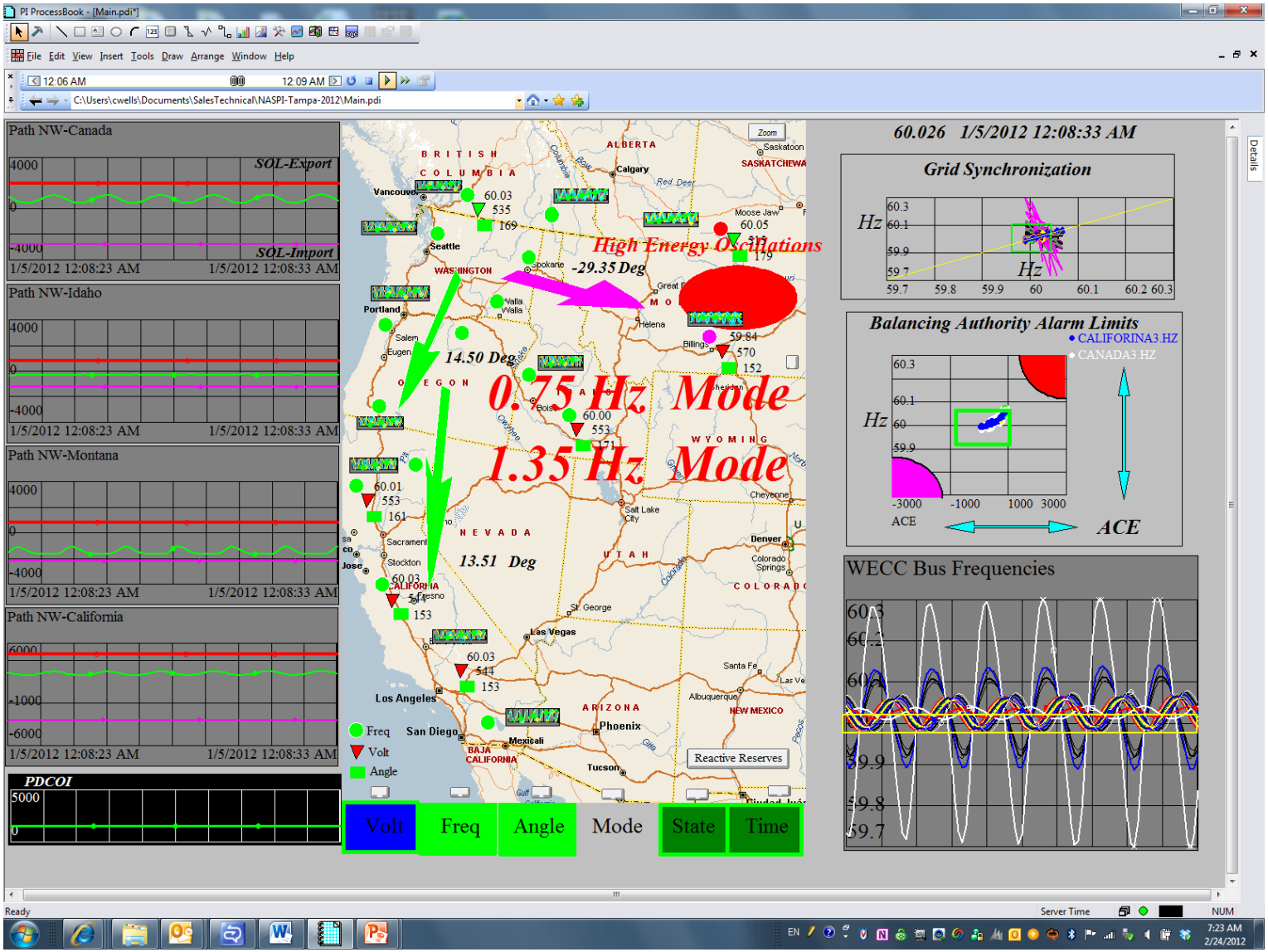
Oscillation Detection and Visualization

Dispatchers, Control Center Staff, Power System Engineers

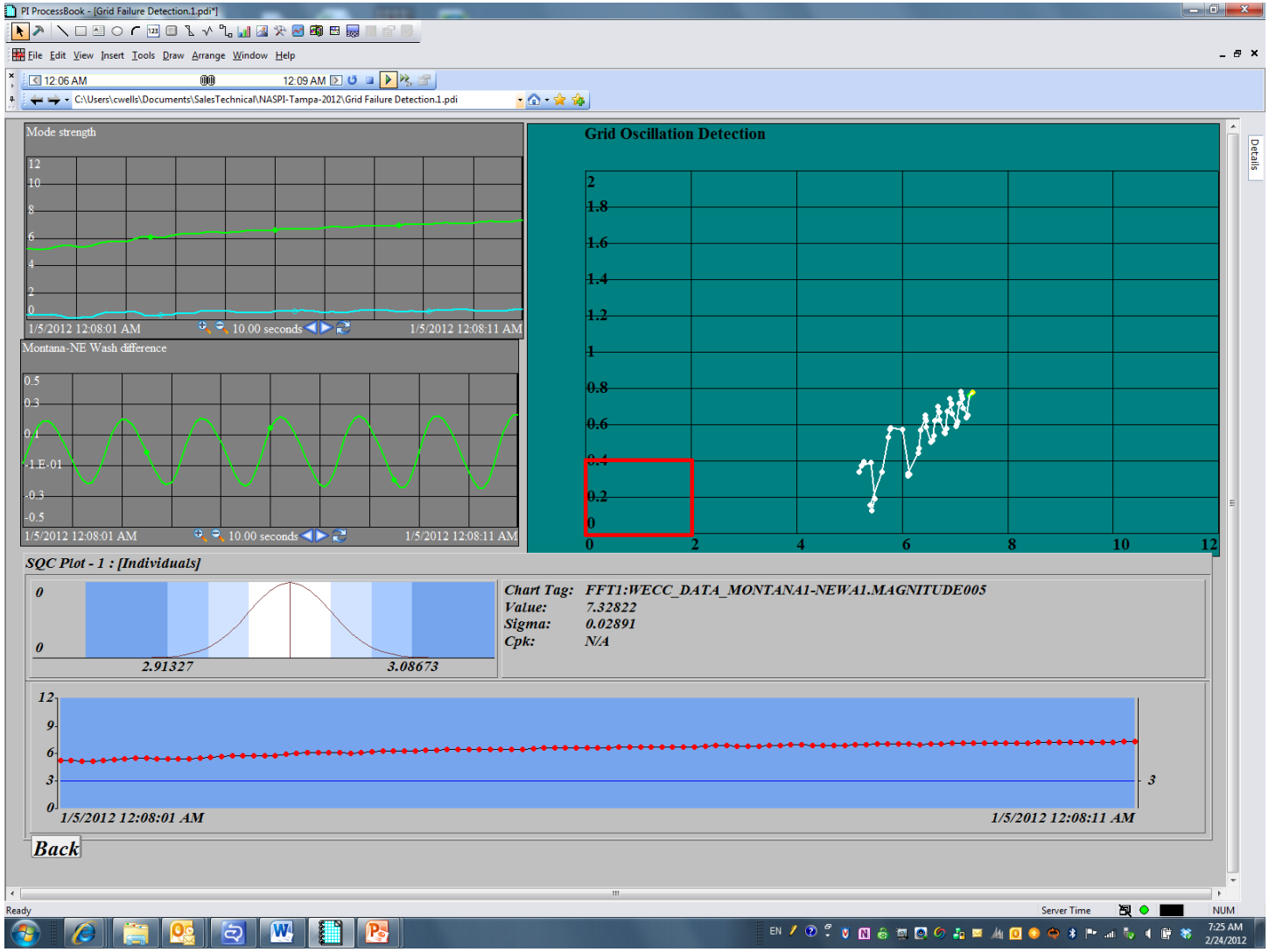
Dispatchers



Calculations behind the screen

- Moving window FFT (Frequency difference)
  - 6 4 points, 10 Hz, Real, Imag, Angle, Mag, Areas, Integrals, damping
- X-Y plots (35 Buses versus Portland Bus)
- Trend plots 36 Frequencies
- Trend plots 36 buses (frequency, angle, voltage)
- Trend plots of Path flows
- Integral under FFT spectrum to 1.35 Hz
- 108 multistate objects
  - Voltage, Frequency, Unwrapped angle

