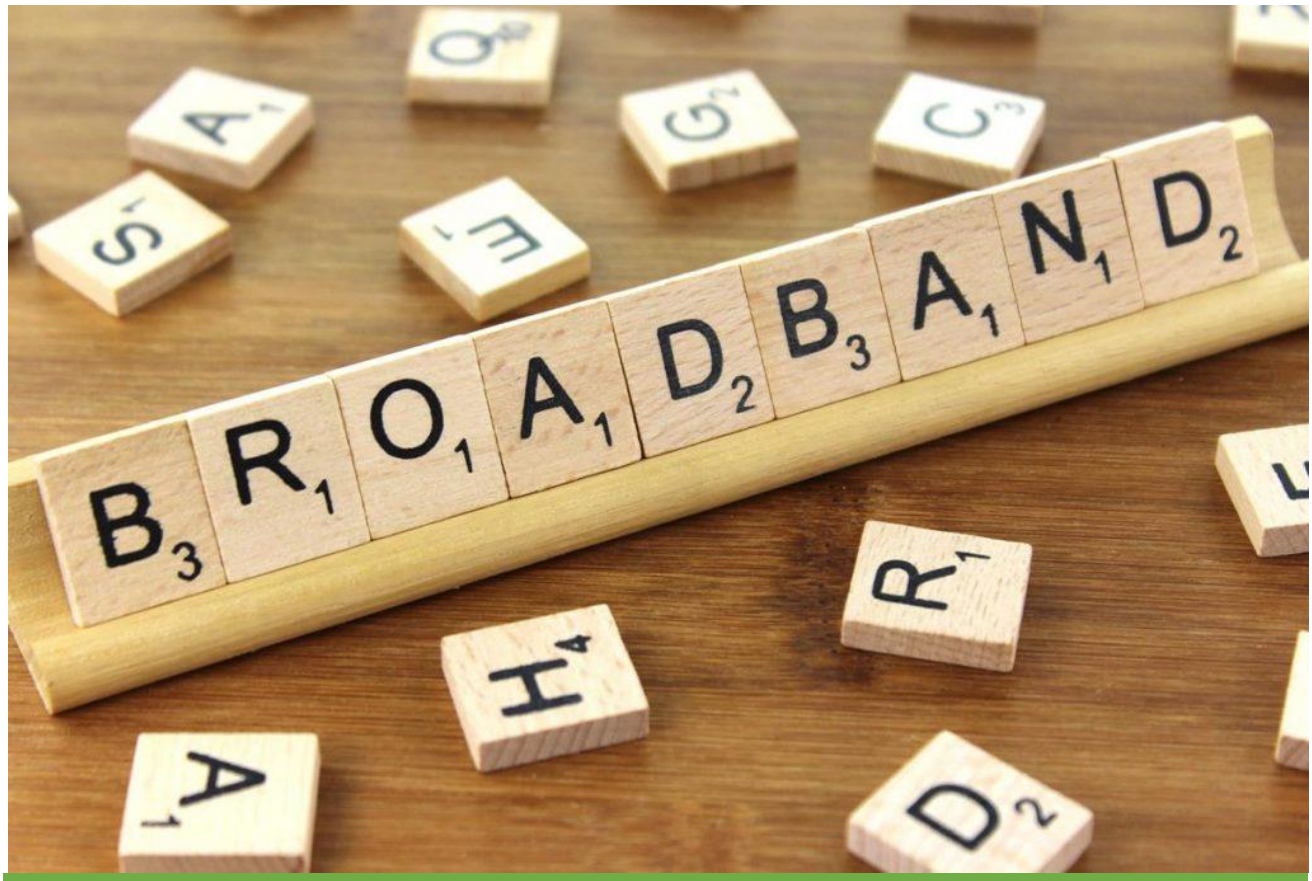

Model Curriculum

QP Name: Broadband Technician

QP Code: TEL/Q0102

QP Version: 2.0

NSQF Level: 4

Model Curriculum Version: 1.0

Telecom Sector Skill Council
Estel House, 3rd Floor, Plot No:- 126, Sector 44
Gurugram, Haryana 122003

