Synchrowave is for Time-Series Data

SEL

Jared Bestebreur, Development Lead Engineer

Synchrowave is for **operations**

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SDGE
A Sempra Energy utility®

Synchrophasors in the Utility Control Center: Today and the Future

Tariq Rahman (SDG&E®), Greg Zweigle (SEL)

NASPI, November 2020

- Situational awareness
- One-click notifications
- GIS navigation
- Weather integration
- Oscillation detection

Operational use case document released

Real-Time Operational Use Cases for
Time-Synchronized Measurements
With Synchrowave Operations

Authored By:

Michael Cassiadoro

Owner and Principal Consulta...

Total Reliability Solutions, LL...

A resource loss within the area of responsibility and subsequent frequency drop will likely result in exceedances of predefined Real Power and system frequency thresholds, which will cause both the Frequency and Power tiles to highlight on the Notification Summary.

Event Analysis Dashboard: Selecting a notification tile will automatically navigate the user to an Event Analysis dashboard that presents data and information specific to the category the user has chosen.

The application uses intelligent software that allows it to generate dashboards that are unique to each event. For example, when a generation loss results in an off-nominal frequency event, the user can select the Frequency or Power tile in the Notification Summary to view a dashboard that provides trends for each frequency measurement that exceeded a predefined threshold and presents information pertaining to event, such as the location of the resource loss and magnitude of the resulting frequency deviation.

Frequency Event Analysis Dashboard Example

Thank you Michael Cassiadoro and TRS!

Document available on SEL Synchrowave Operations webpage.

Synchrowave
is for engineering
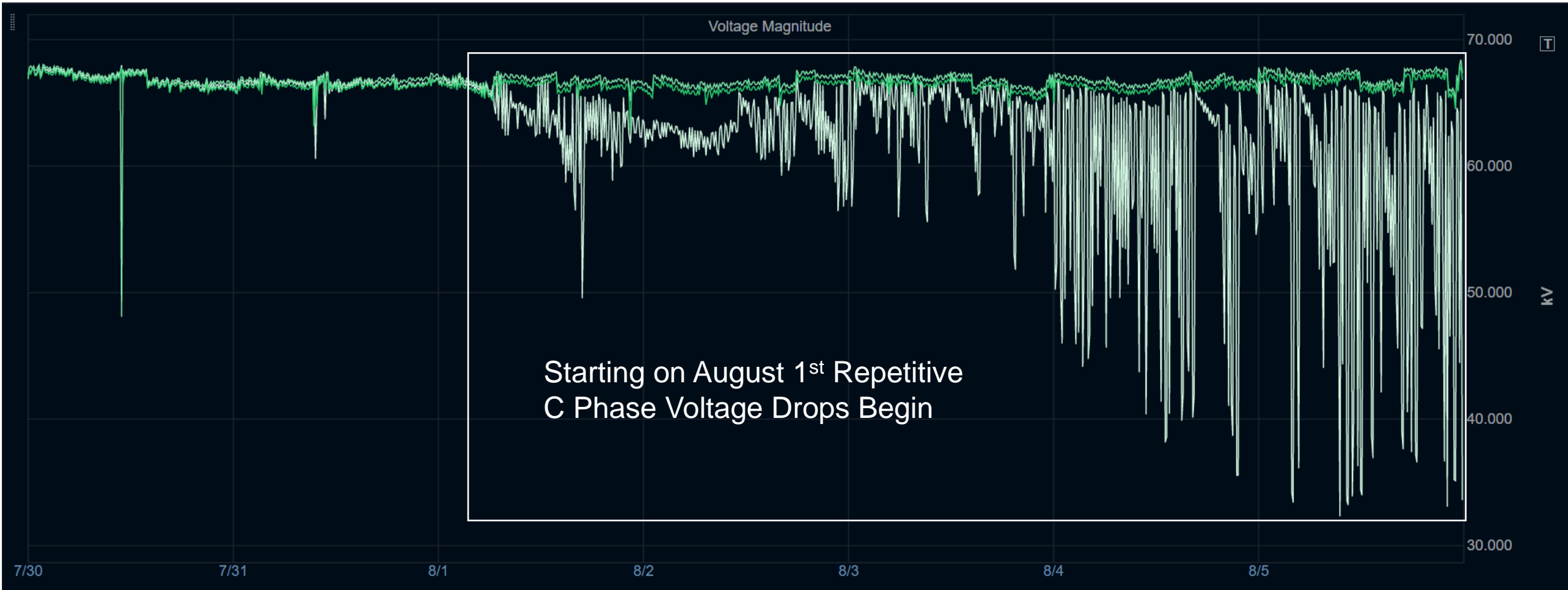
ENGINEERING SUPPORTING OPERATIONS

