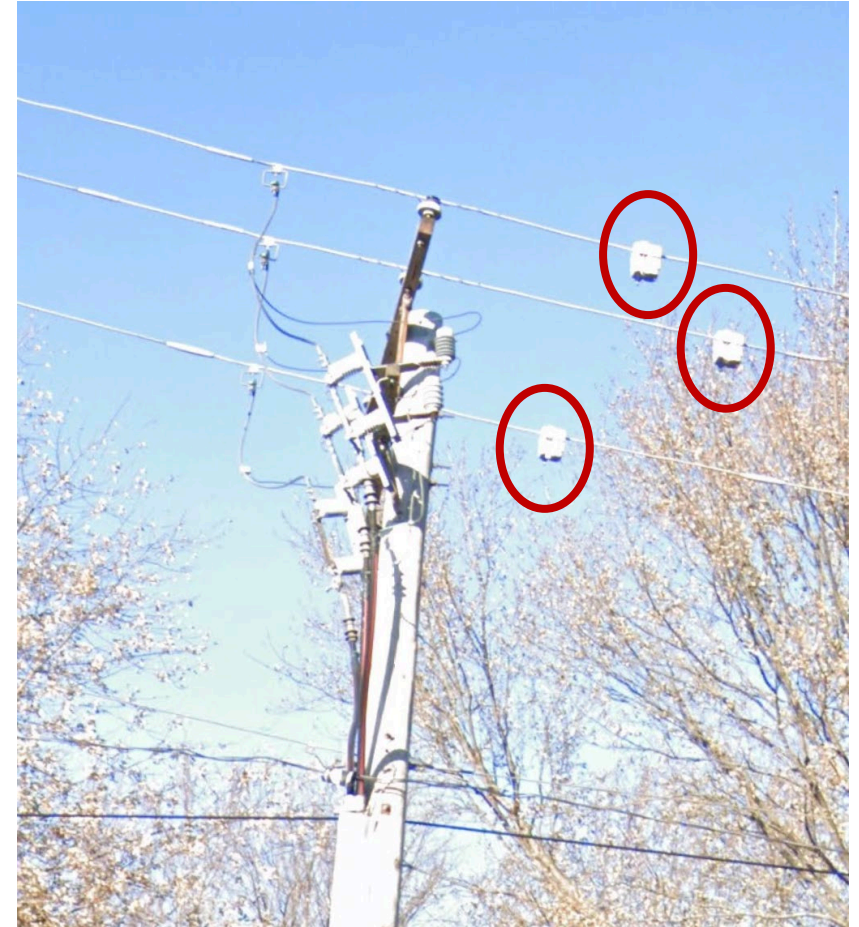


Outage Prediction Using Fault Sensing Devices

ComEd Advanced Analytics Team

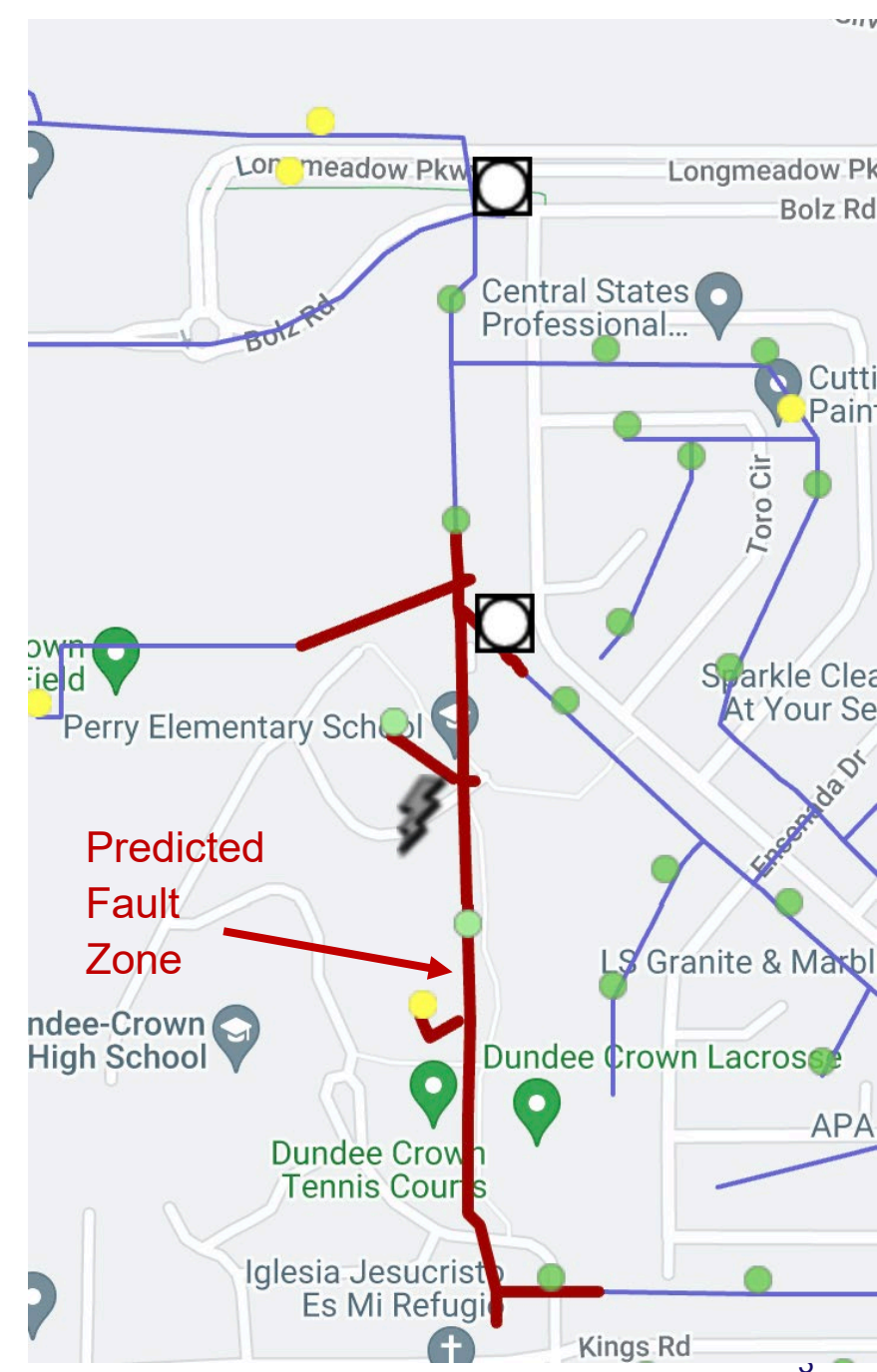
Transient Faults

- A majority of faults that occur on an electrical distribution system are transient, do not immediately result in a sustained customer interruption
 - May be indicative of a condition that could cause a sustained interruption in the future
- Typically, the only account of what happened comes from records generated by field sensing devices
- ComEd employs various field located devices which collect data about faults including thousands of distribution automation devices and overhead line sensors



Algorithm

- ComEd has developed an algorithm that detects transient faults and provides a location where latent damage is most likely
 - Fault location is estimated using fault current magnitude from fault sensing devices
- Field inspectors are dispatched to these locations to determine the root-cause of faults



1 Predicted Fault Zone (Red)

2 Lightning Stroke Location

3 AMI Meter Power Down

4 Meter Outage Duration

5 Recloser

6 Event Summary

Meters

Reclosers

Substations

Faults

Lightnings

