S&C Electric Company

Michael Kilpatrick Regional Vice President

November 29, 2011

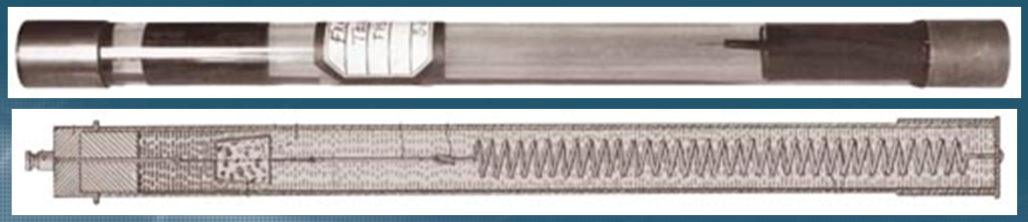
www.sandc.com

1909 A fire and a fuse

Edmund O. Schweitzer was the utility's chief testing engineer.

Nicholas J. Conrad was one of Edison's generator-starting engineers.

Conrad (far left) at the Fisk station with other Commonwealth Edison engineers. The legendary Charles Steinmetz from General Electric is in the light suit (center).



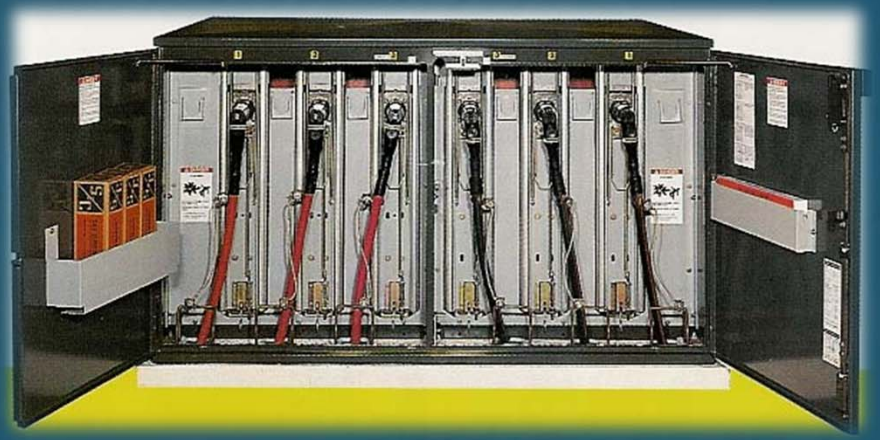
S&C Today

- S&C Electric Company
- Chicago, Illinois
- Employee Owned
  - 46 acres
  - 1.2 million sq. ft.

Employees
- 1800 in Chicago
- 2500 Globally

- Commitment
  - Employee Owned
  - 90% of profits back into people and plant
  - Certified Member of Green Supplier Network
  - Certified ISO:14001
  - Continuous Improvement and Innovation at the core of S&C

S&C Traditional Products



S&C Innovations Shaped Electric Delivery

Liquid Power Fuse 1909

Circuit-Switcher 1959

Vista® Switchgear 1996

Advanced Technology Center 2010

Load Interrupter Switch 1940

Pad-Mounted Gear 1960

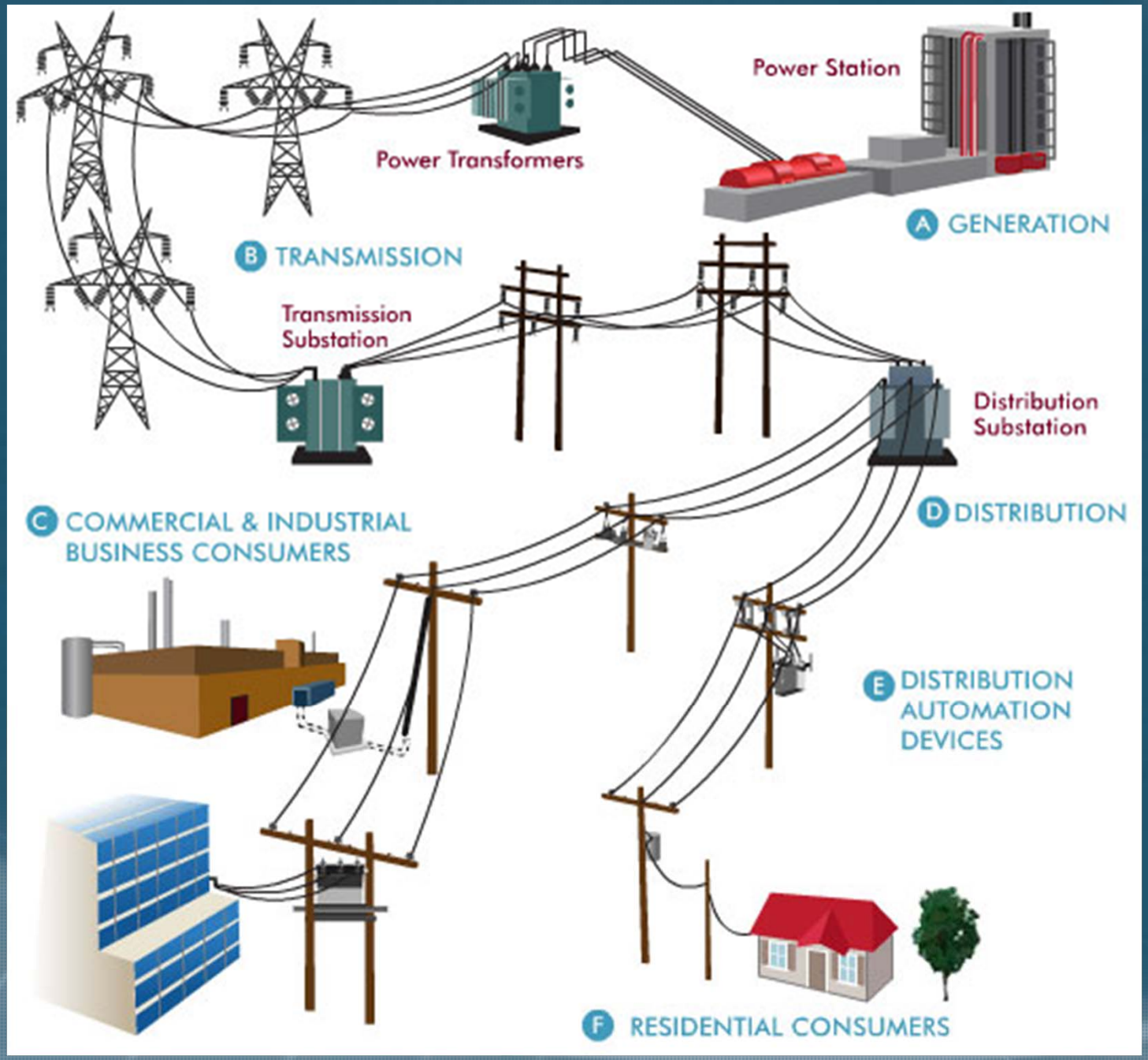
IntelliRupter PulseCloser 2008

Community Energy Storage 2011

Vision for Electric Delivery System

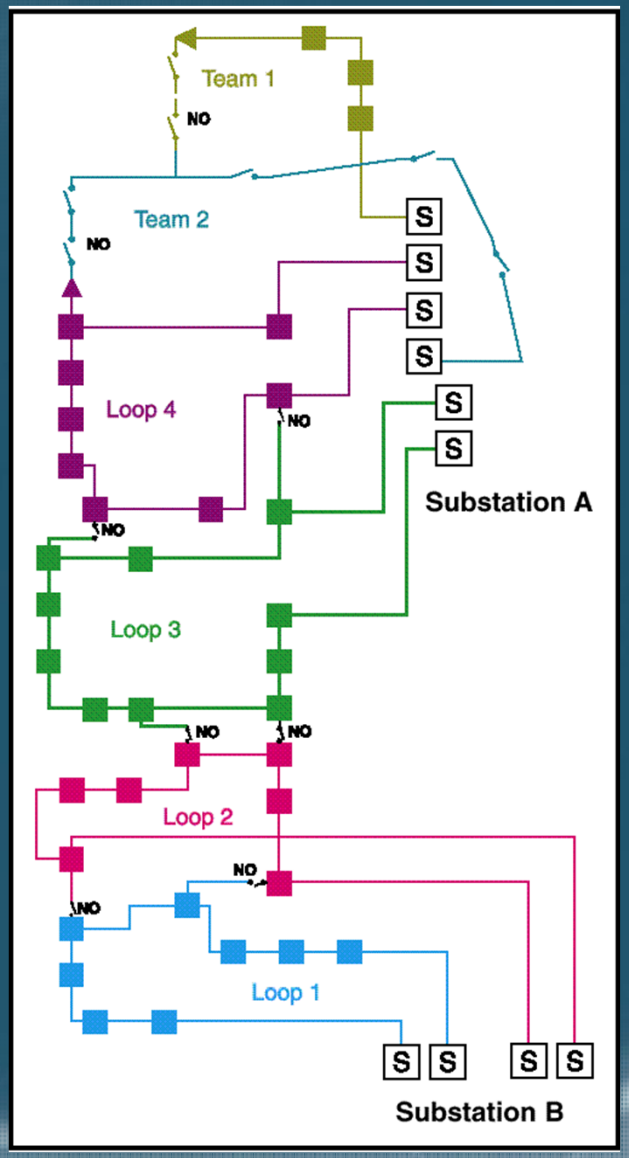
The Past: Centralized, Carbon-Emitting Sources . . .

The Future: Distributed, renewable electricity resources, and greater focus on reliability and efficiency

