Preventing Equipment Failure

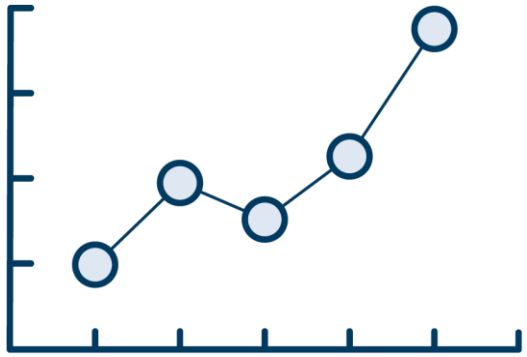
NASPI Webinar Series Presentation

Jared Bestebreur, Senior Product Manager

January 24, 2024

Monitoring asset health

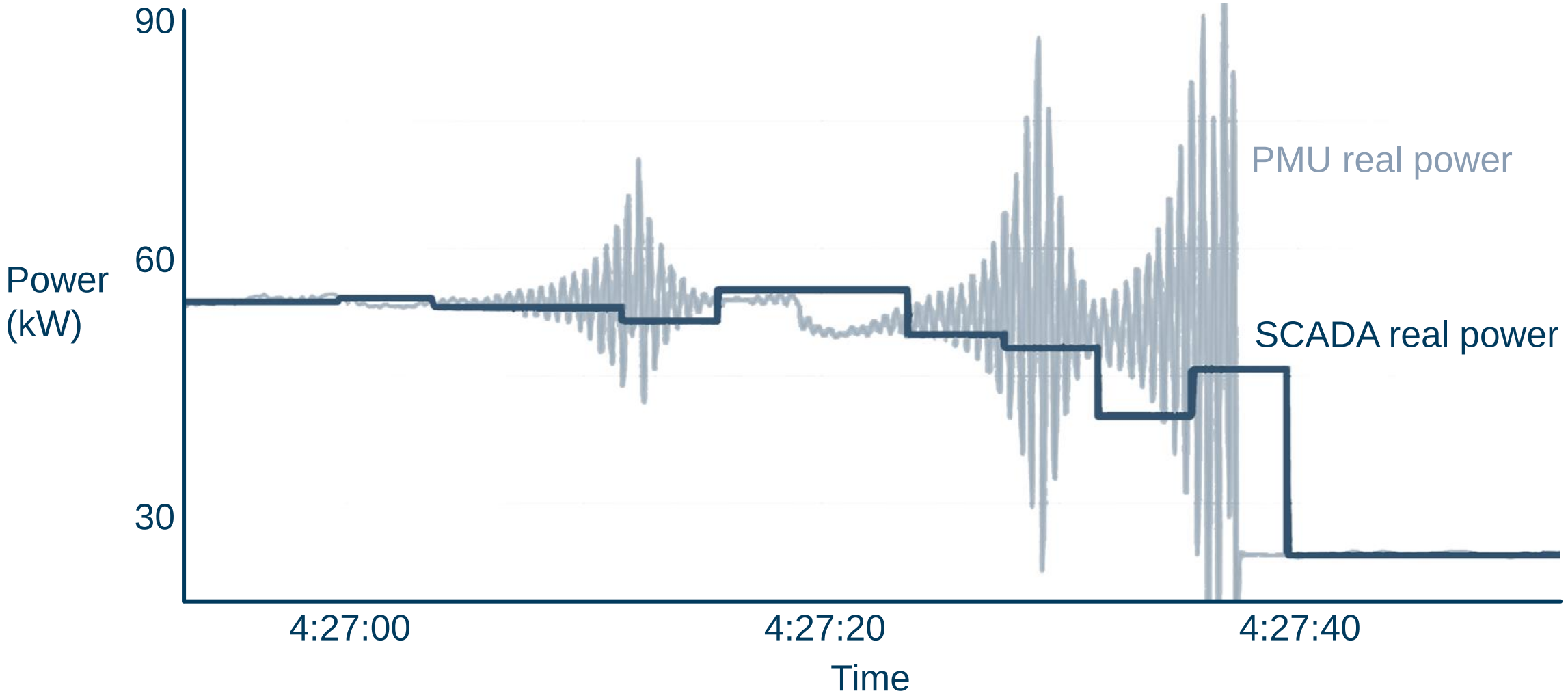
Time-series Data



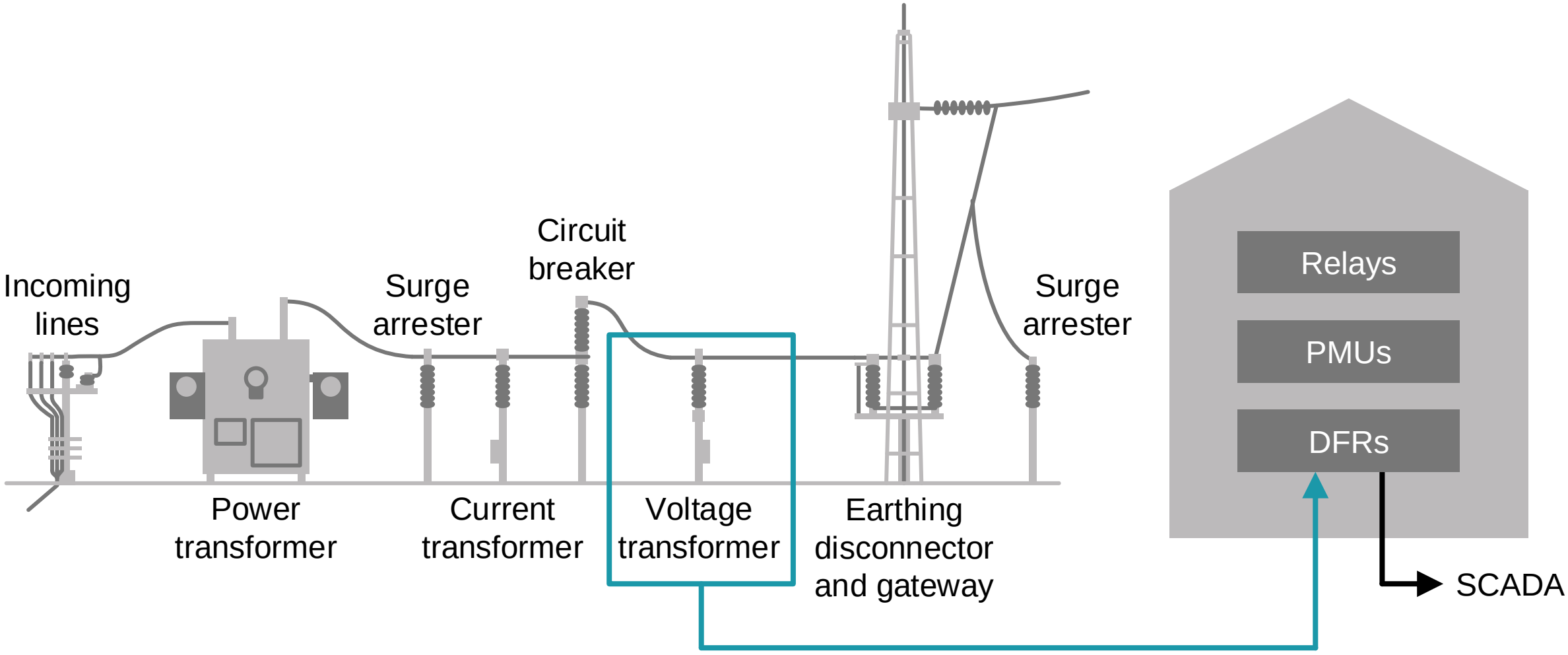
Real-Time Algorithms and Apps

- VT/CT Monitoring
- Oscillation Monitoring
- Disturbance Monitoring
- SSO Monitoring

