QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR TELECOM INDUSTRY

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What are Occupational Standards(OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

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Introduction

Qualifications Pack- BroadBand Technician

SECTOR: TELECOM

SUB-SECTOR: Service Provider

OCCUPATION: CUSTOMER SERVICES

REFERENCE ID: TEL/Q0102
ALIGNED TO: NCO-2015/3114.0804

Brief Job Description: Broadband Technician is responsible for installation, configuration and testing of CPE (modem, routers and switches) for broadband access. He also establishes connectivity between CPE and end-user device (CPU, Laptop, tablets, Smart/IP TV etc.) at customer premises and carries out basic trouble-shooting for identifying, localizing & rectifying cable, connectivity and equipment fault in coordination with NOC.

Personal Attributes: Personal Attributes: This job requires the individual to have good communication skills with a clear diction; regional language proficiency; strong customer service focus; pleasant personality; should be self-motivated; should be able to apply practical judgment to successfully perform the assigned responsibilities and a team player with ability to work under pressure.

Job Details

Qualifications Pack Code	TEL/Q0102		
Job Role	**BroadBand Technician**		
Credits NSQF	**4**	**Version number**	**1.0**
Sector	**Telecom**	**Drafted on**	**07/11/13**
Sub-sector	**Service Provider**	**Last reviewed on**	**29/04/15**
Occupation	**Customer Services**	**Next review date**	**31/05/17**

Job Role	**Customer Premises Equipment**
Role Description	Broadband Technician is responsible for installation, configuration and testing of CPE (modem, routers, and switches) for broadband access. He also establishes connectivity between CPE and end-user device (CPU, Laptop, tablets, Smart/IP TV etc.) at customer premises and carries out basic trouble-shooting for identifying, localizing & rectifying cable, connectivity and equipment fault in coordination with NOC.
NSQF level	4
Minimum Educational Qualifications **Maximum Educational Qualifications**	10+2 / ITI (Electronics)
Training	NA
Experience	NA
Applicable National Occupational Standards (NOS)	(Click to open the below hyperlinks) **Compulsory:** 1. TEL/N0111 (**Cable/system wiring and equipment installation at customer premises**) 2. TEL/N0112 (**Configuration of equipment and establishing Broadband connectivity**) 3. TEL/N0113 (**Trouble-shoot to localize and rectify faults**) **Optional:** 4. TEL/N0114 (**UPS installation & Domestic Power Supply checks**)
Performance Criteria	As described in the relevant OS units

Definitions

Keywords /Terms	Description
Sector	Sector is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/related set of functions in an industry.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of OS.
Job Role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
OS	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria	Performance Criteria are statements that together specify the standard of performance required when carrying out a task.
NOS	NOS are Occupational Standards which apply uniquely in the Indian context.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack.
Qualifications Pack	Qualifications Pack comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification pack code.
Unit Code	Unit Code is a unique identifier for an Occupational Standard , which is denoted by an 'N'.
Unit Title	Unit Title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Knowledge and Understanding	Knowledge and Understanding are statements which together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to perform to the required standard.
Organizational Context	Organizational Context includes the way the organization is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills or Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the OS , these include communication related skills that are applicable to most job roles.

Acronyms

Keywords /Terms	Description
CPE	Customer Premise Equipment
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
Modem	Modulator/Demodulator
CPU	Central Processing Unit
PoP	Point of Presence
OHS	Organizational Health & Safety
EMI	Electro Magnetic Interference
EMC	Electro Magnetic Compatibility
JB	Junction Box
SHE	Safety Health & Environment
OHS	Operational Health & Safety
OFC	Optical Fiber Cable
STP	Shielded Twisted Pair
UTP	Un-Shielded Twisted Pair
MAC	Media Access Control
IP	Internet Protocol

