

## Qualification Pack-ICT Engineer

### What are Occupational Standards(OS)?

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



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## Introduction

### Qualifications Pack-ICT Engineer

**SECTOR:** Telecom

**SUB-SECTOR:** Network Managed Service

**OCCUPATION:** Operation & Maintenance

**REFERENCE ID:** TEL/Q6205

**ALIGNED TO :** NCO-2004/NIL

**ICT Engineer** in the telecom industry is also known as **First Level ICT Degree Engineer**

**Brief Job Description:** ICT Engineer is responsible for installing and ensuring uptime of the assigned ICT node/network segment, by undertaking preventive maintenance fault management activities, upgrades, capacity augmentation, configuration changes and Point of Interconnect testing with minimal disruption of services.

**Personal Attributes:** This job requires the individual to work closely with multiple teams and operate critical telecommunication equipment. The individual should have excellent problem-solving capabilities, strong quantitative abilities, strong interpersonal skills, ability to work with people, ability to multitask and track multiple projects simultaneously, dedication and willingness to stay current on changing technologies. An ICT Engineer should be able to hand high pressure situations and be analytical to successfully perform the assigned responsibilities.

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|                                 |                                  |                         |            |
|---------------------------------|----------------------------------|-------------------------|------------|
| <b>Qualifications Pack Code</b> | TEL/Q6205                        |                         |            |
| <b>Job Role</b>                 | ICT Engineer                     |                         |            |
| <b>Credits(NSQF)[OPTIONAL]</b>  | 6                                | <b>Version number</b>   | 1.0        |
| <b>Sector</b>                   | Telecom                          | <b>Drafted on</b>       | 20-06-2014 |
| <b>Sub-sector</b>               | Network managed Service          | <b>Last reviewed on</b> | 8-10-2014  |
| <b>Occupation</b>               | Network Operations & Maintenance | <b>Next review date</b> | 10-10-2016 |

| <b>Job Role</b>   | <b>ICT Engineer</b>  |
|---|--|
| <b>Role Description</b>                                 | ICT Engineer is responsible for installing and ensuring uptime of the assigned ICT node/network segment, by undertaking preventive maintenance and fault management activities. The ICT engineer is also responsible for performing upgrades, capacity augmentation, configuration changes and Point of Interconnect testing with minimal disruption of services. The ICT or Information & Communication Technology equipments are NodeB/eNodeB, IP and TDM transmission equipment, IP and Packet Core switch, Cloud and Data Centre equipments. |
| <b>NSQF level</b>                                       |  |
| <b>Minimum Educational Qualifications</b>               | Graduate in Science/Engineering/Technology - Electronics, Computer Science, and IT.  |
| <b>Training</b>   | NA   |
| <b>Experience</b>                                       | 0 years  |
| <b>Applicable National Occupational Standards (NOS)</b> | Click to open the below hyperlinks<br>Compulsory:<br>1. TEL/N6218 ( <a href="#">Perform preventive maintenance at ICT nodes</a> )<br>2. TEL/N6219 ( <a href="#">Perform Corrective maintenance/Fault Management at ICT nodes</a> )<br>3. TEL/N6220 ( <a href="#">Undertake upgrade, capacity augmentation and configuration change activities</a> )<br>4. TEL/N6221 ( <a href="#">Undertaking of POI</a> )   |
| <b>Performance Criteria</b>                             | As described in the relevant OS units  |

Definitions

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

**Acronyms**

| <b>Keywords /Terms</b> | <b>Description</b>   |
|------------------------|--|
| BSC                    | Base Station Controller  |
| BTS                    | Base Transceiver Station   |
| DCN                    | Data Communication Network   |
| Node B                 | UMTS equivalent to Base Station for 3G systems                                   |
| eNode B                | Base Station for 4G/ LTE systems. Also known as Evolved Node B or E-UTRAN Node B |
| DWDM                   | Dense Wavelength Division Multiplexing   |
| EDFA                   | Erbium Doped Fiber Amplifier   |
| EMS                    | Element Management System  |
| EoS                    | Ethernet over SDH  |
| FTP                    | File Transfer Protocol   |
| FM Engineer            | Field Maintenance Engineer   |
| GPRS                   | General Packet Radio Service   |
| GGSN                   | Gateway GPRS Support Node  |
| GUI                    | Graphic User Interface   |
| HLR                    | Home Location Register   |
| IF cable               | Intermediate Frequency cable   |
| IGRP                   | Interior Gateway Routing Protocol  |
| IP Network             | Internet Protocol Network  |
| IN                     | Intelligent Network  |
| L2                     | Layer 2, i.e. Data link layer standard of OSI architecture                       |
| L3                     | Layer 3, i.e. Network layer standard of OSI architecture                         |
| LAN                    | Local Area Network   |
| MAN                    | Metropolitan Area Network  |
| MGW                    | Media Gateway  |
| MSC                    | Mobile Switching Centre  |
| MDU                    | Multiplexer Demultiplexer Unit   |

|          |   |
|----------|---|
| MMU      | Man-Machine Unit                            |
| NME      | Network Management Engineer                 |
| NMS      | Network Management System                   |
| NOC      | Network Operation Centre                    |
| OHS      | Organizational Health & Safety              |
| O&M      | Operation & Maintenance                     |
| OSPF     | Open Shortest Path First                    |
| OSS      | Operations Support System                   |
| PDH      | Plesiochronous digital hierarchy            |
| PIU      | Power Interface unit                        |
| RF Cable | Radio Frequency Cable                       |
| RIP      | Routing Information Protocol                |
| ROADM    | Reconfigurable Optical Add-Drop Multiplexer |
| SGSN     | Serving GPRS Support Node                   |
| SHE      | Safety, Health & Environment                |
| SDH      | Synchronous Digital Hierarchy               |
| SDP      | Service Delivery Platform                   |
| SFP      | Small Form Factor Pluggable                 |
| SMPS     | Switch Mode Power Supply                    |
| VAS      | Value Added Services                        |
| VCG      | Virtual Container Group                     |
| VSWR     | Voltage Standing Wave Ratio                 |
| WTR      | Wait To Restore                             |
| WAN      | Wide Area Network                           |

TEL/ N6218

Perform preventive maintenance at ICT nodes

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# National Occupational Standard



## Overview

This NOS unit is about carrying out Preventive Maintenance to ensure high site uptime.