SCADA misses information

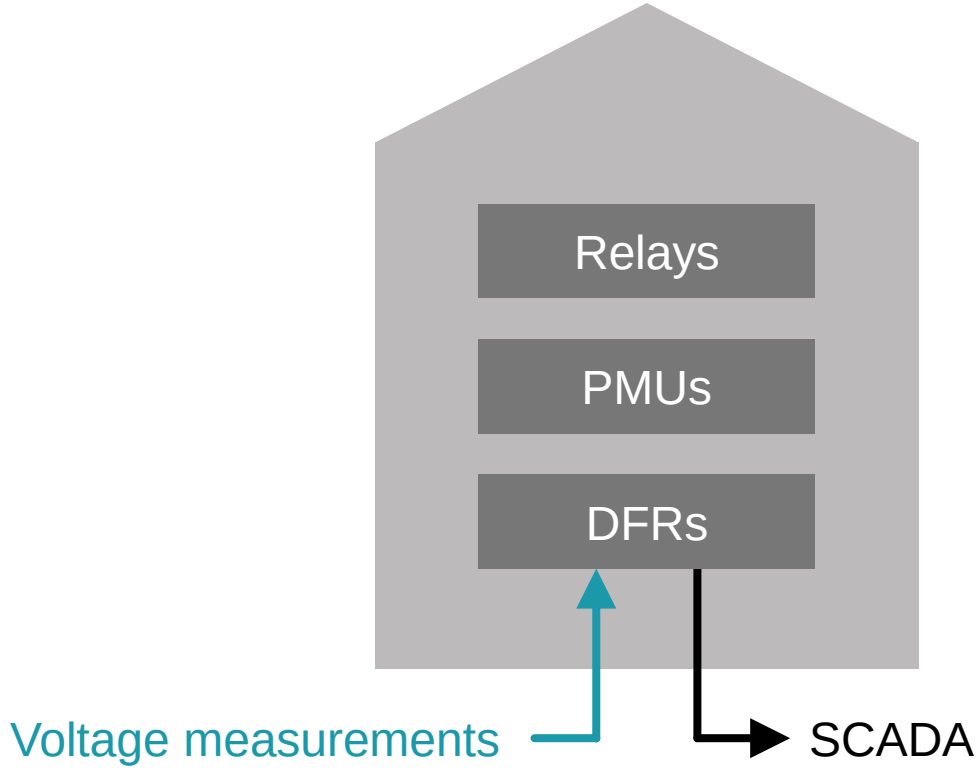


Voltage transformer

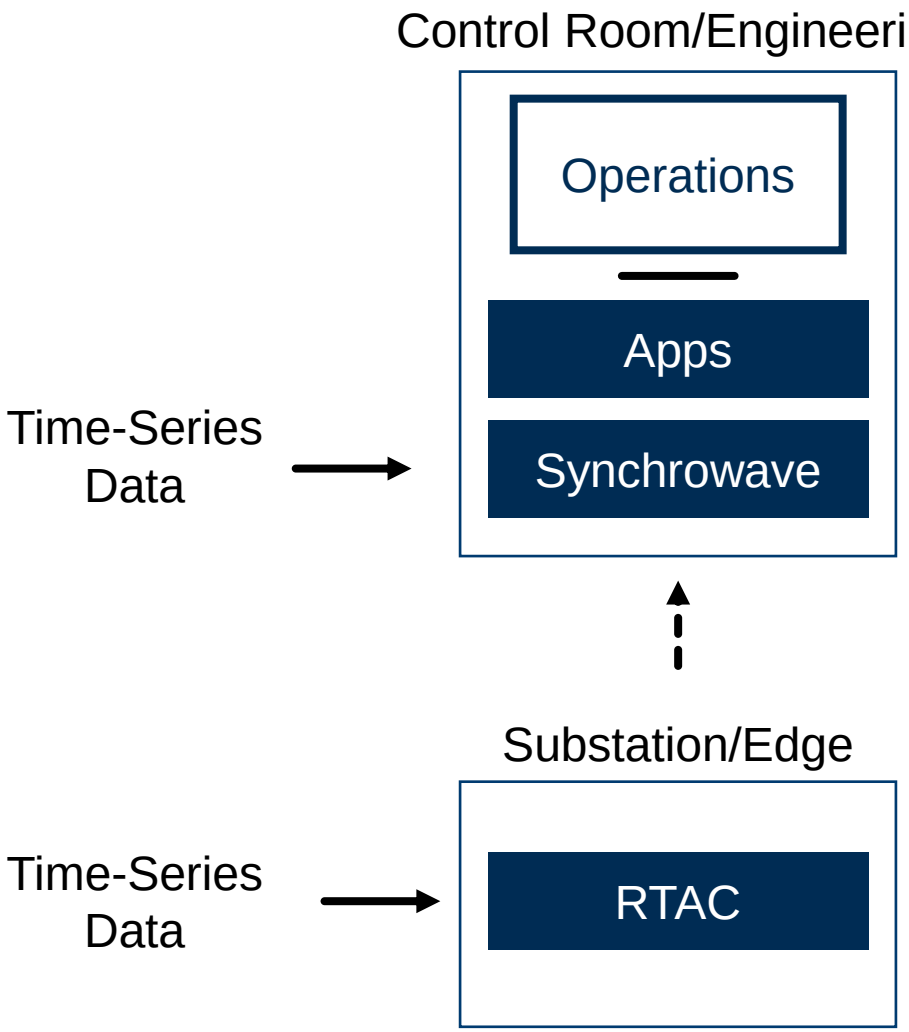


Potential impacts of failing voltage transformer

- Protection impacts
  - Improper relay operation
  - False alarms sent to SCADA
  - Misrepresentation of phase angle
  - Corrupted voltage measurements
  - Corrupted frequency signals
- Equipment/personnel impacts
  - Substation equipment damage
  - Personnel safety hazards



Time-series solutions to detecting VT failure

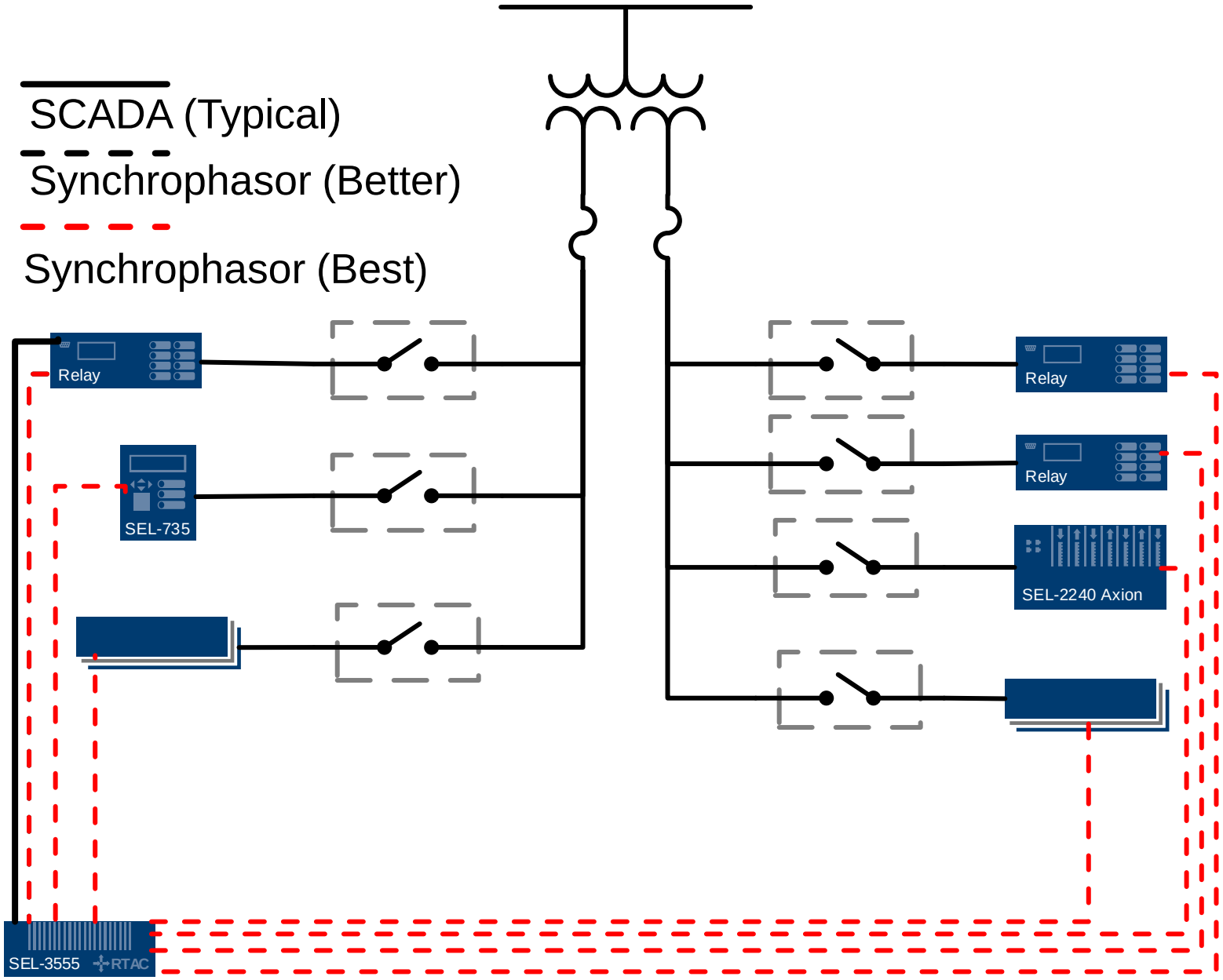


Data focused approach. Compares three phase voltage magnitudes and angles to identify anomalies.

