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Telecom Sector Skill Council

# Facilitator Guide


Sector
**Telecom**

Sub-Sector
**Network Managed Services**

Occupation
**Network Operation and Maintenance**

Reference ID: **TEL/Q6202**, Version **5.0**
NSQF Level **4**

## Telecom Field Operations Coordinator

**This book is sponsored by**
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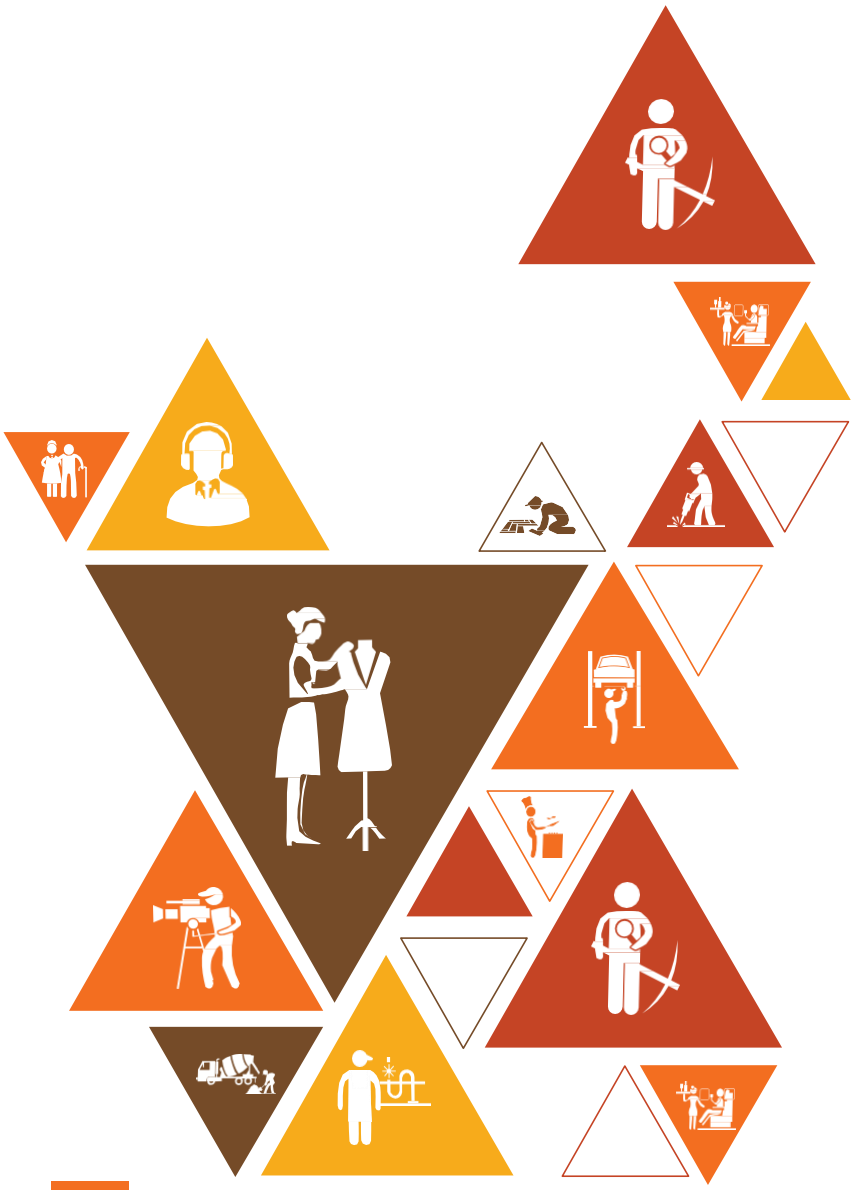
"Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission."

**Shri Narendra Modi**
Prime Minister of India



## Acknowledgements

Telecom Sector Skill Council (TSSC) would like to thank all the individuals and institutions who contributed in various ways towards the preparation of this facilitator guide. The facilitator guide could not have been completed without their active contribution. Special gratitude is extended to those who collaborated during the preparation of the different modules in the facilitator guide. Wholehearted appreciation is also extended to all who provided peer review for these modules.

The preparation of this guide would not have been possible without the Telecom Industry's support. Industry feedback has been extremely beneficial since inception to conclusion and it is with their guidance that we have tried to bridge the existing skill gaps in the industry. This facilitator guide is dedicated to the aspiring youth, who desire to achieve special skills which will be a lifelong asset for their future endeavours.

## About this Guide

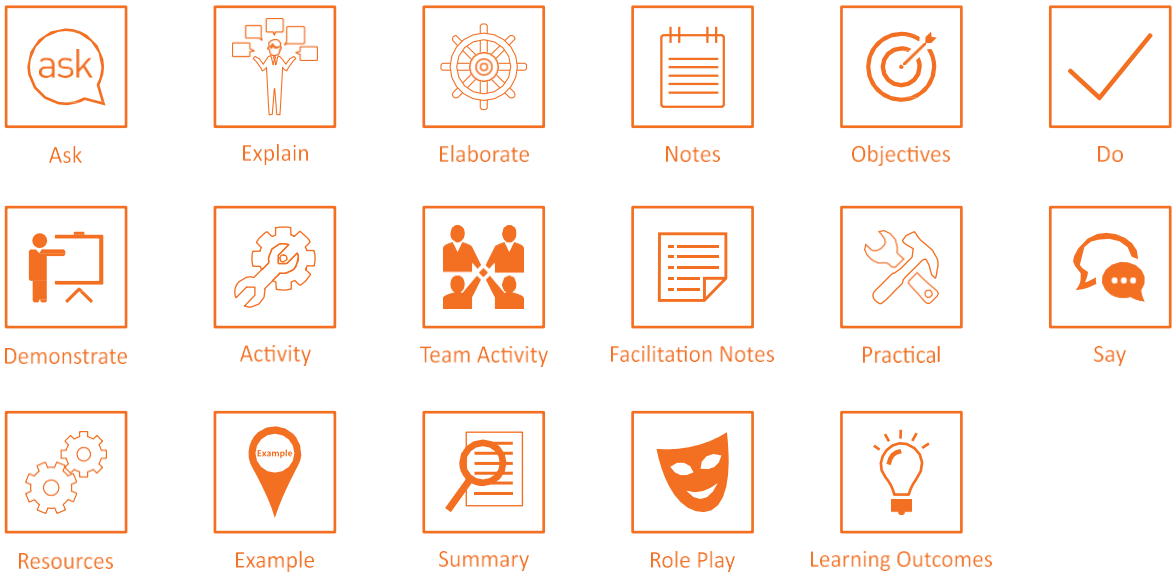
The facilitator guide (FG) for Telecom Field Operations Coordinator is primarily designed to facilitate skill development and training of people, who want to become professional Telecom Field Operations Coordinator. The facilitator guide is aligned to the Qualification Pack (QP) and the National Occupational Standards (NOS) as drafted by the Sector Skill Council (TSSC) and ratified by National Skill Development Corporation (NSDC).

It includes the following National Occupational Standards (NOSs)-

1. TEL/N6208: Undertake Site Acceptance Testing
2. TEL/N6209: Perform Preventive and Corrective Maintenance at Radio Locations
3. TEL/N6210: Perform Change Management at Radio Locations
4. TEL/N6500: Undertake Fault Rectification
5. TEL/N6501: Undertake Configuration Changes, Upgrades and Node Back- up Activities
6. TEL/N9109: Follow sustainable practices in telecom infrastructure management
7. TEL/N9104: Manage Work, Resources and Safety at workplace
8. DGT/VSQ/N0101: Employability Skills (30 Hours)

Post this training, the participants will be able to overseeing installation, configuration, testing, and acceptance of equipment, antennas, and supporting infrastructure. We hope that this Facilitator Guide provides a sound learning support to our young friends to build a lucrative career in the Telecom Skill Sector of our country.

## Symbols Used



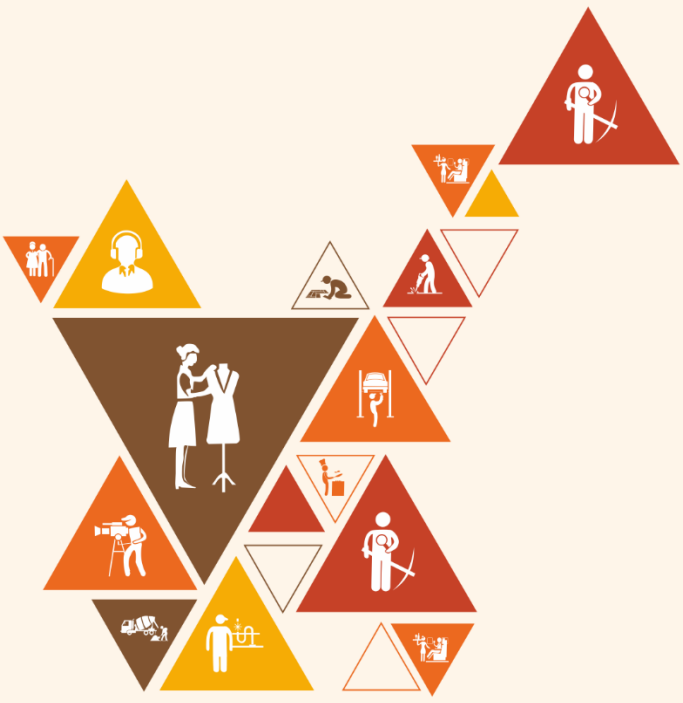
# Table of Contents



It is recommended that all trainings include the appropriate Employability skills Module. Content for the same is available here: **https://www.skillindiadigital.gov.in/content/list**

# 1. Introduction to the Sector & the Job Role of a Telecom Field Operations Coordinator

Unit 1.1 – Telecom Sector in India
Unit 1.2 – Roles and Responsibilities of Telecom Field Operations Coordinator



TEL/N6208

## Key Learning Outcomes 

After the completion of this module, the participant will be able to:

1. Explain the significance of the telecom sector in daily activities and business operations.
2. Elucidate the key skills and technical expertise required for a Telecom Field Operations Coordinator.

# UNIT 1.1: Telecom Sector in India

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Outline the growth of the Telecom Sector in India.
2. Describe the size and scope of the Telecom industry and its sub-sectors.
3. Describe the evolution of mobile networks, highlighting the transition from 4G to 5G.
4. Elucidate the key features and benefits of 5G technology, such as ultra-low latency, enhanced bandwidth, and massive device connectivity.
5. Identify the primary components of 5G infrastructure, including gNodeB, fiber optic backhauls, and antenna systems.

## Resources to be Used

Participant handbook, notepad, pen, whiteboard, markers, presentation slides, overhead projector or large screen, computer/laptop with internet connection.

## Say

- Welcome to the 'Introduction to the Telecom Sector' class. Today, we will explore the exciting world of telecommunications, exploring its growth, size, scope, documentation, safety measures, and environmental regulations.
- We'll discuss how the telecom sector has evolved in India and its significant impact on various industries.
- Before we move ahead with the topics, let us play a game.

## Team Activity

- Activity name: Ice Breaker - Two Truths and a Lie
- Objective of the Activity: To help participants get to know each other in a fun and interactive way by sharing interesting facts about themselves.
- Resources: None
- Time Duration: 15-20 minutes
- Instructions:
  - Gather all participants in a circle or seated in a comfortable arrangement.
  - Explain the game: Each participant will share two truths and one lie about themselves.
  - Emphasise that the challenge is to make the lie sound convincing, making it harder for others to identify.
  - Start by giving an example yourself: Hi, I'm [Your Name]. I have visited three countries, am fluent in four languages, and have a pet horse.
  - Participants take turns sharing their statements in any order they prefer.

- After each participant shares their statements, the rest of the group discusses and guesses which statement is a lie.
- After everyone has shared, reveal the truths and lies, and have a brief conversation about the interesting facts shared.

6. **Outcome:** Participants will have an opportunity to learn unique facts about each other, fostering a relaxed and friendly atmosphere for the training session.

## Ask

- Raise your hand if you've ever used a smartphone or made a phone call?
- Can anyone share a situation where you think the telecom sector plays a crucial role?

## Do

- Encourage participants to share their experiences and thoughts on the telecom sector, creating a comfortable and interactive learning environment.
- Utilise presentation slides, whiteboard diagrams, and relevant online resources to enhance understanding and engagement.
- Prompt participants to ask questions, share opinions, and discuss real-world examples to deepen their understanding.

## Elaborate

- Growth of the Telecom Sector in India: Explore the historical development of the telecom industry in India, from its early stages to the current digital era.
- Size and Scope of the Telecom Industry and Its Sub-sectors: Discuss the different components of the telecom industry, including network providers, equipment manufacturers, service providers, and emerging trends like 5G technology.
- Documentation Involved in Different Maintenance Processes: Explain the essential documentation practices for maintenance processes, such as work orders, maintenance logs, and compliance reports.
- Safety, Health, and Environmental Policies: Highlight the importance of workplace safety, health regulations, and environmental policies in the telecom sector to ensure a secure and sustainable working environment.

## Activity

- Activity Name: Telecom Scavenger Hunt
- Objective of the Activity: To familiarise participants with key telecom terms and concepts while promoting teamwork and engagement.
- Resources: Participant handbook, markers, whiteboard, presentation slides.
- Time Duration: 20 minutes

- **Instructions:**
  - Divide participants into small groups.
  - Provide each group with a list of telecom-related terms or concepts (e.g., 4G, fiber optics, and bandwidth).
  - Instruct groups to find these terms within the provided resources (handbook, slides) and write a brief explanation for each term on the whiteboard.
  - After the allocated time, have each group present their findings and explanations.
  - Facilitate a short discussion about the terms and concepts, clarifying misconceptions and reinforcing the learning points.
- **Outcome:** Participants will better understand telecom terminology and concepts, fostering collaboration and active participation.

## Notes for Facilitation

- Encourage active participation by using open-ended questions and inviting group discussions.
- Keep the pace of the session dynamic to maintain engagement.
- Relate concepts to real-life examples to make the content more relatable and understandable.
- Ensure a respectful and inclusive environment for all participants to share their perspectives.
- If participants are curious about certain sub-topics, be prepared to elaborate on their interests.

# UNIT 1.2: Roles and Responsibilities of Telecom Field Operations Coordinator

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the organizational hierarchy and key functions within a telecom service provider.
2. Describe the primary responsibilities of a Telecom Field Operations Coordinator, including installation, maintenance, and fault management.
3. Discuss the importance of coordinating with technical teams, customers, and management to ensure seamless operations.
4. Explain the role of industry standards and regulatory bodies in governing telecom operations.
5. Explain the key skills and competencies required for effective performance as a Telecom Field Operations Coordinator.

## Resources to be Used

Participant handbook, whiteboard, markers, projector, laptop, organizational chart examples, case studies, videos on telecom network operations.

## Note

This unit helps trainees understand how telecom companies are structured and how a Field Operations Coordinator fits into daily operations, ensuring efficient installations, timely fault resolution, and strong customer satisfaction.