**TEL/ N6218**
**Perform preventive maintenance at ICT nodes**

|   |  |
|---|--|
| <b>Unit Code</b>                                  | <b>TEL/ N6218</b>  |
| <b>Unit Title (Task)</b>                          | <b>Perform preventive maintenance at ICT nodes</b>   |
| <b>Description</b>                                | This unit is about carrying out Preventive Maintenance ensuring high site uptime   |
| <b>Scope</b>                                      | This task covers the following:<br>1. ensure adherence to the preventive maintenance schedule<br>2. carry out preventive maintenance activities at ICT nodes/customer premises<br>3. escalate in case of emergency situation<br>4. reporting and documenting the status at the end of scheduled activity   |
| <b>Performance Criteria(PC) w.r.t. the Scope:</b> |  |
| <b>Element</b>                                    | <b>Performance Criteria</b>  |
| <b>Obtain schedule &amp; notify NOC</b>           | To be competent, the user/individual on the job must be able to:<br>PC1. plan preventive maintenance schedule along with NOC team<br>PC2. suggest changes to the planned maintenance schedule considering site criticality, capacity, frequency of faults if required.<br>PC3. assess the potential impact of the proposed maintenance on customers and network and plan for possible outage or deferral of maintenance<br>PC4. notify the network operations center (NOC) prior to undertaking the maintenance work as per the schedule<br>PC5. check power consumption pattern and report any unusual consumption to   |
| <b>Arrange for tools &amp; spares</b>             | To be competent, the user/individual on the job must be able to:<br>PC6. arrange necessary equipment like login cables (RJ45, RS232, Hi-speed USB etc)<br>PC7: ensure equipment specific software like NMS client is installed in pc<br>PC8. ensure availability of spare hardware equipment and raise request for spares, in case the same are not available<br>PC9. utilize spares if required, and send faulty equipment for repair and replacement<br>PC10. follow-up with the Report & Record team/ logistics team in case of delay completion of spare requisition   |
| <b>Conduct Periodic Maintenance activities</b>    | To be competent, the user/individual on the job must be able to:<br>PC11. conduct physical maintenance tasks like checking temperatures, routing of Ethernet and optical fibers, cables ties, earthing, equipment grouting, even distribution of cables etc.<br>PC12. conduct logical maintenance tasks like PM counter checking, obtaining daily back-ups, checking alarm status, system availability parameters, logical redundancy etc.<br>PC13. conduct alarm configuration testing in co-ordination with NOC team to ensure their functionality<br>PC14. escalate emergency/ unresolved issues according to established Company's procedure<br>PC15. interact with technical team for performing maintenance activities related to passive infrastructure deployed at ICT nodes or customer premises<br>PC16. interact with other vendors for ensuring interconnectivity uptime and lease line uptime |
| <b>test effectiveness &amp; close activity</b>    | To be competent, the user/individual on the job must be able to:<br>PC17. monitor site's alarm status in co-ordination with the NOC team to confirm effectiveness of the maintenance process<br>PC18. complete administrative jobs like site clearance, return of test equipment etc.  |

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Perform preventive maintenance at ICT nodes

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| <p><b>Report and record</b></p>  | <p>To be competent, the user/individual on the job must be able to:<br/>           PC19. notify all relevant parties (including NOC team, other supervisors) of the results of the routine maintenance and obtain sign off<br/>           PC20. reporting to supervisor once completed relating to one's role<br/>           PC21. update routine maintenance logs, activity logs and spare tracker within stipulated timelines<br/>           PC22. follow reporting procedures as prescribed by the company</p>  |
| <p><b>Knowledge and Understanding</b></p>  |  |
| <p><b>A. Organizational Context (Knowledge of the company / organization &amp; its process relevant to area of responsibilities)</b></p> | <p>The user/individual on the job needs to know and understand:<br/>           KA1. checklists for preventive maintenance and site hygiene<br/>           KA2. asset layout as per company standards<br/>           KA3. process for handling equipments &amp; reporting process<br/>           KA4. environmental &amp; Quality check<br/>           KA5. risk and impact of not following defined procedures/work instructions<br/>           KA6. escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures ,fire and power failures<br/>           KA7. types of documentation in organization and importance of the same<br/>           KA8. process for obtaining sign-off post completion of the maintenance activities<br/>           KA9. knowledge of spare management and repair &amp; return process for faulty equipments<br/>           KA10. protection equipments (anti-static bands, anti-static packaging, appropriate insulations) that are required to be used</p> |
| <p><b>B. Technical Knowledge</b></p>   | <p>The user/individual on the job needs to know and understand:<br/>           KB1. use &amp; functionality of ICT equipments<br/>           KB2. knowledge of IP standard &amp; protocols like OSI Layer, Number system, Ethernet Standards, Routing protocols (like RIP, OSPF etc)<br/>           KB3. knowledge of 3G &amp; 4G technology &amp; its functioning<br/>           KB4. knowledge of SDH &amp; DWDM technology and standards<br/>           KB5:knowledge of CS (Circuit Switch) Call flow &amp; PS (Packet Switch) call flow<br/>           KB6:knowledge of Cloud Computing technology, its building blocks<br/>           KB7.knowledge on how to use console cable to connect to equipments<br/>           KB8.knowledge of connecting equipments to NMS<br/>           KB9. how to calculate power cost and site up-time<br/>           KB10. alarm handling process</p>   |
| <p><b>Skills (S)</b></p>   |  |
| <p><b>A. Core Skills/ Generic Skills</b></p>   | <p><b>Personal skills – Communication</b><br/>           The user/ individual on the job should be to:<br/>           SA1. having skills to provide advice and guidance to peers &amp; juniors<br/>           SA2. ability to liaise with third party vendors<br/>           SA3. communicate with supervisor<br/>           SA4. ability to communicate in the local language<br/>           SA5. understand the various Alarm codes, as per company's nomenclature</p>   |



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Perform preventive maintenance at ICT nodes

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|   | <p><b>Personal skill - Time management</b></p> <p>The user/ individual on the job should be:</p> <p>SA6. able to prioritize and execute tasks in a high-pressure environment</p> <p>SA7. able to balance multiple projects and tasks and complete them successfully and within timelines</p>  |
|   | <p><b>Personal skills - Analytical ability</b></p> <p>The user/ individual on the job should be:</p> <p>SA8. diagnose faults in the machine based on results of diagnostic tests etc.</p> <p>SA9. learning skills to keep up to date with new technology</p> <p>SA10. numeracy skills to interpret levels, readings and numerical data</p> <p>SA11. problem solving skills to address complex problems</p> <p>SA12. research skills to source technical information from enterprise website or manufacturer's technical documentation</p>   |
|   | <p><b>Organizational skills</b></p> <p>The user/ individual on the job should be have:</p> <p>SA13. ability to work in teams</p> <p>SA14. ability to take initiatives</p> <p>SA15. ability to ensure adequate knowledge sharing with peers and subordinates</p>   |
| <p><b>B. Domain Specific Skills</b></p> | <p><b>Technical skills</b></p> <p>The user/ individual on the job should be have:</p> <p>SB1. ability to login to the equipment using relevant cables (RJ45, RS232, Hi Speed USB) for different site equipment like microwave, eNodeB/NodeB etc</p> <p>SB2. ability to work on ICT nodes login applications like Secure CRT, Hyperterminal etc.</p> <p>SB3. ability to understand &amp; work on ICT nodes like NodeB, Routers, switches, Transmission equipments, Core equipments, Cloud</p> <p>SB4. understanding of physical and logical redundancy</p> <p>SB4. ability to undertake standard logical and physical maintenance tasks for the ICT nodes</p> <p>SB6. ability to understand and undertake Point of Interconnect testing as per defined checklist</p> |