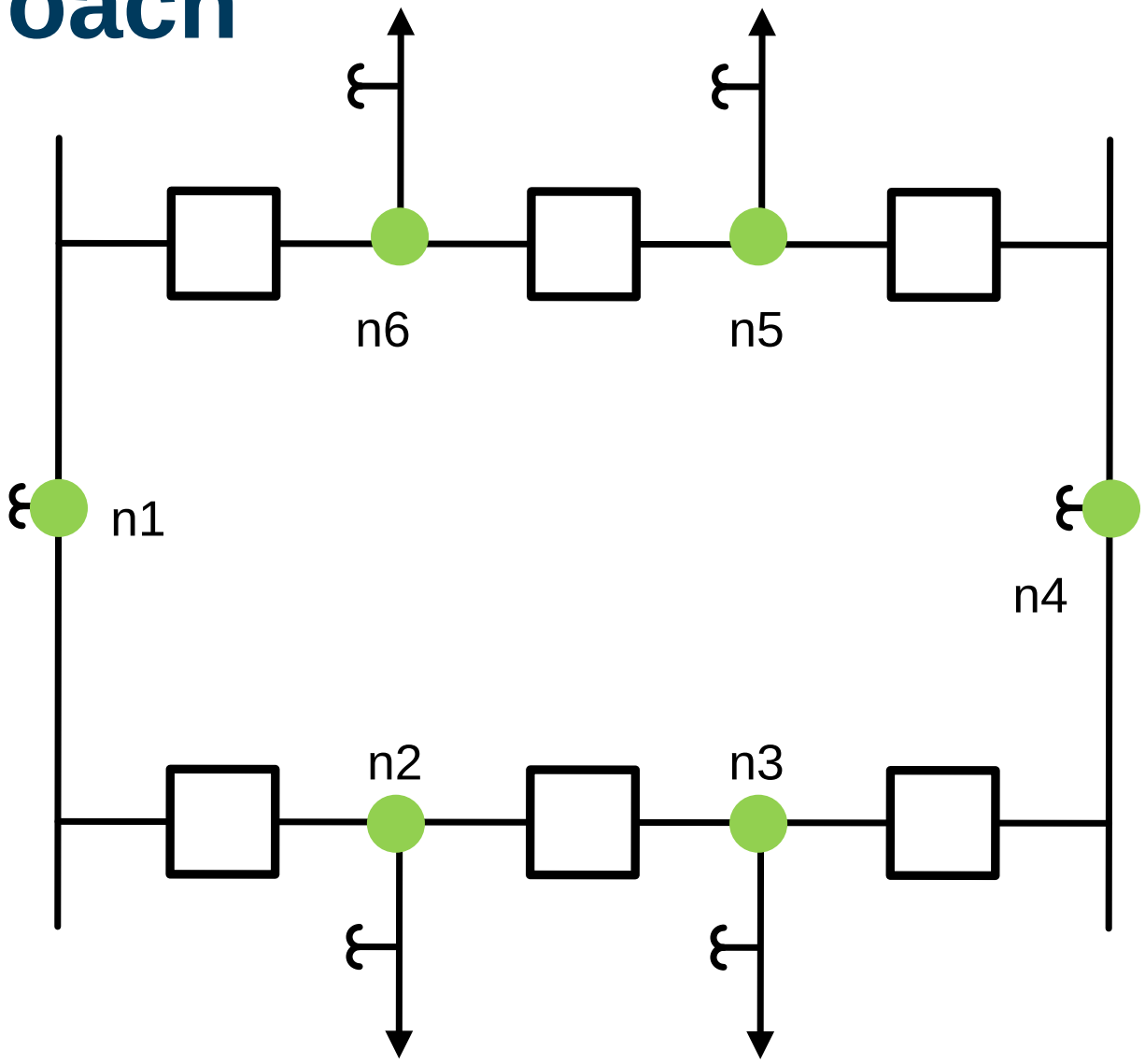
Topology aware approach. Compares multiple voltage magnitudes and angles within substation to identify anomalies.

VT secondary connections

- Multiple devices connect to each VT
- Secondary wiring introduces multiple failure points



