prisma photonics

GREAT RIVER ENERGY

Presented at:

WILDFIRE RISK & RESILIENCE @PNNL

Pacific Northwest NATIONAL LABORATORY

Shifting utility paradigm from reactive to proactive

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Prisma Photonics | Great River Energy

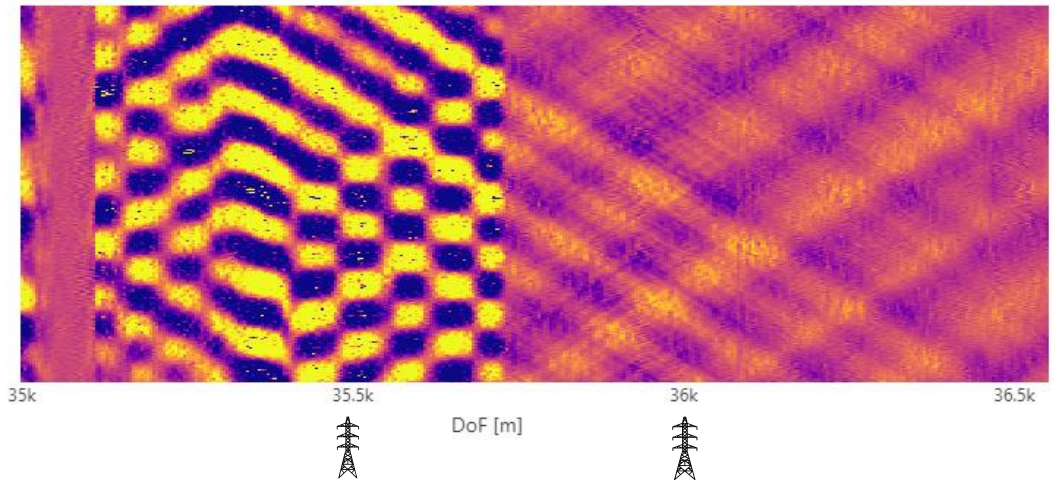
August 27th, Madison, WI

Great River Energy Overview

- HQ at Maple Grove, MN
- Serves approximately 1.7 million people across Minnesota
- 5,000 miles of high-voltage transmission lines
- 100 transmission substations
- 3,500 megawatts (MW) of generation

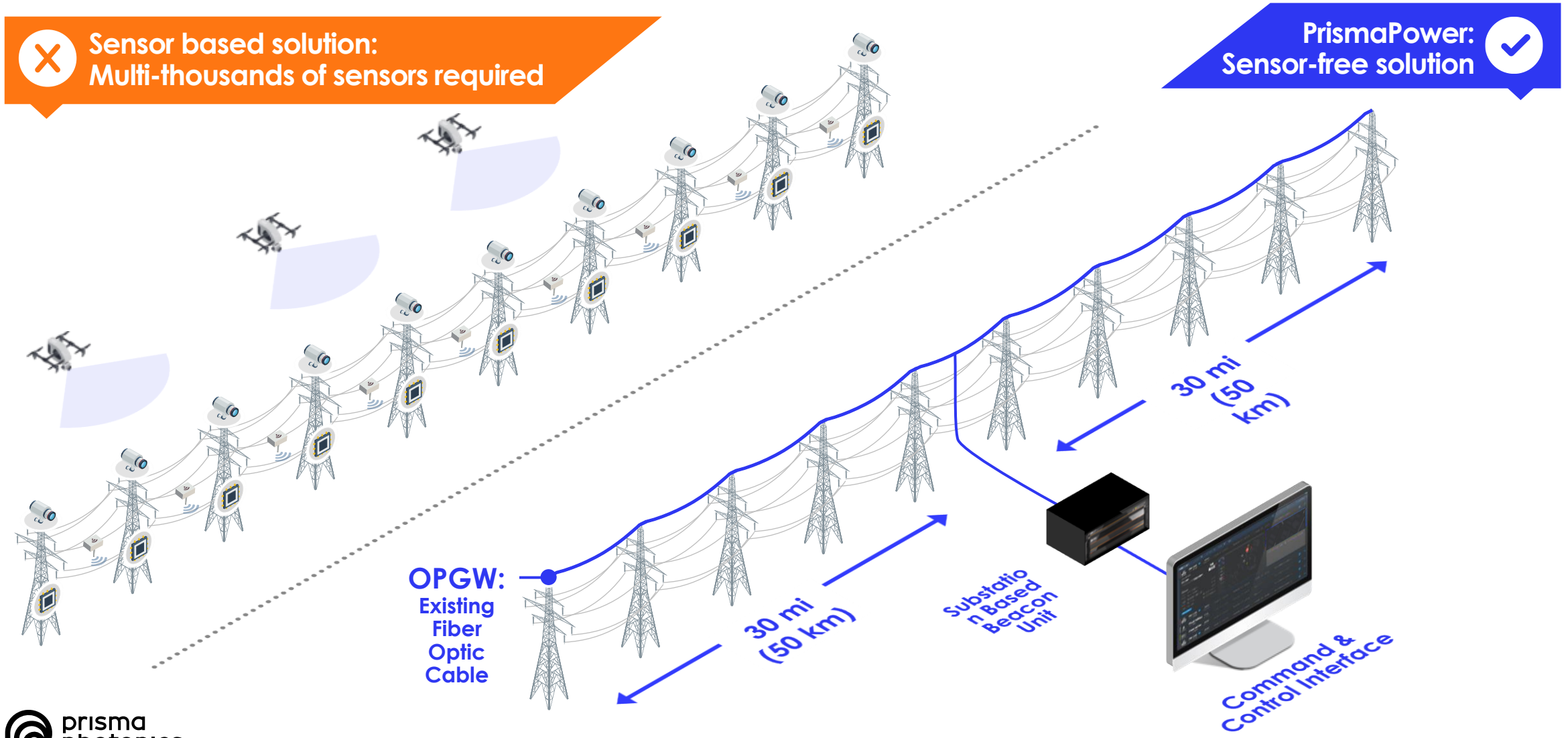
Prisma Photonics

- Optical Fiber Sensing for Power Line Monitoring
- Founded in 2017, HQ in Tel Aviv, offices in the U.S., and Germany
- Over 90 employees and rapidly growing
- Innovating next-generation fiber sensors to increase grid resiliency and capacity



