

Rubin Observatory

Vera C. Rubin Observatory
Data Management

LVV-P73: Network Pre-Verification for Operation Rehearsal #2 Test Plan and Report

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DMTR-241

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Abstract

This is the test plan and report for LVV-P73 (Network Pre-Verification for Operation Rehearsal #2), an LSST milestone pertaining to the Data Management Subsystem.

Change Record

Version	Date	Description	Owner name
	2020-06-04	First draft	Jeff Kantor
1.0	2020-06-08	First issue, document approved. Test ready to start.	Jeff Kantor

Document curator: Jeff Kantor

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LVV-P73: Network Pre-Verification for Operation Rehearsal #2 Test Plan and Report

1 Introduction

1.1 Objectives

This test campaign will verify that the network infrastructure is ready for Operation Rehearsal #2.

1.2 System Overview

The component of DM subsystem involved in this test campaign is the **Base to Archive** network.

Applicable Documents:

LSE-61 Data Management System Requirements

LDM-732 Rubin Observatory Network Verification Baseline

1.3 Document Overview

This document was generated from Jira, obtaining the relevant information from the LVV-P73 Jira Test Plan and related Test Cycles (LVV-C155).

Section 1 provides an overview of the test campaign, the system under test (Data Management), the applicable documentation, and explains how this document is organized. Section 2 provides additional information about the test plan, like for example the configuration used for this test or related documentation. Section 3 describes the necessary roles and lists the individuals assigned to them.

Section 4 provides a summary of the test results, including an overview in Table 2, an over-

all assessment statement and suggestions for possible improvements. Section 5 provides detailed results for each step in each test case.

The current status of test plan LVV-P73 in Jira is **Approved** .

1.4 References

- [1] **[LSE-61]**, Dubois-Felsmann, G., Jenness, T., 2018, *LSST Data Management Subsystem Requirements*, LSE-61, URL <https://ls.st/LSE-61>
- [2] **[LDM-142]**, Kantor, J., 2017, *Network Sizing Model*, LDM-142, URL <https://ls.st/LDM-142>
- [3] **[LDM-732]**, Kantor, J., 2020, *Vera C. Rubin Observatory Network Verification Document*, LDM-732, URL <https://ls.st/LDM-732>

2 Test Plan Details

2.1 Data Collection

Observing is not required for this test campaign.

2.2 Verification Environment

Base Facility La Serena, Base - Archive Network, Construction Data Facility at NCSA

2.3 Entry Criteria

ComCAM data staged in La Serena
Base to Archive network functional
Construction Data Facility ready to receive data

2.4 Exit Criteria

Data transferred
Network monitoring logs captured.

2.5 Related Documentation

The documentation related to this test campaign should be provided in the following Do-
cuShare Collection (as per Verification Artifacts in Jira test plan LVV-P73).

- Network monitoring logs

2.6 PMCS Activity

Primavera milestones related to the test campaign.

NA

3 Personnel

The personnel involved in the test campaign is shown in the following table.

T. Plan LWV-P73 owner: Jeff Kantor			
T. Cycle LWV-C155 owner: Jeff Kantor			
Test Cases	Assigned to	Executed by	Additional Test Personnel
LWV-T193	Jeff Kantor		Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)
LWV-T194	Jeff Kantor		Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)
LWV-T195	Jeff Kantor		Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)
LWV-T196	Jeff Kantor		Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)

4 Test Campaign Overview

4.1 Summary

T. Plan LVV-P73:		Network Pre-Verification for Operation Rehearsal #2		Approved
T. Cycle LVV-C155:		DM Network Testing for Operation Rehearsal #2		Not Executed
Test Cases	Ver.	Status	Comment	Issues
LVV-T193	1	Not Executed		
LVV-T194	1	Not Executed		
LVV-T195	1	Not Executed		
LVV-T196	1	Not Executed		

Table 2: Test Campaign Summary

4.2 Overall Assessment

Not yet available.

4.3 Recommended Improvements

Not yet available.

5 Detailed Test Results

5.1 Test Cycle LVV-C155

Open test cycle *DM Network Testing for Operation Rehearsal #2* in Jira.

