



Vera C. Rubin Observatory
Data Management

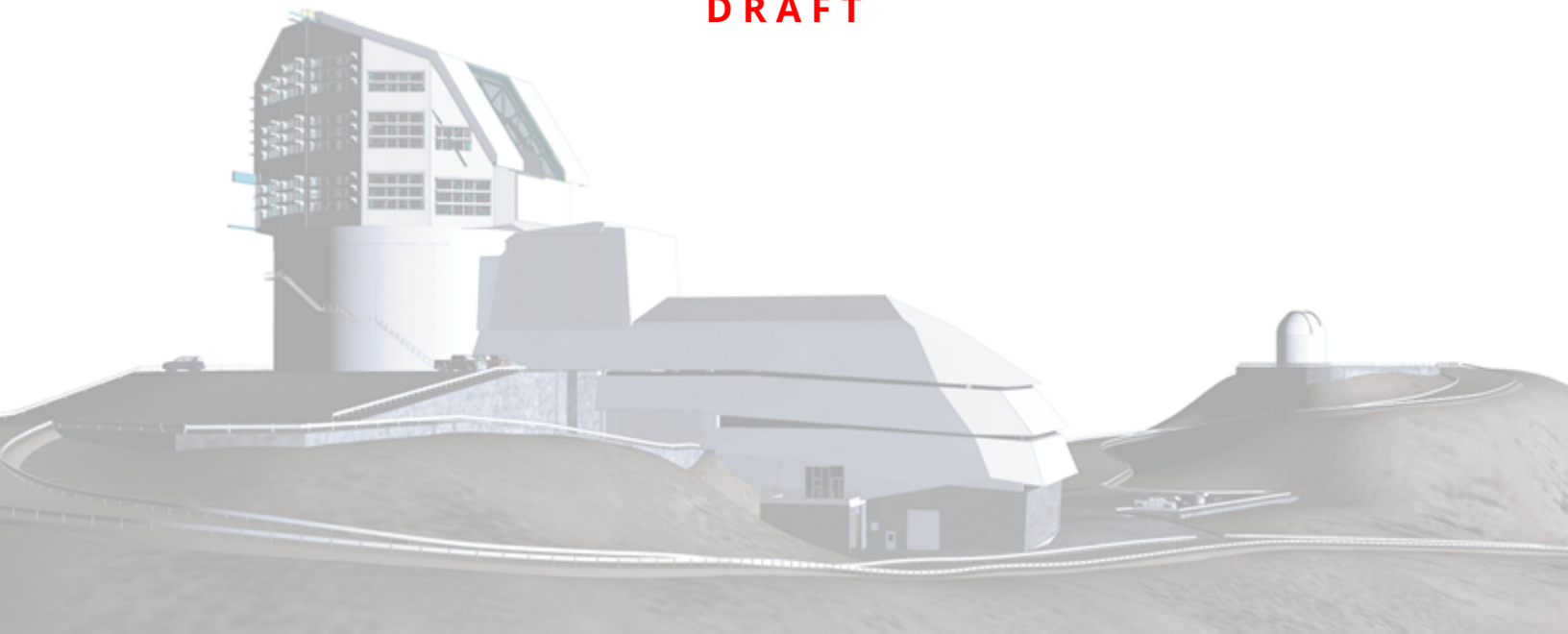
LVV-P128: LDM-503-19 (All P1a and 1b DM requirements verified) Test Plan

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DMTR-441

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DRAFT



Abstract

This is the test plan for **LDM-503-19 (All P1a and 1b DM requirements verified)**, an LSST milestone pertaining to the Data Management Subsystem.

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LVV-P128: LDM-503-19 (All P1a and 1b DM requirements verified) Test Plan

1 Introduction

1.1 Objectives

This DM acceptance test campaign will verify all DM priority 1a and 1b requirements that have not been verified as part of prior testing and milestones.

1.2 System Overview

This test campaign is intended to verify that the DM system satisfies all of the priority 1a and 1b requirements outlined in the Data Management System Requirements (DMSR; LSE-61), ensuring that we are progressing toward readiness for LSSTCam on-sky observing. Additional DMSR requirements (priorities 2 and 3) will be verified in later Acceptance Test Campaigns.

Applicable Documents:

LSE-61: Data Management System (DMS) Requirements

LDM-503 Data Management Test Plan

LDM-639: Data Management Acceptance Test Specification

Tests in this campaign will use data products and artifacts from Data Preview 0.2, which consists of DESC Data Challenge 2 (DC2) simulated data reprocessed using the LSST Science Pipelines, on-sky data from auxTel and LSSTComCam imaging campaigns, precursor data from Subaru+HyperSuprime-Cam (HSC), and camera test-stand data, when appropriate.

1.3 Document Overview

This document was generated from Jira, obtaining the relevant information from the LVV-P128 Jira Test Plan and related Test Cycles (LVV-R155 LVV-R293).

Section 1 provides an overview of the test campaign, the system under test (Acceptance), 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 overall assessment statement and suggestions for possible improvements. Section ?? provides detailed results for each step in each test case.

The current status of test plan LVV-P128 in Jira is **Approved**.

1.4 References

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- [3] **[LSE-61]**, Dubois-Felsmann, G., Jenness, T., 2019, *Data Management System (DMS) Requirements*, Systems Engineering Controlled Document LSE-61, NSF-DOE Vera C. Rubin Observatory, URL <https://lse-61.lsst.io/>, doi:10.71929/rubin/2587200
- [4] **[LDM-554]**, Dubois-Felsmann, G., Ciardi, D., Mueller, F., Economou, F., 2019, *Data Management LSST Science Platform Requirements*, Data Management Controlled Document LDM-554, NSF-DOE Vera C. Rubin Observatory, URL <https://ldm-554.lsst.io/>
- [5] **[LDM-639]**, Guy, L., Wood-Vasey, W., Bellm, E., et al., 2022, *LSST Data Management Acceptance Test Specification*, Data Management Controlled Document LDM-639, NSF-DOE Vera C. Rubin Observatory, URL <https://ldm-639.lsst.io/>
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- [7] **[LDM-142]**, Kantor, J., 2017, *Network Sizing Model*, Data Management Controlled Document LDM-142, NSF-DOE Vera C. Rubin Observatory, URL <https://ls.st/LDM-142>
- [8] **[LDM-503]**, O'Mullane, W., Swinbank, J., Juric, M., et al., 2023, *Data Management Test Plan*, Data Management Controlled Document LDM-503, NSF-DOE Vera C. Rubin Observatory, URL <https://ldm-503.lsst.io/>
- [9] **[LSE-160]**, Selvy, B., 2013, *Verification and Validation Process*, Systems Engineering Controlled Document LSE-160, NSF-DOE Vera C. Rubin Observatory, URL <https://ls.st/LSE-160>

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2 Test Plan Details

2.1 Data Collection

Observing is not required for this test campaign.

2.2 Verification Environment

Most testing will be performed using the Rubin Science Platform (RSP) and the development cluster at the USDF. All tests will use the most recent available version of the Pipelines.

2.3 Entry Criteria

None

2.4 Exit Criteria

None

2.5 Related Documentation

Docushare collection where additional relevant documentation can be found:

- None

2.6 PMCS Activity

Primavera milestones related to the test campaign: None

3 Personnel

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

T. Plan LVV-P128 owner:		Jeffrey Carlin	
T. Cycle LVV-R155 owner:		Leanne Guy	
Test Cases	Assigned to	Executed by	Additional Test Personnel
LVV-E1104	Jeffrey Kantor	Cristián Silva	Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)
LVV-E3138	Robert Gruendl	Cristián Silva	
LVV-E3143	Jeffrey Kantor	Cristián Silva	Ron Lambert (LSST)
LVV-E3144	Kian-Tat Lim	Cristián Silva	Ron Lambert (LSST), Albert Astudillo (REUNA), Jeronimo Bezerra (FIU/AmLight), Matt Kollross (NCSA)
LVV-E3145	Cristián Silva	Cristián Silva	Heinrich Reinking (LSST), another LSST DM Person at Summit, Headquarters, or LDF
LVV-E3146	Jeffrey Kantor	Cristián Silva	Ron Lambert (LSST), Greg Thayer (SLAC)
T. Cycle LVV-R293 owner:		Jeffrey Carlin	
Test Cases	Assigned to	Executed by	Additional Test Personnel
LVV-E3756	Leanne Guy	William O'Mullane	
LVV-E3760	Jeffrey Carlin	Undefined	
LVV-E3761	Jeffrey Carlin	Undefined	
LVV-E3762	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3767	Leanne Guy	Leanne Guy	
LVV-E3768	Leanne Guy	Undefined	
LVV-E3769	Leanne Guy	Leanne Guy	
LVV-E3770	Jeffrey Carlin	William O'Mullane	
LVV-E3771	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3772	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3773	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3774	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3775	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3781	Leanne Guy	Jeffrey Carlin	
LVV-E3782	Leanne Guy	Undefined	
LVV-E3785	Leanne Guy	Jeffrey Carlin	
LVV-E3787	Jeffrey Carlin	Undefined	

