Weather and Radar Processor (WARP)

Operational Requirements Document (ORD)

March 3, 1995

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This Operational Requirements Document (ORD) was prepared in accordance with FAA Order 1810.1F, Acquisition Policy, and defines the critical mission performance parameters for the Weather and Radar Processor (WARP). The WARP will acquire, process, and disseminate aviation-significant weather data. The primary purpose of the WARP is to receive and process WSR-88D weather radar products and disseminate them to the display system replacement (DSR) for display to controllers. The WARP will also provide automated, interactive meteorological workstations to Center and Central Flow Weather Service Unit (CWSU and CFWSU) meteorologists and provide briefing terminals to traffic management coordinators, traffic management coordinator supervisors, and area supervisors. Later updates to the system will provide additional WSR-88D products to controllers, enhancements for the meteorologist's workstation, new National Weather Service (NWS) gridded products for display to controllers and meteorologists, and other pre-planned product improvements.

Approval:

Director of Air Traffic, AAT-1

3/16/95
Date

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1.0 GENERAL DESCRIPTION

1.1 Mission Area and Type of Capability Needed

In the Air Traffic weather requirements team (ATWRT) report [Feb. 1993], Air Traffic reaffirms the need for weather information to be transformed into unambiguous weather information products that do not require interpretation and for tailoring weather information products to specifically assist air traffic control specialists with their tactical and strategic decision-making. Air traffic controllers need timely and accurate weather information to carry out their primary mission of sequencing and separating aircraft within their assigned airspace. Pilots require the same information to navigate efficient routes through controlled airspace. Traffic management coordinators (TMC), supervisory TMCs (STMC), and area supervisors (ARSUP) need accurate, reliable information on current and forecast weather conditions to regulate and manage the flow of aircraft within the national airspace system (NAS). Center and central flow weather service unit (CWSU and CFWSU) meteorologists support controllers, TMC/STMCs, and ARSUPs by providing weather advisories. Meteorologists need automated weather data processing to enable them to analyze a range of official weather measurements, reports, and forecasts to identify weather conditions that may adversely impact air traffic control (ATC) and aircraft operations. The weather and radar processor (WARP) will provide weather data collection, dissemination, and display functions to support these weather-related needs.

1.2 Deficiency to be Eliminated

The current systems are deficient in several areas :

a. Lack of comprehensive data -- Currently, controllers receive limited weather information. Precipitation intensity derived from surveillance radars is the only weather information depicted graphically on the controller's display. The air route surveillance radars (ARSR) were designed to minimize weather sensitivity in order to maximize surveillance range and provide only a coarse measure of precipitation intensity. These radars cannot provide the detailed, accurate weather measurements which enable identification of wind hazards (mesocyclones, tornadoes, shear turbulence) that WSR-88D (i.e., NEXRAD) can. In addition, many ARSRs (-1, -2, and some -3's) are old and no longer cost effective to maintain. The ARSRs primary radar, other than those at joint use sites, will be deactivated after WSR-88D data is available to controllers and the FAA will save the costs of maintaining or replacing the systems.

b. Lack of meteorological processing -- The Host computer system provides only coordinate conversion and symbolic presentation processing of the radar weather data. It does not identify weather hazards such as severe storm cells, hail, or other related phenomena. The controller must rely on pilot reports for identification of specific weather and on scan-to-scan reflectivity changes to determine storm motion. No consistency-checking or compositing of overlapping radar data is performed. The lack of automated storm cell identification and alert

processing of current data from single and multiple weather radars seriously limits the timeliness of CWSU hazard identification.

c. Limited dissemination -- Forecasts and other alphanumeric weather data are not tailored to the specific needs of controllers and therefore must be manually reviewed by a meteorologist to determine their usefulness. This reduces data timeliness and effectiveness.