TEL/ N6218

Perform preventive maintenance at ICT nodes

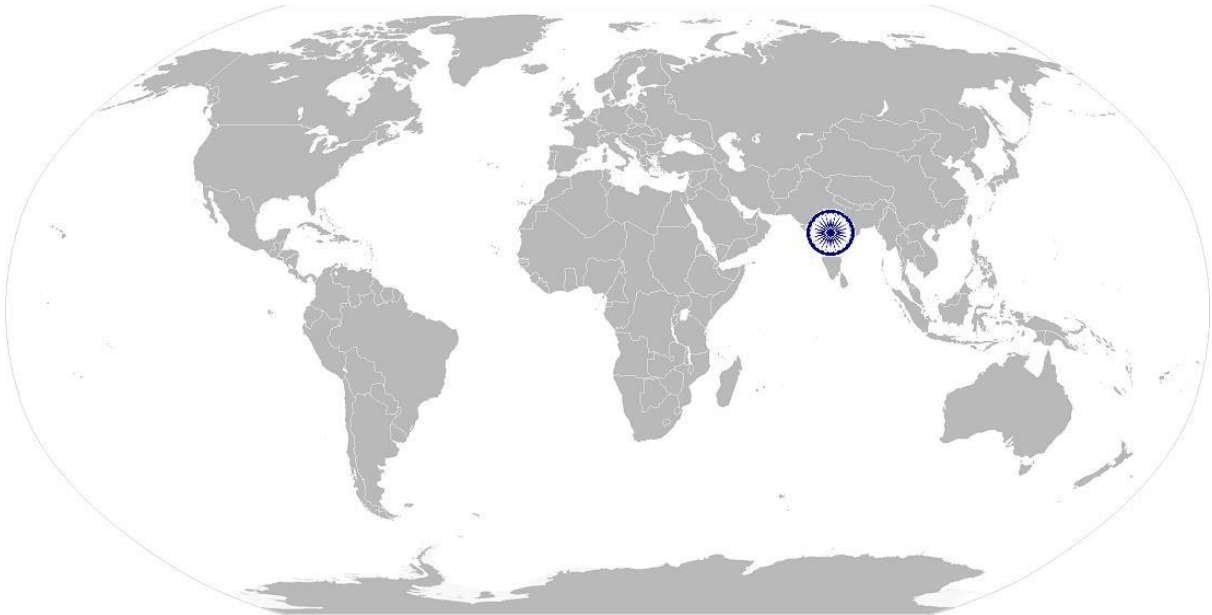
**NOS Version Control:**

|                          |                         |                  |            |
|--------------------------|-------------------------|------------------|------------|
| NOS Code                 | TEL/N6218               |                  |            |
| Credits(NSQF) [OPTIONAL] |                         | Version number   | 1.0        |
| Industry                 | Telecom                 | Drafted on       | 20-06-2014 |
| Industry Sub-sector      | Network Managed Service | Last reviewed on | 8-10-2014  |
|                          |                         | Next review date | 10-10-2016 |



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# National Occupational Standard



## Overview

This unit is about carrying out regular corrective maintenance activities at ICT nodes to ensure their optimal working.

**TEL/N6219 Perform corrective maintenance/ fault management at ICT nodes**

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|---|---|
| <b>Unit Code</b>                                  | TEL/N6219   |
| <b>Unit Title (Task)</b>                          | Perform corrective maintenance/ fault Management at ICT nodes   |
| <b>Description</b>                                | This unit is about carrying out regular corrective maintenance activities at ICT nodes to ensure their optimal working.   |
| <b>Scope</b>                                      | This task covers the following:<br>1. ensure timely response to the network alarms/ trouble tickets<br>2. carry out diagnostic tests at site location and identify root cause of fault<br>3. rectify fault condition or escalate in case additional technical support in required<br>4. reporting and documenting the status of the activity  |
| <b>Performance Criteria(PC) w.r.t. the Scope:</b> |   |
| <b>Element</b>                                    | <b>Performance Criteria</b>   |
| <b>Respond to Network Alarms</b>                  | To be competent, the user/individual on the job must be able to:<br>PC1. determine alarm severity, SLAs and the affected network elements<br>PC2. provide information to and seek advice from relevant parties in identifying the problem and cause of the alarm condition  |
| <b>Arrange for tools &amp; spares</b>             | To be competent, the user/individual on the job must be able to:<br>PC3. arrange necessary equipment like login cables (RJ45, RS232, Hi-speed USB etc.)<br>PC4. ensure availability of Equipment related NMS client in their PC to connect to equipment, if required<br>PC5: availability of spare hardware equipment. Raise request, in case the same are not available  |
| <b>Fault identification &amp; rectification</b>   | To be competent, the user/individual on the job must be able to:<br>PC7. login to the ICT nodes by connecting laptop with appropriate login consoles<br>PC8. based on the alarm code/ other indicators determine the fault details<br>PC9. carry out diagnostic tests to identify the root cause of the alarm<br>PC10. determine the options to rectify the fault and confirm with supervisors if required<br>PC11. rectify network problem/ fault as per the alarm SLAs<br>PC12. conduct the work in compliance with the health and safety norms, and in compliance with company's procedures<br>PC13. escalate unresolved faults/ instances of delays in resolution as per Company's policy |
| <b>Test effectiveness &amp; close activity</b>    | To be competent, the user/individual on the job must be able to:<br>PC14. monitor relevant alarms in co-ordination with the NOC team to confirm effectiveness of the rectification process<br>PC15. perform data and call testing to ensure effectiveness of the rectification process<br>PC16. complete administrative jobs like site clearance, return of test equipment etc.   |
| <b>Report &amp; Records</b>                       | To be competent, the user/individual on the job must be able to:<br>PC17. notify all relevant parties (including NOC team, other supervisors) of the results of the fault rectification status and obtain sign-off<br>PC18. identify documentation to be completed relating to one's role<br>PC19. update activity tracker, issue logs and spare tracker within stipulated timelines and justify the fault diagnosis and rectification methodology if required<br>PC20. follow reporting procedures as prescribed by the company  |
| <b>Knowledge and Understanding</b>                |   |

**TEL/N6219**

**Perform corrective maintenance/ fault management at ICT nodes**

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|--|--|
| <p><b>A. Organizational Context</b><br/>(Knowledge of the company/ organization &amp; its processes)</p> | <p>The user/individual on the job needs to know and understand:</p> <p>KA1. checklists for preventive maintenance and site hygiene<br/>         KA2. asset layout as per company standards<br/>         KA3. process for handling equipments &amp; reporting process<br/>         KA4. environmental &amp; Quality check<br/>         KA5. risk and impact of not following defined procedures/work instructions<br/>         KA6. escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures ,fire and power failures<br/>         KA7. types of documentation in organization and importance of the same<br/>         KA8. process for obtaining sign-off post completion of the maintenance activities<br/>         KA9. knowledge of spare management and repair &amp; return process for faulty equipments<br/>         KA10. protection equipments (anti-static bands, anti-static packaging, appropriate insulations) that are required to be used</p>                             |
| <p><b>B. Technical Knowledge</b></p>   | <p>The user/individual on the job needs to know and understand:</p> <p>KB1. use &amp; functionality of ICT equipments<br/>         KB2. knowledge of IP standard &amp; protocols like OSI Layer, Number system, Ethernet Standards, Routing protocols (like RIP, OSPF etc)<br/>         KB3. knowledge of 3G &amp; 4G technology &amp; its functioning &amp; its functioning<br/>         KB4. knowledge of SDH &amp; DWDM technology and standards<br/>         KB5: knowledge of CS (Circuit Switch) Call flow &amp; PS (Packet Swit) call flow<br/>         KB6: knowledge of Cloud Computing technology, its building blocks<br/>         KB7. knowledge on how to use console cable to connect to equipments<br/>         KB8: knowledge of connecting equipments to NMS<br/>         KB9. how to calculate power cost and site up-time<br/>         KB10.alarm handling process<br/>         KB11. troubleshooting techniques for ICT nodes as per alarm guide &amp; logs<br/>         KB12. use of required test equipments</p> |
| <p><b>Skills (S)</b></p>   |  |
| <p><b>A. Core Skills/ Generic Skills</b></p>   | <p><b>Personal skills – Communication</b></p>  |
|  | <p>The user/ individual on the job need to know and understand how to:</p> <p>SA1. read and comprehend company polices and guidelines to conduct timely preventive maintenance activities<br/>         SA2. comprehend formats and checklists to verify PM (preventive maintenance)</p>  |
|  | <p><b>Personal skill -Analytical ability</b></p>   |
|  | <p>The user/ individual on the job should be :</p> <p>SA3. diagnose reasons of down-time through up-time analysis<br/>         SA4. perform fault analysis to identify and repair recurring faults on site</p>   |
|  | <p><b>Planning and Execution</b></p>   |
|  | <p>The user/ individual on the job needs to know and understand how to :</p> <p>SA5. prioritize to conduct preventive maintenance activities effectively</p>   |
|  | <p><b>Organizational skills</b></p>  |
|  | <p>The user/ individual on the job should be having :</p> <p>SA6. ability to work in team<br/>         SA7. ability to take initiative<br/>         SA8. ability to ensure adequate knowledge sharing with peers and subordinates</p>  |