## Say

Today we're going to take a closer look at how telecom service providers operate behind the scenes and what role a Field Operations Coordinator plays in keeping everything running smoothly. Whether it's broadband, fiber, wireless, or enterprise networks — coordinated teamwork is essential for seamless service delivery.

## Ask

Ask the trainees:

- How do you think a telecom company is organized?
- Who do you think handles the installation, maintenance, and customer complaints?

Write down their responses, relate them to real telecom workflows, and then guide the discussion forward.

## Elaborate

- Telecom Field Operations Coordinator
- Organizational Hierarchy and Key Functions in a Telecom Service Provider (TSP)
- Importance of Coordination, Standards, and Skills in Telecom Operations
- The Role of Industry Standards and Regulatory Bodies
- Key Skills and Competencies for a Telecom Field Operations Coordinator

## Say

Now, let's reinforce these concepts with a short group activity to understand real-world field coordination challenges.

## Activity

- Activity Name: Installation & Fault Management Simulation
- Resources: Whiteboard, sample tickets/complaint logs, role cards (customer, technician, NOC, coordinator).
- Time Duration: 30 minutes
- Instructions:
  - Form small groups and assign roles.
  - Give each group a mock installation or fault complaint scenario.
  - Ask them to simulate how a Field Operations Coordinator would communicate with each stakeholder.
  - Groups present their solution and discuss what challenges they faced.

## Notes for Facilitation

- Reinforce the importance of accurate documentation.
- Encourage trainees to share any field experiences they may have.
- Clarify any doubts related to hierarchy, roles, or regulatory requirements.
- Ask them to answer workbook exercises related to telecom operations coordination.

## Exercise

**Answers to exercises for PHB**

**Short Answer Questions – Answers**

1. The telecom sector consists of network operators, service providers, infrastructure companies, regulatory bodies, and equipment vendors. It is critical because it enables national and global connectivity for communication, business, government, and digital services.
2. Advancements from 2G to 5G, fiber networks, VoIP, and cloud-based systems have made communication faster, more reliable, and capable of supporting high-bandwidth, real-time digital applications.
3. A Telecom Field Operations Coordinator manages field installation, maintenance, fault repair, scheduling, resource allocation, and ensures that teams follow standards and timelines.
4. Coordination ensures proper information flow, quick issue resolution, efficient deployment, and high service quality, preventing delays and customer dissatisfaction.
5. Regulatory bodies set rules, allocate spectrum, ensure service quality, enforce safety standards, and protect consumer interests to maintain fairness in the telecom sector.

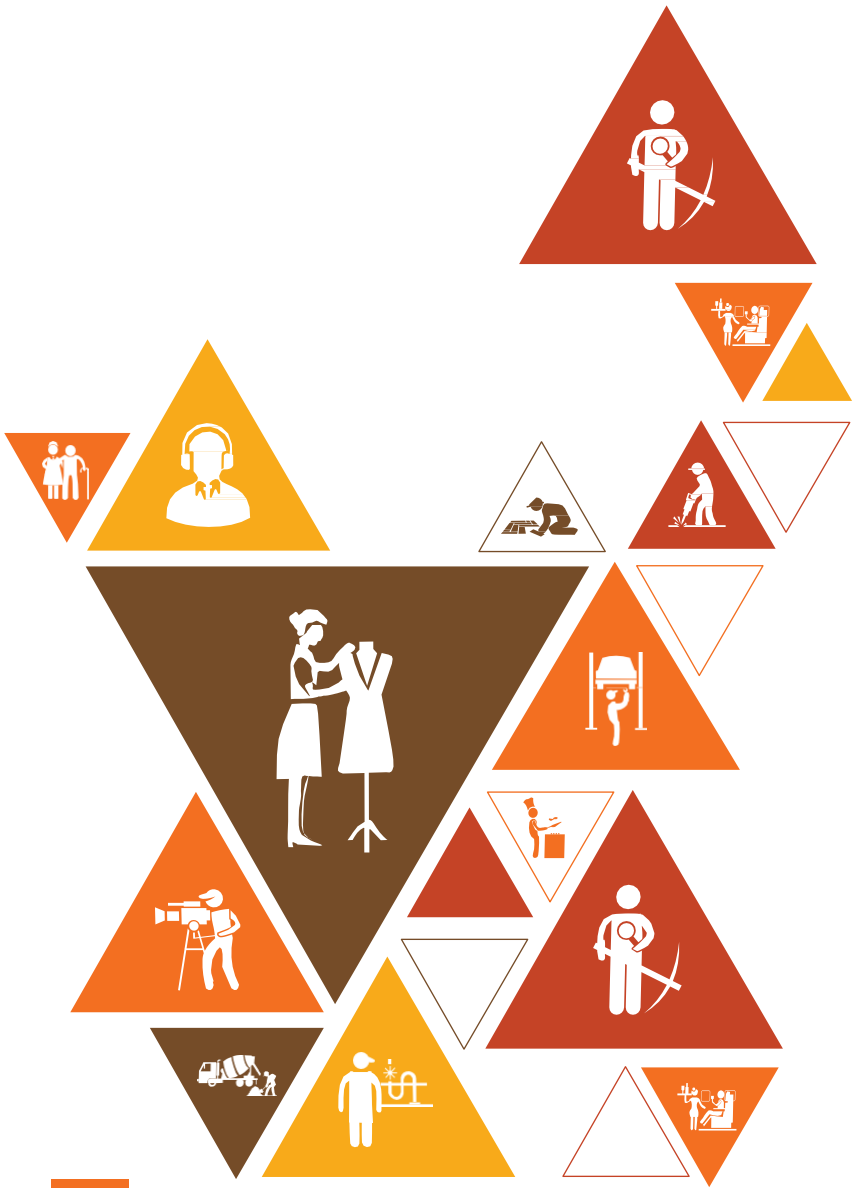
**Multiple Choice Question**

1. b) Enables global communication and digital connectivity
2. b) Field installation, maintenance, and fault management
3. b) Compliance with standards and fair operations
4. b) Improve operational efficiency and service quality
5. b) Strong technical knowledge and problem-solving abilities

**Fill in the Blanks**

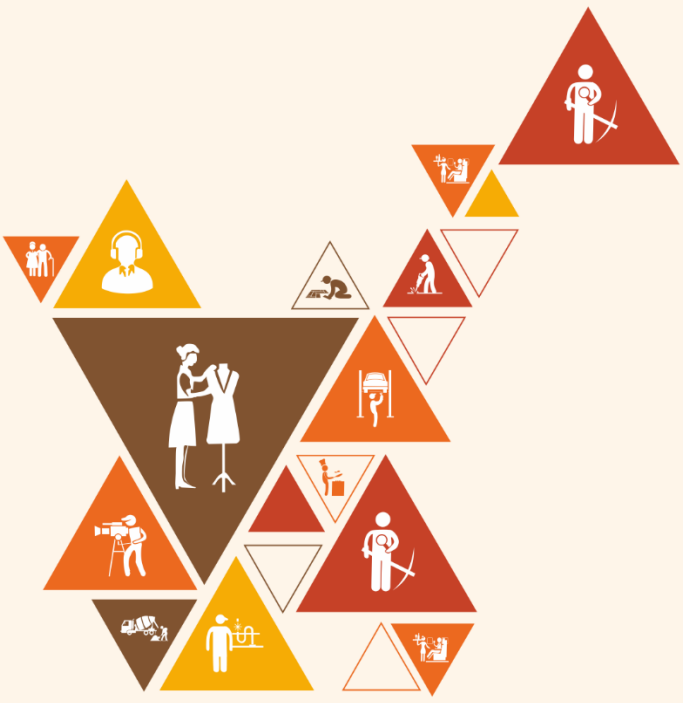
1. Communication
2. Evolution
3. Roles
4. Faults
5. fairness

## Notes



# 2. Undertake Site Acceptance Testing

Unit 2.1 – Perform Site Acceptance and Compliance Testing



TEL/N6208

## Key Learning Outcomes 

After the completion of this module, the participant will be able to:

1. Explain the process of performing Site Acceptance Testing (SAT) and its importance in telecom operations.
2. Demonstrate the steps involved in executing SAT, documenting results, and reporting non-compliance issues.

# UNIT 2.1: Perform Site Acceptance and Compliance Testing

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the purpose and steps of Site Acceptance Testing (SAT).
2. Identify the tools used in testing, like E1 tester, Ethernet tester, VSWR meter, power meter, and optical meter.
3. Describe different types of cables (RJ45, RS232, Hi-Speed USB) and their use in testing.
4. Explain the software needed for BTS and other network equipment.
5. Describe the role of equipment like Microwave, BTS, feeder cables, and fiber optics in network setup.
6. Explain the importance of backup systems like DG sets, PIU panels, transformers, SMPS, air conditioners, and battery banks.
7. Identify safety measures like grounding, weatherproofing, and proper electrical insulation.
8. Explain key network performance indicators like signal strength, latency, and interference levels.
9. List the steps for proper documentation and reporting of test results.
10. Describe best practices for testing, maintaining, and monitoring telecom sites.
11. Demonstrate how to check the functionality of required test equipment such as E1 tester, Ethernet tester, VSWR meter, power meter, and optical meter.
12. Show how to ensure the compatibility of installed software versions on laptops and confirm readiness for testing.
13. Demonstrate how to inspect physical infrastructure for adherence to standards, including shelter condition, weatherproofing, grouting, cabling, earthing, and connector integrity.
14. Show how to conduct logical tests such as VSWR levels, alarm connectivity, and equipment connectivity per site AT checklist.
15. Demonstrate how to coordinate with field teams to complete testing of passive infrastructure, including antenna alignment, diesel generator functionality, SMPS condition, and battery backup performance.
16. Show how to validate network performance by measuring key parameters such as signal strength, latency, throughput, and redundancy mechanisms.
17. Demonstrate how to identify and document deviations from required specifications, flagging critical issues needing immediate resolution.
18. Show how to report test outcomes to relevant stakeholders, including BSS/BTS engineers, the NOC team, and project managers.
19. Demonstrate how to update site documentation with complete and accurate test records as per organizational standards.

## Resources to be Used

Participant handbook, laptop with testing software, sample BTS configuration tool, E1 tester, Ethernet tester, VSWR meter, power meter, optical power meter, RJ45/RS232/USB cables, projector, markers, whiteboard, site test sheets, site photos/videos.

## Say

Today, we are going to learn one of the most important responsibilities in telecom field operations — Site Acceptance Testing (SAT).

## Ask

Ask trainees the following questions:

- Have you ever visited or seen a BTS or telecom site?
- What do you think engineers test before a site goes live?
- Which tools have you heard of — E1 tester, VSWR meter, optical meter?

Write their inputs on the whiteboard and build the discussion around their experiences.

## Elaborate

- Introduction to Site Acceptance Testing (SAT)
- Stages of the SAT Process
- Test Equipment Used in Site Acceptance Testing (SAT)
- Demonstration of Equipment Functionality (Practical Application)
- Telecom Cables and Their Applications in Testing
- Software Requirements for BTS and Network Equipment
- Telecom Site Infrastructure Components
- Power and Backup Systems
- Safety and Compliance Requirements

## Demonstrate

Now let’s move toward hands-on activities to understand how these tools work in real field situations.

## Activity

- **Activity name:** Test Equipment Verification & Laptop Software Check
- **Resources:** E1 tester, Ethernet tester, VSWR meter, optical meter, laptop with software..
- **Time Duration:** 40 minutes
- **Instructions:**
  - Divide into small groups and receive your designated test device and laptop.
  - Inspect the test device. Verify that it powers on, the self-test status is clear, the calibration is current, and the battery status is adequate. Also, visually check the integrity of all cable connection points.
  - On the provided laptop, check and record all installed software versions (e.g., specific configuration tools, drivers).
  - Launch the BTS configuration tools to ensure they open correctly. Then, confirm that both the USB drivers and serial drivers are correctly installed and functioning.
  - As a group, thoroughly document all findings from steps 2, 3, and 4 in your assigned record sheet.

## Notes for Facilitation

- Ensure all tools are handled safely.
- Keep reminding trainees to follow grounding and insulation rules.
- Encourage peer learning and group problem-solving.
- Ask trainees to complete related questions in the participant manual.

## Exercise

**Answers to exercises for PHB**

**Short Answer Questions – Answers**

1. SAT ensures that a telecom site meets all technical, safety, and operational requirements before handover. Key steps include: physical inspection, power and grounding checks, equipment configuration, link testing, performance verification, and documentation of results.
2. E1/Ethernet testers validate transmission links, VSWR meters check antenna line reflection, power meters measure RF output levels, and optical meters verify fiber signal strength and loss—all ensuring site performance meets standards.
3. RJ45 cables support Ethernet configuration and IP testing, RS232 cables are used for serial communication with legacy or CLI-based devices, and Hi-Speed USB cables enable firmware loading, diagnostics, and data transfer.
4. Safety measures prevent electrical faults, equipment damage, and accidents; grounding reduces shock risks, weatherproofing protects outdoor components, and insulation prevents short circuits and fire hazards.
5. Documenting test results captures site performance, confirms compliance, enables troubleshooting, and provides evidence for site acceptance and project closure.