Table of Contents

Training Parameters

Sector	Telecom
Sub-Sector	Passive Infrastructure
Occupation	Customer Service – Passive Infrastructure
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3114.0804
Minimum Educational Qualification & Experience	12th Class
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	30/09/20
Next Review Date	30/09/25
NSQC Approval Date	
QP Version	2.0
Model Curriculum Creation Date	30/09/20
Model Curriculum Valid Up to Date	30/09/25
Model Curriculum Version	1.0
Minimum Duration of the Course	400 Hours, 0 Minutes
Maximum Duration of the Course	400 Hours, 0 Minutes

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Install cable/system wiring and equipment at customer premises
- Configure equipment and establish Broadband connectivity
- Troubleshoot and rectify the faults
- Optimize resources, work efficiently and adhere to safety standards
- Interact effectively with others while being sensitive of gender and persons with disabilities

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Introduction to the role of a Broadband Technician *Bridge Module*	08:00	04:00	-	-	12:00
TEL/N0111 – Lay cable/system wiring and install equipment at customer premises **NOS Version No. 2.0** **NSQF Level 4**	**52:00**	**56:00**	-	-	**108:00**
Install cable/system wiring and equipment at customer premises	52:00	56:00	-	-	108:00
TEL/N0112 – Configure customer premises equipment and establish Broadband connectivity **NOS Version No. 2.0** **NSQF Level 4**	**44:00**	**48:00**	-	-	**92:00**
Configure equipment and establish Broadband connectivity	44:00	48:00	-	-	92:00
TEL/N0113 – Troubleshoot and rectify faults **NOS Version No. 2.0** **NSQF Level 4**	**52:00**	**56:00**	-	-	**108:00**
Troubleshoot and rectify faults	52:00	56:00	-	-	108:00

TEL/N9101 – Organize work and resources as per health and safety standards **NOS Version No. 1.0** **NSQF Level 4**	**16:00**	**24:00**	-	-	**40:00**
Optimise resources and work effectively and safely	16:00	24:00	-	-	40:00
TEL/N 9102– Interact effectively with team members and customers **NOS Version No. 1.0** **NSQF Level 4**	**16:00**	**24:00**	-	-	**40:00**
Communication and interpersonal skills	16:00	24:00	-	-	40:00
Total Duration	**188:00**	**212:00**	-	-	**400:00**

Module Details

Module 1: Introduction to the Role of Broadband Technician
Mapped to Bridge Module

Terminal Outcomes:

- Describe the role and responsibilities to be performed by a broadband technician.
- Explain the scope of work for a broadband technician.

Duration: *08:00*	**Duration**: *04:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the size and scope of the Telecom industry and its various sub-sectors. • Explain the role and responsibilities of broadband technician. • Discuss the organisational policies on workplace ethics, managing sites, quality standards, personnel management and public relations (PR). • Describe the process workflow in the organization and the role of broadband technician in the process. • List the various daily, weekly, monthly operations/activities that take place at the site under a broadband technician.	• Evaluate case studies outlining the role, responsibilities, and challenges for a broadband technician. • Analyse the requirements for the course and prepare an action/learning plan for updating skills as per the pre-requisites of the course.
Classroom Aids:	
Laptop, white board, marker, projector	
Tools, Equipment and Other Requirements	
Documents of standard operating procedures, code of conduct, checklists, schedules tools and equipment, status report	

Module 2: Install Cable/System Wiring and Equipment at Customer Premises
Mapped to TEL/N0111

Terminal Outcomes:

- Install cable/system wiring and equipment at customer premises

Duration: *52:00*	**Duration**: *56:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the various activities needed to be carried out prior to the installation procedure. • State the various cabling norms pertaining to laying of the cables. • Identify the cables, wire sizes and colours and connectors' required as per customer requirements. • Explain the process of crimping, splicing and soldering of cables. • Analyse the work requirements received from the supervisor to plan visit to a site/customer premises for installation and carry required tools and equipment. • Discuss the importance of conducting post-installation tests after laying down cables and installing modem, router and switch. • Explain the role of a UPS, its components and its installation and repair process. • State the importance of following defined procedures/work instructions issued as per SHE & OSH guidelines. • Explain the importance of maintaining and updating installation and testing records such as installation and test results, updated plans, installation documents and customer signoffs. • Discuss the importance of escalating and reporting incidents and/or emergencies.	• Demonstrate how to identify different types of cables, wires and connectors. • Perform splicing, crimping and soldering of cables. • Perform cable connectorization. • Prepare a list of probing questions to analyse the requirements of customers. • Inspect indoor and outdoor cable route using a variety of techniques. • Apply basic techniques to check that the equipment installation location is near power point and has proper signal coverage. • Demonstrate how to install cable wiring. Using the tools and equipment required for installation procedures. • Demonstrate the variety of techniques to test the cable and joints for transmission loss and strength. • Install equipment such as modem, router and/or switch and UPS. • Apply basic techniques to perform checks for voltage, current and earthing, and battery in case of a defective UPS. • Demonstrate how to repair a defective UPS. • Calculate sample equipment load and compare it with UPS rating. • Dispose the installation waste and restore work site to its original state, clean of debris and waste.
Classroom Aids:	
Laptop, white board, marker, projector	
Tools, Equipment and Other Requirements	