TEL/N6219

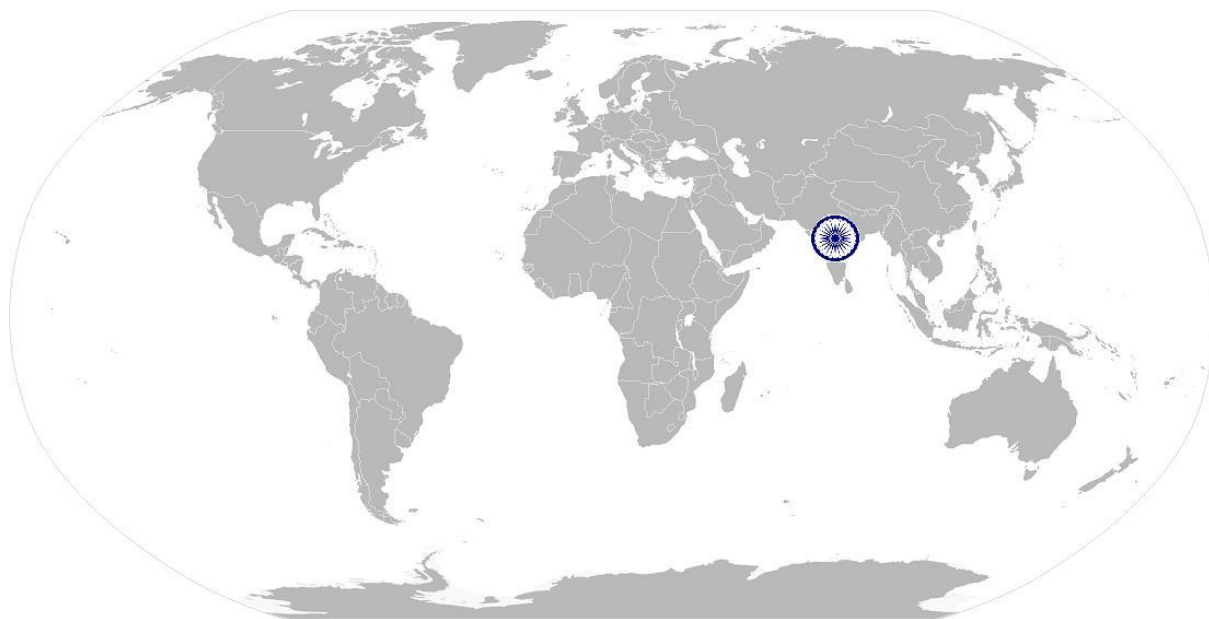
**Perform corrective maintenance/ fault management at ICT nodes**

|                                  |   |
|----------------------------------|---|
| <b>B. Domain specific skills</b> | <b>Technical skills</b>   |
|                                  | <p>The user/ individual on the job should be having :</p> <p>SB1. ability to login to the equipment using relevant cables (RJ45, RS232, Hi Speed USB) for different site equipment like microwave, eNodeB/NodeB etc</p> <p>SB2. ability to work on ICT nodes login applications like Secure CRT, Hyperterminal etc.</p> <p>SB3. ability to understand &amp; work on ICT nodes like NodeB, Routers, switches, Transmission equipments, Core equipments, Cloud equipments</p> <p>SB4. understanding of physical and logical redundancy</p> <p>SB4. ability to undertake standard logical and physical maintenance tasks for the ICT nodes</p> |
|                                  | <b>Fault diagnostics and handling</b>   |
|                                  | <p>The user/ individual on the job should be having :</p> <p>SB8. ability to understand alarm coding and interpret fault type</p> <p>SB9. ability to conduct physical maintenance tasks like checking temperatures, fan working condition, earthing, equipment grounding, distribution of cables etc</p> <p>SB10. ability to conduct logical maintenance tasks like checking alarm status, system availability parameters, logical redundancy etc.</p>  |

**TEL/N6219 Perform corrective maintenance/ fault management at ICT nodes**

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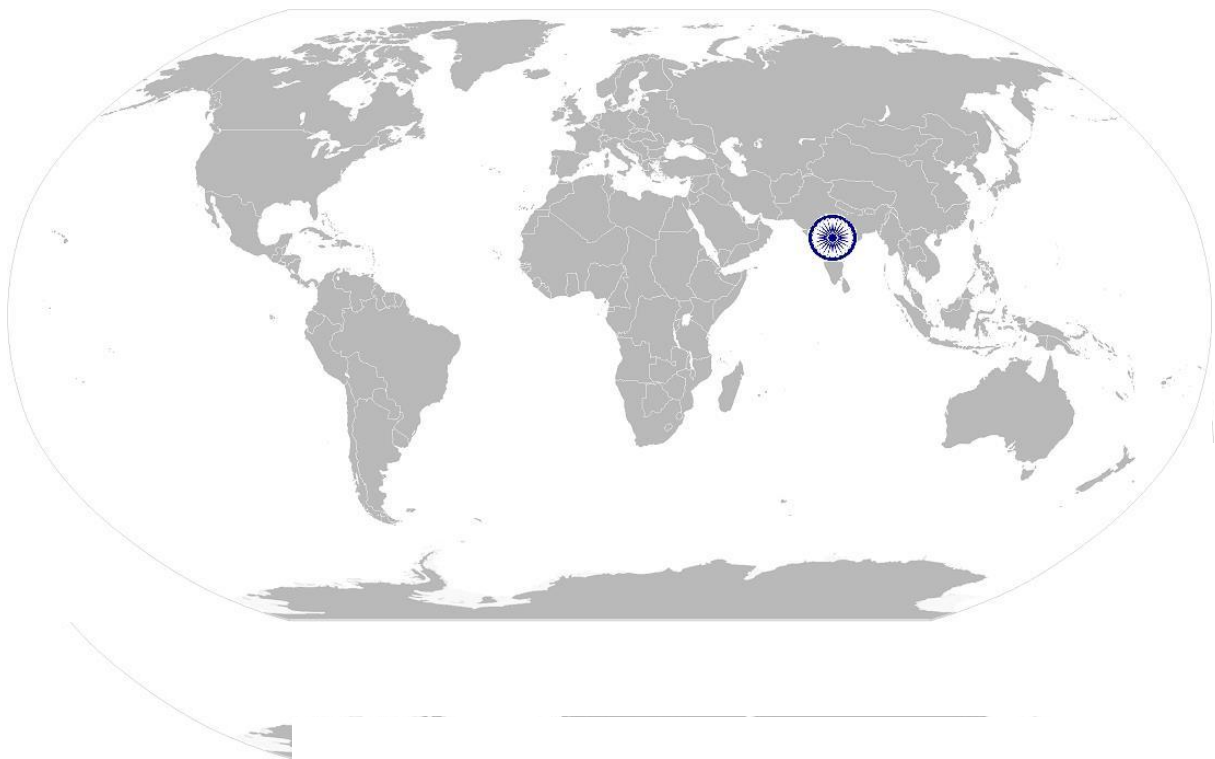
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|---------------------------------|--------------------------------|-------------------------|------------|
| <b>NOS Code</b>                 | <b>TEL/N6219</b>               |                         |            |
| <b>Credits(NSQF) [OPTIONAL]</b> |                                | <b>Version number</b>   | <b>1.0</b> |
| <b>Industry</b>                 | <b>Telecom</b>                 | <b>Drafted on</b>       | 20-06-2014 |
| <b>Industry Sub-sector</b>      | <b>Network Managed Service</b> | <b>Last reviewed on</b> | 08-10-2014 |
|                                 |                                | <b>Next review date</b> | 10-08-2016 |



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TEL/ N6220 Undertake upgrade, capacity augmentation and configuration change activities

# National Occupational Standard



## Overview

This unit is about carrying out change management activities (Upgrade/ Capacity augmentation/ Configuration changes) at ICT nodes.

