NATF Protection System
Misoperation Reduction Initiative

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Where we Started

• NATF commenced an initiative to review protection system misoperation data and formulate associated corrective actions

• Detailed data was obtained from a member subset

• Many NATF findings matched those of NERC’s Misoperations Task Force

• Most common causes for misoperations were:
  – Communication Channel Problems
  – Relay Setting Errors
  – Relay Failures
Misoperations by Cause Code

- Commun
- Relay Settings
- Relay Failures
- Unknown
- Relay Condition
- Field Errors
- AC Failures
- Design
- Duplicate
- DC System
What NATF Did and Discovered

• NATF added detailed sub cause codes (relay scheme, model, etc.) and communications failure types

• This data enabled some new conclusions:
  – Directional Comparison schemes accounted for about half of the misoperations
  – Short Circuit modeling errors were noticeable
  – Electromechanical relay failures remain significant
Misoperations by Scheme Type

- DCB: 45%
- Other/Unknown: 16%
- NonPilot: 16%
- LINEDIFF: 3%
- DTT: 7%
- DUTT: 1%
- POTT: 2%
- PHCOMP: 2%
- SPT: 1%
- SPS: 0%
- TrfProt: 5%
- UF/UV: 0%
- BusProt: 2%
- DCUB: 0%
- Open Distribution: 16%
Directional Comparison Blocking: Misoperations by Failure Type

- Communication failures: 29%
- Relay failures/malfunctions: 22%
- Incorrect setting/logic/design errors: 23%
- Unknown: 17%
- AC system: 3%
- As-left personnel error: 4%
- DC system: 2%

Breakdown of DCB Scheme misoperations causes
Power line carrier is the most common communications system involving misoperations.
Next Steps

• Develop, approve, and reinforce best practices
  – Power Line Carrier maintenance
  – System Impedance Modeling
  – Electromechanical relay (maintenance/replacement)
  – Outage planning processes
  – Settings and logic
  – Setting relays to respect ratings

• Conduct relevant member training

• Develop and monitor more detailed metrics