Strategies for Complying with the NERC PRC-027 Standard

MIPSYCON 2019
Saint Paul, MN

November 12, 2019

Outline

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- NERC PRC-027 requirements
- PRC-027 implications for generation or transmission owner
- Strategies for compliance
- Typical process for verifying compliance with PRC-027
- Conclusions

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NERC PRC-027 Overview

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- Standard was approved by FERC on June 7, 2018
- Effective (enforceable) date of the standard is October 1, 2020
- The standard is concerned with the proper coordination of protective relays so that they operate in the intended sequence to isolate faults
- Ensure that the absolute minimum portion of the bulk electric system (BES) is rendered out-of-service by the operation of the protective relays
  - This is also one of the design objectives of any protection system
- BES – facilities rated at 100 kV or above

PRC-027 Requirements

- Requirement R1: Establish a process for developing new and revised protection system settings for BES elements such that the protection systems operate in the intended sequence during faults.

- Requirement R2: Applies to BES protection system functions wherein either the fault current is used to develop protection settings or coordinated operation with other protection systems is required. For such protection systems, the standard specifies three options for compliance:
  - (1) Perform a protection system coordination study in a time interval not to exceed 6 years (or)
  - (2) Compare present fault current values to an established baseline and perform a protection system coordination study when the comparison identifies a deviation greater than 15% (3PH or SLG), all in a time interval not to exceed 6 years
  - (3) A combination of Options (1) and (2)

- Requirement R3: Develop new and revised protection system settings by following the process developed in requirement R1

PRC-027 – Affected Protective Relay Elements

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- Relay elements whose settings are developed using fault current levels
- Protection functions that require coordination with other protection systems
- ANSI/IEEE device numbers:
  - 21 – phase or ground distance
  - 50 – instantaneous overcurrent (phase or ground)
  - 51 – inverse-time overcurrent (phase or ground)
  - 67 – direction overcurrent, either phase or ground, instantaneous or inverse-time
- Line current differential schemes are excluded
- Impedance and overcurrent based communication-aided schemes are excluded
  - Impedance and overcurrent elements must not be used by themselves to directly trip circuit breakers

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Implications for Generation or Transmission Owner

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- Standard is enforceable on October 1, 2020

- Establish a baseline short-circuit case by October 1, 2020
  - Verify generator impedances
  - Verify GSU transformer impedances
  - Verify tie-line impedance if owned by GO
  - Similar approach for dispersed power producing resources (solar or wind)
  - Verify all transmission line impedances including mutual coupling
  - Verify all power transformer impedances
  - Validate interconnections with neighboring utilities

- Model the protection devices and schemes in the short-circuit model by October 1, 2020

- Develop a process for performing a protection coordination study (R1) by October 1, 2020
  - This process will form the basis for coordination studies in R2, whether using Option 1, Option 2 or Option 3

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Uniform Protection Philosophy

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- In the era of consolidation, utilities are often made up of several operating entities
- Each entity might follow its own protection philosophy and schemes
- Work on developing a standardized philosophy and settings process across the entire company
- Document this philosophy with clear step-by-step procedures and examples

Data Integrity – Single Source of Truth

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- Consolidate sources of data for the primary equipment – there must be exactly one place to go to fetch equipment information

- Utilize an asset management database if one does not exist already

Short-Circuit Model

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- All companies possess an accurate short-circuit model that is maintained regularly
- Document the maintenance process if not already done so
- Ensure that planning scenarios and ongoing capital projects can all be part of a single model
- Document the process for exchanging data with neighboring utilities
- Use standards-based formats such as the Common Information Model (CIM) to represent the primary network
- This will allow for easier exchange of data with other entities

Protective Relay Data

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- Short-circuit model often lacks protective relay information, which is usually added on an ad-hoc, as-needed basis only
- Develop a plan to gather all the necessary relay settings and enter them in the short-circuit model
- Utilize automated techniques to transfer relay settings from vendor-specific data files to the model
- Deploy a relay asset database to serve as the database of record for protective relay settings
- Develop automation to move protection data back and forth between the asset database and the model that needs this data

Simulation Tools

- Most utilities use software programs to perform short-circuit and protection studies
- Work with the vendor of these programs to develop automated tools for protection studies
- Develop comprehensive protection security assessment procedures to test the performance of the protection system
- Develop visualization and summarization tools to handle the voluminous amounts of data produced
- **The role of automation in performing the PRC-027 protection studies accurately and efficiently cannot be stressed enough**

