Dynamic Islanding

For Improving Electric Service Reliability with Energy Storage

Ali Nourai

American Electric Power

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AEP AMERICAN® ELECTRIC POWER

Outline

1. **Existing AEP storage projects**

   - **performance data**

2. **New AEP storage projects**

   - **exploring new storage values**

DOE/Sandia has been sponsoring
the innovative components
of energy storage projects in AEP

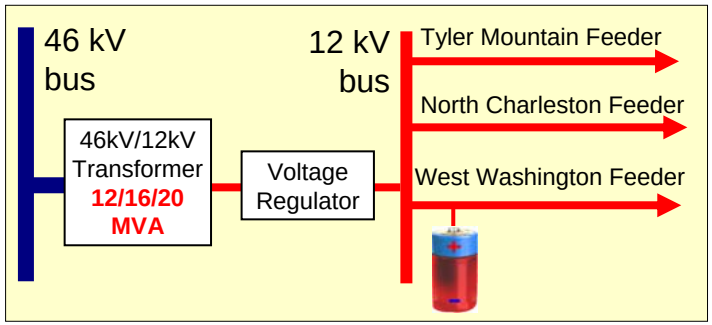
AEP NaS Application #1

1.2 MW, 7.2 MWh Distributed Energy Storage System in Chemical Station, North Charleston

APPALACHIAN POWER
A unit of American Electric Power

Started Operation on June 26th , 2006

NGK Insulators Ltd
S&C Electric Co.
