawing with clear indication of network equipment name, logical interconnectivity, virtual LAN, and logical links speed generated in accordance with network equipment installation plan documentation.
4. Carry out wired network equipment installation works.	4.1 Identify types of wired network equipment. 4.2 Locate wired network equipment rack location. 4.3 Rack mount wired network equipment. 4.4 Implement cable patching works. 4.5 Power up wired network equipment.	4.1 Types and quantity of wired network equipment comprising of router, firewall and network switch determined in accordance with network equipment physical drawing. 4.2 Router, firewall and network switch rack location and mounting height position confirmed in accordance with network equipment rack drawing. 4.3 Router, firewall and network switch mounting bracket with ESD wrist strap fastened on installed and mounted on network rack in accordance with network equipment rack drawing. 4.4 Patching works between router, firewall and network switch and cabling patch panel installed in accordance with network equipment physical drawing. 4.5 Router, firewall and network switch power supply unit connected to power source to kickstart booting up process in accordance with network equipment installation manuals.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
5. Carry out wireless network equipment installation works.	5.1 Identify types of wireless network equipment. 5.2 Locate wireless network equipment mounting position. 5.3 Mount wireless network equipment. 5.4 Implement cable patching works. 5.5 Power up wireless network equipment.	5.1 Types and quantity of wireless network equipment comprising of wireless access points and wireless mesh determined in accordance with network equipment physical drawing. 5.2 Wireless access points and wireless mesh mounting position confirmed in accordance with network equipment rack drawing. 5.3 Wireless access points and wireless mesh mounting bracket ESD wrist strap fastened on installed and mounted on facility ceiling or walls in accordance with network equipment physical drawing. 5.4 Patching works between wireless access points, wireless mesh and faceplate installed in accordance with network equipment physical drawing. 5.5 Wireless access points and wireless mesh power adapter unit connected to power source to kickstart booting up process in accordance with network equipment installation manuals.
6. Carry out network end node installation works.	6.1 Identify types of end node device. 6.2 Locate end node device location. 6.3 Implement cable patching works. 6.4 Power up end node device.	6.1 Types and quantity of end node device comprising of computers and network printer determined in accordance with network equipment physical drawing. 6.2 Computer and network printer location confirmed in accordance with network equipment physical drawing. 6.3 Patching works between computer and network printer and faceplate installed in accordance with network equipment physical drawing. 6.4 Computer and network printer power adapter unit connected to power source to kickstart booting up process in accordance with network equipment installation manuals.

CU TITLE & CU CODE	Configure computer networking equipment J619-003-3:2023-C04
CU DESCRIPTOR	Configure computer networking equipment describes the competency to configure main network equipment that forms a complete Local Area Network (LAN). The main LAN components consists of router, firewall, switch and wireless Access Points (AP). The person who is competent in this CU should be able to produce network Internet Protocol (IP) addressing table, apply layer 3 router configuration parameters, apply layer 2 switch configuration parameters, apply network firewall configuration parameters, apply wireless Access Points (AP) configuration parameters, and prepare computer network configuration records. The outcome of this CU is all components and end node in the Local Area Network (LAN) are interconnected and able to reach to one another in accordance with computer network objectives.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
1. Produce network Internet Protocol (IP) addressing table.	1.1 Acquire public IP address from internet service provider. 1.2 Check private IP address class suitability. 1.3 Check total numbers of network host. 1.4 Check IP address subnet mask. 1.5 Prepare public and private IP addressing listing record.	1.1 Complete 32 binary bits and legitimate public IP address for internet facing connections on router obtained from internet service provider in accordance with Internet Service Provider (ISP) internet application services procedure. 1.2 Private IP address class A, B or C determined for subnet and hosts usage within the local area network determined based on network equipment logical drawings. 1.3 Total numbers of end nodes for computer, network printer and other network attached devices determined in accordance with IP address class. 1.4 Default class A, B or C subnet mask for network and hosts identification determined in accordance with IP addressing subnetting calculations. 1.5 Public and private IP address addressing listing record with IP address assignment to network equipment and end node tabulated for references and cross check in accordance with network equipment configuration documentation.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