חברת החשמל
Israel Electric

From Multi-Thousands of Sensors to a Continuous Sensor Solution



The PrismaPower™ Suite

PrismaCapacity

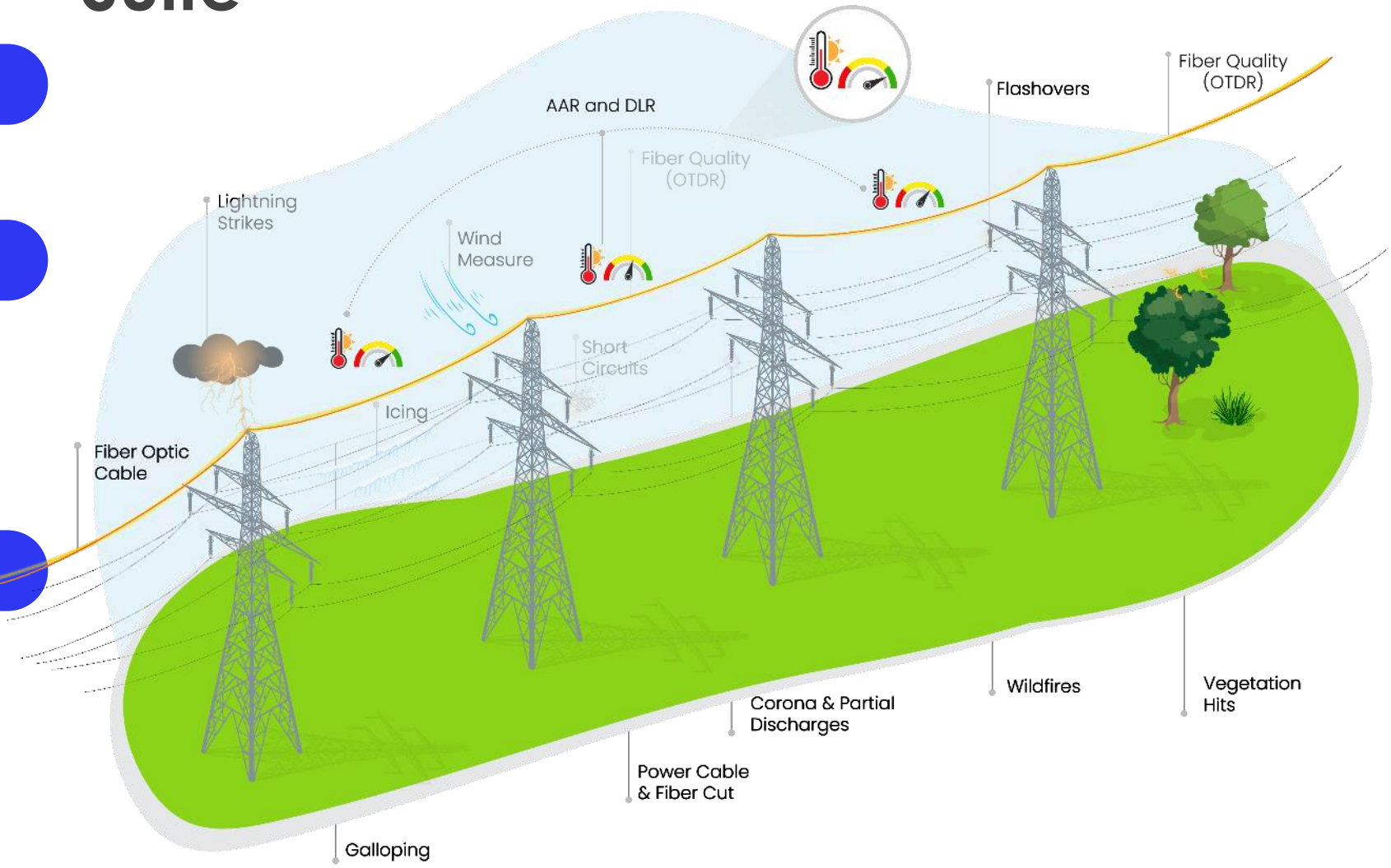
- Dynamic Line Rating (DLR)
- Ambient Adjusted Rating (AAR)

PrismaClimate

- Galloping
- Wire tension
- Extreme winds
- Icing
- Lightning strike
- Wildfires

PrismaCircuit

- Short circuits
- Flashovers
- Partial discharge & Corona
- Fiber cut
- Fiber quality (OTDR)
- Vandalism
- Tower climbing
- Vegetation hits