Process Automation & Data Management

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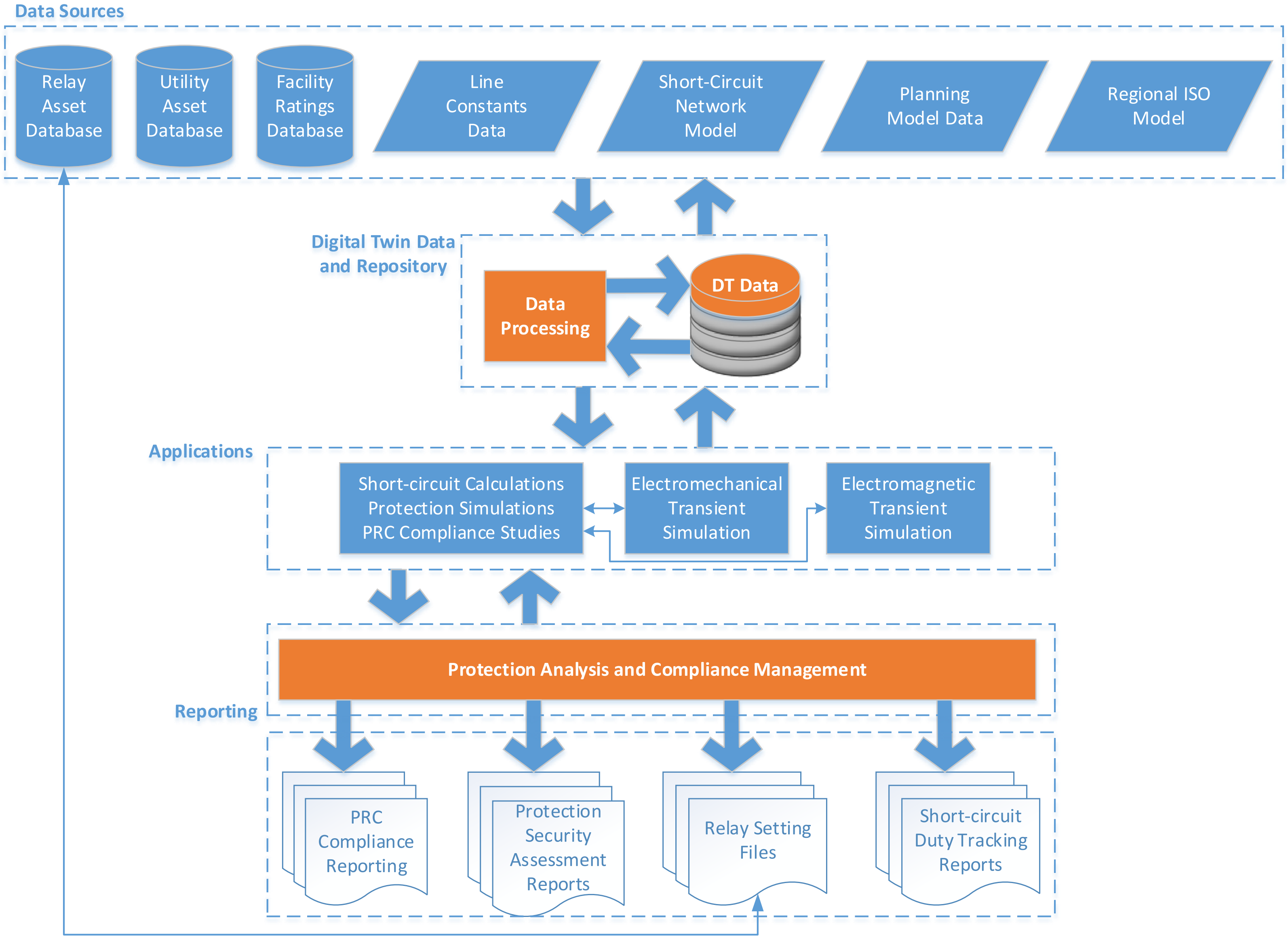

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PRC-027 Compliance Process

- Develop or validate short-circuit model of the system
- Model the necessary protection
- Perform detailed protection coordination studies and protection assessment
- Document the results of the studies and mitigate the protection issues found
- Repeat the studies to show mitigation

Protection Security Assessment

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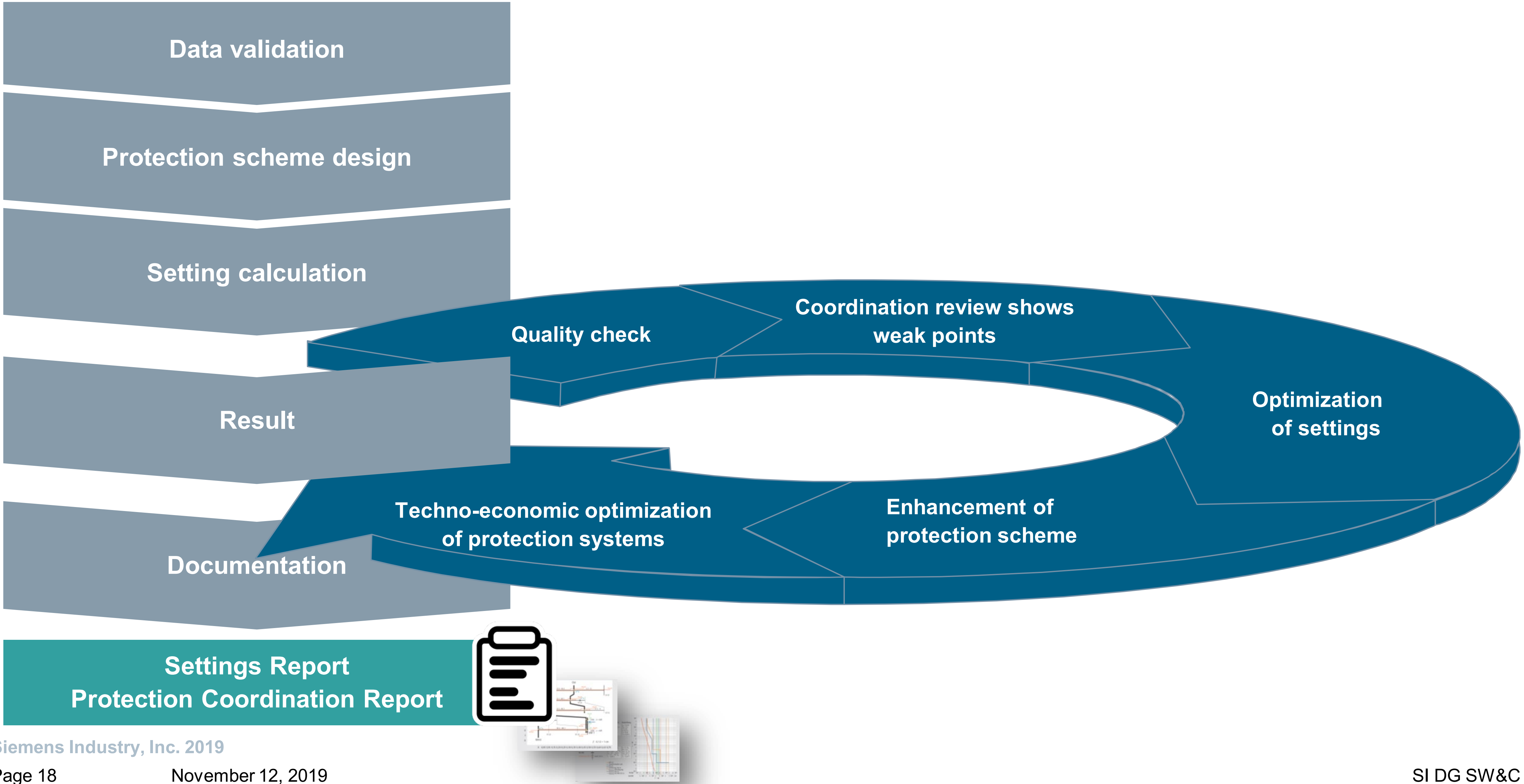

