

# Commonwealth Edison

## Distribution Automation Teaming Exception Analytics

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# Agenda

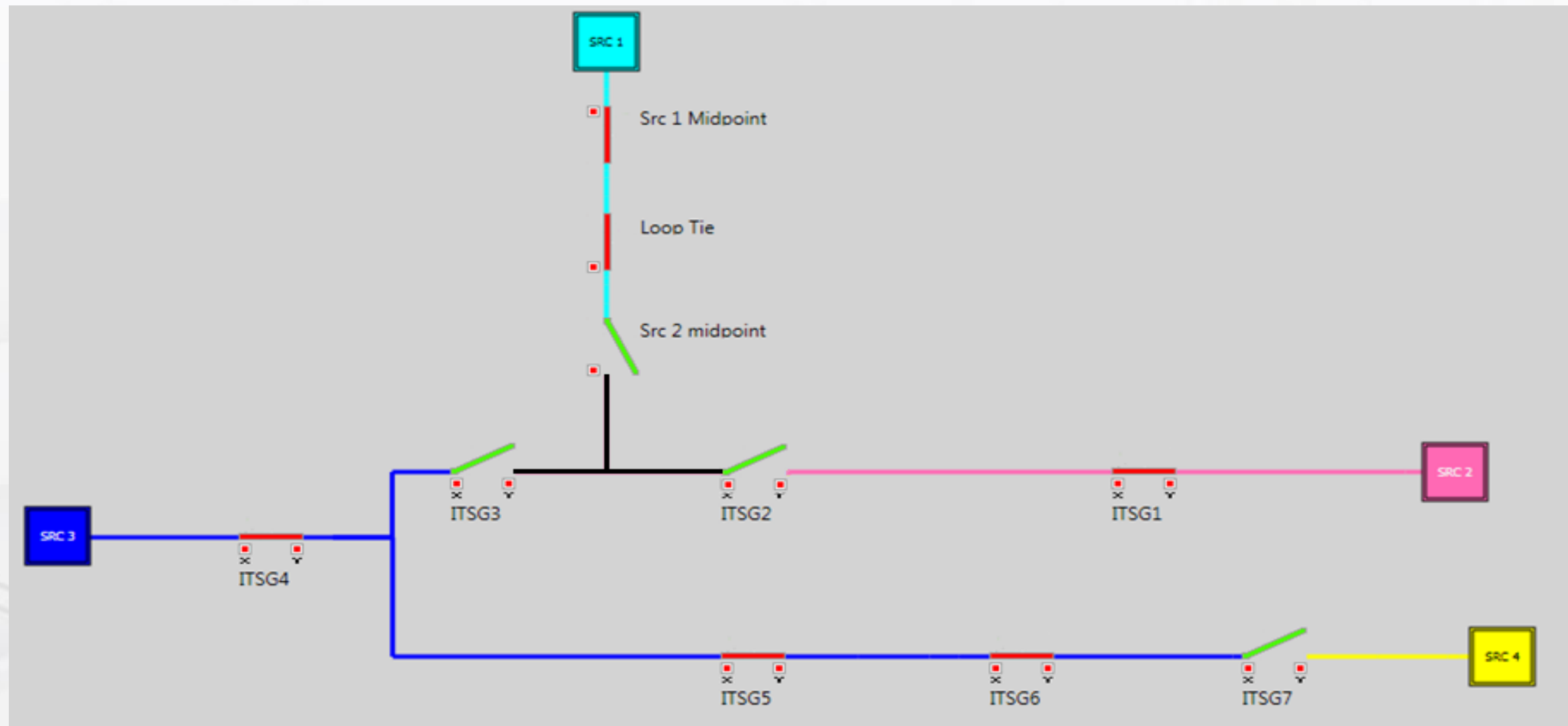
- Introductions
- DA Team Scheme and alarms
- Current State
- Design and Dataflow
- Sequence Auto Learn
- What's Next?