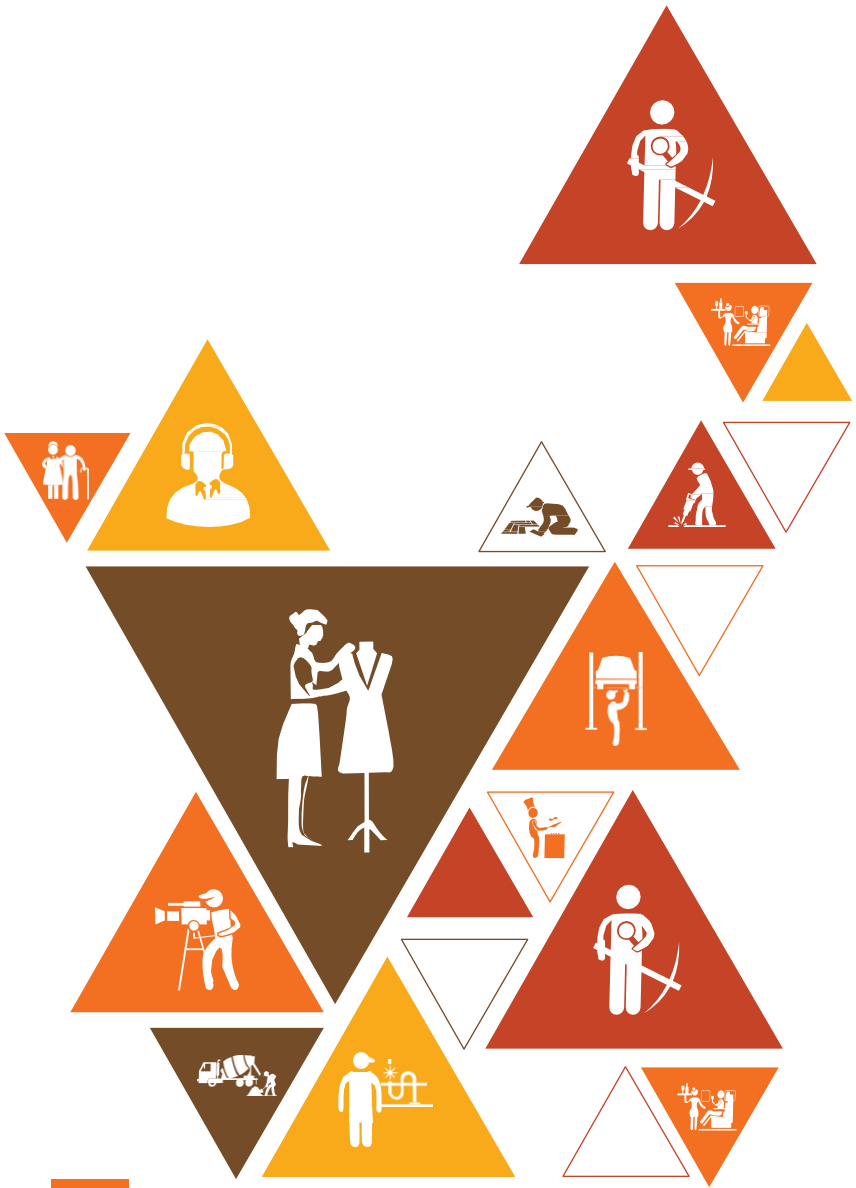
**Multiple Choice Question**

1. b) Verify that the site meets technical and operational requirements
2. c) Antenna feed line reflection levels
3. c) Ethernet communication and device configuration
4. b) Ensure continuous site operation during power failures
5. b) Network Performance Indicators

**Fill in the Blanks**

1. Site Master (or Spectrum Analyzer)
2. bonding
3. antenna
4. test records
5. performance

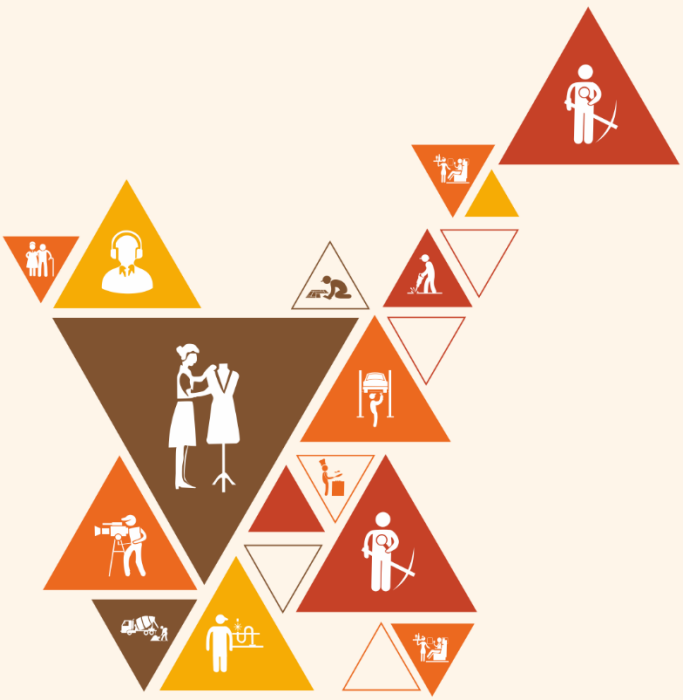
## Notes



# 3. Perform Preventive and Corrective Maintenance at Radio Locations

Unit 3.1 – Perform Preventive Maintenance at Radio Locations

Unit 3.2 – Perform Corrective Maintenance at Radio Locations



TEL/N6209

## Key Learning Outcomes 

After the completion of this module, the participant will be able to:

1. Explain the importance of preventive maintenance in ensuring network performance.
2. Demonstrate the steps to perform preventive maintenance and record findings.
3. Explain the process of identifying and resolving faults at radio locations.
4. Demonstrate corrective maintenance procedures and recordkeeping.

# UNIT 3.1: Perform Preventive Maintenance at Radio Locations

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the purpose of preventive maintenance and its role in maintaining network uptime.
2. Identify different maintenance schedules like monthly, quarterly, and annual checks.
3. Describe common equipment at radio locations, such as BTS, antennas, and power supply units.
4. List the tools and test equipment needed, like screwdrivers, pliers, multimeters, VSWR meters, and RF power meters.
5. Explain the importance of keeping records of maintenance activities and site conditions.
6. Describe safety protocols for working at radio locations, including handling equipment and ensuring personal safety.
7. Show how to review the preventive maintenance schedule and site-specific checklists.
8. Demonstrate how to gather and inspect tools, test equipment, and spare parts before starting maintenance.
9. Show how to check equipment for physical damage, cable connections, and power supply stability.
10. Demonstrate how to clean filters, fans, and vents to prevent overheating.
11. Show how to check battery health, earthing connections, and perform necessary software or firmware updates.
12. Demonstrate how to test system performance after maintenance and ensure no alarms are triggered.
13. Show how to document maintenance activities, record test results, and report findings to the NOC and supervisor.

## Resources to be Used

Participant handbook, projector, whiteboard, markers, sample preventive maintenance checklists, test tools (multimeter, VSWR meter, RF power meter), dummy BTS equipment images, PPE kit demonstration items (helmet, gloves, shoes).

## Say

In this session, we are going to explore preventive maintenance at radio locations. Whether it's a rooftop BTS site or a tower-mounted antenna, timely maintenance helps avoid breakdowns, improves efficiency, and ensures uninterrupted network service.

## Ask

Start by asking trainees:

- Why do you think preventive maintenance is necessary for network equipment?
- What could happen if a BTS or antenna is not maintained regularly?
- Have you seen any real-world issues caused by poor maintenance?

Encourage them to share experiences and note their responses on the board.

## Elaborate

- Purpose of Preventive Maintenance & Its Role in Network Uptime
- Maintenance Schedules
- Common Equipment at Radio Locations
- Tools & Test Equipment Needed
- Importance of Maintaining Records
- Safety Protocols at Radio Locations

## Activity

- Activity name: Preventive Maintenance Checklist Creation
- Objective of the Activity: To enable participants to create a complete preventive maintenance checklist for a radio site based on a given scenario.
- Resources: Participant handbook, notepads, pens, presentation slides.
- Time Duration: 30 minutes
- Instructions:
  1. Divide participants into small groups.
  2. Provide each group with a hypothetical preventive maintenance scenario (e.g., rooftop BTS site with antennas and battery banks).
  3. Ask groups to collaborate and create a detailed preventive maintenance checklist covering:
     - equipment inspection
     - power supply checks
     - RF cable inspections
     - safety measures
     - documentation requirements
  4. Groups present their checklists.
  5. Facilitate a discussion on completeness, accuracy, and practical feasibility of each checklist.

  Outcome: Participants will gain a deeper understanding of preventive maintenance tasks by collaboratively creating checklists that mirror real-world telecommunications scenarios..

## Do

- Encourage trainees to share field experiences or examples of poor maintenance.
- Help them refine their checklists with industry best practices.
- Reinforce the importance of safety and documentation.

## Notes for Facilitation

- Guide trainees who are unfamiliar with radio equipment terminology.
- Use real pictures and videos to make the concepts more relatable.
- Ask participants to answer workbook questions related to preventive maintenance.

# UNIT 3.2: Perform Corrective Maintenance at Radio Locations

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the importance of corrective maintenance in minimizing service disruptions.
2. Identify different types of faults and alarms, such as hardware failures, power outages, and link failures.
3. Describe diagnostic tools like E1 testers and spectrum analyzers and their uses in fault detection.
4. Explain procedures for replacing faulty components, applying software patches, and restoring service.
5. Discuss proper documentation and reporting protocols for corrective actions.
6. Explain escalation procedures for unresolved or complex faults. Show how to identify alarms from the NOC and assess fault severity.
7. Demonstrate the process of gathering fault history and planning corrective actions.
8. Show the use of diagnostic tools like E1 testers and spectrum analyzers to identify issues.
9. Demonstrate how to replace faulty components such as TRX modules and feeder cables.
10. Show how to apply software patches or reconfigure equipment as needed.
11. Demonstrate testing system performance post-maintenance and ensuring alarm clearance.
12. Show the process of recording corrective actions, updating fault logs, and reporting resolutions to the NOC and supervisor.

## Resources to be Used

Participant handbook, laptop, projector, sample alarm dashboards, E1 tester, spectrum analyzer, TRX module samples, feeder cables, whiteboard, markers.

## Say

Good Morning everyone!
Today we'll be exploring one of the most critical parts of telecom field operations — corrective maintenance. Whenever a fault occurs in the network, field teams are responsible for identifying the issue, restoring service quickly, and preventing future occurrences. Understanding alarms, using diagnostic tools, and following escalation protocols are key to minimizing downtime.

## Ask

Ask the trainees:

- What kinds of faults have you observed at telecom sites or customer locations?
- How do you think field teams identify and respond to these faults?
- Which diagnostic tools have you used earlier?

Write their responses on the whiteboard. Use their input to build the session naturally.

## Elaborate

- Introduction to Corrective Maintenance (CM)
- Importance in Network Operations
- Diagnostic Tools: E1 Testers & Spectrum Analyzers
- Procedures for Corrective Action & Service Restoration
- Documentation & Reporting Protocols
- Escalation Procedures for Unresolved Faultss

## Activity

- Activity name: Fault Diagnosis and Corrective Action Planning
- Objective of the Activity: To enable participants to analyze a network fault scenario, identify alarms, and create a corrective action plan using fault history and diagnostic tools.
- Resources: Participant handbook, notepads, pens, projector, sample NOC alarm screenshots.
- Time Duration: 30 minutes
- Instructions:
  1. Divide participants into small groups.
  2. Provide each group with a hypothetical fault scenario (e.g., TRX failure, E1 link down, feeder cable damage).
  3. Each group must:
     - Identify possible alarms from the NOC view.
     - Assess the severity of the fault.
     - List diagnostic tools they would use.
     - Plan corrective actions (component replacement, testing, documentation, etc.).
  4. Groups present their action plans.
  5. Conduct a discussion on the accuracy, completeness, and priority of their steps.

  Outcome: Participants will better understand how to interpret alarms, plan corrective maintenance activities, and coordinate effective fault resolution using appropriate tools and procedures.

## Do

- Guide trainees as they analyze fault scenarios.
- Encourage logical thinking and teamwork.
- Share industry examples of tricky faults and how they were resolved.

## Notes for Facilitation

- Reinforce proper escalation timelines.
- Emphasize documenting each corrective step.
- Encourage trainees to share real experiences or common field issues.
- Ask them to complete related exercises in the participant manual.

## Exercise

**Answers to exercises for PHB**

**Short Answer Questions – Answers**

1. Preventive maintenance ensures equipment at radio sites stays in optimal condition, reducing failures and maximizing network uptime by identifying issues early, cleaning components, verifying alarms, and checking power systems before problems occur.
2. Monthly maintenance covers basic cleaning and routine checks; quarterly maintenance includes deeper inspection of power systems, RF units, and environmental controls; annual maintenance involves full system audits, calibration, and replacement of aging components.
3. Key equipment includes BTS/NodeB/eNodeB (handles radio transmission), antennas and feeders (enable signal coverage), power systems like SMPS and batteries (ensure uninterrupted operation), DG sets (backup power), and transmission equipment (ensures network connectivity).
4. Tools include multimeters (voltage/continuity testing), VSWR meters (antenna line quality), spectrum analyzers (RF interference analysis), power meters (RF output checks), and hand tools for tightening, cleaning, and ensuring physical integrity—helping maintain equipment health.
5. Documentation ensures accurate records of site condition, actions taken, and test results, enabling troubleshooting, compliance, performance tracking, and smooth handover between teams.

**Multiple Choice Question**

1. b) Avoid unexpected service disruptions and maintain uptime
2. b) Electrical voltage and continuity
3. b) Overheating and equipment failure
4. c) Faults, outages, or alarms occur
5. b) RF interference and frequency-related issues

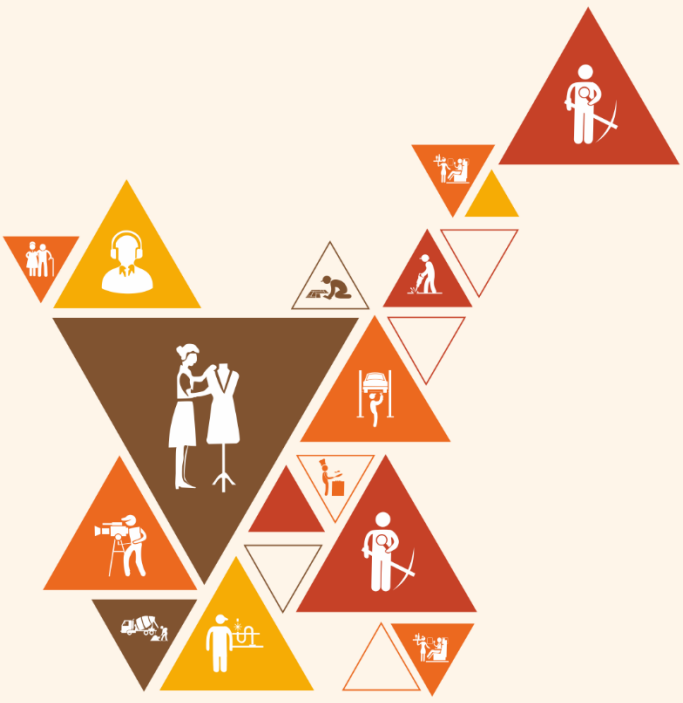
**Fill in the Blanks**

1. preventive
2. site
3. alarms
4. Annual
5. maintenance

## Notes

# 4. Perform Change Management at Radio Locations

Unit 4.1 – Assess and Prepare for Change Management at Radio Locations
Unit 4.2 – Execute and Document Change Management at Radio Locations



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## Key Learning Outcomes 

After the completion of this module, the participant will be able to:

1. Explain the process of assessing infrastructure upgrades and preparing for change management.
2. Demonstrate the arrangement of tools, spares, and resources for implementing changes at radio locations.
3. Explain the process of executing infrastructure changes and monitoring post-change performance.
4. Demonstrate the documentation and reporting procedures after implementing changes at radio locations.

