

Appendix – H2

SITE ACCEPTANCE TEST PROCEDURE (FO Transmission system, Termination Equipment sub-system & associated NMS System)

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1. SCOPE OF TESTING

All equipment shall be tested on site under the conditions in which it will normally operate. The tests shall be exhaustive and shall demonstrate that the overall performance of the contract works satisfies every requirement specified.

Phases of Site Acceptance Testing

1.1 Installation Testing

Site Installation Test

The field installation test will be performed for all equipment at each site.

The purpose of installation test is to ensure that all the equipment and cables conform to the BOQ; the installation of equipment and cabling conform to drawings, rack elevations; the appearance of equipment meets the requirements.

(1) Installation tests on FO Transmission system (SDH Equipment):

The installation tests on FO Transmission system (SDH Equipment) mainly include:

1.	Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling
2.	Station power supply input and equipment power supply (DC-DC converter) output voltage measurements
3.	Terminal transceiver performance testing (Tx power, Tx spectrum, receive signal strength, connector losses etc.)
4.	Service channel performance
5.	Craftsperson interface, alarm, control functional performance
6.	Rack and local alarms: No alarms shall be present, and all alarms shall be demonstrated to be functional
7.	Network management interface and supervision performance
8.	Correct configuration, level setting & adjustments and termination of Input/output interfaces
9.	Proper establishment of Safety and signaling earthing system and resistance to ground to be checked.
10.	Simulation of failure conditions and failover of protected components.

(2) Installation tests on Termination Equipment sub-system (PDH Equipments Drop Insert Mux & DACS):

The installation tests on Termination Equipment sub-system mainly includes:

1.	Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling
2.	Power supply/converter voltage measurements
3.	Muldem performance testing
4.	Craftsperson interface, alarm, and control functional performance
5.	Rack and Local alarms
6.	Network management interface and supervision performance
7.	Channel performance
8.	Safety and signaling earthing system
9.	Simulation of failure conditions and failover of protected components.

(3) Installation Test on NMS system.

The installation tests on NMS system mainly includes:

1.	Physical inspection for conformance to drawings, rack elevations and appearance of equipment and cabling.
2.	Workstation (Remote & Local) hardware inventory, configuration, and characteristics.
3.	Demonstration of proper operation of all hardware, including workstations (Remote & Local) peripherals.

1.2 Link Commissioning Testing

The link commissioning tests shall verify that communication can be performed over the fiber optic link under the test. Delay measurement, Bit Error measurements & service channel performance monitoring shall be made on the fiber optic links to verify compliance with designed link performance.

For Ethernet interface: At a minimum the following test requirements shall be demonstrated as per RFC 2544:

- a) Ping test
- b) Throughput test
- c) Latency test
- d) Packet Loss

10% of the total links (as chosen by PrKTCL, generally to cover links from all configurations used) shall be tested for duration of 12 Hours.

Rest of the links shall be tested for 1 Hour. In case a link does not meet the performance requirements during 1 hour, then the duration of the test shall be increased to 12 hours.

In case any link does not meet the performance requirements during 12 hour, then the cause of failure shall be investigated and the test shall be repeated after rectifying the defects.

This phase of testing shall be conducted by the Contractor and witnessed by the Employer. Field adjustments shall be made to meet established standard, however if the field adjustments fail to correct the defects the equipment may be returned to the Contractor for replacement at his own expense. In case any adjustments are required to be made during the interval of the test then the test shall be repeated.

1.3 **Integrated Testing**

Prior to commencement of integrated testing the overall system shall be configured as required to provide all the data and voice channel required to interconnect the various control centers and RTU. The integrated testing shall include end-to-end testing of back-bone network. Integrated testing for last batch shall include testing of the entire back-bone network. The intent of integrated testing is to demonstrate that the equipment is operational end to end under actual conditions, that all variances identified during factory and field installation and communications testing have been corrected, and that the communication equipment is compatible with other equipment at all locations. The Integrated System Test shall include all fiber optic transmission equipment, termination equipment, the network management subsystem, and other components.

At a minimum the following tests shall be included in the integrated testing:

- 1.3.1 Installation testing for NMS as per table given below.
- 1.3.2 Equipment configuration shall be checked to establish that it supports the channel routing.
- 1.3.3 End to end testing of all individual voice circuits originating from PLCC, PABX or Phones and to establish proper interfacing with PLCC\ PABX\ Phones and to demonstrate proper operation of channels over wideband systems. Operation shall be checked in terms of quality of voice, call initiation and call termination processes.
- 1.3.4 End-to-end testing of all individual Data Circuits originating from PLCC, RTU and SCADA Front Ends and to establish proper interfacing with PLCC\RTU\Front End and to demonstrate proper operation of channels over wideband systems. Operation shall be checked in terms of monitoring of BER/packet loss.
- 1.3.5 Testing of NMS to demonstrate proper operation of all functions: Configuration Management, Performance Management, Fault, Management and Security management. All the standard features of the NMS shall be demonstrated for proper functioning.
- 1.3.6 Demonstration of Protection switching including ring network whereas applicable and synchronization of equipment as per synchronization plan.