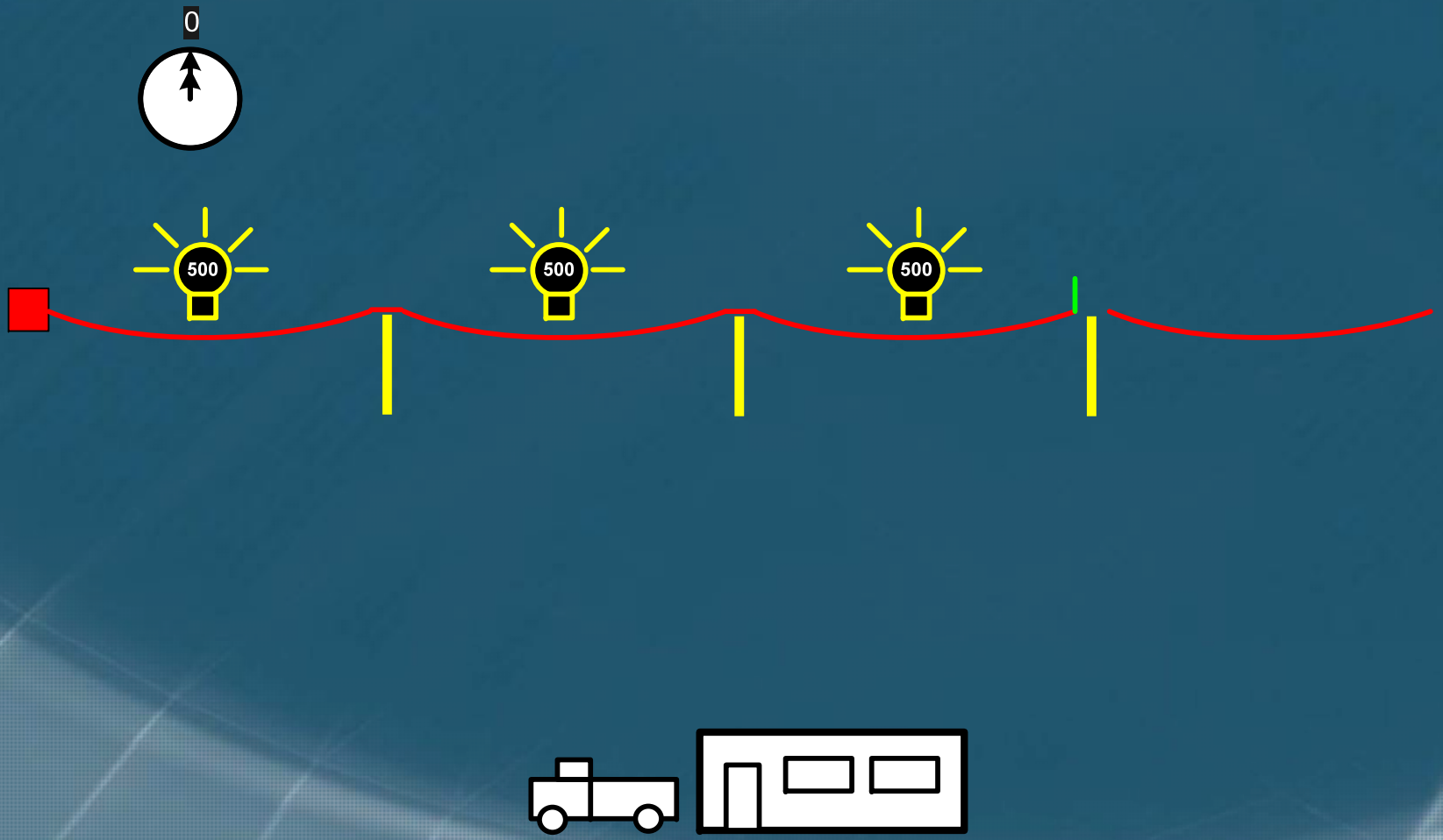

Power Station
Power Transformers
A GENERATION
B TRANSMISSION
Transmission Substation
Distribution Substation
C COMMERCIAL & INDUSTRIAL BUSINESS CONSUMERS
D DISTRIBUTION
E DISTRIBUTION AUTOMATION DEVICES
F RESIDENTIAL CONSUMERS

What this means to the consumer?

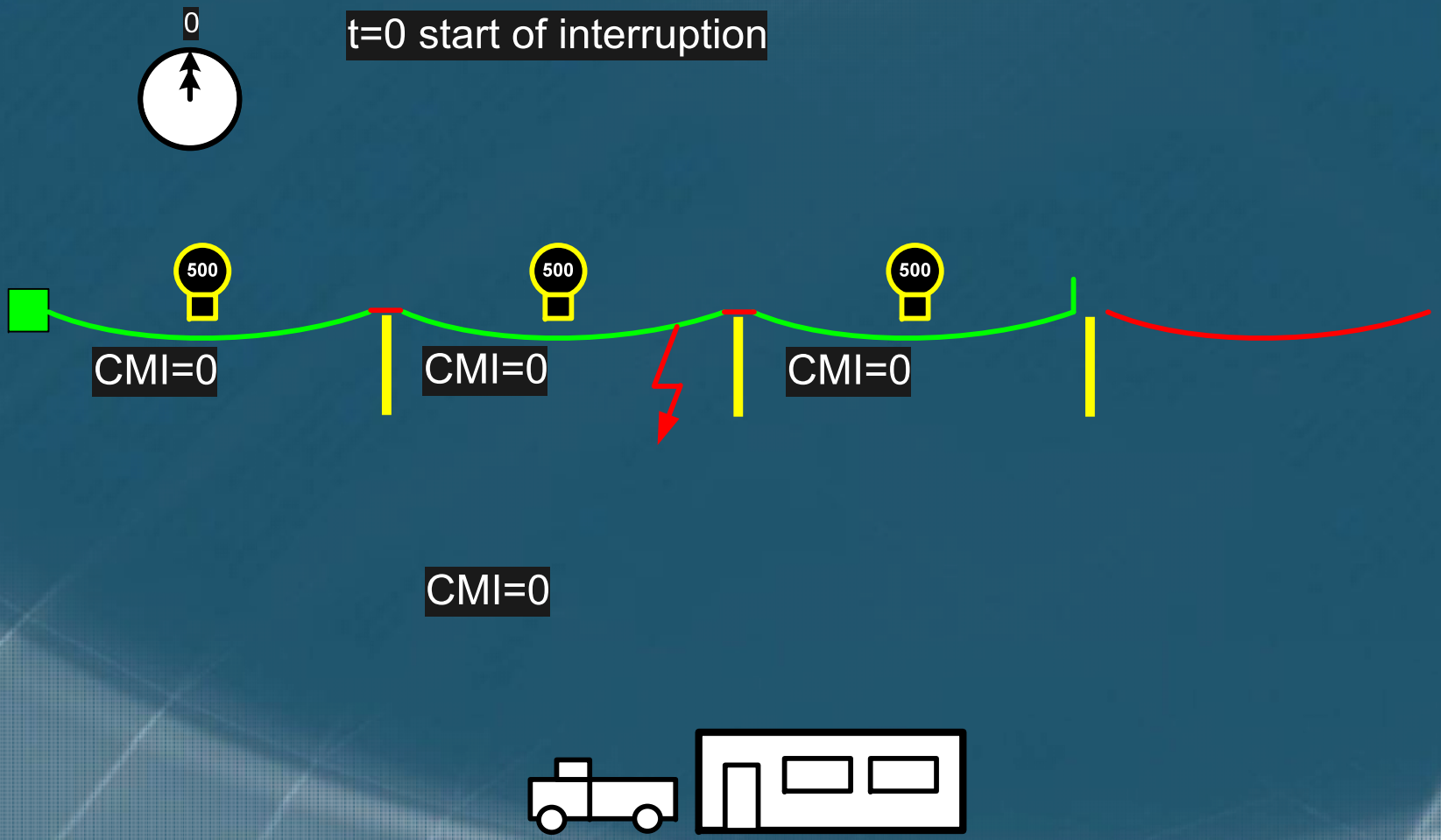
- Neighborhoods are feed from Substations
- Main Circuits are the spine of the grid and account for the majority of customer outages
- 500 to 5000 customers per circuit
- Distributed Devices Manual or Smart
- Capacity and Design considerations



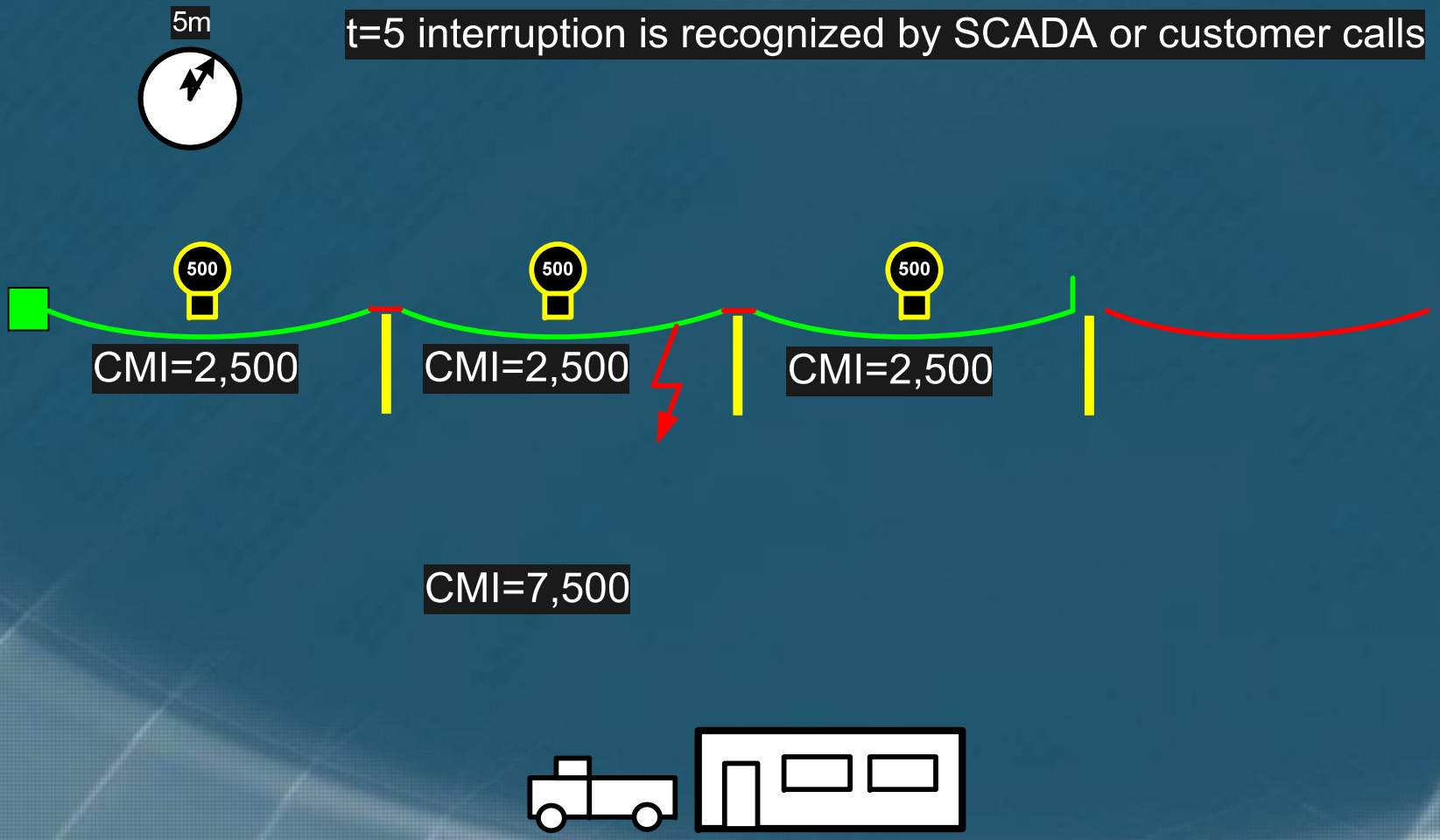
Many Systems Today
Interruption Timeline with Manual Switching



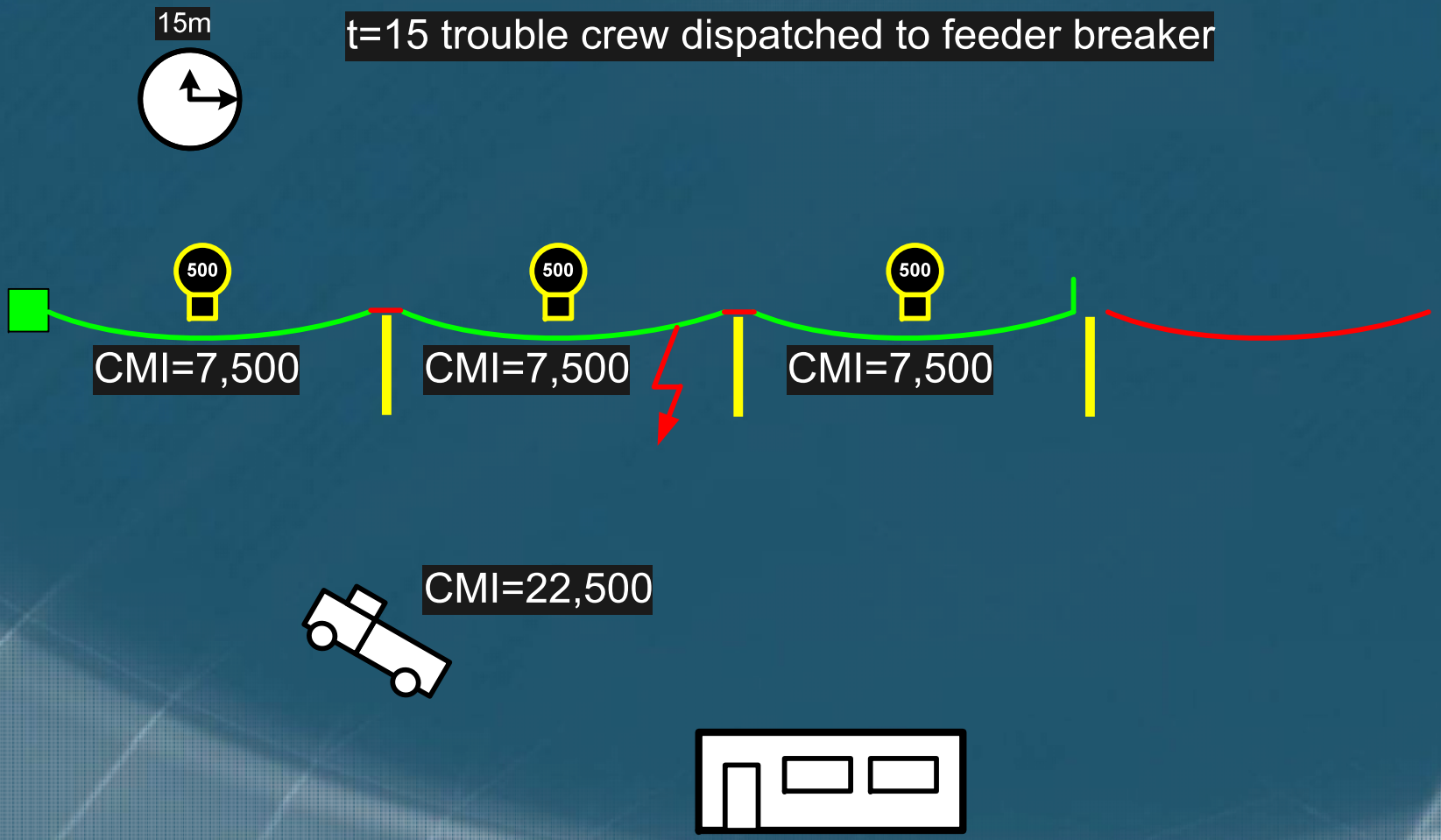
Interruption Timeline with Manual Switching