Test Cycle name: DM Network Testing for Operation Rehearsal #2

Status: Not Executed

This test cycle includes the list of test cases required to verify the network infrastructure in the context of this test campaign.

5.1.1 Software Version/Baseline

Not provided.

5.1.2 Configuration

Not provided.

5.1.3 Test Cases in LVV-C155 Test Cycle

5.1.3.1 LVV-T193 - Verify implementation of Base to Archive Network

Version **1**. Open *LVV-T193* test case in Jira.

Verify that the data acquired by a DAQ can be transferred within the required time, i.e. verify that link is capable of transferring image for prompt processing in `oArchiveMaxTransferTime = 5[second]`, i.e. at or exceeding rates specified in LDM-142.

Preconditions:

Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with simulated or pre-cursor data.

Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base -

Archive Network.

As-built documentation for all of the above is available.

Execution status: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	<p>Description</p> <p>Transfer data between base and archive while monitoring the network over uninterrupted 1 day period (with repeated transfers on normal observing cadence).</p> <hr/> <p>Test Data</p> <p>LATISS, ComCAM, or FullCAM data.</p> <hr/> <p>Expected Result</p> <p>Data transfers occur without significant delay or frequent latency spikes.</p> <hr/> <p>Actual Result</p> <hr/> <p>Status: Not Executed</p>
2	<p>Description</p> <p>Analyze the network logs and monitoring system to determine average and peak latency and packet loss statistics.</p> <hr/> <p>Expected Result</p> <p>Data can be transferred within the required time, i.e. verify that link is capable of transferring image for prompt processing in oArchiveMaxTransferTime = 5[second]. Verify transfer of data at or exceeding rates specified in LDM-142 at least 98% of the time.</p> <hr/> <p>Actual Result</p> <hr/> <p>Status: Not Executed</p>

5.1.3.2 LVV-T194 - Verify implementation of Base to Archive Network Availability

Version 1. Open *LW-T194* test case in Jira.

Verify the availability of the Base to Archive Network communications by demonstrating that it meets or exceeds a mean time between failures, measured over a 1-yr period of MTBF > baseToArchNetMTBF (180[day])

Preconditions:

Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with simulated or pre-cursor data.

Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base - Archive Network.

At least 6 months of historical monitoring data on this link is available.

As-built documentation for all of the above is available.

Execution status: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	<p>Description</p> <p>Transfer data between base and archive over uninterrupted 1 week period.</p> <hr style="border-top: 1px dashed #000;"/> <p>Test Data</p> <p>LATISS, ComCAM, or FullCAM data.</p> <hr style="border-top: 1px dashed #000;"/> <p>Expected Result</p> <p>Data is successfully transferred during the entire week.</p> <hr style="border-top: 1px dashed #000;"/> <p>Actual Result</p> <hr style="border-top: 1px dashed #000;"/> <p>Status: Not Executed</p>
2	<p>Description</p> <p>Analyze monitoring/performance data, compare to historical data, and extrapolate to a full year, average and peak throughput and latency.</p> <hr style="border-top: 1px dashed #000;"/> <p>Test Data</p> <p>NA</p> <hr style="border-top: 1px dashed #000;"/>

Expected Result

Extrapolated network availability meets baseToArchNetMTBF = 180[day]. Note that this is for complete loss of transfer service (all paths), not a single path failure with successful fail-over.

Actual Result

Status: **Not Executed**

5.1.3.3 LVV-T195 - Verify implementation of Base to Archive Network Reliability

Version 1. Open *LVV-T195* test case in Jira.

Verify Base to Archive Network Reliability by demonstrating that the network can recover from outages within baseToArchNetMTTR = 48[hour].

Preconditions:

Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with simulated or pre-cursor data.

Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base - Archive Network.

At least 6 months of monitoring data for this link is available.

As-built documentation for all of the above is available.

Execution status: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	Description
	Disconnect primary fiber on base side of Base - Archive network.

	Test Data
	LATISS, ComCAM, or FullCAM data.

Expected Result

Network fails over to secondary path.