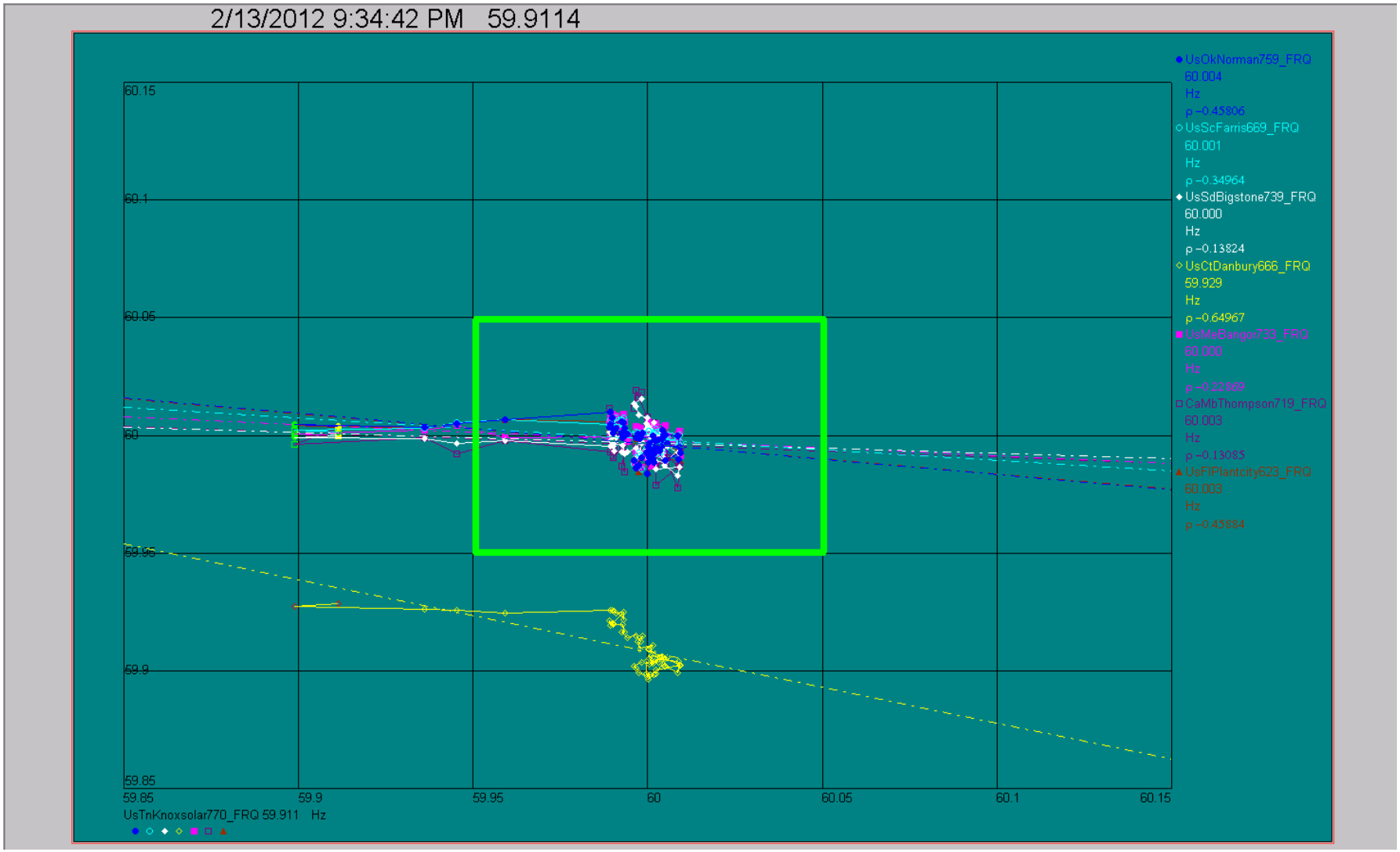
Control center staff



Calculations behind screen

- FFT spectrum of frequency difference
- Trend plot of 0.75 and 1.35 magnitudes
- X-Y plot of 0.75 and 1.35 magnitudes
- SQC alarms on angle difference between Montana and Northeast Washington