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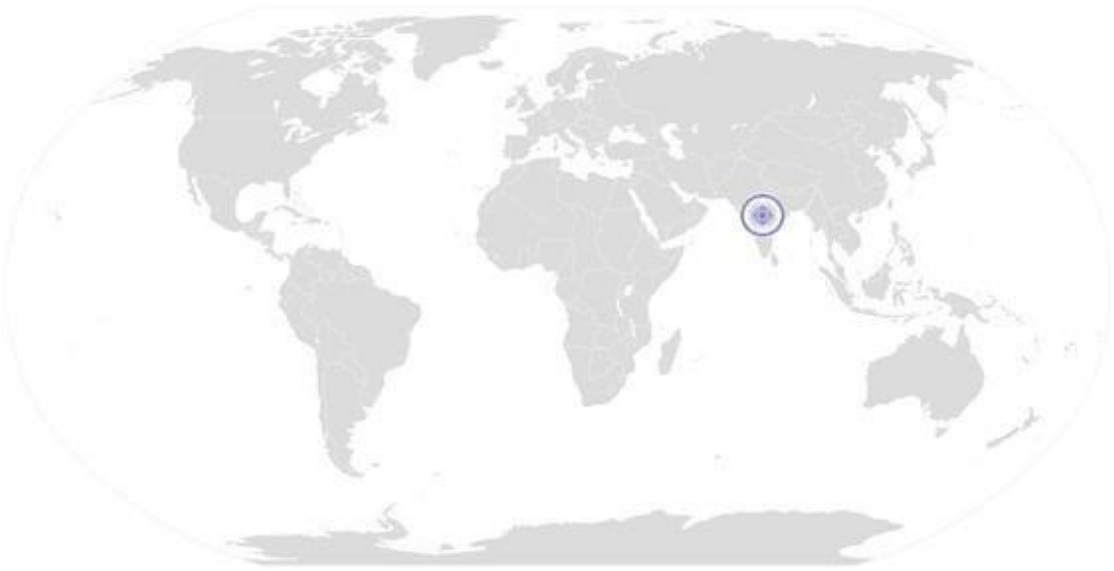
National Occupational Standard



Overview

This unit is about cable/system wiring & installation of customer premises equipment (CPE).

National Occupational Standard

Unit Code	TEL/N0111
Unit Title (Task)	System wiring & equipment installation at customer premises
Description	This unit is about cable/system wiring & installation of customer premises equipment. Cables include OFC, UTP/STP and Co-axial.
Scope	This unit/task covers the following: • Identify and mark cable route from PoP to customer premise • Identify and mark cable route within customer premise • Identify suitable position for equipment positioning • Undertake wiring, termination and equipment installation

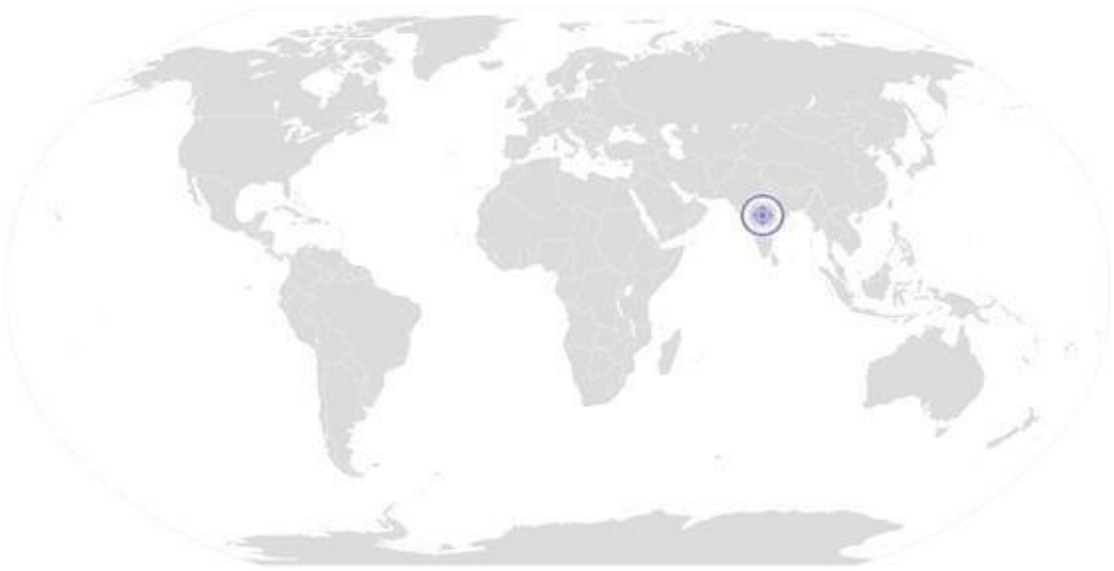
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Prepare for wiring and equipment installation	To be competent, the user/individual on the job must be able to PC1. arrange access to site according to required procedure PC2. organize tools, equipment and materials for a given work PC3. match cable type and connectors to installation environment and customer requirements PC4. check cable length for continuity PC5. verify cable route is free of electrical hazards and obstructions both outdoors and indoors PC6. verify that the cable running length is within the permissible limit to ensure designed throughput PC7. select suitable location for equipment installation wrt power point and signal coverage
Undertake wiring & Install system hardware	PC8. ensure structured wiring from PoP to Customer premise JB PC9. ensure neat wiring and clipping within customer premise PC10. ensure proper cable termination and use of appropriate connectors PC11. test the cable & joints for transmission loss and strength. Re-terminate if loss exceeds prescribed limits PC12. install equipment following electrical safety principals and manufacturer's instructions PC13. power-up the system ensuring proper earthing arrangement
Clean up worksite and complete documentation	PC14. removal and proper dispose of installation waste PC15. restore worksite to customer's satisfaction PC16. update plans and records with details of installation and test results PC17. complete all installation documents and customer signoff

Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. risk and impact of not following defined procedures/work instructions issued as per SHE & OSH guidelines. KA2. escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures ,fire and power failures KA3. records to be maintained and implications of non-maintenance of the same KA4. knowledge of obtaining cables and equipment from company KA5. knowledge of payment options and procedures KA6. first aid requirements in case of electrical shocks, cuts, fall and other common injuries
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. cabling types (OFC, UTP, STP, Twisted Pair etc.) and connectors (RJ-45, RJ-11 etc.) KB2. structured cabling norms (pertaining to laying the cables) KB3. working knowledge of cable laying and connectorisation KB4. knowledge of customer premise equipment (modem, routers, switches)
Skills (S)	
A. Core Skills/ Generic Skills	**Basic Reading & Writing Skills** The user/ individual on the job needs to know and understand how to: SA1. fill up appropriate technical forms, activity logs in required format of the company SA2. maintain proper records as per given format SA3. read and understand manuals, work orders, health and safety instructions, memos, reports etc.
	Communication Skills The user/ individual on the job needs to know and understand how to: SA4. courteous to the customers SA5. liaisioning and coordination skills SA6. communicate with supervisor and peers SA7. communicate in the local language (preferable)
B. Professional Skills	**Equipment installation/Task Management Skills** The user/individual on the job needs to know and understand how to: SB1. select a suitable installation location adhering to cabling norms and signal coverage (for Wi-Fi equipment) SB2. work systematically with required attention to detail and adherence to all safety requirements
	Technical Skills The user/individual on the job needs to know and understand how to: SB3. read and comprehend/understand equipment installation manual SB4. perform fault clearance

	SB5. use diagnostic equipment SB6. use hand and power tools

NOS Version Control

NOS Code	**TEL /N0111**		
Credits NSQF	4	**Version number**	**1.0**
Industry	**Telecom**	**Drafted on**	**07/11/13**
Industry Sub-sector	**Service Provider**	**Last reviewed on**	**29/04/15**
		Next review date	**31/05/17**



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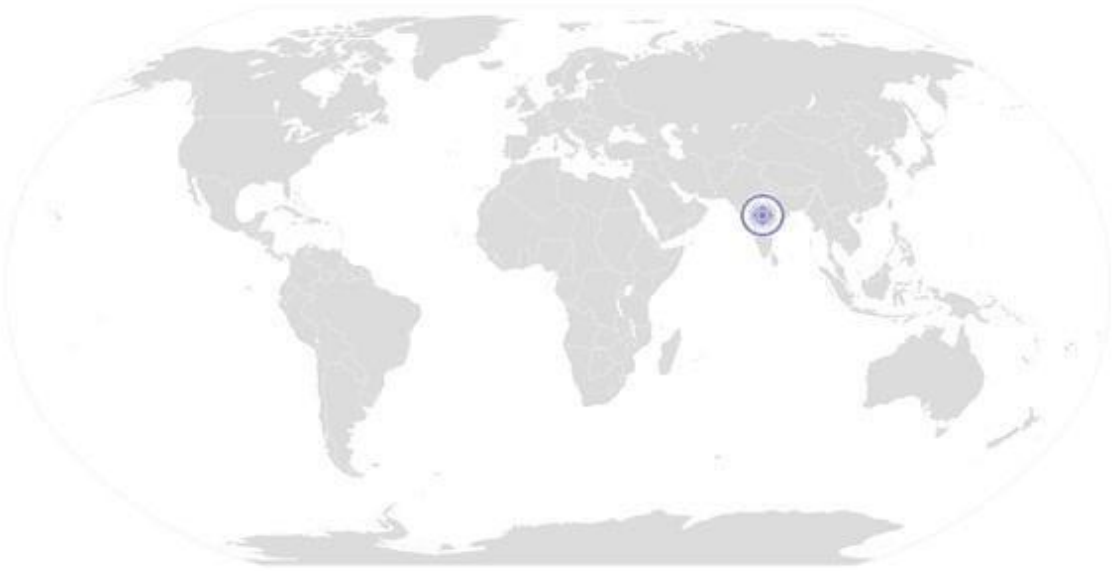
National Occupational Standard



Overview

This unit is about configuring of CPE and establishing broadband connectivity.