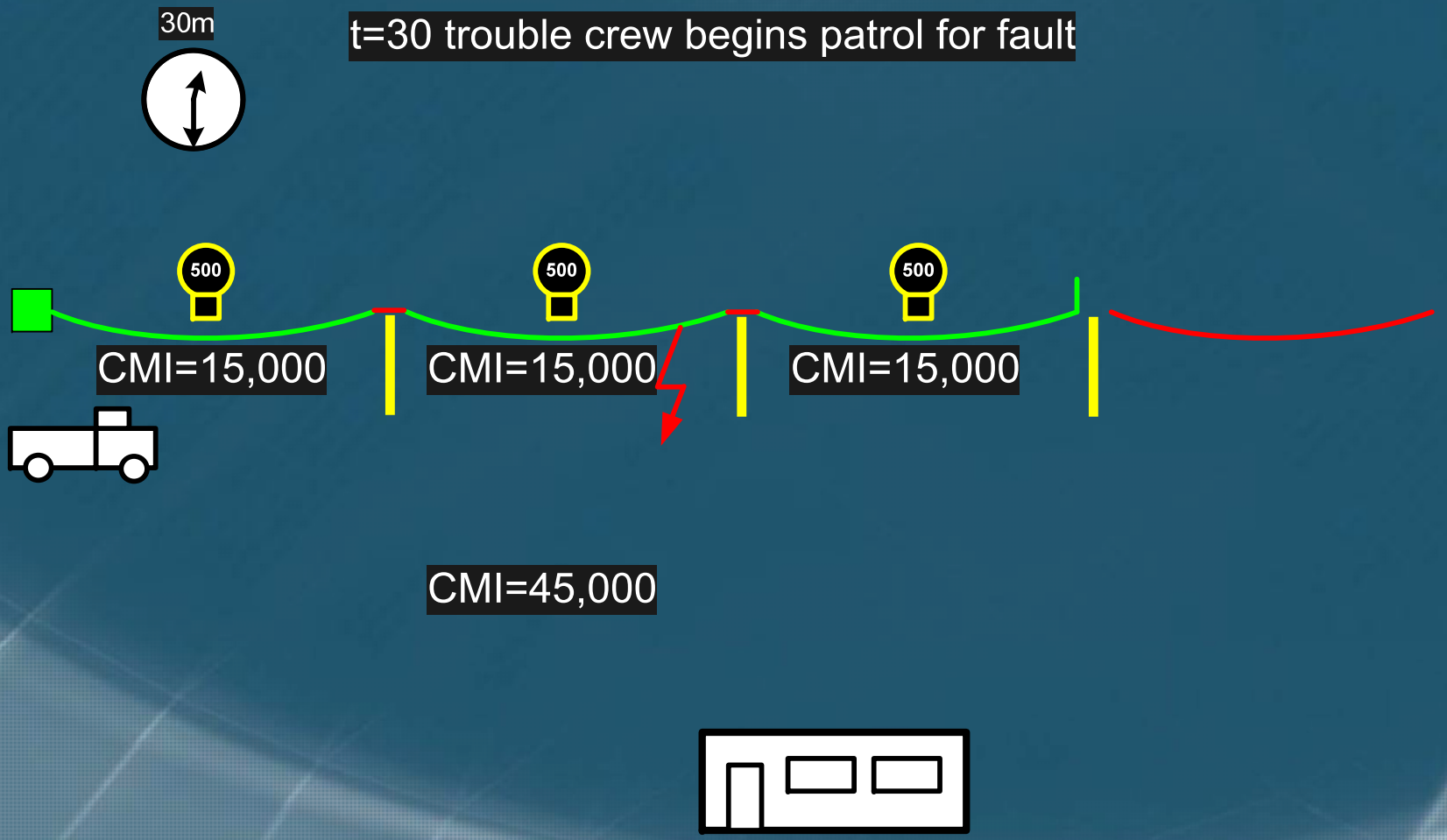
Interruption Timeline with Manual Switching



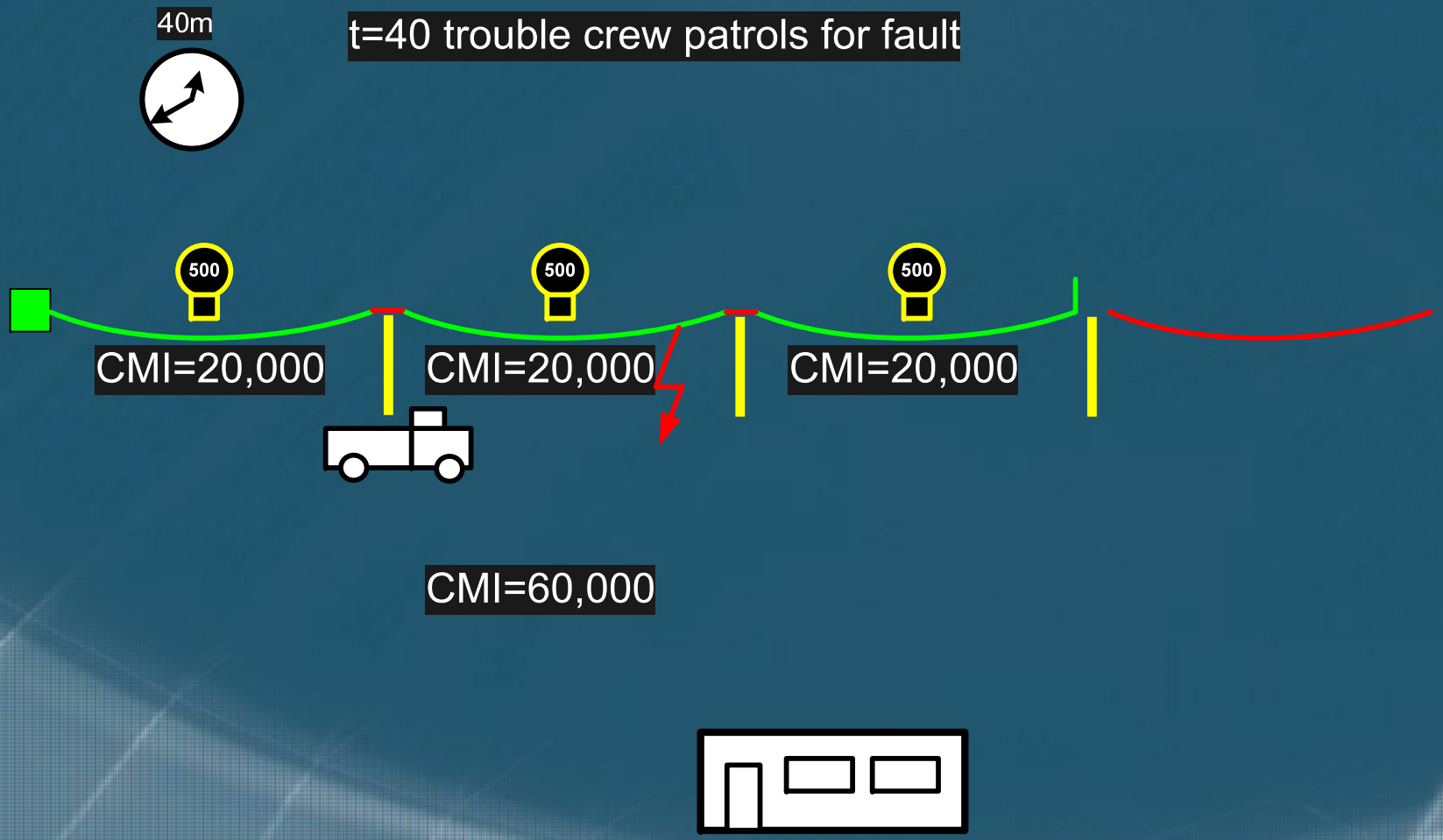
Interruption Timeline with Manual Switching



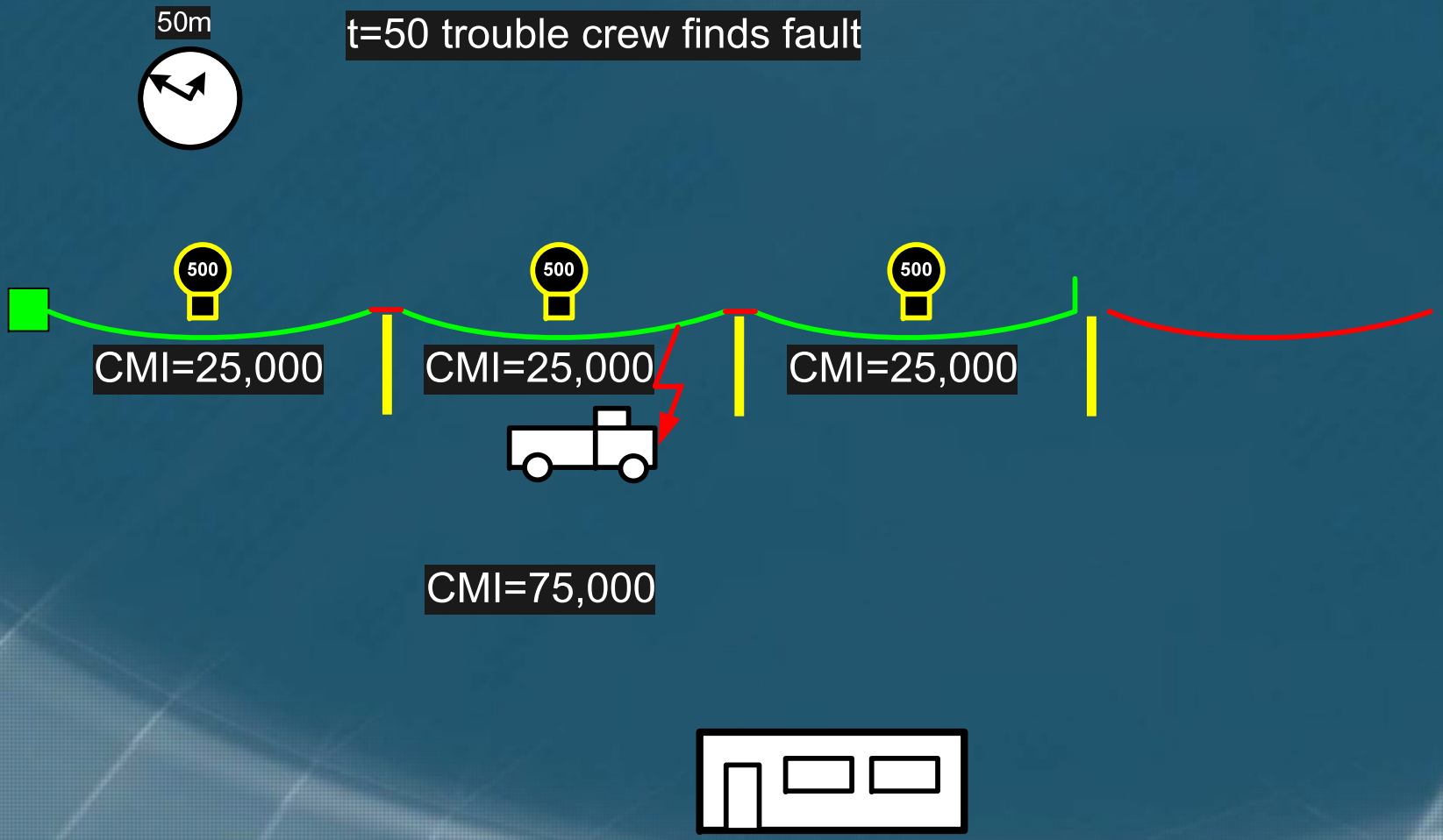
Interruption Timeline with Manual Switching



