

## **FACTORY ACCEPTANCE TEST PROCEDURE**

**(Network Management System)**

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## 1.0 FAT SAMPLING:

The sampling rate for the Factory Acceptance Test (FAT) shall be 10% of the batch size (minimum 1) for all the items. The physical verification shall be carried out on 100% of the offered quantities. In case any sample fails, the failed sample will be rejected, and an additional 20% samples will be selected randomly and tested. In case any sample from the additional 20% also fails the entire batch may be rejected. In case a number of equipments are required for demonstration of the performance of any equipment during FAT, the sample size shall be taken as that number of equipments which are necessary to demonstrate the performance, irrespective of the percentage.

## 2.0 ABBREVIATIONS

AC	Alternate Current
BER	Bit Error rate
DACS	Digital Access Cross Connect Switch
DC	Direct Current
DCN	Data Communication Network
EXCH	Exchange
FAT	Integrated Factory Acceptance Test
FDS	Functional Design Specification
FTC	Fiber Termination Closure
GPS	Global Positioning System
LCT	Local Craft Terminal
NMS	Network Management System
PDH	Plesiochronous Digital Hierarchy
SDH	Synchronization Digital Hierarchy
STM	Synchronous Transport Module

### **TPS-TMN-001: Physical Inspection**

Equipment Under Test : To Physically verify Hardware & Software as per BOQ, DRS & Drawings

Test Parameters : Verification for NMS Hardware & Software

#### **Test Description**

The aim of this test is to verify hardware & software with respect to BOQ & DRS. Check & record the hardware and software configuration and also check for any physical impairment.

#### **Reference Documents**

- BOQ

#### **Test Procedure and Expected Result**

- Verify the hardware configuration and Qty. with respect to approved DRS, BOQ & Drawings
  - Tabulate results as under Section. 4.1 to 4.4
- Check the software details and License
  - Tabulate results as under Section 4.5 & 4.6.
- Check the physical damage.
  - Tabulate results as under Section 4.7

#### **Test Result Record**

Sr. No.	Check Point	Acceptance Criteria	Quantity	Remarks
4.1	SDH NMS Hardware Configuration	As per Approved DRS	As per Approved BOQ	Ok/Not Ok
4.2	SDH Client Hardware Configuration	do	do	Ok/Not Ok
4.3	PDH NMS Hardware Configuration	do	do	Ok/Not Ok
4.4	PDH Client Hardware Configuration	do	do	Ok/Not Ok
4.5	SDH NMS Software and Licenses	do	do	Ok/Not Ok
4.6	PDH NMS Software and Licenses	do	do	Ok/Not Ok
4.7	Physical Damage to the Server and Client PC and LCT	do	do	Ok/Not Ok