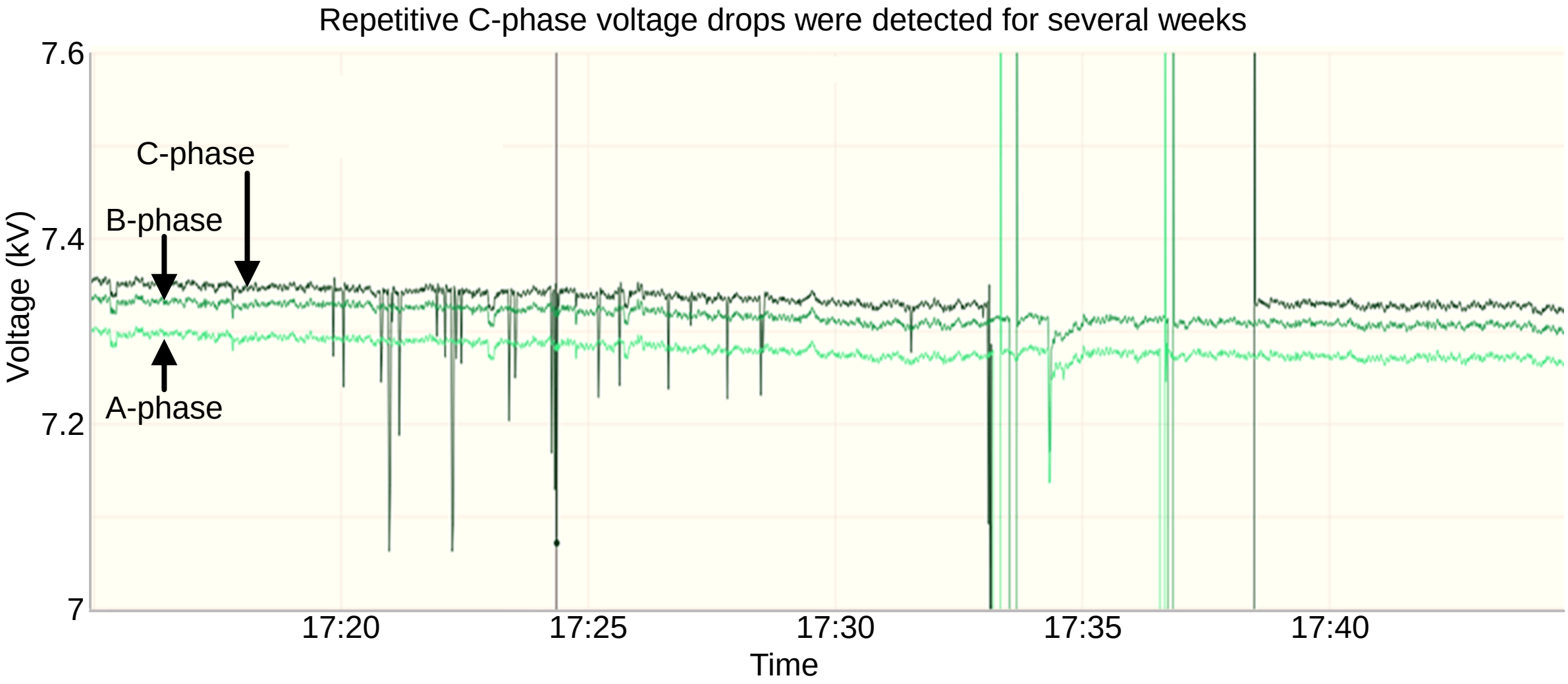
Topology aware approach



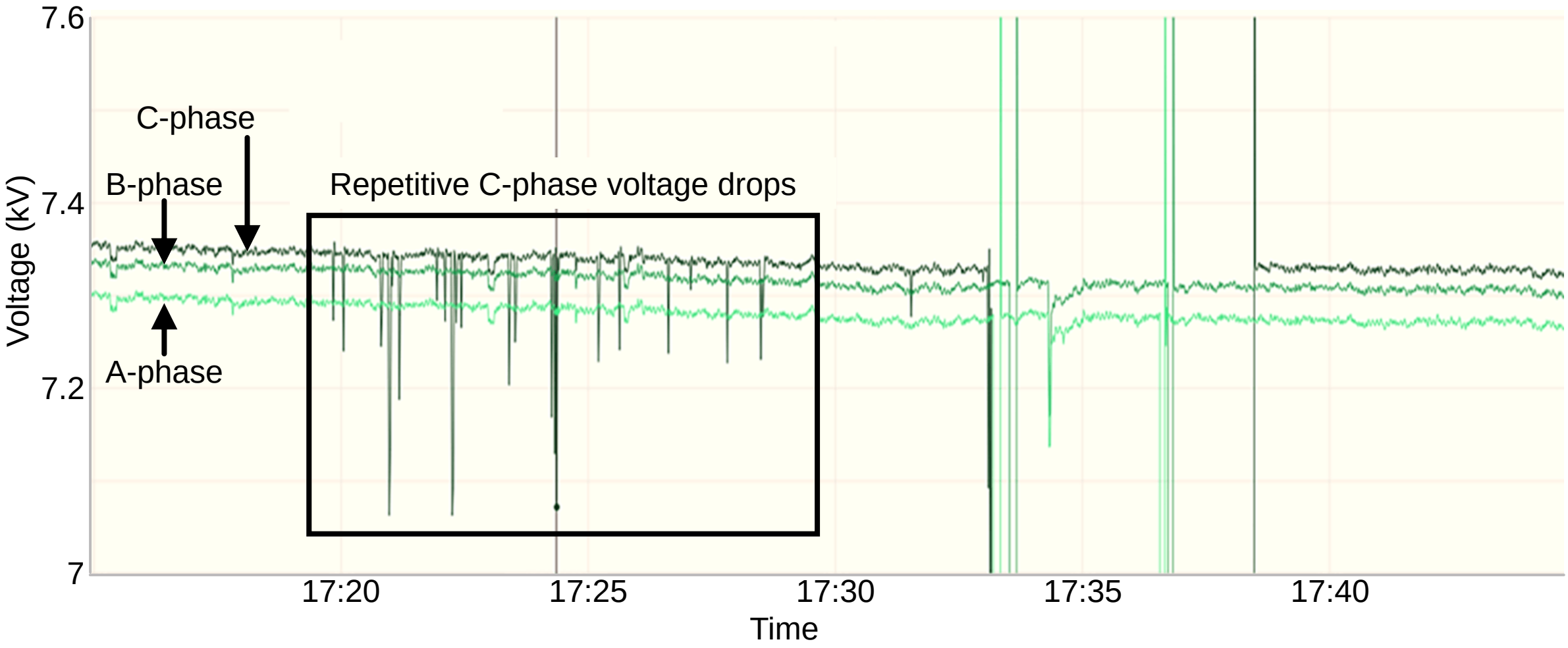
Case Study VT Fuse

Analysis of customer data related to the impact of two VT fuse failures

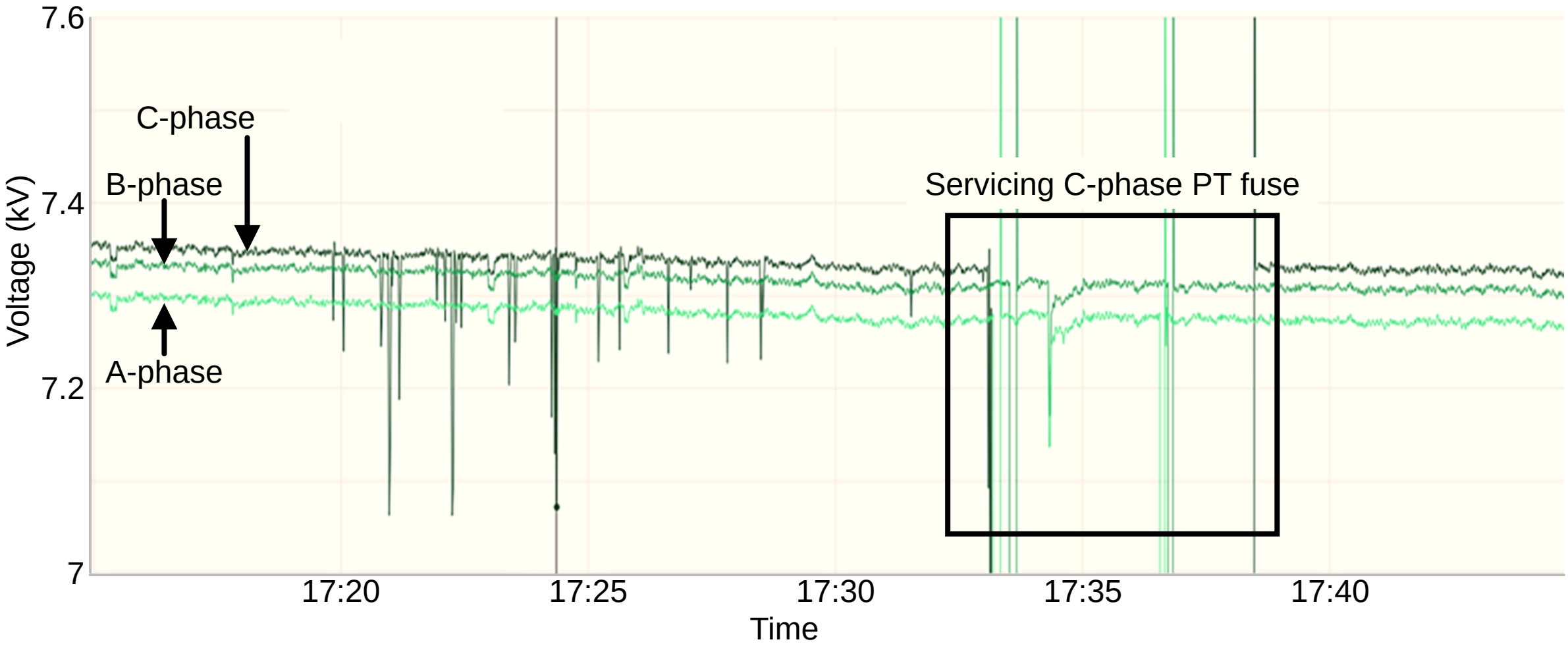
First voltage transformer failure