2. TEST PROCEDURES

2.1 Installation Testing

Following is the list of Installation and Link Commissioning tests to be conducted on the selected equipment during the Site acceptance testing: -

Sr. No	Test Description	Test Procedure No.
1	Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling	TPS-01
2	Station power supply input and equipment power supply (DC-DC converter) output voltage measurements	TPS-02
3	Terminal transceiver performance testing (Tx power, Tx spectrum, receive signal strength, connector losses etc.)	TPS-03
4	Services channel performance Test	TPS-04
5	Craftsperson interface, alarm, and control functional performance	TPS-05
6	Rack and local alarms	TPS-06
7	Network management interface and supervision performance	TPS-07
8	Correct configuration, level setting & adjustments and termination of Input/ output interfaces	TPS-08
9	Proper establishment of Safety and signaling earthing system and resistance to ground to be checked.	TPS-09
10	Simulation of failure conditions and failover of protected components.	TPS-10
11	Craftsperson interface, alarm and control functional performance (PDH)	TPS-11
12	Simulation of failure conditions and failover of protected components (PDH)	TPS-12
13	Channel performance tests (PDH)	TPS-13
14	Network management interface and supervision performance (PDH)	TPS-14

15	Muldem performance testing (PDH)	TPS-15
16	Simulation of failure conditions and failover of protected components (DACS)	TPS-16
17	Channel Performance Tests (DACS)	TPS-17
18	Physical inspection for conformance to drawings, rack elevations and appearance of equipment and cabling of NMS System Workstation hardware inventory, configuration, and characteristics of NMS System	TPS-18
19	Demonstration of proper operation of all hardware, including workstations peripherals of NMS System	TPS-19

2.2 Link Commissioning Testing

The commissioning tests shall verify that communication can be performed over the fiber optic link under test. Delay measurement, Bit Error measurements & service channel performance monitoring shall be made on the fiber optic links to verify compliance with designed link performance.

For Ethernet interface: At a minimum the following test requirements shall be demonstrated as per RFC 2544:

- 2.2.1 Ping test
- 2.2.2 Throughput test
- 2.2.3 Latency test
- 2.2.4 Packet Loss

10% of the total links (Chosen by PrKTCL, generally to cover links from all configurations used) shall be tested for duration of 12 Hours.

Rest of the links shall be tested for 1 Hour. In case a link does not meet the performance requirements during 1 hour, then the duration of the test shall be increased to 12 hours.

In case any link does not meet the performance requirements during 12 hour, then the cause of failure shall be investigated and the test shall be repeated after rectifying the defects.

This phase of testing shall be conducted by the Contractor and witnessed by the Employer. Field adjustments shall be made to meet established standards, however if the field adjustments fail to correct the defects the equipments may be returned to the Contractor for replacement at his own expense. In case any adjustments are required to be made during the interval of the test then the test shall be repeated.

Sr. No	Test Description	Test Procedure No.
1	Ethernet Channel Testing	TPS-20
2	Measurement of BER For SDH Link	TPS-21
3	Delay measurement	TPS-22

2.3 Integrated Testing

Following is the list of Integrated testing tests to be conducted on the selected equipment during the Site acceptance testing: -

Sr. No	Test Description	Test Procedure No.
1	End to End testing of Voice circuits	TPS-23
2	Testing of NMS Functionality	TPS-24
3	Protection Switching and Synchronization of Equipment	TPS-25
4	End to End Data Channel testing	TPS-26
5	Interfacing with Existing Communication System	TPS-27

3. TEST EQUIPMENT

Prior to start of testing a consolidated list of all test equipment used for the Site Acceptance Testing shall be provided along with Make/Model numbers and valid Calibration Certificates.

Test Equipment's/Instruments to be used during SAT:

- 1) E1 BER Tester
- 2) Ethernet Tester
- 3) Optical Power meter
- 4) Digital Multi meter
- 5) VF Tester
- 6) Earth Tester
- 7) Any other as per testing requirements

4. SAT PROCEDURE

4.1 SAT-I

TPS-01: Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling

Equipment Under Test : FO EQUIPMENTS (SDH) & TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling

1. Test Descriptions

To identify correctly given equipment and verify the hardware configuration and make the equipment ready for software configuration and commissioning.

2. Test Procedure

- Check the hardware configuration as per the configuration drawing.
- Check the installation whether it is as per the site layout drawing.
- Check the workmanship and accuracy of the installation and cabling.
- Check for physical damage.
- Check the quantity as per approved BOQ.

3. Test Results Records

Test Parameters	Test Criteria	Test Results
Hardware configuration	Complies with the approved BOQ	Ok / Not Ok
Equipment layout	Equipment layout complies with the approved site layout drawing	Ok / Not Ok
Installation of Rack	<ul style="list-style-type: none"> • Location should conform to layout drawing. • Fixed on floor by bolts 	Ok / Not Ok
Installation of subrack and card	<ul style="list-style-type: none"> • Sub-rack should be firmly fixed. • Cards should be inserted into the slots and locked 	Ok / Not Ok
Cabling and terminator processing	<ul style="list-style-type: none"> • DC Power cable colour to distinguish the polarity. 	Ok / Not Ok

	<ul style="list-style-type: none"> • Cable lays smoothly, straight, and tidily, without obvious twist and cross. • Cable buffer arcs are consistent. • Well colligated • Stripped length of cable should be consistent. • Good connection. Soldering point should be smooth and tight 	
Physical damage	<ul style="list-style-type: none"> • Any physical damage in equipment 	Ok / Not Ok

Make the sketch drawing of actual telecom room layout if any variance.



4. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-02: Station power supply input and equipment power supply (DC-DC converter) output voltage measurements

Equipment Under Test: FO EQUIPMENTS (SDH) & TERMINATION EQUIPMENT SUB- SYSTEM

Test Parameter : Station power supply input and equipment power supply (DC-DC converter) output voltage measurements

1. Test Descriptions

To check the station Power Supply Voltage and the PDP output Voltage is within the given range.

2. Test Procedure

Check the i/p voltage at PDP.