PrismaClimate and PrismaCircuit in Action

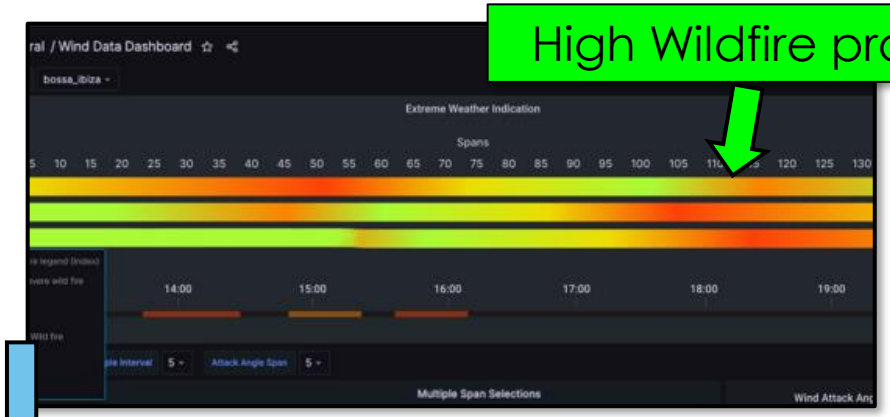
Short-term weather forecast

Weather Warning

Present high wildfire warning in dashboard

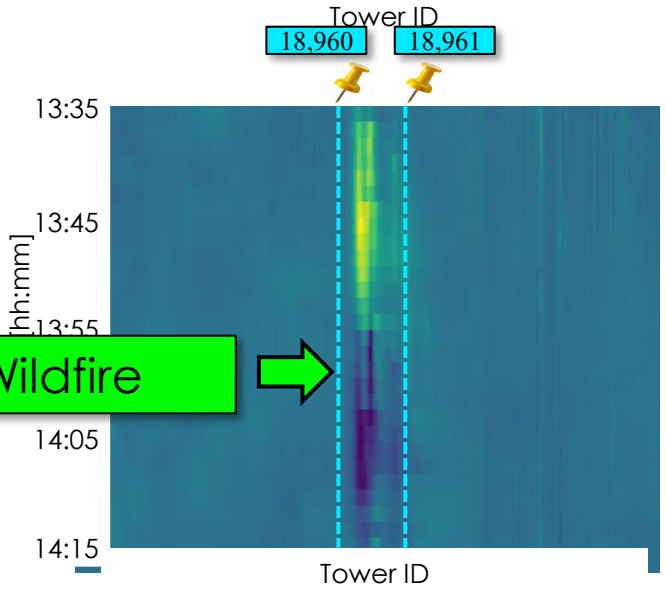
AI identifies Wildfire unique seismic signature

GUI shows alert + tower localization

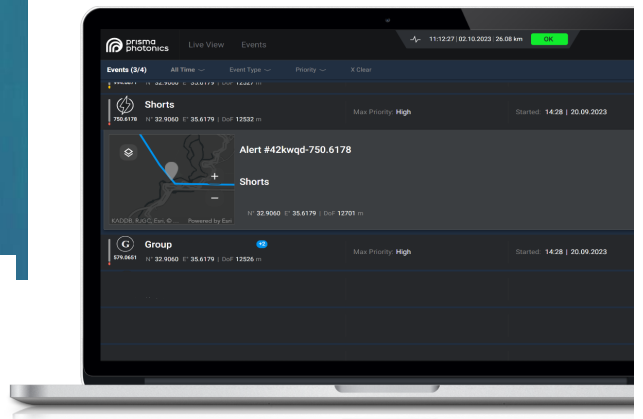


High Wildfire probability +4.5hours

Weather dashboard – High Risk of Wildfire



Wildfire



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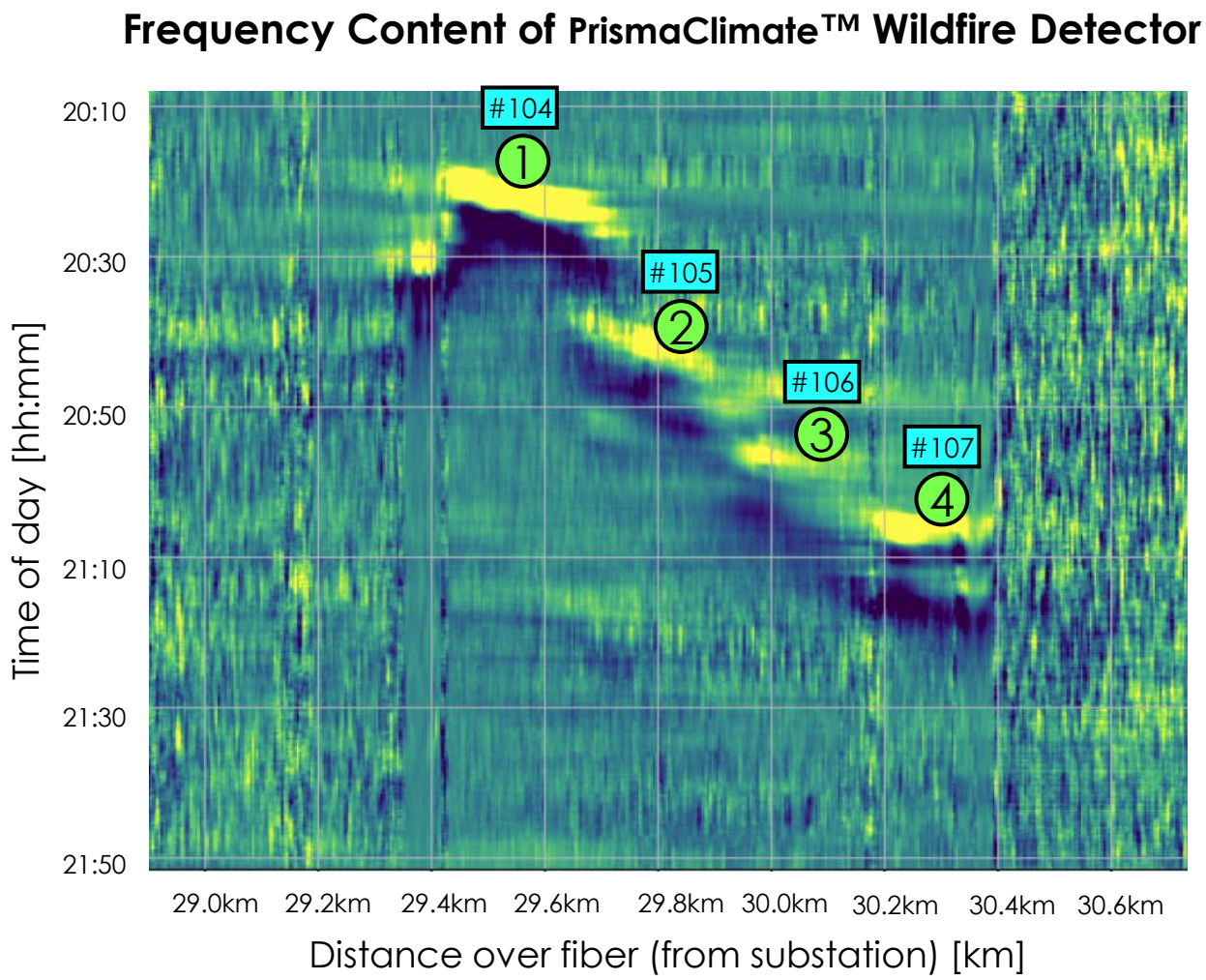
Gilaboa Nature Reserve Wildfire, July 2023