d. Meteorologist weather processor (MWP) limitations -- Currently, the MWP provides the CWSU/CFWSU meteorologist with workstations and the TMC/STMCs and ARSUPs with briefing terminals that automate the collection and display of weather information. A sole source extension of the MWP lease, which expired in January 1995, was approved until September 1997 by the General Services Administration to provide continued coverage until WARP can be procured. There is no other program or funding except for WARP to ensure continuity of support for the CWSU/CFWSU mission. In addition, MWP also has the following specific deficiencies:

(1) Key WSR-88D products (e.g., storm point data) will not be available through the MWP's commercial data source. They can be displayed individually on separate WSR-88D displays but cannot be overlaid on MWP displays for analysis.

(2) No plotting and processing of gridded upper air winds and temperature forecast data and pilot reports.

(3) No interfaces for direct dissemination of CWSU warnings and advisories to new NAS user subsystems and

(4) No interfaces for dissemination of system status information to the maintenance processing subsystem (MPS).

1.3 New Operational Capability

WARP will be deployed in the Air Route Traffic Control Centers/Area Control Facilities (ARTCC /ACF) and ATC System Command Center (ATCSCC) and will serve as the prime source of weather data for controllers, pilots, and meteorologists for tactical and strategic decision making. WARP's major functions will be:

a. Comprehensive weather data acquisition -- The WARP will acquire real-time advanced Doppler weather data from the WSR-88D including high resolution precipitation, upper air wind field measurements, and severe storm identification and tracking data. The WSR-88D will identify individual storm cells and storm height and will detect extreme phenomena such as hail or organized cyclonic winds. The WARP will also receive automated surface observations, identical to those broadcast continuously to pilots, National Weather Service (NWS) upper air gridded model data, pilot reports, and other NWS data.

b. Enhanced meteorological processing -- Product data from all WSR-88Ds within the ARTCC/ACF airspace coverage will be processed by the WARP to form mosaics of precipitation in three altitude bands to coincide with air traffic altitude sectorization. The WARP will process pilot reports and other alphanumeric products to improve their value as quick reference aids. The WARP will also transform upper air wind and temperature forecast data to provide hourly projections of expected conditions and selected flight levels and grid positions.

c. Weather data dissemination -- The WARP will disseminate mosaicked WSR-88D reflectivity data to controllers for depiction on their displays. Textual and graphic weather hazard warnings and advisories created by the meteorologist, will provide situation awareness to ARSUPs and TMC/STMC users. Pre-planned product improvements may include reformated alphanumeric weather products to provide additional weather support services to controllers and pilots.

The WARP will serve as the FAA's gateway for WSR-88D information to NAS users, and it will provide a platform upon which future aviation weather research (AWR) functional capabilities can be implemented. Additionally, it will expand the limited central services currently offered by the MWP by providing enhanced automated weather products and displays. It will also provide a common data base of weather information for users in the ARTCC/ACF and ATCSCC, and may later be extended to provide a weather data base for users in other facilities, such as Metroplex Control Facilities and Automated Flight Service Stations.

2.0 OPERATIONAL CONCEPT

How the WARP will be Used. Roles and Responsibilities Affected.

The WARP's primary function is to receive WSR-88D weather data, generate mosaics, and disseminate this information to controllers via the display system replacement (DSR). These weather radar mosaic products will provide a background of current weather conditions on the controller's display. At their option, the controller may display one or more mosaic products on the their display. Typically, the precipitation mosaic for the altitude band which corresponds best to the sector assigned airspace will be displayed. At the point of aircraft hand-off between stacked sectors, the adjacent altitude band may be momentarily selected. When notified that organized storm cells are present, the controller may select the point product mosaic as an overlay to both the targets and the precipitation. This combined display will support the widest range of weather hazard avoidance and information relay actions. The positions of specific aircraft and precipitation, of an intensity that threatens that particular target type, will be immediately correlated visually by the controller so that appropriate action can be taken. Hail and mesocyclone symbols associated with an individual storm cell on the display will permit the controller to quickly identify the presence of hazardous weather and provide this information to pilots.