# ComEd System Overview

- Service territory is Northern IL including Chicago
- 11,400 square miles
- Covers 70% of the population
- 3.8 million customers in more than 400 communities
- Over 90,000 miles of Power Lines
  - 5,547 miles of transmission lines
  - 44,400 miles of overhead distribution lines
  - 55,600 miles of underground distribution cable
- 1,300 Substations
- 5,433 distribution circuits
- 1.3 Million Poles
- System Peak of 23,753 MW July 20<sup>th</sup>, 2011



# DA Teams Overview





# Multi Asset Analytics – Exception Based Smart Alarming



## Challenge

How to monitor DA Team status in a one-to-many group of DA assets

Variable DA asset team size

Team Smart Alarming with 5 digital states

Maintain one-to-many relationship's



## Solution

Provide exception Based Smart Alarming in near real time and display teams “not ready” with alarm conditions

Retrieve operational states and perform analytics in near real time from hundreds of DA Teams

Automate Team configuration



## Benefits

Provided visualization of team member status in near real time

Maintain Automate Team configuration

Reduced alarms required for review by ~70%

DA Team Status is available to DA support group in near real-time

# Current State/Challenge

- Static Report produced daily with all alarms
  - Tabular Form
- Point-in-Time DA Team alarm status
- All alarms need to be vetted
  - No Team relation and requires familiarity
- 2 DA Engineers Monitoring team statuses

# Before and After

## Static Report

REGION	SUBNAM	PNTNAM	CSTEXT
REGION 1	1234 LINE	4290 TEMNTR TGT	ALARM
REGION 1	1234 LINE	4331 TEMNTR TGT	ALARM
REGION 1	1234 LINE	4329 TEMNTR TGT	ALARM
REGION 1	1234 LINE	4332 TEMNTR TGT	ALARM
REGION 1	1234 LINE	4340 TEMNTR TGT	ALARM
REGION 1	4567 LINE	3151 TEMNTR TGT	ALARM
REGION 1	4567 LINE	3160 TEMNTR TGT	ALARM
REGION 1	4567 LINE	3163 TEMNTR TGT	ALARM
REGION 1	4567 LINE	3194 TEMNTR TGT	ALARM
REGION 1	4567 LINE	3150 TEMNTR TGT	ALARM
REGION 1	8899 LINE	3360 TEMNTR TGT	ALARM
REGION 1	8899 LINE	3352 TEMNTR TGT	ALARM
REGION 1	8899 LINE	3375 TEMNTR TGT	ALARM
REGION 1	8899 LINE	3317 TEMNTR TGT	ALARM
REGION 1	8899 LINE	3354 TEMNTR TGT	ALARM
REGION 1	8899 LINE	3337 TEMNTR TGT	ALARM
REGION 1	8899 LINE	3970 TEMNTR TGT	ALARM
REGION 1	8899 LINE	3958 TEMNTR TGT	ALARM