Automated Protection Coordination Studies

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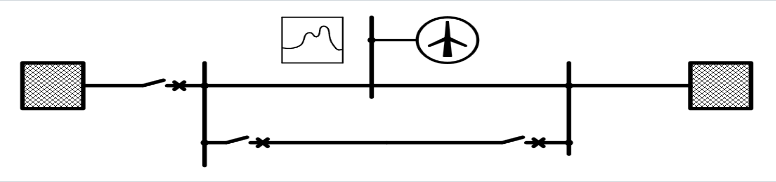
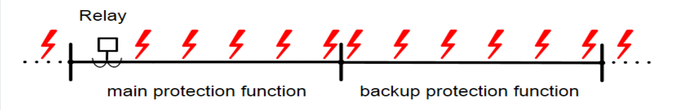
Automated Protection Coordination Studies Consider ALL combinations of operation and fault conditions			
Generation Levels	Variants 2		Are the protection settings suitable for all switching states?
Primary System Contingencies	4		Intermediate infeed and parallel lines cause under-/over-reach of the protection relays. What are the consequences?
Fault locations	3-10		Do the protection settings and protection schemes meet all requirements?
Fault types	3	3-phase, 2-phase, 1-phase faults, conductor interruptions, overloads	Will all faults be detected and cleared?
Fault resistance	1-3	Arc and fault impedances	Is backup protection provided under all circumstances?
Protection System Contingencies	3	Circuit breaker failure Loss of CT or VT (single-point failure)	Are there any risks? How can it be checked?

1000's of combinations per line are possible – data processing and management challenge

Automated Protection Coordination Studies

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Benefits

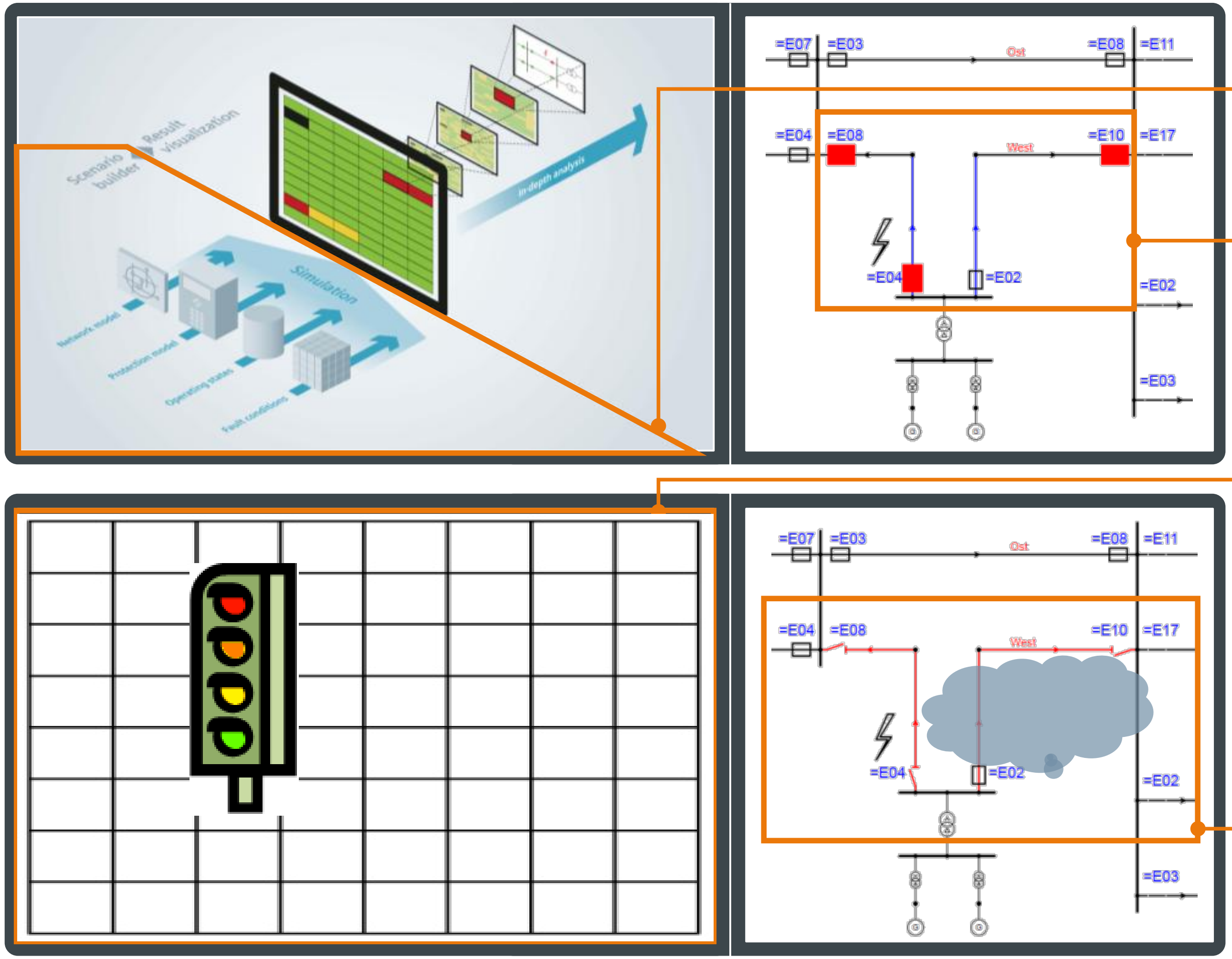
- Optimized system-wide protection coordination
- Increased system security
- Higher system utilization
- Adherence to technical, safety and regulatory standards
- The high degree of automation enables the efficient handling of complex tasks, and helps saving time and resources