# UNIT 4.1: Assess and Prepare for Change Management at Radio Locations

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the importance of change management in maintaining network performance and minimizing disruptions.
2. Identify the different types of activities involved in infrastructure upgrades.
3. Describe the process of validating change requests and assessing their criticality, dependencies, and impact on the network.
4. Explain the procedures for developing structured work plans, including pre-change checks and resource requirements.
5. Define the protocols for obtaining necessary permits and authorizations before initiating upgrades.
6. List the tools, login cables, and diagnostic equipment required for infrastructure upgrades.
7. Explain the procedures for managing spare parts, including handling, tracking, and returning defective components.
8. Identify potential risks, vulnerabilities, and security concerns associated with implementing system changes.
9. Show how to validate change requests from relevant teams, such as NOC, change management, and network planning.
10. Demonstrate the process of categorizing infrastructure upgrades based on activity type and assessing their impact.
11. Show how to develop a structured work plan, considering criticality, dependencies, and resource requirements.
12. Demonstrate the process of obtaining necessary permits and authorizations before executing changes.
13. Show how to check the availability of login cables, diagnostic tools, and necessary spare hardware like TRX cards.
14. Demonstrate the coordination process with the logistics team for the procurement, repair, and return of faulty or obsolete equipment.
15. Show how to ensure compliance with organizational spare management and tracking procedures.

## Resources to be Used

Participant handbook, whiteboard, markers, projector, laptop, sample change request templates (CR forms), inventory sheets, sample work plans, diagnostic tools demonstration videos.

## Say

Today we're going to learn how telecom companies manage network changes in a structured and safe manner. Whether it's upgrading a router, replacing fibers, or updating software — every change must be controlled to protect network stability.

## Ask

- Have you ever seen a network outage caused by a misconfigured change or improper installation?
- Why do you think telecom companies follow strict change management processes?

## Elaborate

- Importance of Change Management
- Types of Infrastructure Upgrade Activities
- Validating Change Requests
- Developing Structured Work Plans
- Permits and Authorizations
- Tools, Login Cables & Diagnostic Equipment
- Spare Parts Management Procedures
- Risks & Security Concerns in System Changes

## Demonstrate

Let's now engage in a structured activity to reinforce these concepts by creating a practical work plan.

## Activity

- Activity name: Change Request Validation Simulation
- Objective of the Activity: To help participants practice evaluating a change request by reviewing criticality, dependencies, risks, and required approvals.
- Resources: Participant handbook, mock CR forms, pens, projector.
- Time Duration: 30 minutes
- Instructions:
  1. Divide participants into small groups.
  2. Give each group a hypothetical change request (e.g., "Upgrade OLT firmware", "Replace fiber patch panel", "Expand switch capacity").
  3. Ask groups to validate the CR by identifying:
     - Risks
     - Dependencies
     - Impact on customers
     - Required approvals
     - Rollback plan
  4. Each group presents their analysis to the class.
  5. Facilitate a discussion on what was accurate, missing, or could be improved.
- Outcome: Participants will learn how to analyze and validate real-world change requests effectively and understand the importance of structured planning before upgrades.

## Notes for Facilitation

- Encourage participants to share insights from their own experiences and consider real-world challenges.
- Address any questions related to specific tools, equipment, and safety protocols.
- Promote an open dialogue and collaborative learning atmosphere among participants.
- Reinforce the significance of accurate material verification and thorough safety assessments.

# UNIT 4.2: Execute and Document Change Management at Radio Locations

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the importance of following approved work plans and industry best practices while executing change management activities.
2. Describe the process of real-time monitoring of key performance indicators (KPIs) during and after infrastructure changes.
3. Identify the steps for escalating anomalies or unexpected network behaviors during post-change monitoring.
4. Explain rollback procedures for reversing changes if service degradation crosses acceptable thresholds.
5. Define the importance of adhering to Service Level Agreements (SLAs) for completing changes and validating performance.
6. List the essential administrative tasks to be completed after implementing changes, such as site clearance and returning testing tools.
7. Explain the procedures for verifying post-change effectiveness by monitoring alarm status and coordinating with the NOC team.
8. Describe the process of documenting all activities, including performance snapshots, troubleshooting logs, and resolution timelines.
9. Identify communication protocols for notifying stakeholders about change status and obtaining necessary sign-offs.
10. Explain the requirements for updating network documentation, maintenance logs, and spare inventory records as per regulatory standards.
11. Demonstrate the execution of change management activities according to approved work plans and best practices.
12. Show how to conduct real-time monitoring of KPIs during and after changes to assess network performance.
13. Demonstrate the process of identifying and escalating anomalies or unexpected network behaviors.
14. Show how to apply rollback procedures if changes cause unacceptable service degradation.
15. Demonstrate adherence to SLAs by ensuring timely completion of changes and performance validation.
16. Show the completion of administrative tasks post-change, including clearing the site and returning testing tools.
17. Demonstrate the verification of post-change effectiveness by monitoring alarms and coordinating with the NOC team.
18. Show how to document all activities, including performance comparisons, troubleshooting steps, and resolution timelines.
19. Demonstrate the proper communication of change status to stakeholders and obtaining necessary approvals or sign-offs.
20. Show how to update network documentation, maintenance logs, and spare inventory records following regulatory and organizational standards.

## Resources to be Used

Participant handbook, change management workflow charts, KPI dashboards (live or demo), laptop, projector, sample maintenance logs, alarm monitoring screenshots, escalation matrix, whiteboard, markers.

## Say

In this session, we'll explore how change management works in telecom operations, and why following approved procedures is crucial for minimizing network disruptions and maintaining customer satisfaction.

## Ask

- Why do you think telecom operators use strict workflows for network modifications?
- What might happen if KPIs are not monitored during a change?

## Elaborate

- Importance of Following Approved Work Plans & Best Practices
- Real-Time Monitoring of KPIs During & After Changes
- Steps for Escalating Anomalies During Post-Change Monitoring
- Rollback Procedures
- Importance of Adhering to SLAs
- Verifying Post-Change Effectiveness

## Activity

- Activity name: Change Execution and KPI Monitoring Simulation
- Objective of the Activity: To engage participants in creating a comprehensive pre-installation checklist
- Resources: KPI dashboard screenshots, sample alarms, escalation matrix, role cards.
- Time Duration: 40 minutes
- Instructions:
  1. Divide trainees into groups.
  2. Provide each group a scenario such as fiber rerouting, CPE upgrade, or link reconfiguration.
  3. Ask them to execute the "change" using the given work plan.
  4. Show them simulated KPIs before and after the change.
  5. Ask them to decide:
     - Is performance acceptable?
     - Should they escalate?
     - Should rollback be triggered?
  6. Each group presents its findings.

## Notes for Facilitation

- Promote teamwork and communication during simulations.
- Reinforce that documentation is as important as the technical task itself.
- Ask trainees to discuss real-life challenges faced during changes.
- Guide them to complete all unit-related questions in the participant manual.

## Exercise

**Answers to exercises for PHB**

**Short Answer Questions – Answers**

1. Change management ensures network stability during upgrades by allowing planned, controlled execution, reducing the risk of outages, and maintaining consistent performance while introducing new configurations or hardware.
2. Validating a change request involves checking technical dependencies, assessing its criticality, analyzing potential service impact, reviewing risks, and confirming resource readiness before approval.
3. Structured work plans provide a clear sequence for upgrade tasks. They typically include pre-change checks, required tools and resources, activity steps, risk/impact details, KPI monitoring guidelines, and rollback procedures.
4. Real-time KPI monitoring helps detect service degradation instantly, allowing immediate corrective actions and ensuring network performance remains within acceptable levels during and after the change.
5. Documentation—such as logs, performance snapshots, and sign-offs—provides evidence of work done, supports audits, ensures accountability, helps future troubleshooting, and formally closes the change activity.

**Multiple Choice Question**

1. b) Reduce network disruption and ensure controlled execution
2. b) Change request validation
3. b) Service degradation exceeds acceptable thresholds
4. b) Spare parts and testing essentials
5. b) Notify status, obtain sign-offs, and close the activity

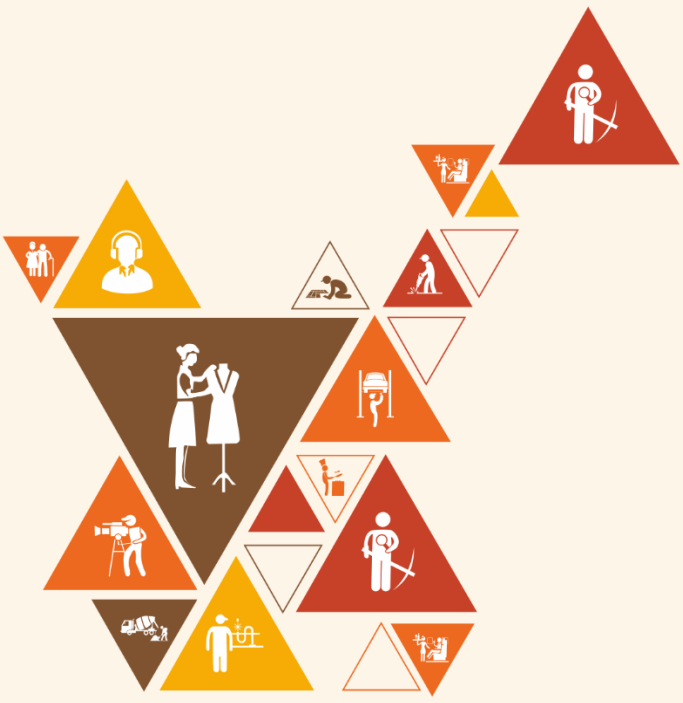
**Fill in the Blanks**

1. Criticality
2. work plan
3. Degradation
4. Thresholds
5. compliance

## Notes

# 5. Undertake Fault Rectification

Unit 5.1 – Fault Identification and Rectification in BSS Networks



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# Key Learning Outcomes

After the completion of this module, the participant will be able to:

1. Explain the process of monitoring network alarms and identifying faults in the Base Station Sub-system (BSS) network.
2. Demonstrate fault diagnosis, rectification techniques, and post-rectification activities.

# UNIT 5.1: Fault Identification and Rectification in BSS Networks

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the functions and capabilities of Network Monitoring Systems (NMS) and related tools.
2. Describe the end-to-end ticketing process, including lifecycle tracking and resolution workflows.
3. Identify various types of alarms, their impact on network performance, and corresponding troubleshooting methodologies.
4. Explain advanced fault diagnosis techniques such as data analysis and predictive maintenance.
5. Describe the functionalities of passive infrastructure elements like DG sets, PIU panels, transformers, SMPS, air conditioners, and battery banks.
6. Define different network topology structures (e.g., ring, daisy chain) and their impact on fault localization and rectification.
7. Explain the importance of Maintenance Operation Protocols (MOPs) for reducing repeat faults.
8. Identify key characteristics and performance parameters of service networks such as GSM, WCDMA, and LTE.
9. Explain the interpretation and application of VSWR and E1 test results for fault localization.
10. Describe industry best practices for documentation, regulatory compliance, and data security.
11. List record-keeping standards and the consequences of poor documentation management. Demonstrate logging into the alarm management system using secure credentials.
12. Show how to monitor network alarms on the NMS and assess threshold levels.
13. Demonstrate generating service requests/tickets as per the priority matrix and escalating unresolved critical alarms.
14. Show how to verify fault resolutions by comparing current configurations against previous backup records and alarm logs.
15. Demonstrate coordination with the infrastructure NOC to identify passive infrastructure faults.
16. Show how to categorize alarms based on service impact analysis and take appropriate actions.
17. Demonstrate identifying root causes of alarms by following standardized troubleshooting protocols.
18. Show how to conduct advanced diagnostic tests, including remote analysis of active equipment.
19. Demonstrate evaluating fault rectification options and confirming the selected solution with supervisors if needed.
20. Show how to apply corrective measures like system resets based on fault severity.
21. Demonstrate dispatching field engineers and providing fault rectification instructions.
22. Show how to monitor and verify the fault resolution process executed by field engineers and technicians.
23. Demonstrate coordinating with the NOC team to confirm post-rectification alarm status.
24. Show the completion of post-maintenance activities, such as equipment return and site clearance.
25. Demonstrate notifying relevant stakeholders about test results and obtaining sign-offs.
26. Show how to maintain detailed logs, including fault rectification reports, maintenance records, and spare parts usage.
27. Demonstrate updating documentation according to organizational standards and providing necessary documents for audits and regulatory inspections.

## Resources to be Used

Participant handbook, notepad, pen, whiteboard, markers, presentation slides, overhead projector or large screen, computer/laptop with internet connection.

## Say

- Welcome to the session on 'Performing Quality Checks Pertaining to Installation and Commissioning.'
- Throughout this class, we will delve into essential steps and processes that guarantee the quality of installation and commissioning activities.
- Our exploration will encompass testing tools, effective troubleshooting strategies, and the significance of consistent maintenance practices.

## Ask

- Who can explain the significance of testing and quality checks during the installation and commissioning process?
- Raise your hand if you're familiar with any testing tools used for network performance assessment.

## Elaborate

- Analysing Commissioning Requirements:
  - Explain the process of analysing specific commissioning requirements based on factors such as coverage area, capacity, and network topology.
  - Emphasise the importance of aligning the installation process with the unique needs of the service provider and the network's objectives.
- Testing gNodeBs and Simulating Networks:
  - Provide a detailed overview of the procedure for testing 5G gNodeBs.
  - Discuss the significance of using testing tools like channel and network emulators to simulate real-world network conditions, ensuring thorough and accurate testing.

## Do

- Initiate a discussion about the importance of analysing specific commissioning requirements based on factors like coverage area, capacity, and network topology. Encourage participants to share their thoughts and experiences.
- Utilise presentation slides and diagrams to summarise the procedure for testing 5G gNodeBs, emphasising the use of testing tools like channel and network emulators for accurate testing. Facilitate discussions on real-world network simulation.
- Engage participants in exploring UE simulators such as Aeroflex TM500 and Keysight and UE debuggers like QXDM, XCAL, and TEMS.
- Walk participants through the steps required to complete a comprehensive test run of upgraded software and equipment. Showcase the process of identifying issues and bugs during testing and troubleshooting.
- Encourage participants to brainstorm and list different issues and bugs that may arise during the test run. Facilitate a discussion on possible solutions and corrective measures for each issue.
- Engage participants in a hypothetical scenario where they must efficiently resolve an identified issue. Facilitate discussions on the incorporation of necessary changes for smooth equipment operation.

## Demonstrate

Simulate the use of IXIA on a computer to demonstrate traffic generation and monitoring in a controlled environment.

## Activity

- Activity name: Maintenance Planning Simulation
- Objective of the Activity: To engage participants in planning routine maintenance tasks for a hypothetical 5G site.
- Resources: Participant handbook, notepads, pens.
- Time Duration: 30 minutes
- Instructions:
  - Divide participants into small groups.
  - Provide each group with a scenario of a 5G site requiring routine maintenance.
  - Instruct groups to collaboratively create a maintenance plan, including tasks, schedules, and responsibilities.
  - Groups present their maintenance plans, followed by a discussion on the effectiveness of each plan.
- Outcome: Participants will develop practical skills in planning routine maintenance activities for 5G sites.

## Notes for Facilitation

- Foster an interactive and collaborative learning environment by encouraging participants to share insights and experiences.
- Address any technical questions participants may have regarding testing tools and troubleshooting techniques.
- Use real-world examples and case studies to enhance participants' understanding of the concepts.
- Emphasise the importance of routine maintenance in ensuring the smooth operation of network equipment.
- Reinforce the significance of efficient issue resolution and incorporating necessary changes for optimal network performance.