2. Apply layer 3 router configuration parameters.	2.1 Identify service provider public IP address. 2.2 Identify private IP address. 2.3 Access router Command Line Interface (CLI) console. 2.4 Configure public IP interface. 2.5 Configure private IP interface. 2.6 Configure default static route. 2.7 Enable public and private IP interface. 2.8 Assign network management IP address. 2.9 Implement ping test. 2.10 Save network configuration settings.	2.1 Internet service provider public IP address determined from IP addressing listing record in accordance with network equipment configuration documentation. 2.2 Private IP address to be used for internal networks determined from IP addressing listing record in accordance with network equipment configuration documentation. 2.3 Router CLI console logged on by using serial RS-232 cable and serial console software in accordance with network equipment installation manuals. 2.4 Complete 32 binary bits public IP address for ISP facing network configured via CLI console in accordance with network equipment installation manuals. 2.5 Complete 32 binary bits private IP address for internal facing network configured via CLI console in accordance with network equipment installation manuals. 2.6 Default static route (next hop IP address) for outbound requested network traffic (not within internal routing table) configured via CLI console in accordance with network equipment installation manuals. 2.7 Public and private interface on the router enabled via CLI console in accordance with network equipment installation manuals. 2.8 Router management IP address for network monitoring and configuration purposes configured via CLI console in accordance with network equipment installation manuals. 2.9 Network connectivity ping test successfully executed via CLI console in accordance with network equipment installation manuals. 2.10 Router configuration settings saved in router internal memory in accordance with network equipment installation manuals.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
3. Apply layer 2 switch configuration parameters.	3.1 Identify network subnets and hosts. 3.2 Access switch CLI terminal. 3.3 Configure Virtual Local Area Network (VLAN). 3.4 Configure ports grouping. 3.5 Configure default gateway. 3.6 Disable unused ports. 3.7 Assign network management IP address. 3.8 Implement ping test. 3.9 Save network configuration settings.	3.1 Networks subnets and hosts to be used for internal networks determined from IP addressing listing record in accordance with network equipment configuration documentation. 3.2 Switch CLI console logged on by using serial RS-232 cable and serial console software in accordance with network equipment installation manuals. 3.3 Logical group of subnets VLAN configured via CLI console in accordance with network equipment installation manuals. 3.4 Physical ports grouping logically configured to a subnet VLAN via CLI console in accordance with network equipment installation manuals. 3.5 Default gateway IP address for traffic outside of the local network configured via CLI console in accordance with network equipment installation manuals. 3.6 All unconnected physical ports on switch disabled via CLI console in accordance with network equipment installation manuals. 3.7 Switch management IP address for network monitoring and configuration purposes configured via CLI console in accordance with network equipment installation manuals. 3.8 Network connectivity ping test successfully executed via CLI console in accordance with network equipment installation manuals. 3.9 Router configuration settings saved in router internal memory in accordance with network equipment installation manuals.
4. Apply network firewall configuration parameters.	4.1 Identify firewall internal and external interface IP address. 4.2 Identify firewall mode. 4.3 Access firewall CLI terminal. 4.4 Configure external and internal zones.	4.1 Firewall internal and external interfaces IP address determined from IP addressing listing record in accordance with network equipment configuration procedure. 4.2 Firewall routed (layer 3) or transparent (layer 2) mode of operations determined in accordance with network equipment logical diagram.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
	4.5 Configure (De-Militarised Zone) DMZ zone. 4.6 Assign zone security level. 4.7 Configure firewall management IP. 4.8 Access firewall Graphical User Interface (GUI) console. 4.9 Configure Network Address Translation NAT and Port Address Translation (PAT). 4.10 Configure default gateway. 4.11 Configure firewall access rules/policy. 4.12 Save firewall configuration settings.	4.3 Firewall CLI console logged on by using serial RS-232 cable and serial console software in accordance with network equipment installation manuals. 4.4 Complete 32 binary bits IP address for external and internal zones configured via CLI console in accordance with network equipment installation manuals. 4.5 Complete 32 binary bits IP address for DMZ zone configured via CLI console in accordance with network equipment installation manuals. 4.6 Firewall zones security weightage applied to all configured zone in firewall in accordance with network equipment installation manuals. 4.7 Firewall management IP address for network monitoring and configuration purposes configured via CLI console in accordance with network equipment installation manuals. 4.8 Firewall GUI console logged on by using firewall management IP through web browser or manufacturer's applications in accordance with network equipment installation manuals. 4.9 NAT and PAT between external, internal and DMZ zones configured via GUI console for IP address translation between these security zones in accordance with network equipment installation manuals. 4.10 Default gateway route for outbound requested network traffic (not within internal network) configured via GUI console in accordance with network equipment installation manuals. 4.11 Firewall access rules/policy for all incoming and outgoing bound traffic between all security zones configured via GUI console in accordance with network equipment installation manuals. 4.12 Firewall configuration settings saved in firewall internal memory in accordance with network equipment installation manuals.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