- Fault condition assessments

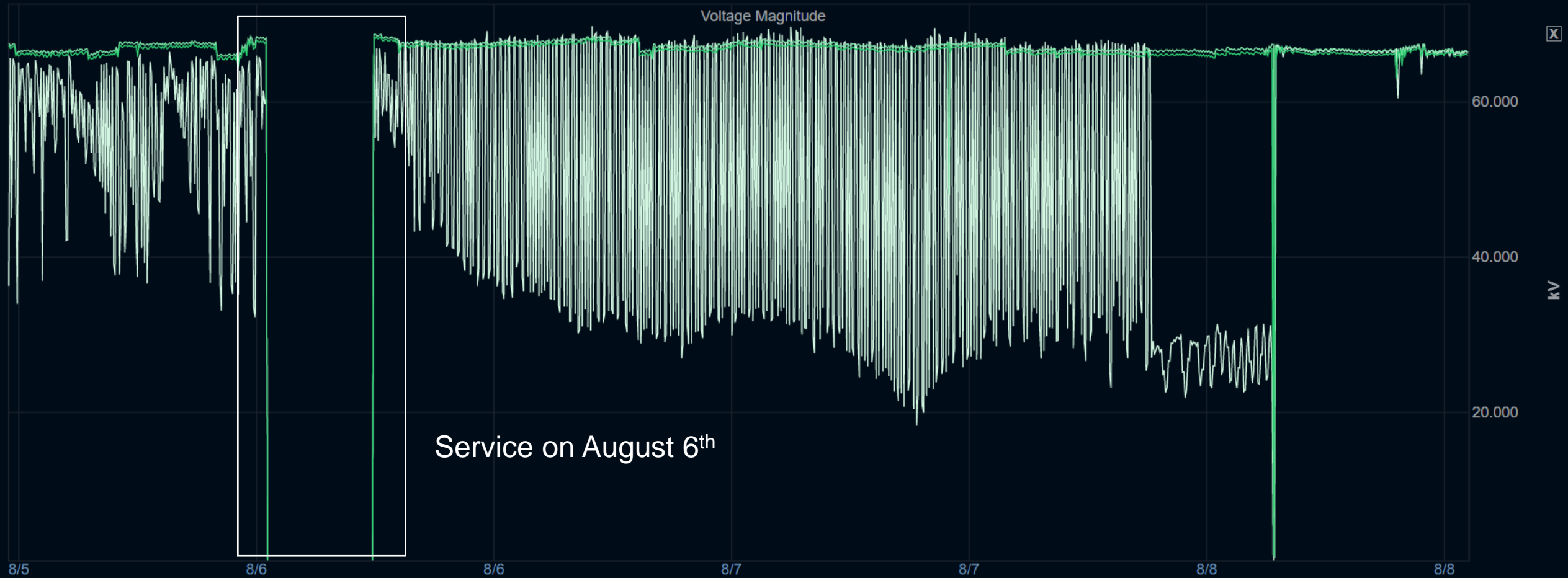- Fault and event location

Synchrowave is for engineering

OFFLINE ENGINEERING ANALYSIS AND DESIGN