CWSU warnings and advisories and the indicated direction and future position spacing of the storm cells indicated in the mosaic will permit the controller to anticipate future conflicts and to plan the safe flow of traffic through the sector. This information will allow controllers to coordinate their actions with pilots. Other information provided by the WARP (e.g., upper air winds at flight levels, current surface observations or official terminal forecasts) will be available for prompt display to permit the controller to respond to pilot requests for weather information.

Traffic management personnel at the ARTCC/ACFs and ATCSCC will use weather information to anticipate the need to meter and sequence aircraft. Selected presentations of official reports, measurements and local guidance will be prepared, automatically or manually by the meteorologist, and displayed on traffic management briefing terminals. Periodically, the meteorologist will review the latest official regional and terminal forecasts and current radar, satellite, and surface observation data displayed at the WARP workstation. Advisories projecting weather conditions expected to impact the area of interest over the next few hours will also be prepared and disseminated.

The WARP will inspect real-time observations and forecasts upon receipt, and the meteorologist will be immediately notified if preselected thresholds are exceeded. The meteorologist will review the alert and the associated product data to analyze the weather conditions and assess the nature of the impact to tactical decision making and strategic planning. Graphical and textual warnings will be created by the meteorologist which precisely locate and describe the hazard and its projected duration will be relayed to traffic management users on briefing terminals. The controllers will receive the warnings automatically on their displays. The meteorologist will also notify users when current conditions invalidate outstanding CWSU forecasts and advisories.

The WARP will also disseminate AWR graphical images of current and forecast aviation weather impact areas. This information will be disseminated to air traffic controllers through the DSR, to meteorologists through WARP workstations, and to TMC/STMCs and ARSUPs through WARP briefing terminals. These graphical images are derived from advanced models and analyses developed by the Aviation Gridded Forecast System that produce high resolution, gridded data bases of the state of the atmosphere and aviation impacts. They will provide the users with better weather information in a form tailored to the user that avoids the workload and delays associated with manual weather data interpretation.

Planned Life-Cycle

The WARP will be deployed in stages:

a. Stage 0: The primary function of this stage is to deploy the commercially available and non-developmental portions of WARP as early as possible to competitively replace the MWP workstations and briefing terminals with updated and enhanced workstations and brieifng terminals. Stage 0 will be a leased, turn-key system, which installed and maintained by the contractor until the Stage 1 system is deployed.

b. Stage 1: The primary function of this stage is to acquire, process, and disseminate WSR-88D reflectivity products to the DSR for display to controllers. This Stage also implements other required NAS interfaces.

c. Stage 2: The primary function of this stage is to provide further WSR-88D products to controllers and enhancements for the meteorologist's workstation.

d. Stage 3: The primary function of this stage is to provide controllers and meteorologists with new weather products that are currently under development within the AWR program and implement weather related interfaces with future NAS systems.

Impact on Existing Operational Procedures, Rules, and Human Interfaces

WARP will have a positive impact on controller operations. WARP will enable WSR-88D data to be displayed directly to controllers. This data is more accurate and can be tailored to the operational position through the display of different altitude bands. With WARP, controllers will also have access to new weather products, such as point product mosaics which show severe weather hazards for a discrete location. These changes are not anticipated to have significant impact on operational procedures, however this will be reexamined during operational evaluations.

WARP will also provide new weather workstations for CWSU and CFWSU meteorologists, TMC/STMCs , and ARSUPs. These workstations will provide an improved computer-human interface, new products (e.g., lightning, point product mosaics, additional satellite coverage), and new data analyses functions.

3.0 CAPABILITIES REQUIRED

The following capabilities are needed to support air traffic controllers, TMC/STMCs , and ARSUPs:

-- depiction of weather radar information on their displays.

