

CASA WX (COLLABORATIVE ADAPTIVE SENSING OF THE ATMOSPHERE)

Executive Summary

What is CASA WX?

CASA WX is a multi-sector partnership among academia, industry and government that is creating a new paradigm for weather observation based on low cost, densely spaced networks of X-band radars for improved warning and response.

Why is there a need for CASA WX?

Current National Weather Service (NWS) radar technology, most notably Next-Generation Radar (NEXRAD – currently in North Central Texas), does not provide coverage at the lower level of the atmosphere where the majority of severe weather takes place. CASA WX technology addresses this gap with a network of smaller, faster Doppler Dual Polar radars. This innovative network provides real-time, detailed mapping of events in the lower atmosphere that fall below conventional radar coverage – storms, winds, rain, hail, and the flow of airborne hazards. The comprehensive weather data and resulting enhanced prediction capabilities will allow leaders and decision makers in both the public and private sectors to make more informed weather-related decision relating to daily activities. Impacts could affect school closing, emergency response staging, damage reporting, citizen warnings, air traffic control, transportation asset protection, and numerous other weather based actions.

Comparison NEXRAD vs. CASA WX

	CASA WX	NEXRAD
Low-Level Sensing	Coverage Below 32,000 ft.	30% Coverage Below 32,000 ft.
Data Granularity	1-2.5 Football Fields	10-40 Football Fields
Update Rate	1 Minute	5 Minutes
Radar Scanning Strategies	Smart Scans, Optimized Each Minute	Autonomous 360 Degree Scans, Changed Manually

Low Level Sensing: Allows for detection of actual weather patterns at lower level of the atmosphere where severe weather reaching ground level occurs. This will provide for a more accurate reading of what the storms are doing. The belief is that it will increase lead time for warning by approximately 10 minutes. In some cases, it may actually provide an additional lead time of 20 minutes.

Data Granularity: An analogy of this concept can be described as a classroom setting; a room with tables and chairs. With the NEXRAD radar, the entire classroom would show up as one pixel on the radar. With the CASA WX system, each table would be a pixel. This enhanced data granularity will provide a clearer picture of the details of a storm to include actual hook echo formation, size of hail, etc.

Update Rate: CASA WX radars are able to complete a full scan and return results within 1 minute. Current systems take at least 5 minutes and in some cases longer. The magnitude, size, and direction of a storm can be significantly different in a 5 minute span.

Radar Scanning Strategies: The smart scan technology of the CASA WX radar allows the radar to sense the storm and focus the radar scan on the storm versus scanning a full 360 degree area, regardless of the absence of additional storm areas.

Additional Benefits to CASA WX Radar System

Fine Scale Rainfall Rates: Rainfall will be detected at every 800 ft. within the atmosphere. A test program is being implemented in Fort Worth in low-lying areas. New flood-gauges are being installed that will utilize data from the rainfall information from CASA WX to help predict flash flooding events.

Winter Weather (Research Stage): With the CASA WX system, it is believed that detection of winter weather precipitation will be detectable to the exact type of precipitation and the probability of it reaching ground-level.

Hybrid Warnings: Utilizing CASA WX and NEXRAD together will allow for very specific weather warnings, decreasing the amount of false alarms, thereby decreasing citizen complacency. It is thought that this hybrid approach will be able to warn closer to neighborhood levels, versus wide path of current polygons.

Current Status of North Central Texas Implementation

At the completion of this project, there will be 16-20 CASA WX radars installed in North Central Texas. The first six radars will be at the University of Texas – Arlington; UNT Discovery Park; City of Fort Worth; Town of Addison; City of Midlothian; and the City of Cleburne.

Locations for the next two radars that have been donated to our region are being researched at this time.

The remaining 8-12 radars will cover the NCTCOG area.

Next Steps: Jurisdiction Participation & Funding

A multi-sector cost share approach has been taken with this system.

- CASA WX pays for first 8 radars (~\$3.5 million)
- Local “Host” cities pay for network and electricity (UNT, UTA, Addison, etc.)
- Public-Private partnership pays for operations costs - \$600K annually
 - DFW stakeholders (local jurisdictions)
 - NWS and other federal agencies
 - Third party data providers (WeatherBug, Weather Tap, etc.)
 - Grants

It is estimated that the cost share will be required from jurisdictions wanting to participate and receive CASA WX weather data in October 2014. The cost structure estimated is based on population (see tables below). This amount may decrease as additional private partners are brought on board and additional jurisdictions agree to participate in the program. This is the first network of its kind in the United States for the CASA WX system. The Region has committed to a 5 year pilot program with the intent to maintain the system for long-term use.

Municipal Population Cost Structure – Annually

Population	Cost	Population	Cost	Population	Cost	Population	Cost
0-999	\$500	15,000-29,999	\$3,000	80,000-119,999	\$10,000	250,000-399,999	\$25,000
1,000-4,999	\$1,000	30,000-49,999	\$5,000	120,000-169,999	\$15,000	400,000-749,999	\$30,000
5,000-14,999	\$2,000	50,000-79,999	\$7,500	170,000-249,999	\$20,000	750,000-1 Million +	\$35,000

County & Special District Cost Structure – Annually

Type	Cost	Type	Cost	Type	Cost
Rural County	\$3,000	Urban County	\$10,000	Special Districts	\$15,000

Additional information regarding the CASA WX project can be found at www.nctcog.org/casawx.