National Wind Institute Weather Station Polling Issue

EPOC Contact Point: Hans Addleman (addlema@iu.edu)
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The National Wind Institute (NWI) at Texas Tech University (TTU) works to solve some of society's most complex problems by supporting convergent research in Energy Systems, Wind Engineering, and Measurement and Simulation. The West Texas Mesonet part of the NWI has 132 weather stations spanning 79 counties in West Texas, southwest Colorado and eastern New Mexico. These stations are polled from a central location and the data is used for weather and agricultural research.

In February of 2020, TTU engineers reached out to Lonestar Education and Research Network (LEARN) staff reporting that they were having a recurring issue polling some of their 130 weather stations spread across the western United States. After reviewing the inquiry, LEARN staff referred TTU engineers to EPOC for further assistance.

In the initial consultation, TTU engineers reported that their weather stations were all diversely connected to the internet by various cellular and land-based network technologies, and that they were polled every 2.5 minutes by two separate servers in the TTU datacenter. However, from Dec 12th 2019 until Feb 6th 2020 on Thursdays between 11:50am-12:35pm and 2:50pm-3:35pm CDT, as many as 50% of the weather stations were not responding. The weather stations were affected across all the various networks and technologies and no station was failing for the entire polling duration.

During the course of the investigation, TTU engineers reported that the only recent change to the setup was the addition of two new weather stations just before the problems started. No changes to hardware or software had been made to either collection server, and TTU engineers analyzed CPU, memory, disk, and network utilization on both servers with no discernible difference between normal and problematic polling times. TTU security staff and engineers also reviewed firewall logs and packet captures during the problematic periods, and found nothing out of the ordinary. To fully rule out the campus firewall TTU engineers moved one of the polling servers outside of the network to a neutral data center and the problem followed.EPOC engineers recommended using perfSONAR nodes installed in different parts of the TTU network to diagnose possible network performance issues.

A week after the initial consultation, TTU engineers replaced one of the polling servers with new hardware, however, they continued using the same version of polling software. On February 13th, TTU engineers reported the problem was no longer occurring. No issues have been reported since.