1. Wildfire detector triggered at 20:20, at span #104
2. Wildfire detector triggered at 20:40 at span #105
3. Wildfire detector triggered at 20:55 at span #106
4. Wildfire detector triggered at 21:05 at span #107

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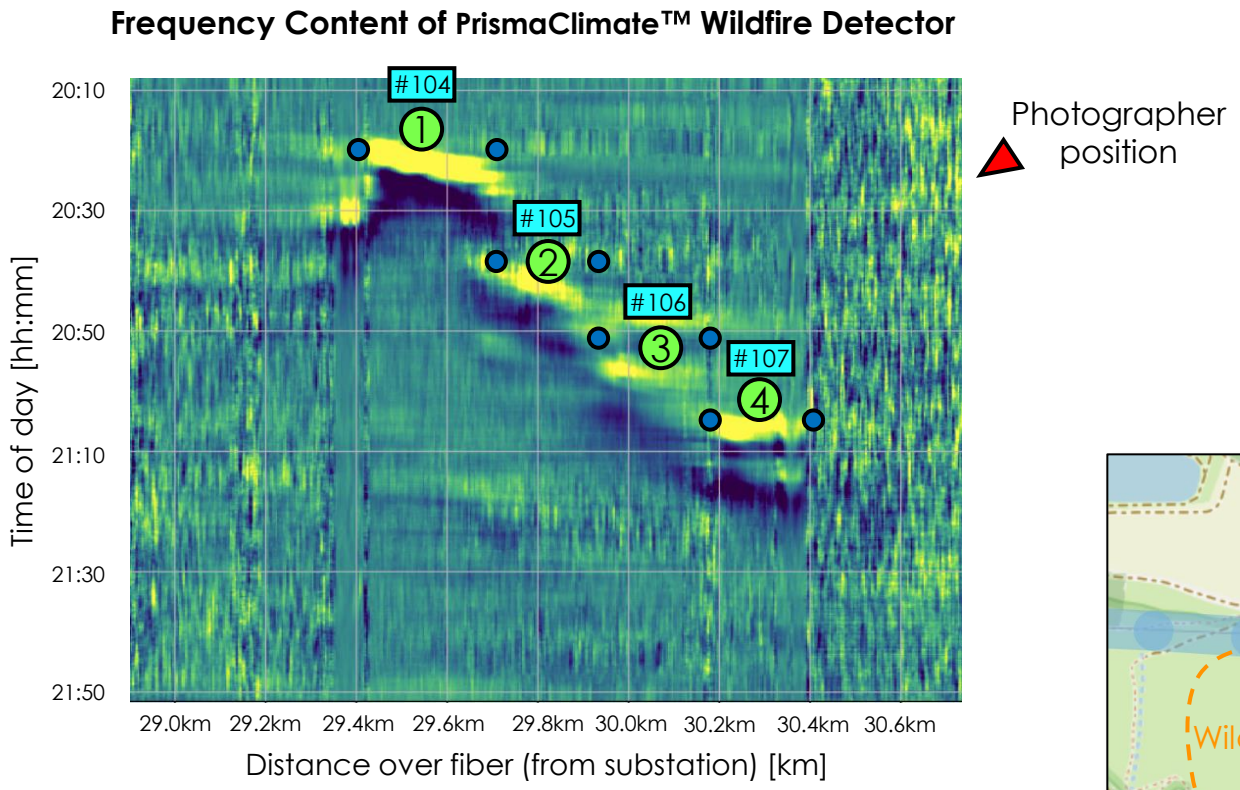
Gilaboa Nature Reserve Wildfire, July 2023



Photographer position

Photographer position

Problem/Opportunity

Opportunity:
How GRE's recognition of the critical span through continuous monitoring provides optimal grid resiliency and wildfire mitigation strategy

Pain:

- Evolving Planning from severe weather to wildfire mitigation
- Meeting resiliency and reliability planning needs
- Need Precision and accuracy of grid events
- More reliable data and enhanced reporting capabilities for system operations

Overview:
Location: Mid – North of Minneapolis
Applications: PrismaClimate, PrismaCircuit
Term: 3 Years

5 Beacon systems to be installed in 4 different substations

- Line 1: Cook to Orr - 18.1 Miles
- Line 2: Ortman to Fork Tap - 21.3
- Line 3: Cambridge to Rush City - 18.6 Miles
- Line 4: Cambridge to Grasston - 15.5 Miles
- Line 5: Big Swan to Hutchinson - 16.6 Miles