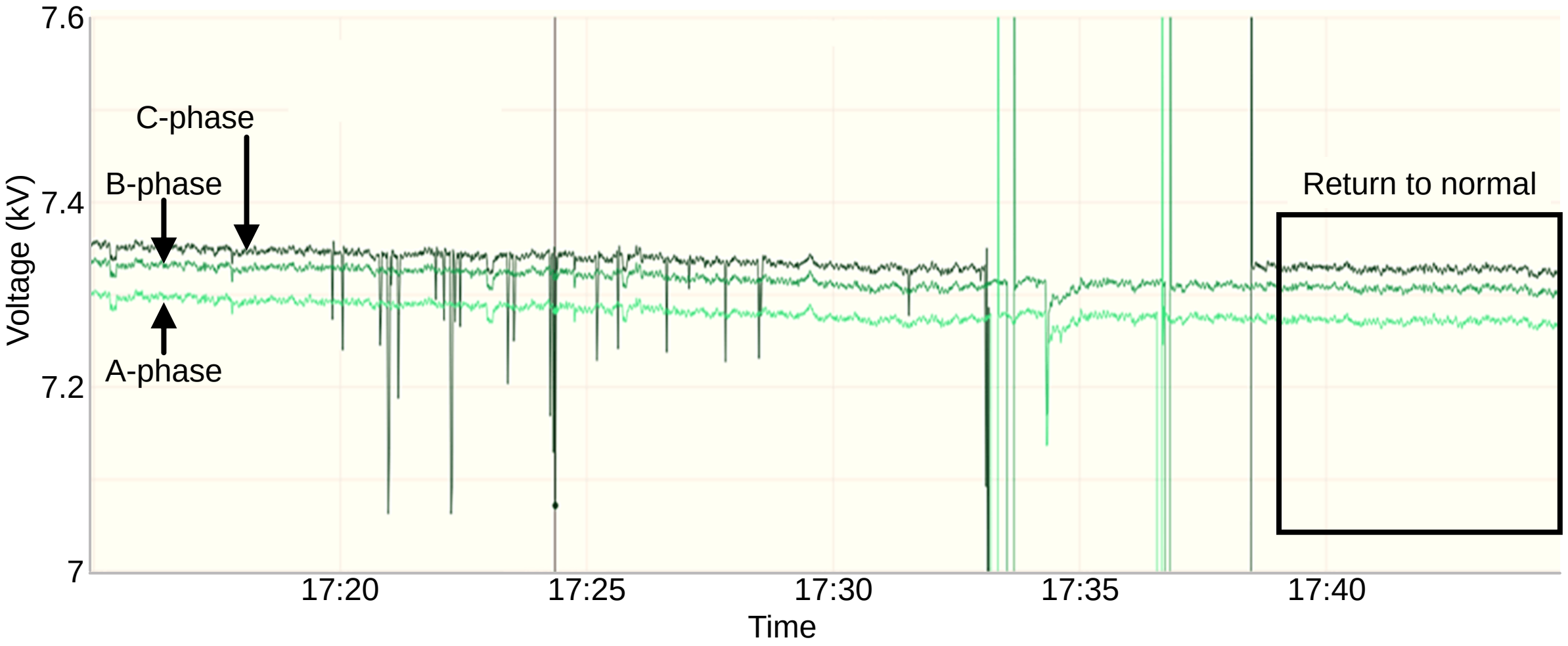
First voltage transformer failure



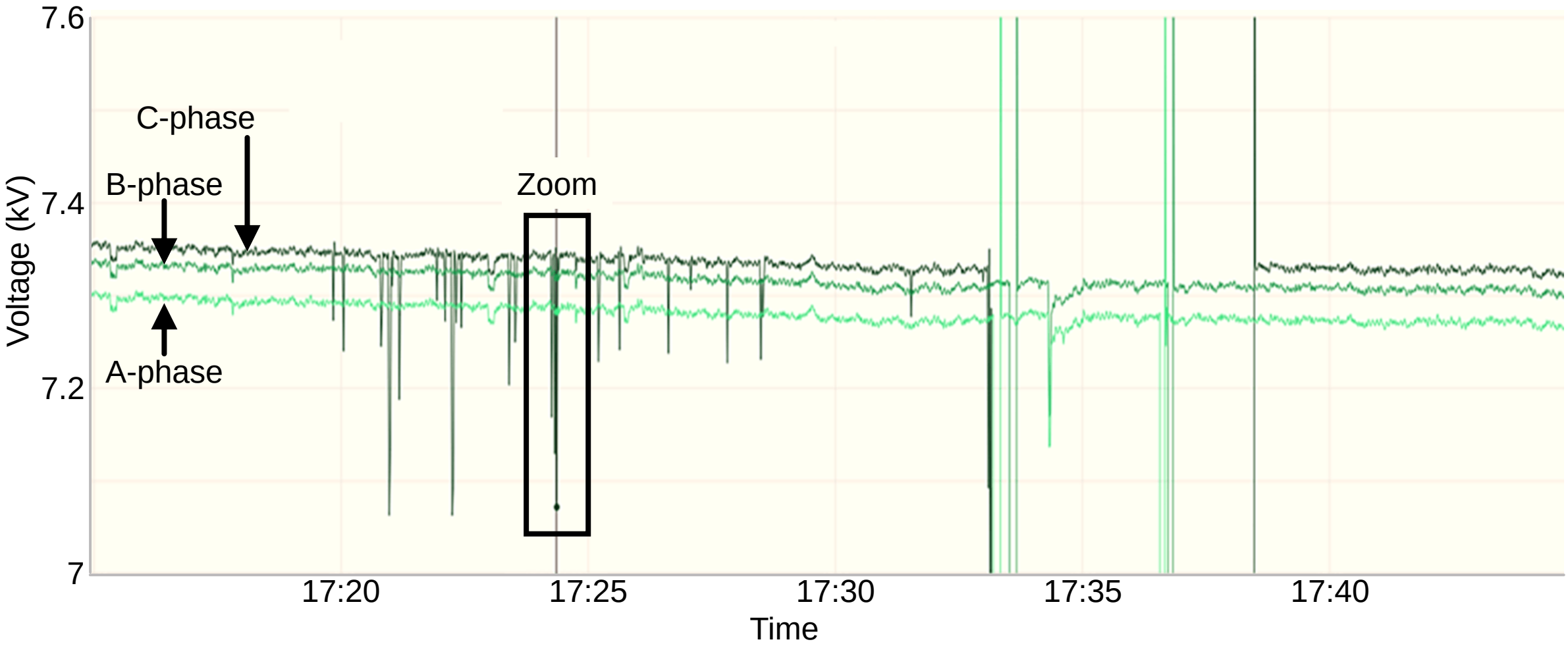
First voltage transformer failure



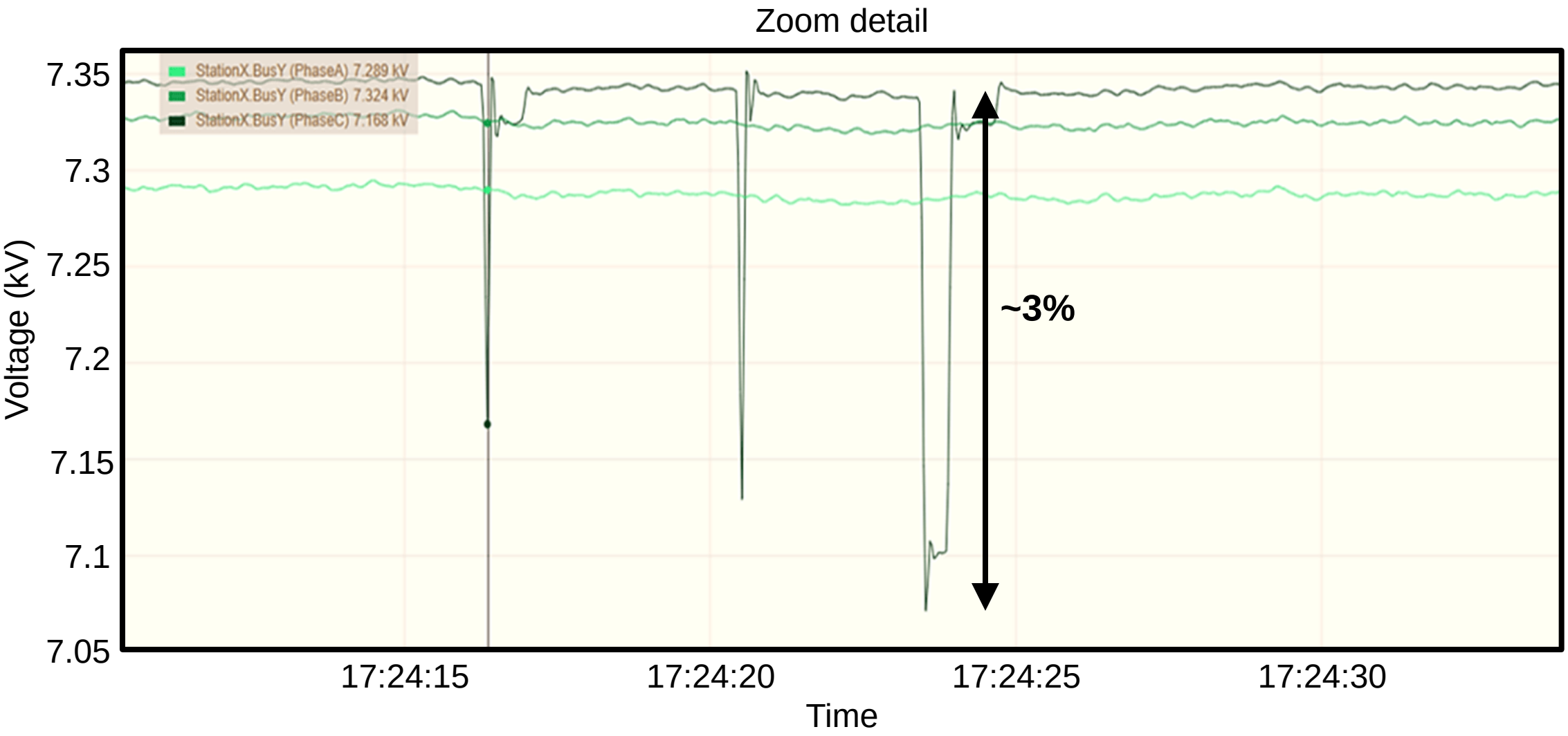
First voltage transformer failure



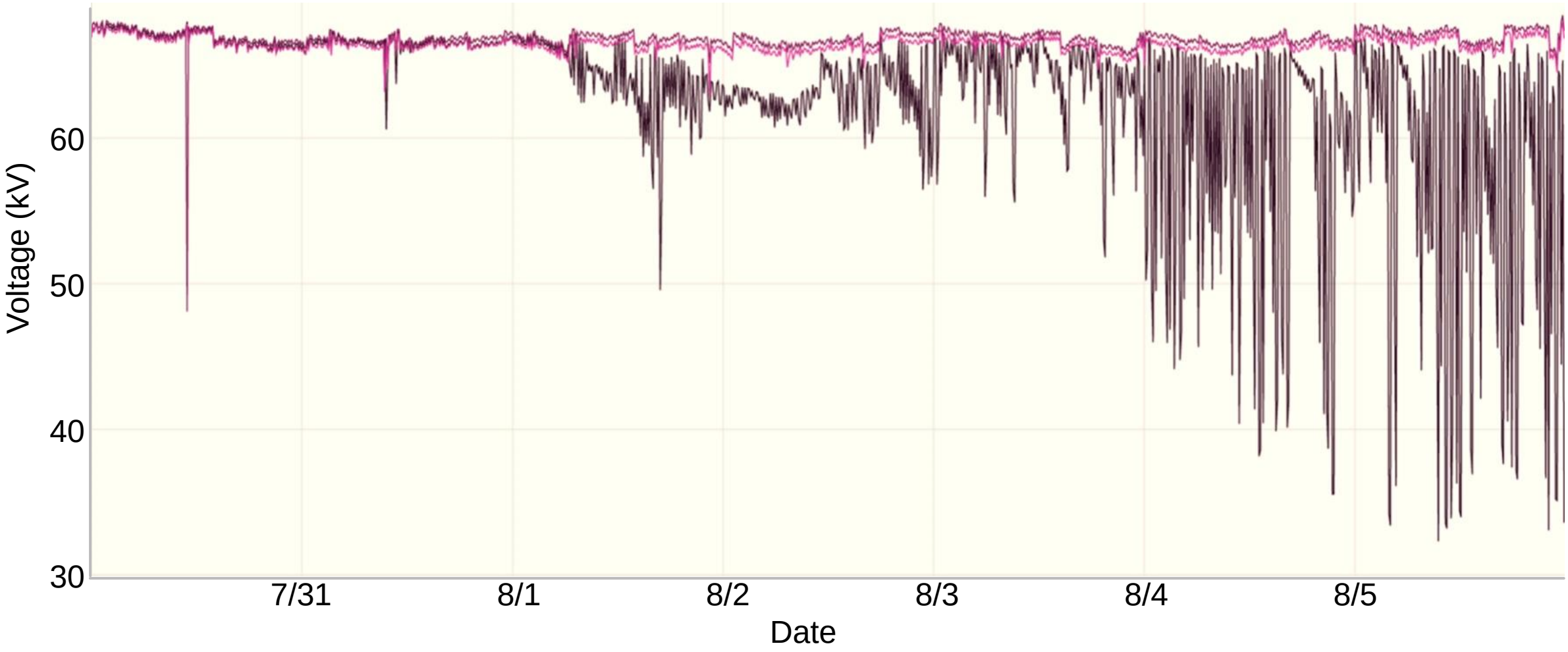