National Occupational Standard

Unit Code	**TEL/N0112**
Unit Title (Task)	**Configuration of equipment and establishing Broadband connectivity**
Description	Involves configuring of CPE (modem, router, switch) and establishing broadband connectivity between equipment and service provider gateway and also between the equipment and end user device.
Scope	This unit/task covers the following: • Configuration of CPE (wired and wireless) • Establishing connectivity with the service provider gateway • Establishing connectivity between CPE and end-user device

Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Configuring CPE	To be competent, the user/individual on the job must be able to PC1. connect up laptop/PC, Smart/IP TV and other appropriate device to the CPE (modem, router, switch) and establish connectivity PC2. access CPE setting using default login credentials PC3. configure CPE as per the base setting (IP, Gateway, Mask etc.)
Establishing connectivity with service provider gateway	PC4. ensure all cables/connectors are correctly plugged in PC5. ping service provider gateway PC6. analyze test results for connectivity and throughput parameters
Establishing connectivity between CPE and end user device	PC7. configure end user device to establish LAN connectivity with the CPE PC8. ping CPE from end user device and analyze response
Record configuration setting and testing steps for customer	PC9. record CPE configuration settings PC10. record end user device configuration setting PC11. record pinging procedure and expected result parameters PC12. brief customer on basic trouble-shooting steps/self-help

Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. risk and impact of not following defined procedures/work instructions as per SHE & OHS guidelines KA2. escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures ,fire and power failures KA3. knowledge of sourcing equipment and base configuration details

	KA4. first aid requirements in case of electrical shocks, cuts, fall and other common injuries
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. basic concepts of network topologies, broadband network elements, gateways, TCP/IP, IP address, subnet masks, Ethernet address, MAC address, IPv4, IPv6 KB2. basic commands like ping & ipconfig and acceptable round-trip time for IP packets KB3. connectivity options and methods for CPE & end user device KB4. configuration settings at CPE (wired & wireless) & end user device KB5. command line access and command prompts to execute basic commands KB6. knowledge of customer premise equipment KB7. features and operating requirements of test equipment KB8. how to test the speed of connection and to demonstrate same to customer
Skills (S)	
A. Core Skills/ Generic Skills	**Basic Reading & Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. read and comprehend technical data on networks, configurations and testing SA2. record system configuration and testing procedure SA3. read and comprehend organizational policies and procedures
	Communication Skills
	The user/ individual on the job needs to know and understand how to: SA4. courteous to the customers SA5. liaisioning and coordination skills SA6. communicate with supervisor and peers SA7. communicate in the local language (preferable)
B. Professional Skills	**Equipment Configuration Skills**
	The user/individual on the job needs to know and understand how to: SB1. configure CPE & end user equipment SB2. test configuration SB3. Level1 & 2 diagnostics
	Technical interpretation/analysing Skills
	The user/individual on the job needs to know and understand how to: SB4. interpret configuration screens for entering correct details SB5. interpret ping results SB6. interpret ipconfig and other basic command outputs SB7. interpret in-built diagnostics results for remedial action

NOS Version Control

NOS Code	**TEL /N0112**		
Credits NSQF	4	**Version number**	**1.0**
Industry	**Telecom**	**Drafted on**	**07/11/13**
Industry Sub-sector	**Service Provider**	**Last reviewed on**	**29/04/15**
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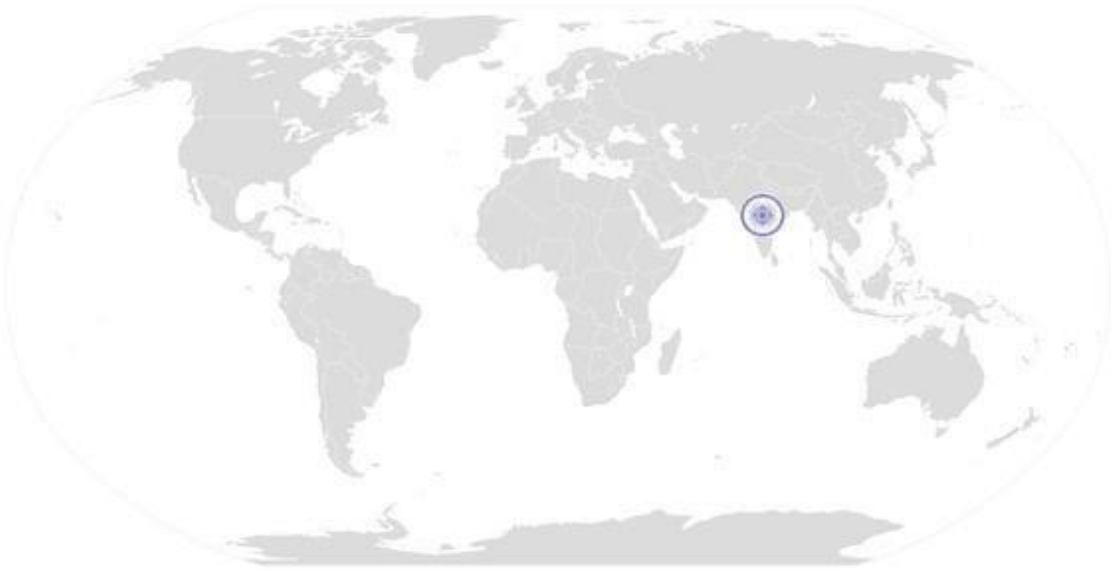