Not Cleared
Protection system failed to clear a fault

Over function
More trips than expected can isolate a fault

Under function
Less trips than expected can isolate a fault

Selective
Expected trips can correctly isolate a fault



System-Wide Result Matrix

- Scenario builder
- Automated system-wide protection simulation
- In-depth fault clearing sequence evaluation
- Concise result visualization
- Weak spot identi-fication by traffic light colors
- Selectivity and impact analysis

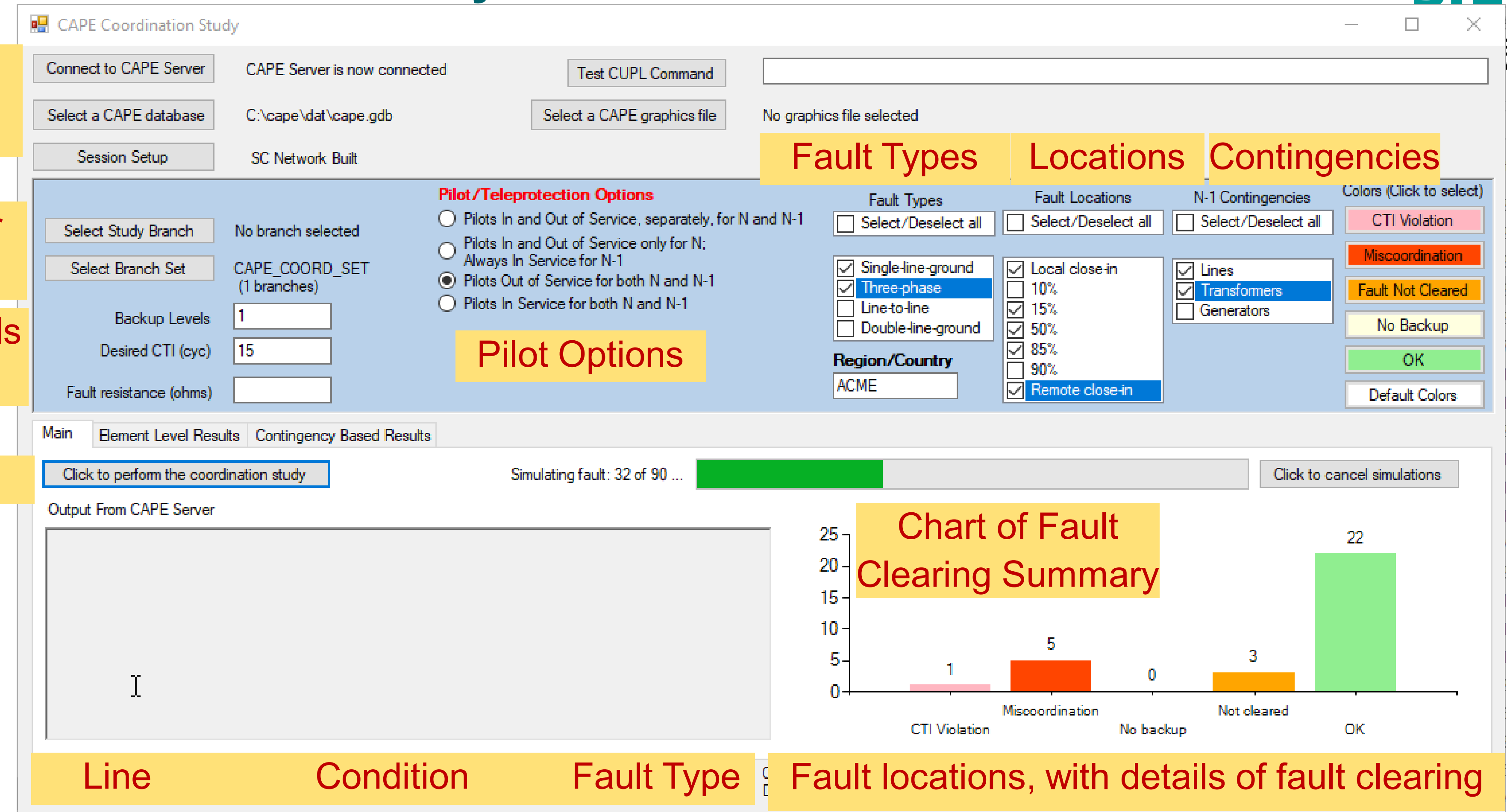
Protection Coordination Study

Connect to Short-Circuit Model

Study Branch or Branch Set

Backup Levels CTI

Perform Study



	Faulted Line	System Condition / Outage	Fault Type	ClsIn	10%	15%	50%	85%	90%	RemClsIn
▸	177 CENTER 230 to 183 W...	Primary System Normal/Pilot Out	SINGLE_LINE_G...	1, 7.50	N/A	2, 5.00	3, 4.00	4, 3.50	N/A	5, 5.50
	177 CENTER 230 to 183 W...	Primary System Normal/Pilot Out	THREE_PHASE	6, INFINI...	N/A	7, 3.00	8, 3.00	9, 3.00	N/A	10, 28.00
	177 CENTER 230 to 183 W...	XFMR : (CENTER) 177-1317-1 (Bank A)/Pilot ...	SINGLE_LINE_G...	11, 7.50	N/A	12, 5.00	13, 4.00	14, 5.50	N/A	15, 5.50
	177 CENTER 230 to 183 W...	XFMR : (CENTER) 177-1317-1 (Bank A)/Pilot ...	THREE_PHASE	16, INFIN...	N/A	17, 3.00	18, 3.00	19, 3.00	N/A	20, 28.00
	177 CENTER 230 to 183 W...	Line : 177 (CENTER 230) -154 (GANSVLE2C23...	SINGLE_LINE_G...	21, 7.50	N/A	22, 5.00	23, 4.00	24, 3.50	N/A	25, 5.50
	177 CENTER 230 to 183 W...	Line : 177 (CENTER 230) -154 (GANSVLE2C23...	THREE_PHASE	26, INFIN...	N/A	27, 3.00	28, 3.00	29, 3.00	N/A	30, 28.00
	177 CENTER 230 to 183 W...	Line : 177 (CENTER 230) -175 (BIO 230) -1( )/Pil...	SINGLE_LINE_G...	31, 7.50	N/A				N/A	
*										

Main Results – Tabulation of All Cases Studied

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Country/Regio	Faulted Line	System Condition / Outage	Fault Type	ClsIn	10%	15%	50%	85%	90%	RClsI
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Primary System Normal/Pilot Out	SINGLE_LINE_GROUND	1; 7.50	N/A	2; 5.00	3; 4.00	4; 3.50	N/A	5; 5.50
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Primary System Normal/Pilot Out	THREE_PHASE	6; INFINITE	N/A	7; 3.00	8; 3.00	9; 3.00	N/A	10; 28.00
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	XFMR : (CENTER) 177-1317-1 (Bank A)/Pilot Out	SINGLE_LINE_GROUND	11; 7.50	N/A	12; 5.00	13; 4.00	14; 5.50	N/A	15; 5.50
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	XFMR : (CENTER) 177-1317-1 (Bank A)/Pilot Out	THREE_PHASE	16; INFINITE	N/A	17; 3.00	18; 3.00	19; 3.00	N/A	20; 28.00