5. Apply wireless Access Points (AP) configuration parameters.	5.1 Access wireless Access Point (AP) CLI terminal. 5.2 Assign wireless Access Points (AP) management IP address. 5.3 Access wireless AP Graphical User Interface (GUI) console. 5.4 Configure wireless AP radio settings. 5.5 Configure wireless AP Service Set Identifiers (SSID). 5.6 Configure wireless AP encryption method. 5.7 Implement wireless AP network connection association test. 5.8 Save wireless AP configuration settings.	5.1 Wireless AP CLI console logged on by using serial RS-232 cable and serial console software in accordance with network equipment installation manuals. 5.2 Wireless AP management IP address for network monitoring and configuration purposes configured via CLI console in accordance with network equipment installation manuals. 5.3 Wireless AP GUI console logged on by using wireless AP management IP through web browser or manufacturer's applications in accordance with network equipment installation manuals. 5.4 Wireless AP radio power level and frequency settings of 802.11n, 802.11ac or 802.11ax standards configured in accordance with network equipment installation manuals. 5.5 SSID name broadcasting in beacon for advertising of available wireless network name configured in accordance with network equipment installation manuals. 5.6 Wireless AP encryption method of Wi-Fi Protected Access (WPA), WPA2 and WPA3 and the associated encryption method of Temporal Key Integrity Protocol (TKIP), Advanced Encryption Standard – Counter Mode CBC-Mac Protocol (AES-CCMP) configured in accordance with network equipment installation manuals. 5.7 Wireless client to wireless SSID association test successfully executed in accordance with network equipment installation manuals. 5.8 Wireless AP configuration saved in wireless AP internal memory in accordance with network equipment installation manuals.
6. Prepare computer network configuration records.	6.1 Compile computer network equipment hardware installation details.	6.1 Computer network equipment including network switches, routers, firewall and wireless AP unit details specifications, serial number and warranty period recorded in accordance with computer network record procedure.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
	6.2 Compile computer network equipment configuration details. 6.3 Compile computer network diagram details. 6.4 Produce computer network configuration record.	6.2 Computer network configuration including network IP addressing, layer 2 configuration, layer 3 configuration, firewall policy and wireless security recorded in accordance with computer software record procedure. 6.3 Computer network diagram including structured cabling diagram, network physical diagram and logical diagram recorded in accordance with computer device driver record procedure. 6.4 Computer network configuration record generated in accordance with computer network records procedure.

CU TITLE & CU CODE	Configure computer networking application services J619-003-3:2023-C05
CU DESCRIPTOR	Configure computer networking application services describes the competency to install and make ready of core networking application services. The core application services include web server, Domain Name Server (DNS), Dynamic Host Configuration Protocol (DHCP) server, directory server and network monitoring system. All of these services will run can either run on a dedicated servers or a shared server to reduce the number of nodes in the network. The person who is competent in this CU should be able to implement server hardware installation works, implement server software installation works, install networking application services, install network monitoring system software, install network automation system and install Network Attached Storage (NAS) system. The outcome of this CU is all network application services is up and running efficiently with zero disruptions to normal network operations.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
1 Implement server hardware installation works.	1.1 Assemble server CPU components. 1.2 Assemble server system peripherals. 1.3 Check server hardware installation. 1.4 Check server system cable connection. 1.5 Boot up server hardware.	1.1 Server CPU components including processor, motherboard, memory, storage and power supply unit connected in accordance with server hardware installation manuals. 1.2 Server system peripherals including monitor, mouse and keyboard connected to the CPU in accordance with server hardware installation manuals. 1.3 All server hardware CPU components firmly secured to the slot in accordance with slot specifications on the motherboard. 1.4 All server system peripherals firmly connected to the types of ports in accordance with ports specifications on the motherboard. 1.5 Server hardware system boot up gracefully with NetBIOS without any error indications in accordance with installed server hardware and peripherals.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
2 Implement server software installation works.	2.1 Identify server OS installer file. 2.2 Check server OS installation procedure. 2.3 Install server OS software. 2.4 Boot up server system. 2.5 Check server OS software installation status.	2.1 Server OS installer or executable file determined in accordance with types of OS. 2.2 Sequence of server OS installation procedure confirmed in accordance with server OS installation manuals. 2.3 Server OS with valid/original license key and end node identification name set up in accordance with server information table. 2.4 Server OS software gracefully boot up without any error indication message in accordance with server OS installation manuals. 2.5 Server OS successfully installed status confirmed without any error or warning message notification in accordance with server OS installation manuals.