-- dissemination of notifications of approaching or developing weather and its severity in order to make tactical and strategic decisions to safely route and meter traffic.

-- fine resolution of the intensity and location of hazardous weather to determine the impact on a specific air carrier or general aviation aircraft operating at lower altitudes where significant weather and related hazards are more prevalent.

-- detection and forecast of current long-range weather for strategic planning of runway configurations and airport capacity.

-- accurate forecasts of the extent and duration of severe weather conditions that will reduce the handling capacity of major airports to better anticipate the need for metering and for destination changes.

-- accurate reports of the extent and duration of severe weather in order to select jet routes and flight levels which will minimize the exposure of aircraft to potential hazards.

In addition, the following capabilities are needed to support CWSU and CFWSU meteorologists:

-- continuous acquisition of all available real-time weather measurements pertaining to the area of interest.

-- acquisition of official weather observations, reports and forecasts as available.

-- detection of potential weather hazards in received data and prompt notification to the meteorologist.

-- graphic workstation display manipulation functions for rapid presentation and analysis of weather conditions.

-- graphic and textual product generation and dissemination capabilities for communicating hazards to ATC users.

3.1 System Performance

Performance requirements in terms of objective and threshold values are given below. These requirements have been grouped according to the weather needs categories identified in the ATWRT report and FAA Order 7032.15, Air Traffic Weather Needs and Requirements. The workstation data display requirements apply to displays at both the CWSU and CFWSU workstations. Processing, generation, and dissemination times are measured from the time of receipt of the last bit of data from the data source.

The following table is for all WARP stages except as noted in the Stage 0 exception table below.

PARAMETER	OBJECTIVE	THRESHOLD
Data Collection:		
Area of coverage	ARTCC/ACF area + 150 nmi buffer zone	ARTCC/ACF area + 150 nmi buffer zone

PARAMETER	OBJECTIVE	THRESHOLD
Data Dissemination		
Dissemination of individual weather radar products to neighboring WARPs	5 sec	5 sec
Generation and dissemination of weather radar mosaic products to DSR	30 sec	30 sec
Processing and dissemination of alphanumeric products ~~to DSR~~ and WMSCR	10 sec	10 sec
Generation and dissemination of converted gridded binary products to DSR	5 min	5 min
Processing and dissemination of manually created graphic products ~~to DSR~~ and WMSCR	10 sec	10 sec
Data Displays		
Retrieval and display of stored non-imagery products and maps at the workstation and briefing terminals	1 sec	5 sec
Retrieval and display of stored imagery products and maps at the workstation and briefing terminals	3 sec	5 sec
Display of alarm/alert at the workstation and briefing terminals	15 sec	15 sec
Generation of individual weather radar products for use at the workstation and briefing terminals	5 sec	10 sec

PARAMETER	OBJECTIVE	THRESHOLD
Generation of weather radar mosaic products for use at the workstation and briefing terminals	30 sec	30 sec
Generation of national weather radar mosaic for use at the workstation and briefing terminals	3 min	10 min
Generation of satellite products for use at the workstation and briefing terminals	15 min	30 min
Generation of lightning products for use at the workstation and briefing terminals	15 sec	30 sec
Generation of NWS graphic/gridded products for use at the workstation	15 sec	30 sec
Generation of station model plots for use at the workstation	15 sec	30 sec
Generation of thermodynamic analyses for use at the workstation	3 sec	10 sec
Generation of contour/streamline analyses for use at the workstation	15 sec	30 sec
Generation of vertical cross sections for use at the workstation	15 sec	30 sec
Maximum age of weather radar tiles in regional mosaic	the length of time of one WSR-88D volume scan from the time the product is available for display	the length of time of one WSR-88D volume scan from the time the product is available for display

The following table provides the exceptions to the above requirements for Stage 0:

PARAMETER	OBJECTIVE	THRESHOLD
Data Dissemination (all requirements)	Not applicable	Not applicable
Data Displays		
Generation of weather radar mosaic products for use at the workstation and briefing terminals	3 min	5 min
Maximum age of weather radar tiles in regional mosaic	Data shall be no more than 15 min old at completion of mosaic generation	Data shall be no more than 15 min old at completion of mosaic generation

3.2 Supportability

Availability

The WARP system located at an ARTCC/ACF shall have an availability of 0.99963. The WARP system located at the ATCSCC does not have as stringent of an availability requirement because it will not be required to disseminate radar mosaics to the DSR. The ATCSCC WARP shall have an availability of 0.99917873. Availability for Stage 0, comprised entirely of commercially available, non-developmental hardware and software, shall be .995.

Maintainability

The mean-time-to-repair the WARP system shall be no more than 0.5 hours.

Reliability

The mean-time-between-failures (MTBF) of the WARP Stage 0 system shall be no less than 100 hours. The MTBF of the Stage 1-3 ACF system shall be no less than 1354 hours, and the MTBF of the Stage 1-3 ATCSCC system shall be not less than 608 hours.

Frequency or Duration of Maintenance Actions

The WARP shall be designed such that corrective and periodic maintenance actions will be required no more than four times per year.

4.0 CRITICAL OPERATIONAL ISSUES

4.1 System Quantities

Twenty-three WARP Stage 0 systems will be purchased to replace the existing MWP systems at all ARTCCs and the ATCSCC. Up to twenty-six WARP Stage 1 systems will be purchased: one for each ARTCC/ACF, one for the ATCSCC CFWSU, one for the FAA Technical Center, one for the FAA Academy, one for the WARP contractor to use as a development system, and one for a location to be designated by the FAA. The number of equipment spares required will be determined by the WARP contractor as part of his provisioning process. No other agency will procure a WARP system.

4.2 Schedule Constraints

January 1997 is planned as the first operational readiness date for WARP Stage 0, which provides new workstations for the meteorologists and new briefing terminals for the TMC/STMCs and ARSUPs. The current workstations and briefing terminals are provided as part of the MWP. A sole source extension of the MWP lease has been approved until September 1997, by which time all Stage 0 WARP systems will be installed and operational. If WARP Stage 0 is not in place when the MWP lease extension expires, the FAA will be required to seek approval from GSA to further extend the MWP lease or require meteorologists to manually analyze weather data. Further extensions, beyond 1997, could be costly because the MWP equipment will be outdated and will require another sole-source extension with the provider of the MWP system. Relying on manual analysis will seriously limit the timeliness and comprehensiveness of the weather information provided to ATC users.

December 1997 is planned as the first operational readiness date for WARP Stage 1, which receives, processes, and disseminates weather radar information to the DSR. This date is planned to coincide with the first release of DSR software, which will incorporate the WARP interface. If the WARP system is not ready to be deployed by this date, implementation of Stage 1 functionality could be delayed until at least the next DSR software release, and controllers will continue to depend on surveillance radars for their weather information. These surveillance radars use outdated technology and are planned to be decommissioned after controllers have access to WSR-88D data through WARP. As a result, delaying WARP Stage 1 will not only delay the controller's access to more accurate WSR-88D weather reflectivity data, it will result in continued, costly maintenance of the ARSR surveillance radars.

Stage 2 will include software only and is planned to be fully deployed by March 2000. A detailed schedule for WARP Stage 3 has not been developed because, based on the developmental status of the Stage 3 products, this stage can not be completely defined at this time. However, the full range of AWR graphic products will not be made available to users until this stage is deployed.

4.3 Standardization and Commonality

All CWSUs will have the same WARP configuration, although the number of briefing terminals and some site parameters (e.g., background maps, number of WSR-88D interfaces, and satellite coverage) will be site specific. The CFWSU system will support two workstations and will not be required to acquire WSR-88D data directly from the radar.