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 177 (CENTER 230) -154 (GANSVLE2C230) -1( )/Pilot Out	SINGLE_LINE_GROUND	21; 7.50	N/A	22; 5.00	23; 4.00	24; 3.50	N/A	25; 5.50
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 177 (CENTER 230) -154 (GANSVLE2C230) -1( )/Pilot Out	THREE_PHASE	26; INFINITE	N/A	27; 3.00	28; 3.00	29; 3.00	N/A	30; 28.00
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 177 (CENTER 230) -175 (BIO 230) -1( )/Pilot Out	SINGLE_LINE_GROUND	31; 7.50	N/A	32; 7.50	33; 4.00	34; 5.50	N/A	35; 5.50
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 177 (CENTER 230) -175 (BIO 230) -1( )/Pilot Out	THREE_PHASE	36; INFINITE	N/A	37; 3.00	38; 3.00	39; 3.00	N/A	40; 28.00
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	XFMR : (WINDER) 183-1316-1 (Bank C)/Pilot Out	SINGLE_LINE_GROUND	41; 7.50	N/A	42; 7.50	43; 4.00	44; 3.50	N/A	45; 5.50
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	XFMR : (WINDER) 183-1316-1 (Bank C)/Pilot Out	THREE_PHASE	46; 234.00	N/A	47; 3.00	48; 3.00	49; 3.00	N/A	50; 28.00
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 183 (WINDER 230) -105 (LAWRVILLE230) -1( )/Pilot Out	SINGLE_LINE_GROUND	51; 7.50	N/A	52; 7.50	53; 4.00	54; 4.00	N/A	55; 5.50
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 183 (WINDER 230) -105 (LAWRVILLE230) -1( )/Pilot Out	THREE_PHASE	56; 313.50	N/A	57; 3.00	58; 3.00	59; 3.00	N/A	60; 28.00
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 183 (WINDER 230) -141 (CONYERS 230) -1( )/Pilot Out	SINGLE_LINE_GROUND	61; 7.50	N/A	62; 7.50	63; 4.00	64; 4.00	N/A	65; 5.50
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 183 (WINDER 230) -141 (CONYERS 230) -1( )/Pilot Out	THREE_PHASE	66; 313.50	N/A	67; 3.00	68; 3.00	69; 3.00	N/A	70; 28.00
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 183 (WINDER 230) -151 (GANSVLE2D230) -1( )/Pilot Out	SINGLE_LINE_GROUND	71; 7.50	N/A	72; 7.50	73; 4.00	74; 3.50	N/A	75; 3.50
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 183 (WINDER 230) -151 (GANSVLE2D230) -1( )/Pilot Out	THREE_PHASE	76; 298.00	N/A	77; 3.00	78; 3.00	79; 3.00	N/A	80; 28.00
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 183 (WINDER 230) -449 (E.SOC.CIR230) -1( )/Pilot Out	SINGLE_LINE_GROUND	81; 7.50	N/A	82; 7.50	83; 4.00	84; 4.00	N/A	85; 5.50
ATHENS DIVISION	177 CENTER 230 to 183 WINDER 230 ckt: 1 on " "	Line : 183 (WINDER 230) -449 (E.SOC.CIR230) -1( )/Pilot Out	THREE_PHASE	86; 313.50	N/A	87; 3.00	88; 3.00	89; 3.00	N/A	90; 28.00