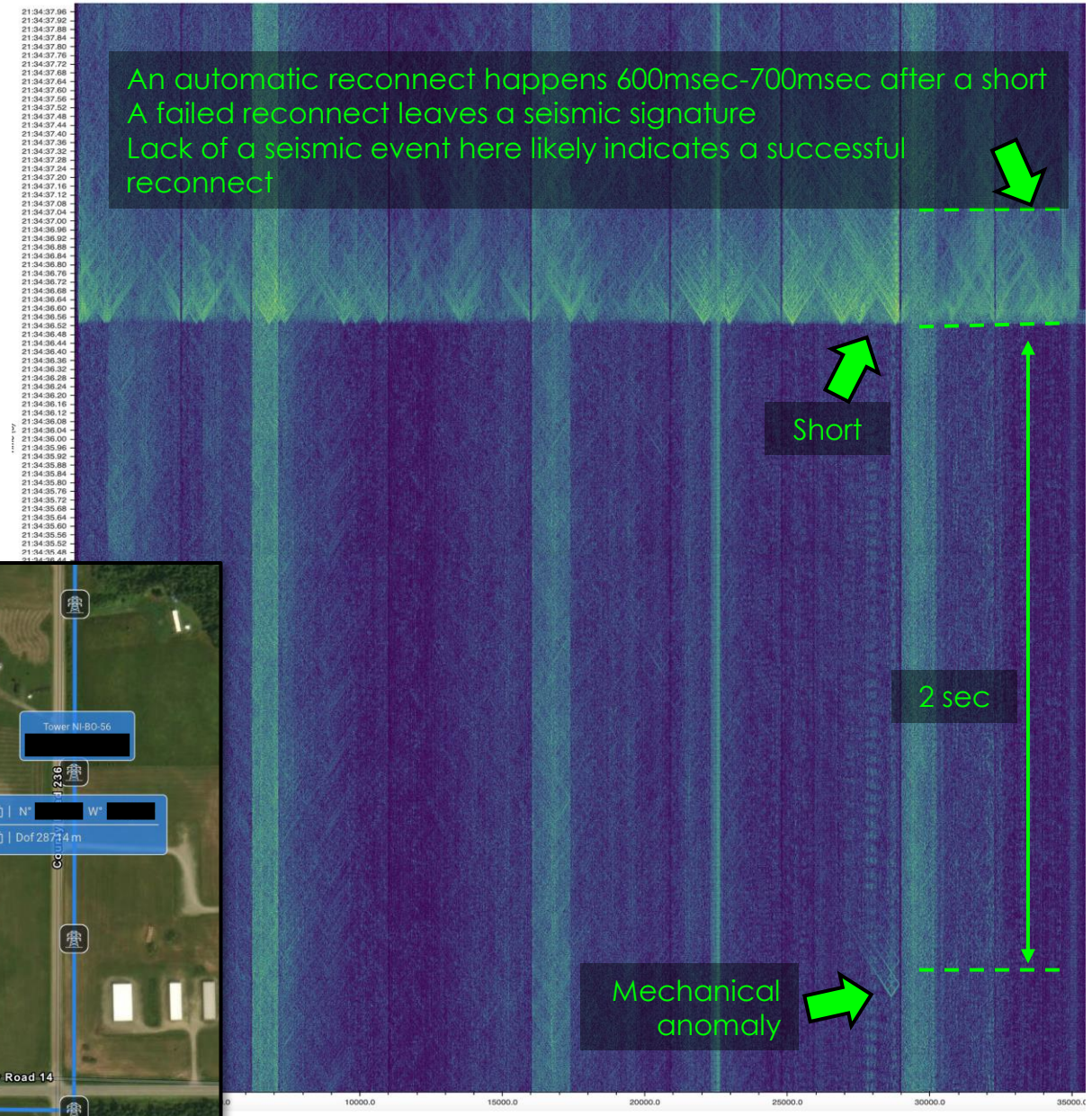
Implementation with GRE

Monitoring 5 lines in central and northern MN

- Installation completed in December 2024
- ~90 miles of transmission is being monitored
- Five PrismaPower Beacon Systems – located in four GRE substations
- PrismaClimate and PrismaCircuit applications are gathering data
- The system is producing resilience alerts
  - About 50 events were detected until May 2025
  - Short circuits and physical anomalies