- Asset investigation

- Root-cause events

- Predictive analytics

- Parameter validation

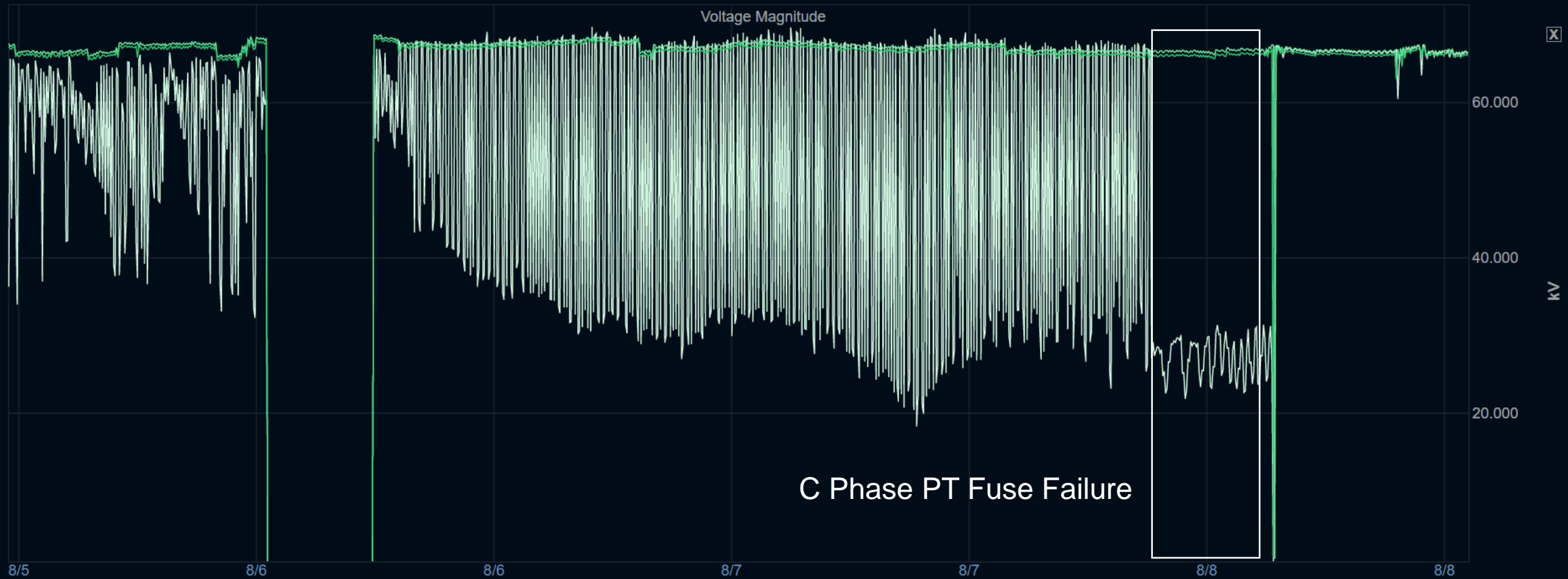- System