LVV-E3790	Simon Krughoff	Undefined	
LVV-E3791	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3792	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3794	Eric Bellm	Undefined	
LVV-E3797	Leanne Guy	William O'Mullane	
LVV-E3798	Leanne Guy	William O'Mullane	
LVV-E3802	Robert Gruendl	Undefined	
LVV-E3803	Jeffrey Carlin	William O'Mullane	
LVV-E3804	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3805	Leanne Guy	Leanne Guy	
LVV-E3806	Jeffrey Carlin	Undefined	
LVV-E3807	Jeffrey Carlin	Undefined	
LVV-E3810	Eric Bellm	Undefined	
LVV-E3812	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3813	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3814	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3815	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3816	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3817	Eric Bellm	Leanne Guy	
LVV-E3818	Eric Bellm	Undefined	
LVV-E3821	Eric Bellm	Undefined	
LVV-E3822	Eric Bellm	Jeffrey Carlin	
LVV-E3823	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3824	Kian-Tat Lim	Kevin Siruno	
LVV-E3825	Leanne Guy	Undefined	
LVV-E3826	Leanne Guy	William O'Mullane	
LVV-E3828	Leanne Guy	Cristián Silva	Ron Lambert (LSST), Albert Astudillo (REUNA), Jeronimo Bezerra (FIU/Am-Light), Matt Kollross (NCSA)
LVV-E3829	Leanne Guy	Cristián Silva	Ron Lambert (LSST), Albert Astudillo (REUNA), Jeronimo Bezerra (FIU/Am-Light), Matt Kollross (NCSA)
LVV-E3830	Leanne Guy	Cristián Silva	Ron Lambert (LSST), Albert Astudillo (REUNA), Jeronimo Bezerra (FIU/Am-Light), Matt Kollross (NCSA)
LVV-E3831	Jeffrey Kantor	Cristián Silva	Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)

LVV-E3833	Jeffrey Kantor	Cristián Silva	Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)
LVV-E3834	Jeffrey Kantor	Cristián Silva	Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)
LVV-E3835	Jeffrey Kantor	Cristián Silva	Jeff Kantor (LSST)
LVV-E3837	Jeffrey Kantor	Cristián Silva	Ron Lambert (LSST), Guido Maulen (LSST)
LVV-E3838	Jeffrey Kantor	Cristián Silva	Ron Lambert (LSST)
LVV-E3839	Leanne Guy	William O'Mullane	
LVV-E3840	Leanne Guy	William O'Mullane	
LVV-E3841	Robert Gruendl	Jeffrey Carlin	
LVV-E3842	Robert Gruendl	Cristián Silva	
LVV-E3843	Leanne Guy	Jeffrey Carlin	
LVV-E3844	Leanne Guy	Jeffrey Carlin	
LVV-E3845	William O'Mullane	William O'Mullane	
LVV-E3846	Jeffrey Carlin	Undefined	
LVV-E3848	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3849	Jeffrey Carlin	Undefined	
LVV-E3850	Leanne Guy	Undefined	
LVV-E3851	Leanne Guy	Undefined	
LVV-E3852	Leanne Guy	Undefined	
LVV-E3854	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3855	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3856	Jeffrey Carlin	Undefined	
LVV-E3858	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3859	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3860	Jeffrey Carlin	Jeffrey Carlin	
LVV-E3863	Leanne Guy	Undefined	
LVV-E3868	Kian-Tat Lim	Jeffrey Carlin	
LVV-E3872	Leanne Guy	Undefined	
LVV-E3874	Jeffrey Carlin	Undefined	
LVV-E3875	Jeffrey Carlin	Undefined	
LVV-E3876	Jeffrey Carlin	Undefined	
LVV-E3877	Jeffrey Carlin	Undefined	
LVV-E3878	Leanne Guy	Undefined	
LVV-E3994	Leanne Guy	Leanne Guy	
LVV-E4047	Jeffrey Carlin	Undefined	
LVV-E4048	Jeffrey Carlin	Undefined	

LVV-E4052	Leanne Guy	Leanne Guy
LVV-E4053	Colin Slater	Jeffrey Carlin
LVV-E4057	Jeffrey Carlin	Jeffrey Carlin
LVV-E4058	Jeffrey Carlin	Jeffrey Carlin
LVV-E4059	Jeffrey Carlin	Jeffrey Carlin
LVV-E4060	Jeffrey Carlin	Jeffrey Carlin
LVV-E4061	Leanne Guy	Jeffrey Carlin
LVV-E4062	Jeffrey Carlin	Jeffrey Carlin
LVV-E4068	Jeffrey Carlin	Jeffrey Carlin
LVV-E4069	Jeffrey Carlin	Jeffrey Carlin
LVV-E4070	Jeffrey Carlin	Jeffrey Carlin

4 Test Campaign Overview

4.1 Summary

T. Plan LVV-P128:		LDM-503-19 (All P1a and 1b DM requirements verified)	Approved
T. Cycle LVV-R155:		Network Acceptance Test Campaign 1	Done
Test Cases	Ver.		
LVV-E1104	1.0(d)		
LVV-E3138	1.0(d)		
LVV-E3143	1.0(d)		
LVV-E3144	1.0(d)		
LVV-E3145	1.0(d)		
LVV-E3146	1.0(d)		
T. Cycle LVV-R293:		LDM-503-19 (All P1a and 1b DM requirements verified)	In Progress
Test Cases	Ver.		
LVV-E3756	1.0(d)		
LVV-E3760	1.0(d)		
LVV-E3761	1.0(d)		
LVV-E3762	1.0(d)		
LVV-E3767	1.0(d)		
LVV-E3768	1.0(d)		
LVV-E3769	1.0(d)		
LVV-E3770	1.0(d)		
LVV-E3771	1.0(d)		
LVV-E3772	1.0(d)		
LVV-E3773	1.0(d)		
LVV-E3774	1.0(d)		
LVV-E3775	1.0(d)		
LVV-E3781	1.0(d)		
LVV-E3782	1.0(d)		
LVV-E3785	1.0(d)		
LVV-E3787	1.0(d)		
LVV-E3790	1.0(d)		
LVV-E3791	1.0(d)		
LVV-E3792	1.0(d)		
LVV-E3794	1.0(d)		
LVV-E3797	1.0(d)		
LVV-E3798	1.0(d)		
LVV-E3802	1.0(d)		

LVV-E3803 1.0(d)
LVV-E3804 1.0(d)
LVV-E3805 1.0(d)
LVV-E3806 1.0(d)
LVV-E3807 1.0(d)
LVV-E3810 1.0(d)
LVV-E3812 1.0(d)
LVV-E3813 1.0(d)
LVV-E3814 1.0(d)
LVV-E3815 1.0(d)
LVV-E3816 1.0(d)
LVV-E3817 1.0(d)
LVV-E3818 1.0(d)
LVV-E3821 1.0(d)
LVV-E3822 1.0(d)
LVV-E3823 1.0(d)
LVV-E3824 1.0(d)
LVV-E3825 1.0(d)
LVV-E3826 1.0(d)
LVV-E3828 1.0(d)
LVV-E3829 1.0(d)
LVV-E3830 1.0(d)
LVV-E3831 1.0(d)
LVV-E3833 1.0(d)
LVV-E3834 1.0(d)
LVV-E3835 1.0(d)
LVV-E3837 1.0(d)
LVV-E3838 1.0(d)
LVV-E3839 1.0(d)
LVV-E3840 1.0(d)
LVV-E3841 1.0(d)
LVV-E3842 1.0(d)
LVV-E3843 1.0(d)
LVV-E3844 1.0(d)
LVV-E3845 1.0(d)
LVV-E3846 1.0(d)
LVV-E3848 1.0(d)
LVV-E3849 1.0(d)
LVV-E3850 1.0(d)
LVV-E3851 1.0(d)
LVV-E3852 1.0(d)