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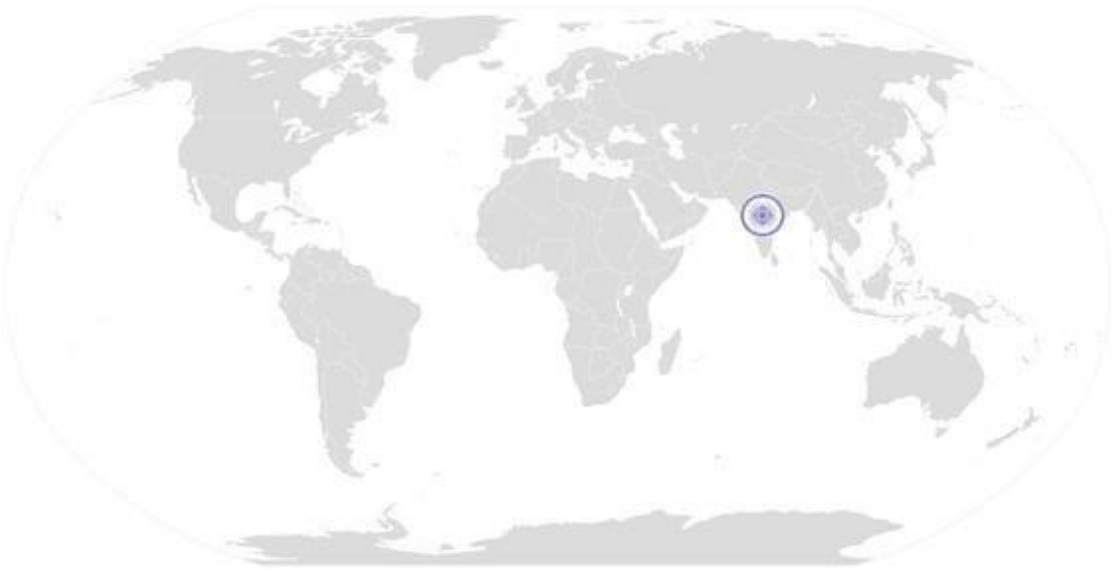
National Occupational Standard



Overview

This unit is about trouble shooting to localize and rectify faults wrt cables, configuration, connectivity etc.

National Occupational Standard

Unit Code	**TEL/N0113**
Unit Title (Task)	**Trouble-shoot to localize and rectify faults**
Description	This unit is about trouble shooting to localize and rectify faults
Scope	This unit/task covers the following: • Trouble shoot cable and connector faults • Trouble shoot CPE (modem, router, switch) • Trouble shoot configuration and connectivity issues between CPE & service provider gateway and between CPE & end user device • Report and document fault, corrective action and the status
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Locate and trouble shoot cable & connector fault	To be competent, the user/individual on the job must be able to PC1. differentiate between types of cables PC2. Identify correct cable pairs PC3. Undertake continuity check and localize fault distance
Troubleshoot CPE fault	PC4. understand relevance of various indicative lights on the CPE PC5. connect CPE to laptop/CPU/portable device for fault diagnostic PC6. install CPE access software, if required PC7. access CPE through browser/software application and run diagnostic application PC8. decipher results to localize fault
Rectify the faults with cable, connectors and CPE	PC9. carry out re-conectorization/crimping (of cable pairs with connector) or replace cable, if required PC10. re-configure the CPE to correct settings PC11. reset CPE, if required.
Complete documentation and clean up worksite	PC12. record steps undertaken for fault localization/isolation PC13. record changes undertaken for fault rectification PC14. Restore any changes made to the worksite during fault repair to the client's satisfaction
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and	The user/individual on the job needs to know and understand: KA1. risk and impact of not following defined procedures/work instructions KA2. escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures ,fire and power failures