First voltage transformer failure



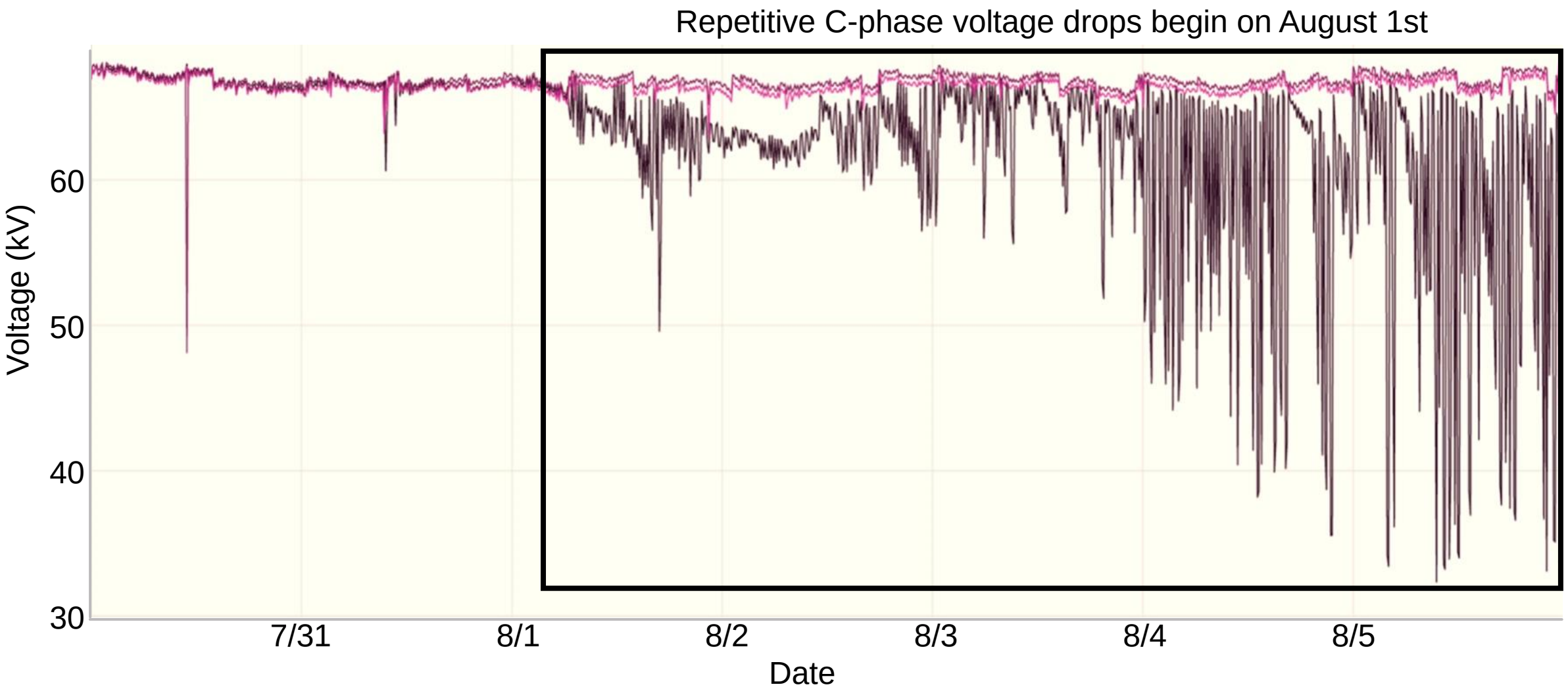
First voltage transformer failure



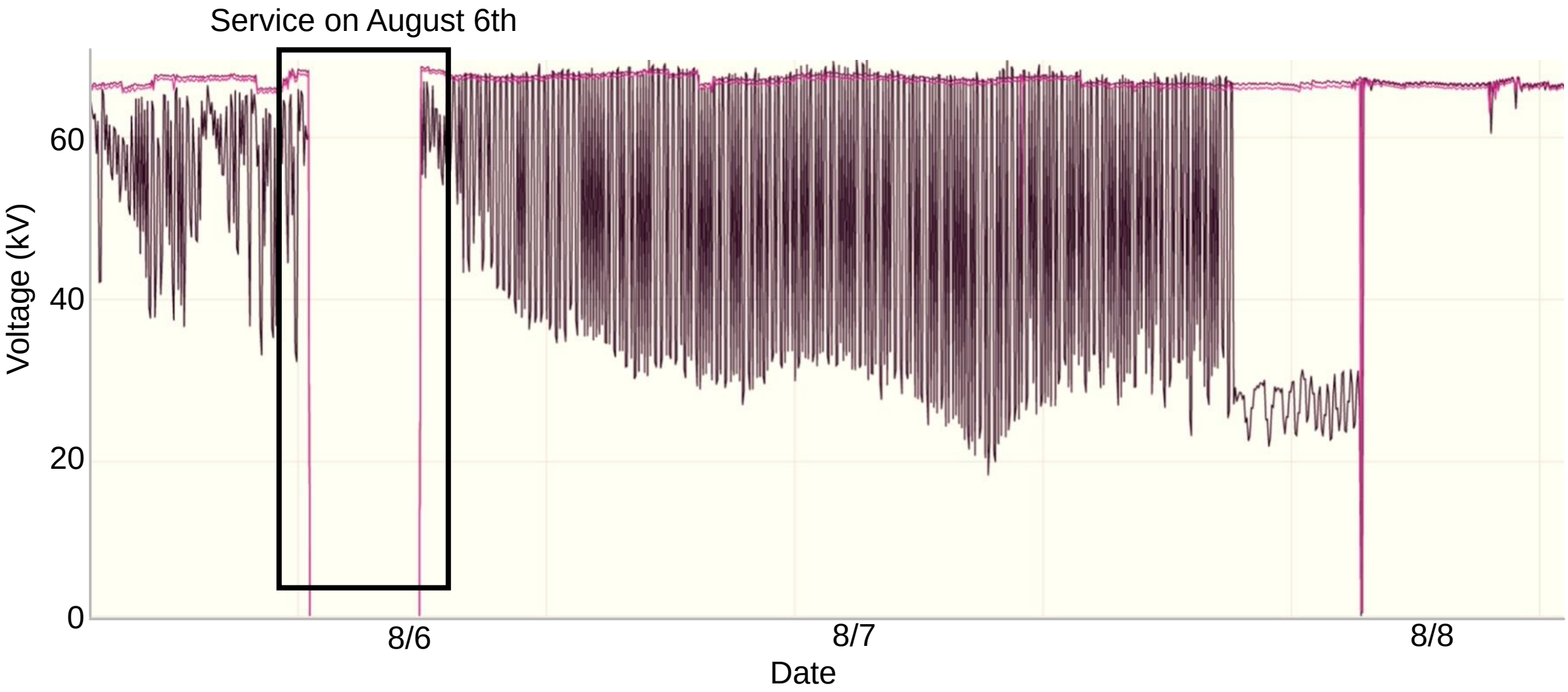
Second voltage transformer failure



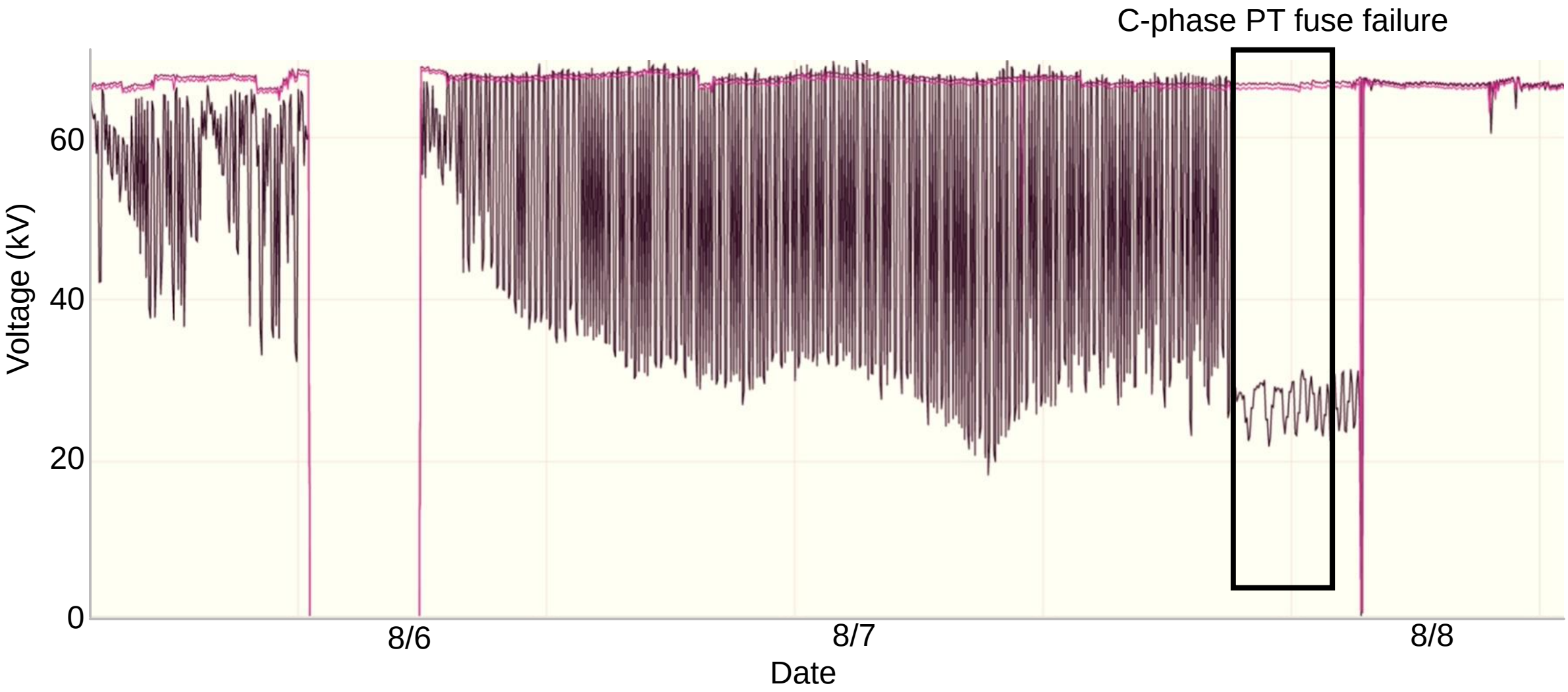
Second voltage transformer failure