LVV-E3854	1.0(d)
LVV-E3855	1.0(d)
LVV-E3856	1.0(d)
LVV-E3858	1.0(d)
LVV-E3859	1.0(d)
LVV-E3860	1.0(d)
LVV-E3863	1.0(d)
LVV-E3868	1.0(d)
LVV-E3872	1.0(d)
LVV-E3874	1.0(d)
LVV-E3875	1.0(d)
LVV-E3876	1.0(d)
LVV-E3877	1.0(d)
LVV-E3878	1.0(d)
LVV-E3994	1.0(d)
LVV-E4047	1.0(d)
LVV-E4048	1.0(d)
LVV-E4052	1.0(d)
LVV-E4053	1.0(d)
LVV-E4057	1.0(d)
LVV-E4058	1.0(d)
LVV-E4059	1.0(d)
LVV-E4060	1.0(d)
LVV-E4061	1.0(d)
LVV-E4062	1.0(d)
LVV-E4068	1.0(d)
LVV-E4069	1.0(d)
LVV-E4070	1.0(d)

Table 2: Test Campaign Summary

4.2 Overall Assessment

None

4.3 Recommended Improvements

5 Detailed Tests

5.1 Test Cycle LVV-R155

Open test cycle *Network Acceptance Test Campaign 1* in Jira.

Test Cycle name: Network Acceptance Test Campaign 1

Status: Done

This test cycle includes the list of test cases required to verify the network infrastructure without encryption

5.1.1 Software Version/Baseline

Not provided.

5.1.2 Configuration

Not provided.

5.1.3 Test Cases in LVV-R155 Test Cycle

5.1.3.1 LVV-E1104 - Verify implementation of Base to Archive Network Reliability

Version **1.0(d)**. Open *LVV-E1104* test case in Jira.

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

Preconditions:

1. Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with

- simulated or pre-cursor data, running on end node computers that are the production hardware or equivalent to it.
2. Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base - Archive Network, running on end node computers that are the production hardware or equivalent to it.
 3. At least 6 months of monitoring data for this link is available.
 4. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:
None

Detailed steps :

5.1.3.2 LVV-E3138 - Verify implementation of Summit Facility Infrastructure

Version **1.0(d)**. Open *LVV-E3138* test case in Jira.

Verify that the Summit Facility provides sufficient computing, storage, and network infrastructure to support buffering and forwarding of all raw image data to the Archive Facility, and compute facilities to support Commissioning activities.

Preconditions:

Summit facility in place

Final comment:

None

Detailed steps :

5.1.3.3 LVV-E3143 - Verify implementation of Summit to Base Network Secondary Link

Version **1.0(d)**. Open *LVV-E3143* test case in Jira.

Verify automated fail-over from primary to secondary equipment in Rubin Observatory DWDM on simulated failure of primary. Verify bandwidth sufficiency on secondary. Verify automated recovery to primary equipment on simulated restoration of primary. Repeat for failure of Rubin Observatory fiber and fail-over to AURA fiber and DWDM. Demonstrate use of secondary in "catch-up" mode.

Preconditions:

1. PMCS DMTC-7400-2400 complete.
2. As-built documentation for Summit - Base Network is available.

NOTE: After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.1.3.4 LVV-E3144 - Verify implementation of Archive to Data Access Center Network Secondary Link

Version **1.0(d)**. Open *LVV-E3144* test case in Jira.

Verify the Archive to Data Access Center Network via Secondary Link by simulating a failure on the primary path and capacity on the secondary path.

Preconditions:

1. Data is staged in LDF and data transfer capabilities to US DAC and Chilean DAC are in place, running on end node computers that are the production hardware or equivalent to it.
2. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.1.3.5 LVV-E3145 - Verify Base Voice Over IP (VOIP)

Version **1.0(d)**. Open *LVV-E3145* test case in Jira.

Verify as-built VOIP at the Base Facility is operational and performs as expected (i.e. sufficient number of extensions allocated properly, no frequent drop-outs, no frequent jaggies on video, etc.) on both voice calls and videoconferencing.

Preconditions:

1. Base VOIP is installed/configured and Test Personnel have phone sets. Base Videoconference system is installed/configured. Summit, Headquarters, and/or LDF Videoconference system is installed/configured.
2. As-built documentation for all of the above is available.

Final comment:

None

Detailed steps :

5.1.3.6 LVV-E3146 - Verify Summit - Base Network Integration (System Level)

Version **1.0(d)**. Open *LVV-E3146* test case in Jira.

Verify ISO Layer 3 full (22 x 10 Gbps ethernet ports on DAQ side with test data from DAQ test stand, AURA, Camera DAQ team do test). Demonstrate transfer of data at or exceeding rates specified in LDM-142.

Preconditions:

1. PMCS DMTC-7400-2400 COMPLETE
2. LVV-T1168 Passed

3. EITHER: Full Camera DAQ installed on summit and loaded with data OR: high-quality DAQ application-level simulators that match the form, volume, file paths, compressibility, and cadence of the expected instrument data, running on end node computers that are the production hardware or equivalent to it. Scientific validity of the data content is not essential.
4. Archiver/forwarders installed at Base running on end node computers that are the production hardware or equivalent to it.
5. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.2 Test Cycle LVV-R293

Open test cycle *LDM-503-19 (All P1a and 1b DM requirements verified)* in Jira.

Test Cycle name: LDM-503-19 (All P1a and 1b DM requirements verified)

Status: In Progress

Test campaign supporting milestone LDM-503-19 -- all P1a and 1b requirements verified.

5.2.1 Software Version/Baseline

Not provided.

5.2.2 Configuration

Not provided.

5.2.3 Test Cases in LVV-R293 Test Cycle

5.2.3.1 LVV-E3756 - Verify the archiving of ancillary data

Version **1.0(d)**. Open *LVV-E3756* test case in Jira.

Verify that the Science Data Archive contains all necessary engineering and calibration data for the full understanding of the performance and operation of the Observatory.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.2 LVV-E3760 - Verify provenance availability to science users

Version **1.0(d)**. Open *LVV-E3760* test case in Jira.

Verify that archived provenance data is available to science users together with the associated science data products.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.3 LVV-E3761 - Verify archiving of processing provenance

Version **1.0(d)**. Open *LVV-E3761* test case in Jira.

Verify that provenance information related to data processing, including relevant data from other subsystems, has been archived.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.4 LVV-E3762 - Verify Visualization of MOCs via Science Platform

Version **1.0(d)**. Open *LVV-E3762* test case in Jira.

Verify that the LSST Science Platform supports the visualization of the LSST-generated MOCs as well as other MOCs which satisfy the IVOA MOC Recommendation.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.5 LVV-E3767 - Verify implementation of minimum number of simultaneous retrievals of CCD-sized coadd cutouts

Version **1.0(d)**. Open *LVV-E3767* test case in Jira.

Verify that at least **ccdRetrievalUsers = 20** users can simultaneously retrieve a single CCD-sized coadd cutout using the IVOA SODA protocol.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.6 LVV-E3768 - Verify the the maximum time to retrieve all PVI images for single visit

Version **1.0(d)**. Open *LVV-E3768* test case in Jira.

Verify the the maximum time to retrieve all PVI images for single visit including mask and variance plane using single IVOA SIAv2 protocol service query is within **allPviRetrievalTime** for up to **allPviRetrievalUsers** simultaneous requests for distinct focal-plane PVI sets.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.7 LVV-E3769 - Verify the maximum time to retrieve single-CCD, single-visit PVI image

Version **1.0(d)**. Open *LVV-E3769* test case in Jira.

Using Rubin Image Services VO SIAv2 protocol verify the time to receive a Processed Visit Image of a single CCD is within **pviRetrievalTime** with **pviRetrievalUsers** simultaneous requests for distinct single-CCD PVIs.