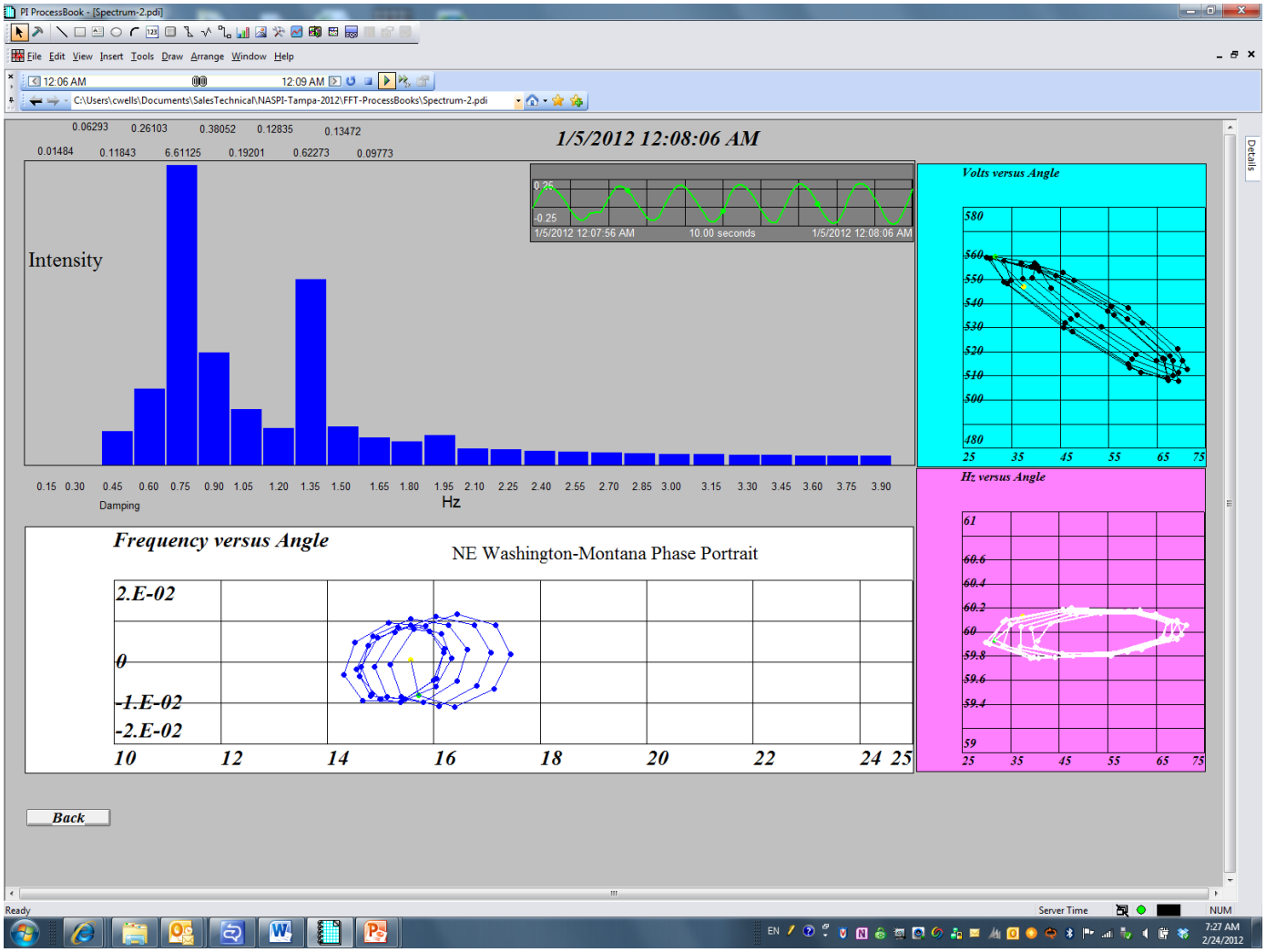
Control center staff



Calculations behind the screen

- X-Y plot of 7 frequencies in the Eastern Interconnection versus Knoxville frequency

