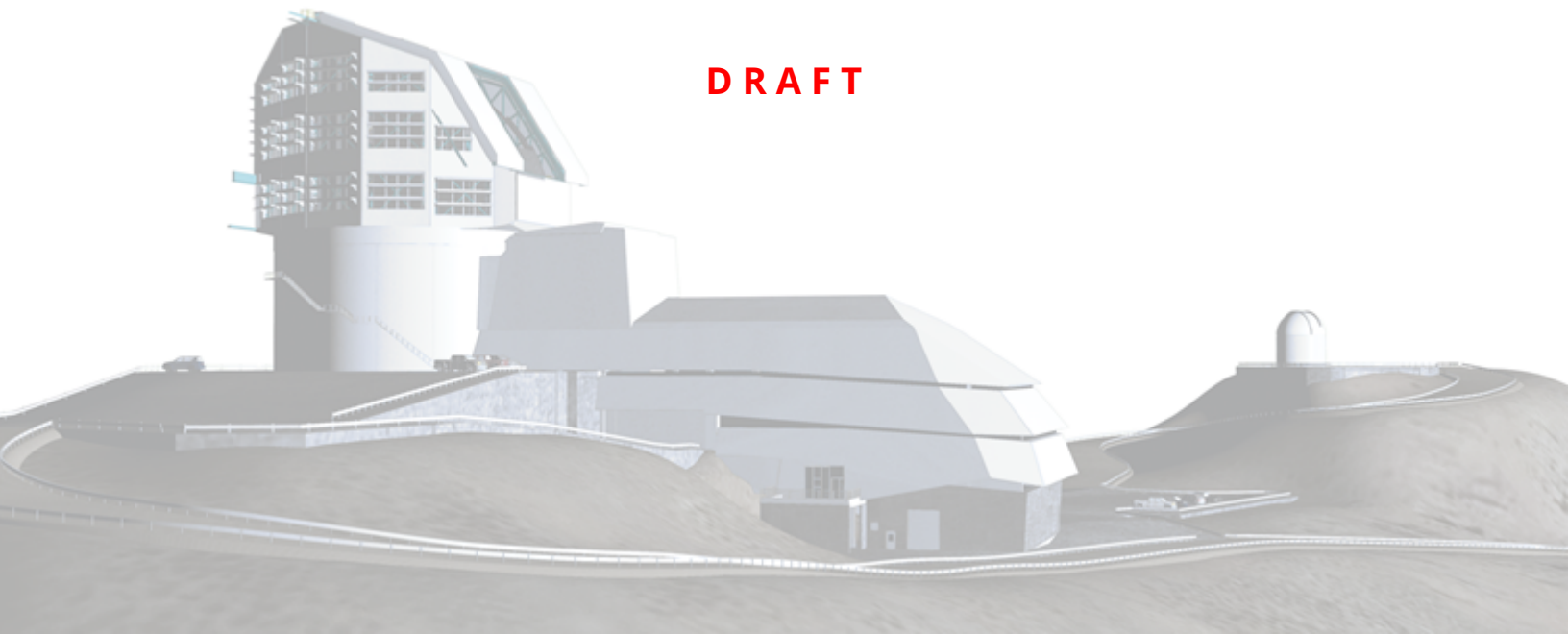**Vera C. Rubin Observatory
Data Management**

LDM-503-6: ComCam Interface Verification Readiness Test Plan and Report

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DMTR-171

Latest Revision: 2020-10-30

D R A F T

Abstract

This is the test plan and report for **ComCam Interface Verification Readiness** (LDM-503-6), an LSST milestone pertaining to the Data Management Subsystem.

Change Record

Version	Date	Description	Owner name
	2019-10-16	Draft	Michelle Butler
1.0	2019-12-03	Test Plan ready for execution. DM-16074	Michelle Butler
2.0	2020-10-30	Test campaign completed. DM-17119	Michelle Butler

Document curator: Michelle Butler

Document source location: `https://github.com/lsst-dm/DMTR-171`

Version from source repository: 030c9d4

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1 Introduction

1.1 Objectives

This test campaign will verify the readiness of the ComCam DM interface. This milestone records successful transfer of an image equivalent to one raft from the DAQ at the summit to reliable storage in the LSST Data Facility at NCSA, from where it will be made available for scientific evaluation through the Rubin Science Platform There are many steps along the way from the DAQ to the L1 handoff machine, transferred to NCSA and ingested into the permanent record of the survey.

1.2 System Overview

The system includes the ComCam DAQ at the summit, and the ComCam DAQ network connecting the ComCam systems to the support infrastructure at the base. On the Com-Cam DAQ network is the ComCam-header service system, the ComCam-forwarder, ComCam-archiver, and on a base network the L1 handoff with the OODS and DBB services. At NCSA, the DBB ingest environment, the raw image file systems, the ingested image file systems and the RSP notebook aspect This milestone includes many steps. It will ensure that image data can be acquired from the camera, a single YAML header file is generated for all 9 CCDs (or sensors), is ingested into a butler into the Base Data Center file systems, served through NFS for the base systems for quick look capabilities, made available for DBB resources, transferred to NCSA, ingested by a butler into NCSA filesystems and made available for processing/viewing by the RSP.