## Exception Based – Smart Alarms

Current Teaming Status ✕

Data up to Version: 762

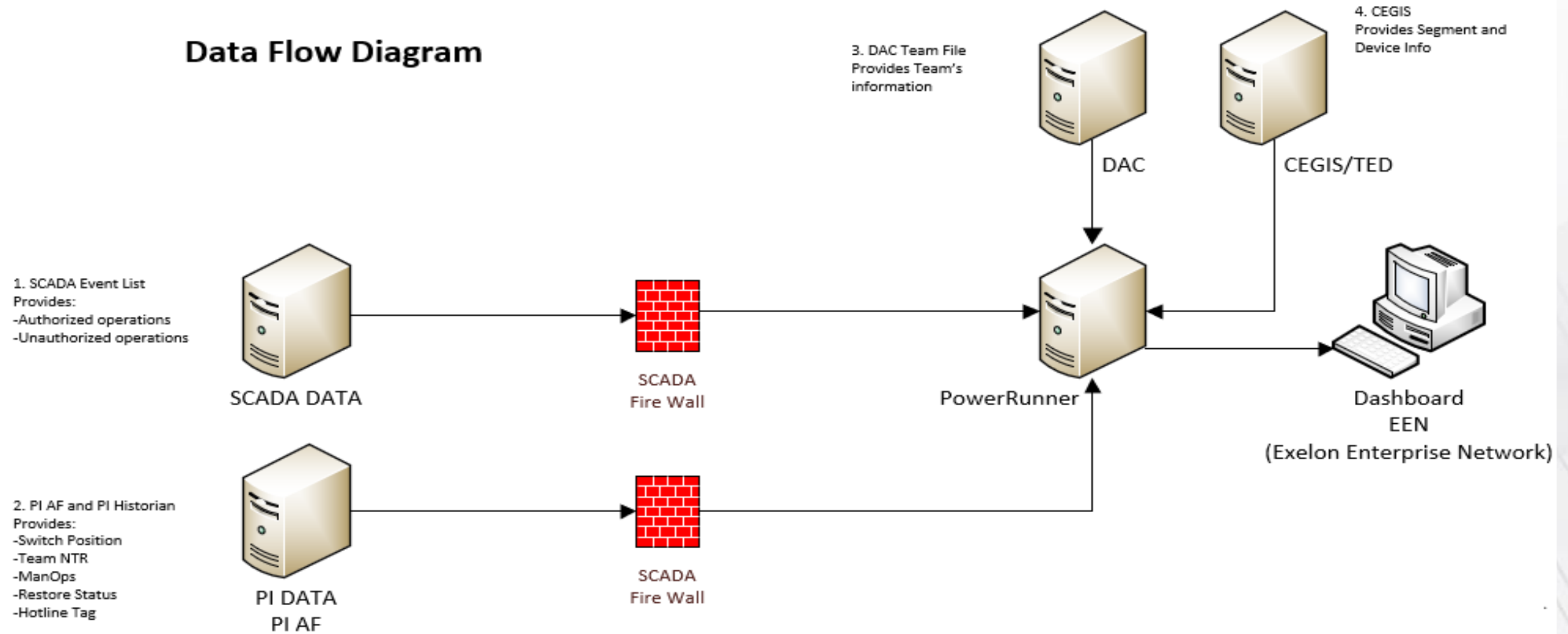
Team	Event Time	Team Status	Review Status
▶ A3422-A3413-A241	11/12/2020 10:50	REVIEW REQUIRED	
▶ A345-A410	11/12/2020 10:50	REVIEW REQUIRED	
▶ B116-B2203	11/12/2020 10:55	REVIEW REQUIRED	
▶ C1722-C174	11/12/2020 10:50	REVIEW REQUIRED	
▶ H322-H285-H915	11/12/2020 10:55	REVIEW REQUIRED	
▶ C201-C497	11/12/2020 12:55	Out of Telemetry	
▶ A315-A316-A282	11/12/2020 10:45	COMPLETE NO ALARM	
▶ A316-E297	11/12/2020 10:50	COMPLETE NO ALARM	
▶ A664-A6617	11/12/2020 10:55	COMPLETE NO ALARM	
▶ A664-A668-A6612	11/12/2020 11:05	COMPLETE NO ALARM	
▶ A666Y-A6612	11/12/2020 10:50	COMPLETE NO ALARM	
▶ A915-A8215	11/12/2020 12:35	COMPLETE NO ALARM	
▶ B110-B312	11/12/2020 10:55	COMPLETE NO ALARM	
▶ B309-B369-B365	11/12/2020 10:50	COMPLETE NO ALARM	
▶ B511-B518	11/12/2020 10:50	COMPLETE NO ALARM	
▶ B539-B531	11/12/2020 10:50	COMPLETE NO ALARM	
▶ B7506-B7505	11/12/2020 10:55	COMPLETE NO ALARM	
▶ C053-C1734	11/12/2020 10:55	COMPLETE NO ALARM	
▶ C091	11/12/2020 10:50	COMPLETE NO ALARM	
▶ C1723-C1713-C1722	11/12/2020 10:55	COMPLETE NO ALARM	
▶ C4615-C4614-C466	11/12/2020 11:55	COMPLETE NO ALARM	
▶ C4713-C532	11/12/2020 10:55	COMPLETE NO ALARM	
▶ C482-C481	11/12/2020 10:55	COMPLETE NO ALARM	