protection wide-area analysis
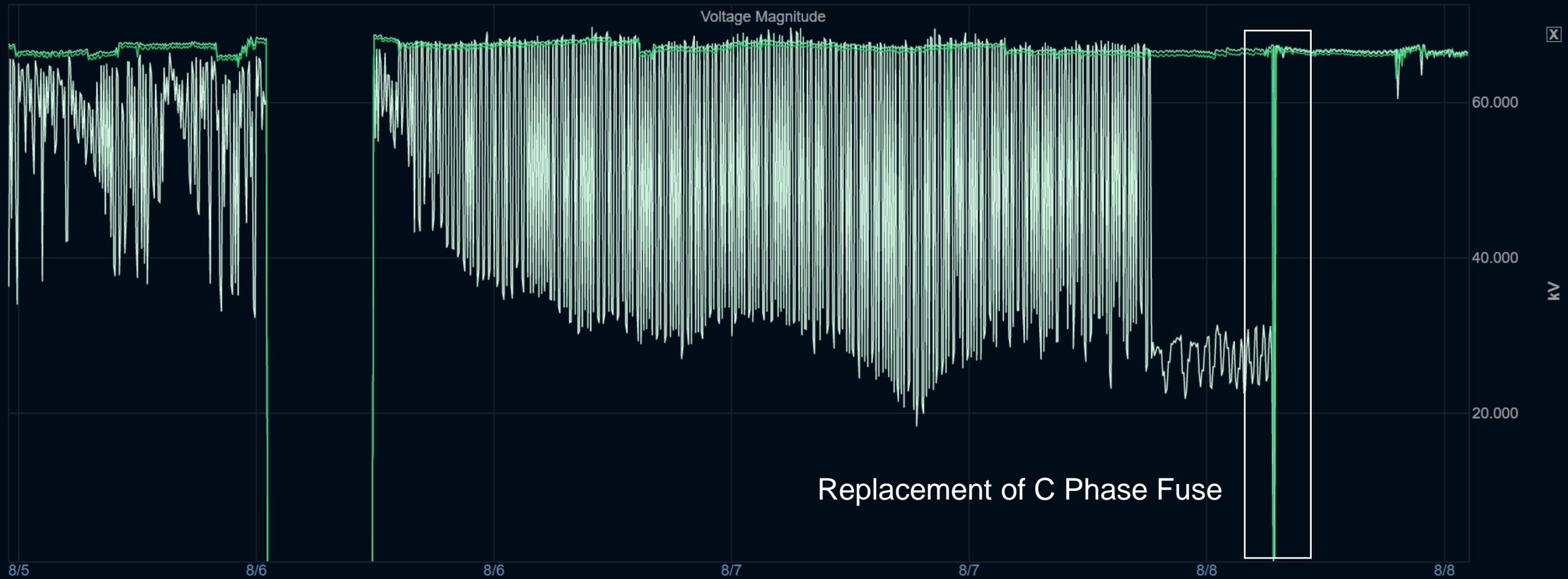
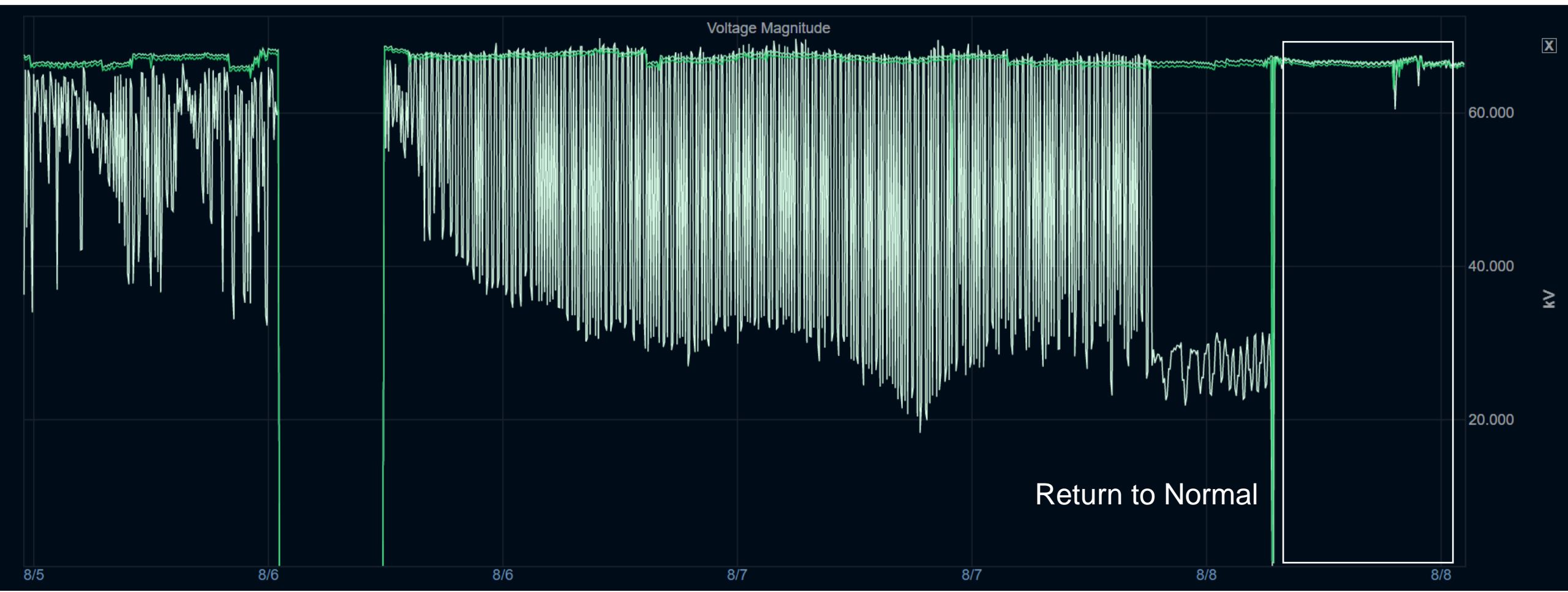# Case 1: Incipient failure detection