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1.3 Applicable Documents

LDM-294 Data Management Organization and Management
LDM-503 DM Test Plan
LDM-148 Data Management System Design
LDM-639 Data Management Test Specification

1.4 Document Overview

This document was generated from Jira, obtaining the relevant information from the LVV-P50 Jira Test Plan and related Test Cycles (LVV-C106).

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 overall 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-P50 in Jira is **Completed** .

1.5 References

[1] **[LDM-639]**, Guy, L., 2018, *DM Acceptance Test Specification*, LDM-639, URL `https://ls.st/LDM-639`

[2] **[LDM-148]**, Lim, K.T., Bosch, J., Dubois-Felsmann, G., et al., 2018, *Data Management System*

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Design, LDM-148, URL https://ls.st/LDM-148

[3] **[LDM-294]**, O'Mullane, W., Swinbank, J., Jurić, M., DMLT, 2018, *Data Management Organization and Management*, LDM-294, URL https://ls.st/LDM-294

[4] **[LDM-503]**, O'Mullane, W., Swinbank, J., Jurić, M., Economou, F., 2018, *Data Management Test Plan*, LDM-503, URL https://ls.st/LDM-503

2   Test Plan Details

2.1   Data Collection

Observing is not required for this test campaign.

2.2   Verification Environment

The verification environment includes the DAQ, ComCam-archiver, ComCam-header service, ComCam-forwarder, L1-handoff, long haul network, NCSA DBB gateway environments, GPFS file systems at NCSA, and the RSP at NCSA.

2.3   Entry Criteria

Images can be taken from the ComCam environment from the summit with unique names and complete headers.

2.4   Exit Criteria

Images can be ingested ingested and available through the RSP at the LDF for viewing and processing by science staff at NCSA.

2.5   Related Documentation

No additional documentation provided.

2.6   PMCS Activity

Primavera milestones related to the test campaign:

- LDM-503-6

3   Personnel

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

	T. Plan LVV-P50 owner:	**Michelle Butler**	
	T. Cycle LVV-C106 owner:	**Michelle Butler**	
Test Cases	**Assigned to**	**Executed by**	**Additional Test Personnel**
LVV-T1549	Michelle Butler	Michelle Butler	Michelle Gower and Michelle Butler and Steve P and Felipe M.

4 Test Campaign Overview

4.1 Summary

T. Plan LVV-P50:	**LDM-503-6: ComCam Interface Verification Readiness**			Completed
T. Cycle LVV-C106:	**LDM-503-6 ComCam verification readiness**			Done
Test Cases	**Ver.**	**Status**	**Comment**	**Issues**
LVV-T1549	1	Pass	The testing of the comcam subsystem was completed many times with testing, but the largest test cycle was done during the Operations rehearsal #2 work. Images were take on the comcam DAQ system installed at the Base Data Center because the summit was closed due to COVID. There were 3 sets of image types and multiplies take for each set. There were darks flats, and bias images taken. Each of those had 9 CCD fits files images generated and transferred over the LHN to NCSA. They were monitored throughout the path, and ingested. Other science team members ran ISR pipelines (Gen2) on the images, and reported feedback to the OR2 team. There were team calls once a day to review the progress and how the OR2 went that day.	

Table 2: Test Campaign Summary

4.2 Overall Assessment

All files generated well with no intervention, the files transferred but we found that the SCP protocol that was used was VERY inefficient for transferring small files over a long haul network.   During the tests, the team wasn't sure if the LHN was really being used, and what the "data transfer" time really was.   One slight change from the original plan, is using the L1 handoff machine for the OODS and DBB services.   The L1-handoff machine is currently not set up at the BDC.   For this test the OODS and DBB servers were running on the ComCam-archiver system.   In the future this functionality will be moved to the L1-handoff machine.

4.3   Recommended Improvements

The DBBBM needs to use a different protocol than SCP.   BBCP would be much better for performance.   Also throughout the tests, it would have been handy to have someone on the team check the LHN to see if we used the LHN, backup networks, and what the speeds of the LHN.   We will add a networking person to the OR team.

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5   Detailed Test Results

5.1   Test Cycle LVV-C106

Open test cycle *LDM-503-6 ComCam verification readiness* in Jira.

Test Cycle name: LDM-503-6 ComCam verification readiness
Status: Done

Verify that the DM services required for ComCam exist and are ready to recieve a image from the comcam DAQ at the summit and transfer the file to NCSA for viewing on the RSP.

5.1.1   Software Version/Baseline

Not provided.