Check the o/p voltage at PDP.

3. Test Equipment Required

- Digital Multimeter

4. Test Results Records

Test Parameters	Test Criteria	Test Results
i/p Voltage at PDP	i/p voltage should be in the range of -42V to -55V	Ok / Not Ok
o/p Voltage at PDP	o/p voltage should be in the range of -42V to -55V	Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-03: Terminal transceiver performance testing (Tx power, Receive Signal Strength)

Equipment Under Test : FO EQUIPMENTS (SDH)

Test Parameter : Terminal transceiver performance testing (Tx power, Receive signal strength)

1. Test Descriptions

To check the Tx Power, Receiving Signal Strength is within the given range.

2. Test Procedure

Tx Power Measurement

- Connect the output port (Tx) of the tested optical interface card to the optical power meter.
- Turning the optical power meter to the specified wavelength.
- Measure the Tx output power level in dBm.
- Record the result showing on the optical power meter.

Receiving Signal Strength

- Connect the output port (Rx) of the tested optical interface card to the optical power meter.
- Turning the optical power meter to the specified wavelength.
- Measure the Rx input power level in dBm.
- Record the result showing on the optical power meter.

3. Test Equipment Required

- Digital Optical Power Meter

4. Test Results Records

Tx Power Measurement:

Sr. No.	Node / Station	Sr.No.	Optical Interface Type (As per Approved BoQ)	Minimum (dBm)*	Maximum (dBm)*	Actual (dBm)
1						
2						
3						

4						

*As per Approved DRS

The measured optical output power should be within the limits as expressed in the table given above.

Receiving Signal Strength:

Sr. No.	Node / Station	Sr.No.	Module Type (As per Approved BoQ)	Receiver Signal Strength (dBm)*	Actual (dBm)
1					
2					
3					

The measured receiver power should be within the limits as expressed in the table given above.

* As per Approved DRS

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-04: Services Channel performance Test

Equipment Under Test : FO EQUIPMENTS (SDH)

Test Parameter : Services Channel Performance Test

1. Test Descriptions

To identify the correct operation of the services channels used for the EOW phones.

2. Test Procedure

- Connect the EOW phone to services channel.
- Make a call from EOW phone to any station at other end (as per EOW numbering plan)
- Check the quality of voice.
- Make a Omnibus call to different sites and check

3. Test Results Records

EOW telephone works well, conversation quality is satisfactory.

Selective calling :Ok / Not ok

Omnibus calling :Ok / Not ok

4. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-05: Craftsperson Interface, Alarm and Control Functional Performance

Equipment Under Test : FO EQUIPMENTS (SDH) & TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Craftsperson interface, alarm, and control functional performance

1. Test Descriptions

Functions of LCT:

Change configuration

Get alarm of any fault

Get performance information

To simulate defects by using the measurement equipment and LCT

Performance monitoring

Loopback

2. Test Equipments Required

- LCT
- BER Tester

3. Test Procedure

Connect the LCT to equipment under test through management port.

- Ensure the equipment under test is working.
- Login the LCT.
- Change some configurations of the equipment,
- Get the fault information from the equipment.
- Get and browse the performance data of the equipment.
- Change configurations of another station indirectly, get its fault information and performance data.

Loop back test

- Apply a software loop on remote end E1 channel through LCT.
- Test the loop back with E1 tester on local end.
- Record the result there should be no error during this period.

4. Test Results Records

Test item	Ok / Not Ok
LCT is able to change the configuration of the connected NE.	
LCT can get fault information from the connected NE.	
LCT can get performance data from the connected NE.	
LCT is able to change the configuration of any NE in the network.	
LCT can get fault/ alarm information from the unconnected NE.	
LCT can get performance data from the unconnected NE.	
Check for connection of NMS and LCT on the network at the same time	
Check for remote loopback, local loopback	
Check for cross connection	
Test the loop back with E1 tester on local end	
Record the result there should be no error during this period	

Alarms should be indicated on LCT and equipment when there is some failure. Equipment can be configured by LCT.

Performance data can be monitored on LCT.

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-06: Rack and Local Alarms

Equipment Under Test : FO EQUIPMENTS (SDH) & TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Rack and local alarms: No alarms shall be present, and all alarms shall be demonstrated to be functional.

1. Test Descriptions

To check the Rack alarm and Local alarms are correctly reflects on Equipment and LCT.

Rack Alarm

- Urgent Alarm's
- Non-Urgent alarm's
- No Alarm

Local Alarms on LCT FO System

- LOS on optical port
- LOS on 2Mbit/s Port
- Card failure by pulling out some cards

Termination Equipments

- AIS (RDI)
- E1_LOF
- E1_LOS

2. Test Equipments Required

- LCT

3. Test Procedure**Rack Alarm**

- 1) Disconnect one of the optical Rx port. There should be Urgent alarm of SDH Sub- Rack.
- 2) Restore the optical RX port, then there should be no alarm on SDH Sub-Rack
- 3) Remove the 2Mbps cable from the DDF (Should be working 2M), there should be Urgent alarm on SDH Sub-Rack.
- 4) Connect the 2Mbps cable on DDF, the Urgent alarm should be cleared.

Local alarm on LCT

For LOS/LOF on SDH System

- Connect the LCT to the SDH and PDH equipment one by one.
- Pull out the optical card of SDH Equipment, check the alarm display.
- Pull out the Tributary card of SDH and PDH equipment, check the alarm display.
- Pull out the E1 link from SDH and PDH equipments, check the alarm display.
- Verify the SDH and PDH equipment is configurable by LCT.
- Verify the performance monitoring on LCT.

