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AWIPS DEVELOPMENT UPDATE

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The AWIPS procurement has been a multi-phase process. Originally, seven separate teams bid on the AWIPS Definition Phase. Out of the group of seven contractors, two were chosen to work with the Government to refine their proposals. From these two contractors, one was selected to proceed to the AWIPS Development and Deployment Phase. The AWIPS Development Phase Contract was awarded, without a protest, December 29, 1992. This marks the beginning of the next phase of the AWIPS procurement process where the contractor builds the AWIPS system and deploys AWIPS at all the NWS field sites.

The winning contractor is the Planning Research Corporation (PRC) located in the Dulles corridor of Virginia. PRC, a wholly owned subsidiary of Black and Decker, is a medium sized company with annual revenues of 700 million dollars and approximately 7,500 employees located in 200 offices. PRC is the primary or lead contractor. As is the case with many government contracts, PRC has teamed with several other corporations. The primary subcontractors teamed with PRC are Hewlett Packard (HP), GTE Spacenet (GTE), Data Networks Inc. (DNI), and Atmospheric and Environmental Research (AER).

Now that the contract has been awarded, more specific information about the winning proposal can be released. The reader is cautioned that the following information is subject to change. The equipment and software proposed by the contractor forms a set of baseline capabilities. The contractor can propose newer equipment or software which meets or exceeds this baseline capability, subject to Government approval. For example, workstation technology has been advancing rapidly with a new generation of workstations announced every 2 to 3 years. Since the Development Phase contract is 39 months, it is likely that the proposed workstation hardware will be superseded by a new generation of workstations. However, the following information will provide the reader with a good idea of what the future AWIPS system will be.

Communications

Communications have been the Achilles' heel of AFOS. While NMC and NESDIS can produce large amounts of data, a very small percentage of this information reaches the field offices. The communication system proposed for AWIPS is a hybrid system. Approximately 80 to 90 percent of all data flow from NESDIS, NMC, and the NWS Gateway. PRC has proposed a satellite-based communication system to transmit these data to the field. The satellite communication system will employ Ku band technology using a FDMA protocol. Each office will have a satellite dish ranging in size from 1.8 meters (predominate) to 7.6 meters (one site). The actual size of the dish will be determined by the contractor using models to simulate local atmospheric conditions. A larger dish is needed at a few sites where there is the potential for significant attenuation,

such as large tropical thunderstorms. GTE Spacenet is primary subcontractor for this communication link. PRC has divided the broadcast into five data streams. They are:

1.12 Mbps (satellite data)
1.01 Mbps (NMC data and other central data)
311.6 Kbps (optional NOAAPORT)
796 Kbps GOES WEST
534 Kbps Alaska, Hawaii, and other data

The communication bandwidth can be expanded by up to 2 Mbps.

Communications between local offices and the Gateway are provided by a packet switch (X.25 protocol) terrestrial network. There will be approximately 14 packet switching nodes, located primarily at the collocated WFO/RFCs. While multiple 56 Kbps lines are possible for each site, the actual communication capacity is based on a load analysis. For example, a collocated WFO/RFC will have greater communication capacity than a single WFO. The design allows for flexibility to accommodate growth or changing requirements.

The contractor will establish a Network Monitoring and Control Facility to monitor both the communication system and the AWIPS systems at the local offices. The facility will be responsible for detecting errors or failures and invoke backup procedures, communication re-routing procedures or maintenance actions.

Site Level Equipment (WFO/RFCs)

The proposed local office architecture is a distributed processing system using a client-server software control structure. The server approach allows tasks to be assigned to any processor on the LAN. The AWIPS hardware located in the office will consist of a high speed LAN and a set of processors connected to the LAN. The LAN will be a dual ring, counter rotating ring (two individual cables), and a fiber optic system running at a hardware rate of 100 Mbps. The system will use Ethernet 802.3 interfaces. In the event of a cable or interface failure, the LAN will automatically reconfigure itself around the problem.

A generic WFO will consist of one Type I workstation, two Type II workstations, and three Type III workstations. (Type I, II, and III workstations are defined below). The actual equipment that will be deployed varies slightly from site to site depending on the functions of the office. For example, a WFO with a fire weather and a marine program might have four Type III workstations. The site hardware can be modified or upgraded by individual components to accommodate future growth or changes in requirements.

The applications processor will be the HP 9000 series, model 750 system. The HP has approximately 76 mips of processing power, with 48 MBytes of memory, expandable to 192 MBytes. The hard disk storage will be 2.68 GBytes, expandable to 40 GBytes. The communication processors will be the SBE VCOM 24.

The Type I workstation is a simple workstation primarily used by the DAPM or MIC/HIC to monitor the AWIPS system. The Type I workstation will consist of an HP400t processor capable of approximately 12 mips, with 16 MBytes of memory, and 400 MBytes of disk storage. The system is expandable.