Preconditions:

Image Services VO SIAv2 implementation deployed on the RSP

Final comment:

None

Detailed steps :

5.2.3.8 LVV-E3770 - Verify design of Data Access Services allows Evolution of the LSST Data Model

Version **1.0(d)**. Open *LVV-E3770* test case in Jira.

Verify that the design of the Data Access Services are able to accommodate changes/evolution of the LSST data model from one release to another.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.9 LVV-E3771 - Per-image limit on the median residual ellipticity correlations at scales less than to 5 arcmin.

Version **1.0(d)**. Open *LVV-E3771* test case in Jira.

Verify that the per-image limit on the median residual ellipticity correlations at scales less than 5 arcmin (TE3) can be configured in the DMS and applied to the appropriate metrics.

Preconditions:

None

Final comment:

Test executed using a ticket branch that has not yet been merged to the pipelines codebase, running w_2025_37 of the science pipelines at the USDF. Results of the test are attached to this document's repository as test_LVV-T376_T2176_T2177.ipynb.

Detailed steps :

5.2.3.10 LVV-E3772 - Verify calculation of residual PSF ellipticity correlations for separations less than 1 arcmin

Version **1.0(d)**. Open *LVV-E3772* test case in Jira.

Verify that the DM system has provided the code to calculate the median residual PSF ellipticity correlations averaged over an arbitrary field of view for separations less than 1 arcmin, and assess whether it meets the requirement that it shall be no greater than **TE1 = 2.0e-5[arcminuteSeparationCorrelation]**.

Preconditions:

None

Final comment:

Test executed using a ticket branch that has not yet been merged to the pipelines codebase, running w_2025_37 of the science pipelines at the USDF. Results of the test are attached to this document's repository as test_LVV-T1755.ipynb.

Detailed steps :

5.2.3.11 LVV-E3773 - Per-image limit on the median residual ellipticity correlations at scales greater than or equal to 5 arcmin.

Version **1.0(d)**. Open *LVV-E3773* test case in Jira.

Verify that the per-image limit on the median residual ellipticity correlations at scales greater than or equal to 5 arcmin (TE4) can be configured in the DMS and applied to the appropriate metrics

Preconditions:

None

Final comment:

Test executed using a ticket branch that has not yet been merged to the pipelines codebase, running w_2025_37 of the science pipelines at the USDF. Results of the test are attached to this document's repository as test_LVV-T376_T2176_T2177.ipynb.

Detailed steps :

5.2.3.12 LVV-E3774 - Verify calculation of residual PSF ellipticity correlations for separations greater than or equal to 5 arcmin

Version **1.0(d)**. Open *LVV-E3774* test case in Jira.

Verify that the DM system has provided the code to calculate the median residual PSF ellipticity

correlations averaged over an arbitrary field of view for separations greater than or equal to 5 arcmin, and assess whether it meets the requirement that it shall be no greater than **TE2 = 1.0e-7[arcminuteSeparationCorrelation]**.

Preconditions:

None

Final comment:

Test executed using a ticket branch that has not yet been merged to the pipelines codebase, running w_2025_37 of the science pipelines at the USDF. Results of the test are attached to this document's repository as test_LVV-T1754.ipynb.

Detailed steps :

5.2.3.13 LVV-E3775 - Verify the Calculation of Ellipticity Residuals and Correlations

Version **1.0(d)**. Open *LVV-E3775* test case in Jira.

Verify that the DMS includes software to enable the calculation of the ellipticity residuals and correlation metrics defined in the OSS.

Preconditions:

None

Final comment:

Test executed using a ticket branch that has not yet been merged to the pipelines codebase, running w_2025_37 of the science pipelines at the USDF. Results of the test are attached to this document's repository as test_LVV-T376_T2176_T2177.ipynb.

Detailed steps :

5.2.3.14 LVV-E3781 - Verify Result latency for high-volume full-sky queries on the Object table

Version **1.0(d)**. Open *LVV-E3781* test case in Jira.

Verify latency against a full scale, e.g DR1 sized Object catalog

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.15 LVV-E3782 - Verify performance for radius for low-volume query

Version **1.0(d)**. Open *LVV-E3782* test case in Jira.

Verify the response time (lvQueryTime) for queries that are spatially restricted to a circle of radius **lvSkyRadius** and that return at most lvMaxReturnedResults of data under a load of lvQueryUsers simultaneous queries.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.16 LVV-E3785 - Verify Result latency for high-volume complex queries

Version **1.0(d)**. Open *LVV-E3785* test case in Jira.

Verify that complex high-volume queries that involve full-sky spatial and temporal correlations can be answered in less than **hvComplexQueryTime**.

Preconditions:

An operational QSERV database that has been verified via LVV-T1085 and LVV-T1086 and LVV-T1087.

Final comment:

None

Detailed steps :

5.2.3.17 LVV-E3787 - Verify implementation of Data Availability

Version **1.0(d)**. Open *LVV-E3787* test case in Jira.

Determine if all required categories of raw data (specifically enumerated: raw exposures, calibration frames, telemetry, configuration metadata) can be located through the Science Platform and are available for download. Verify through (1) administrative review; (2) checking with precursor data; (3) checking on early data feeds from the Summit such as from AuxTel and ComCam.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.18 LVV-E3790 - Verify implementation of Regenerating Data Products from Previous Data Releases

Version **1.0(d)**. Open *LVV-E3790* test case in Jira.

Show that un-archived data products from previous data releases can be generated using through the LSST Science Platform.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.19 LVV-E3791 - Verify implementation of Maximum Likelihood Values and Covariances

Version **1.0(d)**. Open *LVV-E3791* test case in Jira.

Verify that quantities delivered by all measurement algorithms include maximum likelihood values and covariances.

Preconditions:

None

Final comment:

Executed at the USDF using the DP1 Qserv database accessed via the TAP service. The notebook containing detailed tests is attached to this document's github repository as test_LVV-T26.ipynb.

Detailed steps :

5.2.3.20 LVV-E3792 - Verify implementation of Computing Derived Quantities

Version **1.0(d)**. Open *LVV-E3792* test case in Jira.

Verify that common derived quantities have been made available to end-users either as pre-computed columns or by providing functions that can be used dynamically in queries. These should at least include the ability to calculate the reduced chi-squared of fitted models and make it as easy as possible to calculate color-color diagrams.

Preconditions:

Example data set (e.g., non-LSST or LSST commissioning) loaded into the Science Platform in a format consistent with the DPDD.

Final comment:

Executed at the USDF using the DP1 Qserv database accessed via the TAP service. The notebook containing detailed tests is attached to this document's github repository as test_LVV-T24.ipynb.

Detailed steps :

5.2.3.21 LVV-E3794 - Verify implementation of Matching DIASources to Objects

Version **1.0(d)**. Open *LVV-E3794* test case in Jira.

Verify that a cross-match table is available between DIASources and Objects.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.22 LVV-E3797 - Verify implementation of Data Management Unscheduled Downtime

Version **1.0(d)**. Open *LVV-E3797* test case in Jira.

This applies only to downtime that would prevent the collection of survey data. Verification means that analysis has occurred to identify likely hardware failures that would prevent survey operations and that mitigations that minimize the downtime to less than DM Downtime (1 day/year) are in place. Known systems that fall in this category include: Image and EFD Archiving, Observatory Operations Data, Telemetry Gateway, Data Backbone, Managed Database, Inter-Site Networks, and Service Management and Monitoring.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.23 LVV-E3798 - Verify implementation of Compute Platform Heterogeneity

Version **1.0(d)**. Open *LVV-E3798* test case in Jira.

Demonstrate that production results are the same (within machine accuracy) when production occurs on different platforms (OS, kernel, hardware provisioning).

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.24 LVV-E3802 - Verify implementation of Un-Archived Data Product Cache

Version **1.0(d)**. Open *LVV-E3802* test case in Jira.

Demonstrate that the DMS provides low-latency storage for at least `l1CacheLifetime` (30 days) to keep prompt processing pre-covery images on hand.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.25 LVV-E3803 - Verify implementation of Software Architecture to Enable Community Re-Use

Version **1.0(d)**. Open *LVV-E3803* test case in Jira.

Show that the LSST software is capable of being executed in multiple contexts: single user instance, batch processing, continuous integration.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.26 LVV-E3804 - Verify implementation of Control of Level-1 Production

Version **1.0(d)**. Open *LVV-E3804* test case in Jira.