its processes)	KA3. knowledge of sourcing equipment and base configuration details KA4. SHE and OHS guidelines and regulations as per company's norms KA5. first aid requirements in case of electrical shocks, cuts, fall and other common injuries usage of fire safety equipment
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. correct identifications of cables and cable pairs KB2. knowledge of cable connectors KB3. crimping or soldering expertise KB4. knowledge of supported cable lengths to achieve designed throughput KB5. basic knowledge of EMI/EMC and preventive approach specific to modem KB6. use of test equipment
Skills (S)	
A. Core Skills/ Generic Skills	**Basic Reading & Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. read and comprehend technical manual and literature SA2. maintain proper records as per given format SA3. read and understand work orders, health and safety instructions, memos, reports etc.
	Communication Skills
	The user/ individual on the job needs to know and understand how to: SA4. be courteous to end users/customers SA5. liase with local authorities, especially for outdoor cabling SA6. communicate with supervisor and peers SA7. communicate in the local language
B. Professional Skills	**Equipment operating Skills**
	The user/individual on the job needs to know and understand how to: SB1. operate trouble-shooting equipment for localizing cable & connector faults SB2. operate crimping and soldering equipment SB3. Operate laptop or other specific portable device to connect to CPE and carry out fault diagnostics & repairs
	Technical interpretation Skills
	The user/individual on the job needs to know and understand how to: SB4. interpret data on CPE interface accessed through laptop browser SB5. interpret right cable pairs for connecterisation SB6. interpret output of trouble shooting equipment/device
	Problem solving skills
	The user/individual on the job needs to know and understand how to: SB7. utilize appropriate tools for cable fault rectification SB8. use appropriate commands to reconfigure/rectify fault with CPE SB9. assess correct applications and reconfigure in end user device SB10. utilize appropriate communication channels to escalate unresolved problems

	to relevant personnel

NOS Version Control

NOS Code	**TEL /N0113**		
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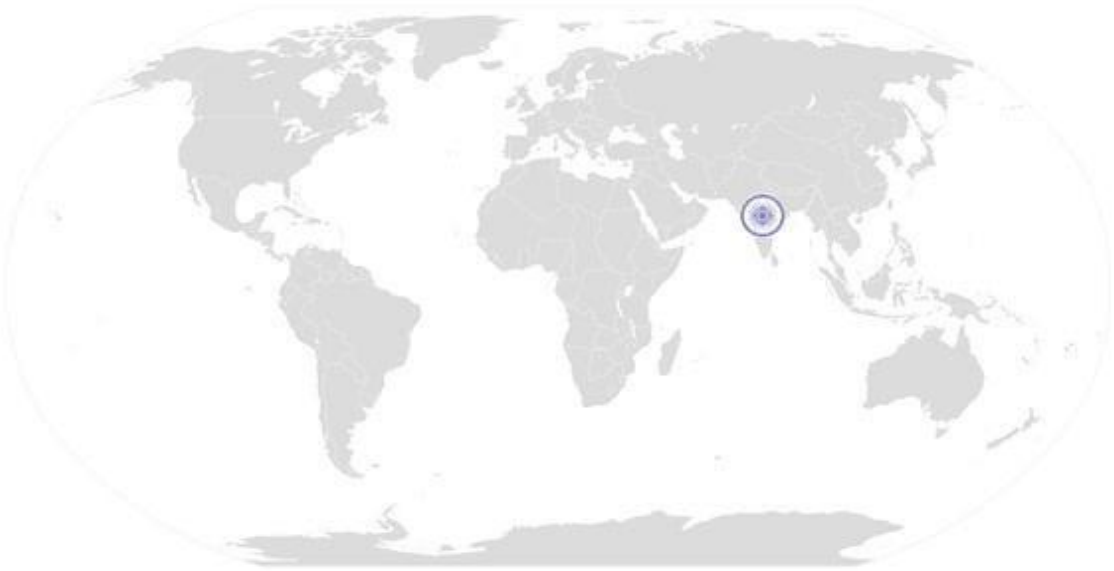
National Occupational Standard



Overview

This unit is about undertaking power supply checks & UPS installation at service provider / customer premise.