Voltage Magnitude

Starting on August 1st Repetitive C Phase Voltage Drops Begin

Case 1: Incipient failure detection

Voltage Magnitude

Service on August 6th

kV

60.000

40.000

20.000

8/5   8/6   8/6   8/7   8/7   8/8   8/8

Case 1: Incipient failure detection

C Phase PT Fuse Failure

Case 1: Incipient failure detection

Voltage Magnitude

Replacement of C Phase Fuse
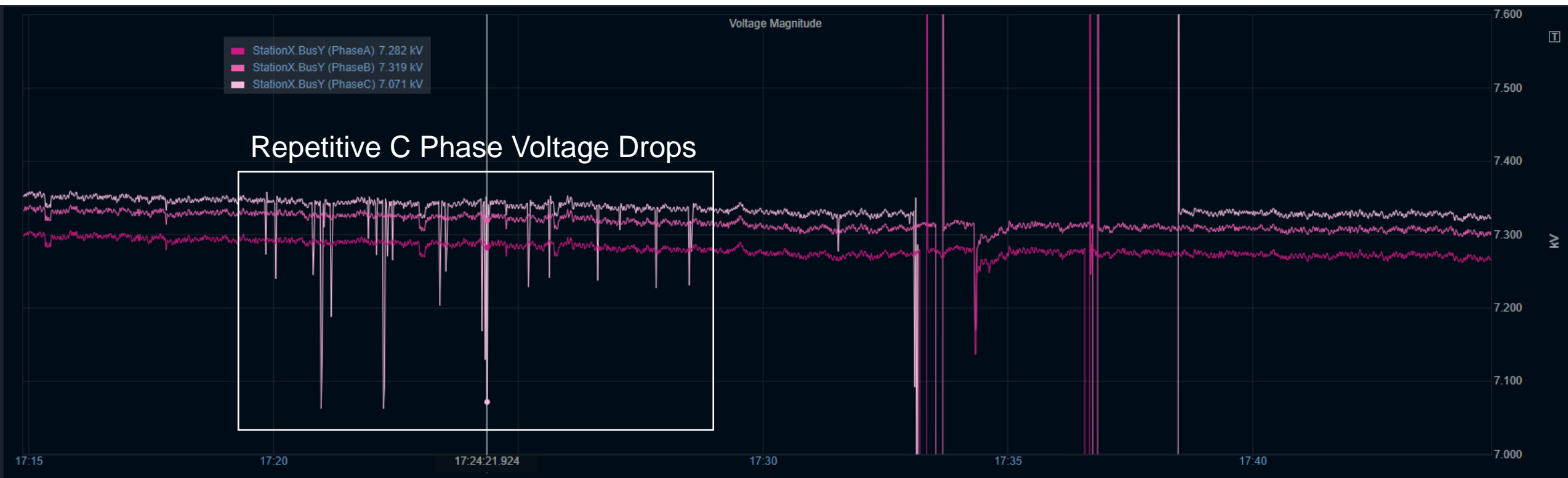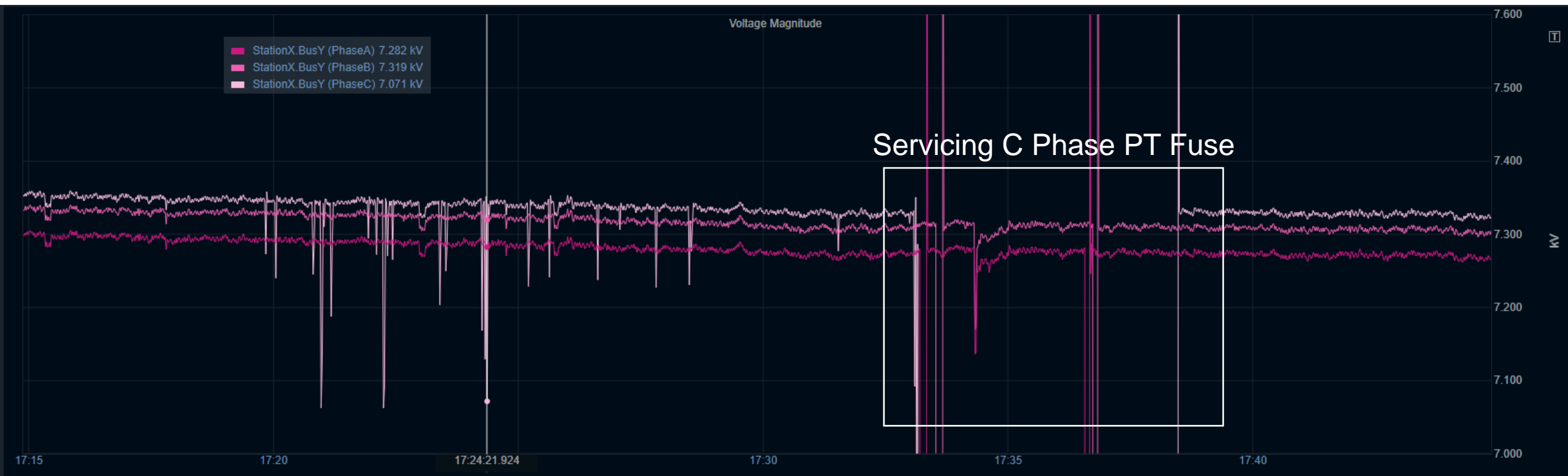
Case 1: Incipient failure detection