5.1.2   Configuration

There are many pieces here.   ComCam DAQ, ComCam-header service, ComCam archiver/-forwarder, DTN transfers, DM butler/G3, LDF file systems, LDF RSP.

5.1.3   Test Cases in LVV-C106 Test Cycle

5.1.3.1   LVV-T1549 - LDM-503-6 Comcam verification readiness

Version **1**. Open *LVV-T1549*   test case in Jira.

Verify that ComCam has all the services running and verified working for retrieving an image from the ComCam DAQ and store it on file systems at the LDF for viewing by RSP.

 Preconditions:
ComCam must be In LaSerena and producing images with proper headers.

Execution status: **Pass**

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Final comment:

The testing of the comcam subsystem was completed many times with testing, but the largest test cycle was done during the Operations rehearsal #2 work. Images were take on the comcam DAQ system installed at the Base Data Center because the summit was closed due to COVID.   There were 3 sets of image types and multiplies take for each set.   There were darks flats, and bias images taken. Each of those had 9 CCD fits files images generated and transferred over the LHN to NCSA. They were monitored throughout the path, and ingested. Other science team members ran ISR pipelines (Gen2) on the images, and reported feedback to the OR2 team.   There were team calls once a day to review the progress and how the OR2 went that day.

Detailed steps results:

Step	Step Details
1	**Description**
	CC-DAQ produces an image
	Test Data
	DAQ produces a SAL message that a image has been created
	Expected Result
	in memory file created in DAQ
	Actual Result
	1 raft scale (9CCDs) have been created.
	Status: **Pass**
2	**Description**
	Archiver and Forwarder build image with proper header from header service
	Test Data
	Good image file with proper header with all 9 CCDs
	Expected Result
	9 image files all with individual headers and then 1 header for all 9 images too.
	Actual Result
	the headers and the images were built properly.
	Status: **Pass**
3	**Description**

AT-archiver/forwarder transfers the file to the l1-handoff machine.

Test Data

l1-handoff machine has image file now on local disk.

Expected Result

image file now found on disk on L1-handoff with hardlinks to 2 different file systems (OODS and DBB) services.

Actual Result

The actual fits files were created.

Status: **Pass**

4	Description

OODS service running on L1-handoff machine ingests the image file into Butler/G3 and readies the file systems for the commissioning cluster at the Base to be able to mount and see the new files.

Test Data

Image file ingested to local butler for Base

Expected Result

Image file ingested

Actual Result

the OODS has the list of files ingested and ready for any system at the BDC wanting to run against them.

Status: **Pass**

5	Description

DBB transfers the file to NCSA thorough the DBB-gateway machines and DTN nodes at the base.

Expected Result

data file arrives at file systems at NCSA

Actual Result

The files arrived, ingested and placed in directory structure: /lsstdata/offline/teststand/comcam/Archiver/storage/2020-07-28

Status: **Pass**

6	Description

Files are ingested into the butler/G3 at NCSA and moved to file systems that are viewable by the LSP.

Expected Result

data can be seen and retrieved by LSP.

Actual Result

The files are then linked for the viewing by science platform on /project/shared/comcam.

Status: **Pass**

A   Acronyms used in this document

Acronym	Description
AT	Auxiliary Telescope
BDC	Base Data Center
CC	ComCam
CCD	Charge-Coupled Device
COVID	COrona VIrus Disease
ComCam	The commissioning camera is a single-raft, 9-CCD camera that will be installed in LSST during commissioning, before the final camera is ready.
DAQ	Data Acquisition System
DBB	Data Backbone
DBBBM	Data Backbone Buffer Manager
DM	Data Management
DMS	Data Management Subsystem
DMS-REQ	Data Management System Requirements prefix
DMTR	DM Test Report
DTN	Data Transfer Node
GPFS	General Parallel File System (now IBM Spectrum Scale)
ISR	Instrument Signal Removal
L1	Lens 1
LDF	LSST Data Facility
LDM	LSST Data Management (Document Handle)
LHN	long haul network
LSP	LSST Science Platform (now Rubin Science Platform)
LSST	Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope)
NCSA	National Center for Supercomputing Applications
NFS	Network File System
OCS	Observatory Control System
OODS	Observatory Operations Data Service
PMCS	Project Management Controls System
RSP	Rubin Science Platform
SAL	Service Abstraction Layer
VE	vendor estimate

YAML	Yet Another Markup Language

B Traceability

Test Case	VE Key	VE Summary
LVV-T1549	LVV-9	DMS-REQ-0020-V-01: Wavefront Sensor Data Acquisition
	LVV-8	DMS-REQ-0018-V-01: Raw Science Image Data Acquisition
	LVV-28	DMS-REQ-0068-V-01: Raw Science Image Metadata
	LVV-11	DMS-REQ-0024-V-01: Raw Image Assembly
	LVV-146	DMS-REQ-0315-V-01: DMS Communication with OCS