WARP's computer human interface will use a windows environment compliant with FIPS 158 X-Windows Standards with a windows management schema compliant with the Open System Foundation Motif Style Guide. WARP shall display data using World Meteorological Organization standard symbols.

WARP's interfaces will be compliant with International Standards Organization (ISO) Open Systems Interconnection (OSI) Basic Reference Model (ISO 7498).

4.4 User Requirement

The WARP will receive data from government sources such as the WMSCR, AWOS/ASOS data acquisition system (ADAS), WSR-88D, DSR, and integrated terminal weather system (ITWS). The WARP will also use FAA provided communication systems such as the FAA telecommunications satellite (FAATSAT) and NAS data interchange network packet switch network (NADIN PSN). WARP has no requirement for rule making.

5.0 SUPPORT CONCEPT

5.1 Maintenance Concept

The maintenance concept is to monitor system performance locally, identify failures through the use of software and hardware maintenance features, and to replace the failed element, module, or line replaceable unit (LRU). In accordance with the FAA's maintenance philosophy, maintenance of the WARP hardware will be performed at two levels: site and depot. Site maintenance, which includes fault isolation and replacement of LRUs, will be performed by FAA maintenance personnel. Depot level maintenance, which includes the repair or replacement of LRUs, will also be performed or contracted for by the FAA Logistics Center. The WARP contract will contain provisions for the contractor to perform maintenance actions for the first year or until the FAA is able to perform them. This will include both site and depot level maintenance actions, as well as replenishment of spare parts. The contract will also contain provisions to continue contractor maintenance in lieu of FAA maintenace at the Government's option. These options could be exercised if the FAA elected to lease the Stage 1-3 system in lieu of purchase. The Stage 0 WARP will be maintained by the contractor as part of the Stage 0 leased, turn-key service.

Maintenance of the WARP software will be performed by the WARP contractor under the direction of AOS at the FAA Technical Center.

A WARP system will be provided to the FAA Academy for training support. A WARP system will also be provided to the FAA Technical Center for software maintenance support. No changes to current support staffing levels are anticipated.

5.2 NAS Integrated Logistics Support (NAILS) Concept

The WARP design will meet mission requirements for reliability, availability, and maintainability by making maximum use of standardization, automation, and centralization. Modularity of equipment will be emphasized to ensure ease of maintenance. The contract will require maintenance software and hardware features to be designed into the equipment in order to rapidly isolate a malfunction to the smallest replaceable component level.

Logistics Support Analysis will identify supply support and support equipment requirements for Stages 1-3.

During Stage 1, a complement of spare parts will be identified and issued to each site in order to ensure availability requirements are met. Any special test equipment, tools, and/or handling equipment required for WARP will also be identified by the contractor. The contractor will also identify all software test program sets and test fixtures required to test/repair LRUs on proposed automatic test equipment.

5.3 Other NAILS Considerations

In order to identify the range and quantity of spares to be stocked, provisioning technical documentation will be developed by the contractor. This information will be screened through the Defense Logistics Services Center (DLSC) to identify or establish National Stock Numbers. Every effort will be made to use standard, approved parts already in the government inventory.

The FAA will establish supply support for WARP. Spares will be stocked and issued by the FAA Logistics Center. A complement of spares will be issued to each site as discussed above.

No unique facility and shelter requirements, special packaging, handling, and transportation considerations, or unique data requirements have been identified.

5.4 Computer Resources

Constraints, Unique Requirements

The WARP will be developed using an open system architecture and commercial-off-the-shelf hardware. A large portion of the WARP functions are currently available in commercial systems, so it is anticipated that the majority of the software will not require new development by the vendor. No high order language requirement will be specified. The computer-human interface will use a window environment compliant with FIPS 158 X-Windows Standards. Software documentation describing any new software developed by the vendor (e.g., FAA

specific interface software) will be prepared in accordance with FAA-STD-026, NAS Software Development.