4. Test Results Records

Rack alarm

S.No.	Test item (SDH)	Test result
1	Urgent Alarm appearing in fault conditions	Ok / Not Ok
2	Non-Urgent Alarm appearing in fault conditions	Ok / Not Ok
3	No alarms (during Normal operation)	Ok / Not Ok

Local alarm on LCT

Alarms should be indicated on LCT and equipment when there is fault condition.

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-07: Network management interface and supervision performance

Equipment Under Test : FO EQUIPMENTS (SDH) & TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Network management interface and supervision performance

1. Test Descriptions

To check the Communication between NMS and Gateway NE through management interface. Test will be carried out to check the following parameters.

- Configuration
- Loopback Testing
- Laser Testing
- Alarm reporting
- Performance monitoring

2. Test Equipments Required

- NMS System
- BER Tester

3. Test Procedure

- Login to the equipment through management port.
- STM-4 / 16 Line loop back in software
- E1 Loop back in software and check on BER tester.
- Laser switches off/on through software
- Monitor optical power.
- Display of alarms
- Performance event collection like ES, SES, BBE for 15Min

4. Test Results Records

Verify all the above listed test procedures is working ok	: Ok / Not Ok
NMS can configure and supervise the whole network	: Ok/ Not Ok
Diagnostics is possible on NMS	: Ok / Not Ok
Alarms should be displayed if there is any failure	: Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-08: Correct configuration, level setting & adjustments and termination of Input/ output interfaces

Equipment Under Test : FO EQUIPMENTS (SDH)

Test Parameter : Correct configuration, level setting & adjustments and termination of Input/ output interfaces

1. Test Descriptions

To check the Equipment configuration is according to approved Configuration plan. To check the Input/output termination of Optical and Electrical cables are according to approved scheme.

2. Test Equipments Required

- LCT
- Approved Optical and 2Mbps distribution Diagrams.

3. Test Procedure

- Connect the LCT to the SDH equipment through f interface.
- Ensure the SDH equipment is working.
- Login the LCT.
- Check the equipment configuration.
- Check the Termination of Input and Output cables.
- Check different level settings in the SDH Equipment.

4. Test Results Records

Configuration, level setting adjustment and termination should comply with the approved documents : Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:
(Manufacturer/Contractor)

Witnessed By:
(PrKTCL)

Date:

Date:

TPS-09: Proper establishment of Safety and signalling earthing system and resistance to ground to be checked.

Equipment Under Test : FO EQUIPMENTS (SDH) & TERMINATION SUB-SYSTEM

Test Parameter : Proper establishment of Safety and signaling earthing system and resistance to ground to be checked.

1. Test Descriptions

To check the Earthing cable Terminations To check the Earth resistance.

2. Test Equipments Required

- Clamp Earth Tester

3. Test Procedure

- Check that all the earthing connections are terminated on the earth bus bar are tightened.
- All equipments are connected with Earth bus bar
- Colour of the Earth cable is yellow-green or green
- Measure the Earth resistance Clamp Earth Tester
- Check the wrist strap is available at each station

4. Test Results Records

Earthing connections are properly done : Ok / Not Ok

Earth resistance measured is less than 10 Ω : Ok/ Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-10: Simulation of failure conditions and failover of protected components.

Equipment Under Test : FO EQUIPMENTS (SDH)

Test Parameter : Simulation of failure conditions and fail over of protected components.

1. Test Descriptions

To check the Failure conditions and protection components for following cards:

- Control Cards
- Optical Cards

2. Test Equipments Required

- BER Tester

3. Test Procedure**Control Card**

- Control cards work on 1+1 protection. 1 protection card for 1 workingcard.
- Make the equipment work on normal status.
- Pull out the working Control card.
- The protection Control card should take over, and traffic should be restored.

Optical Card

- Optical cards work on 1+1 protection. 1 protection card for 1 workingcard.
- Make the equipment work on normal status.
- Pull out the working Optical card.
- The protection STM-4 /16 card should take over, and traffic should be restored.

For both the cards make software loop on any E1 and put in the BER testing mode. Check that during both the test the traffic is restored automatically.

4. Test Results Records

Traffic restored automatically even if one.

Control card and Optical card terms Faulty : Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-11: Craftsperson interface, alarm, and control functional performance

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Craftsperson interface, alarm, and control functional performance (MUX and DACS)

1. Test Descriptions

Functions of LCT:

Change configuration Get alarm of any fault.

Get performance information.

To simulate defects by using the measurement equipment and LCT

Performance monitoring

Loopback

2. Test Equipments Required

- LCT
- BER Tester

3. Test Procedure

Connect the PDH Equipment with LCT.

- Connect the LCT to the PDH equipment.
- Ensure the PDH equipment is working.
- Login the LCT.
- Change some configurations of the equipment,
- Get the fault information from the PDH equipment.
- Get and browse the performance data of the equipment.
- Change configurations of another station indirectly, get its fault information and performance data.

Loop back test

- Apply a software loop on any E1 channel thro LCT.
- Test the loop back with E1 tester.

4. Test Results Records

Test item	Ok/Not Ok
LCT is able to change the configuration of the connected NE.	
LCT can get fault information from the connected NE.	
LCT can get performance data from the connected NE.	
LCT is able to change the configuration of any NE in the network.	
Check for remote loopback, local loopback	
Check for branching connection	

Alarms should be indicated on LCT and equipment when there is some failure.

Equipment can be configured by LCT.

Performance data can be monitored on LCT.