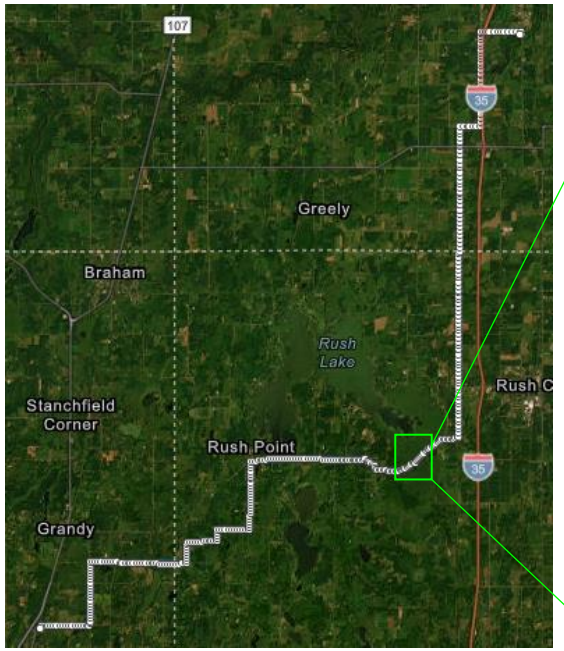
Short Circuit Event

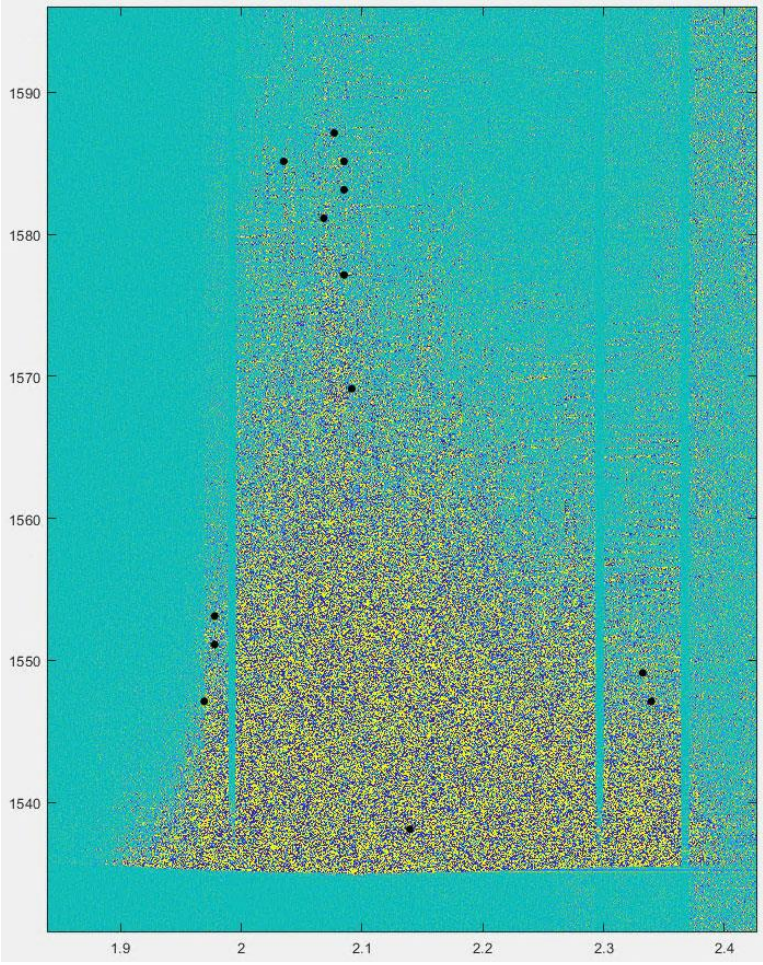
- Mechanical anomaly 2 seconds prior
- Fiber distance: 17.8 miles (28.7km) from substation
- Tower: [redacted]-[redacted]-56



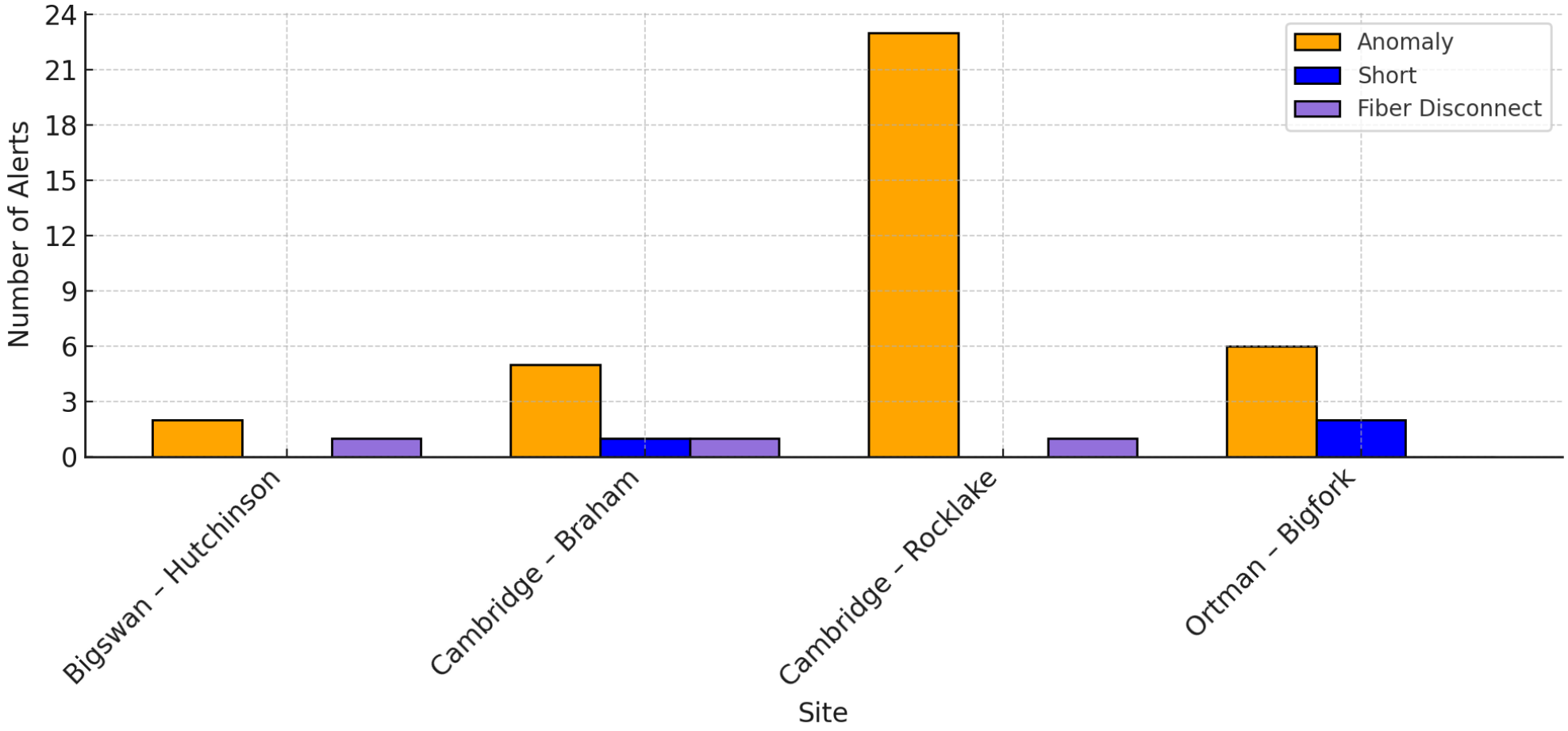
Car hitting a tower

- Cambridge – Rocklake line (System 210-1074)
- Mechanical anomaly
- Location: Distance on fiber (DoF) = 13.04 miles from Cambridge
- Tower: EC-CP-195 (wood tower)





Alert Summary - per site



Wildfire Alerting

- **Wildfires Are on the Rise**
- Value stacking continuous monitoring for all resiliency and wildfire mitigation strategy
- Utilities prioritizing adoption of innovative solutions reduce risk
- Early detection in all conditions with real-time alerts is critical
- Only continuous, wide-area coverage can meet the challenge

Questions, please?