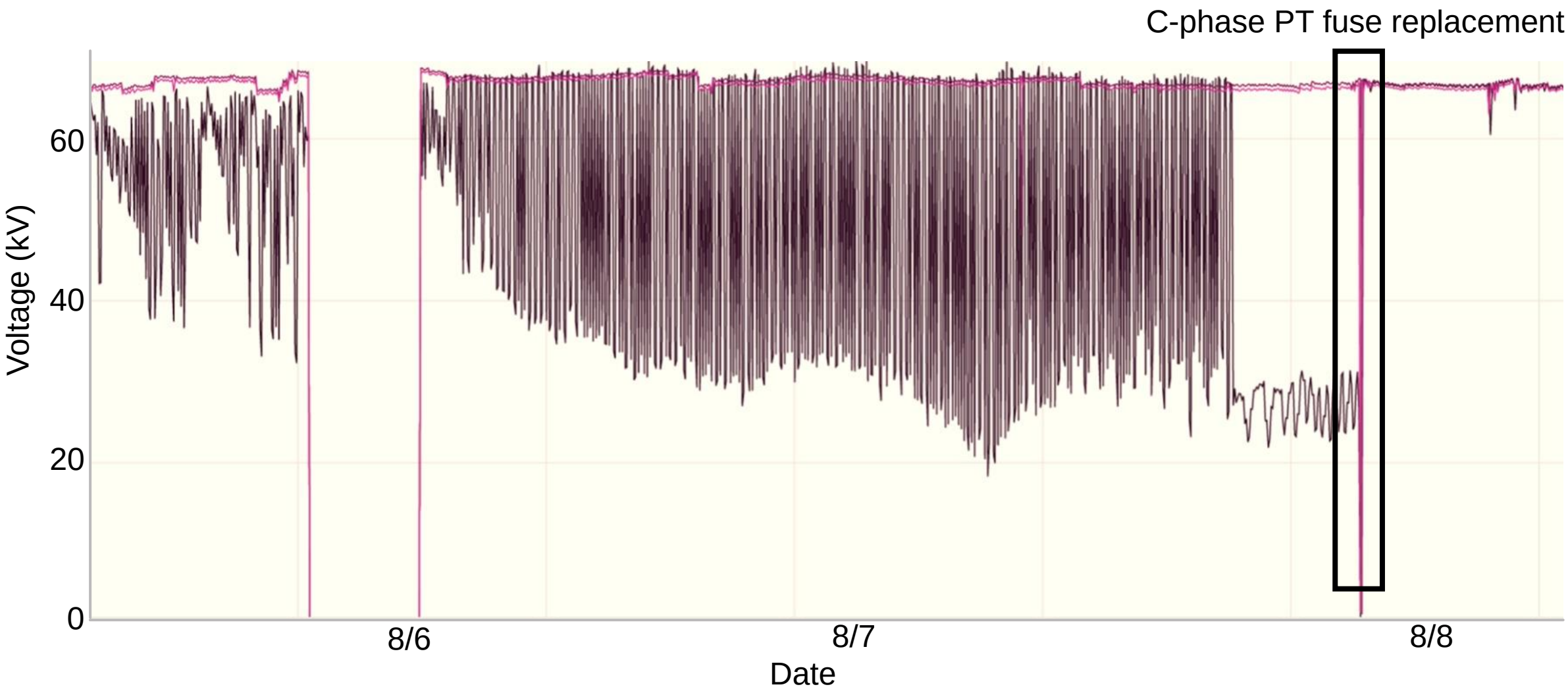
Second voltage transformer failure



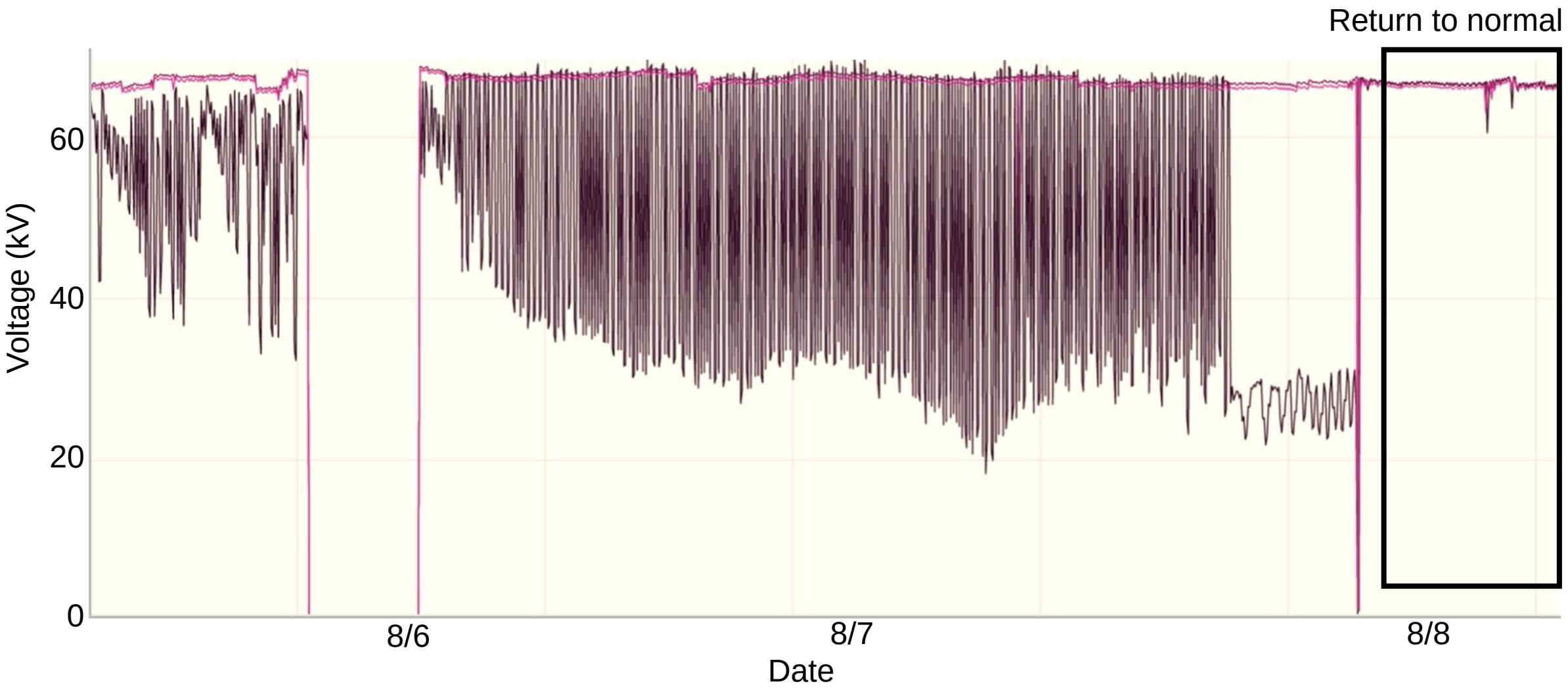
Second voltage transformer failure



Second voltage transformer failure



Second voltage transformer failure

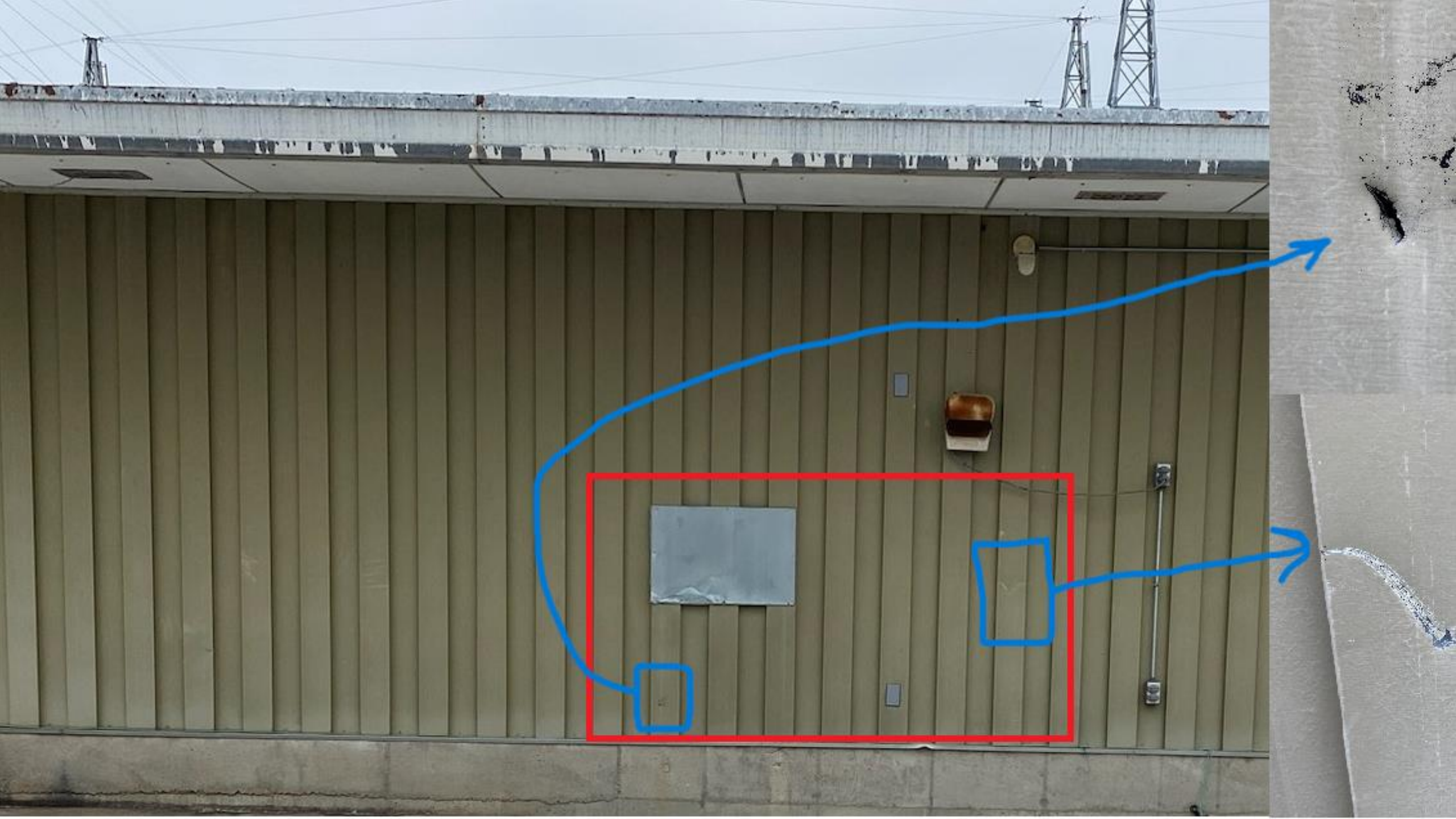


Case Study 345kV CCVT Failure