National Occupational Standard

Unit Code	TEL/N0114
Unit Title (Task)	UPS installation & Domestic Power Supply checks
Description	This unit is about undertaking power supply checks & UPS installation at service provider / customer premise.
Scope	• Use of voltage/current meters • Power Supply checks at 5/15 Amp power socket • Earthing checks • Installation of UPS • Routing of supply to equipment through UPS • Precautions whilst handling live power supply • Familiasssrity with UPS (battery, charger etc.) • Basic maintenance of AC

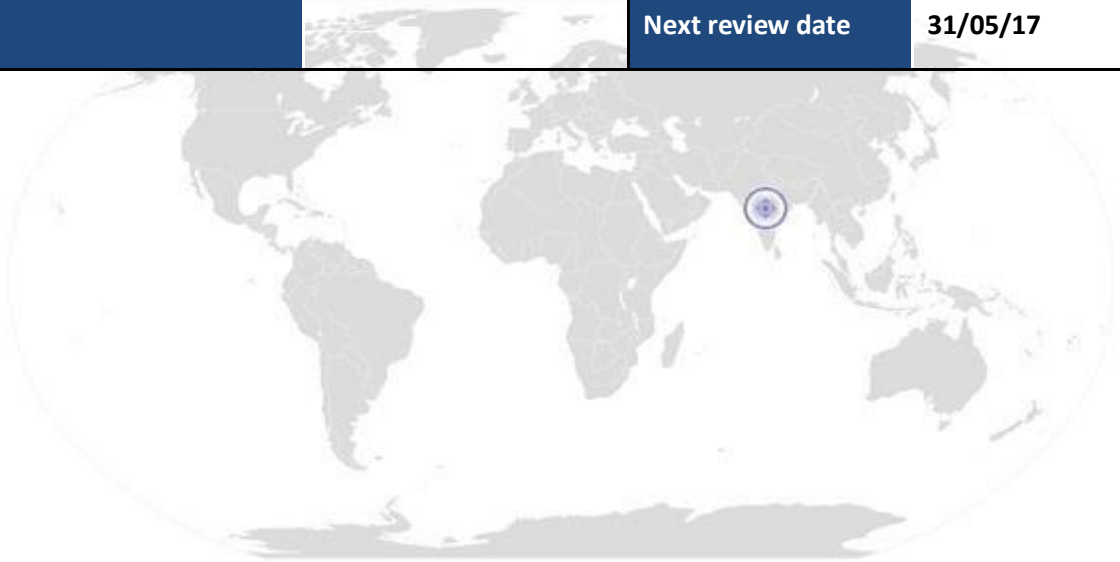
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
	To be competent, the user/individual on the job must be able to PC1. carry out voltage, current checks PC2. carry out earthing checks PC3. installation of ups PC4. routing of power supply through ups PC5. calculate equipment load vis-à-vis ups rating PC6. exercise precautions whilst handling power supplies PC7. UPS battery checks & replacement

Knowledge and Understanding (K)	
B. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. UPS installation norms KA2. compliance to Voltage/Current norms KA3. UPS & compatible batteries KA4. the basic process for maintaining AC
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. UPS & types of UPS KB2. power rating of UPS KB3. basic load calculations

	KB4. routing of power supply through UPS KB5. earth & continuity checks for power supply KB6. use of test equipment for checking/measuring power supply KB7. checks & replacement of UPS batteries
Skills (S)	
C. Core Skills/ Generic Skills	**Reading Skills**
	The user/ individual on the job needs to know and understand how to: SA1. i nstallation manual for UPS SA2. read and comprehend basic wiring disgrams
	Oral communication Skills
	The user/ individual on the job needs to know and understand how to: SA3. communicate the issue/fault to the customer SA4. communicate the issue/fault with complete details to the supervisor
D. Professional Skills	**Analytical Skills**
	The user/individual on the job needs to know and understand how to: SB1. analyse basic wiring diagrams to facilitate correct installation of UPS SB2. analyse house-hold circuits for correct installation of devices SB3. calculate equipment load and suggest UPS connection configuration
	Planning and Execution
	The user/individual on the job needs to know and understand how to: SB1. plan installation/check activities SB2. carry out installation with minimum disturbance

NOS Version Control

NOS Code	**TEL /N0114**		
Credits NSQF	4	**Version number**	**1.0**
Industry	**Telecom**	**Drafted on**	**01/02/14**
Industry Sub-sector	**Service Provider**	**Last reviewed on**	**29/04/15**
		Next review date	**31/05/17**



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Job Role	BROADBAND TECHNICIAN
Qualification Pack	TEL/Q0102
Sector Skill Council	: Telecom

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Individual assessment agencies will create unique question papers for theory and skill practical part for each candidate at each examination/training center.
4. To pass the Qualification Pack , every trainee should score a minimum of 40% in every NOS and overall of 50%.
5. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