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GREAT RIVER ENERGY

THANK YOU

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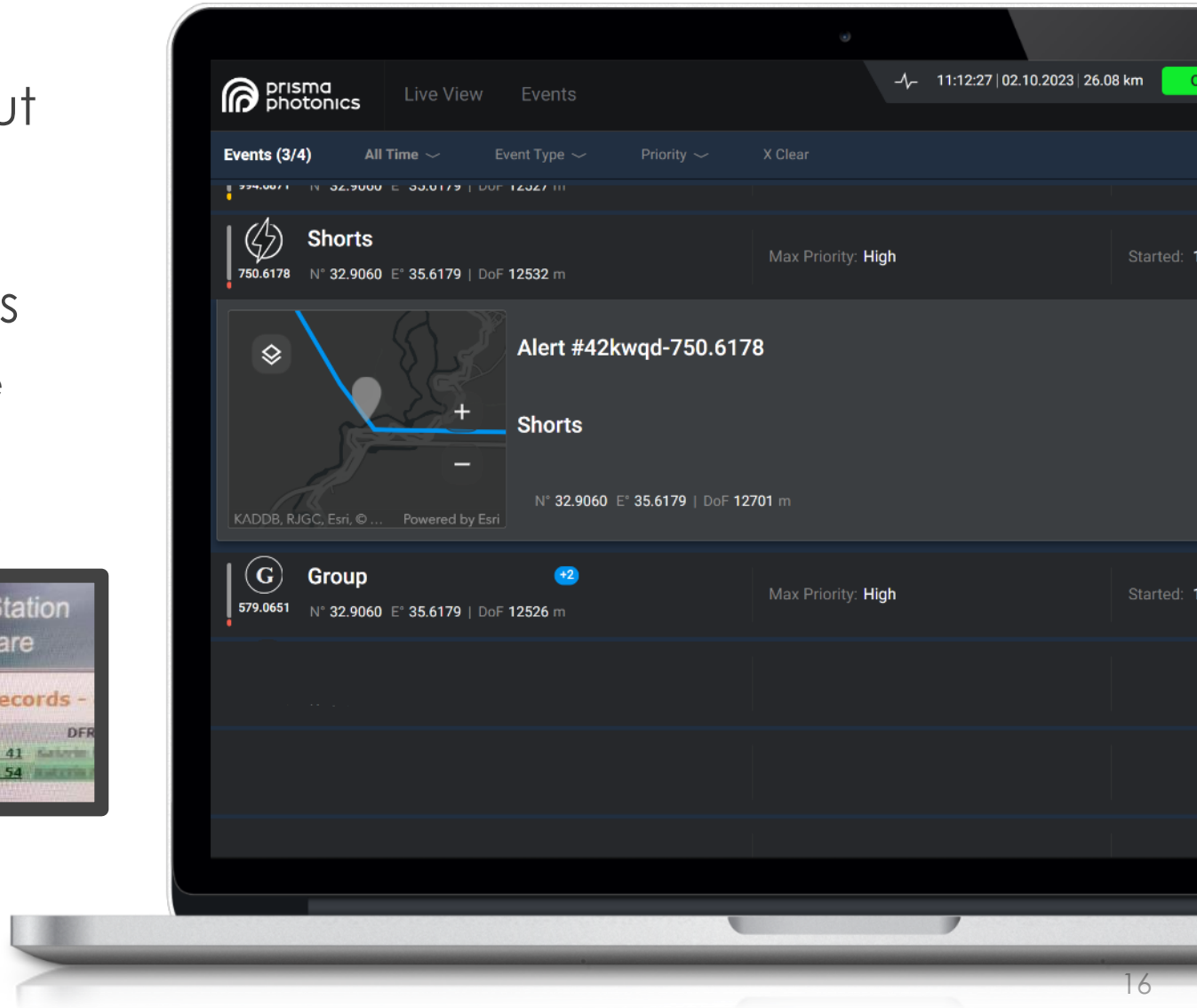
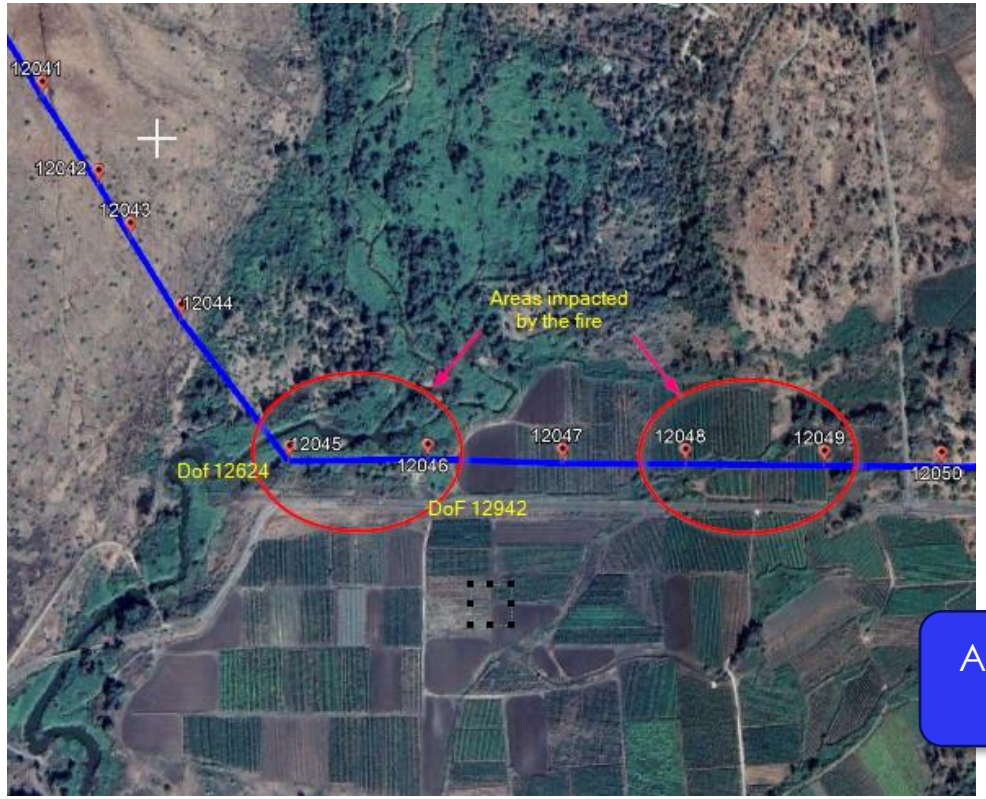
Localization of Brushfire Induced Short Circuit (1/2)