3 Install networking application services.	3.1 Identify networking services. 3.2 Enable web server services. 3.3 Enable Domain Name Server (DNS). 3.4 Enable Dynamic Host Configuration Protocol (DHCP) server services. 3.5 Enable directory server.	3.1 LAN networking services including web server, DNS server, DHCP server and directory server determined in accordance with core LAN services listings. 3.2 Web server services and role addition installed via server manager configuration in accordance with server OS installation manuals. 3.3 DNS server services, role addition and update address records installed via networking services features in accordance with server OS installation manuals. 3.4 DHCP server services, role addition and IP address pool range installed via networking services features in accordance with server OS installation manuals. 3.5 Directory server services, role addition and domain controller installed via networking services features in accordance with server OS installation manuals.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
4 Install network monitoring system software.	4.1 Identify types of network monitoring software. 4.2 Identify network monitoring software installer file. 4.3 Check network monitoring software installation procedure. 4.4 Check Simple Network Management Protocol (SNMP) status. 4.5 Install network monitoring software. 4.6 Restart server system. 4.7 Launch network monitoring software application.	4.1 Network monitoring software functions including availability. configuration and performance monitoring determined in accordance with network monitoring objectives. 4.2 Network monitoring software installer or executable file determined in accordance with types of network monitoring software. 4.3 Sequence of network monitoring software installation procedure confirmed in accordance with network monitoring software installation manuals. 4.4 Simple Network Management Protocol (SNMP) version 3 features for traffic flow protocol between network equipment and network management system confirmed enabled on all network equipment in accordance with network monitoring software installation manuals. 4.5 Network monitoring software with valid/original license key and administrator identification name set up in accordance with server information table. 4.6 Server system gracefully rebooted without any error indication message in accordance with network management system software installation manuals. 4.7 Network monitoring software application executed with all network equipment discovered in topology maps in accordance with network management system software installation manuals.
5 Install network automation system.	5.1 Identify network automation programming language. 5.2 Identify network automation tools. 5.3 Install network automation tools. 5.4 Develop router configuration backup script.	5.1 Compatible network automation programming language with specific network equipment manufacturers determined in accordance with network equipment automation compatibility list. 5.2 Compatible network automation tools determined in accordance with network equipment automation compatibility list. 5.3 Network automation tools installed under programming language module in accordance with network equipment automation best practice.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
	5.5 Run router configuration backup script.	5.4 Daily router configuration backup script generated with code editor in accordance with network automation tools command and syntax. 5.5 Router configuration backup script executed via programming language program CLI in accordance with network automation best practice.
6 Install Network Attached Storage (NAS) system.	6.1 Configure NAS fixed IP address. 6.2 Attach NAS system to LAN. 6.3 Install NAS application manager. 6.4 Run NAS drive initialization process. 6.5 Configure storage Redundant Array of Independent Disk (RAID) system. 6.6 Configure NAS administrator and user's account. 6.7 Configure user access folders.	6.1 NAS static/permanent IP address configured on NAS physical ethernet interfaces in accordance with NAS installation manuals. 6.2 NAS system connected to LAN switch via patch cord in accordance with NAS installation manuals. 6.3 NAS GUI console logged on by using NAS management IP through web browser or manufacturer's applications in accordance with NAS installation manuals. 6.4 Drive errors check and familiar file system scanning executed in drive initialization process via NAS GUI console in accordance with NAS installation manuals. 6.5 Selection of RAID 0, 1, 3 5 and 10 system for storage capacity, performance and reliability configured via NAS GUI console in accordance with NAS installation manuals. 6.6 NAS administrator and users account with distinct role/function configured via NAS GUI console in accordance with NAS installation manuals. 6.7 Dedicated or shared user access folders with specific storage space limit created via NAS GUI console in accordance with NAS installation manuals.