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**TEL/ N6220 Undertake upgrade, capacity augmentation and configuration change activities**

National Occupation Standard

|  |   |
|--|---|
| <b>Unit Code</b>   | <b>TEL/ N6220</b>   |
| <b>Unit Title (Task)</b>                                   | <b>Undertake upgrade, capacity augmentation and configuration change activities</b>   |
| <b>Description</b>   | This unit is about carrying out change management activities (Upgrade/ Capacity augmentation/ Configuration changes) at ICT nodes.  |
| <b>Scope</b>   | <p>This task covers the following:</p> <ol style="list-style-type: none"> <li>1. Ensure timely response to the change work orders</li> <li>2. Implement change work order and test effectiveness of change</li> <li>3. Reporting and documenting the status</li> </ol>  |
| <b>Performance Criteria(PC) w.r.t. the Scope:</b>          |   |
| <b>Element</b>   | <b>Performance Criteria</b>   |
| <b>Determine change/ configuration requirements</b>        | <p>To be competent, the user/individual on the job must be able to:</p> <p>PC1. receive change requests (hardware upgrade, software upgrade, capacity augmentation, configuration changes) from the NOC team or supervisors</p> <p>PC2. identify criticality, and timelines for carrying out the changes</p> <p>PC3. develop work plan and identify dependencies if any</p> <p>PC4. assess the potential impact of the proposed activity and plan for possible outage condition or deferral of the activity</p> <p>PC5. ensure customer is informed and an approval is obtained in case of service impacting change activity</p> <p>PC6. ensure that Network Operating Centre (NOC) is notified prior to undertaking the activities</p>   |
| <b>Arrange for tools &amp; spares</b>                      | <p>To be competent, the user/individual on the job must be able to:</p> <p>PC4.arrange necessary equipment like login cables (RJ45, RS232, Hi-speed USB etc.)</p> <p>PC5. Ensure availability of spare hardware equipment and raise request for spares, in case the same are not available</p> <p>PC6. utilize spares if required, and send faulty equipment for repair and replacement</p> <p>PC7. ensure equipment specific Network Management tool or application should be installed in pc</p>  |
| <b>Carry out change and perform post change monitoring</b> | <p>To be competent, the user/individual on the job must be able to:</p> <p>PC8. carry out changes carried out by the central NOC or help NOC to carry out change at local device</p> <p>PC9. perform pre-testing and observe output of configuration changes</p> <p>PC10. perform changes like traffic migrations, capacity augmentation, feature activations, routing configuration etc.</p> <p>PC11. implement configurations changes like routing schemes, IP, VLAN, HLR configuration etc. as per requirements</p> <p>PC12. conduct the work in compliance with the health and safety norms, and in compliance with company's procedures</p> <p>PC13. monitor progress of change and notify change requestor of problems encountered if any</p> <p>PC14. abort change and implement contingency plan should the change plan not be released without major disruption to network</p> |

## TEL/ N6220

## Undertake upgrade, capacity augmentation and configuration change activities

|  |  |
|--|--|
| <p><b>Obtain back-up, test effectiveness &amp; close activity</b></p>  | <p>To be competent, the user/individual on the job must be able to:</p> <p>PC15. obtain back-up of ICT nodes - both pre and post-performance of change activities<br/>         PC16. monitor relevant alarms in co-ordination with the NOC team to confirm effectiveness of the changes performed<br/>         PC17. perform data and call testing to ensure effectiveness of the change process<br/>         PC18. complete administrative jobs like site clearance, return of test equipment etc.</p>  |
| <p><b>Report and record</b></p>  | <p>To be competent, the user/individual on the job must be able to:</p> <p>PC21. notify all relevant parties (including NOC team, other supervisors) of the results of the change process and obtain sign-off<br/>         PC22. identify documentation to be completed relating to one's role<br/>         PC23. follow reporting procedures as prescribed by the company<br/>         PC25. ensure that documents are available to all appropriate authorities to inspect</p>  |
| <p><b>Knowledge and Understanding(K)</b></p>   |  |
| <p><b>A. Organizational Context<br/>(Knowledge of the company / organization &amp; its process relevant to area of responsibilities)</b></p> | <p>The user/individual on the job needs to know and understand:</p> <p>KA1. Risk and impact of not following defined procedures/work instructions<br/>         KA2. Escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures, fire and power failures<br/>         KA3. clearances/ regulatory approvals that are required prior to carrying out the installation work.<br/>         KA4. types of documentation in organization and importance of the same<br/>         KA5. records to be maintained and implications of non-maintenance of the same<br/>         KA6. knowledge of spare management and repair &amp; return process for faulty equipment<br/>         KA7. safety guidelines and regulations as per company's norms<br/>         KA8. first aid requirements in case of electrical shocks, cuts, fall and other common injuries</p>  |
| <p><b>B. Technical Knowledge</b></p>   | <p>The user/individual on the job needs to know and understand:</p> <p>KB1. use &amp; functionality of ICT equipments<br/>         KB2. knowledge of IP standard &amp; protocols like OSI Layer, Number system, Ethernet Standards, Routing protocols (like RIP, OSPF etc)<br/>         KB3. knowledge of 3G &amp; 4G technology &amp; its functioning &amp; its functioning<br/>         KB4. knowledge of SDH &amp; DWDM technology and standards<br/>         KB5: knowledge of CS (Circuit Switch) Call flow &amp; PS (Packet Swith) call flow<br/>         KB6: Knowledge of Cloud Computing technology, its building blocks<br/>         KB7. knowledge on how to use console cable to connect to equipments<br/>         KB8: knowledge of connecting equipments to NMS<br/>         KB9. how to calculate power cost and site up-time<br/>         KB10. alarm handling process<br/>         KB11. troubleshooting techniques for ICT nodes as per alarm guide &amp; logs<br/>         KB12. use of required test equipments<br/>         KB13. functioning of NOC/TOC<br/>         KB14. basic functioning of alarm box and the interface</p> |