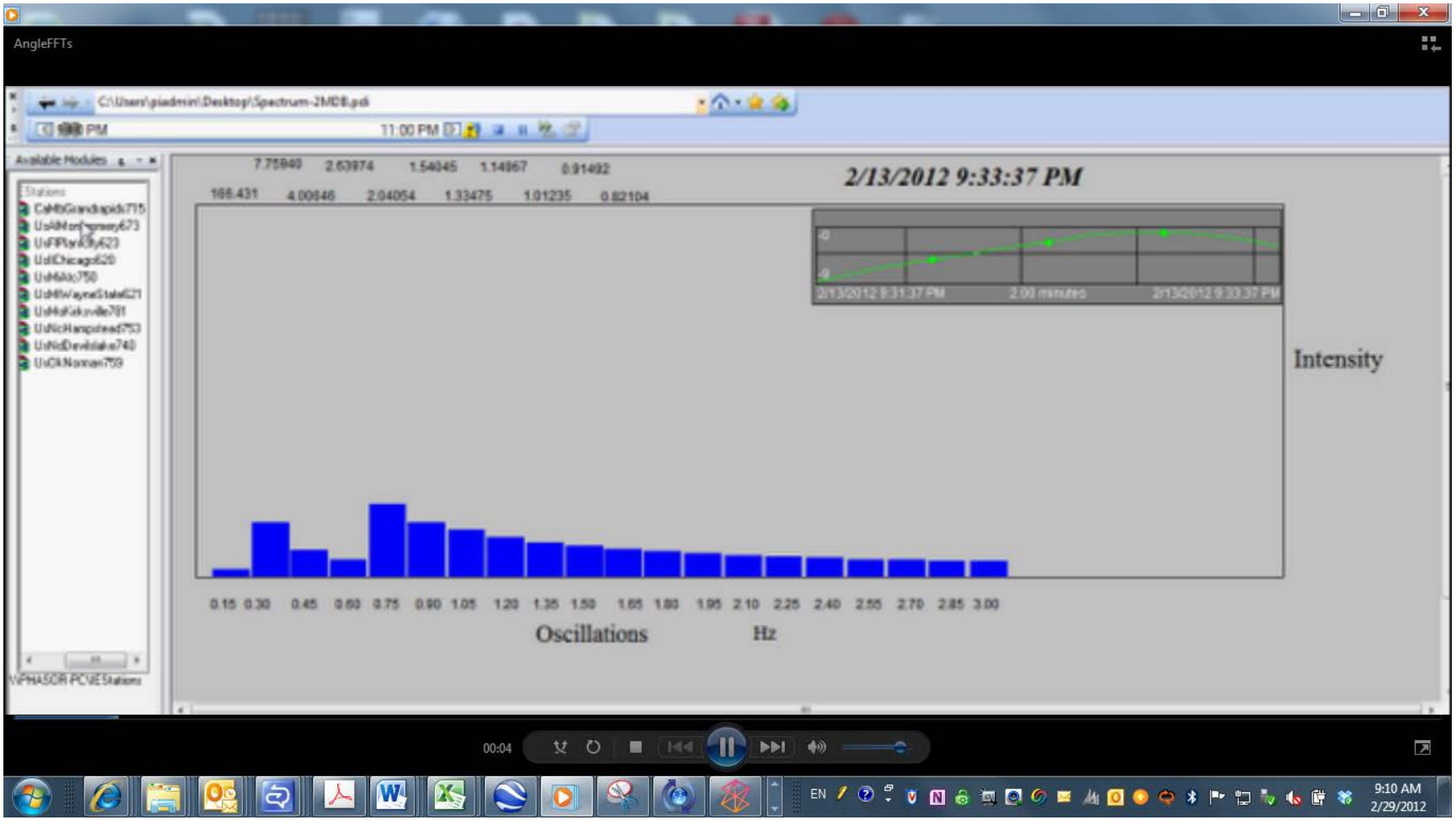
Power system engineers



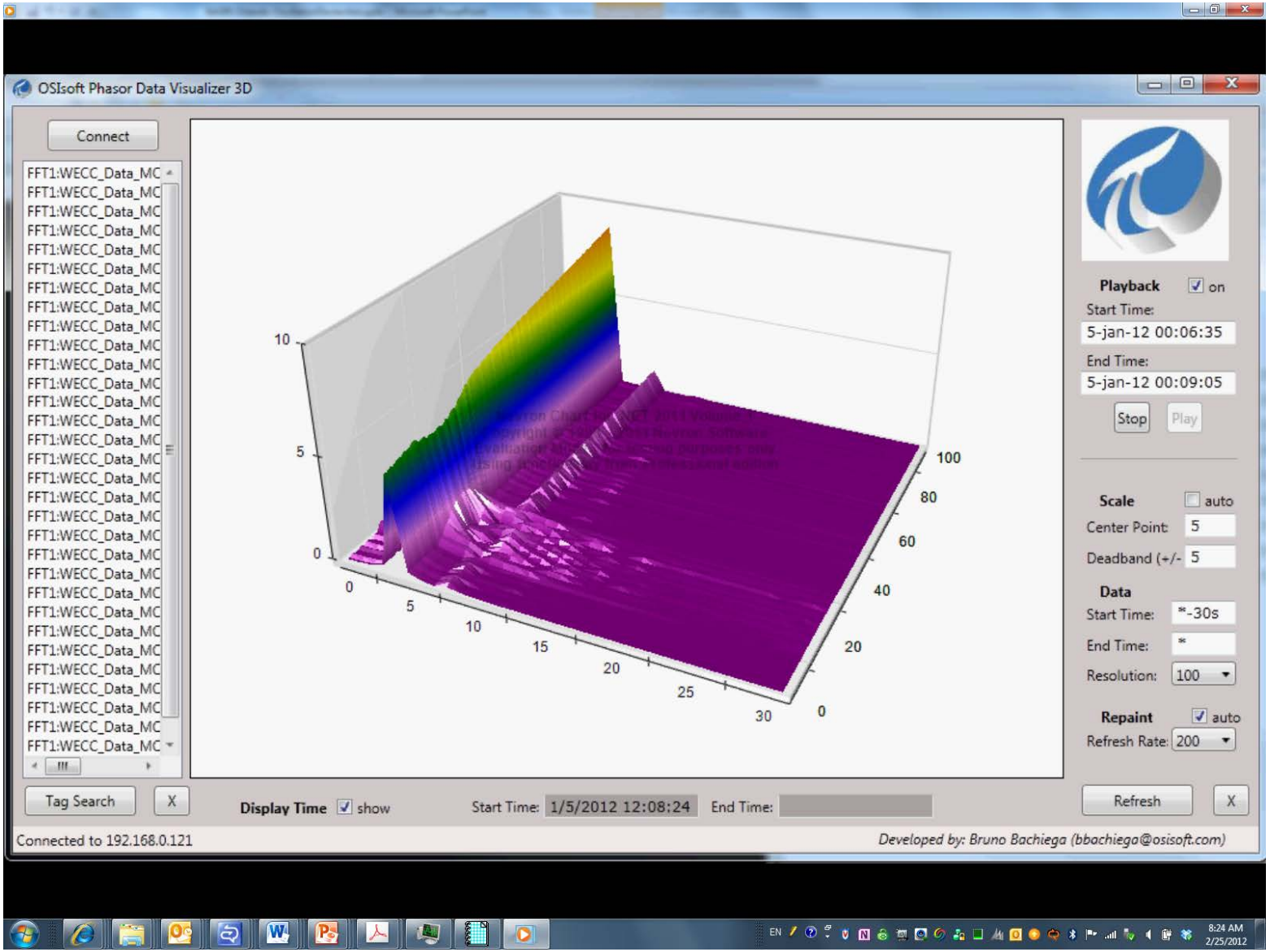
Calculations behind the screen

- FFT Spectrum of frequency difference between Montana and Northeast Washington
- State chart of Montana1 frequency versus unwrapped angle at Montana1
- State chart of Montana1 voltage verus unwrapped angle at Montana1
- Phase portrait of frequency difference between NEWash1 and Montana1 versus angle difference between stations

Angle FFTs



3-D Surface views



Calculations behind the screen

- Standard PI tags computed by PI-FFT-INT
- Commercial graphics software
- PI-Data Access to feed data to the graphics

Thank you

- Questions?