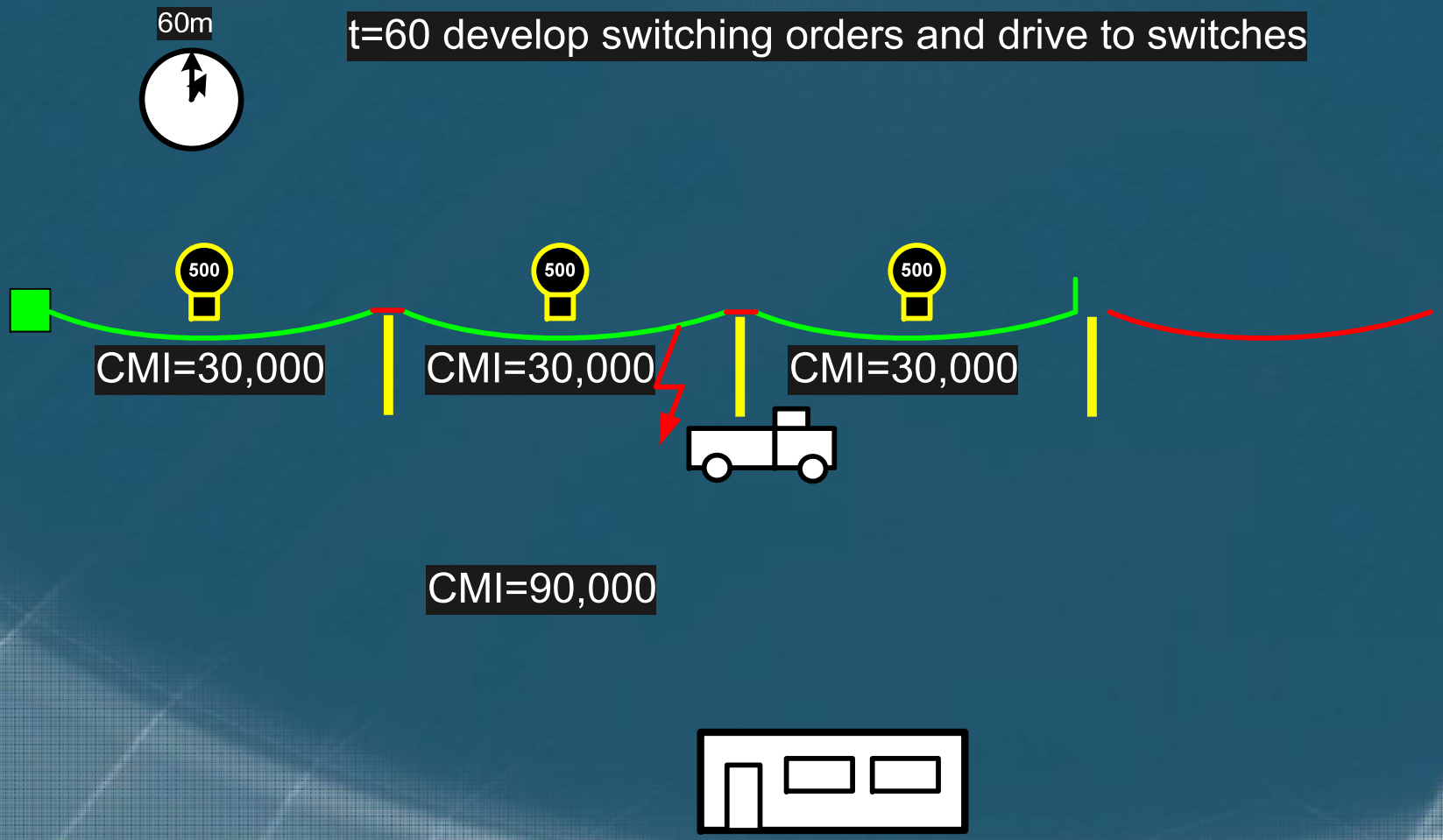
Interruption Timeline with Manual Switching



Interruption Timeline with Manual Switching



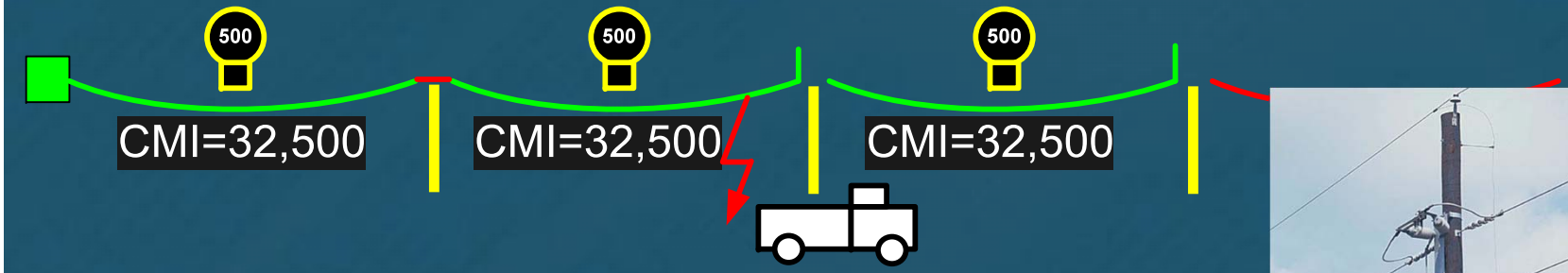
Interruption Timeline with Manual Switching



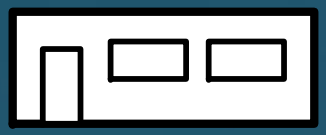
Interruption Timeline with Manual Switching

1h 5m

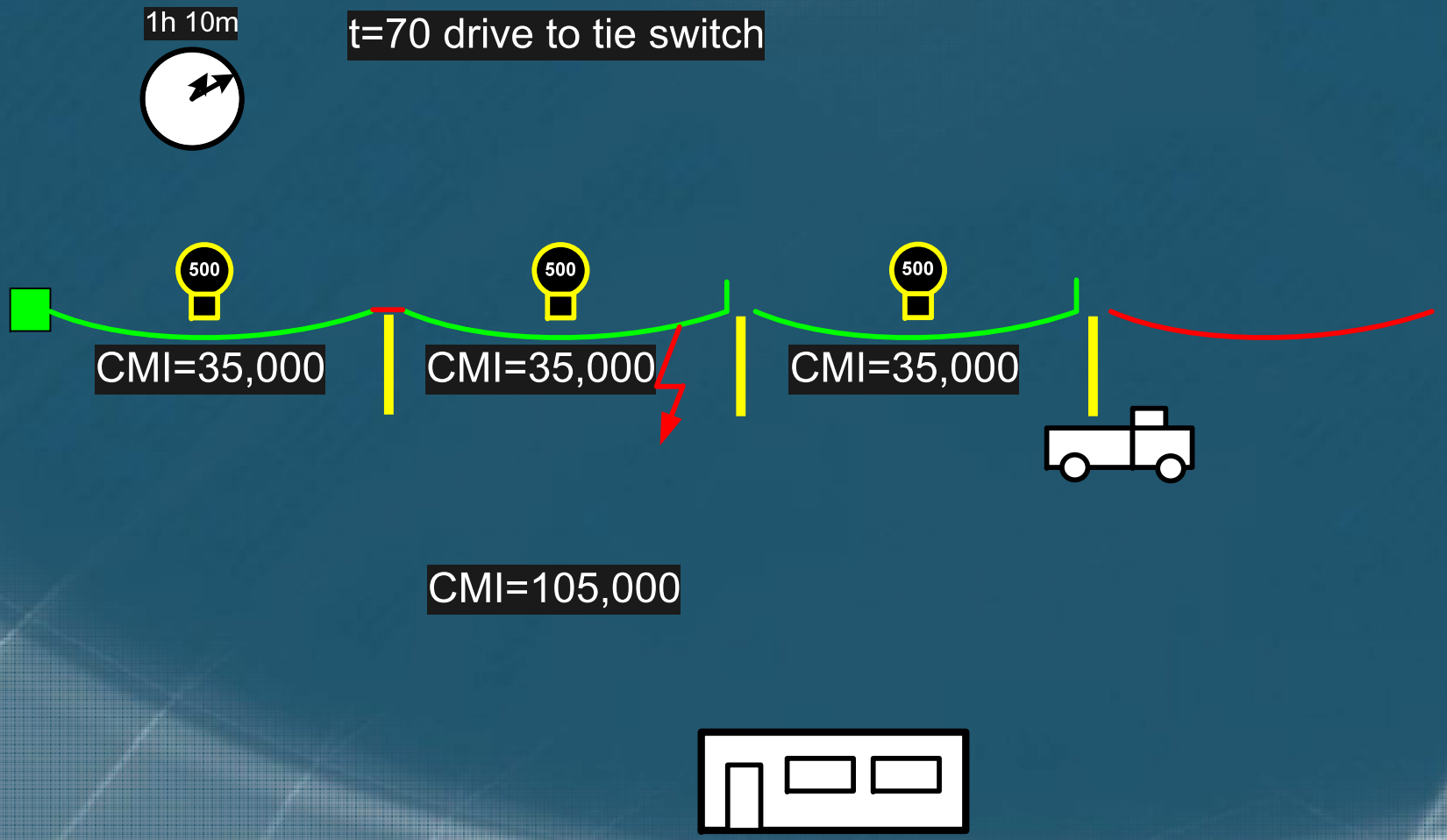
t=65 open downstream switch



CMI=97,500



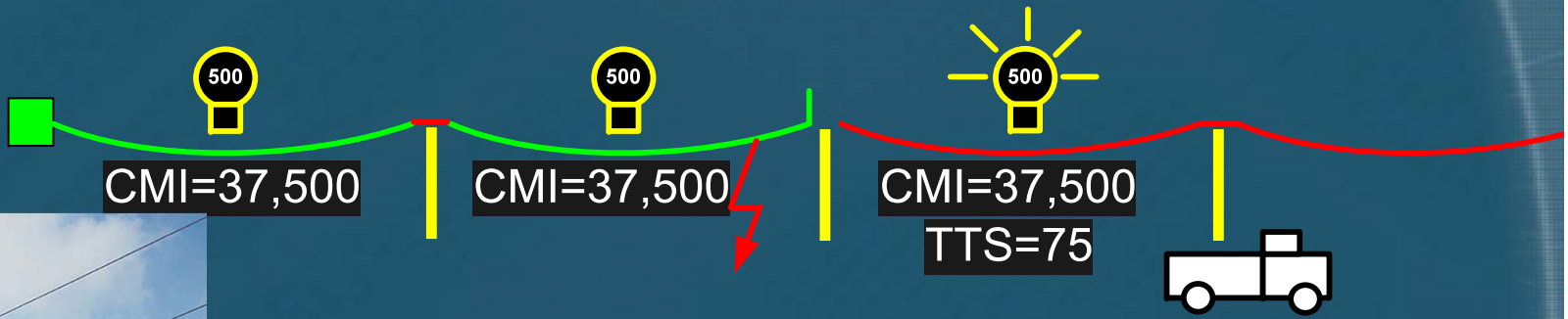
Interruption Timeline with Manual Switching