TEL/ N6220

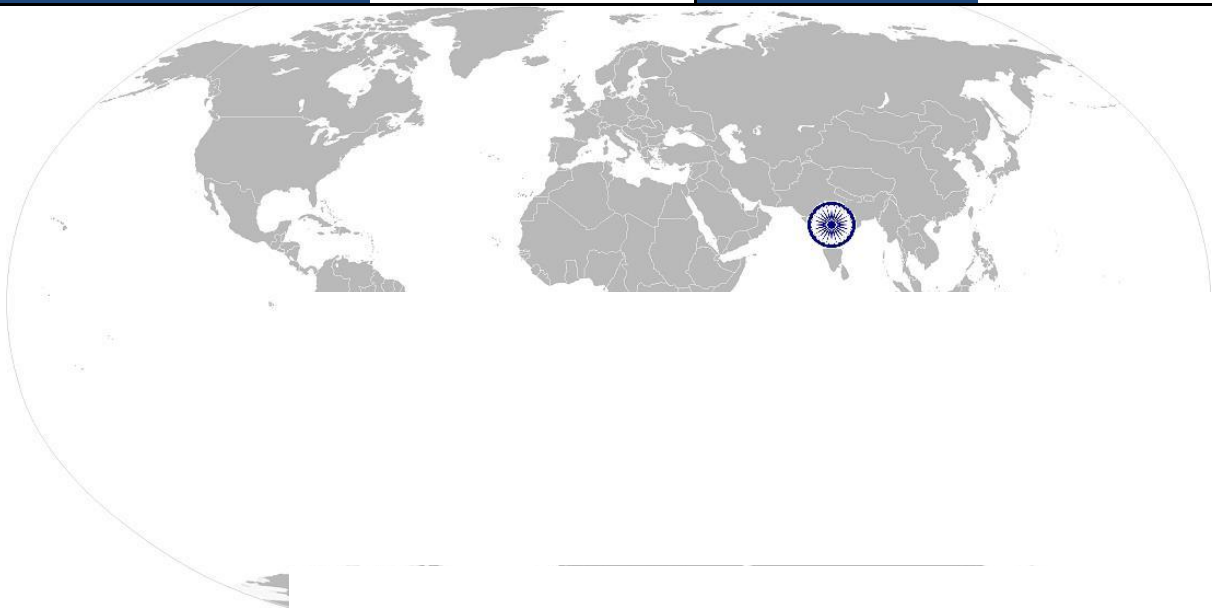
**Undertake upgrade, capacity augmentation and configuration change activities**

| Skills (S)                                |  |
|---|--|
| <b>A. Core Skills/<br/>Generic Skills</b> | <b>Personal skills – Communication</b>   |
|   | The user/ individual on the job should be to:<br>SA1. read and comprehend process and policies of the company<br>SA2: able to interpret the technical jargon of equipment manual and understand technical instructions   |
| <b>B. Domain Specific Skills</b>          | <b>Technical skills</b>  |
|   | The user/ individual on the job should be have:<br><br>SB1. ability to login to the equipment using relevant cables (RJ45, RS232, Hi Speed USB) for different site equipment like microwave, eNodeB/NodeB etc<br>SB2. ability to work on ICT nodes login applications like Secure CRT, Hyperterminal etc.<br>SB3. ability to understand & work on ICT nodes like NodeB, Routers, switches, Transmission equipments, Core equipments, Cloud equipments<br>SB4. understanding of physical and logical redundancy<br>SB4. ability to undertake standard logical and physical maintenance tasks for the ICT nodes<br>SB6. ability to understand and undertake Point of Interconnect testing as per defined checklist<br>SB7: ability to work with required test equipments and associated NMS applications |
|   | <b>Planning and Execution</b>  |
|   | The user/individual on the job needs to know and understand how to:<br>SB6. prioritize activities to effectively manage the ICT site   |

**TEL/ N6220      Undertake upgrade, capacity augmentation and configuration change activities**

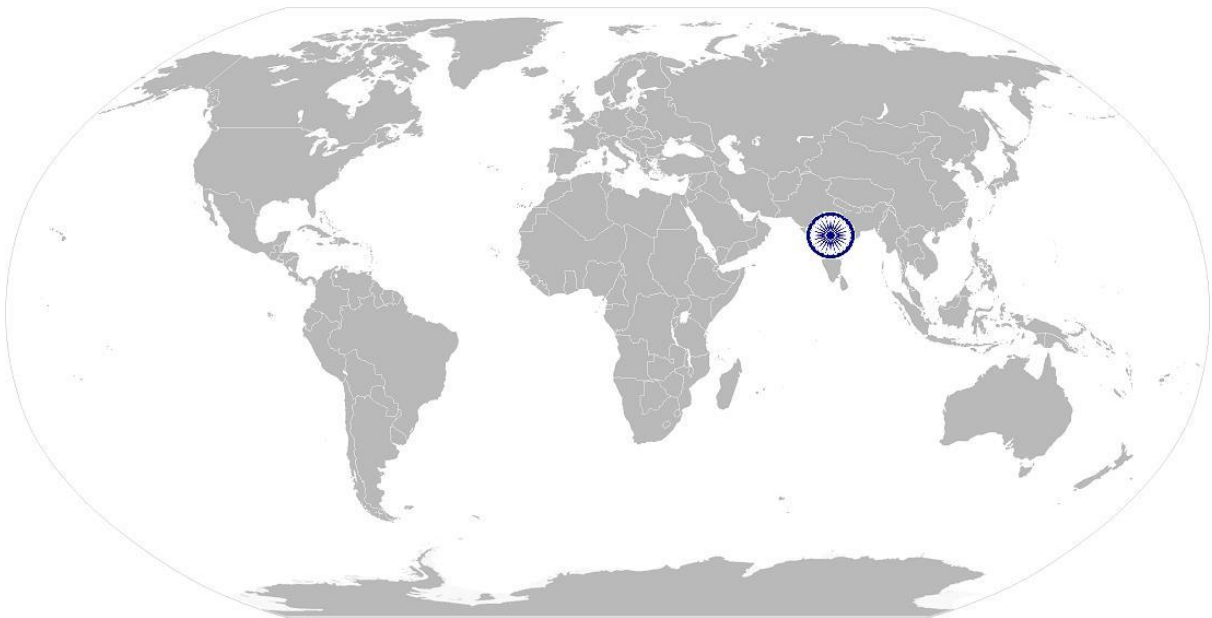
## **NOS Version Control:**

|                                 |                         |                         |            |
|---------------------------------|-------------------------|-------------------------|------------|
| <b>NOS Code</b>                 | TEL/N6220               |                         |            |
| <b>Credits(NSQF) [OPTIONAL]</b> |                         | <b>Version number</b>   | 1.0        |
| <b>Industry</b>                 | Telecom                 | <b>Drafted on</b>       | 20-06-2014 |
| <b>Industry Sub-sector</b>      | Network Managed Service | <b>Last reviewed on</b> | 08-10-2014 |
|                                 |                         | <b>Next review date</b> | 10-10-2016 |



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# National Occupational Standard



## Overview

This unit is about carrying out Point of Interconnect testing prior to approving for link commissioning/ integration.

## TEL/N6221

## Undertaking of POI

|  |  |
|--|--|
| <b>Unit Code</b>   | TEL/N6221  |
| <b>Unit Title (Task)</b>   | Undertaking of POI   |
| <b>Description</b>   | This unit is about carrying out Point of Interconnect testing prior to approving for link commissioning/ integration.  |
| <b>Scope</b>   | The unit/ task covers the following:<br>1. Undertake testing of the POI (Point of Interconnect) as per the test checklist<br>2. Communicate testing status to the project engineer/ customer<br>3. Approve for integration/ link commissioning   |
| <b>Performance Criteria(PC) w.r.t. the Scope:</b>                              |  |
| <b>Element</b>   | <b>Performance Criteria</b>  |
| <b>Undertake Point of Interconnect testing</b>                                 | To be competent, the user/individual on the job must be able to:<br>PC1. carry out physical tests of the POI as per the checklist<br>PC2. arrange necessary equipment<br>PC3. carry out logical tests (connectivity, redundancy, power levels etc.) as per the checklist<br>PC4. communicate status of tests to the client team and obtain sign-off<br>PC5. co-ordinate with Interconnect vendors for carrying out configuration changes as  |
| <b>Report &amp; Records</b>  | To be competent, the user/individual on the job must be able to:<br>PC7. notify all relevant parties (including NOC team, other supervisors) of the results of the interconnect process and obtain sign-off<br>PC8.. identify documentation to be completed relating to one's role<br>PC9. update routine issue logs, activity logs and spare tracker within stipulated timelines<br>PC10. follow reporting procedures as prescribed by the company<br>PC11. ensure that documents are available to all appropriate authorities to inspect |
| <b>Knowledge and Understanding(K)</b>  |  |
| <b>C. Organizational Context</b><br>(Knowledge of the company & its processes) | The user/individual on the job needs to know and understand:<br>KA1. interconnect process as per the company norms<br>KA2. site AT checklist & Link integration norms as per the company<br>KA3. site up-time targets of the company, to avoid penalties<br>KA4. repair and maintenance guidelines of the company  |