Tools and equipment, types of cables (OFC, UTP, STP, Twisted Pair etc.) and connectors (RJ-45, RJ-11 etc.), crimping tools, soldering tools and splicing tools, signal level meters /OTDR, voltmeter, digital multimeter, digital clamp meter, signal tester, electrical drill, ladder, spanner, screw driver set, nut driver set, bolt remover, cutter, angle finder Wiring layout, Instruction manual Service Manual/ User Manuals, Customer Registration, Program Authentication Form, Customer Feedback form

Module 3: Configure Equipment and Establish Broadband Connectivity
Mapped to TEL/N0112

Terminal Outcomes:

- Establish broadband connectivity of CPE with service provider gateway and end user device
- Record configuration setting and testing steps for customer

Duration: *44:00*	**Duration**: *48:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**

• Summarize the concepts of network topologies, broadband network elements, gateways, TCP/IP, IP address, subnet masks, Ethernet address, MAC address, IPv4, IPv6 wires and their application in broadband connectivity.
• Explain the process of configuring the customer premises equipment.
• Recall basic commands at command line access and command prompt to be able to test and verify connectivity.
• Describe the usage of basic commands like ping and ipconfig and acceptable round-trip time for IP packets process, and other such commands typically used for confirming connectivity.
• Discuss the process of establishing broadband connectivity of CPE with service provider gateway and end user device and LAN/WiFi connectivity with CPE.
• State the process to analyse test results of connectivity and throughput parameters to detect any issues/errors in connectivity.
• Describe the process of performing speed test and recording the data throughputs to show to the customer about successful installation and connectivity among devices.
• State the importance of explaining the basic troubleshooting steps to customers for quick resolution of common issues.
	• Connect the laptop/PC, smart/IP TV and other customer device to the CPE and establish connectivity using appropriate (more than one) techniques/methods.
	• Execute the basic commands like ping and ipconfig.
	• Access CPE settings using default login credentials. And configure CPE as per the base setting (ip, gateway, mask etc.)
	• Demonstrate how to verify that all cables and connectors are plugged in properly.
	• analyse test results for connectivity and throughput parameters using multiple approaches
	• Apply basic techniques to configure end user device to establish LAN /WiFi connectivity with CPE.
	• Demonstrate the tests and data records required after connecting a CPE including but not limited to:
	  ○ Using common commands such as ping to configure end-user devices to the CPE
	  ○ Perform speed test to verify against specifications
	  ○ Record all test results and verify connectivity across end-user devices

Classroom Aids:	
Laptop, white board, marker, projector	
Tools, Equipment and Other Requirements	

Tools and equipment, types of cables (OFC, UTP, STP, Twisted Pair etc.) and connectors (RJ-45, RJ-11 etc.), crimping tools, soldering tools and splicing tools, signal level meters /OTDR, voltmeter, digital multimeter, digital clamp meter, signal tester, electrical drill, ladder, spanner, screw driver set, nut driver set, bolt remover, cutter, angle finder Wiring layout, Instruction manual Service Manual/ User Manuals, Customer Registration, Program Authentication Form, Customer Feedback form

Module 4: Troubleshoot and Rectify Faults
Mapped to TEL/N0113

Terminal Outcomes:

- Troubleshoot and rectify cable, connectors and CPE faults
- Troubleshoot and repair clients' broadband service
- Complete documentation and clean-up work site