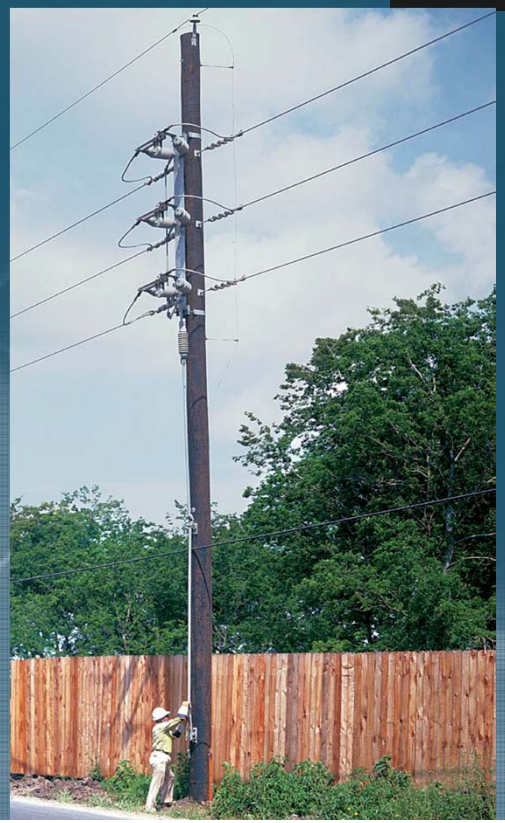


Interruption Timeline with Manual Switching

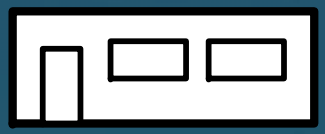
1h 15m

t=75 close tie switch for restoration

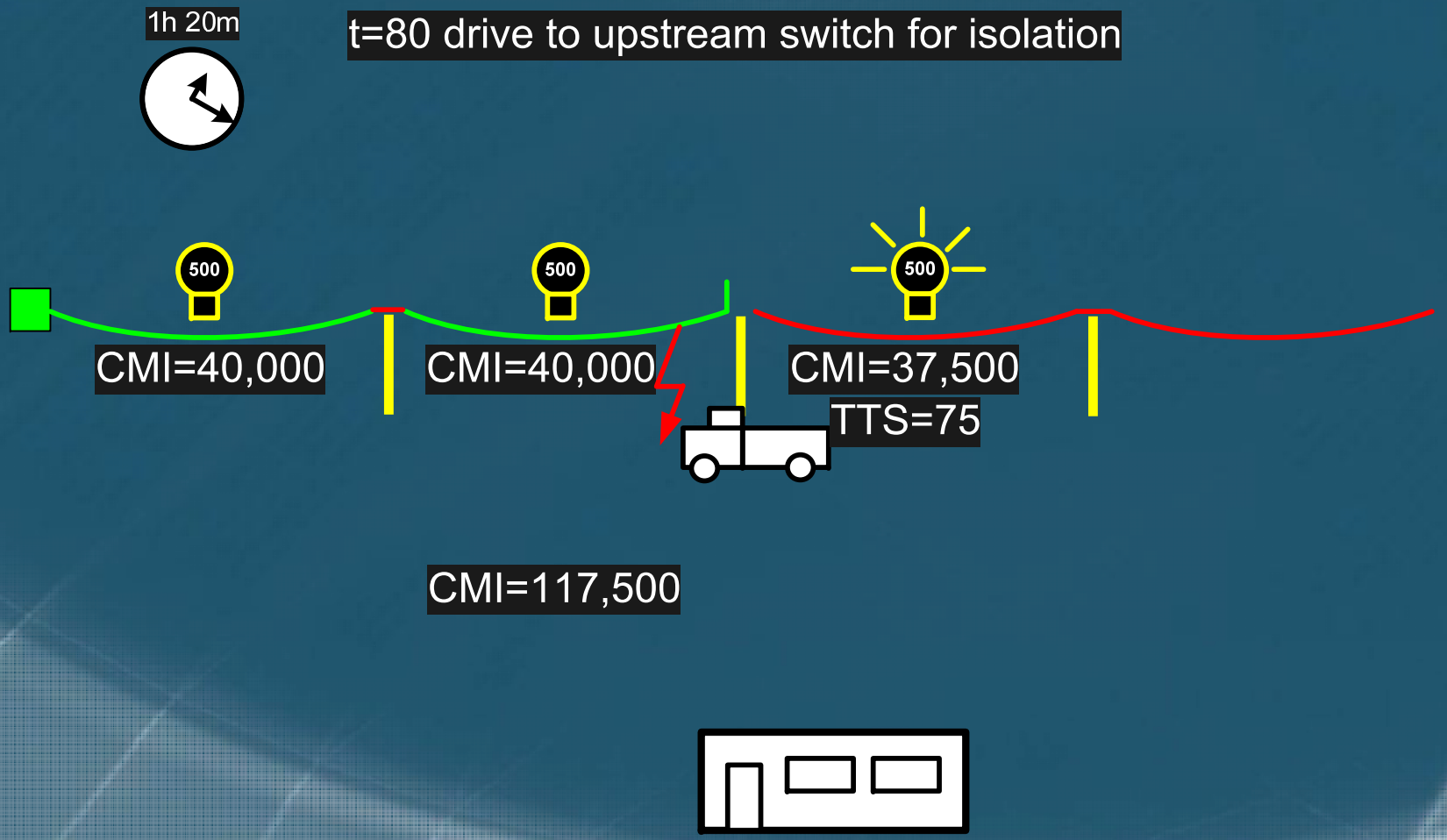




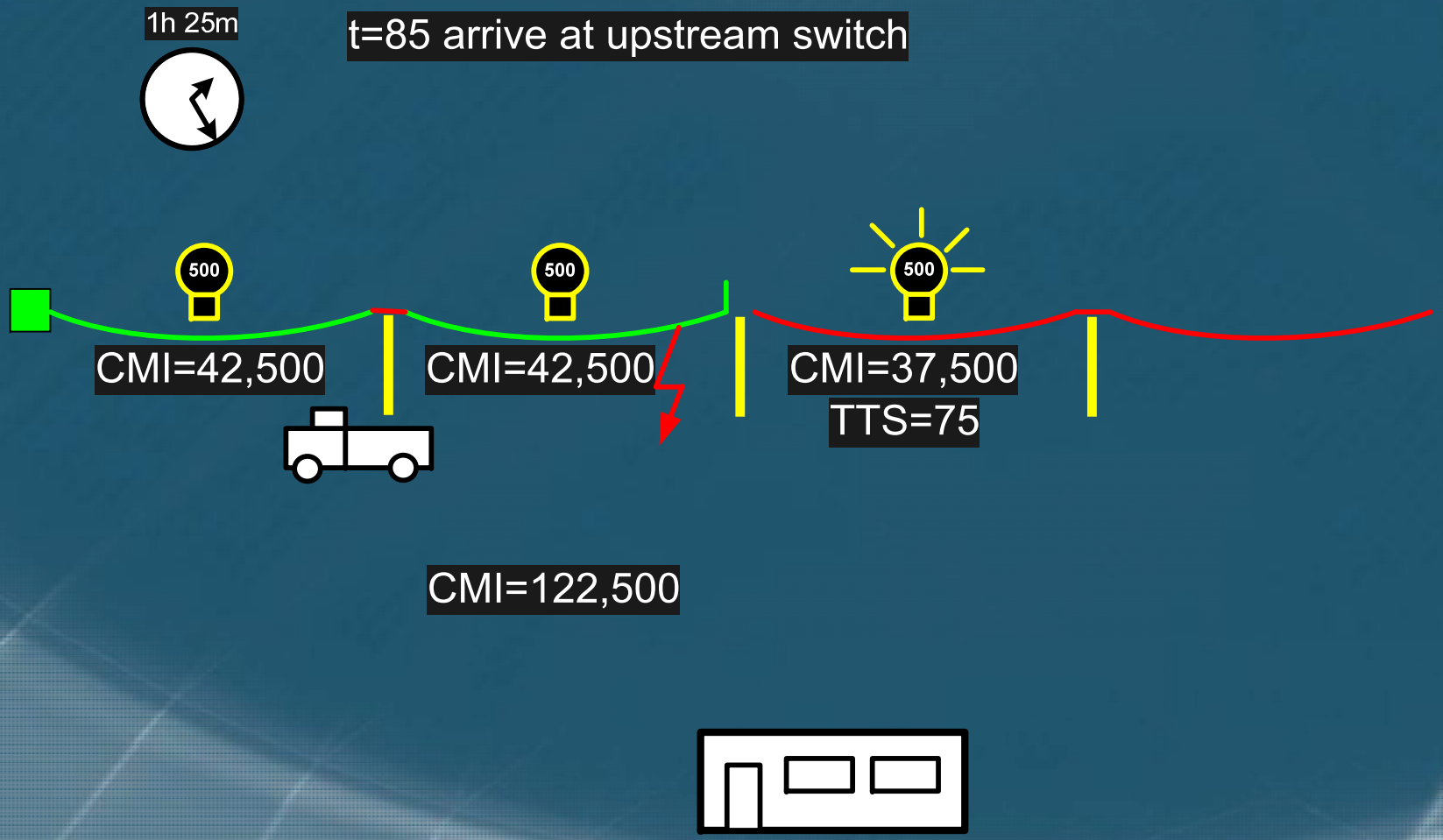
CMI=112,500



Interruption Timeline with Manual Switching



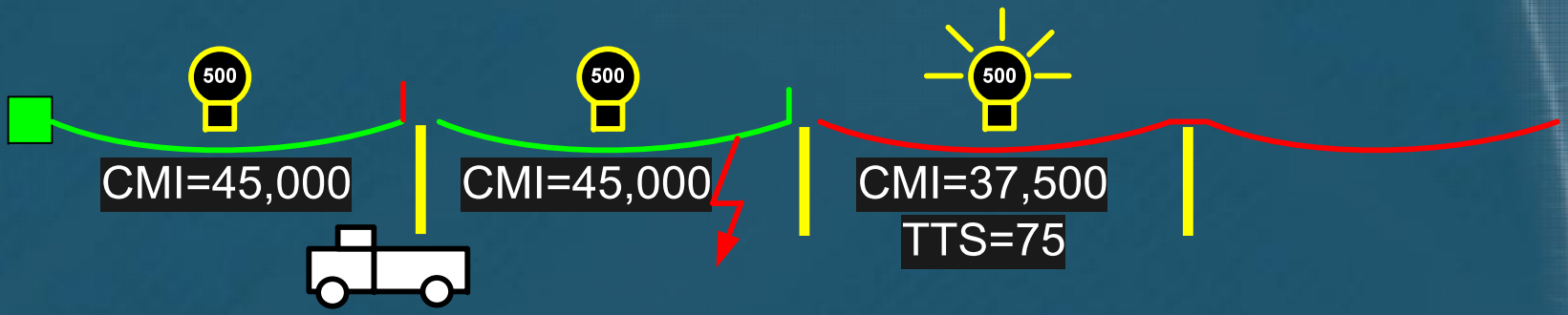
Interruption Timeline with Manual Switching



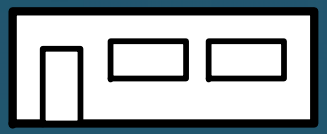
Interruption Timeline with Manual Switching