TEL/N6221

Undertaking of POI

|  |  |
|--|--|
| <p><b>D. Technical Knowledge</b></p>             | <p>The user/individual on the job needs to know and understand:</p> <p>KB1. use &amp; functionality of ICT equipments</p> <p>KB2. knowledge of IP standard &amp; protocols like OSI Layer, Number system, Ethernet Standards, Routing protocols (like RIP, OSPF etc)</p> <p>KB3. knowledge of 3G &amp; 4G technology &amp; its functioning&amp; its functioning</p> <p>KB4. knowledge of SDH &amp; DWDM technology and standards</p> <p>KB5: knowledge of CS (Circuit Switch) Call flow &amp; PS (Packet Swit) call flow</p> <p>KB6: knowledge of Cloud Computing technology, its building blocks</p> <p>KB7. knowledge on how to use console cable to connect to equipments</p> <p>KB8: knowledge of connecting equipments to NMS</p> <p>KB9. alarm handling process</p> <p>KB10. use of required test equipments</p> <p>KB11. functioning of NOC/TOC</p> <p>KB12. basic functioning of alarm box and the interface</p> |
| <p><b>Skills (S)</b></p>                         |  |
| <p><b>A. Core Skills/<br/>Generic Skills</b></p> | <p><b>Personal skills – Communication</b></p> <p>The user/ individual on the job should be to:</p> <p>SA1. adequately skilled to provide advice and guidance to peers &amp; juniors</p> <p>SA2. able to liaise with third party vendors</p> <p>SA3. communicate with supervisor</p> <p>SA4. able to communicate in national languages</p> <p>SA5. understand the various Alarm codes, as per company's nomenclature</p> <p><b>Organizational skills</b></p> <p>The user/ individual on the job should be having .</p> <p>SA6. ability to work in team</p> <p>SA7. ability to take initiative</p> <p>SA8. ability to ensure adequate knowledge sharing with peers and subordinates</p>  |
| <p><b>B. Domain specific skills</b></p>          | <p><b>Planning and Execution</b></p> <p>SB1. ability to login to the equipment using relevant cables (RJ45, RS232, Hi Speed USB) for different site equipment like microwave, eNodeB/NodeB etc</p> <p>SB2. ability to work on ICT nodes login applications like Secure CRT, Hyperterminal etc.</p> <p>SB3. ability to understand &amp; work on ICT nodes like NodeB, Routers, switches, Transmission equipments, Core equipments, Cloud equipments</p> <p>SB4. understanding of physical and logical redundancy</p> <p>SB4. ability to undertake standard logical and physical maintenance tasks for the ICT nodes</p> <p>SB6. ability to understand and undertake Point of Interconnect testing as per defined checklist</p> <p>SB7: ability to work with required test equipments and associated NMS applications</p>  |

TEL/N6221

Undertaking of POI

## NOS Version Control:

|                          |                         |                  |            |
|--------------------------|-------------------------|------------------|------------|
| NOS Code                 | TEL/N6221               |                  |            |
| Credits(NSQF) [OPTIONAL] |                         | Version number   | 1.0        |
| Industry                 | Telecom                 | Drafted on       | 20-06-2014 |
| Industry Sub-sector      | Network Managed Service | Last reviewed on | 08-10-2014 |
|                          |                         | Next review date | 10-10-2016 |