Duration: *52:00*	**Duration**: *56:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss transmission, broadcasting, switching and operation of telecommunication systems. • Explain electromagnetic interference (EMI) and its impact on????? • Describe the functioning of circuit boards and processors. • Discuss the parameters used to identify cause of fault, No Service or service degradation. • Outline the process of testing cables using signal level meters/OTDR. • Explain how to repair and replace faulty connectors/damaged cable. • Describe the process of performing re connectorization/crimping of cable pairs with connector. • Describe and detail the troubleshooting process for common CPE faults, signal loss and continuity and common network issues. • Explain how to monitor and repair system, drop, and in-house signal leakage and maintain records of all the troubleshooting activities undertaken for fault isolation and repairs/replacements. • Discuss how to interpret CPE data and other output of the device. • Discuss the process of restoring any changes made to the worksite during fault repair.	• Demonstrate the process to identify cause of fault or service degradation. • Employ appropriate techniques to test cables using signal level meters/OTDR. • Apply basic techniques to repair and replace faulty connectors/damaged cable • Perform the steps of re-connectorization/crimping of cable pairs with connector. • Demonstrate how to connect CPE to laptop/CPU/portable device, run diagnostics to find the issue, install the CPE access software, access the CPE through browser/software application and finally verify the functionality. • Apply basic techniques to re-configure/reset the CPE to correct settings. • Apply appropriate techniques for troubleshooting typical problems between customer equipment and the optical node, common problems such as signal loss and interference, and network/connectivity problems using ping test, trace routes and speed test. • Record all test readings and document the results/findings in proper formats. • Demonstrate how to monitor, repair and record system, drop, and in-house signal leakage.
Classroom Aids:	
Laptop, white board, marker, projector	

Tools, Equipment and Other Requirements
Tools and equipment, types of cables (OFC, UTP, STP, Twisted Pair etc.) and connectors (RJ-45, RJ-11 etc.), crimping tools, soldering tools and splicing tools, signal level meters /OTDR, voltmeter, digital multimeter, digital clamp meter, signal tester, electrical drill, ladder, spanner, screw driver set, nut driver set, bolt remover, cutter, angle finder Wiring layout, Instruction manual Service Manual/ User Manuals, Customer Registration, Program Authentication Form, Customer Feedback form

Module 5: Organize Work and Resources as per Health and Safety Standards
Mapped to TEL/N9101

Terminal Outcomes:

- Plan work effectively, implement safety practices and optimize use of resources.

Duration: *16:00*	**Duration**: *24:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• List the recent skills and technologies prevalent in the telecom industry. • Discuss some commonly occurring problems with their causes and solutions. • State the importance of keeping the workplace clean, safe and tidy. • Outline the organizational structure to assign duties and responsibilities to each team member. • List different types of hazards and the procedure to report it to the supervisor. • List the precautionary steps one needs to follow while handling hazardous materials. • State the importance of participating in fire drills and other safety workshops. • Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol-based hand sanitizers. • List the different methods of cleaning, disinfection, sanitization etc. • Define self-quarantine or self-isolation. • Explain the path of disease transmission. • Discuss organizational hygiene and sanitation guidelines and ways of reporting breaches/gaps if any. • Explain the ways to optimize usage of resources. • Discuss various methods of waste management and its disposal. • List the different categories of waste for the purpose of segregation. • Differentiate between recyclable and non-recyclable waste. • State the importance of using appropriate colour dustbins for different types of waste. • Discuss the common sources of pollution and ways to minimize it.	• Prepare a time schedule to complete the tasks on the given time. • Demonstrate the use of safety equipment such as goggles, gloves, ear plugs, shoes etc. • Demonstrate the correct postures while working and handling hazardous materials at the workplace. • Demonstrate how to evacuate the workplace in case of an emergency. • Show how to sanitize and disinfect one's work area regularly. • Demonstrate the correct way of washing hands using soap and water. • Demonstrate the correct way of sanitizing hands using alcohol-based hand rubs. • Display the correct way of wearing and removing PPE such as face masks, hand gloves, face shields, PPE suits, etc. • Demonstrate warning labels, symbols and other related signages. • Perform basic checks to identify any spills and leaks and that need to be plugged /stopped. • Demonstrate different disposal techniques depending upon different types of waste. • Employ different ways to clean and check if equipment/machines are functioning as per requirements and report malfunctioning, if observed. • Employ ways for efficient utilization of material and water. • Use energy efficient electrical appliances and devices to ensure energy conservation.