Case 2: Incipient failure detection

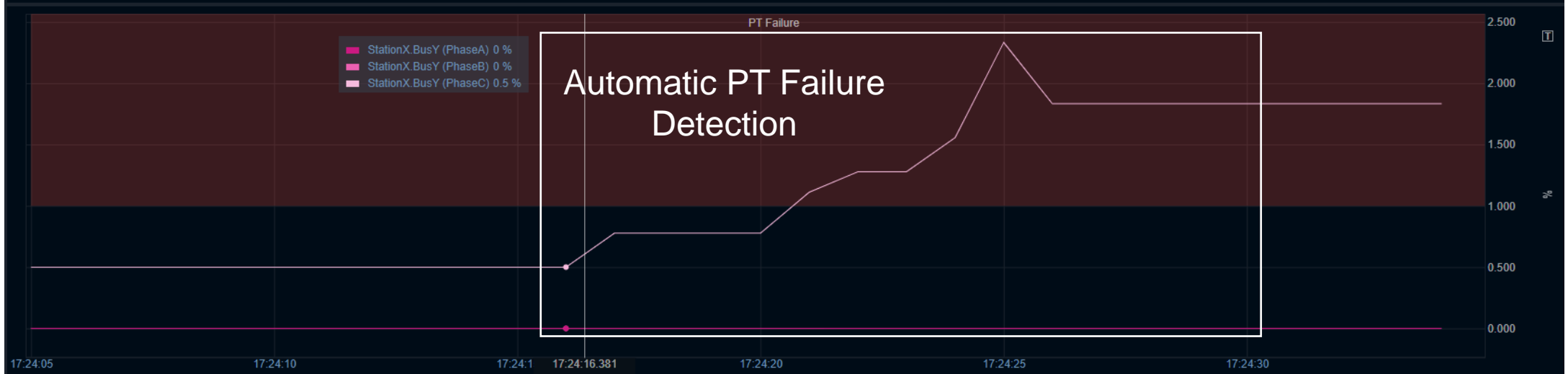Repetitive C Phase Voltage Drops were Detected for Several Weeks