1h 30m

t=90 open upstream switch



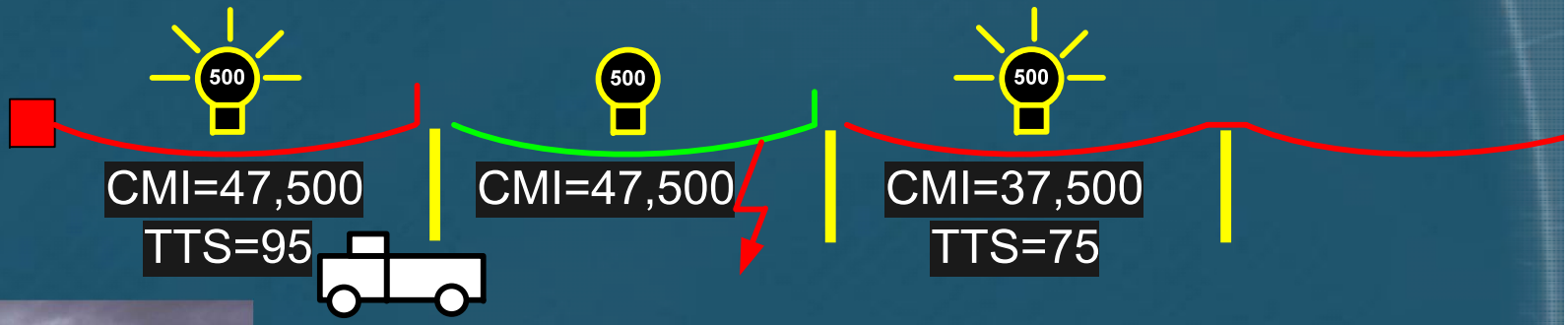
CMI=127,500

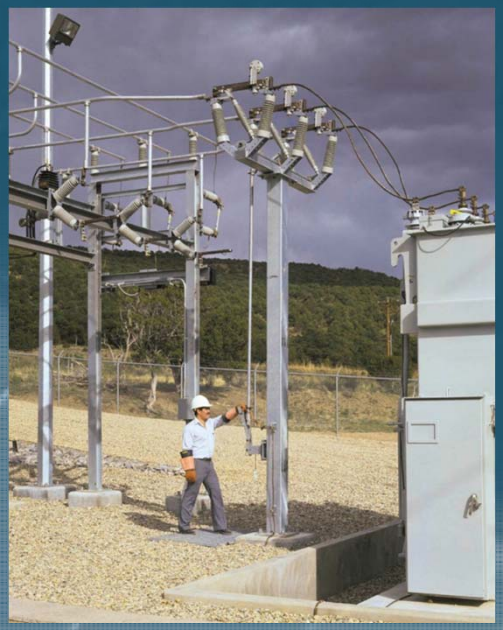


Interruption Timeline with Manual Switching

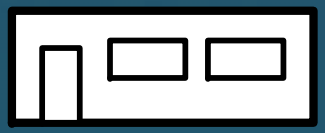
1h 35m

t=95 call in for SCADA close of circuit breaker