60 Team

Map Satellite

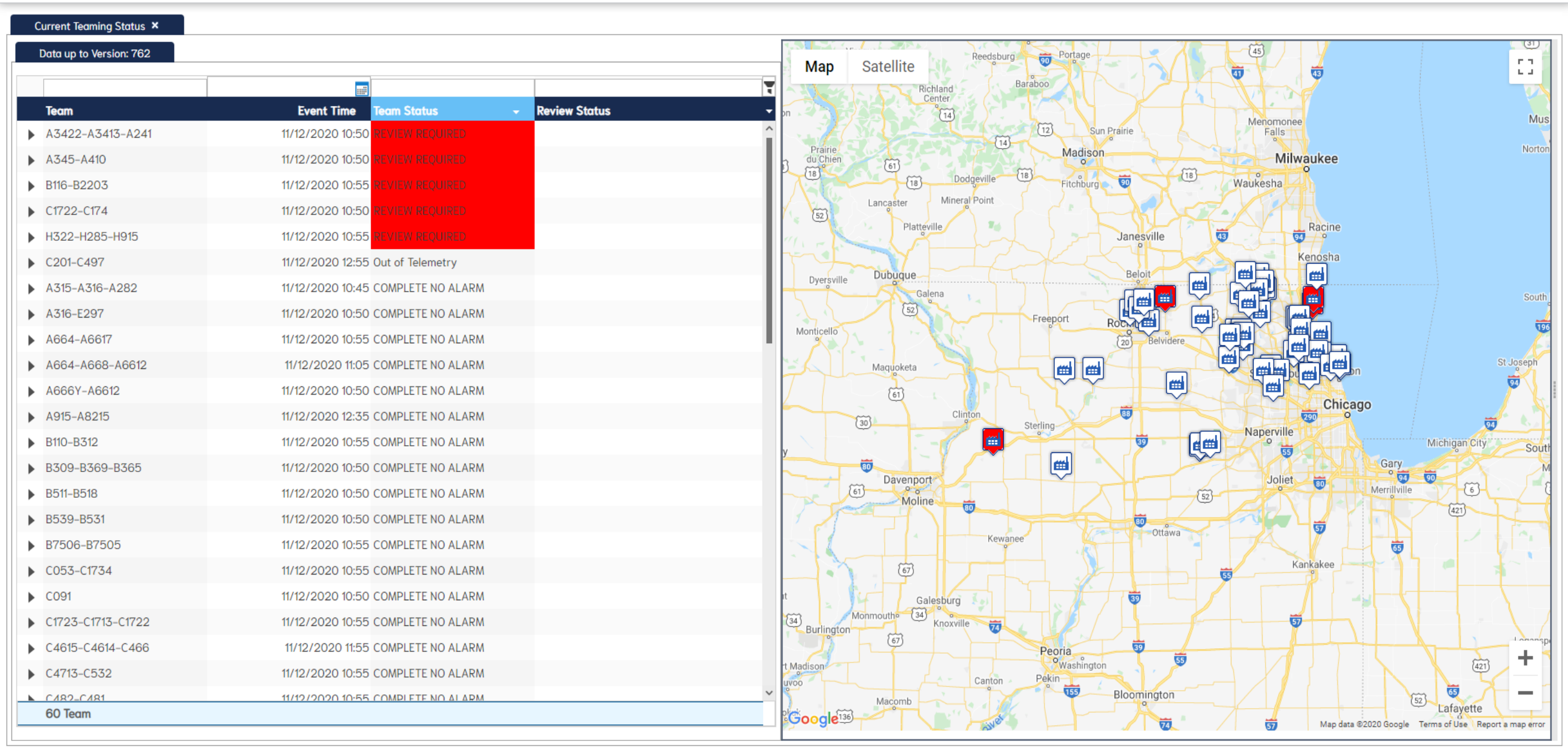
# Solution Data Flow

**Data Flow Diagram**





# Dashboard



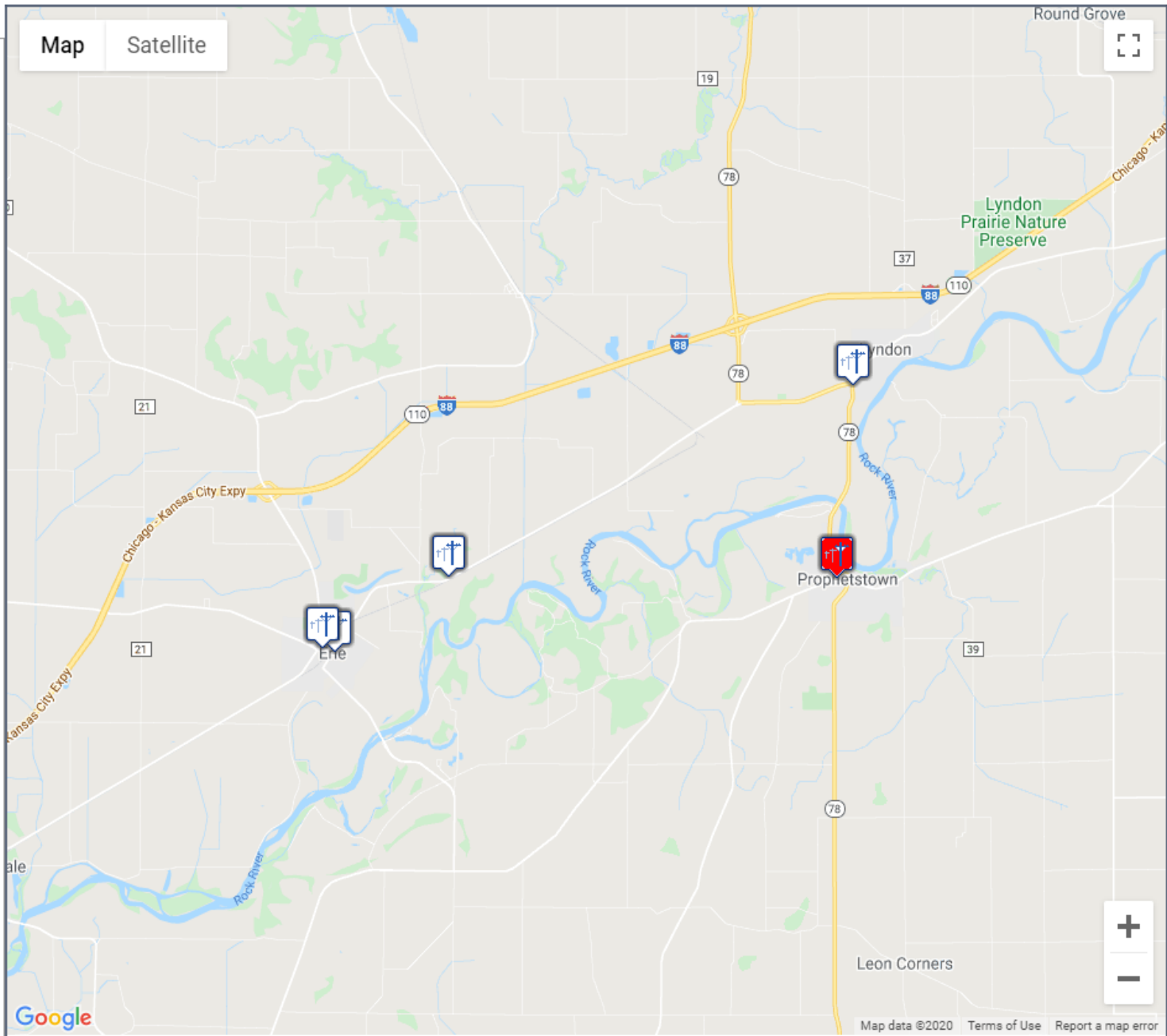
# PowerRunner - Dashboard



Current Teaming Status ✕

Data up to Version: 762

Team	Event Time	Team Status	Review Status			
A3422-A3413-A241	11/12/2020 10:50	REVIEW REQUIRED				
A345-A410	11/12/2020 10:50	REVIEW REQUIRED				
B116-B2203	11/12/2020 10:55	REVIEW REQUIRED				
C1722-C174	11/12/2020 10:50	REVIEW REQUIRED				
H322-H285-H915	11/12/2020 10:55	REVIEW REQUIRED				
Device Team Status			Complete Review			
Device	Feeder	Bus	Event Type	Event	Event Time	Device Status
497461	H915	EMC	TEMNTRTGT	TEMNTRTGT ALARM-METER	11/12/2020 10:57	REVIEW REQUIRED
497461	H915	EMC	VS	VS OPEN-METER	11/12/2020 10:57	REVIEW REQUIRED
497461	H915	EMC	MANOPRTGT	MANOPRTGT NORMAL-METER	11/12/2020 10:57	REVIEW REQUIRED
497461	H915	EMC	ITRESTSTAT	ITRESTSTAT ON-METER	11/12/2020 10:57	REVIEW REQUIRED
497461	H915	EMC	NOTTACSTAT	NOTTACSTAT OFF-METER	11/12/2020 10:57	REVIEW REQUIRED
C201-C497				11/12/2020 12:55 Out of Telemetry		
A315-A316-A282				11/12/2020 10:45 COMPLETE NO ALARM		