Case 2: Incipient failure detection

Case 2: Incipient failure detection

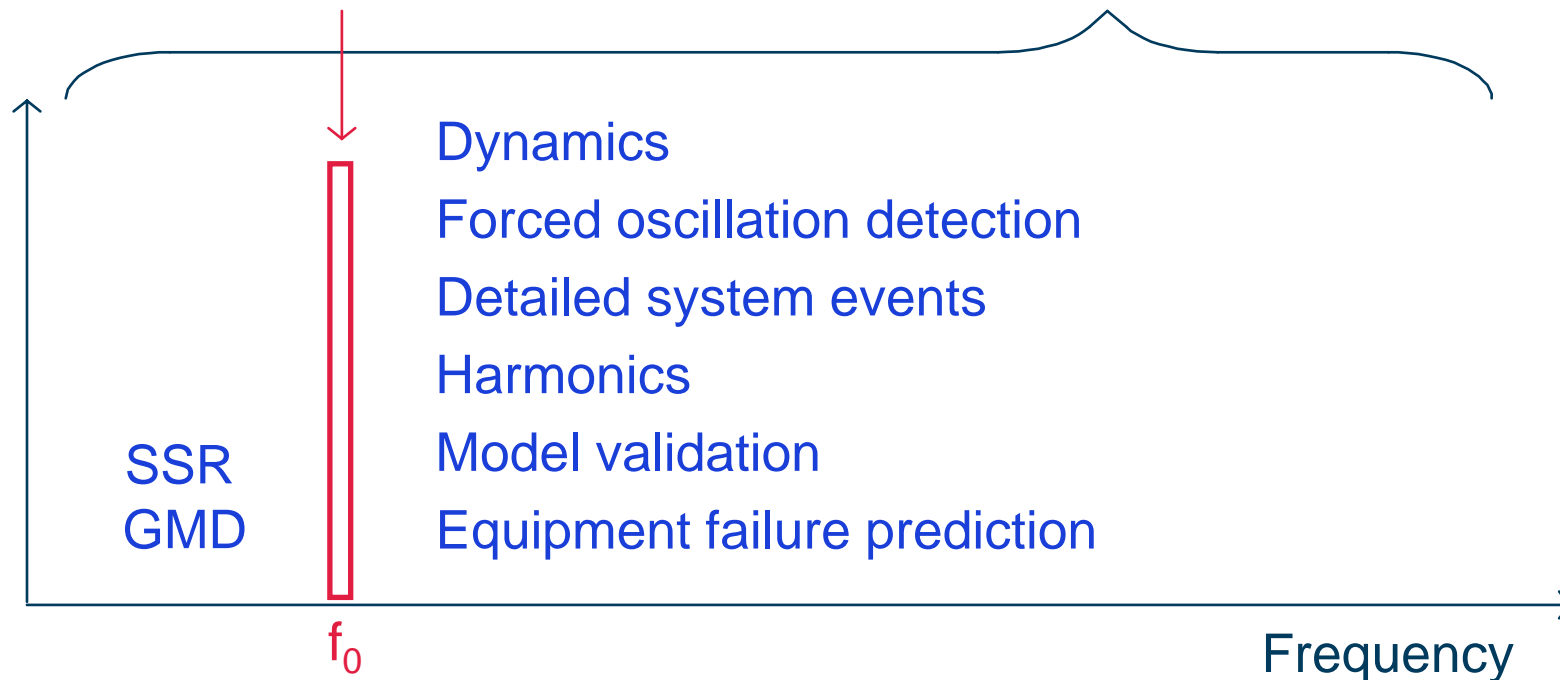# Automating incipient event detection

The future of time-series data

SCADA and synchrophasors
rely on same quasi-steady-state,
lossy-phasor approximation

Wide-area time-domain data
make all information available,
enabling new benefits and innovations