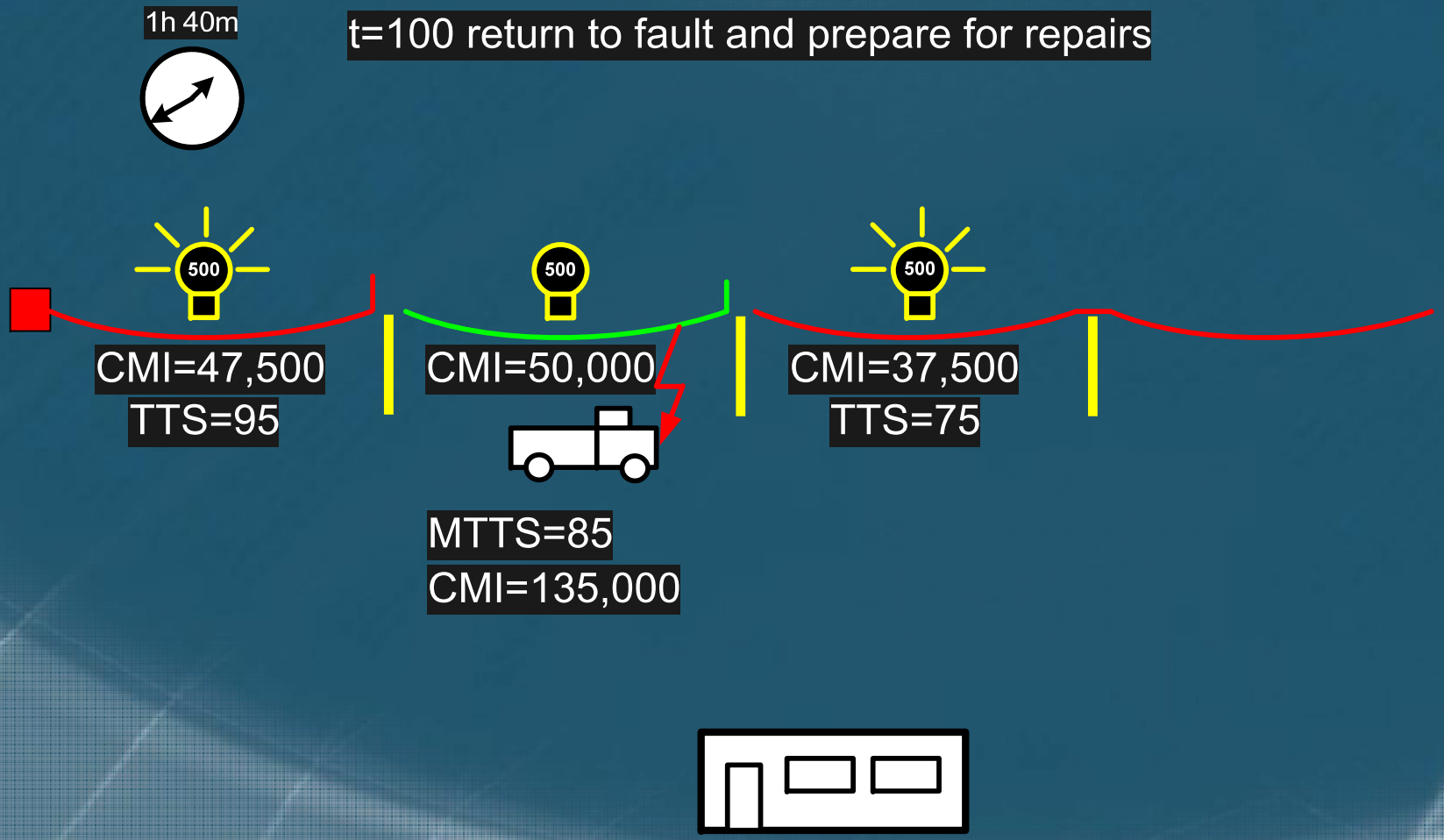




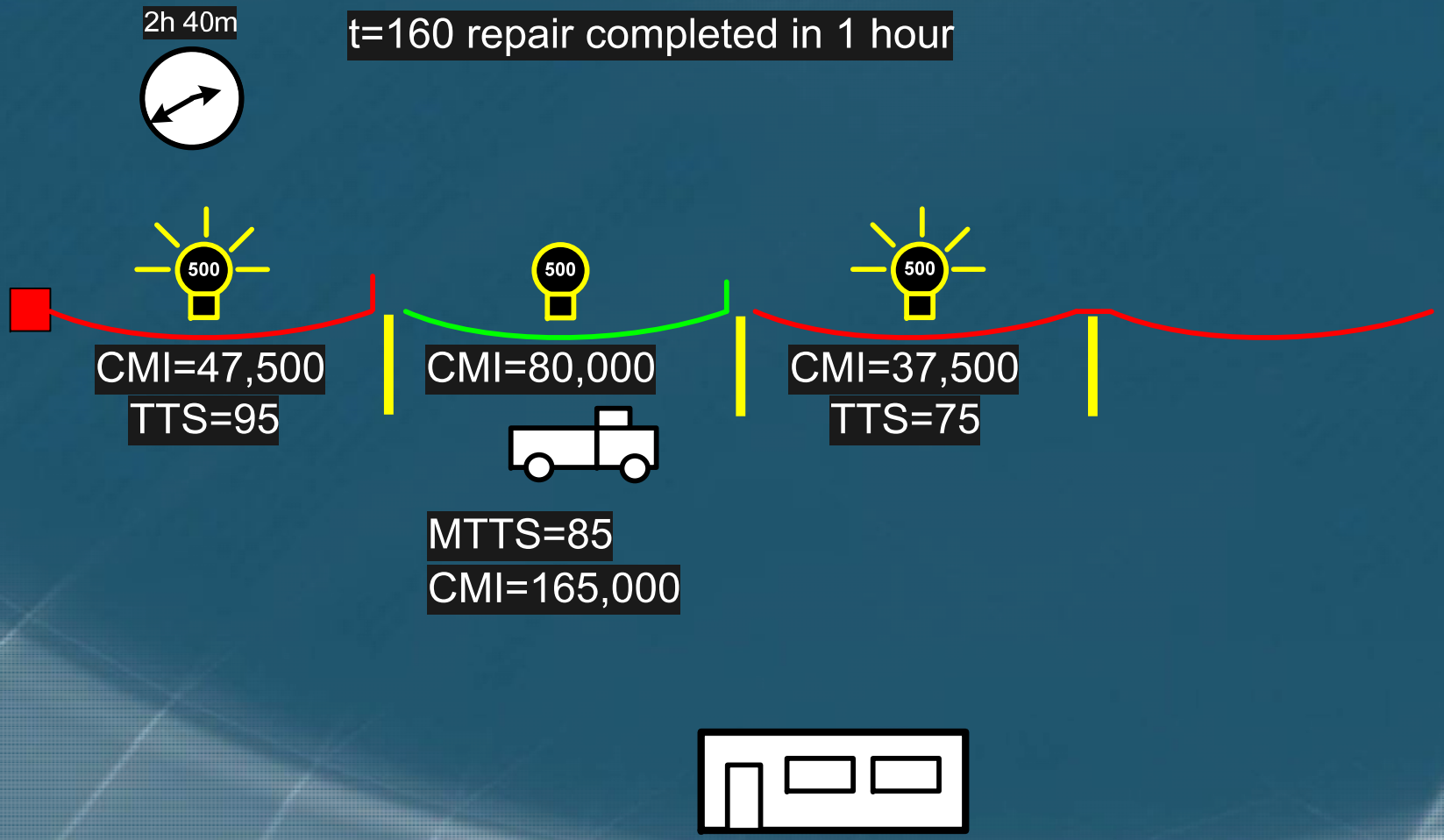
MTTS=85
CMI=132,500



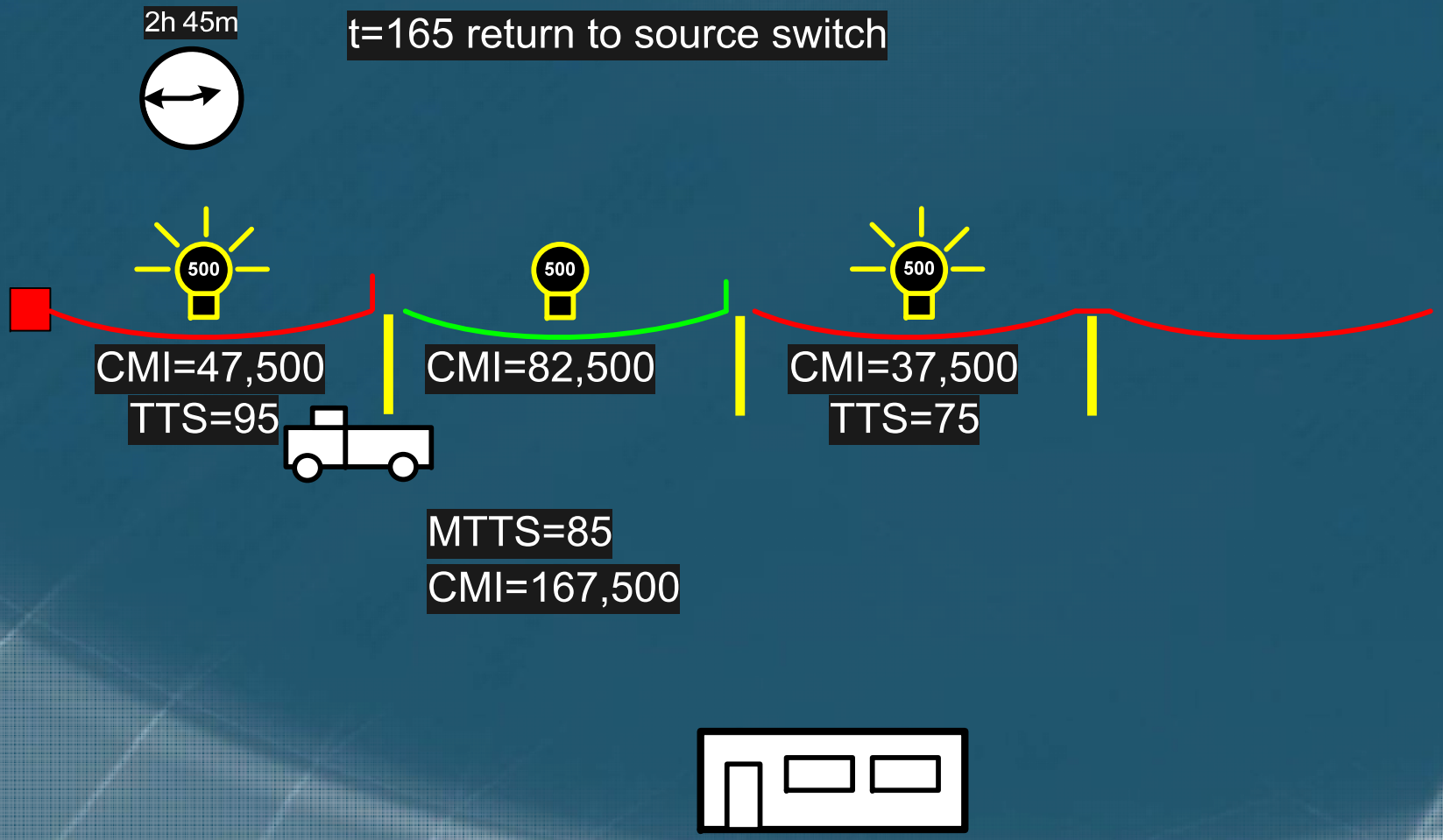
Interruption Timeline with Manual Switching



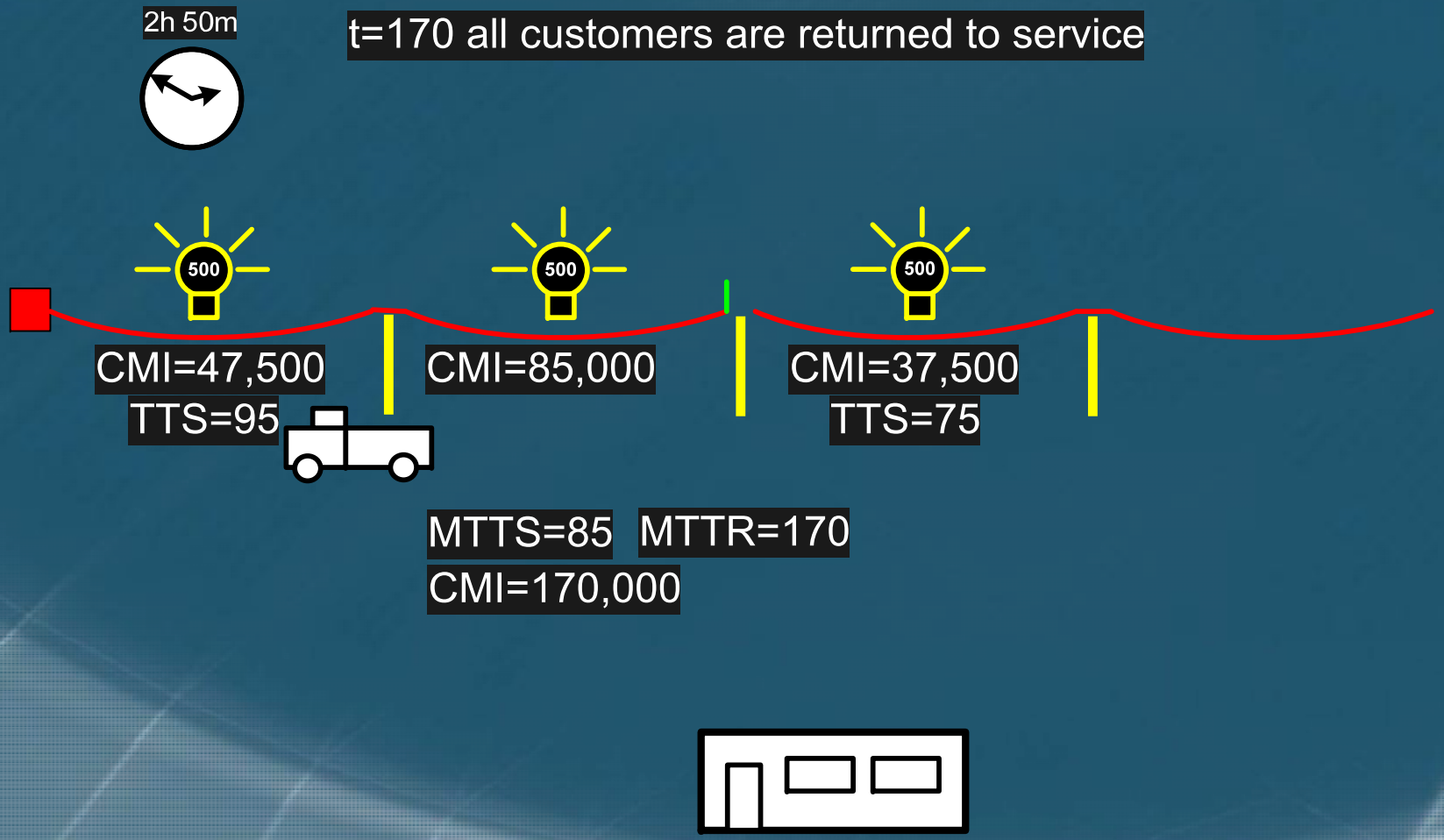
Interruption Timeline with Manual Switching