A316-E297				11/12/2020 10:50 COMPLETE NO ALARM		
A664-A6617				11/12/2020 10:55 COMPLETE NO ALARM		
A664-A668-A6612				11/12/2020 11:05 COMPLETE NO ALARM		
A666Y-A6612				11/12/2020 10:50 COMPLETE NO ALARM		
A915-A8215				11/12/2020 12:35 COMPLETE NO ALARM		
B110-B312				11/12/2020 10:55 COMPLETE NO ALARM		
B309-B369-B365				11/12/2020 10:50 COMPLETE NO ALARM		
60 Team						



# PowerRunner - Status Sequence Auto-Learning



Status Pt	Value 1	Value 2	Value 3
T= Team	NORMAL	ALARM	F*
V= SW Pos	OPEN	CLOSED	F*
M= ManOps	NORMAL	ALARM	F*
I= RESTORE	ON	OFF	F*
H= HOTLINE	ON	OFF	F*

Attribute ValuesAttribute Groups

Attribute Groups

Group Name	Unmatched Values Set Name
<div><div></div><div></div><div>REVIEW</div></div>	REVIEW REQUIRED

Group Sets

Available Attribute Values

Value

NONE

T=A-M

V=OP-M M=N-M I=ON-M H=OFF-M

T=A V=OP M=N I=ON H=OFF

T=A-M,F\*A-M V=F\*OP-M M=F\*N-M I=F\*ON-M H=F\*OFF-M

T=A-M V=OP-M M=N-M I=ON-M H=OFF-M

T=A-M,F\*A-M V=CL-M,F\*CL-M M=F\*N-M,N-M I=F\*ON-M,ON-M H=F\*OFF-M,OFF-M

- 5 Digital Points
- Anchor on Team Status Point
- Bookend 5 Minute
- > 360 different combinations and growing