The Type II workstation is a non-animating, windowing workstation that will be primarily used by the Service Hydrologist and HMTs at the WFOs and the Hydrologists at the RFCs. At the time the requirements were written, animation capability was a significant additional cost. Due to the rapid change in technology, this cost differential has been dramatically reduced. It is expected that the Type II workstation will have some type of animation capability as future technology further reduces this cost differential. The Type II workstation will consist of the HP 9000 series, model 750, configured with 76 mips of processing power, 64 MBytes of memory, expandable to 192 MBytes, and 1.34 GBytes of disk storage, expandable to 40 GBytes.

The Type III workstation is a windowing, full animation system. This will be the primary workstation that the forecasters will use to support the forecast and warning programs. The workstation hardware is the HP 9000 series, model 750, consisting of 76 mips of processing power. The system will also contain 64 MBytes of memory, expandable to 192 MBytes, and 1.34 GBytes of disk storage, expandable to 40 GBytes. To support the windowing and animation requirements, a graphics adapter will also be included. This adapter essentially performs as a co-processor and is responsible for generating the screen displays. The adapter is a HP 1439A Image/Graphics Processor. The graphics processor is a 32 bit system. For the NWS, the forecaster will be able to display up to 12 bits of data, 8 bit imagery, plus 4 bit graphics or 12 bits of graphics. If each graphic is a single color, then up to 12 graphics can be displayed. The remaining graphic bits are used to support the user interface and X-window capabilities. Each Type III workstation will consist of three monitors. One monitor will serve as a alphanumeric screen; the other two can display any combinations of images, graphics or alphanumerics. These monitors are 19-inch color screens with at least 1280 by 1024 pixel resolution.

The printers at the local site will consist of a simple HP line printer for alphanumeric text. For graphics, the HP Paint Jet XL color printer will be provided. The HP can be used to produce hard-copy plots suitable for hand analysis. The office can also choose to connect the NEXRAD printer up to AWIPS. The NEXRAD printer employs a thermal hot wax technology that produces nice color images, but is not suitable for hand analysis.

Each site will be able to archive data for local research purposes. The local site will have a HP Digital Audio Tape (DAT) system capable of storing 1.3 GBytes of data.

Software

AWIPS will consist of system and application software. Only the system software will be discussed here. The application software will be the subject of a future Technical Attachment (TA). The AWIPS requirements call for the use of as much Commercial Off-the-Shelf (COTS) software as possible, employing recognized standards to the extent possible. While these COTS packages can consume a great deal of processing power and memory, the NWS will take advantage of future software upgrades at relatively low costs and provide software portability with other institutions, such as universities. The software packages proposed for AWIPs are:

HP UNIX Operating System (8.0)
HP Motif X Window and Motif Window Manager
C X3.159 1989 ANSI

Fortran
Pascal
Basic
IMSL Statistical and Mathematical Libraries
Informix 5.0 Database
WordPerfect

C and Fortran will be the primary languages employed in AWIPS. C will be used for system routines and Fortran will still be used for most of the application programs. The contractor has been instructed to build the software system using libraries to reduce the amount of duplicative software routines and enable more efficient development of new software. Due to the complexity of these libraries, Pascal and Basic will not have access to all of the system libraries, and will only be supported to the extent that the subroutine calls do not violate the ANSI language standards.

Local Software Development

Each site will be able to conduct local software development. This is a key requirement that the NWS has insisted be included in the AWIPS system. Any site will have the ability to access almost all of the software libraries. Each site will be responsible for the software that they develop locally. If a locally-developed software program is useful to other sites, the site can submit the software program to the NWS and the AWIPS contractor for inclusion in the nationally distributed and supported software package. Once done, the AWIPS contractor assumes the responsibility of maintaining the software program. We will provide more information on the local software development and configuration management capabilities in future TAs as the plans are further refined.

Future Schedule

The current schedule for completion of the Development Phase is 39 months. The time starts with the award of the contract. The major milestones are the following, dates are approximate:

4/94	Successful completion of Build 1. This is a partial initial system capability, to be defined by the contractor and Government.
4/95	Successful completion of Build 2 and the First Article system testing. The First Article system is the basic core system capability, such as communications, database, basic workstation capabilities.
10/95	Successful completion of the initial Beta site testing. Two field sites in the MARD will be selected for the installation of the initial AWIPS system and testing of local interfaces, implementation procedures, etc.
11/95	Successful completion and testing of Build 3 and the rest of application software necessary to support the Initial Deployed Baseline (IDB).
12/95	Successful completion of the installation and acceptance of AWIPS equipment at all MARD sites.

2/96 Conclusion of Development Phase activities, including the final test and acceptance.

There are incentives built into the AWIPS contract to shorten the length of the Development Phase from 39 months to 33 months. The development effort required for AWIPS is not a simple task. As with most procurement activities, there are many twists and turns in the process. We will continue to provide updates on the progress of AWIPS as Western Region is notified of the progress.

After the Development Phase, there is a 24-month Deployment Phase. During this time, AWIPS will be deployed at the remaining NWS sites. All WFOs, RFCs, National Centers, Regional Headquarters, and a few other NWS facilities will receive AWIPS equipment.

2/96 to 2/98 Deployment Phase. The regions have defined the installation sequence.

AWIPS is the last major system acquisition in preparation for the modernization. While it may seem like a lengthy process, progress is being made.