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-12: Simulation of failure conditions and failover of protected components

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Simulation of failure conditions and failover of protected components (MUX)

1. Test Descriptions

To check the Failure conditions and protection components for following cards Power supply card

2. Test Equipments Required

- BER Tester

3. Test Procedure

- Power Cards work on 1+1 protection. 1 protection card for 1 working card.
- Make the equipment work on normal status.
- Pull out the working power card.
- The protection power card should take over, and traffic should be restored.

For this test make software loop on any data channel and put in the BER testing mode. Check that during test the traffic is restored automatically.

4. Test Results Records

Traffic restored automatically even if one
Power card terms Faulty : Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-13: Channel performance Tests (PDH)

Equipment Under Test : TERMINATION EQUIPMENT SUB SYSTEM

Test Parameter : Channel Performance Test (MUX)

1. Test Descriptions

To check the channel performance of interface cards as below:

- FXO/FXS voice cards
- VF E&M 4w Cards
- Async. Data card

2. Test Equipments Required

- BER Tester
- Telephone Instrument
- VF Tester

3. Test Procedure**For FXO/FXS Voice cards**

- Connect the Telephone Instrument at station under test and any remote station
- Make a telephone call to remote station.
- Check the quality of Voice.

For 4 w VF E&M cards

- Connect the VF Tester to channel under test.
- Give the loop back at remote station.
- Send the frequency of 1 Khz, Level 4 db thro VF Tester
- Measure the return frequency and level.
- Results should be same with $\pm 5\%$ variation.
- Perform the test on 30% of all channels.

For Async. Data channel card

- Connect the BER tester to channel under test.
- Give the loop back at remote end of the channel.
- Measure the BER for 5 min.
- There should be no error during this period.
- Perform the test on 30% of all channels.

4. Test Results Records

For FXO/FXS cards

Card Serial No.:

Call can be established between two stations : Ok / Not Ok

Voice Quality is Good : Ok / Not Ok

For 4w VF E&M Cards

Card Serial No.:

Channel No	Tx Frequency (KHz) / Level (db)	Rx Frequency (KHz) / Level (db)	Test Status
1	1 KHz / 4 db		Ok / Not Ok
2	1 KHz / 4 db		Ok / Not OK
3	1 KHz / 4 db		Ok / Not OK
4	1 KHz / 4 db		Ok / Not OK

Card Serial No.:

Channel No	Tx Frequency (KHz) / Level (db)	Rx Frequency (KHz) / Level (db)	Test Status
1	1 KHz / 4 db		Ok / Not OK
2	1 KHz / 4 db		Ok / Not OK
3	1 KHz / 4 db		Ok / Not OK
4	1 KHz / 4 db		Ok / Not OK

For Async. data channel card

Card Serial No.:

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok

Card Serial No.:

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-14: Network management interface and supervision performance

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Network management interface and supervision performance (MUX and DACS)

1. Test Descriptions

To check the Communication between NMS and Gateway NE through Management interface.

Test will be carried out to check the following parameters.

- Configuration
- Loopback Testing
- Alarm reporting
- Performance monitoring

2. Test Equipments Required

- NMS system
- BER Tester

3. Test Procedure

- Login to the equipment through management interface.
- E1 Loop back in software and check on BER tester
- Display of alarms
- Check the MUX board Configuration
- Perform the operation of branching the Timeslots
- Performance event collection

4. Test Results Records

Verify all the above listed test procedures is working ok : Ok / Not Ok

NMS can configure and supervise the whole network : Ok/ Not Ok

Diagnostics is possible on NMS : Ok / Not Ok

Alarms should be displayed if there is any failure : Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-15: Muldem performance testing (MUX)

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Muldem performance testing (MUX)

1. Test Descriptions

To check the multiplexing and de-multiplexing is properly happening in MUX Equipment.

2. Test Equipments Required

- BER Tester
- VF Tester

3. Test Procedure

Loop back the main 2mbps transmission Signal of E1 card. Connect the BER Tester to any data channel of same MUX Check the loop back

Follow the following procedure for different data channels

For 4w VF E&M cards

- Connect the VF Tester to channel under test
- Send the frequency of 1 KHz, Level 4 db thro VF Tester
- Measure the return frequency and level
- Results should be same with $\pm 5\%$ variation

For Async. Data channel card

- Connect the BER tester to channel under test
- Measure the BER for 5 min.
- There should be no error during this period.

4. Test Results Records

Multiplexing and Demultiplexing is happening properly in MUX equipment : Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-16: Simulation of failure conditions and failover of protected components (DACS)

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Simulation of failure conditions and failover of protected components (DACS)

1. Test Descriptions

To check the Failure conditions and protection components for following cards:

Power supply card
Control card

2. Test Equipments Required

- BER Tester

3. Test Procedure

- Power Card and Control Card work on 1+1 protection. 1 protection card for 1 working card.
- Make the equipment work on normal status.
- Pull out the working power card.
- The protection power card should take over, and traffic should be restored.
- Pull out the working Control card
- The protection Control card should take over, and traffic should be restored.

For this test make software loop on any E1 channel on and put in the BER testing mode. Check that during test the traffic is restored automatically.

4. Test Results Records

Traffic restored automatically even if one.

Power card terms Faulty	:	Ok / Not Ok
Control card terms Faulty	:	Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS17: Channel Performance Tests (DACS)

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : Channel Performance Test (DACS)

1. Test Descriptions

To check the channel performance of interface cards as below

- Tributary Card
- Cross connect card

2. Test Equipments Required

- BER Tester

3. Test Procedure**For Tributary Card**

- Connect the BER tester to E1 channel under test.
- Give the local software loop back to the channel.
- Measure the BER for 5 min.
- There should be no error during this period.
- Perform the test for 30% of total E1 channels.