Demonstrate that the DMS can control all Prompt Processing across DMS facilities.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.27 LVV-E3805 - Verify provision of Bulk Download Service

Version **1.0(d)**. Open *LVV-E3805* test case in Jira.

Verify that DM has provided software to enable bulk download of data products and raw data, subject to network bandwidth.

Preconditions:

Final comment:

Transfers to IDACs via Rucio

Detailed steps :

5.2.3.28 LVV-E3806 - Verify implementation of Processing of Datasets

Version **1.0(d)**. Open *LVV-E3806* test case in Jira.

Execute AP and DRP, simulate failures, observe correct processing

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.29 LVV-E3807 - Verify implementation of Query Repeatability

Version **1.0(d)**. Open *LVV-E3807* test case in Jira.

Verify that prior queries can be rerun with identical results, or with new additional data for live (Alert Production) databases.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.30 LVV-E3810 - Verify implementation of Level-1 Production Completeness

Version **1.0(d)**. Open *LVV-E3810* test case in Jira.

Verify that the DMS successfully eventually processes all images of sufficient quality for processing, even after connectivity failures.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.31 LVV-E3812 - Verify implementation of Multi-band Coadds

Version **1.0(d)**. Open *LVV-E3812* test case in Jira.

Verify that the DRP pipelines produce multi-band coadds for detection purposes.

Preconditions:

None

Final comment:

This requirement is verified by inspection, as the multi-band coadds are not part of typical DRP processing, and are not persisted.

Detailed steps :

5.2.3.32 LVV-E3813 - Verify implementation of Template Coadds

Version **1.0(d)**. Open *LVV-E3813* test case in Jira.

Verify that the DMS can produce Template Coadds for DIA processing.

Preconditions:

None

Final comment:

Test executed on the RSP at USDF using pipelines version w_2025_33. The executed notebook was saved in the repository associated with this campaign's test report as "notebooks/test_LVV-T73.ipynb."

Detailed steps :

5.2.3.33 LVV-E3814 - Verify implementation of Deep Detection Coadds

Version **1.0(d)**. Open *LVV-E3814* test case in Jira.

Verify that the DRP pipelines produce a suite of per-band coadded images that are optimized for depth.

Preconditions:

None

Final comment:

Test executed on the RSP at USDF using pipelines version w_2025_33. The executed notebook was saved in the repository associated with this campaign's test report as "notebooks/test_LVV-T73.ipynb."

Detailed steps :

5.2.3.34 LVV-E3815 - Verify implementation of Object Characterization

Version **1.0(d)**. Open *LVV-E3815* test case in Jira.

Verify that Object catalogs produced by the DRP pipeline include all measurements listed in DMS-REQ-0276: a point-source model fit, a bulge-disk model fit, standard colors, a centroid, adaptive moments, Petrosian and Kron fluxes, surface brightness at multiple apertures, proper motion and parallax, and a variability characterization.

Preconditions:

None

Final comment:

Test executed at the USDF using commissioning data processed with pipelines version 'w_2025_49'. The notebook corresponding to this test is attached to the document repo as "test_LVV-T69.ipynb".

Detailed steps :

5.2.3.35 LVV-E3816 - Verify implementation of Object Catalog

Version **1.0(d)**. Open *LVV-E3816* test case in Jira.

Verify that the DRP pipelines produce an Object catalog derived from detections made on both coadded images and difference images and measurements performed on coadds and possibly overlapping single-epoch images.

Preconditions:

Input Data

DECam HiTS data (raw science images and master calibrations)

HSC "RC2" data (raw science images and master calibrations)

Final comment:

Test executed at the USDF using pipelines version 'w_2026_02'. The associated notebook from this test is attached to the report repository as "test_LVV-T67.ipynb".

Detailed steps :

5.2.3.36 LVV-E3817 - Verify implementation of Alert Content

Version **1.0(d)**. Open *LVV-E3817* test case in Jira.

Verify that the DMS creates an Alert for each detected DIASource

Verify that this Alert is broadcasted using community protocols

Verify that the context of the Alert packet match requirements.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.37 LVV-E3818 - Verify implementation of DIAObject Attributes

Version **1.0(d)**. Open *LVV-E3818* test case in Jira.

Verify that the DMS provides summary attributes for each DIAObject, including periodicity measures.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.38 LVV-E3821 - Verify implementation of DIAObject Catalog

Version **1.0(d)**. Open *LVV-E3821* test case in Jira.

Verify that the DIAObject includes a unique ID, identifiers for nearest stars and nearest galaxies, and probability of matching to static Object.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.39 LVV-E3822 - Verify implementation of DIASource Catalog

Version **1.0(d)**. Open *LVV-E3822* test case in Jira.

Verify that the DMS produces a Source catalog from Difference Exposures with the required attributes.

Preconditions:

None

Final comment:

Test executed on the RSP at USDF, using pipelines version w_2025_50. The executed notebook was saved in the repository associated with this campaign's test report as "notebooks/test_LVV-T49.ipynb."

Detailed steps :

5.2.3.40 LVV-E3823 - Verify implementation of Source Catalog

Version **1.0(d)**. Open *LVV-E3823* test case in Jira.

Verify that all Sources produced by the DRP pipelines contain the entries listed in DMS-REQ-0267.

Preconditions:

None

Final comment:

Test executed on the RSP at USDF, using pipelines version w_2025_33. The executed notebook was saved in the repository associated with this campaign's test report as "notebooks/test_LVV-T65.ipynb."

Detailed steps :

5.2.3.41 LVV-E3824 - Verify implementation of Data Access Center Geographical Distribution

Version **1.0(d)**. Open *LVV-E3824* test case in Jira.

Verify that the DACs are geographically distributed to provide low-latency access to data-rights community.

Preconditions:

None

Final comment:

Setting this test case as a Pass as the Data Access Centers have long since been established and in use since this test case was first defined. To demonstrate the "success" of this test case, I will attach relevant verification artifacts.

Detailed steps :

5.2.3.42 LVV-E3825 - Verify implementation of Data Access Center Simultaneous Connections

Version **1.0(d)**. Open *LVV-E3825* test case in Jira.

Verify that the each DAC can support at least `dacMinConnections` simultaneously

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.43 LVV-E3826 - Verify implementation of Data Access Centers

Version **1.0(d)**. Open *LVV-E3826* test case in Jira.

Verify that the Data Access Centers are provisioned with computing resources necessary to support end-user access to LSST Data Products.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.44 LVV-E3828 - Verify implementation of Archive to Data Access Center Network Reliability

Version **1.0(d)**. Open *LVV-E3828* test case in Jira.

Verify the reliability of Archive to Data Access Center Network by demonstrating successful failover and capacity to the secondary part and subsequent recovery to primary within or exceeding $chToDacNetMTTR = 48[hour]$.

Preconditions:

1. Data is staged in LDF and data transfer capabilities to US DAC and Chilean DAC are in place, running on end node computers that are the production hardware or equivalent to it.
2. As-built documentation for all of the above is available.
3. NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, LSSTCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.2.3.45 LVV-E3829 - Verify implementation of Archive to Data Access Center Network Availability

Version **1.0(d)**. Open *LVV-E3829* test case in Jira.

Verify availability of archiving to Data Access Center Network using test and historical data of or exceeding archToDacNetMTBF= 180[day].

Preconditions:

1. Data is staged in LDF and data transfer capabilities to US DAC and Chilean DAC are in place, running on end node computers that are the production hardware or equivalent to it.
2. At least 6 months of historical monitoring data is available on these network links, running on end node computers that are the production hardware or equivalent to it.
3. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.2.3.46 LVV-E3830 - Verify implementation of Archive to Data Access Center Network

Version **1.0(d)**. Open *LVV-E3830* test case in Jira.

Verify archiving of data to Data Access Center Network at or exceeding rates specified in LDM-142, i.e at archToDacBandwidth = 10000[megabit per second].

