OPERATIONAL TEST AND EVALUATION (OT&E) REPORT

For

The National Weather Service ASOS Operations and Monitoring Center (AOMC) Background System Upgrade

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U.S. DEPARTMENT OF COMMERCE
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1.0 Introduction

In mid-1992, the AOMC (ASOS Operations and Monitoring Center) was commissioned and placed in service to support and maintain ASOS (Automated Surface Observing System) deployed across the nation. The AOMC provides maintenance monitoring support for all fielded ASOS sites and access for each ASOS to the following; 1) ASOS site-specific parameter and configuration files, and 2) access to a precision time-source via a toll-free number.

The AOMC equipment providing access to the site-specific files and the precision time source (AOMC background) were originally installed on 286 personal computers using the DELL System-V UNIX package. Red Hat Enterprise Linux 3 was introduced in 2006 and was supported until October 31, 2010 and with the passage of time, the equipment and operating systems have become outdated, requiring the AOMC to go through three upgrades since the original installation.

Up until now, the AOMC operating system has been using the Red Hat Enterprise LINUX 3 (RHEL 3). While still a strong and reliable operating system, the version has reached End of Life and support for this operating system has systematically deteriorated. This precluded the Software Branch from making any significant changes / enhancements deemed necessary for the AOMC background system. To overcome this problem, a decision was reached to migrate the AOMC operating system to the newest version of Red Hat Enterprise Linux 6 (RHEL 6) operating system. Red Hat Enterprise Linux 6 (RHEL 6) system combines all of the functionalities available with the Red Hat Enterprise Linux 3 (RHEL 3) and more. Research shows the Red Hat Enterprise Linux 6 will not reach end of life until 30 November 2017 and software support from the Software Branch (OPS23) will also be readily available.

The new AOMC background systems was based upon standard DELL desktop PCs running the latest version of Red Hat Enterprise operating system is RHEL6. The purchase and delivery of the new DELL systems was completed in late December 2010. A brief system test (ST) was successfully conducted by OPS24 from August 24-31, 2011 to ensure the systems would be ready for Operational Test and Evaluation (OTE). A meeting was held on 08/31/2011 to review the ST results and to kick-off the OT&E. The attendees (OPS24-Khien Nguyen, OPS32-Christopher Stark, Barbara Burgos, and OPS23-Hak Kim) concluded the ST was successful and the systems were ready for the OT&E. The OT&E began on September 06, 2011 and ended on January 31, 2012. The results of the OT&E are documented herein.

2.0 OT&E Objectives

The primary objective of this OT&E was to ensure a successful migration of the AOMC operating system to the newest version of Red Hat Enterprise Linux 6 (RHEL) operating system and to ensure the current level of support provided to fielded ASOS sites by the AOMC remains at or above the current level of operations.

3.0 OT&E Methodology and Results

The OT&E started on September 6, 2011. Eight field sites participated in this OT&E (See Table-1). The OT&E was conducted jointly by OPS34 and OPS23, and monitored by OPS24 (See Table-2). Each of four servers at the AOMC was tested for at least 20 days per server (See Table-3). All required tests (See Table-4) on the four servers were successfully completed in accordance to the OT&E Plan (dated July 27, 2011). The original planned completion date was November 11, 2011. However due to Critical Weather Incidents, the OT&E was further delayed. In addition, after AOMCNBG#3 was updated from RHEL 6 kernel 2.6.32-131.4 to a more recent kernel 2.6.32-131.17, a problem was encountered on December 6, 2011. When this server was powered down and up again, the video display became corrupted before the login prompt appeared. The same problem also occurred on AOMCNBG#2. This problem was later corrected by the software Branch (OPS23) for all four servers. Consequently the OT&E was extended for 30 days after the correction to the operating system was made. The OT&E was completed on January 31, 2012.

Afterward, the AOMCNBG#1 and the AOMCNBG#2 have remained operational in the AOMC while the AOMCNBG#3 and the AOMCNBG#4 were moved to the Backup Telecommunication Gateway (BTG) at Mt. Weather, VA.

3.1 Field Site Participants

The following sites participated in the OT&E.

Table 1 **- Test Sites**

Site Name	**Regions**	**POC**
PAMR - Palmer, AK	Alaska	James Durr, Don Bolton
PALH - Lake Hood, AK	Alaska	James Durr, Don Bolton
KBFL - Bakersfield, CA	Pacific	Scott Birch
KDCA - Reagan national Air Port, D.C.	Eastern	Kevin Murray
KBWI - Baltimore Washington Intl. Air Port, MD	Eastern	Kevin Murray
KSPD – Springfield, CO	Central	Brian Hirsch
KN60 – Garrison Municipal Air Port, NC	Central	Brian Hirsch
KGDP - Guadalupe Pass, TX	Southern	Victor Murphy

3.2 OT&E Personnel

Table 2 **- Test Personnel**

Names/Organizations	**Functions**
Khien Nguyen, W/OPS24	Monitor
Barbara Burgos, W/OPS32	Tester
Christopher Stark, W/OPS32	Tester
Hak Kim, W/OPS23	Software Support
Darren Dobkin , Contractor	Software Support

3.3 Servers under Test

Table 3 **– Tested Servers**

AOMC Servers	**Test Dates**
AOMCNBG#1	Sept 6 through Oct 4, 2011
AOMCNBG#2	Oct 4 through Oct 25, 2011
AOMCNBG#3	Oct 26 through Nov 21, 2011
AOMCNBG#4	Nov 21, 2011 through Jan 18, 2012
AOMCNBG#1 and AOMCNBG#2	Simultaneously tested from Jan 18 through Jan 31, 2012

3.4 Tested Functions

The following functions were successfully tested or verified.

Table 4 – **Tested Functions**

Functions	**Results**
AOMC controllers uploaded all of the site specific data files to the AOMC for each ASOS site participating in the OT&E.	Successful
AOMC verified no corruption of any data elements has occurred with the uploading of site specific files	Successful

AOMC controllers requested each ASOS OT&E site to download all of its site specific data files	Successful
AOMC verified no corruption of any data element has occurred with the downloading of the site specific files by each ASOS OT&E site.	Successful
OT&E test participants verified no degradation in service occurs with any of the file uploading and downloading processes.	Successful
OT&E test participants monitored each ASOS site to verify no degradation in service occurs with the ASOS time synchronization process.	Successful
AOMC controllers verified / validated that no degradation in service has occurred with the routine, day-to-day, system administration tasks.	Successful

3.5 Problem Found and Fixed during OT&E

There were two problems encountered during the OT&E but they were successfully resolved:

1. **Problem:** Christopher Stark was unable to access the New AOMC background machine.
Fix: OPS34 gave Darren the correct IP addresses to use for primary and secondary DNS and the subnet mask.

2. **Problem:** when AOMCNBG#3 was updated from RHEL 6 kernel 2.6.32-131.4 to a more recent kernel 2.6.32-131.17, a problem was encountered on 12/17/2011. When this server was powered down and up again, the video display became corrupted before the login prompt appeared. The same problem also occurred on AOMCNBG#2.
Fix: Add nomodeset grub parameter to AOMCNBG#3 to fix video corruption so that the OT&E could continue. This problem was later corrected by the software Branch (OPS23) for all four servers.

4.0 Conclusions and Recommendations

The OT&E results demonstrated that the new AOMCNBG machines have met all operational requirements. All functionalities have been retained and no degradations to current field operations were observed during the OT&E. A few minor problems encountered during the OT&E were completely resolved. It is recommended that these machines be used to replace the obsolete servers in the AOMC and assume routine operations.