Interruption Timeline with Manual Switching

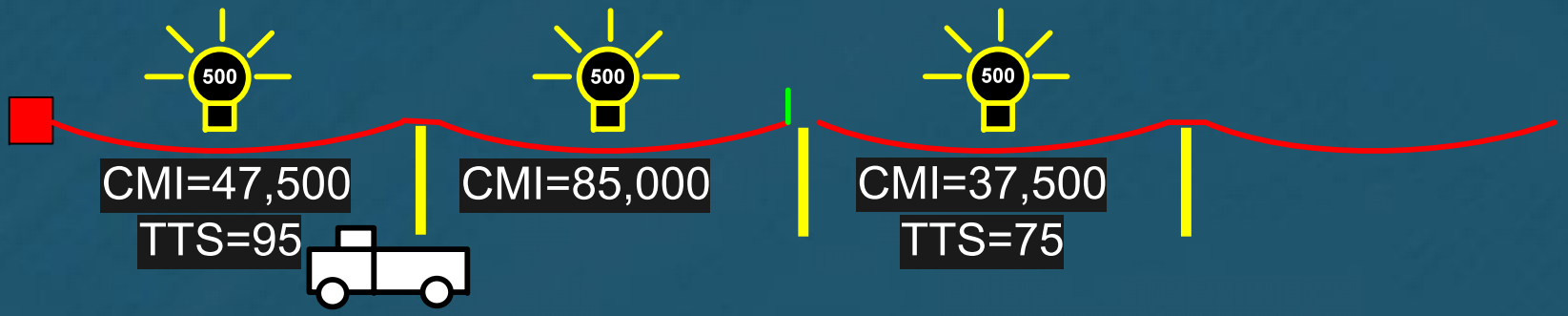


Interruption Timeline with Manual Switching



Interruption Timeline with Manual Switching

t=170 all customers are returned to service

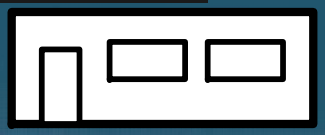


MTTS=85 MTTR=170

CMI=170,000

SAIDI = 170,000/1,500 = 113 minutes

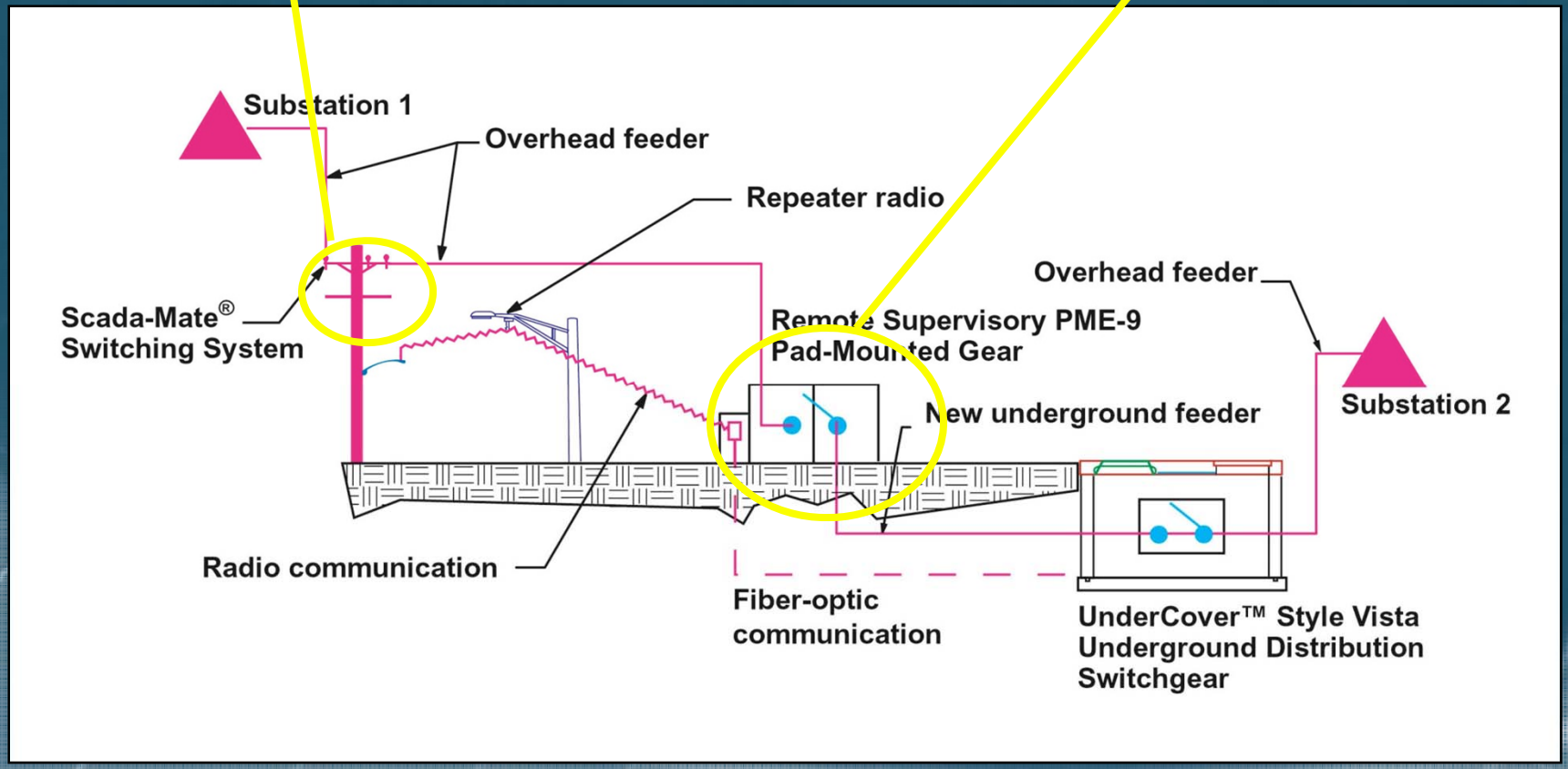
SAIFI = 1,500/1,500 = 1



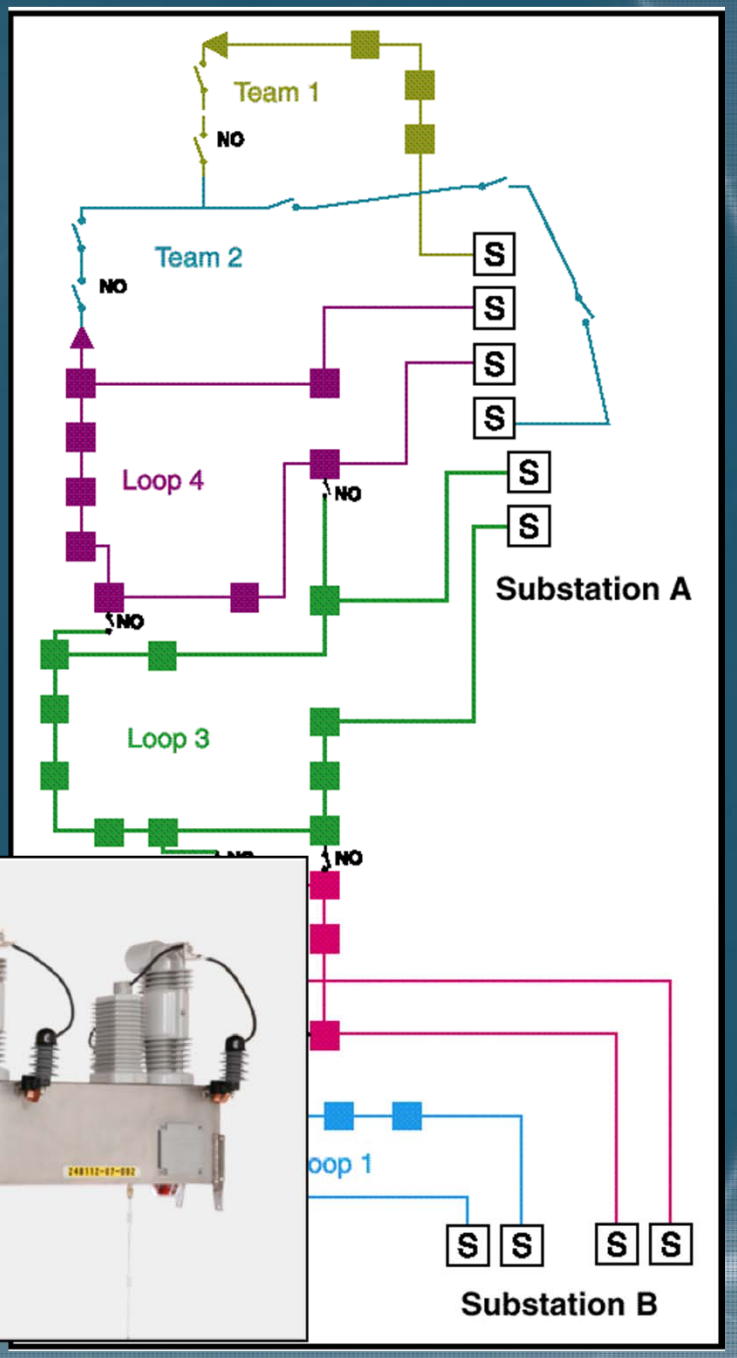
Since the 1950's

- Transfer between two utility sources
- Sensing of Voltage and Current
- Overhead or Underground
- Communications- is the critical link for all

Smart Devices Communicating



Keeping the Lights On



Truly Self Healing

IntelliTEAM Demo

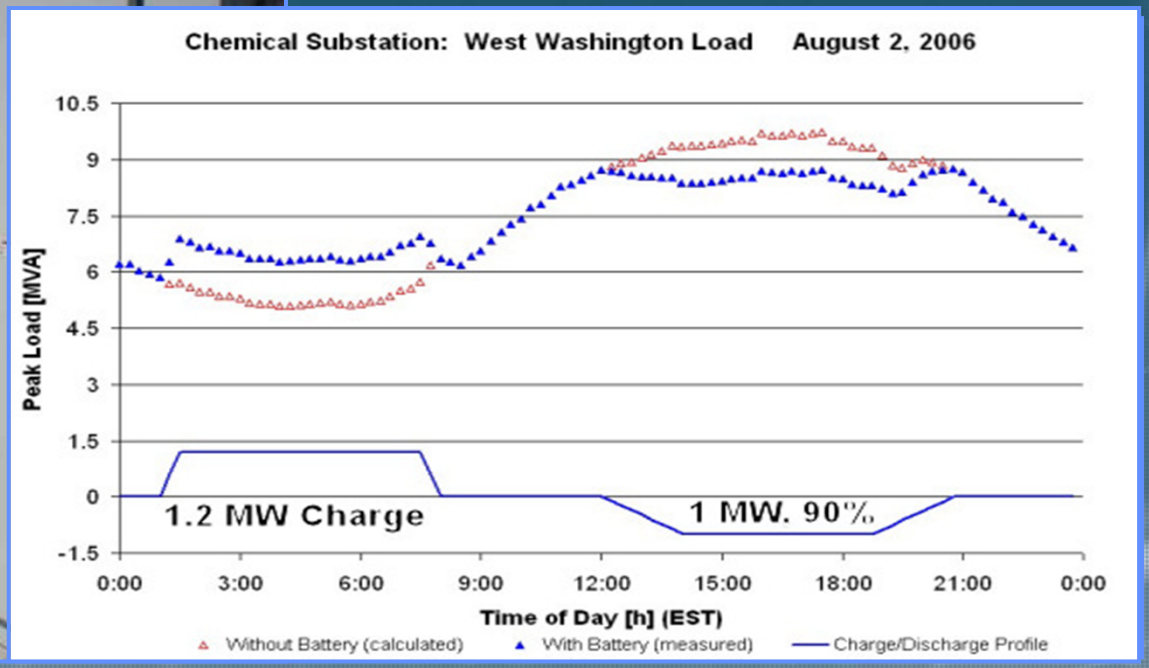
Integrating Renewables

S&C SG Portfolio

- Grid-purposed energy storage (***bulk*** and ***distributed***)

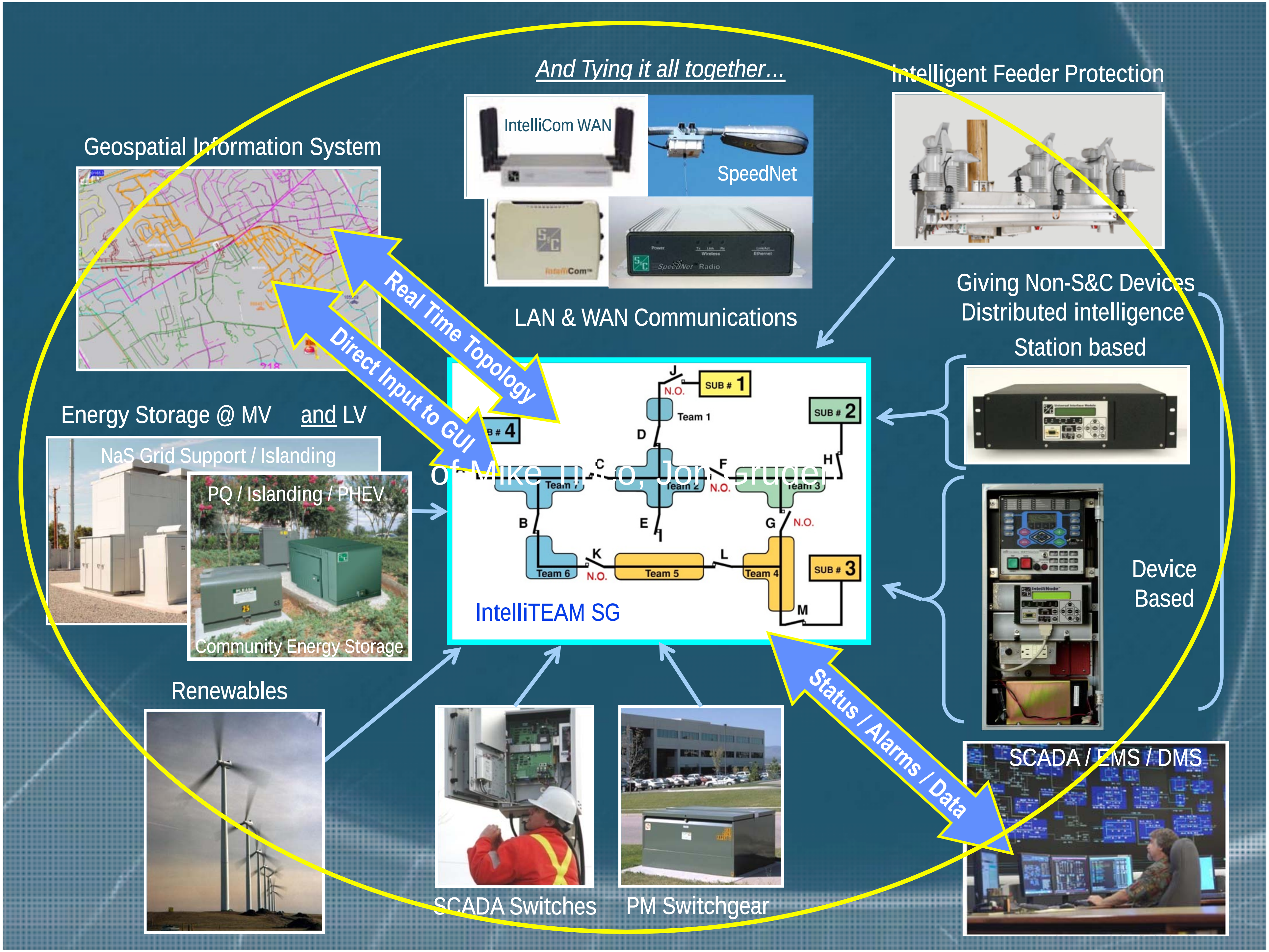
Bulk Energy Storage

- Substation Level
  - Applications from 1 to 4 MVA
  - Applications = Peak shaving / Islanding / Grid Support
  - Match Peak load to Renewable Generation
  - Illustration of Peak Shaving on 1 MVA NaS



Distributed Energy Storage – CES

- Leader in Community Energy Storage
  - Applications = Peak shaving / Islanding / Load Following / Grid Support
  - Aggregate many small units into a “virtual” multi-MVA bulk supply
  - Regulatory issue: who will own it, manage it, pay for it?


And Tying it all together…
Intelligent Feeder Protection
Geospatial Information System
IntelliCom WAN
SpeedNet
IntelliCom
SpeedNet Radio
LAN & WAN Communications
Giving Non-S&C Devices
Distributed intelligence
Station based
Real Time Topology
Direct Input to GUI
Energy Storage @ MV and LV
NaS Grid Support / Islanding
PQ / Islanding / PHEV
Community Energy Storage
SUB # 1
SUB # 2
SUB # 3
SUB # 4
N.O.
Team 1
Team 2
Team 3
Team 4
Team 5
Team 6
Team 7
IntelliTEAM SG
Device
Based
Renewables
Status / Alarms / Data
SCADA / EMS / DMS
SCADA Switches
PM Switchgear

Questions?