DOE / SANDIA



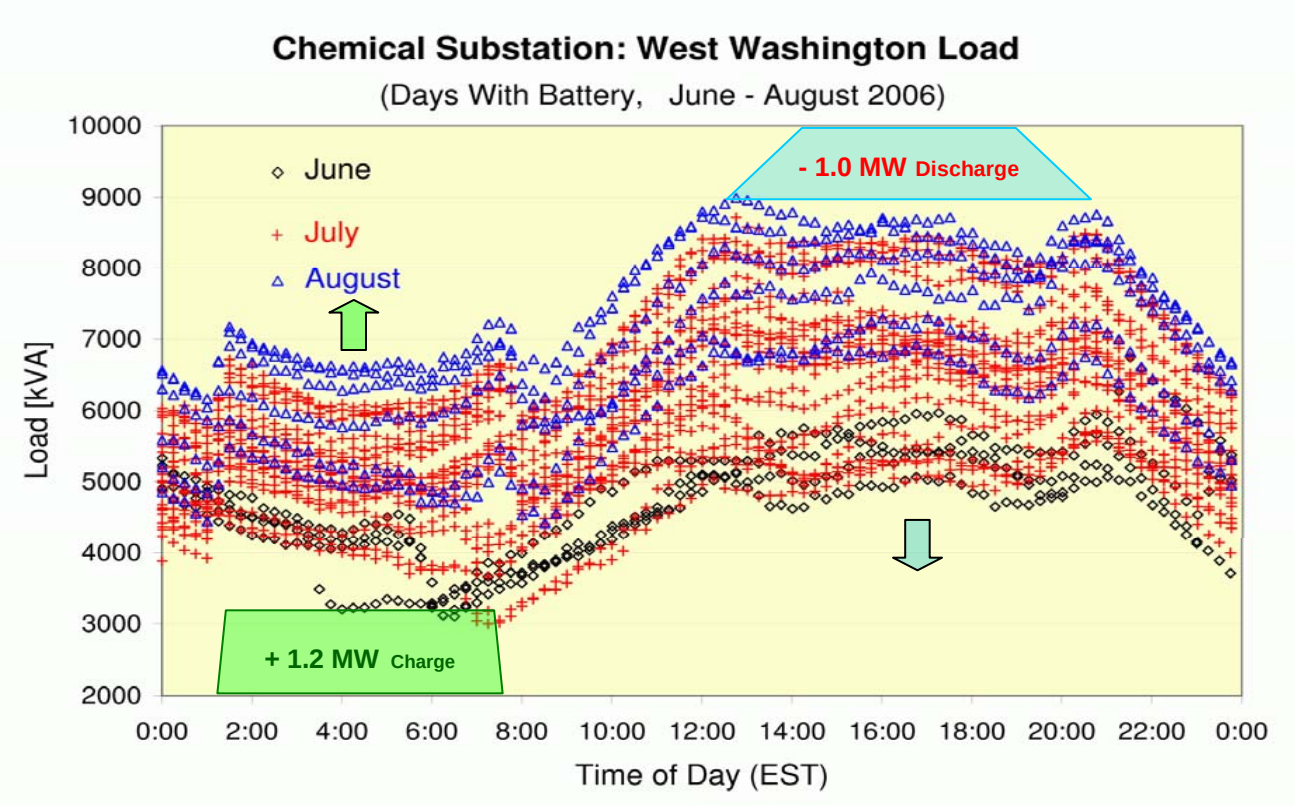
DOE/Sandia Report

SAND2007-3580

gridSMART from American Electric Power

Operational Data Supports Benefits

- Capital Deferral- three years
- Less Stress on our Aging Infrastructure
- Quick Alternative to Conventional Mitigation
- Energy Value



Energy Storage - beyond Peak Shaving

- 2006: 1 MW, Peak Shaving *(Being relocated to a new site)*

- 2008: 6 MW, Peak Shaving + Islanding
- 2009: 4 MW, Peak Shaving + UPS (City-Scale)

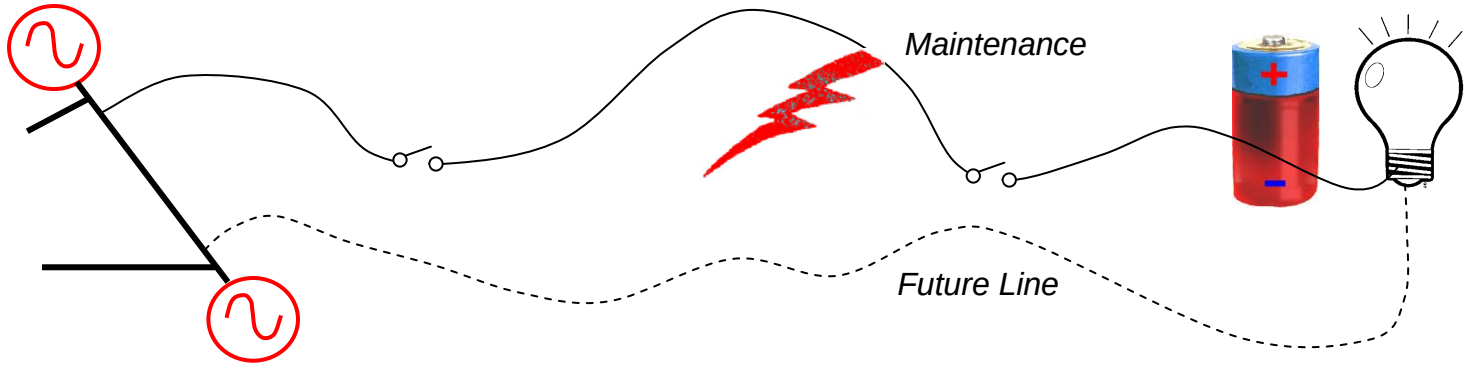
- … + Renewables
- + Ancillary Services

- 2020: 1000 MW total + Multiple Values

Another Relaizable Benefit of Energy Storage

A *Quick* solution to *Reliability* and *Capital Deferral*:

1. Provide contingency power to single-source loads
2. Maintain service during system repairs
3. Defer Investment



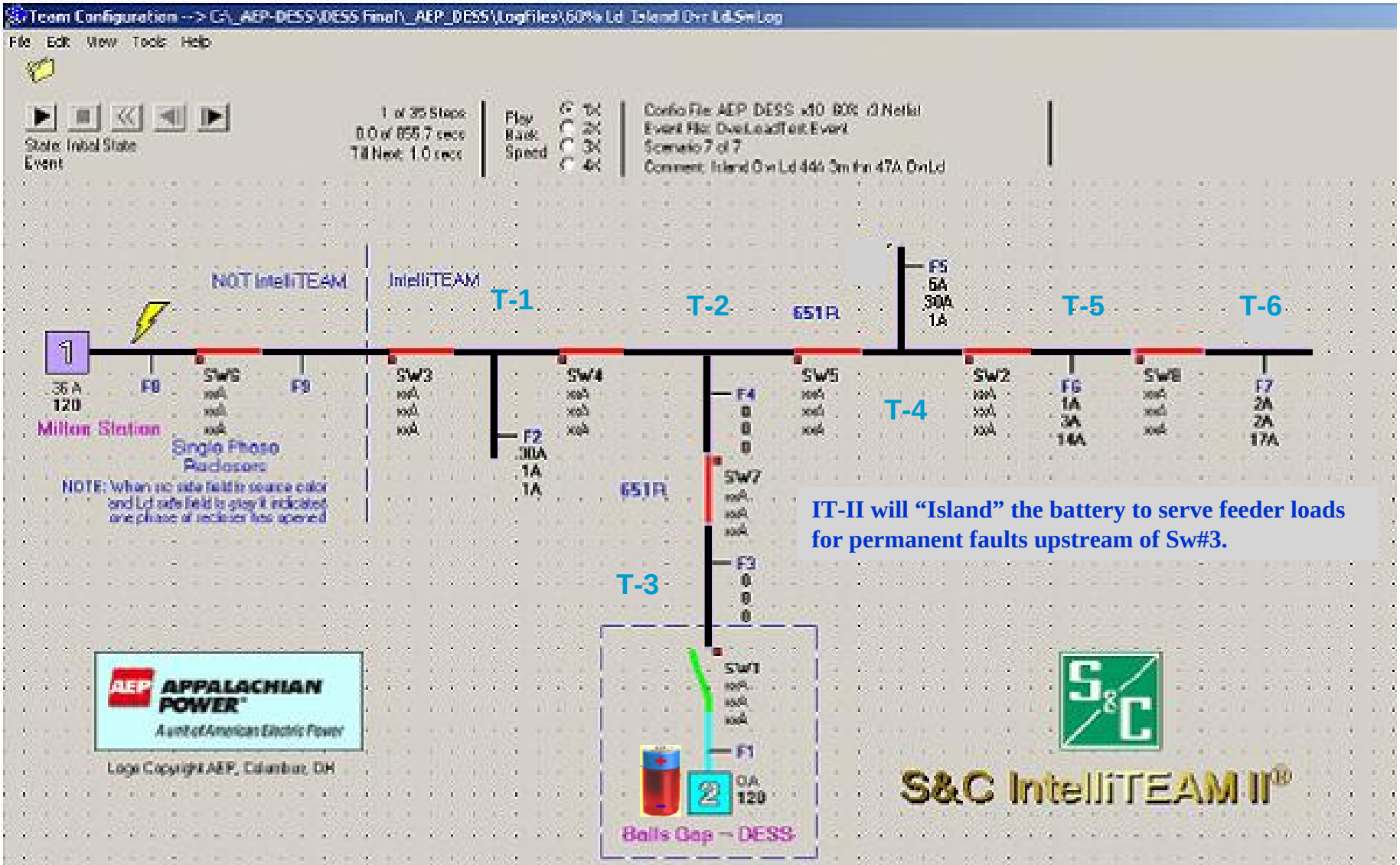
Improved Service Reliability

AEP NaS Application #2 - with DOE support

- 2MW, 14.4 MWh in Bluffton, Ohio
- Two other identical sites (2008)
- All will have dynamic islanding
- DOE/Sandia is sponsoring development of Dynamic Islanding