Condition	Color
CTI Violation	
Miscoordination	
No Backup Available	
Fault Not Cleared	
OK	

Overall Summary

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Fault Simulation Summary Table	Count
Total number of simulations	90
Selective fault clearing	67
Miscoordinations	17
CTI violations	2
No fault clearing	4
No available backup	0

Element-Based Summary

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Element Type	Miscoordinations	CTI <= 15 cyc. (N)	CTI > 15 cyc. (N)	CTI <= 15 cyc. (N-1)	CTI > 15 cyc. (N-1)
Ground IOC (50N)	12	0	0	2	0
Ground TOC (51N)	0	1	0	8	0
Zone 3 Ph. Dist. (21P3)	39	0	0	0	0

Substation	LZOP	Element	Type	Miscoordinations	CTI <= 15 cyc. (N)	CTI > 15 cyc. (N	CTI <= 15 cyc. (N-1	CTI > 15 cyc. (N-1
COMMERCE (ATHENS DIVISION)	Center 115 Line	95 IOC ' ' ' ' (GND_IOC) (CO-9)	Ground Instantaneous Overcurrent	12	0	0	1	0
COMMERCE (ATHENS DIVISION)	Center 115 Line	95 TOC ' ' ' ' (GND_TOC) (CO-9)	Ground Inverse-Time Overcurrent	0	1	0	8	0
LAWRENCEVILLE (ATHENS DIVISION)	Winder 230 Line	457 TIMER ' ' '2' (ZDT3) (SAM14B)	Zone 3 Phase Distance	4	0	0	0	0
EAST SOCIAL CIRCLE (ATHENS DIVISION)	Winder 230 Line	444 TIMER ' ' '2' (ZDT3) (SAM14B)	Zone 3 Phase Distance	4	0	0	0	0
CONYERS (ATHENS DIVISION)	Winder 230 Line	441 TIMER ' ' '2' (ZDT3) (SAM14B)	Zone 3 Phase Distance	4	0	0	0	0
GAINESVILLE NO.2 (ATHENS DIVISION)	Winder 230 Line	453 TIMER ' ' '2' (ZDT3) (SAM14B)	Zone 3 Phase Distance	4	0	0	0	0
BUFORD DAM (ATHENS DIVISION)	Gainesville #2 115 Line	429 TIMER ' ' '2' (ZDT3) (RPM11A)	Zone 3 Phase Distance	4	0	0	0	0
LAWRENCEVILLE (ATHENS DIVISION)	Winder 115 Line	458 TIMER ' ' '2' (ZDT3) (SAM14B)	Zone 3 Phase Distance	4	0	0	0	0
ATHENS (ATHENS DIVISION)	Winder 115 Line	419 TIMER ' ' '2' (ZDT3) (SAM14B)	Zone 3 Phase Distance	4	0	0	0	0
MONROE (ATHENS DIVISION)	Winder 115 Line	459 TIMER ' ' '2' (ZDT3) (SAM14B)	Zone 3 Phase Distance	4	0	0	0	0
CENTER (ATHENS DIVISION)	Commerce 115 Line	434 TIMER ' ' '2' (ZDT3) (SAM14B)	Zone 3 Phase Distance	3	0	0	0	0
COMMERCE (ATHENS DIVISION)	Winder 115 Line	438 TIMER ' ' '2' (ZDT3) (SAM14B)	Zone 3 Phase Distance	4	0	0	0	0
ATHENS (ATHENS DIVISION)	Winder 115 Line	3 IOC ' ' ' ' (DIR_GND_IOC) (IRQ-9)	Ground Instantaneous Overcurrent	0	0	0	1	0

Hyperlink to detailed information

Element Details

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Condition	Color
Miscoordination	
CTI <= 8 cyc. (N)	
CTI > 8 cyc. (N)	
CTI <= 8 cyc. (N-1)	
CTI > 8 cyc. (N-1)	

Element:	332 TOC 'IN>_TEF' ' ' (51G1_B)	Ground Inverse-Time Overcurrent
Substation:	PAV B620_3034	
LZOP:	AGC B624_3301_Cir.1_230 kV	