Preconditions:

1. Data is staged in LDF and data transfer capabilities to US DAC and Chilean DAC are in place, running on end node computers that are the production hardware or equivalent to it.
2. At least 6 months of historical monitoring data is available on these network links.
3. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, LSSTCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.2.3.47 LVV-E3831 - Verify implementation of Base to Archive Network Secondary Link

Version **1.0(d)**. Open *LVV-E3831* 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:

1. Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with simulated or pre-cursor data, running on end node computers that are the production hardware or equivalent to it.
2. Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base - Archive Network, running on end node computers that are the production hardware or equivalent to it.
3. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.2.3.48 LVV-E3833 - Verify implementation of Base to Archive Network Availability

Version **1.0(d)**. Open *LVV-E3833* 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:

1. Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with simulated or pre-cursor data, running on end node computers that are the production hardware or equivalent to it.
2. Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base - Archive Network, running on end node computers that are the production hardware or equivalent to it.
3. At least 6 months of historical monitoring data on this link is available.
4. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.2.3.49 LVV-E3834 - Verify implementation of Base to Archive Network

Version **1.0(d)**. Open *LVV-E3834* 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:

1. Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with simulated or pre-cursor data, running on end node computers that are the production hardware or equivalent to it.
2. Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base - Archive Network, running on end node computers that are the production hardware or equivalent to it.
3. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.2.3.50 LVV-E3835 - Verify implementation of Summit to Base Network Ownership and Operation

Version **1.0(d)**. Open *LVV-E3835* test case in Jira.

Verify Summit to Base Network Ownership and Operation by LSST and/or the operations entity by inspection of construction and operations contracts and Indefeasible Rights.

Preconditions:

1. As-built documentation for all of the above contracts and IRUs is available.

Final comment:

None

Detailed steps :

5.2.3.51 LVV-E3837 - Verify implementation of Summit to Base Network Reliability

Version **1.0(d)**. Open *LVV-E3837* test case in Jira.

Verify the reliability of the summit to base network by demonstrating reconnection and recovery to transfer of data at or exceeding rates specified in LDM-142 following a cut in network connection, within MTTR specification. The network operator will provide MTTR data on links during commissioning and operations.

Preconditions:

1. PMCS DMTC-7400-2400 Complete
2. As-built documentation for Summit - Base Network is available.

NOTE: After the initial test, the corresponding verification elements will be flagged as “Requires Monitoring” such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.2.3.52 LVV-E3838 - Verify implementation of Summit to Base Network Availability

Version **1.0(d)**. Open *LVV-E3838* test case in Jira.

Verify the availability of Summit to Base Network by demonstrating that the mean time between failures is less than summToBaseNetMTBF (90 days) over 1 year.

Preconditions:

1. PMCS DMTC-7400-2400 Complete.
2. 6 months of historical availability data for this link is available.
3. perSonar installed in Summit and publishing statistics to MadDash.
4. As-built documentation for all of the above is available.

NOTE: After the initial test, the corresponding verification elements will be flagged as “Requires Monitoring” such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out

of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Final comment:

None

Detailed steps :

5.2.3.53 LVV-E3839 - Verify implementation of Prefer Computing and Storage Down

Version **1.0(d)**. Open *LVV-E3839* test case in Jira.

Only build compute or storage facilities at the summit that are justified by operational need or to prevent loss of data during networking downtimes.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.54 LVV-E3840 - Verify implementation of Incorporate Fault-Tolerance

Version **1.0(d)**. Open *LVV-E3840* test case in Jira.

Demonstrate that Data Management Systems have features that prevent data loss. Includes: MD5SUM/checksum verification for data transfer; RAID to eliminate single-point disk failures; multi-site and tape for disaster recovery of raw data; multiple site (and tape?) for backup/recovery of Data Release products; DB transaction logging and backup to maintain DB integrity. (Note: storage to prevent loss in case of networking failures is covered in LVV-T175).

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.55 LVV-E3841 - Verify implementation of Infrastructure Sizing for "catching up"

Version **1.0(d)**. Open *LVV-E3841* test case in Jira.

Demonstrate Data Management System has sufficient excess capacity (compute infrastructure) to process one night's data (2800 exposures) within 24 hours while also maintaining nightly Alert Production (note this is very similar to LVV-T173).

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.56 LVV-E3842 - Verify implementation of Temporary Storage for Communications Links

Version **1.0(d)**. Open *LVV-E3842* test case in Jira.

Demonstrate that storage capacity is present and usable to prevent data loss if networking is interrupted between summit and base, base and archive, or archive and DAC. The requirement is to have storage necessary to hold tempStorageReIMTTR (200%) of the expected raw

data that would arrive during the Mean Time to Repair ($\text{summToBaseNetMTTR} = 24$ hours, $\text{baseToArchNetMTTR} = 48$ hours, $\text{archToDacNetMTTR} = 48$ hours). This scale is further set by $\text{nCalibExpDay} + \text{nRawExpNightMax} = 450 + 2800 = 3250$ exposures/day.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.57 LVV-E3843 - Verify implementation of Re-processing Capacity

Version **1.0(d)**. Open *LVV-E3843* test case in Jira.

Verify that the DMS has sufficient processing, storage, and network to reprocess all data within "drProcessingPeriod" (1 year) while maintaining full Prompt Processing capability.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.58 LVV-E3844 - Verify implementation of Pipeline Throughput

Version **1.0(d)**. Open *LVV-E3844* test case in Jira.

Specification: The infrastructure will be sized such that the net throughput of the data pro-

cessing pipelines will permit a complete processing of a night's observing data prior to the start of the next observing night, assuming no system outages.

Demonstrate that the Alert Production Pipeline is capable of processing `nRawExpNightMax` (2800) science exposures within a (`24-nightDurationMax`) 12 hour period and issue alerts in offline batch mode.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.59 LVV-E3845 - Verify implementation of Optimization of Cost, Reliability and Availability

Version **1.0(d)**. Open *LVV-E3845* test case in Jira.

In matters of cost, system reliability (functioning properly at a given time) has precedence over system availability (ability to use the system at a given time). The optimization may be outside the realm of direct testing as it is more of a system provisioning guideline but on its face it demands that the Data Management System include failure reporting, regimented change control, acceptance testing, maintenance and monitoring.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.60 LVV-E3846 - Verify implementation of Provide User Interface Services

Version **1.0(d)**. Open *LVV-E3846* test case in Jira.

Verify the availability and functionality of the broad range of user interface services called for in the requirement, as applied to both Nightly and DRP data. This will primarily be done by verifications performed at the LSST Science Platform level, based on the requirements in LDM-554; however, a high-level set of tests corresponding to the DMS-REQ-0160 requirement are defined below.

Preconditions:

1. Testing this requirement relies on a set of data products meeting the data model implied by the DPDD existing in a deployment of the Science Platform and its underlying database and file services.
 - (a) In particular, both image and catalog data products are required.
 - (b) From the specific language of the underlying requirement, it appears clear that coadded data products are required, but in practice single-epoch data products should be included in the test as well.
2. Depending on when this requirement is tested, the tests may involve either or both of precursor data and LSST commissioning data. The use of the latter is ultimately essential to ensure that the tests are performed with as LSST-like a dataset as possible.

Final comment:

None

Detailed steps :

5.2.3.61 LVV-E3848 - Verify implementation of Coadded Image Provenance

Version **1.0(d)**. Open *LVV-E3848* test case in Jira.

Verify that all coadd data products produced by the DRP pipelines are associated with provenance information that includes the set of input epochs contributing to that coadd as well as any additional information needed to exactly produce that coadd.

Preconditions:

None

Final comment:

Executed at the USDF using pipelines version 'w_2026_13'. The script that was executed for this test, and its output log, are attached to this document's repo as "test_LVV-T64.py" and "test_LVV-T64.log".

Detailed steps :

5.2.3.62 LVV-E3849 - Verify implementation of Produce Images for EPO

Version **1.0(d)**. Open *LVV-E3849* test case in Jira.

This test will verify that the DRP pipelines produce the image data products called out in LSE-131. Currently this is limited to a color all-sky HiPS map. This will be verified (1) by inspection of pipeline configurations and (2) in operations rehearsals on precursor data. The production of a usable HiPS map will be verified by browsing it with community tools.

Preconditions:

In order for an operational test to be successful, as a precondition the inputs to that production must exist. For the only currently mandated image data production in LSE-131, a color all-sky HiPS map down to 1 arcsecond resolution, the prerequisite inputs to that are the single-filter coadds in the bands required by the yet-to-be-specified color prescription.