CU TITLE & CU CODE	Perform computer networking security hardening. J619-003-3:2023-C06
CU DESCRIPTOR	Perform computer networking security hardening describes the competency of securing the network equipment and end node from cybersecurity threats and critical data information leak. This activity is constantly performed to address the latest security issues in the network as the security threats keep evolving from time to time. The person who is competent in this CU should be able to prepare network security hardening plan, implement networking equipment security hardening and implement end node security hardening. The outcome of this CU is network equipment and end node security are at the optimum and is constantly updated to the latest security issues and concerns.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
1 Prepare network security hardening plan.	1.1 Identify default network equipment security features. 1.2 Identify network equipment security hardening area. 1.3 Check network security advisories and responses. 1.4 Check security feature updates. 1.5 Produce security hardening plan.	1.1 Default network security features determined in enabled state on all installed network equipment in accordance with network equipment technical specifications. 1.2 Network service, interface/port level and secure access security hardening area determined to reduce the risk of unauthorised access into the network in accordance with network equipment security advisories and recommendations. 1.3 Latest network equipment security advisories and responses applicable to security hardening area confirmed in accordance with latest network equipment security requirements document. 1.4 Latest security features updates and software patch updates availability confirmed in accordance with network equipment security updates announcements. 1.5 Security hardening plan covering the area of network service, interface/port level and secure access generated in accordance with latest network equipment security requirements document.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
2 Implement networking equipment security hardening.	2.1 Configure network logging features. 2.2 Assign network equipment access complex password. 2.3 Configure network access strongest encryption. 2.4 Configure port anti spoofing protections. 2.5 Install network equipment latest software patch. 2.6 Disable unused network services. 2.7 Disable unused network physical ports.	2.1 Network logging features configured pointing to a dedicated centralised server for constant security related message monitoring in accordance with network equipment security hardening plan document. 2.2 Network equipment access configured with strong and complex password to deny unauthorised access to network system in accordance with network equipment security hardening plan document. 2.3 Strongest network access encrypted protocol availability on network equipment including SSHv3, SNMPv3, TLS, WPA2 and WPA3 configured in accordance with network equipment security hardening plan document. 2.4 Port security features including IP source guard, port security, dynamic Address Resolution Protocol (ARP) inspection and DHCP snooping configured in accordance with network equipment security hardening plan document. 2.5 All network equipment OS updated with latest software release and patches addressing the latest vulnerabilities issues in accordance with network equipment security hardening plan document. 2.6 All unused network services turned off to deny any potential of services exploit in accordance with network equipment security hardening plan document. 2.7 All unused network physical ports turned off to prevent authorised access to network equipment in accordance with network equipment security hardening plan document.
3 Implement network end node security hardening.	3.1 Assign strong user password rules. 3.2 Update end node latest operating system software patch.	3.1 End node access configured with strong and complex password policy to deny unauthorised access to network system in accordance with end node security hardening plan document. 3.2 All end node OS software updated with latest software release and patches addressing the latest vulnerabilities issues in accordance with end node security hardening plan document.

WORK ACTIVITIES	WORK STEPS	PERFORMANCE CRITERIA
	3.3 Update end node latest service packs. 3.4 Configure end node firewall services. 3.5 Configure end node threat protection software. 3.6 Configure secure boot.	3.3 All end node OS software updated with latest service packs addressing the latest securities updates in accordance with end node security hardening plan document. 3.4 Firewall features and services on end node enabled with inbound and outbound rules against malware and threat in accordance with end node security hardening plan document. 3.5 Anti-malware and threat protection enabled with regular scanning schedule for application virus protection in accordance with end node security hardening plan document. 3.6 Secure boot features with Trusted Platform Module (TPM) 2.0 and Unified Extensible Firmware Interface (UEFI) enabled via BIOS mode on all end node in accordance with end node security hardening plan document.