Actual Result

Status: **Not Executed**

2 Description

Simulate diagnosis and repair by elapsed time.

Test Data

NA

Expected Result

Wall clock advances by 48 hours. Data is successfully transferred over secondary path.

Actual Result

Status: **Not Executed**

3 Description

Reconnect primary fiber on base side of Base - Archive network.

Test Data

NA

Expected Result

Network recovers to primary path.

Actual Result

Status: **Not Executed**

4 Description

Analyze fail-over and recovery times. Compare to historical data and extrapolate to MTTR.

Expected Result

Verify recovery can occur within $\text{baseToArchNetMTTR} = 48[\text{hour}]$. Demonstrate reconnection and recovery to transfer of data at or exceeding rates specified in LDM-142.

Actual Result

Status: **Not Executed**

5.1.3.4 LVV-T196 - Verify implementation of Base to Archive Network Secondary Link

Version **1**. Open *LW-T196* test case in Jira.

Verify Base to Archive Network Secondary Link failover and capacity, and subsequent recovery primary. Demonstrate the use of the secondary path in “catch-up” mode.

Preconditions:

Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with simulated or pre-cursor data.

Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base - Archive Network.

As-built documentation for all of the above is available.

Execution status: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	<p>Description</p> <p>Transfer data between base and archive on primary links over uninterrupted 1 day period.</p> <hr style="border-top: 1px dashed #000;"/> <p>Test Data</p> <p>LATISS, ComCAM, or FullCAM data.</p> <hr style="border-top: 1px dashed #000;"/> <p>Expected Result</p> <p>Data is successfully transferred over primary link at or exceeding rates specified in LDM-142 throughout period.</p> <hr style="border-top: 1px dashed #000;"/> <p>Actual Result</p> <hr style="border-top: 1px dashed #000;"/> <p>Status: Not Executed</p>
2	<p>Description</p> <p>Simulate outage by disconnecting fiber on primary fiber on Base side of Base - Archive Network.</p> <hr style="border-top: 1px dashed #000;"/> <p>Test Data</p>

NA

Expected Result

Network fails over to secondary links in <=60s

Actual Result

Status: **Not Executed**

3 Description

Transfer data between base and archive over secondary equipment uninterrupted 1 day period.

Test Data

LATISS, ComCAM, or FullCAM data.

Expected Result

Data is successfully transferred over secondary link at or exceeding rates specified in LDM-142 throughout period.

Actual Result

Status: **Not Executed**

4 Description

Restore connection on primary link by reconnecting fiber.

Test Data

NA

Expected Result

Network recovers to primary.

Actual Result

Status: **Not Executed**

5 Description

Demonstrate use of secondary in catch-up mode.

Test Data

DAQ buffer full of images and associated metadata.

Expected Result

Images from DAQ buffer and associated metadata are retrievable over secondary path while current observing data is being transferred over primary path.

Actual Result

Status: **Not Executed**

A Acronyms used in this document

Acronym	Description
DAQ	Data Acquisition System
DM	Data Management
DMS	Data Management Subsystem
DMS-REQ	Data Management System Requirements prefix
DMTR	DM Test Report
DWDM	Dense Wave Division Multiplex
FIU	Florida International University
LATISS	LSST Atmospheric Transmission Imager and Slitless Spectrograph
LDF	LSST Data Facility
LDM	LSST Data Management (Document Handle)
LSE	LSST Systems Engineering (Document Handle)
LSST	Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope)
LWV	LSST Verification and Validation (Jira project)
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
NCSA	National Center for Supercomputing Applications
PMCS	Project Management Controls System
REUNA	Red Universitaria Nacional

B Traceability

Test Case	VE Key	VE Summary
LWV-T193	LWV-81	DMS-REQ-0180-V-01: Base to Archive Network
LWV-T194	LWV-82	DMS-REQ-0181-V-01: Base to Archive Network Availability
LWV-T195	LWV-83	DMS-REQ-0182-V-01: Base to Archive Network Reliability
LWV-T196	LWV-84	DMS-REQ-0183-V-01: Base to Archive Network Secondary Link