Final comment:

None

Detailed steps :

5.2.3.63 LVV-E3850 - Verify implementation of Generate Calibration Report Within Specified Time

Version **1.0(d)**. Open *LVV-E3850* test case in Jira.

Verify that the DMS can generate a night Calibration Report in both human-readable and machine-parseable forms.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.64 LVV-E3851 - Verify implementation of Prompt Processing Performance Report Definition

Version **1.0(d)**. Open *LVV-E3851* test case in Jira.

Verify that the DMS produces a Prompt Processing Performance Report. Specifically check that the number of observations that describe each of the following:

1. Successfully processed, recoverable failures, unrecoverable failures.
2. Archived
3. Result in science.

This is testing more the processing rather than the observatory system.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.65 LVV-E3852 - Verify implementation of Generate DMS Performance Report Within Specified Time

Version **1.0(d)**. Open *LVV-E3852* test case in Jira.

Verify that the DMS can generate a nightly Performance Report within perfReportComplTime

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.66 LVV-E3854 - Verify implementation of Maintain Archive Publicly Accessible

Version **1.0(d)**. Open *LVV-E3854* test case in Jira.

Verify that prior data releases remain accessible.

Preconditions:

Availability of at least three (3) data releases, of which at least one of them must be archived outside the QSERV database. These can be precursor datasets, if needed.

Final comment:

None

Detailed steps :

5.2.3.67 LVV-E3855 - Verify implementation of Difference Exposure Attributes

Version **1.0(d)**. Open *LVV-E3855* test case in Jira.

Verify that for each Difference Exposure the DMS stores

1. The identify of the input exposures and related provenance information
2. Metadata attributes of the subtraction, including the PSF-matching kernel used.

Preconditions:

None

Final comment:

Test executed with pipelines version w_2025_41, examining data products from w_2025_30 processing of LSSTCam on-sky data. The related notebook demonstrating the detailed verification is attached to this report's github repository as test_LVV-T37.ipynb.

Detailed steps :

5.2.3.68 LVV-E3856 - Verify implementation of Provide Image Access Services

Version **1.0(d)**. Open *LVV-E3856* test case in Jira.

Verify that images can be identified and that images and image cut-outs can be retrieved using the network interfaces - primarily IVOA standards-based - and Python APIs provided for image access by science users.

Preconditions:

Testing requires the establishment of running services such as SIAv2 and SODA to which the tests can be applied and a dataset with all LSST image types

Final comment:

None

Detailed steps :

5.2.3.69 LVV-E3858 - Verify implementation of Illumination Correction Frame

Version **1.0(d)**. Open *LVV-E3858* test case in Jira.

Verify that the DMS can produce an illumination correction frame calibration product.
Verify that the DMS can determine the effectiveness of an illumination correction and determine how often it should be updated.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.70 LVV-E3859 - Verify implementation of Enable a Range of Shape Measurement Approaches

Version **1.0(d)**. Open *LVV-E3859* test case in Jira.

Verify that multiple shape measurement algorithms can be used.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.71 LVV-E3860 - Verify implementation Provide Astrometric Model

Version **1.0(d)**. Open *LVV-E3860* test case in Jira.

Verify that an astrometric model is available for Objects and DIAObjects.

Preconditions:

None

Final comment:

Test executed at the USDF with pipelines version 'w_2025_50'. The notebook is attached to this report's github repo as "test_LVV-T128.ipynb".

Detailed steps :

5.2.3.72 LVV-E3863 - Verify Pipeline Availability

Version **1.0(d)**. Open *LVV-E3863* test case in Jira.

Demonstrate that Data Management System pipelines are available for use without disruptions of greater than productionMaxDowntime (24 hours).

This requires a regimented change control process and testing infrastructure for all pipelines and their underlying software services, and regimented management and monitoring of compute and networking resources.

The list of services covered by this test include:

- Image and EFD Archiving,

- Prompt Processing,
- OCS Driven Batch,
- Telemetry Gateway,
- Alert Distribution,
- Alert Filtering,
- Batch Production,
- Data Backbone,
- Compute/Storage/LAN,
- Inter-Site Networks, and
- Service Management and Monitoring.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.73 LVV-E3868 - Verify implementation of Transient Alert Distribution

Version **1.0(d)**. Open *LVV-E3868* test case in Jira.

Precursor or simulated data, execute AP, observe distribution to simulated clients using standard protocols

Preconditions:

Final comment:

None

Detailed steps :

5.2.3.74 LVV-E3872 - Verify secure data transfer from summit to archive

Version **1.0(d)**. Open *LVV-E3872* test case in Jira.

Verify that the data transfer from the summit to the USDF complies with funding agency requirements for cyber security.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.75 LVV-E3874 - Verify uncached L1 data product lifetime for focal plane PVIs

Version **1.0(d)**. Open *LVV-E3874* test case in Jira.

Verify that unarchived, Level 1 full focal-plane PVIs are available on the file system and retrievable for **l1CacheLifetime = 30[day]**.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.76 LVV-E3875 - Verify the minimum number of simultaneous full-visit PVI users

Version **1.0(d)**. Open *LVV-E3875* test case in Jira.

Verify that at least **allPviRetrievalUsers = 10** simultaneous users are able to retrieve distinct focal-plane PVI datasets.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.77 LVV-E3876 - Verify uncached L1 data product lifetime for single CCDs

Version **1.0(d)**. Open *LVV-E3876* test case in Jira.

Verify that unarchived, Level 1 single-CCD PVIs are available on the file system and retrievable for **l1CacheLifetime = 30[day]**.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.78 LVV-E3877 - Verify the minimum number of simultaneous single-CCD PVI users

Version **1.0(d)**. Open *LVV-E3877* test case in Jira.

Verify that at least **pviRetrievalUsers = 20** simultaneous users are able to retrieve single, distinct PVI images.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.79 LVV-E3878 - Verify maximum size of low-volume query results

Version **1.0(d)**. Open *LVV-E3878* test case in Jira.

Verify that low-volume queries return less than `lvMaxReturnedResults = 0.5[gigabyte]`

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.80 LVV-E3994 - Publishing the Predicted Visit Schedule

Version **1.0(d)**. Open *LVV-E3994* test case in Jira.

Verify that a predict-visit schedule can be published by the OCS.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.81 LVV-E4047 - Verify max time to retrieve low-volume query results

Version **1.0(d)**. Open *LVV-E4047* test case in Jira.

Verify that low volume query results are retrievable in a maximum time of **lvQueryTime = 10 seconds**.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.82 LVV-E4048 - Verify min number of simultaneous low-volume query users

Version **1.0(d)**. Open *LVV-E4048* test case in Jira.

Verify that a minimum of **lvQueryUsers = 100** users can simultaneously execute low volume queries.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.83 LVV-E4052 - Verify implementation of Archive Center Disaster Recovery

Version **1.0(d)**. Open *LVV-E4052* test case in Jira.

Verify disaster recovery plan for Archive Center.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.84 LVV-E4053 - Verify implementation of Raw Data Archiving Reliability

Version **1.0(d)**. Open *LVV-E4053* test case in Jira.

Verify that raw images are reliably archived.

Preconditions:

None

Final comment:

None

Detailed steps :

5.2.3.85 LVV-E4057 - Verify calculation of band-to-band color zero-point accuracy including u-band

Version **1.0(d)**. Open *LVV-E4057* test case in Jira.

Verify that the DM system provides software to assess whether the accuracy of absolute band-to-band color zero-points for all colors constructed from any filter pair, including the u-band, is less than **PA5u = 10 millimagnitudes**.

Preconditions:

None

Final comment:

Test performed using DRP processing of LSSTComCam data from Data Preview 1. This was necessary because there are not yet any LSSTCam observations containing absolute flux standards in all passbands. The notebook where calculations were performed is attached to this Report's git repository as test_LVV-T1846.ipynb.

Detailed steps :

5.2.3.86 LVV-E4058 - Verify calculation of zeropoint error fraction exceeding the outlier limit

Version **1.0(d)**. Open *LVV-E4058* test case in Jira.

Verify that the DM system provides software to calculate the fraction of zeropoint errors that exceed the zero point error outlier limit, and confirm that it is less than **PF2 = 10 percent**.

Preconditions:

None

Final comment:

Test performed using pipelines version w_2025_38 and the DRP processing of Science Validation data with pipelines version w_2025_37. The notebook where calculations were performed is attached to this Report's git repository as test_LVV-T1842_T2202.ipynb.