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**PERFORMANCE CRITERIA**

**Job Role** : ICT Engineer  
**Qualification Pack** TEL/Q6205  
**Sector Skill Council** : Telecom

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

|  |   | Total Mark (400)  | Total of Sub-Element | Out Of | Theory   | Skills Practical |    |   |   |   |
|--|---|---|----------------------|--------|--|------------------|----|---|---|---|
| 1. TEL/N6218 Perform preventive maintenance at ICT sites   | Obtain schedule & notify NOC  | PC1. Plan preventive maintenance schedule along with NOC team   | 100                  | 22     | 4  | 3                | 1  |   |   |   |
|  |   | PC2. Suggest changes to the planned maintenance schedule considering site criticality, capacity, frequency of faults if required.   |                      |        | 5  | 3                | 2  |   |   |   |
|  |   | PC3. Assess the potential impact of the proposed maintenance on customers and network and plan for possible outage or deferral of maintenance   |                      |        | 9  | 4                | 5  |   |   |   |
|  |   | PC4. Notify the network operations center (NOC) prior to undertaking the maintenance work as per the schedule   |                      |        | 1  | 1                | 0  |   |   |   |
|  | Arrange for tools and spares  | PC5. Check power consumption pattern and report any unusual consumption to supervisor   |                      |        | 3  | 1                | 2  |   |   |   |
|  |   | PC6. Arrange necessary equipment like login cables (RJ45, RS232, Hi-speed USB etc)  |                      |        | 2  | 1                | 1  |   |   |   |
|  |   | PC7. Ensure equipment specific software like NMS client is installed in pc  |                      |        | 10   | 3                | 7  |   |   |   |
|  |   | PC8. Ensure availability of spare hardware equipment and raise request for in case the same are not available   |                      |        | 1  | 1                | 0  |   |   |   |
|  |   | PC9. Utilize spares if required, and send faulty equipment for repair and replacement   |                      |        | 2  | 1                | 1  |   |   |   |
|  | Conduct/ Co-ordinate maintenance activity   | PC10. Follow-up with the Report & Record team/ logistics team in case of delay completion of spare requisition  |                      |        | 1  | 1                | 0  |   |   |   |
|  |   | PC11. Conduct physical maintenance tasks like checking temperatures, routing of Ethernet and optical fibers, cables ties, earthing, equipment grounding, even distribution of cables etc. |                      |        | 15   | 5                | 10 |   |   |   |
|  |   | PC12. Conduct logical maintenance tasks like PM counter checking, obtaining daily back-ups, checking alarm status, system availability parameters, logical redundancy etc.                |                      |        | 10   | 4                | 6  |   |   |   |
|  |   | PC13. Conduct alarm configuration testing in co-ordination with NOC team to ensure their functionality  |                      |        | 5  | 3                | 2  |   |   |   |
|  |   | PC14. Escalate emergency/ unresolved issues according to established Company's procedure  |                      |        | 3  | 2                | 1  |   |   |   |
|  |   | PC15. Interact with technical team for performing maintenance activities related to passive infrastructure deployed at ICT nodes or customer premises                                     |                      |        | 3  | 2                | 1  |   |   |   |
|  | Test effectiveness & close activity   | PC16. Interact with other vendors for ensuring interconnectivity uptime and lease line uptime   |                      |        | 3  | 2                | 1  |   |   |   |
|  |   | PC17. Monitor site's alarm status in co-ordination with the NOC team to confirm effectiveness of the maintenance process  |                      |        | 10   | 3                | 7  |   |   |   |
|  | Report & Record   | PC18. Complete administrative jobs like site clearance, return of test equipment etc.   |                      |        | 4  | 3                | 1  |   |   |   |
|  |   | PC19. Notify all relevant parties (including NOC team, other supervisors) of the results of the routine maintenance and obtain sign off   |                      |        | 4  | 2                | 2  |   |   |   |
|  |   | PC20. Reporting to supervisor once completed relating to one's role   |                      |        | 2  | 2                | 0  |   |   |   |
|  |   | PC21. Update routine maintenance logs, activity logs and spare tracker within stipulated timelines  |                      |        | 3  | 2                | 1  |   |   |   |
|  |   |   |                      |        | 2  | 2                | 0  |   |   |   |
| 2. TEL/N6219 Perform Corrective maintenance/ Fault Management at ICT nodes   | Respond to Network Alarm/ NOC instructions  | PC1. Determine alarm severity, SLAs and the affected network elements   | 100                  | 25     | 15   | 5                | 10 |   |   |   |
|  |   | PC2. Provide information to and seek advice from relevant parties in identifying the problem and cause of the alarm condition   |                      |        | 10   | 4                | 6  |   |   |   |
|  | Arrange for tools and spares  | PC3. Arrange necessary equipment like login cables (RJ45, RS232, Hi-speed USB etc.)   |                      |        | 2  | 1                | 1  |   |   |   |
|  |   | PC4. Ensure availability of Equipment related NMS client in their PC to connect to equipment, if required   |                      |        | 10   | 3                | 7  |   |   |   |
|  |   | PC5. Availability of spare hardware equipment. Raise request, in case the same are not available  |                      |        | 3  | 2                | 1  |   |   |   |
|  |   | PC6. Utilize spares if required, and send faulty equipment for repair and replacement   |                      |        | 1  | 1                | 0  |   |   |   |
|  | Identify & rectify faults   | PC7. Login to the ICT nodes by connecting laptop with appropriate login consoles  |                      |        | 6  | 3                | 3  |   |   |   |
|  |   | PC8. Based on the alarm code/ other indicators determine the fault details  |                      |        | 10   | 4                | 6  |   |   |   |
|  |   | PC9. Carry out diagnostic tests to identify the root cause of the alarm   |                      |        | 8  | 3                | 5  |   |   |   |
|  |   | PC10. Determine the options to rectify the fault and confirm with supervisors if  |                      |        | 6  | 3                | 3  |   |   |   |
|  |   | PC11. Rectify network problem/ fault as per the alarm SLAs  |                      |        | 8  | 3                | 5  |   |   |   |
|  |   | PC12. Conduct the work in compliance with the health and safety norms, and in compliance with company's procedures  |                      |        | 5  | 3                | 2  |   |   |   |
|  |   | PC13. Escalate unresolved faults/ instances of delays in resolution as per Company's policy   |                      |        | 2  | 1                | 1  |   |   |   |
|  | Test effectiveness & close activity   | PC14. Monitor relevant alarms in co-ordination with the NOC team to confirm effectiveness of the rectification process  |                      |        | 3  | 1                | 2  |   |   |   |
|  |   | PC15. Perform data and call testing to ensure effectiveness of the rectification process  |                      |        | 3  | 1                | 2  |   |   |   |
|  | Report & Record   | PC16. Complete administrative jobs like site clearance, return of test equipment etc.   |                      |        | 1  | 1                | 0  |   |   |   |
|  |   | PC17. Notify all relevant parties (including NOC team, other supervisors) of the results of the fault rectification status and obtain sign-off  |                      |        | 2  | 2                | 1  |   |   |   |
|  |   | PC18. Identify documentation to be completed relating to one's role   |                      |        | 1  | 1                | 0  |   |   |   |
|  |   | PC19. Update activity tracker, issue logs and spare tracker within stipulated timelines and justify the fault diagnosis and rectification   |                      |        | 3  | 1                | 2  |   |   |   |
|  |   | PC20. Follow reporting procedures as prescribed by the company  |                      |        | 1  | 1                | 0  |   |   |   |
|  | 3. TEL/N6220 Undertake upgrade, capacity augmentation and configuration change activities | Determine change/ configuration requirements  |                      |        | PC1. receive change requests (hardware upgrade, software upgrade, capacity augmentation, configuration changes) from the NOC team or supervisors | 100              | 22 | 2 | 1 | 1 |
|  |   |   |                      |        | PC2. identify criticality, and timelines for carrying out the changes  |                  |    | 5 | 2 | 3 |
| PC3. develop work plan and identify dependencies if any  |   |   | 4                    | 2      | 2  |                  |    |   |   |   |
| PC4. assess the potential impact of the proposed activity and plan for possible outage condition or deferral of the activity |   |   | 6                    | 3      | 3  |                  |    |   |   |   |
| PC5. ensure customer is informed and an approval is obtained in case of service impacting change activity                    |   |   | 3                    | 2      | 1  |                  |    |   |   |   |
| PC6. ensure that Network Operating Centre (NOC) is notified prior to undertaking the activities                              |   |   | 2                    | 1      | 1  |                  |    |   |   |   |
| Arrange for tools and spares   |   | PC7. Arrange necessary equipment like login cables (RJ45, RS232, Hi-speed USB etc.)   | 2                    | 1      | 1  |                  |    |   |   |   |
|  |   | PC8. Ensure availability of spare hardware equipment and raise request for spares, in case the same are not available   | 3                    | 2      | 1  |                  |    |   |   |   |
|  |   | PC9. Ensure equipment specific Network Management tool or application should be installed in pc   | 10                   | 3      | 7  |                  |    |   |   |   |
|  |   | PC10. Utilize spares if required, and send faulty equipment for repair and replacement  | 1                    | 1      | 0  |                  |    |   |   |   |
| Report & Record  |   | PC11. Carry out changes carried out by the central NOC or help NOC to carry out change at local device  | 5                    | 2      | 3  |                  |    |   |   |   |
|  |   | PC12. Perform pre-testing and observe output of configuration changes   | 8                    | 2      | 4  |                  |    |   |   |   |

|  |   |  |  |    |    |   |   |
|--|---|--|--|----|----|---|---|
|  | Carry out change and perform post change monitoring | PC13. Perform changes like traffic migrations, capacity augmentation, feature activations, routing configuration etc.              |  | 39 | 8  | 2 | 4 |
|  |   | PC14. Implement configurations changes like routing schemes, IP, VLAN, HLR configuration etc. as per requirements                  |  |    | 8  | 2 | 4 |
|  |   | PC15. Conduct the work in compliance with the health and safety norms, and in compliance with company's procedures                 |  |    | 3  | 1 | 2 |
|  |   | PC16. Monitor progress of change and notify change requestor of problems encountered if any  |  |    | 4  | 2 | 2 |
|  |   | PC17. Abort change and implement contingency plan should the change plan not be released without major disruption to network       |  |    | 3  | 1 | 2 |
|  |   | PC18. Obtain back-up of ICT nodes - both pre and post-performance of change activities   |  |    | 10 | 4 | 6 |
|  |   | PC19. Monitor relevant alarms in co-ordination with the NOC team to confirm effectiveness of the changes performed                 |  |    | 3  | 1 | 2 |
|  | Obtain back-up, test effectiveness & close activity | PC20. Perform data and call testing to ensure effectiveness of the change process  |  | 2  | 1  | 1 |   |
|  |   | PC21. Complete administrative jobs like site clearance, return of test equipment etc.  |  | 1  | 1  | 0 |   |
|  |   | PC22. Notify all relevant parties (including NOC team, other supervisors) of the results of the change process and obtain sign-off |  | 2  | 1  | 1 |   |
|  | Report and record                                   | PC23. Identify documentation to be completed relating to one's role  |  | 3  | 1  | 2 |   |
|  |   | PC24. Follow reporting procedures as prescribed by the company   |  | 1  | 1  | 0 |   |
|  |   | PC25. Ensure that documents are available to all appropriate authorities to inspect  |  | 1  | 1  | 0 |   |
|  |   |  |  |    |    |   |   |