## Exercise

**Answers to exercises for PHB**

**Short Answer Questions – Answers**

1. Network Monitoring Systems (NMS) continuously track network health, device status, alarms, and performance KPIs. They enable proactive management by detecting issues early, triggering alerts, and helping teams resolve faults before they affect customers.
2. The ticketing workflow begins with alarm detection, followed by ticket creation, fault classification, assignment to the concerned team, field investigation, corrective action, validation, and finally issue closure with proper documentation.
3. Network alarms include critical, major, and minor alarms. Critical alarms cause service outages, major alarms degrade performance, and minor alarms indicate non-urgent issues. Each type affects user experience differently depending on severity.
4. Passive components like DG sets, PIU panels, SMPS units, and battery banks ensure continuous power supply. They protect equipment from outages, stabilize voltage, support backup operations, and maintain uninterrupted network service.
5. Documentation and compliance ensure accurate asset tracking, support audits, maintain legal alignment, and help avoid repeated issues. Proper records also improve troubleshooting, site maintenance, and operational transparency.

**Multiple Choice Question**

1. b) Monitoring alarms and analyzing network performance
2. b) Improving fault tolerance through alternate routing
3. b) Historical data analysis to identify potential failures
4. b) RF antenna systems and feeder cables
5. c) Compliance failures and repeated network issues

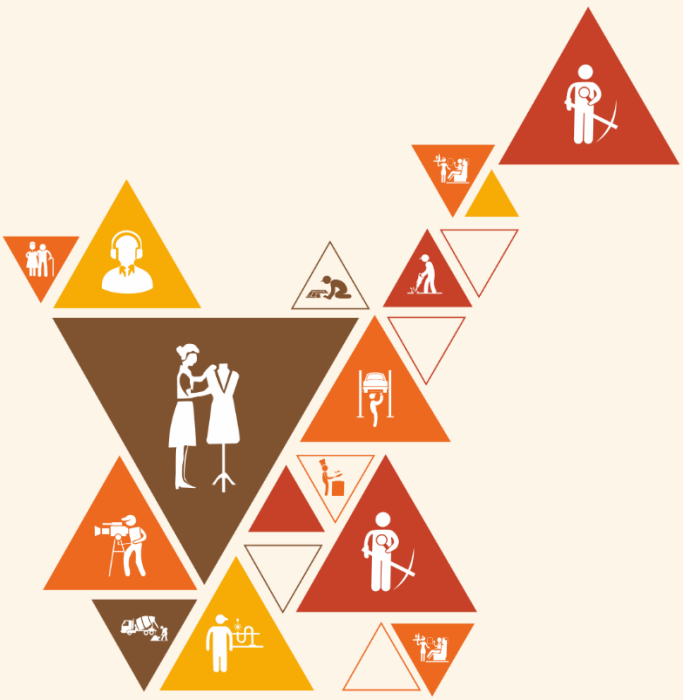
**Fill in the Blanks**

1. Performance
2. ticket lifecycle
3. passive NOC
4. RF/antenna path
5. audits

## Notes

# 6. Undertake Configuration Changes, Upgrades and Node Backup Activities

Unit 6.1 – Manage Configuration Changes and Backup Processes



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## Key Learning Outcomes 

After the completion of this module, the participant will be able to:

1. Explain how to assess, plan, and execute configuration changes, software upgrades, and node backup activities in the BSS network.
2. Demonstrate post-change monitoring techniques, contingency planning, and proper documentation of change management activities.

# UNIT 6.1: Manage Configuration Changes and Backup Processes

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain standard operating procedures (SOPs) for change management, upgrades, and backup activities.
2. Describe incident escalation protocols for system failures, security breaches, and environmental hazards.
3. Identify key network elements (BSC, BTS, transmission links) and their functionalities.
4. Explain the operational aspects of passive infrastructure components such as DG sets, power systems, air conditioning, and battery backup systems.
5. Describe Network Monitoring System (NMS) functions for real-time fault detection and performance tracking.
6. Explain risks associated with unplanned changes, non-compliance with standard procedures, and improper backup management.
7. Identify industry best practices and technological advancements in BSS network upgrades and configuration management.
8. Explain cybersecurity measures to ensure network integrity during configuration changes.
9. Describe compliance requirements, including data privacy and telecommunications regulations.
10. Explain root cause analysis techniques for identifying and mitigating network failures
11. Demonstrate how to identify and verify change requirements based on maintenance plans and operational needs.
12. Show how to assess the urgency and impact of configuration changes.
13. Demonstrate developing a structured work plan, including resource allocation and approval workflows.
14. Show how to conduct a risk analysis to anticipate service outages and determine mitigation strategies.
15. Demonstrate notifying relevant stakeholders before initiating changes.
16. Show how to obtain approvals from customers and management for service-impacting changes.
17. Execute Changes and Monitor Post-Change Activities
18. Demonstrate implementing configuration changes, software upgrades, and firmware updates.
19. Show how to perform comprehensive node backups before and after making changes.
20. Demonstrate monitoring system performance and alarms post-change.
21. Show how to execute contingency plans and rollback procedures in case of failures.
22. Demonstrate ensuring compliance with SLAs and change management protocols.
23. Demonstrate collaborating with the NOC team to verify system stability and performance.
24. Show how to provide detailed reports and updates to stakeholders.
25. Demonstrate logging all change activities, findings, and resolutions in the system.
26. Show how to update and close tickets following proper documentation standards.

## Resources to be Used

Test tools and simulators, Sample SOPs and acceptance checklists,3GPP standard documents, Safety gear and site guidelines, Laptops, test software, and configuration tools, Visual aids showing 5G architecture, SA/NSA layouts, and sample test cases

## Say

- Today we will explore Acceptance Testing and Monitoring—a critical process that ensures a 5G site is technically sound, safe, compliant, and ready for integration.
- The session focuses on understanding test strategies, standards, documentation, infrastructure validation, and analyzing test results.
- By the end, you will be able to plan and conduct acceptance testing confidently using industry-aligned procedures.
- Acceptance testing is the final checkpoint before a site goes live, making accuracy, safety, and documentation essential.

## Ask

- Have you ever observed or participated in any form of network testing? What challenges did you notice?
- Why do you think acceptance testing is so important before a site goes on air?
- What tools or documents do you think are necessary before starting a test at a 5G site?
- What could happen if a site is commissioned without following proper SOPs?

## Do

- Share any personal experiences related to telecom installation, testing, or troubleshooting.
- Identify tools you think are required for 5G site acceptance.
- Discuss with peers how safety protocols impact field testing activities.
- Observe how infrastructure elements influence test outcomes.

## Elaborate

- Introduce the acceptance testing workflow—pre-checks, test setup, test execution, documentation, and reporting.
- Explain the importance of SA/NSA architecture knowledge in building test cases and selecting test tools.
- Discuss regulatory standards like 3GPP and local DoT requirements to highlight the importance of compliance.
- Describe the need for accurate test case design, proper site documentation, and maintaining SOP consistency.
- Explain how analyzing test results helps identify deviations and supports corrective actions.

## Demonstrate

- Perform a simple logical check such as alarm connectivity or equipment status validation.
- Display how site documents like checklists, safety guidelines, and SOPs are used during testing.

## Activity

- Activity Name: Acceptance Test Flow Mapping
- Objective: Understand the complete sequence from site readiness to test completion.
- Type of Activity: Group
- Resources: Sample SOPs, test checklists, flowchart sheets
- Time Duration: 30 minutes
- Instructions:
    - Each group will create a flowchart representing acceptance testing steps including pre-checks, test execution, documentation, and issue reporting.
- Outcome: Participants understand the structure and documentation flow involved in acceptance testing.

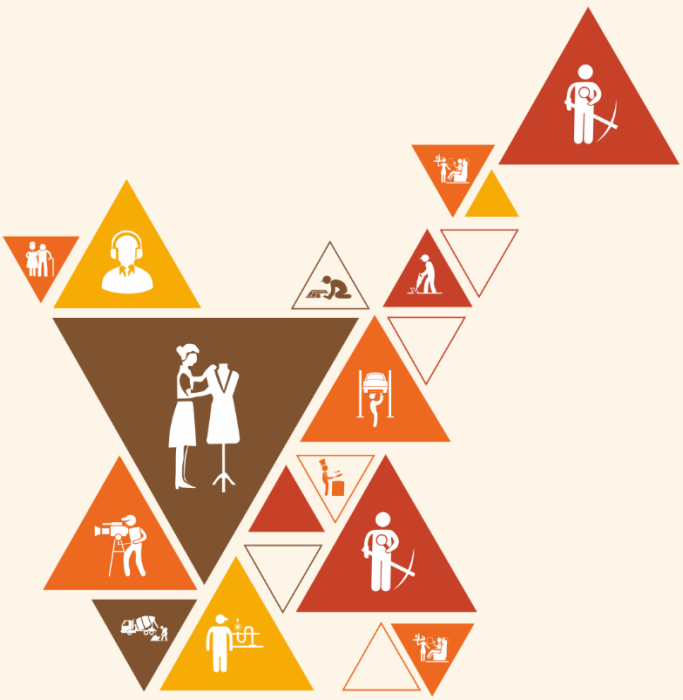
## Notes for Facilitation

- Encourage trainees to connect concepts with real telecom field experiences.
- Reinforce the need for strict adherence to standards, safety protocols, and SOPs.
- Use practical examples of test failures and corrective actions to build clarity.
- Guide trainees through understanding how gNodeB architecture impacts testing.
- Emphasize the importance of documentation accuracy and stakeholder coordination.
- Provide examples of common site issues such as high VSWR, alarm failures, or configuration mismatches.
- Ensure trainees actively participate in discussions, demonstrations, and group activity

## Notes

# 7. Sustainability Practices in Telecom Infrastructure Management

Unit 7.1 - Sustainability Practices in Telecom Infrastructure Management



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## Key Learning Outcomes

After the completion of this module, the participant will be able to:

1. Explain the e-waste management rules applicable to the telecom sector.
2. Show how to identify, segregate, and categorize e-waste and hazardous waste at telecom sites.
3. Describe Central Pollution Control Board (CPCB) guidelines for telecom site waste disposal.
4. Demonstrate the process of maintaining logs and records for disposed, recycled, or repurposed telecom waste.
5. Identify safety standards for battery handling and disposal, including lead-acid and lithium-ion batteries.
6. Demonstrate safe handling procedures for hazardous materials, including the use of protective gear.
7. List recyclable telecom components and methods for minimizing telecom waste.
8. Demonstrate the reduction of packaging waste through the reuse of telecom materials and accessories.
9. Elucidate techniques for energy optimization, such as smart cooling, LED lighting, and hybrid power systems.
10. Demonstrate energy-efficient practices, such as optimizing power usage and using smart cooling systems.
11. Explain the role of renewable energy sources, like solar energy, in reducing telecom carbon footprint.
12. Show how to assist in adopting solar-powered telecom towers and integrating hybrid energy systems.
13. Describe best practices for managing telecom tower site waste and reducing fuel consumption in Diesel Generators (DG) sets.
14. Demonstrate guiding co-workers on eco-friendly practices and waste management policies.
15. Define water conservation principles and sustainable telecom site design.
16. Explain the importance of training telecom employees on environmental awareness and compliance.
17. Show how to conduct periodic environmental audits to ensure sustainability compliance.

# UNIT 7.1: Sustainability Practices in Telecom Infrastructure Management

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the e-waste management rules applicable to the telecom sector.
2. Show how to identify, segregate, and categorize e-waste and hazardous waste at telecom sites.
3. Describe Central Pollution Control Board (CPCB) guidelines for telecom site waste disposal.
4. Demonstrate the process of maintaining logs and records for disposed, recycled, or repurposed telecom waste.
5. Identify safety standards for battery handling and disposal, including lead-acid and lithium-ion batteries.
6. Demonstrate safe handling procedures for hazardous materials, including the use of protective gear.
7. List recyclable telecom components and methods for minimizing telecom waste.
8. Demonstrate the reduction of packaging waste through the reuse of telecom materials and accessories.
9. Elucidate techniques for energy optimization, such as smart cooling, LED lighting, and hybrid power systems.
10. Demonstrate energy-efficient practices, such as optimizing power usage and using smart cooling systems.
11. Explain the role of renewable energy sources, like solar energy, in reducing telecom carbon footprint.
12. Show how to assist in adopting solar-powered telecom towers and integrating hybrid energy systems.
13. Describe best practices for managing telecom tower site waste and reducing fuel consumption in Diesel Generators (DG) sets.
14. Demonstrate guiding co-workers on eco-friendly practices and waste management policies.
15. Define water conservation principles and sustainable telecom site design.
16. Explain the importance of training telecom employees on environmental awareness and compliance.
17. Show how to conduct periodic environmental audits to ensure sustainability compliance.

## Resources to be Used

Visual aids or slides on e-waste, Samples of e-waste products, Information on local waste man-agement facilities, Recycling bins or containers.

## Say

- Today, we're diving into a crucial topic – 'Waste Management.' It's not just about cleaning up; it's about understanding what we discard and how it impacts the environment.
- Our objective today is to explore the world of waste management, with a special focus on e-waste. By the end, you'll understand what e-waste is, the concept of waste management, and the recycling process, contributing to a cleaner, greener planet.
- The way we manage waste, especially electronic waste, has a direct impact on our environ-ment. Understanding this process empowers us to make informed choices and actively partici-pate in creating a sustainable future.

## Ask

- Can you name some electronic devices you've discarded recently, and what did you do with them?
- Have you ever thought about what happens to your old gadgets once you throw them away?
- Do you currently practice any recycling habits at home or in your workplace?

## Do

- Introduce the concept of waste management and its importance.
- Outline the session's objectives.

## Elaborate

**Understanding E-Waste**

- Define e-waste and discuss common electronic products contributing to it.

**Concept of Waste Management**

- Explain the overall concept of waste management, including the 3 R's (Reduce, Reuse, Re-cycle).

**Recycling Process of E-Waste**

- Detail the process of recycling e-waste and the environmental benefits.

## Demonstrate

Demonstrate the disassembly of a simple electronic device to highlight recyclable compo-nents. Discuss the importance of responsible disposal.

## Activity

- Activity name: E-Waste Sorting
- Objective: Sort various e-waste items into categories (recyclable, non-recyclable).
- Type of Activity: Group
- Resources: Samples of e-waste, recycling bins.
- Time Duration: 30 minutes
- Instructions:
  - Groups sort provided e-waste items, discussing reasons for their choices.
- Outcome: Improved understanding of e-waste categories and recycling possibilities.

## Notes for Facilitation

- Encourage participants to share personal experiences or challenges related to waste manage-ment.
- Emphasize the importance of individual responsibility in waste reduction.
- Provide information on local e-waste recycling facilities or programs.
- Discuss the impact of improper e-waste disposal on the environment.
- Encourage participants to share any sustainable waste management practices they are aware of.