For Cross connect card

- Connect the BER tester to any 64kbps data channel configured between any remote station and station under test.
- Give the Remote Loop back.
- Check the cross connection is properly done in DACS using LCT.
- Check the BER
- In case of 64K VF channel
- Send the frequency of 1 KHz, Level 4 db thro VF Tester
- Measure the return frequency and level.
- Results should be same with $\pm 5\%$ variation.

4. Test Results Records**For Tributary Card**

Card Serial No.:

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok
5		Ok / Not Ok

For Cross connect card

Card Serial No.:

Channel Performance of Cross Connect Card : Ok / Not Ok

5. Test Remarks

Equipment Under Test:**Test Date and Time:****Site Name:****Tested By:**

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:**Date:**

TPS-18: Physical inspection for conformance to drawings, rack elevations and appearance of equipment and cabling of NMS System Workstation hardware inventory, configuration, and characteristics of NMS System

Equipment Under Test : NMS System (incl. all associated HW & SW supplied with the complete system)

Test Parameter : Physical Inspection for conformance to drawings, rack elevations and appearance of equipment and cabling Hardware & Software Inventory, Configuration, and characteristic.

1. Test Descriptions

To identify correctly given equipment and verify the hardware configuration and make the equipment ready for software configuration and commissioning.

2. Test Procedure

- Check the hardware configuration as per the configuration drawing.
- Check the installation whether it is as per the site layout drawing.
- Check the workmanship and accuracy of the installation and cabling.
- Check for physical damage.
- Check the Hardware & software inventory as per approved DRS & BOQ documents.

3. Test Results Records

Make the sketch drawing of actual NMS room layout if any variance.



No Physical Damage	: Ok / Not Ok
Hardware & Software Inventory as per approved DRS & BOQ	: Ok / Not Ok
Hardware Configuration as per approved DRS & BOQ	: Ok / Not Ok

4. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:
(Manufacturer/Contractor)

Witnessed By:
(PrKTCL)

Date:

Date:

TPS-19: Demonstration of proper operation of all hardware, including workstations peripherals of NMS System

Equipment Under Test : NMS SYSTEM

Test Parameter : Demonstration of proper operation of all hardware, including workstations peripherals of NMS System

1. Test Descriptions

To identify all the hardware including Workstations and its peripheral devices operates correctly.

2. Test Procedure

- 2.1. Check the Workstations are connected with all the peripheral devices as per the BOQ
- 2.2. Power On the Workstation and devices.
- 2.3. Check the operation of all devices.

3. Test Results Records

All hardware associated with NMS are working properly : Ok / Not Ok

4. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

4.2 SAT-II

TPS-20: Ethernet Channel Testing (SDH)

Equipment Under Test : SDH Equipment along with Ethernet Interface Unit

Test Parameter : Throughput, Latency, Packet Loss Measurement and Ping test of Ethernet Interface

1.0 TEST DESCRIPTION

To verify that Ethernet card is in compliance with the specifications of IEEE 802.3/RFC-2544 standards.

2.0 TEST EQUIPMENT

1. Ethernet Analyzer
2. Local Craft Terminal (LCT)
3. Low loss optical patch cord & LAN cable

3.0 TEST PROCEDURE

1. Connect the SDH nodes Node-A & B with LCT.
2. At Node-A and B, Configure WAN bandwidth of the Ethernet interface as per channel plan.
3. Connect the Ethernet Analyzer to LAN port of SDH equipment with UTP cable. Set the LAN port to Auto Negotiate mode.
4. At Node-B, set the Ethernet Analyzer in Layer-2 loop back mode.
5. At Node-A, start the RFC 2544 test in the Ethernet analyzer, set the test parameters for throughput, latency and packet loss test, set the frame length to 1518 bytes.
6. Measure the throughput, latency & packet loss.
7. All links will be tested for 1 min.

4.0 Test Result Record

A. Throughput

Anticipated result		Actual result
Bandwidth	Throughput	
2Mbps	As per applicable RFC-2544 Standard	
6 Mbps	As per applicable RFC-2544 Standard	
10 Mbps	As per applicable RFC-2544 Standard	

The throughput of the Ethernet card should not be less than the bandwidth configured.

B. Latency

Anticipated result		Actual result
Bandwidth	Latency	
2 Mbps	As per applicable RFC-2544 Standard	
6 Mbps	As per applicable RFC-2544 Standard	
10 Mbps	As per applicable RFC-2544 Standard	

The actual latency should be less than the value tolerated in the worst case.

C. Packet Loss

Anticipated result		Actual result
Bandwidth	Packet loss ratio	
2 Mbps	As per applicable RFC- 2544Standard	
6 Mbps	As per applicable RFC-2544 Standard	
10 Mbps	As per applicable RFC-2544 Standard	

The actual frame loss ratio should be less than the value tolerated in the worst case.

D. Ping Test

Connect the laptop to Ethernet port under test at both the nodes. Run the ping test

Test Result:

Both laptops ping each other thro Ethernet Channel : Ok / Not Ok

There should be No Packet Loss :Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-21: Measurement of BER For SDH Link

Equipment Under Test : FO EQUIPMENTS (SDH)

Test Parameter : Bit Error measurements

1. Test Descriptions

To check the BER Measurements for End-to-End links for SDH Equipment.

2. Test Equipments Required

- LCT
- BER Tester

3. Test Procedure

- Configure an E1 channel from remote end to local end.
- Apply a software loop on remote end E1 channel through LCT.
- Test the loop back with E1 tester on local end for 1 hours/12 hours as required @10% of the link will be test for 12 hours.