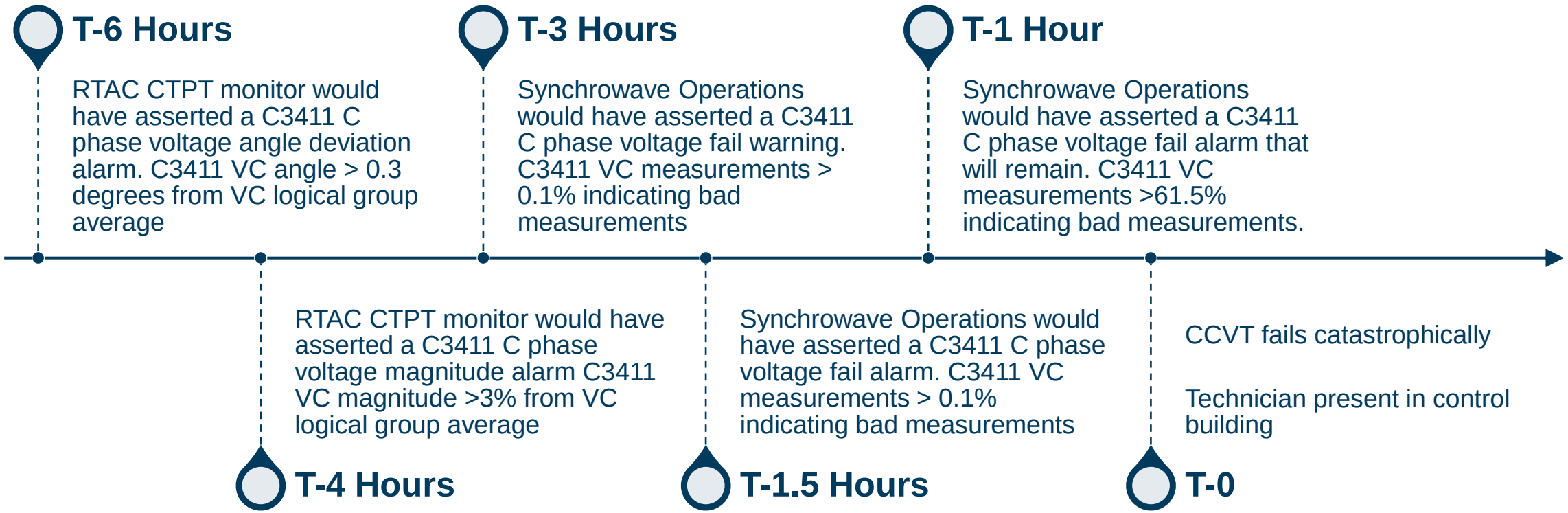
Analysis of customer data related to the catastrophic failure of a CCVT

C phase CCVT failure

Short software video showing data for failure.



Timeline for detecting CCVT failure



Thank you

SCHWEITZER ENGINEERING LABORATORIES