## Exercise

**Answers to exercises for PHB**

**A. Multiple Choice Questions:**

1. b) E-Waste Management Rules
2. b) Lead-acid or lithium-ion battery
3. b) To track waste movement and ensure compliance
4. c) Metal frames and cables
5. b) Reducing carbon footprint

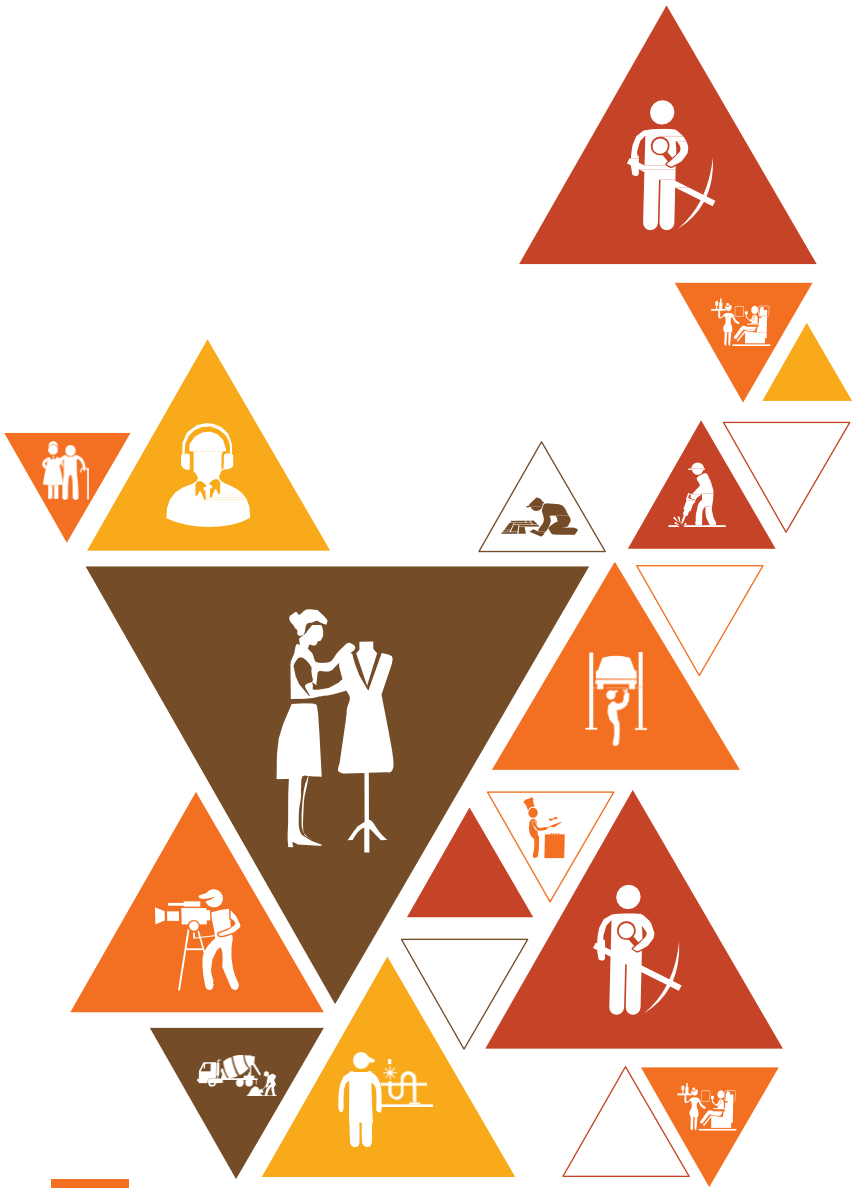
**B. Fill in the Blanks:**

1. handling and disposal of telecom waste.
2. hazardous
3. energy

**D. Short Answer Questions:**

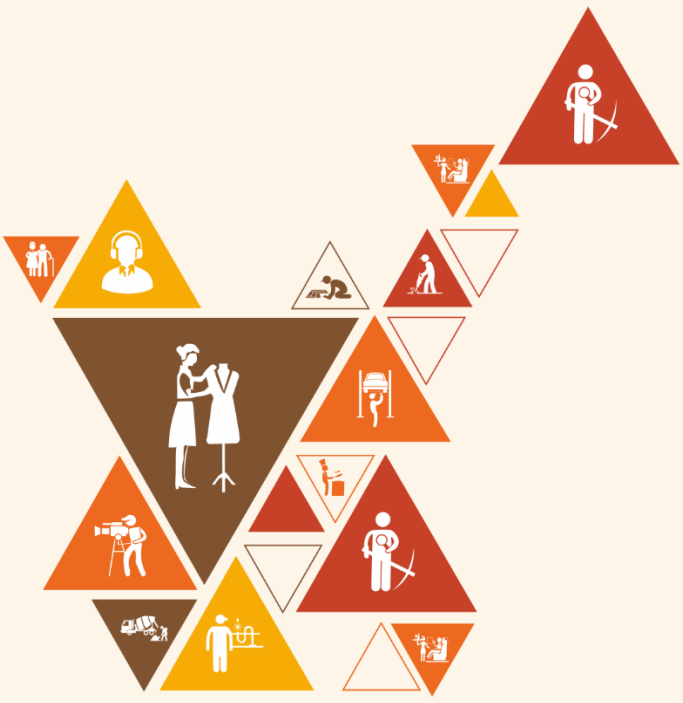
1. To ensure safe, compliant, and environmentally responsible disposal that avoids pollution and legal violations.
2. Smart cooling systems, LED lighting, hybrid power systems, or solar energy (any two).
3. To track waste movement, ensure regulatory compliance, support audits, and promote responsible waste management.

## Notes



# 8. Workplace Management, Safety, and Resource Optimization

Unit 8.1 - Skill Development and Work Planning
Unit 8.2 - Safety, Resource Management, and Team Motivation



TEL/N9104

## Key Learning Outcomes

After the completion of this module, the participant will be able to:

1. Explain strategies to pursue skill advancement relevant to the industry.
2. Show how to develop technical and personal skills for staying updated with industry advancements.
3. Describe key performance indicators (KPIs) for task evaluation and improvement.
4. Show techniques to guide the team in being accountable for timely completion of tasks.
5. Explain feedback processes and formats to guide performance improvement.
6. Show methods to train the team on adapting to new products, services, and technologies.
7. Discuss the significance of setting timelines and goals for work allocation.
8. Show the process of creating schedules and rosters to ensure smooth workflow.
9. Describe the importance of quality and timely delivery of products and services.
10. Show supervision techniques to ensure work is done according to assigned requirements.
11. Explain the layout of the workstation and equipment used in daily tasks.
12. Show ways to maintain efficiency and productivity while performing assigned tasks.
13. Discuss the escalation matrix and its importance, especially in emergencies.
14. Show problem-solving skills by analyzing workplace issues and providing appropriate solutions.
15. Explain techniques for time and cost management in workplace operations.
16. Show how to train the team to estimate the root cause of problems and validate solutions.
17. Show identification of organizational health, safety, and security policies and procedures.
18. Explain different types of hazards and associated risks in the workplace.
19. Show handling of hazards like illness, accidents, fires, or natural calamities as per organizational procedures.
20. Discuss the procedures for reporting breaches in health, safety, and security.
21. Show how to instruct the team to report breaches in health, safety, and security.
22. Show the process of reporting hazards outside individual authority and warning others who may be affected.
23. Describe methods for efficient resource and material management.
24. Show practices to optimize material usage, including water, in daily activities.
25. Show supervision of the team to ensure responsible use of workplace resources.
26. Explain common electrical problems and practices for conserving electricity.
27. Show methods to guide the team in optimizing energy usage in various processes.
28. Show techniques to motivate the team for routine cleaning of tools, machines, and equipment.
29. Show periodic checks to ensure the proper functioning of machines and equipment.
30. Show guidance on reporting malfunctions and lapses in equipment maintenance.
31. Show identification of opportunities for team-building workshops and motivational training.

# UNIT 8.1: Skill Development and Work Planning

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain strategies to pursue skill advancement relevant to the industry.
2. Show how to develop technical and personal skills for staying updated with industry advancements.
3. Describe key performance indicators (KPIs) for task evaluation and improvement.
4. Show techniques to guide the team in being accountable for timely completion of tasks.
5. Explain feedback processes and formats to guide performance improvement.
6. Show methods to train the team on adapting to new products, services, and technologies.
7. Discuss the significance of setting timelines and goals for work allocation.
8. Show the process of creating schedules and rosters to ensure smooth workflow.
9. Describe the importance of quality and timely delivery of products and services.
10. Show supervision techniques to ensure work is done according to assigned requirements.
11. Explain the layout of the workstation and equipment used in daily tasks.
12. Show ways to maintain efficiency and productivity while performing assigned tasks.
13. Discuss the escalation matrix and its importance, especially in emergencies.
14. Show problem-solving skills by analyzing workplace issues and providing appropriate solutions.
15. Explain techniques for time and cost management in workplace operations.
16. Show how to train the team to estimate the root cause of problems and validate solutions.

## Resources to be Used

Participant handbook, laptop, monitoring dashboard or sample test tool screens, pen, notebook, markers, projector, backup SOP templates, sample log files, printouts of KPI threshold charts, and performance report formats. These resources can be easily arranged in a training room with basic digital equipment.

## Say

Good morning and welcome back to this training session on Site Performance Monitoring and Reporting.In this unit, we will learn how to observe real-time KPIs, interpret site health indicators, carry out backups safely, and communicate the test results to the concerned teams.By understanding these procedures, you will be able to maintain smooth site operations and ensure consistent service quality.

## Ask

- Can anyone share an example of why accurate documentation is important in the context of network deployment?
- Raise your hand if you've ever been involved in preparing compliance reports.

## Elaborate

- Explain how KPIs like RSRP, SINR, and PRB utilization indicate site performance.
- Describe how node status, alarms, and traffic patterns reveal network health.
- Clarify why detailed logs support RCA and long-term optimization.
- Discuss how coordination with NOC and RF teams ensures faster issue resolution.
- Highlight how customer complaints help detect hidden service issues.

## Do

- Initiate a discussion about the significance of a pre-defined report format for accurate test result recording. Discuss the inclusion of KPIs, signal strength, handover success rates, and other performance metrics. Encourage participants to share their insights and experiences.
- Utilise presentation slides to outline the importance of maintaining different types of documentation, reports, and logs. Discuss how installation and commissioning compliance reports contribute to regulatory compliance and performance monitoring.
- Guide participants in recalling the process of compliance closure for a site after successful inspection.

## Activity

- Activity name: Compliance Reporting Simulation
- Objective of the Activity: To engage participants in collaboratively preparing compliance reports for different scenarios.
- Resources: Participant handbook, notepads, pens.
- Time Duration: 30 minutes
- Instructions:
  - Divide participants into small groups.
  - Provide each group with a compliance scenario related to network deployment.
  - Instruct groups to outline the steps, documentation, and report format required to prepare accurate compliance reports for their scenarios.
  - Groups present their findings, followed by a discussion on effective reporting strategies and challenges.
- Outcome: Participants will develop practical skills in preparing accurate compliance reports for diverse scenarios.

## Notes for Facilitation

- Encourage active participation and discussion among participants.
- Emphasise the importance of accurate reporting in maintaining regulatory compliance and tracking network performance.
- Address any questions participants may have regarding compliance procedures and documentation.
- Use real-world examples and case studies to reinforce the concepts covered.
- Reinforce the significance of thorough documentation for transparency, accountability, and regulatory adherence.

# UNIT 8.2: Safety, Resource Management, and Team Motivation

## Unit Objectives

After the completion of this unit, the participant will be able to:

1. Describe workplace health and safety regulations and their implementation.
2. Show identification of organizational health, safety, and security policies and procedures.
3. Explain different types of hazards and associated risks in the workplace.
4. Show handling of hazards like illness, accidents, fires, or natural calamities as per organizational procedures.
5. Discuss the procedures for reporting breaches in health, safety, and security.
6. Show how to instruct the team to report breaches in health, safety, and security.
7. Show the process of reporting hazards outside individual authority and warning others who may be affected.
8. Describe methods for efficient resource and material management.
9. Show practices to optimize material usage, including water, in daily activities.
10. Show supervision of the team to ensure responsible use of workplace resources.
11. Explain common electrical problems and practices for conserving electricity.
12. Show methods to guide the team in optimizing energy usage in various processes.
13. Show techniques to motivate the team for routine cleaning of tools, machines, and equipment.
14. Show periodic checks to ensure the proper functioning of machines and equipment.
15. Show guidance on reporting malfunctions and lapses in equipment maintenance.
16. Show identification of opportunities for team-building workshops and motivational training.

## Resources to be Used

Participant handbook, notebook, pens, markers, whiteboard, safety posters, sample hazard charts, workplace SOPs, projector, organizational safety guidelines, checklists for resource usage, equipment maintenance templates.

## Say

Welcome the trainees and introduce the topic of workplace health, safety, and responsible resource usage. Explain that understanding safety rules and practicing efficient material handling helps create a secure and productive work environment.

## Ask

Ask the trainees the following questions:

- What workplace hazards have you seen or heard about?
- Why is it important to follow safety procedures?
- How can material and resource usage be optimized in daily tasks?
- Why should equipment maintenance and reports be taken seriously? Write the responses on the board and connect them to the objectives of the lesson.

## Elaborate

- Explain major workplace hazards such as slips, electrical faults, fire risks, and chemical exposure.• Discuss how safety policies guide hazard prevention, response, and reporting.
- Highlight the importance of conserving materials, water, and electricity for operational efficiency.
- Describe how regular equipment checks prevent breakdowns and ensure smooth functioning.
- Explain how motivating the team improves workplace hygiene and cleanliness.
- Discuss how team-building workshops enhance communication and cooperation.

## Do

- Discuss in small groups how safety rules are applied in daily work.
- Identify common workplace hazards from sample photos or descriptions.
- Review a sample safety breach report and identify what information is essential.
- Observe a mock scenario and list materials or resources that can be conserved.
- Check any simple tool/equipment in the classroom and note basic maintenance needs.
- Share examples of how team motivation or training improved workplace behavior.

## Activity

- Activity Name: Workplace Safety & Resource Mapping
  Objective: Understand safety procedures and efficient resource use in real work situations.
  Type: Group Activity
  Resources: Hazard charts, safety SOPs, resource usage checklist, chart paper, markers
  Duration: 25–30 minutes
- Instructions:
  - Each group selects one scenario—fire risk, electrical fault, accident, water wastage, or equipment malfunction.
  - Identify the hazard, possible risks, and steps to handle it as per procedures.
  - Map the correct reporting process and the person responsible.
  - List opportunities to conserve resources (materials, water, electricity) in the scenario.
  - Present the flowchart to the class.
- Outcome: Participants understand hazard identification, safe handling, proper reporting flow, and methods to optimize resource usage.

