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## 1. INTRODUCTION

The Advanced Weather Interactive Processing System (AWIPS) Network Control Facility (NCF) located in Silver Spring, Maryland, has undergone several important system improvements within the last year. These improvements have increased the data handling capacity, as well as improved the overall reliability of the NCF. In addition, a backup NCF has been deployed in Fairmont, West Virginia, to provide redundancy for critical NCF functions in the event of single or multiple failures at the primary NCF.

## 2. NCF UPGRADES

The upgrades to the primary NCF have focused on replacing outdated HP-UX D-class servers with PC-based Linux servers providing network router enhancements and Local Area Network (LAN) improvements.

The Satellite Broadcast Network (SBN) HP-UX-based uplink servers have been replaced with current generation PC-based Linux servers. These Linux servers are compact rack-mounted units each requiring 2U (3.5 inches) of vertical space allowing multiple servers to be easily accommodated in a single rack. Each Linux server has dual Intel Pentium processors clocked at over 1 GHz, 1 GB RAM, a 5 x 18 GB SCSI (hot pluggable) disk array in a hardware-enabled RAID 5 disk configuration. Further high availability for each server is provided by dual redundant power supplies and dual 10/100/1000BaseT onboard network interfaces. Each SBN Uplink channel is supported by a dedicated Linux server with backup provided by remaining servers. Each server is capable of supporting the full T1 1.54 Mbps data rate (or higher E1 2.048 Mbps data rates) for any mix of products large or small, thus allowing full utilization of SBN bandwidth under all existing and foreseeable load conditions. Software running on the HP-UX servers was ported to the Linux environment with minimal effort due to the easy portability of the C code.

Benefits of the SBN Uplink Linux servers include the following:

- Better throughput and performance to handle additional products on the SBN (e.g., higher resolution Eta-12 model data)
- Increased server availability with redundant power

supplies and hardware based RAID disk array

- Lower cost migration to future generations of hardware due to use of multiplatform Linux OS and Intel PC-based server architecture

Additional network routers have been installed at the NCF to provide dedicated connectivity to the backup NCF and to other external networks. Also, the primary NCF to WAN routers were upgraded to a full 100 Mbps LAN interface (versus the existing 10 Mbps interface).

The LAN has been upgraded with multiple redundant 10/100BaseT-switched LAN hubs similar to the LAN upgrade being deployed at AWIPS field sites. These hubs are HP Procurve 24-port switches capable of being cascaded at a full 1 Gb/second. This new configuration will provide 48 fully redundant 10/100BaseT Ethernet ports for connection to the NCF hardware platforms. In addition connectivity to the legacy FDDI-based network ring will be maintained for the remaining HP-UX-based servers and workstations via the existing WaveSwitch 1216 hubs.

## 3. MASTER GROUND STATION (MGS) UPGRADES

The primary MGS located in Ft. Meade, Maryland, and the backup in Fairmont, West Virginia, have been upgraded to use higher performance Linux Communication Processors (CPs). These Linux-based CP devices allow the NCF to easily sustain a full T1 data rate on the existing SBN NWSTG and GOES data channels.

The previous Hewlett-Packard (HP) CPs had throughput limitations that prevented a full T1 utilization rate under full load conditions. The new Linux-based CPs are a dense configuration 1U (1.5 inch) rack mount server with a single Intel Pentium processor clocked at over 1 GHz, 256 Mbytes of RAM, and a 3 x 18 GB SCSI (hot pluggable) disk array in a hardware-enabled RAID 5 disk configuration. Further high availability for each CP is provided by dual redundant power supplies and dual 10/100/1000BaseT onboard network interfaces. Each Linux CP is configured to handle a single SBN channel with failover capability to another remaining CP. Again software running on the HP-RT CPs was ported to the Linux environment with minimal effort due to the easy portability of the C code.

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#### **4. BACKUP NCF**

A fully functional backup NCF has been deployed in Fairmont, West Virginia. This backup facility provides full capability to handle NCF operations in the event of one or more failure conditions at the primary NCF.

Features of this backup facility include following:

- Full access to the AWIPS Wide Area Network (WAN) via an independent set of 26 Permanent Virtual Circuits (PVC) to the existing 13 AWIPS hub sites
- Independent T1 terrestrial connections for receipt of GOES satellite imagery from the NESDIS facility located in Camp Springs, Maryland
- Backup SBN MGS facility for independent transmission of SBN data
- NCF Central Archive implemented on a Linux server
- Full monitor and control capability for AWIPS field sites including tools for trouble ticket handling and alarm monitoring

#### **5. OTHER PLANNED NCF CAPABILITES**

An SBN encryption capability has been implemented for future use. This will allow the transmission of data for NWS use only on the publicly available NOAAPORT data streams. AWIPS sites will be able to decrypt these products for internal NWS use only.

The capability to compress the current GOES-EAST and GOES-WEST data streams onto a single data stream has been tested for possible implementation as a means to provide a second NWSTG data channel by using the former GOES-WEST data channel for this purpose. This second NWSTG data channel is required to meet projected increases in the volume and resolution of data expected in the future.

#### **6. SUMMARY**

The recent changes to the primary NCF and implementation of a backup NCF will provide higher availability and increased data handling capability for the near future. In addition the introduction of the Linux platforms based upon standard PC architecture will allow future cost effective upgrades as the need for additional capacity and hardware replacement occurs.