Note: -

1. All BER have to be done for only 1 hour except for 10% of the link (12 hours).

4. Test Results Records

Test item	Ok/ Not Ok
The test results recorded there should be no error during this period as per ITU-T recommendation G.821	

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-22: Delay measurement

Equipment Under Test : FO EQUIPMENTS (SDH) Test

Parameter : Delay measurements

1. Test Descriptions

To Measure the transmission delay in the path of the network for SDH Equipment.

2. Test Equipments Required

- LCT
- BER Tester

3. Test Procedure

- Configure an E1 channel from remote end to local end.
- Apply a software loop on remote end E1 channel through LCT.
- Test the loop back with E1 tester on local end.
- Once there is no alarm in tester, open the delay measurement and simulate test.
- Total delay in the path is measured and displayed.

4. Test Results Records

Test item	Measured value	Ok / Not Ok
Delay measurement should not be more than 50 msec		

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

4.3 SAT-III

TPS-23: End to End testing of Voice circuits.

Equipment Under Test : FO EQUIPMENTS (SDH) & TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : End to End testing of Voice circuits.

1. Test Descriptions

To check the individual voice circuits originating from PLCC, PABX or phones are working properly.

2. Test Procedure

- Make a phone call to all configured voice circuits from the station under test.
- Check the call initiation, Quality of Voice and Call termination is happening properly.

3. Test Results Records

Call initiation is proper	: Ok / Not Ok
Quality of Voice is good	: Ok / Not Ok
Call Termination is proper	: Ok / Not Ok

4. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:
(Manufacturer/Contractor)

Witnessed By:
(PrKTCL)

Date:

Date:

TPS-24: Testing of NMS Functionality

Equipment Under Test : FO EQUIPMENTS (SDH) and EXISTING TERMINATION EQUIPMENT
SUB-SYSTEM (PDH & DACS)

Test Parameter : End to End testing of Voice and Data circuits of Existing System

1. Test Descriptions

To check all Data and Voice circuits originating from RTU, PLCC, PABX or phones are working properly.

2. Test Procedure

- Make a phone call to Existing configured voice circuits from the station under test.
- Check the call initiation, Quality of Voice and Call termination is happening properly.
- Check the Existing Data are reporting to corresponding Sub-LDC and SLDC.

3. Test Results Records

Call initiation is proper : Ok / Not Ok
 Quality of Voice is good : Ok / Not Ok
 Call Termination is proper : Ok / Not Ok
 Data reporting is proper : Ok / Not Ok

4. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-25: Protection Switching and Synchronization of Equipment

Equipment Under Test : NMS System

Test Parameter : Demonstration of the standard features of the NMS System

1. Test Descriptions

To verify that the entire standard features of NMS System are working properly as per technical specifications requirements.

2. Test Parameters

- Configuration Management
- Performance Management
- Fault Management
- Security Management

3. Test Procedure**CONFIGURATION MANAGEMENT**

- Connect the TNMS system with the management interface of SDH equipment by using Ethernet cable.
- Ensure the SDH equipment is working.
- Login NMS as user of advanced level.
- Check the NMS whether it can establish and maintain the network topology.
- Check the NMS whether it provides the tools for planning, establishing and changing the static equipment configuration, this item can be conducted by changing some parameters & cross connection of the SDH equipment.
- Check the NMS whether it provide verification testing to support new equipment installation, this can be tested by adding a new NE.
- For creating the cross connection, establish the cross connection between any of the two ports in the same or different card.

FAULT MANAGEMENT

- Display Equipment Status, display graphical, topological & Map type and display the use of colour on links and Nodes.

Connect the TNMS system with the management interface of SDH equipment by using Ethernet cable.

- Ensure the SDH equipment is working.
- Login NMS as user of advanced level.
- Generate the various alarms; check the NMS for relevant alarm status.
- For example, pull out one card from SDH sub-rack, check the NMS for alarm of that fault.
- Insert the card, and then the alarm disappears.
- Check the alarm history, which includes all alarm events.
- Check the capability of alarm retrieval filter. Change the setting and retrieve.
- Check the colors for different level alarm events.
- Print alarm report.

SECURITY MANAGEMENT

- Connect the TNMS system with the management interface of SDH equipment by using Ethernet cable.
- Ensure the SDH equipment is working.
- Login as Administrator
- Add a user and define the user profile.
- Login as user and verify that user is able to perform various tasks as per profile.

PERFORMANCE MANAGEMENT

- Connect the TNMS system with the management interface of SDH equipment by using Ethernet cable.
- Ensure the SDH equipment is working.
- Configure a E1 interface and run performance management for specified interval.
- Monitor events & thresholds.
- Generate reports on daily, weekly, monthly and yearly basis containing system statistics.

LCT FUNCTIONALITY TEST

- Connect the LCT to the SDH equipment through LCT interface.
- Ensure the SDH equipment is working.
- Login the LCT.
- Change some configurations of the equipment.
- Get the fault information from the SDH equipment.