Faulted Line	System Condition / Outage	Fault Type	ClsIn	10%	15%	50%	85%	90%	RClsIn
28181 15SE-230 to 3211 NNC B639 on " "	Primary System Normal/Pilot Out	SINGLE_LINE_GROUND	OK	OK	OK	OK	313; 1; 11.60	314; 1; 10.30	315; 1; 7.90
28181 15SE-230 to 3211 NNC B639 on " "	XFMR : 28181-24181-1 (INTER_3 XFMR_991)	SINGLE_LINE_GROUND	323; 1; 5.70	324; 3; 38.50	OK	OK	327; 1; 13.70	328; 1; 11.90	329; 1; 8.80
28181 15SE-230 to 3211 NNC B639 on " "	XFMR : 28181-24181-2 (INTER_4 XFMR_992)	SINGLE_LINE_GROUND	337; 1; 5.80	338; 3; 38.50	OK	OK	341; 1; 13.70	342; 1; 11.90	343; 1; 8.80
28181 15SE-230 to 3211 NNC B639 on " "	Line : 28181-28371-1( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	355; 1; 11.80	356; 1; 10.50	357; 1; 8.10
28181 15SE-230 to 3211 NNC B639 on " "	Line : 28181-28371-2( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	369; 1; 11.80	370; 1; 10.50	371; 1; 8.10
28181 15SE-230 to 3211 NNC B639 on " "	Line : 28181-29182-2( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	383; 1; 11.60	384; 1; 10.30	385; 1; 7.80
28181 15SE-230 to 3211 NNC B639 on " "	XFMR : 3211-3581-1 (T648 XFMR_403)	SINGLE_LINE_GROUND	393; 2; 13.10	394; 2; 8.50	395; 2; 6.20	OK	397; 1; 9.70	398; 1; 8.80	399; 1; 6.90
28181 15SE-230 to 3211 NNC B639 on " "	XFMR : 3211-3582-1 (T649 XFMR_404)	SINGLE_LINE_GROUND	407; 2; 13.10	408; 2; 8.50	409; 2; 6.20	OK	411; 1; 9.70	412; 1; 8.80	413; 1; 6.90
28181 15SE-230 to 3301 AGC B624 on " "	Primary System Normal/Pilot Out	SINGLE_LINE_GROUND	OK	OK	OK	OK	439; 1; 5.90	440; 1; 4.60	441; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	XFMR : 28181-24181-1 (INTER_3 XFMR_991)	SINGLE_LINE_GROUND	449; 1; 5.40	450; 3; 10.60	451; 3; 14.20	OK	453; 1; 6.30	454; 1; 4.90	455; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	XFMR : 28181-24181-2 (INTER_4 XFMR_992)	SINGLE_LINE_GROUND	463; 1; 5.50	464; 3; 10.60	465; 3; 14.20	OK	467; 1; 6.30	468; 1; 4.90	469; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	Line : 28181-28371-1( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	481; 1; 6.00	482; 1; 4.70	483; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	Line : 28181-28371-2( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	495; 1; 6.00	496; 1; 4.70	497; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	Line : 28181-29181-1( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	509; 1; 6.00	510; 1; 4.70	511; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	Line : 3301-3155-1( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	537; 1; 5.80	538; 1; 4.60	539; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	Line : 3301-3155-2( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	551; 1; 5.80	552; 1; 4.60	553; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	Line : 3301-3355-1( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	565; 1; 5.90	566; 1; 4.60	567; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	Line : 3301-3355-2( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	579; 1; 5.90	580; 1; 4.60	581; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	Line : 3301-3592-1( )	SINGLE_LINE_GROUND	OK	OK	OK	592; 1; 14.90	593; 1; 5.50	594; 1; 4.30	595; 3; 6.70
28181 15SE-230 to 3301 AGC B624 on " "	Line : 3301-4411-1( )	SINGLE_LINE_GROUND	OK	OK	OK	OK	607; 1; 5.80	608; 1; 4.60	609; 3; 6.70
28181 15SE-230 to 28371 NEJA-230 on " "	XFMR : 28181-24181-1 (INTER_3 XFMR_991)	SINGLE_LINE_GROUND	631; 1; 5.40	632; 1; 12.10	OK	OK	OK	OK	OK
28181 15SE-230 to 28371 NEJA-230 on " "	XFMR : 28181-24181-2 (INTER_4 XFMR_992)	SINGLE_LINE_GROUND	645; 1; 5.50	646; 1; 12.20	OK	OK	OK	OK	OK
28181 15SE-230 to 28371 NEJA-230 on " "	XFMR : 28181-24181-1 (INTER_3 XFMR_991)	SINGLE_LINE_GROUND	785; 1; 5.40	786; 1; 12.10	OK	OK	OK	OK	OK
28181 15SE-230 to 28371 NEJA-230 on " "	XFMR : 28181-24181-2 (INTER_4 XFMR_992)	SINGLE_LINE_GROUND	799; 1; 5.50	800; 1; 12.20	OK	OK	OK	OK	OK