Classroom Aids:
White board/ black board marker / chalk, duster, computer or Laptop attached to LCD projector
Tools, Equipment and Other Requirements
Personal Protection Equipment: safety glasses, head protection, rubber gloves, safety footwear, warning signs and tapes, fire extinguisher and first aid kit

Module 6: Communication and Interpersonal Skills
Mapped to TEL/N9102

Terminal Outcomes:

- Communicate effectively and develop interpersonal skills
- Develop sensitivity towards differently abled people.

Duration: *16:00*	**Duration**: *24:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss the importance of following the standard operating procedures of the company w.r.t. priority, confidentiality and security. • Outline the organizational structure to receive work instruction and report issues to the supervisor. • Discuss the importance of having timely discussions with all genders to avoid repeated errors. • State the importance of co-ordinating and resolving conflicts with the team members to achieve smooth work flow. • Discuss about the different types of disabilities with their respective issues. • State the work ethics, workplace etiquettes as well as standards and guidelines for all genders and PwD. • List health and safety requirements for persons with disability. • Describe the rights, duties and benefits available at workplace for person with disability. • Explain the process of recruiting people with disability for a specific job. • Discuss the specific ways to help people with disability to overcome the challenges.	• Use different modes of communication as per requirement and need. • Prepare a sample report of the commonly occurring errors and their solutions. • Use inclusive language irrespective of the gender/ disability of the person. • Demonstrate appropriate behaviour towards all genders and differently abled people. • Prepare a list of institutes and government schemes that help PwD in overcoming challenges. • Demonstrate the ideal behaviour with a PwD in an organization.
Classroom Aids:	
White board/ black board marker / chalk, duster, computer or Laptop attached to LCD projector	
Tools, Equipment and Other Requirements	
Sample of escalation matrix, organisation structure.	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
ITI/Diploma	Electrical/Electronics /Computer Science and other related domains	2	Telecom/Retail	0		Eligible for ToT program

Trainer Certification	
Domain Certification	**Platform Certification**
Job Role: "Broadband Technician Level 4" "TEL/Q0102 v2.0", Minimum accepted score is 80%	Job Role: "Trainer", "MEP/Q2601v1.0", Minimum accepted score is 80%

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
ITI/Diploma	Electrical/Electronics/Computer Science and other related domains	2	Telecom/Retail	0		Eligible for ToT program

Assessor Certification	
Domain Certification	**Platform Certification**
Job Role: "Broadband Technician Level 4" "TEL/Q0102 v2.0", Minimum accepted score is 80%	Job Role: "Assessor" "MEP/Q2701v1.0", Minimum accepted score is 80%

Assessment Strategy

1. Assessment System Overview:

    - Batches assigned to the assessment agencies for conducting the assessment on SDSM/SIP or email
    - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
    - Assessment agency deploys the ToA certified Assessor for executing the assessment
    - SSC monitors the assessment process & records

2. Testing Environment:

    - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
    - Check the duration of the training.
    - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
    - If the batch size is more than 30, then there should be 2 Assessors.
    - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
    - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
    - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
    - Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:

    - Question papers created by the Subject Matter Experts (SME)
    - Question papers created by the SME verified by the other subject Matter Experts
    - Questions are mapped with NOS and PC
    - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
    - Assessor must be ToA certified & trainer must be ToT Certified
    - Assessment agency must follow the assessment guidelines to conduct the assessment

4. Types of evidence or evidence-gathering protocol:
    - Time-stamped & geotagged reporting of the assessor from assessment location
    - Center photographs with signboards and scheme specific branding
    - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
    - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

5. Method of verification or validation:
    - Surprise visit to the assessment location
    - Random audit of the batch
    - Random audit of any candidate

6. Method for assessment documentation, archiving, and access
    - Hard copies of the documents are stored
    - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
    - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do **upon the completion of the training**.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do **upon the completion of a module.** A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

AC	Air Conditioner
DG	Diesel Generator
PIU	Power Interface Unit
SMPS	Switch Mode Power Supply
BB	Battery Bank
IPMS	Integrated Power Management System
OPCO	Operating Company
PM	Preventive Maintenance
OPEX	Operating Expenditure
PPE	Personal Protective Equipment
RCA	Root Cause Analysis
PwD	Persons with Disabilities
CRM	Customer Relationship Management
EB	Electricity Board
RFS	Radio Frequency Services
NOC	Network Operating Centre
SRN	Service Request Number