Dynamics

Forced oscillation detection

Detailed system events

Harmonics

Model validation

Equipment failure prediction

SSR
GMD

f_0

Frequency

3,000 samples-per-second streaming with SEL Axion®
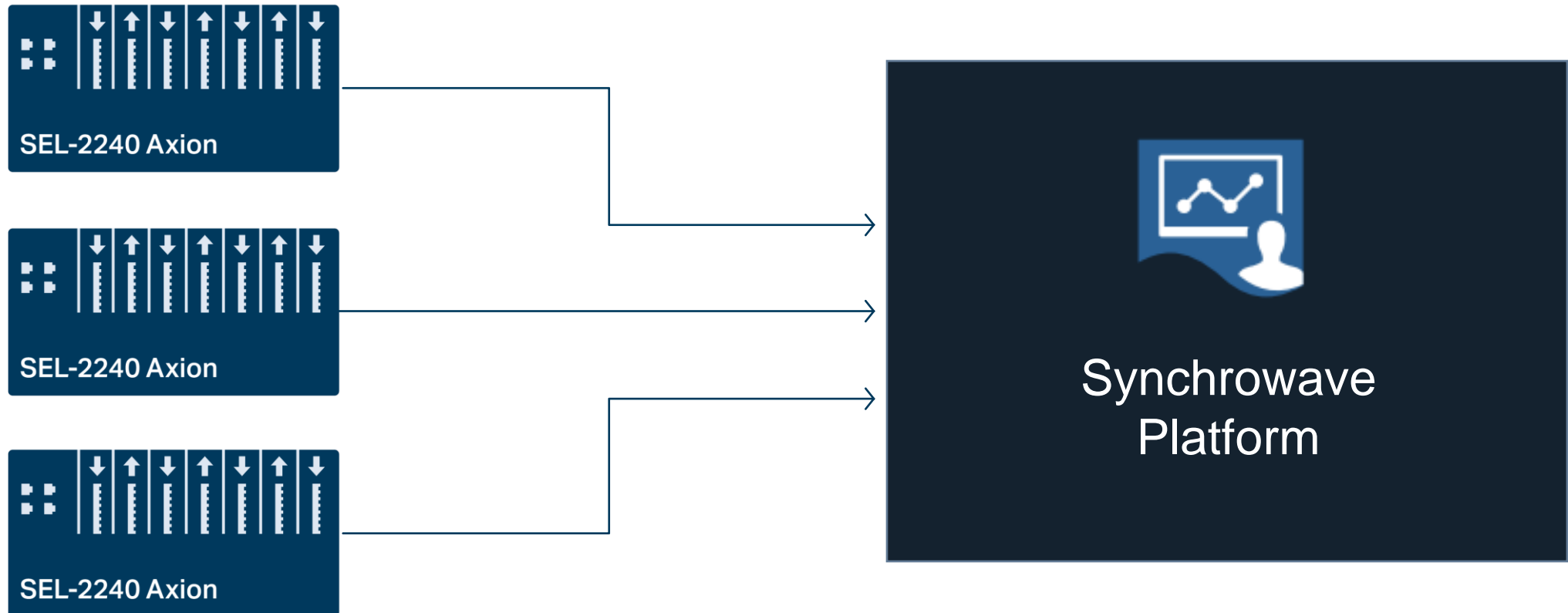
Software Demonstration

Synchrowave Platform

POWER SYSTEM OPERATIONS AND ANALYTICS

Operations — situational awareness for grid operations with time-series data, real-time analytics, and geospatial information

Monitoring — time-series trending and archiving for analysis, modal validation, and PRC-002-2 compliance

Event — protective relay event analysis for COMTRADE and SEL event reports

Frequency

60.000

59.925

Hz

59.850

8:51:45 AM   8:52:00 AM   8:52:15 AM

System Frequency

60

59.85   60.15

HZ

59.925 Hz

Power Flow

Path A		402 MW
Path B		400 MW
Path C		300 MW
Path D		380 MW
Path E		422 MW

Transmission Line	PAD
TL012	10°
TL002	9°
TL005	7°
TL010	7°

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