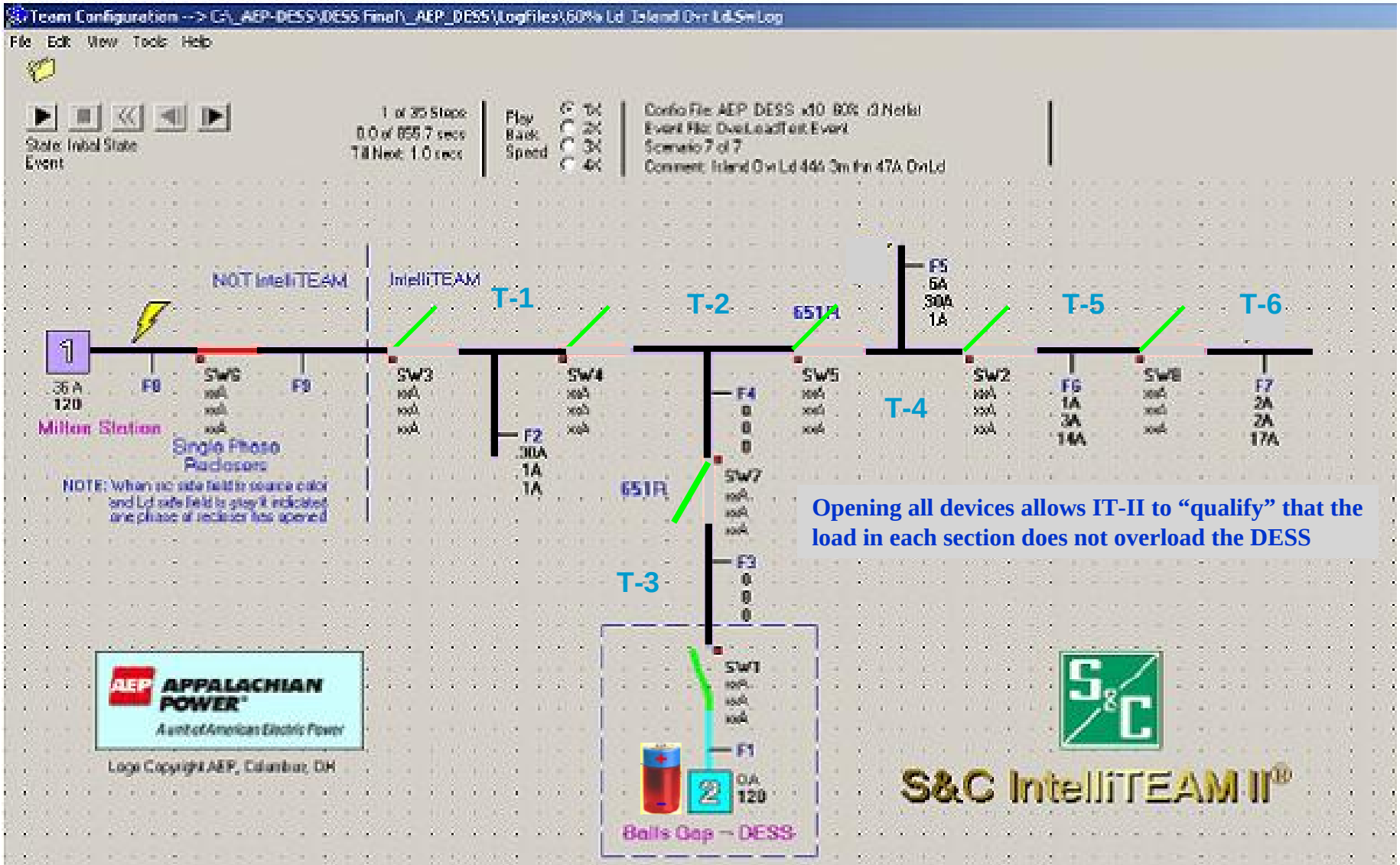
Using a NaS Battery to Mitigate Outages

A Fault Occurs Locking Out the Balls Gap Feeder