## Notes for Facilitation

- Encourage trainees to relate safety and resource issues to real work situations.
- Reinforce the need to follow safety policies and reporting procedures.• Use simple examples to explain hazards and safe responses.
- Emphasize saving materials, water, and electricity during tasks.
- Guide trainees on the importance of regular equipment checks.
- Promote active participation in discussions and activities.
- Highlight teamwork and communication for a safer workplace.

## Exercise

**Answers to exercises for PHB**

**A. Multiple Choice Questions**

1. c. Central Pulmonary Resuscitation
2. a. Incineration
3. c. Composting
4. d. All of the above
5. a. Eyestrain

**B. Answer the following:**

1. Refer UNIT 9.1: Importance of Safe Working Practices
   Topic - 9.2.3 Safe Workplace Practices
2. Refer UNIT 6.1: Workplace Hygiene and Safety
   Topic - 9.1.1 Organisational Hazards
3. Refer UNIT 9.1: Workplace Hygiene and Safety
   Topic - 9.1.5 Sanitising and Disinfecting Work Area
4. Refer UNIT 9.2: Optimal Utilisation of Resources
   Topic - 9.2.1 Efficient Utilisation of Water
5. Refer UNIT 9.2: Waste Management
   Topic - 9.2.7 Waste Disposal Methods

## Notes

NCVET
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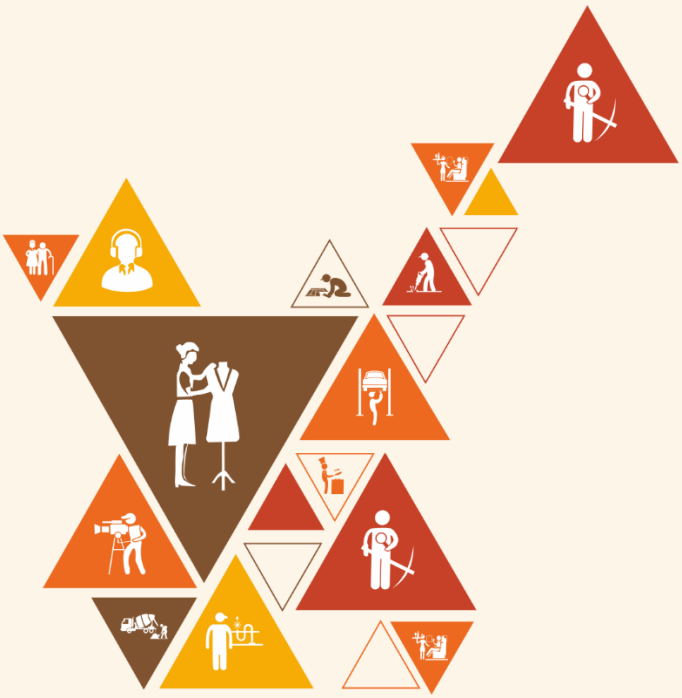
# 9. Employability Skills (30 Hours)

It is recommended that all training include the appropriate. Employability Skills Module. Content for the same can be accessed https://www.skillindiadigital.gov.in/content/list



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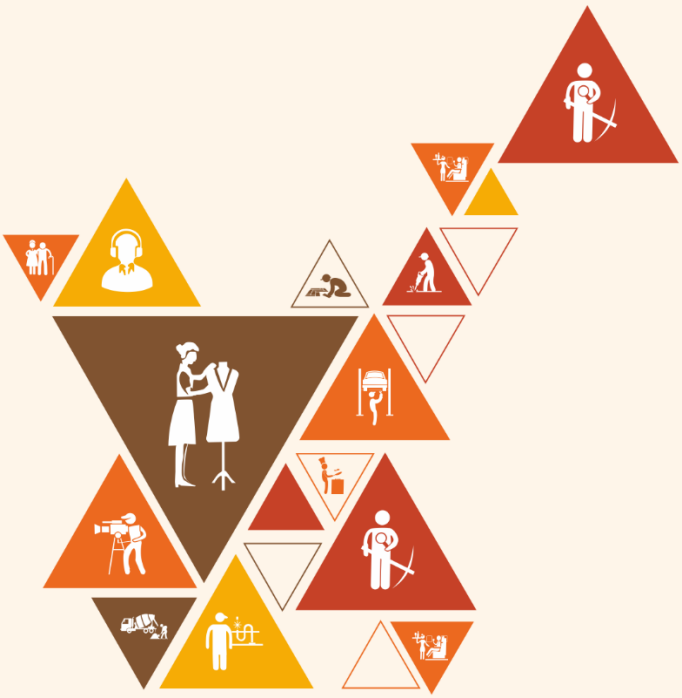
# 10. Annexure

Annexure I: Training Delivery Plan

Annexure II: Assessment Criteria

Annexure III: List of QR Codes used in PHB



# Annexure I
# Training Delivery Plan

| Training Delivery Plan | | | |
|---|---|---|---|
| **Program Name:** | Telecom Field Operations Coordinator | | |
| **Qualification Pack Name & Ref. ID** | Telecom Field Operations Coordinator, TEL/Q6202 | | |
| **Version No.** | 4.0 | **Version Update Date** | 08/05/2025 |
| **Pre-requisites to Training (if any)** | Not Applicable | | |
| **Training Outcomes** | • Explain the key steps involved in coordinating telecom field operations, including installation, maintenance, and repair activities.<br>• Discuss the importance of monitoring network performance to ensure optimal service delivery and minimize downtime.<br>• Describe the process of identifying, analyzing, and resolving faults in telecom infrastructure and equipment.<br>• Elucidate the role of safety protocols, regulatory compliance, and best practices in ensuring secure and efficient telecom operations.<br>• Elucidate the role of sustainability practices in telecom operations and their impact on the environment. | | |

| SL | Module Name | Session name | Session Objectives | NOS | Methodology | Training Tools/Aids | Duration (hours) |
|---|---|---|---|---|---|---|---|
| 1 | Introduction to the sector and the job role of a Telecom Field Operations Coordinator<br>(Theory- 05:00<br>Practical- 00:00) | Introduction to the sector & the job role of a Telecom Field Operations Coordinator | • Describe the structure and significance of the telecom sector, highlighting its role in global and national connectivity.<br>• Discuss the evolution of telecom technologies and their impact on communication infrastructure.<br>• Describe the primary responsibilities of a Telecom Field Operations Coordinator, including installation, maintenance, and fault management.<br>• Explain the key skills and competencies required for effective performance as a Telecom Field Operations Coordinator. | Bridge Module | Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion | White-board and Markers, Chart paper and sketch pens, LCD Projector and Laptop for presentations, Internet with Wi-Fi (Min 2 Mbps Dedicated) Documents of standard operating procedures, code of conduct, checklists, schedules tools and equipment, status report | T- 05:00<br>P- 00:00 |

| SL | Module Name | Session name | Session Objectives | NOS | Methodology | Training Tools/Aids | Duration (hours) |
|---|---|---|---|---|---|---|---|
| 2 | TEL/N6208: Undertake Site Acceptance Testing (Theory-35:00 Practical-80:00) | Introduction to Site Acceptance Testing | Understand SAT purpose, workflow, requirements & importance | KU1 | Interactive Lecture | PPT, sample SAT checklist | T- 02:00 P- 06:00 |
| | | AT Documentation & Pre-Test Review | Collect and review SAT checklists, project documents, and technical specs | PC1 | Demo + Case review | Sample site docs, AT checklist | T- 02:00 P- 06:00 |
| | | Test Equipment Requirements | Verify availability & functionality of test tools (E1, Ethernet, VSWR, optical meter, power meter) | PC2, KU2 | Hands-on demo | All test instruments | T- 02:00 P- 06:00 |
| | | Software Readiness for Testing | Check laptop configuration, software versions, drivers, and compatibility | PC3, KU4 | Demonstration | Laptops, configuration tools | T- 02:00 P- 06:00 |
| | | Physical Infrastructure Inspection – Part 1 | Inspect shelters, weatherproofing, grouting, earthing | PC4, KU7 | Field Demo / Videos | Site photos, inspection list | T- 02:00 P- 06:00 |
| | | Physical Infrastructure Inspection – Part 2 | Verify cabling, connectors, routing, power systems | PC4, KU6 | Hands-on + Case Study | Cable samples, connectors | T- 02:00 P- 06:00 |
| | | Logical Testing – Connectivity | Conduct VSWR checks, alarm testing, BTS/equipment connectivity | PC5, KU5 | Hands-on | VSWR meter, BTS setup | T- 02:00 P- 06:00 |
| | | Passive Infrastructure Testing | Test antenna alignment | PC6, KU6 | Demonstration | DG sets, PIU panel models | T- 02:00 P- 06:00 |
| | | Passive Infrastructure Testing | Tes DG, PIU, SMPS, battery backup | PC6, KU6 | Demonstration | DG sets, PIU panel models | T- 02:00 P- 06:00 |
| | | Network Performance Testing | Validate parameters—signal strength, latency, throughput, redundancy | PC7, KU8 | Practical Demo | Drive test tools, test apps | T- 02:00 P- 06:00 |
| | | Identifying Deviations & Critical Issues | Document non-compliance, categorize deviations, prepare punch list | PC8, KU1 | Activity + Case review | Punch list templates | T- 03:00 P- 04:00 |
| | | Reporting Test Outcomes | Report results to stakeholders (BTS engineers, NOC, project team) | PC9, KU9 | Role play + Practice | Reporting formats | T- 03:00 P- 04:00 |

| SL | Module Name | Session name | Session Objectives | NOS | Methodology | Training Tools/Aids | Duration (hours) |
|---|---|---|---|---|---|---|---|
| | | Punch List Communication & Non-Compliance Reporting | Highlight issues, prepare and escalate punch lists | PC10, KU9 | Group Task | Punch list sheets | s |
| | | Documentation, Updating & Record Management | Maintain updated SAT documentation, ensure accessibility | PC11, PC12 | Practical exercise | MIS templates, cloud folders | T- 03:00<br>P- 04:00 |
| | | Recommendations & Corrective Actions | Recommend corrective measures and ensure collaborative resolution | PC13, KU10 | Discussion + Case analysis | Sample corrective action plans | T- 03:00<br>P- 04:00 |
| 3 | TEL/N6209: Perform Preventive and Corrective Maintenance at Radio Locations (Theory-30:00 Practical-60:00) | Overview of Radio Site Maintenance (PM & CM) | Understand PM/CM purpose, workflow, SLAs & site categories | KU2, KU3, KU6 | Interactive lecture | PPT, site diagrams | T- 02:30<br>P- 05:00 |
| | | Preparing Site Folders & Reviewing PM Schedules | Maintain site folders, checklists, histories & PM plans | PC1, PC2 | Demonstration + Documentation activity | Sample site files, templates | T- 02:30<br>P- 05:00 |
| | | Coordination With NOC & Maintenance Window Planning | Coordinate with NOC and plan PM windows effectively | PC3, KU10 | Role-play + Case scenarios | NOC workflow charts | T- 02:30<br>P- 05:00 |
| | | Pre-PM Verification of Tools & Test Equipment | Verify functionality of test instruments before site visit | PC4, KU9 | Demonstration + Hands-on | E1 testers, RF meter, OPM, login cables | T- 02:30<br>P- 05:00 |
| | | Preparing for Corrective Maintenance & Alarm Analysis | Analyze alarms, assess severity, review fault history | PC5, PC6, PC7, KU3 | Fault-case analysis | Alarm logs, NOC reports | T- 02:30<br>P- 05:00 |
| | | Spare Management, Requisition & Logistics | Manage spare components, requisitions, and faulty returns | PC8, PC9, PC10, KU5 | Lecture + Process mapping | Spare register, forms | T- 02:30<br>P- 05:00 |

| SL | Module Name | Session name | Session Objectives | NOS | Methodology | Training Tools/Aids | Duration (hours) |
|---|---|---|---|---|---|---|---|
| | | Performing Physical Preventive Maintenance | Inspect equipment condition, cabling, power, cooling & DG | PC11, PC12, PC13, KU7, KU8 | Demonstration + Field-simulation | Power system mockups, DG, fans, filters | T- 02:30<br>P- 05:00 |
| | | Logical Preventive Maintenance | Perform alarm checks, redundancy tests, firmware checks | PC14, PC15, PC16, PC17 | Hands-on practice | BTS software tools, laptops | T- 02:30<br>P- 05:00 |
| | | Initial Diagnostics & Fault Isolation (CM) | Run diagnostic tests to isolate active & passive faults | PC18, KU1, KU9 | Troubleshooting drills | IDU/ODU, BTS racks, test tools | T- 02:30<br>P- 05:00 |
| | | Corrective Maintenance Execution | Resolve faults using proper tools, cables & procedures | PC19, PC20, PC21, PC22 | Hands-on troubleshooting | RJ45, RS232, USB tools, microwave IDU/ODU | T- 02:30<br>P- 05:00 |
| | | Testing Effectiveness After PM/CM | Validate repairs, confirm alarm clearances, test stability | PC23, PC24 | Practical evaluation | Test meters, NOC monitoring tools | T- 02:30<br>P- 05:00 |
| | | Reporting, Documentation & Compliance | Complete logs, stakeholder notifications, audit documents | PC25, PC26, PC27, KU11 | Documentation workshop | Log sheets, report templates | T- 02:30<br>P- 05:00 |
| 4 | TEL/N6210: Perform Change Management at Radio Locations (Theory-30:00 Practical 30:00) | Introduction to Change Management in Radio Networks | Understand radio-site change management concepts, processes, risks & best practices | KU1, KU5 | Interactive lecture | PPT, network diagrams, SOPs | T- 04:00<br>P- 04:00 |
| | | Assessing Upgradation Requirements | Validate change requests, identify type of activity, analyze impact & dependencies | PC1, PC2, PC3, KU10 | Case studies + Discussion | Sample CR forms, planning docs | T- 04:00<br>P- 04:00 |
| | | Work Plan, Approvals & Pre-change Preparation | Develop work plan, evaluate downtime, obtain NOC approval & permits | PC4, PC5, PC6, PC7 | Guided exercise | Work plan templates, approval formats | T- 04:00<br>P- 04:00 |