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An Exelon Company



Virtual Industry Summits



# Next Step and Future Use Cases

- Color code Yellow for known Switching states
  - Wish – Bring in Auth and Unauth status from SCADA Event table
- Additional Team Status reviews
- Other use cases
  - DA Operations review
    - Connectivity Model
  - Battery Monitoring
  - Automate PI-AF structure

THANKYOU

謝謝

DZIĘKUJĘ CI

NGIYABONGA

TEŞEKKÜR EDERİM

DANKIE

TERIMA KASIH

GRACIES

WHAKAWHETAI KOE

DANKON

TANK

TAPADH LEAT

SALAMAT

SPASIBO

GRAZIE

MATUR NUWUN

ХВАЛА ВАМ

MULTUMESC

PAKMET CI3GE

고맙습니다

GRAZIE

شكرا

FAAFETAI

ESKERRIK ASKO

HVALA

GO RAIBH MAITH AGAT

БЛАГОДАРЯ

GRACIAS

ТИ БЛАГОДАРАМ

MAHADSANID

TEŞEKKÜR EDERİM

OBRIGADO

TAK DANKE

DANKJE

ΕΥΧΑΡΙΣΤΩ

GRATIAS TIBI

MAHALO IĀ 'OE

TAKK SKAL DU HA

RAHMAT

MERCI

GRAZZI

PAKKA PÉR

HATUR NUHUN

PAXMAT CAҒA

CẢM ƠN BẠN

WAZVIITA

FALEMINDERIT

ありがとうございました

SIPAS JI WERE

TERIMA KASIH

UA TSAUG RAU KOJ

ТИ БЛАГОДАРАМ

СИПОС

DI OU MÈSI

ĎAKUJEM

KÖSZÖNÖM

MAHALO IĀ 'OE

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DI OU MÈSI

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