**Status**

( ) Tested - OK : \_\_\_\_\_

( ) Tested - Failed : \_\_\_\_\_

**Remarks**

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**Tested By:**

**(Manufacturer)**

**Date:**

**Witnessed By:**

**(PrKTCL)**

**Date:**

**TPS-TMN-002 A: Testing of NMS (SDH) to demonstrate proper operation of all functions.**

**Equipment Under Test** : SDH Network Management System & LCT

**Test Parameters** : NMS & LCT Functionality Test

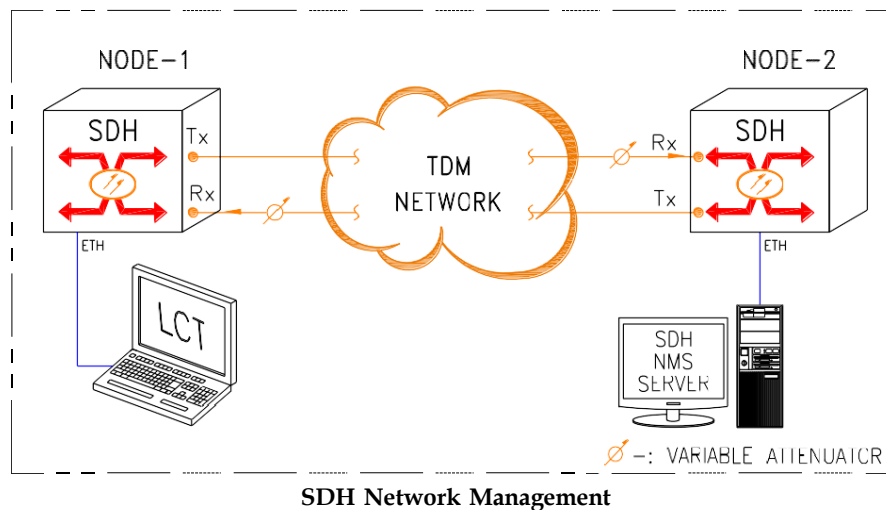
**TEST DESCRIPTION**

The purpose of this test is to confirm proper operation of network management system (NMS) and Local Craft Terminal (LCT) for SDH system as indicated below.

**TEST EQUIPMENT**

- SDH Network Management System (TNMS)
- Local Craft terminal (LCT)
- SDH Analyzer
- Cables and accessories

**TEST SETUP**



**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 provides 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.

#### TEST RESULT

Sr. No.	Test Description	Results (OK/Not OK)
<b>1.0</b>	<b>CONFIGURATION MANAGEMENT</b>	
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.	
<b>2.0</b>	<b>FAULT MANAGEMENT</b>	
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.	
<b>3.0</b>	<b>SECURITY MANAGEMENT</b>	
3.1	Security Management functionality allows user addition and user profile definition.	



4.0	<b>PERFORMANCE MANAGEMENT</b>	
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	<b>LCT Functionality Test</b>	
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.	

**Status**

( ) Tested – OK \_\_\_\_\_

( ) Tested – Failed \_\_\_\_\_

**Remarks**


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**Tested By:****(Manufacturer)****Witnessed By:****(PrKTCL)****Date:****Date**

**TPS-TMN-002 B: Testing of NMS (MUX & DACS) to demonstrate proper operation of all functions**

**Equipment Under Test** : PDH Network Management System

**Test Parameter** : NMS Functionality

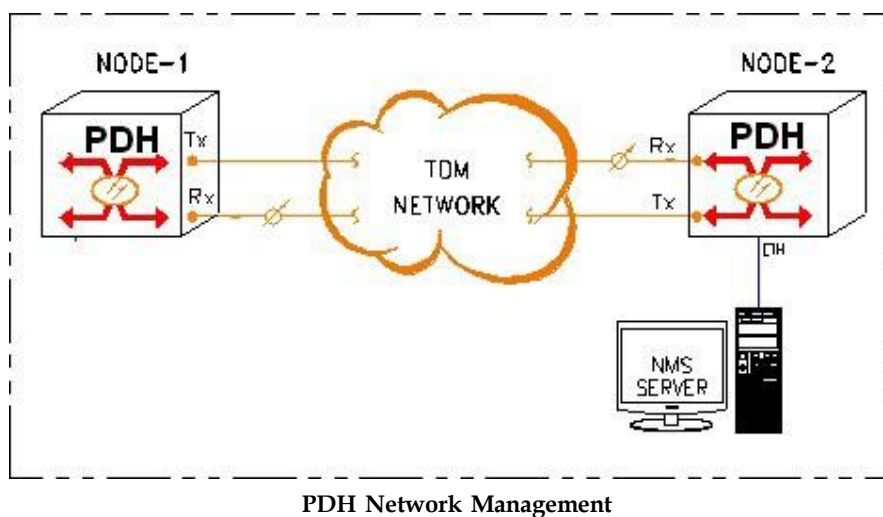
**Test Description**

The purpose of this test is to confirm proper operation of Network Management System supplied for managing the PDH network.

**Test Equipment and Accessories**

Sr.No	Test Accessories	Type	Quantity	Remarks
1	NMS	PC	1	

**Test Set-up**



**Test Procedure**

**Configuration Management**

- Connect the NMS system with the management interface of PDH equipment by using Ethernet cable.
- Ensure the PDH equipment is working.
- Check the NMS whether it supports addition & deletion of New NE.
  - It is possible to add a new NE to the existing network and delete it