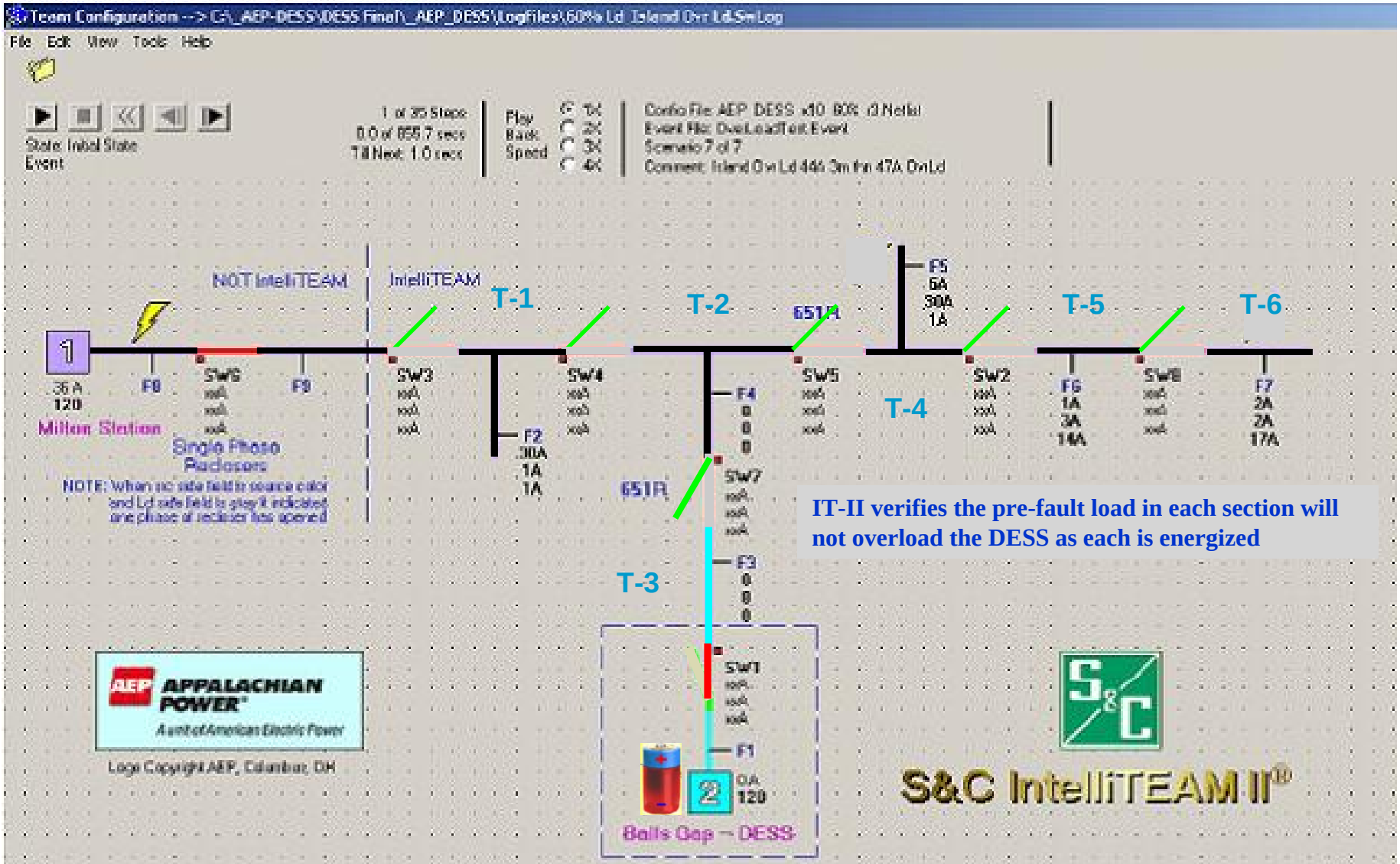
Using a NaS Battery to Mitigate Outages

All IT-II Devices Open (on Loss Of Voltage)



