Lightning Detection Technology

Lightning is Mother Nature's warning sign of dangerous weather.

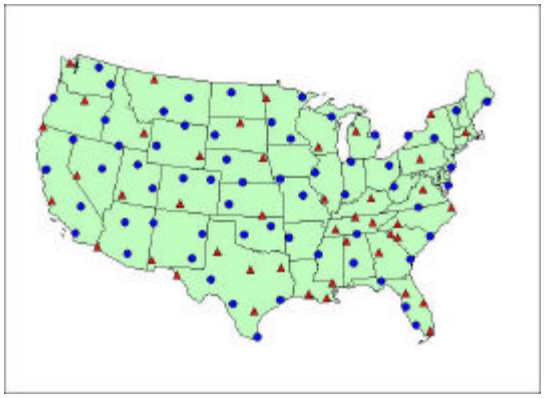
Weather forecasters and weather-sensitive businesses closely watch storm development. When a storm starts generating lightning, the lightning alerts forecasters to watch the thunderstorm for other dangerous weather elements—heavy rain, hail, flash flooding, high winds, downbursts, and tornadoes—that often occur with electrified storms.

Lightning information is critical for:

- Weather forecasters to identify hazardous weather to issue warnings to the public.
- Air traffic controllers to re-route airline traffic around hazardous weather and to warn pilots before vulnerable takeoffs and landings at airports.
- Forestry officials to focus firefighting efforts in remote areas.
- Electric power utilities to prepare crews for dispatch to specific areas for quick repairs when thunderstorms threaten their transmission lines and generating facilities.
- Golf courses and outdoor sports facilities to warn players to seek safe shelter.
- Communications networks to re-route traffic around thunderstorms to avoid interruptions.

The National Lightning Detection Network® locates strikes in seconds.

In the mid-1970's, three University of Arizona scientists, Dr. E. Philip Krider, Dr. Burt Pifer, and Dr. Martin Uman, began researching lightning properties and behavior. Over the next decade, their research and the contributions of others resulted in the development of a national lightning detection system, the U.S. National Lightning Detection Network®. Since 1989, the NLDN® has monitored the 20 to 25 million cloud-to-ground lightning strikes that occur every year across the contiguous 48 states. The network operates 24 hours day, 365 days a year.

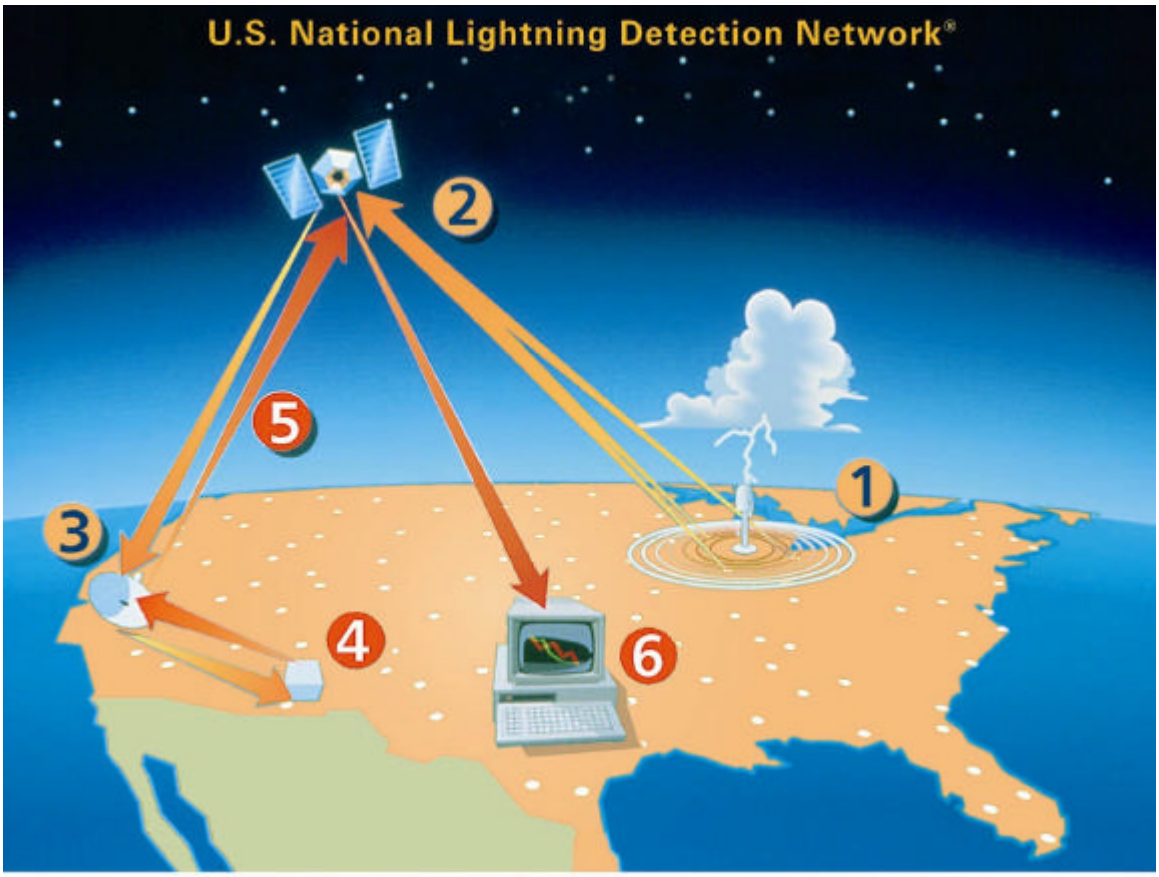


NLDN® sensor locations in the U.S.

The NLDN consists of over 100 remote, ground-based sensing stations located across the continental United States that instantaneously detect the electromagnetic signals given off when lightning strikes the earth's surface. These remote sensors send the raw data via a satellite-based communications network to the Network Control Center operated by Global Atmospherics, Inc. in Tucson, Arizona. Within seconds of a lightning strike, the NCC's central analyzers process information on the location, time, polarity, and amplitude of each strike. The lightning information is then communicated to users across the country.

Lightning strike locations are usually reported in 30 seconds or less—faster than other hazardous weather indicators—making it an important early warning tool. The unprecedented accuracy of the network depends on precise waveform processing, global positioning system (GPS) time

synchronization, high-speed signal processing, and wide-band peak gated magnetic direction finding techniques.



How the NLDN works: 1) Sensors transmit data to satellite; 2) Satellite relays information to earth station; 3) Data is transmitted to NCC via landlines; 4) NCC processes data; 5) Processed data is relayed back to satellite; 6) Lightning data is displayed within seconds of occurrence.

Comparing lightning detection and lightning prediction.

The NLDN is a lightning detection system that reports within seconds the time and place a strike just occurred. Meteorologists use the progression, strength, and number of lightning strikes to assist in forecasting. For instance, direction, change in number of strikes, polarity, area covered and dissipation of lightning can help determine thunderstorm intensity. But lightning information is most valuable to forecasters when it is combined with other weather information, such as prevailing winds and rainfall, to help project the real-time path of a thunderstorm.

The term “lightning prediction” has different uses. Lightning prediction can mean predicting that a storm has enough energy to generate lightning over a general area. Or it can mean predicting the time and place a strike is going to occur. For the first type of prediction, capabilities for predicting general lightning activity have been used for more than 10 years. Sensing equipment measures the weather conditions needed to generate lightning, signaling when lightning activity is likely over a large area, usually several square miles. That’s as close as technology gets to reliably predicting lightning. Mother Nature continues to closely guard her secret on when and where each strike will occur.