- Tabulate the results as under Section 6.1.1
- Login to the NMS as a user with administrative privileges.
  - The NMS can establish connections and maintain the network topology.
  - Tabulate the results as under Section 6.1.2
- Check the NMS whether it provides the tools for planning, establishing and changing the static equipment configuration,
  - It is possible to change system parameters & modify cross connection of the PDH equipment.
  - Tabulate results as under Section 6.1.3 to Section 6.1.5
- Check if the NMS is able to manage the PDH NE's.
  - It is possible to manage NE's.
  - Tabulate the results as under Section 6.1.6

### **Fault Management**

- Login to the NMS as a user with administrative privileges.
- Generate various alarms on the PDH Equipments on the network.
  - The NMS will reflect the relevant alarm status.
  - Tabulate the results as under Section 6.2.1 to Section 6.2.2
- Check the alarm history,
  - It includes all cleared alarms along the link.
  - Tabulate the results as under Section 6.2.3
- Check if the alarms can be categorized through the NMS
  - The alarms can be grouped according to severities.
  - Tabulate the results as under Section 6.2.5.

### **Security Management**

- Connect the NMS system with the management interface of PDH equipment.
- Login to the NMS as a user with administrative privileges.
- Add a user and define the user profile.
- Login to the NMS as the newly created User and verify that user is able to perform various tasks as per profile.
  - Tabulate the results as under Section 6.3.1 to 6.3.2

### **PERFORMANCE MANAGEMENT**

- Connect the NMS system with the management interface of PDH equipment by using Ethernet cable.
- Ensure the PDH equipment is working.

- Configure a E1 interface and run performance management for specified interval.

#### **LCT Functionality Test**

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

#### **Test Result Record**

Sr. No.	Test Description	Results (OK/Not OK)
<b>6.1.0</b>	<b>CONFIGURATION MANAGEMENT</b>	
6.1.1	Capability to add and delete Drop-insert Multiplexer / DACS NE	
6.1.2	Capability to build graphical Maps.	
6.1.3	Capability to view and configure E1 card parameters.	
6.1.4	Capability to view and configure E1 time slots with data channel and voice card.	
6.1.6	Local and Remote Management of NE is possible	
<b>6.2.0</b>	<b>FAULT MANAGEMENT</b>	
6.2.1	Capability to view the current alarms in Network	
6.2.2	Capability to view object specific alarms	
6.2.3	Capability to identify the alarms based upon different severity level and corresponding visual display	
6.2.4	Capability to view historical alarms.	
<b>6.3.0</b>	<b>SECURITY MANAGEMENT</b>	
6.3.1	Security Management functionality allows user addition and user profile definition.	
6.3.2	To add & delete user	
<b>6.4.0</b>	<b>PERFORMANCE MANAGEMENT</b>	
6.4.1	Performance Management can be enabled for specific interface.	
6.4.2	The Measurement interval can be selected.	
<b>6.5.0</b>	<b>LCT Functionality Test</b>	
6.5.1	LCT can get fault information from the connected PDH node.	
6.5.2	LCT is able to change the configuration of the connected PDH node.	
6.5.3	LCT is able to change the configuration of connected PDH node.	

**Status**

( ) Tested – OK : \_\_\_\_\_

( ) Tested – Failed : \_

**Remarks**

\_\_\_\_\_  
\_\_\_\_\_

**Tested By:**

(Manufacturer)

**Date:**

**Witnessed By:**

(PrKTCL)

**Date:**

**TPS-TMN-003: Test to demonstrate the functionality of North bound interface.**

**Equipment Under Test** : Network Management System

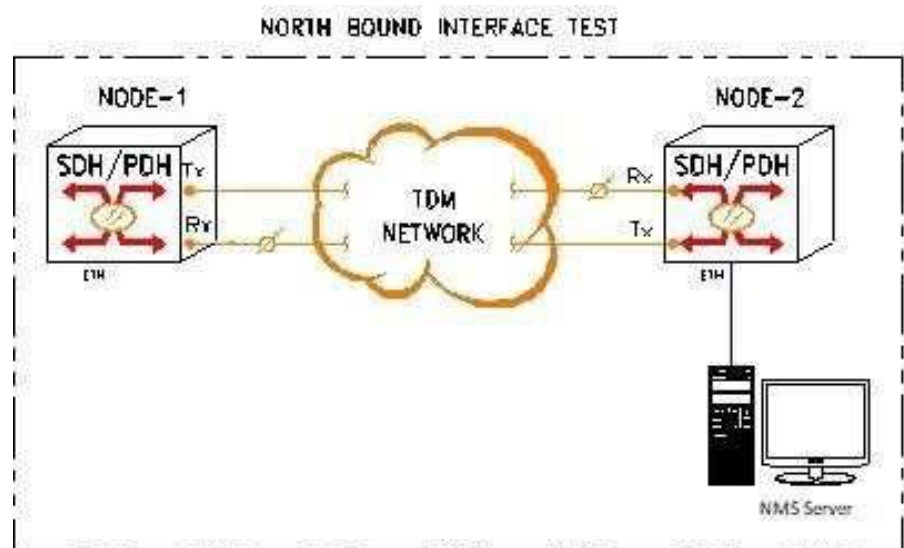
**Test Parameter** : NBI Functionality of NMS