Detailed steps :

5.2.3.87 LVV-E4059 - Verify calculation of RMS width of photometric zeropoint

Version **1.0(d)**. Open *LVV-E4059* test case in Jira.

Verify that the DM system provides code to assess whether the RMS width of the internal photometric zero-point (precision of system uniformity across the sky) for all bands except u-band is less than **PA3 = 10 millimagnitudes**.

Preconditions:

None

Final comment:

Test performed using pipelines version w_2025_38 and the DRP processing of Science Validation data with pipelines version w_2025_37. The notebook where calculations were performed is attached to this Report's git repository as test_LVV-T1839.ipynb.

Detailed steps :

5.2.3.88 LVV-E4060 - Verify calculation of band-to-band color zero-point accuracy

Version **1.0(d)**. Open *LVV-E4060* test case in Jira.

Verify that the DM system provides code to assess whether the accuracy of absolute band-to-band color zero-points for all colors constructed from any filter pair, excluding the u-band, is less than **PA5 = 5 millimagnitudes**.

Preconditions:

None

Final comment:

Test performed using DRP processing of LSSTComCam data from Data Preview 1. This was necessary because there are not yet any LSSTComCam observations containing absolute flux standards in all passbands. The notebook where calculations were performed is attached to this Report's git repository as test_LVV-T1837.ipynb.

Detailed steps :

5.2.3.89 LVV-E4061 - Verify that the of zero-point error outlier limit threshold (PA4) can be applied.

Version **1.0(d)**. Open *LVV-E4061* test case in Jira.

Verify that the DMS has provided the code to apply the zero-point error outlier limit threshold (PA4) to computed values of metrics.

Preconditions:

None

Final comment:

Test performed using pipelines version w_2025_38 and the DRP processing of Science Validation data with pipelines version w_2025_37. The notebook where calculations were performed is attached to this Report's git repository as test_LVV-T1842_T2202.ipynb.

Detailed steps :

5.2.3.90 LVV-E4062 - Verify Implementation of Data Management Nightly Reporting

Version **1.0(d)**. Open *LVV-E4062* test case in Jira.

Verify that the LSST Data Management subsystem produces a searchable - interactive nightly report(s), from information published in the EFD by each subsystem, summarizing performance and behavior over a user defined period of time (e.g. the previous 24 hours).

Preconditions:

None

Final comment:

Verified via inspection of the "Nightly Digest", using a recent night of LSSTCam on-sky observing taken during the Science Validation surveys in commissioning.

Note that the Nightly Digest is in active development, and will thus improve and evolve over the near future.

Detailed steps :

5.2.3.91 LVV-E4068 - Verify calculation of u-band photometric zero-point RMS

Version **1.0(d)**. Open *LVV-E4068* test case in Jira.

Verify that the DM system provides software to assess whether the RMS width of internal photometric zero-point (precision of system uniformity across the sky) in the u-band is less than **PA3u = 20 millimagnitudes**.

Preconditions:

None

Final comment:

Test performed using pipelines version w_2025_38 and the DRP processing of Science Valida-

tion data with pipelines version w_2025_37. The notebook where calculations were performed is attached to this Report's git repository as test_LVV-T1844.ipynb.

Detailed steps :

5.2.3.92 LVV-E4069 - Verify accuracy of photometric transformation to physical scale

Version **1.0(d)**. Open *LVV-E4069* test case in Jira.

Verify that the DM system provides software to assess whether the accuracy of the transformation of internal LSST photometry to a physical scale (e.g. AB magnitudes) is less than **PA6 = 10 millimagnitudes**.

Preconditions:

None

Final comment:

Test performed using DRP processing of LSSTComCam data from Data Preview 1. This was necessary because there are not yet any LSSTCam observations containing absolute flux standards in all passbands. The notebook where calculations were performed is attached to this Report's git repository as test_LVV-T1845.ipynb.

Detailed steps :

5.2.3.93 LVV-E4070 - Verify implementation of Image Differencing with single-exposure templates

Version **1.0(d)**. Open *LVV-E4070* test case in Jira.

Verify that the DMS can perform image differencing from single exposures.

Preconditions:

None

Final comment:

Results are in the notebook "test_LVV-T3177.ipynb" attached to this test repository.

Detailed steps :

Draft

A Documentation

The verification process is defined in LSE-160. The use of Docsteady to format Jira information in various test and planing documents is described in DMTN-140 and practical commands are given in DMTN-178.

B Acronyms used in this document

Acronym	Description
ADQL	Astronomical Data Query Language (IVOA standard)
AP	Alert Production
AURA	Association of Universities for Research in Astronomy
Avro	is a row-oriented remote procedure call and data serialization framework developed within Apache's Hadoop project
CCD	Charge-Coupled Device
CERN	European Organization for Nuclear Research
DAC	Data Access Center
DAQ	Data Acquisition System
DB	DataBase
DC2	Data Challenge 2 (DESC)
DECam	Dark Energy Camera
DESC	Dark Energy Science Collaboration
DHCP	Dynamic Host Configuration Protocol
DIA	Difference Image Analysis
DM	Data Management
DMCS	Data Management Control System
DMS	Data Management Subsystem
DMS-REQ	Data Management System Requirements prefix
DMSR	DM System Requirements; LSE-61
DMTN	DM Technical Note
DMTR	DM Test Report
DP0	Data Preview 0
DP1	Data Preview 1
DP2	Data Preview 2

DPDD	Data Product Definition Document
DR1	Data Release 1
DR2	Data Release 2
DRP	Data Release Processing
DWDM	Dense Wave Division Multiplex
EFD	Engineering and Facility Database
EPO	Education and Public Outreach
FGCM	Forward Global Calibration Method
FIU	Florida International University
FWHM	Full Width at Half-Maximum
GAaP	Gaussian Aperture and PSF
GB	Gigabyte
GMT	Giant Magellan Telescope
GPU	Graphics Processing Unit
HSC	Hyper Suprime-Cam
HSM	Hierarchical Storage Management
HST	Hubble Space Telescope
HiPS	Hierarchical Progressive Survey (IVOA standard)
ICRS	International Celestial Reference Frame
IP	Internet Protocol
IRU	indefeasible right to use
ISO	Information Security Officer
ISR	Instrument Signal Removal
IVOA	International Virtual Observatory Alliance
JSON	JavaScript Object Notation
L1	Lens 1
LAN	Local Area Network
LATISS	LSST Atmospheric Transmission Imager and Slitless Spectrograph
LDF	LSST Data Facility
LDM	LSST Data Management (Document Handle)
LHN	long haul network
LSE	LSST Systems Engineering (Document Handle)
LSP	LSST Science Platform (now Rubin Science Platform)
LSST	Legacy Survey of Space and Time

LSSTCam	LSST Science Camera
LSSTComCam	Rubin Commissioning Camera
LVV	LSST Verification and Validation
MOC	Multi-Order Coverage (IVOA standard)
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
NCSA	National Center for Supercomputing Applications
NOIRLab	NSF National Optical-Infrared Astronomy Research Laboratory
OCS	Observatory Control System
OS	Operating System
OSPF	Open Short Path First
OSS	Observatory System Specifications; LSE-30
PM	Project Manager
PMCS	Project Management Controls System
PSF	Point Spread Function
PVI	Processed Visit Image
QA	Quality Assurance
QSERV	LSST Query Services
RA	Rapid Analysis
RAID	Redundant Array of Inexpensive Disks
REUNA	Red Universitaria Nacional
RMS	Root-Mean-Square
RSP	Rubin Science Platform
RTN	Rubin Technical Note
S3	(Amazon) Simple Storage Service
SED	Spectral Energy Distribution
SITCOM	System Integration, Test and Commissioning
SLAC	SLAC National Accelerator Laboratory
SNR	Signal to Noise Ratio
SODA	Server-side Operations for Data Access (IVOA standard)
TAP	Table Access Protocol (IVOA standard)
TB	TeraByte
TN	Technical Note
UK	United Kingdom

URL	Universal Resource Locator
US	United States
USDF	United States Data Facility
UX	User Experience
VO	Virtual Observatory
VOIP	Voice Over Internet Protocol
WCS	World Coordinate System

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