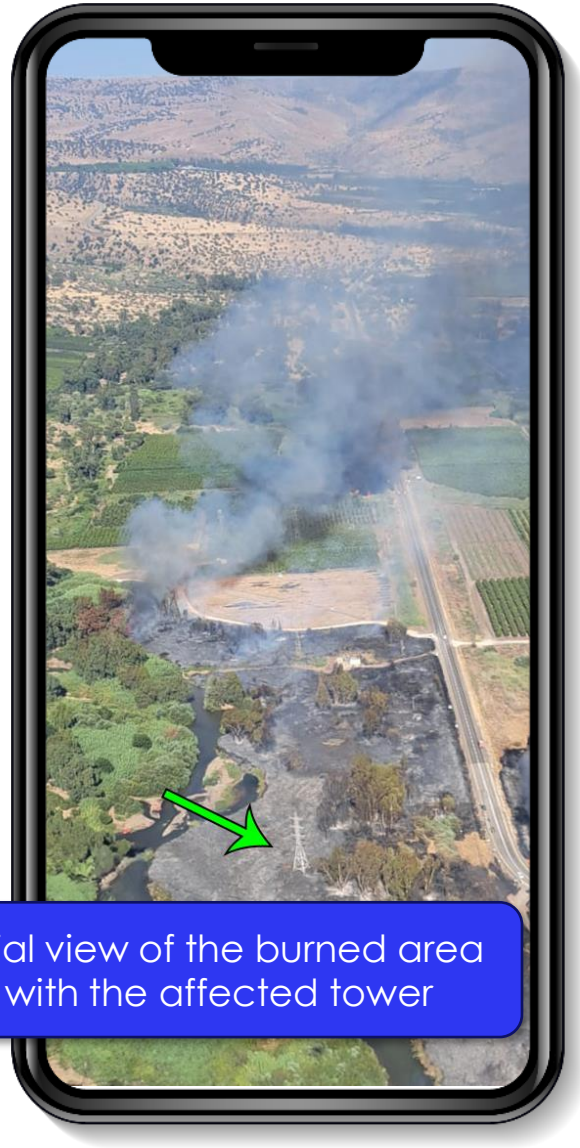
- In August 2023, a brushfire broke out on a mountain range
- As a result, the nearby power line suffered 2 consecutive short circuits
  - In hindsight, they were induced by the fire and not the cause of it
- These were recorded in the feeder substation
- And were identified by PrismaPower



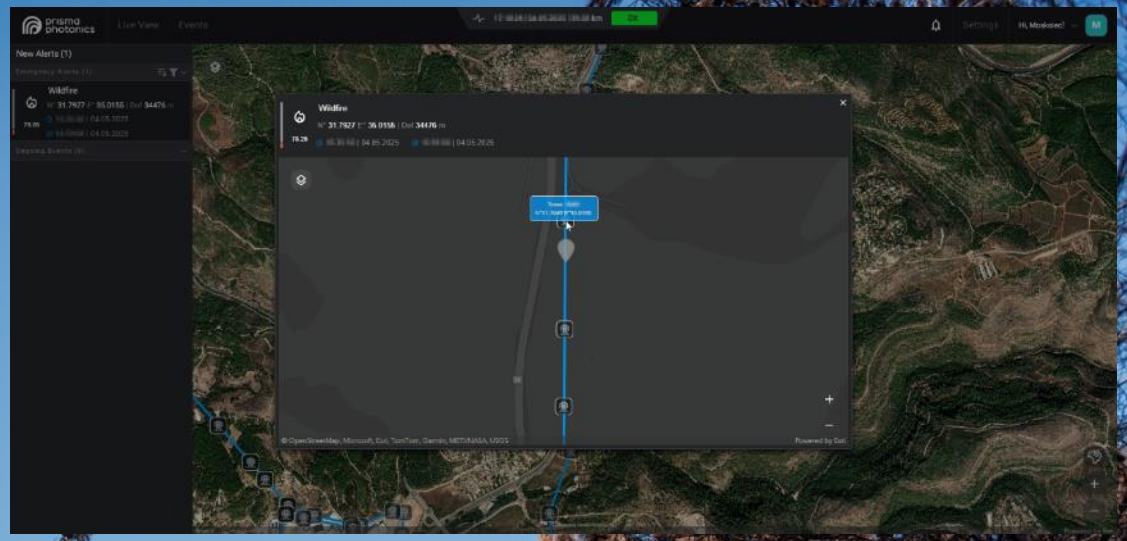
Localization of Brushfire Induced Short Circuit (2/2)

- A firefighter plane identified the source of the short in the middle of the affected area
- PrismaPower, visual inspection, and substation record identified the same tower





Arial view of the burned area with the affected tower



April 2025:

5,000 Acres of burnt forest in the Judean Hills

Tower ID: 18,960