**Test Description**

The purpose of this test is to confirm that the supplied NMS is capable to send alarms over North Bound Interface.

**Test Equipment and Accessories**

Sr.No	Test Accessories	Type	Quantity	Remarks
1	NMS	PC	1	



**Test Set-up**

**PDH Network Management**

**Test Procedure**

- Make the test setup as shown in above figure.
- If possible, connect Third party NMS in the same LAN network of the NMS Server.
- Make required configurations in the servers.
- Create an alarm on any of the NE in the network.

- Verify that the Alarm is replicated on the NMS Server and the server sends SNMP traps to the Third-party NMS.

**Test Result Record**

Sr. No.	Test Description	Results (OK/Not OK)
5.1	SDH NMS sends SNMP traps over the LAN port reserved for Third party NMS	
5.2	PDH NMS sends SNMP traps over the LAN port reserved for Third party NMS	

**Status**

( ) Tested – OK : \_\_\_\_\_

( ) Tested – Failed : \_

**Remarks**


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Tested By : \_\_\_\_\_ Witnessed By : \_\_\_\_\_

(MANUFACTURER/CONTRACTOR) PrKTCL

Date : \_\_\_\_\_ Date : \_\_\_\_\_

**TPS-TMN-004: Random Inspection to verify the Accuracy of Documents**

Equipment Under Test : NMS

Test Parameters : Verify the Documents and Drawings.

**TEST DESCRIPTION**

To conduct additional tests to verify the accuracy of the product documentation i.e., Brochures, DRS. One or two parameters shall be chosen from the list of Parameters in Data sheet and tests shall be conducted to verify the same.

**TEST EQUIPMENT**

- As required by the Test Procedure.

**TEST PROCEDURE:**

The procedures followed to test the parameters / functionality shall be enclosed with the FAT report.

**TEST RESULT**

The test results shall confirm with the data sheet.

**Status**

( ) Tested – OK \_\_\_\_\_

( ) Tested – Failed \_\_\_\_\_

**Remarks**

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Tested By : \_\_\_\_\_ Witnessed By : \_\_\_\_\_

(MANUFACTURER/CONTRACT  
OR)

PrKTCL

Date : \_\_\_\_\_ Date : \_\_\_\_\_



### TPS-TMN-005: Expansion Capability Test

Equipment Under Test : NMS

Test Parameters : Expansion Capability Test

#### TEST DESCRIPTION

The purpose of this test is to confirm that the expansion capacity of the supplied NMS System is 150% of the existing Networks Elements.

#### TEST EQUIPMENT

- Network Management System (NMS)
- Cables and accessories

#### TEST PROCEDURE

1. Setup the NMS System.
2. Check Total no's of Node available in the system. .
3. Add virtual nodes up to 150% capacity of the exiting node.

#### TEST RESULT

Sr. No.	Test Description	Results (OK/Not OK)
1.0	Expansion Capacity of the supplied NMS System is 150% of the existing Network elements.	

#### Status

( ) Tested – OK \_\_\_\_\_

( ) Tested – Failed Remarks

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Tested By \_\_\_\_\_ : \_\_\_\_\_ Witnessed By \_\_\_\_\_ : \_\_\_\_\_  
 (MANUFACTURER/CONTRACT OR) (PrKTCL)  
 Date \_\_\_\_\_ : \_\_\_\_\_ Date \_\_\_\_\_ : \_\_\_\_\_