4. Test Results

Sr. No.	Test Description	Results (OK / Not OK)
1.0	CONFIGURATION MANAGEMENT	
1.1	Capability to establish and maintain the backbone topology.	
1.2	Capability to provide graphical maps depicting the sub-rack configurations.	
1.3	Capability to plan, establish and change the static equipment configuration.	
1.4	Verification testing to support new equipment installation.	
1.5	Cross-connect capability between any of the two ports in same or different card.	
2.0	FAULT MANAGEMENT	
2.1	After generating an alarm, it is automatically displayed.	
2.2	Alarm has been shown automatically when there is card failure.	
2.3	NMS can maintain an alarm summary of unacknowledged current alarm.	
2.4	NMS can maintain an alarm history.	
2.5	Operator can acknowledge and clear alarms.	
2.6	Alarm retrieval filter is available.	
2.7	Alarms can be classified and configured as critical alarms, major alarms and minor alarms, in different colors.	
2.8	Alarm reports can be extracted.	
3.0	SECURITY MANAGEMENT	
3.1	Security Management functionality allows user addition and user profile definition.	
4.0	PERFORMANCE MANAGEMENT	
4.1	Performance Management can be enabled for specific interface.	
4.2	The Measurement interval can be selected.	
4.3	Monitor events & thresholds.	
4.4	Generate reports on daily, weekly, monthly, and yearly basis containing system statistics.	
5.0	LCT Functionality Test	
5.1	LCT can get fault information from the connected SDH node.	
5.2	LCT is able to change the configuration of the connected SDH node.	
5.3	LCT is able to change the configuration of connected SDH node.	

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:

Date:

TPS-26: End to End Data Channel Testing.

Equipment Under Test : TERMINATION EQUIPMENT SUB-SYSTEM

Test Parameter : End to End Data Channel testing.

1. Test Descriptions

To check the channel performance of interface cards as below:

- FXO/FXS voice cards
- VF E&M 4w Cards
- Async. Data card

2. Test Equipments Required

- BER Tester
- Telephone Instrument
- VF Tester

3. Test Procedure**For FXO/FXS Voice cards**

- Connect the Telephone Instrument at station under test and any remote station.
- Make a telephone call to remote station.
- Check the quality of Voice.

For 4 w VF E&M cards

- Connect the VF Tester to channel under test.
- Give the loop back at remote station.
- Send the frequency of 1 KHz, Level 4 db thro VF Tester
- Measure the return frequency and level.
- Results should be same with $\pm 5\%$ variation.
- Perform the test on 30% of all channels.

For Async. Data channel card

- Connect the BER tester to channel under test.
- Give the loop back at remote end of the channel.
- Measure the BER for 5 min.
- There should be no error during this period.
- Perform the test on 30% of all channels.

4. Test Results Records

For FXO/FXS cards

Card Serial No.:

Call can be established between two stations : Ok / Not Ok

Voice Quality is Good : Ok / Not Ok

For 4w VF E&M Cards

Card Serial No.:

Channel No	Tx Frequency (KHz) / Level (db)	Rx Frequency (KHz) / Level (db)	Test Status
1	1 KHz / 4 db		Ok / Not Ok
2	1 KHz / 4 db		Ok / Not OK
3	1 KHz / 4 db		Ok / Not OK
4	1 KHz / 4 db		Ok / Not OK

Card Serial No.:

Channel No	Tx Frequency (KHz) / Level (db)	Rx Frequency (KHz) / Level (db)	Test Status
1	1 KHz / 4 db		Ok / Not OK
2	1 KHz / 4 db		Ok / Not OK
3	1 KHz / 4 db		Ok / Not OK
4	1 KHz / 4 db		Ok / Not OK

For Async. data channel card

Card Serial No.:

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok

Card Serial No.:

Channel No.	BER	Test Status
1		Ok / Not Ok
2		Ok / Not Ok
3		Ok / Not Ok
4		Ok / Not Ok

5. Test Remarks

Equipment Under Test:

Test Date and Time:

Site Name:

Tested By:
(Manufacturer/Contractor)

Witnessed By:
(PrKTCL)

Date:

Date:

TPS-27: Interfacing with Existing Communication System

Equipment Under Test	: FO EQUIPMENTS (SDH) & TERMINATION EQUIPMENT SUB- SYSTEM
Test Parameter	: Protection Switching and Synchronization of Equipment
Pre-requisite	: All the synchronization clock & associated items installed as per approved Synchronization plan

1. Test Descriptions

- a) To check the Failure conditions and protection switching is working properly for all protections on Control cards, Optical Cards (protection switching for ring network wherever applicable).
- b) To check the Failure conditions and protection switching is working properly for protections of Optical Cards/interfaces in ring network wherever applicable.
- c) To check the Synchronization of the Equipment is as per the approved Sync. Plan.

2. Test Equipments Required

- BER Tester

3. Test Procedure**Control Card**

- Control cards work on 1+1 protection. 1 protection card for 1 working card.
- Make the equipment work on normal status.
- Pull out the working Control card.
- The protection Control card should take over, and traffic should be restored.

Optical Card

- Optical cards work on 1+1 protection. 1 protection card for 1 working card.
- Make the equipment work on normal status.
- Pull out the working Optical card.
- The protection Optical card should take over, and traffic should be restored.

For both the cards make software loop on any data/E1 channel at remote end and put in the BER testing mode. Check that during both the test the traffic is restored automatically.

Synchronization

- Check the Synchronization Cabling/connection is as per approved Sync. Plan.
- Check the sync. Priority switching on protected path through LCT/NMS.

4. Test Results Records

- | | |
|--|---------------|
| a) Traffic restored automatically even if one Control and Optical card terms Faulty | : Ok / Not Ok |
| b) No Clock failure alarm during the protection switching | : Ok / Not Ok |
| c) Check Synchronization cabling/connection/Configuration. is as per the approved Synchronization Plan | : Ok / Not Ok |
| d) Check the sync. Priority switching on protected Path through LCT/NMS | : Ok / Not Ok |

5. Test Remarks

Equipment Under Test:**Test Date and Time:****Site Name:****Tested By:**

(Manufacturer/Contractor)

Witnessed By:

(PrKTCL)

Date:**Date**