NOS	Element	PC	Total Mark (400)	ement Weig	Out of	Theory	Skills Practical
1. TEL/N0111 (Cable/system wiring and equipment installation at customer premises)	Prepare for wiring and equipment installation	PC1. arrange access to site according to required procedure	100	40	5	5	0
		PC2. organize tools, equipment and materials for a given work			10	5	5
		PC3. match cable type and connectors to installation environment and customer requirements			5	0	5
		PC4. check cable length for continuity			5	0	5
		PC5. verify cable route is free of electrical hazards and obstructions both outdoors and indoors			5	0	5
		PC6. verify that the cable running length is within the permissible limit to ensure			5	0	5
		PC7. select suitable location for equipment installation wrt power point and signal coverage			5	5	0
	Undertake wiring & Install system hardware	PC8. ensure structured wiring from PoP to Customer premise JB		40	10	10	0
		PC9. ensure neat wiring and clipping within customer premise			5	5	0
		PC10. ensure proper cable termination and use of appropriate connectors			5	5	0
		PC11. test the cable & joints for transmission loss and strength. Re-terminate if loss exceeds prescribed limits			5	0	5
		PC12. install equipment following electrical safety principals and manufacturer's instructions			10	0	10
		PC13. power-up the system ensuring proper earthing arrangement			5	0	5
	Clean up worksite and complete documentation	PC14. removal and proper dispose of installation waste		20	5	5	0
		PC15. restore worksite to customer's satisfaction			5	5	0
		PC16. update plans and records with details of installation and test results			5	5	0
		PC17. complete all installation documents and customer signoff			5	5	0
			Total		100	55	45
2. TEL/N0112 (Configuration of equipment and establishing Broadband connectivity)	Configuring CPE	PC1. connect up laptop/PC, Smart/IP TV and other appropriate device to the CPE (modem, router, switch) and establish connectivity	100	20	10	0	10
		PC2. access CPE setting using default login credentials			5	0	5
		PC3. configure CPE as per the base setting (IP, Gateway, Mask etc.)			5	0	5
	Establishing connectivity with service provider gateway	PC4. ensure all cables/connectors are		20	5	0	5
		PC5. ping service provider gateway			5	0	5
		PC6. analyze test results for connectivity and throughput parameters			10	10	0
	Establishing connectivity between CPE and end user device	PC7. configure end user device to establish LAN connectivity with the CPE		30	15	5	10
		PC8. ping CPE from end user device and analyze response			15	5	10

	Record configuration setting and testing steps for customer	PC9. record CPE configuration settings		30	10	10	0
		PC10. record end user device configuration setting			5	5	0
		PC11. record pinging procedure and expected result parameters			5	5	0
		PC12. brief customer on basic trouble-shooting steps/self-help			10	0	10
			Total		100	40	60
3.TEL/N0113 (Trouble-shoot to localize and rectify faults)	Locate and trouble shoot cable & connector fault	PC1. differentiate between types of cables	100	20	5	5	0
		PC2. Identify correct cable pairs			5	0	5
		PC3. Undertake continuity check and localize fault distance			10	0	10
	Troubleshoot CPE fault	PC4. understand relevance of various indicative lights on the CPE		40	5	5	0
		PC5. connect CPE to laptop/CPU/portable device for fault diagnostic			5	0	5
		PC6. install CPE access software, if required			10	0	10
		PC7. access CPE through browser/software application and run diagnostic application			10	0	10
		PC8. decipher results to localize fault			10	5	5
	Rectify the faults with cable, connectors and CPE	PC9. carry out re-conectorization/crimping (of cable pairs with connector) or replace cable, if required		20	5	0	5
		PC10. re-configure the CPE to correct settings			10	0	10
		PC11. reset CPE, if required.			5	0	5
	Complete documentation and clean up worksite	PC12. record steps undertaken for fault localization/isolation		20	10	10	0
		PC13. record changes undertaken for fault rectification			5	5	0
		PC14. Restore any changes made to the worksite during fault repair to the client's satisfaction			5	5	0
			Total		100	35	65
4. TEL/N0114 (UPS installation & Domestic Power Supply checks)	Scope	PC1. carry out voltage, current checks	100	100	15	5	10
		PC2. carry out earthing checks			15	5	10
		PC3. installation of ups			10	5	5
		PC4. routing of power supply through ups			15	5	10
		PC5. calculate equipment load vis-à-vis ups rating			15	15	0
		PC6. exercise precautions whilst handling power supplies			15	10	5
		PC7. UPS battery checks & replacement			15	5	10
			Total		100	50	50