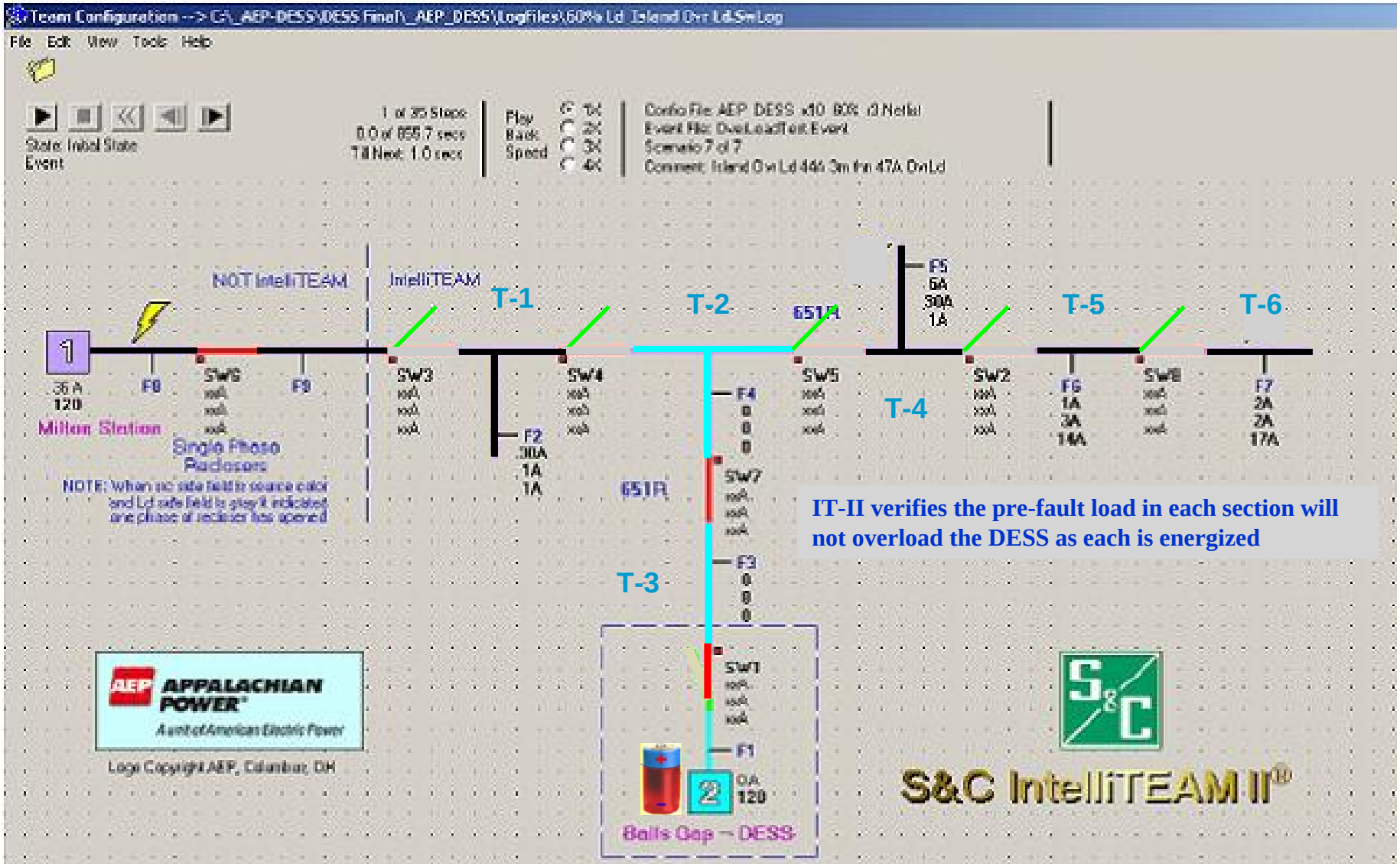
Using a NaS Battery to Mitigate Outages

IT-II Closes SW-1 to Energize Team 3



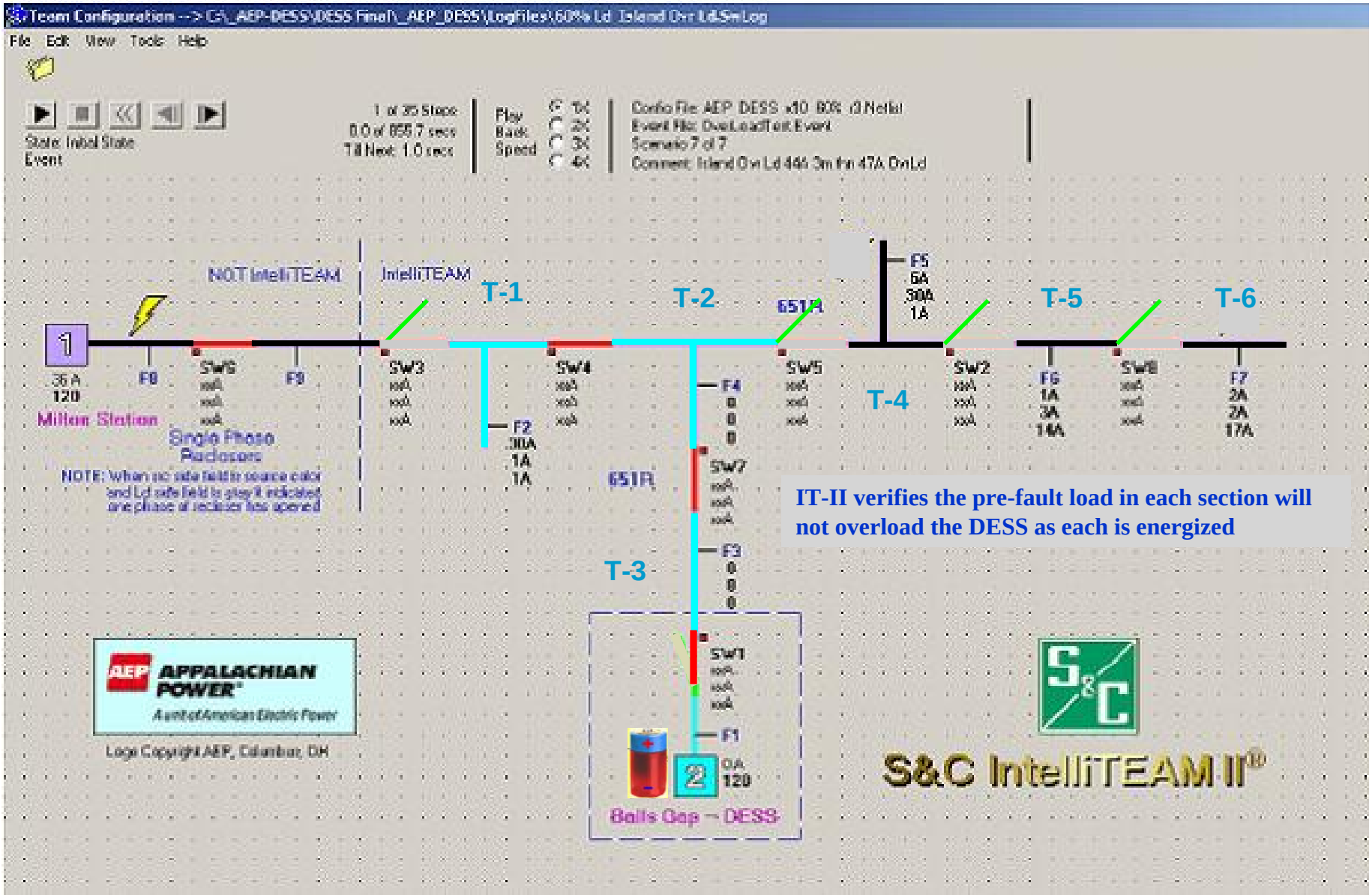
Using a NaS Battery to Mitigate Outages

IT-II Closes SW-7 to Energize Team 2



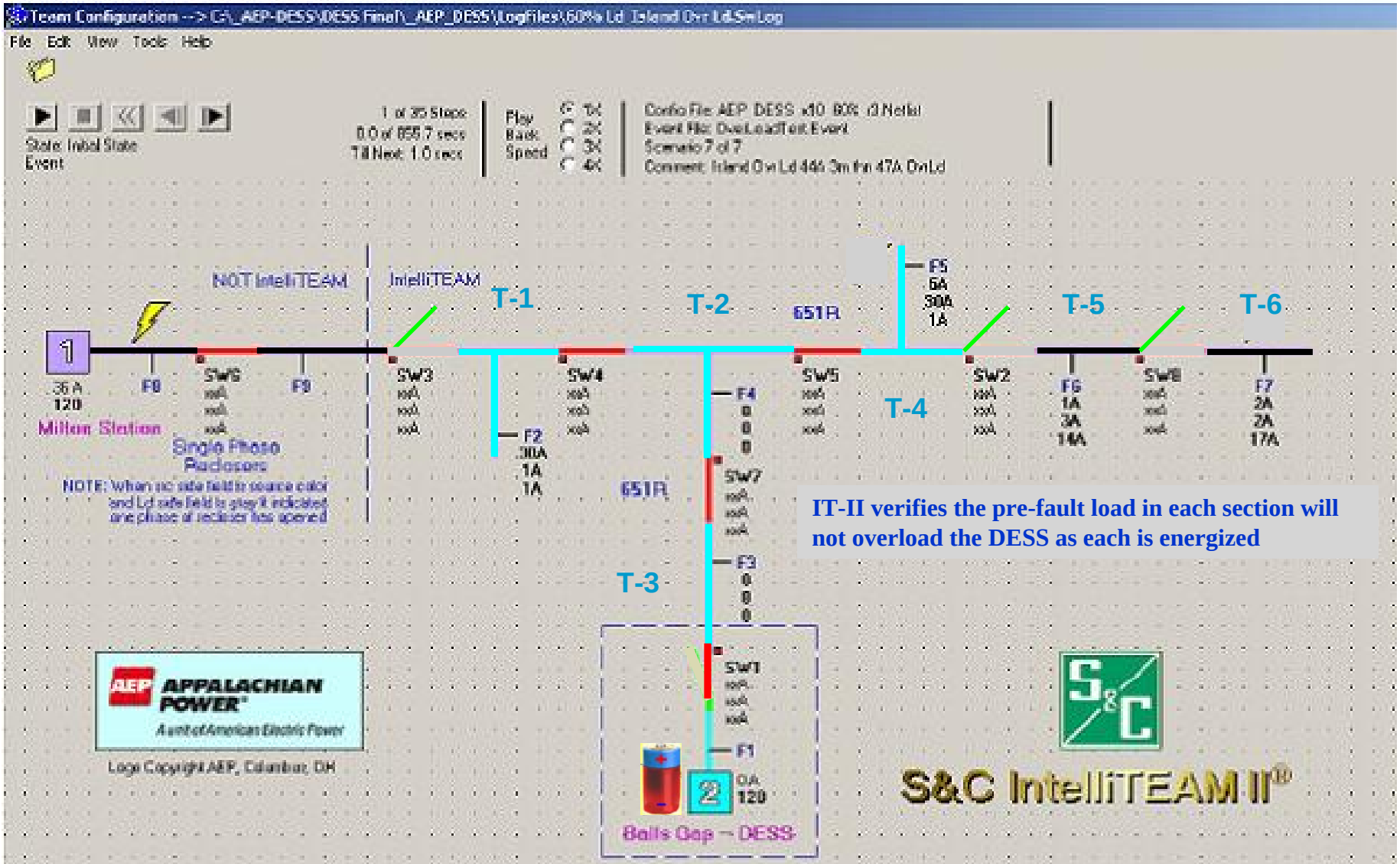
Using a NaS Battery to Mitigate Outages

IT-II Closes SW-4 to Energize Team 1



Using a NaS Battery to Mitigate Outages

IT-II Closes SW-5 to Energize Team 4



Future Work

- AEP's 2009 project in Texas (4MW) will provide islanding without power interruption
- It is a City-Scale UPS with several hours of backup

Conclusions

- Utility-Scale batteries are a viable option
- Challenges:
  - High cost limits applications
  - Realizing multiple benefits of storage
  - Regulatory limitations on:
    - ownership (generation vs. T&D)
    - socializing storage cost
- Financial assistance is still needed to break the price cycle (cost vs. units sold)

Questions???

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