Circuit Map

6

Meters: 471 | Lightnings:5 | Faults:3
Feeders: 4 | Stations:1 | Transformers:132
Event Type: M | Wind: | Possible Cause:Lightning
Event Start: 2022-06-01 1:11:01 | Event End:2022-06-01 1:11:29
Duration (minutes):0.5

4

Event Durations Counters

143	214	6	1	112
< 6s	< 17s	< 38s	< 60s	> 60s

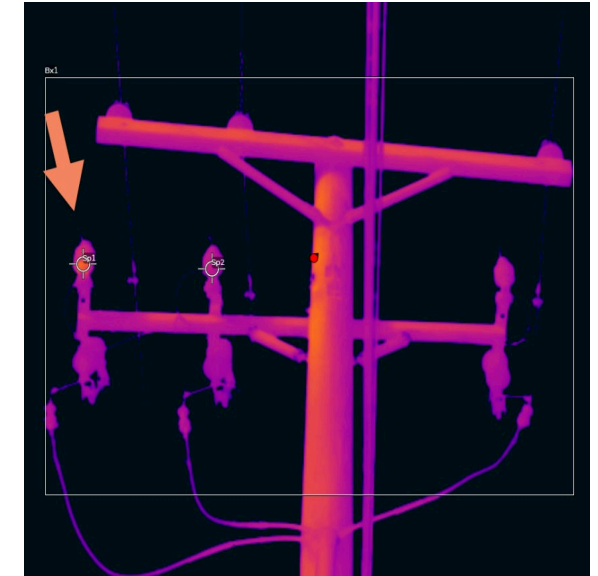
Fault Zones

The map displays the Naperville, Illinois area, highlighting a predicted fault zone (red line) and lightning stroke locations (black lightning bolts). The fault zone is labeled with a circled '1', and lightning stroke locations are labeled with a circled '2'. A recloser location is labeled with a circled '5', and an AMI meter power down location is labeled with a circled '3'. The map also shows a circuit map overlay with red and green dots representing meters and faults. Key landmarks include Costco Wholesale, Lowe's Home Improvement, and the Springbrook Prairie Forest Preserve.

4

Pilot

- Damage was confirmed at 19 of 28 locations identified by the algorithm (68% true positive rate)
- Defects identified during pilot account for 5,449 avoided customer interruptions





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