Charts

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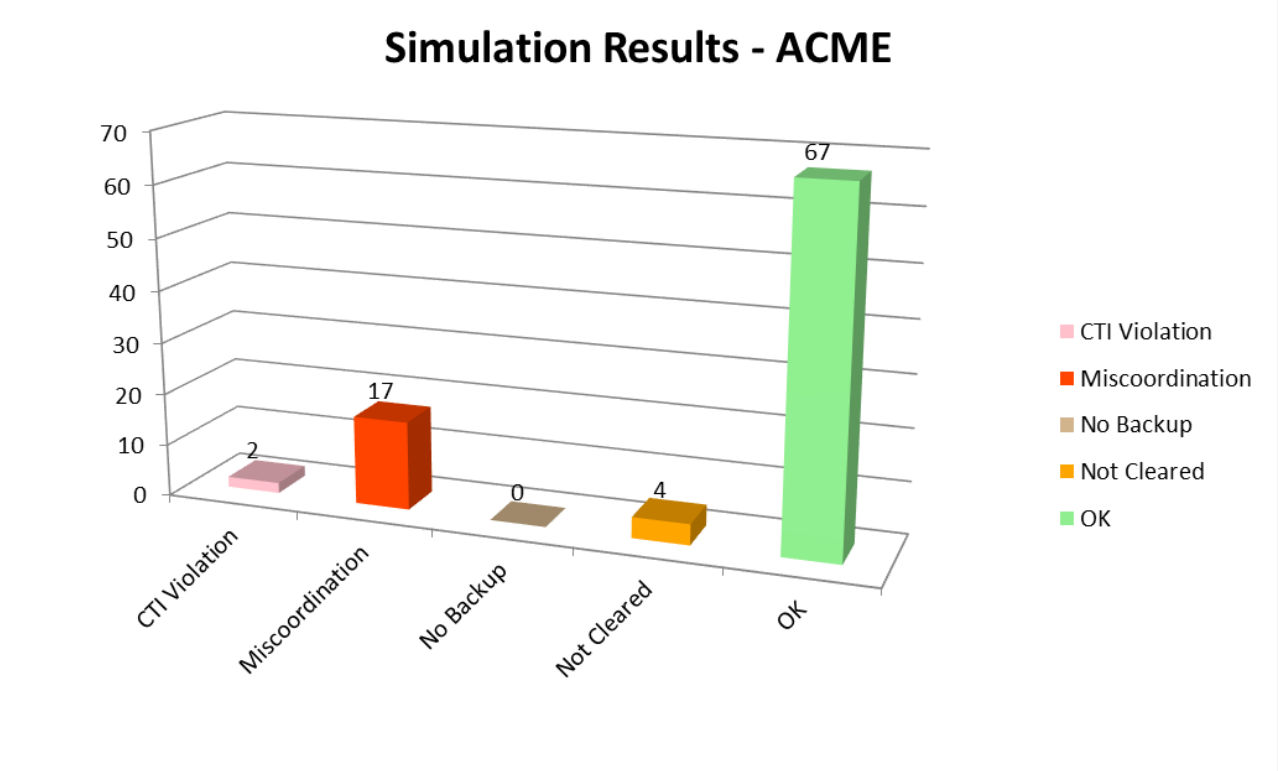

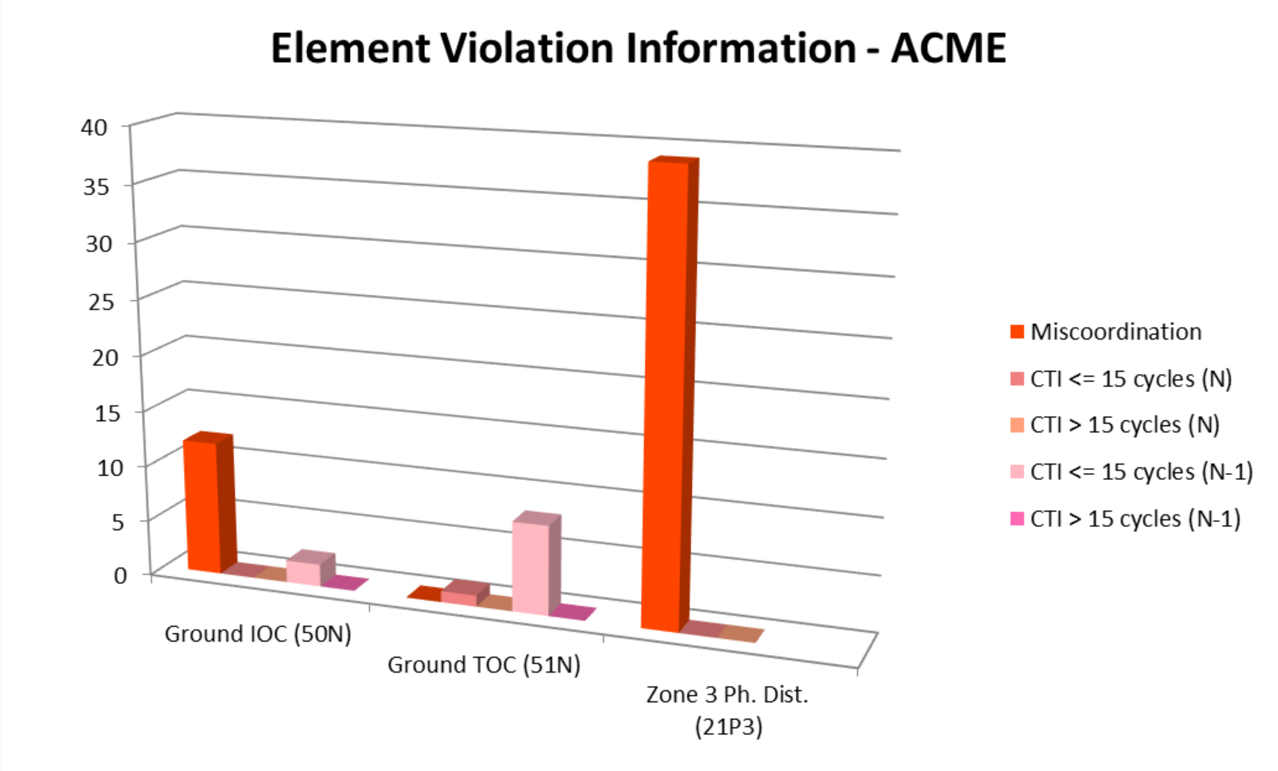

Outline

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- NERC PRC-027 requirements
- PRC-027 implications for generation or transmission owner
- Strategies for compliance
- Typical process for verifying compliance with PRC-027
- Conclusions

Conclusions

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- NERC PRC-027 does impose significant regulatory burden on utilities and generation owners

- There are several advantages to going through the compliance process:
  - Accurate short-circuit model of the system
  - Accurate protection model of the system
  - Awareness of the vulnerabilities of the protection system
  - Ability to perform protection studies at any time

- Automation will need to be implemented in each stage of the process
  - Ability to handle large amounts of data
  - Efficiency and accuracy

- Protection engineers are still needed – they are the ones who will design the system, and will have the necessary knowledge and instincts to help mitigate the protection issues found

Discussion

Contact page

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