| SL | Module Name | Session name | Session Objectives | NOS | Methodology | Training Tools/Aids | Duration (hours) |
|---|---|---|---|---|---|---|---|
| | | Tools, Spares & Resource Management | Arrange tools, check spares, coordinate logistics, follow spare tracking processes | PC8, PC9, PC10, PC11, KU3, KU4 | Demonstration + Practical | Login cables, firmware tools, inventory sheets | T- 04:00<br>P- 04:00 |
| | | Executing Change Activities | Implement upgrades, antenna realignments, augmentations as per best practices | PC12, KU2 | Hands-on Simulation | BTS models, scripts, optical tools | T- 04:00<br>P- 04:00 |
| | | Real-time Monitoring, Escalation & Rollback | Monitor KPIs, identify anomalies, escalate issues, perform rollback actions | PC13, PC14, PC15, KU6, KU9 | Live monitoring simulation | KPI dashboards, logs, alarms | T- 04:00<br>P- 04:00 |
| | | SLA Compliance & Post-change Validation | Adhere to SLAs, validate performance, verify alarm status with NOC | PC16, PC18 | Demo + Scenario-based activity | SLA docs, NOC communication logs | T- 03:00<br>P- 03:00 |
| | | Reporting, Documentation & Stakeholder Updates | Record activities, prepare logs, update inventory, communicate status & obtain sign-offs | PC17, PC19, PC20, PC21, KU7, KU8 | Documentation workshop | Templates, reporting software, checklists | T- 03:00<br>P- 03:00 |
| 5 | TEL/N6500: Undertake Fault Rectification (Theory-30:00 Practical 30:00) | Introduction to BSS Fault Rectification & NMS Overview | Understand BSS network faults, NMS functions, alarm types and SLAs | KU1, KU3, KU8 | Interactive Lecture | PPT, NMS demo clips, network diagrams | T- 04:00<br>P- 04:00 |
| | | Network Alarm Monitoring & Alarm Classification | Monitor alarms, analyse severity, categorize based on service impact | PC1, PC2, PC3, PC6 | Demo + Hands-on practice | NMS simulator, alarm logs | T- 04:00<br>P- 04:00 |
| | | Alarm Verification & Cross-team Coordination | Verify alarms with backups/logs, coordinate with Infra NOC and identify passive infra issues | PC4, PC5, KU5 | Case studies + Role play | Sample backup configs, escalation flowcharts | T- 04:00<br>P- 04:00 |
| | | Fault Diagnosis Techniques | Apply standardized troubleshooting protocols and advanced diagnostics | PC7, PC8, KU4, KU6, KU9 | Demonstration + Troubleshooting Scenarios | Remote diagnostic tools, topology diagrams | T- 04:00<br>P- 04:00 |

| SL | Module Name | Session name | Session Objectives | NOS | Methodology | Training Tools/Aids | Duration (hours) |
|---|---|---|---|---|---|---|---|
| | | Fault Rectification & Decision Making | Evaluate rectification options, decide on reset/recovery, dispatch field engineers | PC9, PC10, PC11, KU7 | Practical decision-making exercises | SOPs, MOPs, component replacement lists | T- 04:00<br>P- 04:00 |
| | | Field Engineer Support & Rectification Monitoring | Guide field teams, track resolution progress, ensure SLA compliance | PC12, KU2 | Simulation + Coordination Activities | SLA sheets, technician task sheets | T- 04:00<br>P- 04:00 |
| | | Post-Rectification Testing & Stakeholder Communication | Confirm effectiveness of maintenance, communicate results to all stakeholders | PC13, PC14, PC15 | Hands-on with sample post-check logs | Test reports, alarm clearance logs | T- 03:00<br>P- 03:00 |
| | | Documentation, Reporting & Compliance | Maintain detailed logs, record spare usage, support audits, follow documentation standards | PC16, PC17, PC18, KU10, KU11 | Documentation workshop | Templates, checklists, compliance manuals | T- 03:00<br>P- 03:00 |
| 6 | TEL/N6501: Undertake Configuration Changes, Upgrades and Node Back-up Activities (Theory-30:00 Practical-60:00) | Overview of Change Management in BSS Network | Understand BSS network, change management purpose, and maintenance workflows | PC1, KU1, KU3 | Theory + Presentation | PPT, Network diagrams | T- 02:30<br>P- 05:00 |
| | | Determining Change Requirements | Identify change requests, operational needs, urgency, and business impact | PC1, PC2, KU1, KU6 | Case Study + Group Discussion | Sample CR forms, Risk matrix | T- 02:30<br>P- 05:00 |
| | | Work Planning & Approvals | Understand approval workflows, dependency mapping, and structured work plans | PC3, PC5, PC6, KU1, KU9 | Demonstration + Activity | Work plan templates, Approval flowcharts | T- 02:30<br>P- 05:00 |
| | | Risk Analysis & Mitigation | Apply risk assessment techniques and determine mitigation strategies | PC4, KU6, KU10 | Practical Exercise | Risk assessment sheets | T- 02:30<br>P- 05:00 |
| | | Pre-Change Notifications & Compliance | Understand stakeholder communication and regulatory obligations | PC5, PC6, KU9 | Roleplay + Discussion | Notification formats, Compliance guidelines | T- 02:30<br>P- 05:00 |
| | | Executing Configuration Changes | Apply configuration changes, upgrades, and firmware updates as per SOP | PC7, KU1, KU7 | Hands-on Lab | NMS console (simulated), Change scripts | T- 02:30<br>P- 05:00 |

| SL | Module Name | Session name | Session Objectives | NOS | Methodology | Training Tools/Aids | Duration (hours) |
|---|---|---|---|---|---|---|---|
| | | Node Backup Procedures | Understand and perform pre- and post-change backups | PC8, KU1, KU6 | Practical Lab | Backup tool, Server simulations | T- 02:30<br>P- 05:00 |
| | | Post-Change Monitoring | Identify alarms, performance deviations, and fault patterns using NMS tools | PC9, KU5, KU3 | Simulation + Monitoring Activity | NMS dashboard, Alarm logs | T- 02:30<br>P- 05:00 |
| | | Contingency Plans & Rollback | Apply rollback steps during service disruptions | PC10, KU2, KU6 | Scenario-based Drill | Rollback scripts, Incident logs | T- 02:30<br>P- 05:00 |
| | | SLA Adherence & Change Audit | Understand SLAs, protocols, and documentation practices | PC11, KU1, KU7 | Theory + Case Study | SLA document, Audit checklist | T- 02:30<br>P- 05:00 |
| | | Reporting & Documentation | Apply ticket logging, report writing, and stakeholder communication | PC12, PC13, PC14, KU1 | Practical + Templates | Reporting formats, Ticketing tool | T- 02:30<br>P- 05:00 |
| | | Root Cause Analysis & Best Practices | Understand RCA methods, cybersecurity measures, and upgrade best practices | KU7, KU8, KU10 | RCA Workshop + Group Activity | RCA templates (Fishbone, 5 Why), Security guidelines | T- 02:30<br>P- 05:00 |

| SL | Module Name | Session Name | Session Objectives | NOS | Methodology | Training Tools/Aids | Duration (hours) |
|---|---|---|---|---|---|---|---|
| 7. | Sustainability in Telecom Infrastructure Management (Theory:10 Practical: 20 hours) | E-Waste and Hazardous Material Management | • Identify, segregate, and categorize e-waste and hazardous waste (PC1)<br>• Dispose of or recycle waste following applicable guidelines (PC2)<br>• Follow safe handling procedures for hazardous materials (PC3)<br>• Maintain logs and records of disposed, recycled, or repurposed waste (PC4)<br>• Know e-waste management rules (2022) applicable to the telecom sector (KU1)<br>• Know CPCB hazardous waste disposal regulations and safety standards for battery handling (KU2, KU3) | TEL/N9109 PC1-PC13, KU1-KU10 TEL/N9109 PC1, PC2, PC3, PC4, KU1, KU2, KU3 | Classroom lecture / Hands-on Demonstration (Waste segregation) / Practical Exercise (Log book maintenance) / Safety Procedure Role-Play | Training Kit, Projector, Sample Waste Segregation Bins (Mock setup), Mock Log Sheets/Digital Templates, Reference CPCB/E-waste guidelines, Personal Protective Equipment (PPE) for demonstration. | (Theory: 2:30) (Practical: 5:00) |
| | | Green Energy and Fuel Efficiency | • Optimize power usage through energy-efficient telecom equipment (PC5)<br>• Assist in adopting solar-powered telecom towers and hybrid energy systems (PC6)<br>• Monitor and minimize fuel consumption in Diesel Generators (DG) sets (PC7)<br>• Know techniques for energy optimization (smart cooling, LED lighting, hybrid power systems) (KU5)<br>• Understand the role of solar energy and renewable sources in reducing carbon footprint (KU6)<br>• Know green telecom practices like fuel efficiency in DG sets and power-saving measures (KU7) | TEL/N9109 PC5, PC6, PC7, KU5, KU6, KU7 | Classroom lecture / Interactive Case Studies (Solar/Hybrid Systems) / Practical Exercise (DG fuel monitoring and load balancing scenarios) / Group Discussion (Optimization techniques) | Training Kit, Projector, Case Study Materials (Energy Audits), Energy Monitoring Dashboard mock-up, Diagrams of hybrid energy systems. | (Theory: 2:30) (Practical: 5:00) |

| SL | Module Name | Session Name | Session Objectives | NOS | Methodology | Training Tools/Aids | Duration (hours) |
|---|---|---|---|---|---|---|---|
| | | E-Waste and Hazardous Material Management | • Identify, segregate, and categorize e-waste and hazardous waste (PC1)<br>• Dispose of or recycle waste following applicable guidelines (PC2)<br>• Follow safe handling procedures for hazardous materials (PC3)<br>• Maintain logs and records of disposed, recycled, or repurposed waste (PC4)<br>• Know e-waste management rules (2022) applicable to the telecom sector (KU1)<br>• Know CPCB hazardous waste disposal regulations and safety standards for battery handling (KU2, KU3) | TEL/N9109 PC1-PC13, KU1-KU10 TEL/N9109 PC1, PC2, PC3, PC4, KU1, KU2, KU3 | Classroom lecture / Hands-on Demonstration (Waste segregation) / Practical Exercise (Log book maintenance) / Safety Procedure Role-Play | Training Kit, Projector, Sample Waste Segregation Bins (Mock setup), Mock Log Sheets/Digital Templates, Reference CPCB/E-waste guidelines, Personal Protective Equipment (PPE) for demonstration. | (Theory: 2:30) (Practical: 5:00) |
| | | Green Energy and Fuel Efficiency | • Optimize power usage through energy-efficient telecom equipment (PC5)<br>• Assist in adopting solar-powered telecom towers and hybrid energy systems (PC6)<br>• Monitor and minimize fuel consumption in Diesel Generators (DG) sets (PC7)<br>• Know techniques for energy optimization (smart cooling, LED lighting, hybrid power systems) (KU5)<br>• Understand the role of solar energy and renewable sources in reducing carbon footprint (KU6)<br>• Know green telecom practices like fuel efficiency in DG sets and power-saving measures (KU7) | TEL/N9109 PC5, PC6, PC7, KU5, KU6, KU7 | Classroom lecture / Interactive Case Studies (Solar/Hybrid Systems) / Practical Exercise (DG fuel monitoring and load balancing scenarios) / Group Discussion (Optimization techniques) | Training Kit, Projector, Case Study Materials (Energy Audits), Energy Monitoring Dashboard mock-up, Diagrams of hybrid energy systems. | (Theory: 2:30) (Practical: 5:00) |

# Annexure II

## Assessment Criteria

## CRITERIA FOR ASSESSMENT OF TRAINEES

| Assessment Criteria for Project Supervisor – 5G Networks | |
|---|---|
| **Job Role** | Telecom Field Operations Coordinator |
| **Qualification Pack** | TEL/Q6202, V4.0 |
| **Sector Skill Council** | Telecom Sector Skill Council |

| S. No. | Guidelines for Assessment |
|---|---|
| 1 | The assessment for the theory part will be based on knowledge bank of questions approved by the SSC. |
| 2 | Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/ option NOS/ Set of NOS. |
| 3 | Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below). |
| 4 | Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion. |
| 5 | To pass the Qualifications File, every trainee should score a minimum of 70% of aggregate marks. |
| 6 | In case of unsuccessful completion, the trainee may seek reassessment on the Qualification File. |

| National Occupational Standards | NOS Code & Version | Theory Marks | Practical Marks | Project Marks | Viva Marks | Total Marks | Weightage |
|---|---|---|---|---|---|---|---|
| **Undertake Site Acceptance Testing** | TEL/N6208, v4.0 | 30 | 50 | - | 20 | 100 | 15 |
| **Perform Preventive and Corrective Maintenance at Radio Locations** | TEL/N6209, v4.0 | 30 | 50 | - | 20 | 100 | 15 |
| **Perform Change Management at Radio Locations** | TEL/N6210, v5.0 | 30 | 50 | - | 20 | 100 | 15 |
| **Undertake Fault Rectification** | TEL/N6500, v4.0 | 30 | 50 | - | 20 | 100 | 15 |
| **Undertake Configuration Changes, Upgrades and Node Back- up Activities** | TEL/N6501, v4.0 | 30 | 50 | - | 20 | 100 | 15 |
| **Follow sustainable practices in telecom infrastructure management** | TEL/N9109, v1.0 | 30 | 50 | - | 20 | 100 | 10 |
| **Manage Work, Resources and Safety at workplace** | TEL/N9104, v2.0 | 40 | 50 | - | 10 | 100 | 10 |
| **Employability Skills (30 Hours)** | DGT/VSQ/N0101, v1.0 | 20 | 30 | - | - | 50 | 5 |
| **Total** | | **240** | **380** | **-** | **130** | **750** | **100** |

## Annexure-III

**QR Codes –Video Links**

| Module No. | Unit No. | Topic Name | Link for QR Code (s) | QR code (s) |
|---|---|---|---|---|
| 1. Introduction to the sector & the job role of a Telecom Field Operations Coordinator (TEL/N6208) | Unit 1.1: Telecom Sector in India | Intro- duc-tion to the Telecom Sec-tor in India | https://youtu.be/Cag-bc-bivtM | Introduction to the Telecom Sector in India |
| | Unit 1.2 - Roles and Responsibilities of Telecom Field Operations Coordinator | Telecom Field Operations | https://www.youtube.com/shorts/LAl2L24rDNk | Telecom Field Operations |
| 2. Undertake Site Acceptance Testing (TEL/N6208) | Unit 2.1 – Telecom Power Systems and Preventive Maintenance | Major Components of a Telecom Power System | https://www.youtube.com/watch?v=9H9Atf9NkVY | Power Distribution System |
| | | Maintaining Solar Panels | https://www.youtube.com/watch?v=KbewfZBp-ko | Maintaining Solar Panels |
| | | Lead Acid Battery | https://www.youtube.com/watch?v=RMP-W2Oo2Kk | Lead Acid Battery - Working |

| Module No. | Unit No. | Topic Name | Link for QR Code (s) | QR code (s) |
|---|---|---|---|---|
| 5. Undertake Fault Rectification (N6500) | Unit 5.1 – Fault Identification and Rectification in BSS Networks | Safety Regulations for Telecom Sites and Infrastructure | https://www.youtube.com/watch?v=JAuKThXWVVQ | Safety Regulations for Telecom Sites |
| | | Safety Requirements During Tower Climbing | https://www.youtube.com/watch?v=S2Uje1PDX7A | Use safety belt for telecom tower climbing |
| 6. Undertake Configuration Changes, Upgrades and Node Back- up Activities (TEL/N6501) | Unit 6.1 – Manage Configuration Changes and Backup Processes | Simple Maintenance Technician Safety | https://www.youtube.com/watch?v=QLbGNTVSKCw | Cleaning of PCBs |

NCVET
कौशल गुणवत्ता प्रगति

Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

N·S·D·C
RE IMAGINE FUTURE

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