Capabilities Desired

The WARP shall have adequate memory, on-line storage, and CPU performance capabilities to support the enhancements planned for Stages 2 and 3. There shall be a sufficient margin so that a 100% increase in memory utilization and on-line storage can be accommodated. The WARP shall provide sufficient CPU performance so that no more than 80% of the CPU will be used in performing the specified requirements.

6.0 CRITICAL SYSTEM CHARACTERISTICS

The following are critical characteristics of the WARP. Processing, generation, and dissemination times are measured from the time of receipt of the last bit of data from the data source. They apply to Stages 1-3, except as noted.

CRITICAL PARAMETER	OBJECTIVE	THRESHOLD
Data Dissemination		
Dissemination of individual weather radar products to neighboring WARPs	5 sec	5 sec
Generation and dissemination of weather radar mosaic products to DSR	30 sec	30 sec
Processing and dissemination of alphanumeric products to WMSCR	10 sec	10 sec
Processing and dissemination of manually created graphic products to WMSCR	10 sec	10 sec
Stage 0 availability	0.995	0.995
Stage 1-3 ACF WARP availability	0.99963	0.9995

7.0 INFRASTRUCTURE SUPPORT

The following systems will interface with the WARP in Stage 1 and are of critical importance to the project:

a. DSR. The WARP will supply weather information, especially WSR-88D mosaic products, to the DSR for display to controllers.

b. WSR-88D. The WARP will receive Doppler weather radar products from the WSR-88D.

c. WMSCR. The WARP will exchange alphanumeric, binary, and graphic weather products with the WMSCR.

d. ADAS. The WARP will receive local real-time weather observations from ADAS.

e. NADIN PSN. The WARP will exchange information with the WMSCR and other WARP systems through the NADIN PSN.

f. Data Link Processor (DLP). The WARP will disseminate alphanumeric and graphic weather products through the DLP.

g. FAATSAT. The WARP will receive weather information from external sources through the FAATSAT.

h. ITWS. The WARP will disseminate gridded data, lightning data and ADAS data to and receive terminal-area weather products from ITWS. (The ITWS has not currently been formally baselined).

i. OASIS. The WARP will disseminate WSR-88D radar and satellite imagery, lightning products, and other weather inforrmation to OASIS, and receive pilot reports (PIREPs) from OASIS.

j. Other WARP systems. The WARP will disseminate weather radar data to neighboring WARP systems and to the WARP located at the ATCSCC.

In addition, the WARP will receive time synchronization data from the Coded Time Source and will exchange system status messages with the Maintenance Processor Subsystem.

APPENDIX A. ACRONYM LIST

ACF	Area Control Facility
ADAS	AWOS/ASOS Data Acquisition System
ARSUP	Area Supervisor
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center
ATWRT	Air Traffic Weather Requirements Team
AWOS	Automated Weather Observing System
AWR	Aviation Weather Research
CFWSU	Central Flow Weather Service Unit
CTS	Coded Time Source
CWSU	Center Weather Service Unit
DLP	Data Link Processor
DLSC	Defense Logistics Services Center
DSR	Display System Replacement
FAA	Federal Aviation Administration
FAATSAT	FAA Telecommunications Satellite
ISO	International Standards Organization
ITWS	Integrated Terminal Weather System
LRU	Line Replaceable Unit
MPS	Maintenance Processor Subsystem
MWP	Meteorologist Weather Processor
NADIN	National Airspace Data Interchange Network
NAS	National Airspace System
NEXRAD	Next Generation Weather Radar
NWS	National Weather Service
OASIS	Operational and Supportability Implementation System
ORD	Operational Requirements Document
OSI	Open System Interconnection
PSN	Packet Switched Network
STMC	Supervisory Traffic Management Coordinator
TMC	Traffic Management Coordinator
WARP	Weather and Radar Processor
WMSCR	Weather Message Switching Center Replacement
WSR-88D	Next Generation Weather Radar