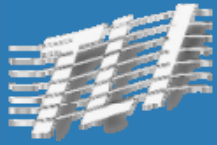


Late Breaking News from TLI

IEEE PES GM

M. Kezunovic, President & CEO
Calgary, Canada, July 2009

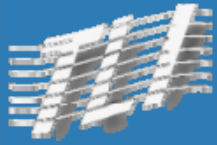




Outline

- ***Introduction***
- Data Integration Solution (FE)
- CBR Deployment (FE)
- Network based Fault Data Analyzer (NYPA)
- Low-Voltage Simulator (CCET)

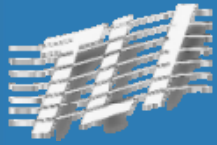




Introduction

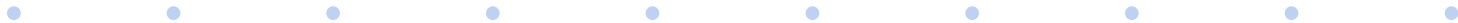
- TLI focus:
 - How to deal with “explosion” of IED data
 - How to assure the Smart Grid investments in IEDs (PMUs) is “safeguarded”
 - How to help utilities with tools for managing data reporting for NERC and other interested parties
- Late breaking news:
 - Substation IED data integration and analysis deployment at several utilities (FE, NYPA, CNP)
 - New tools for application and performance testing of PMUs, relays and other IEDs (CCET, BPA)

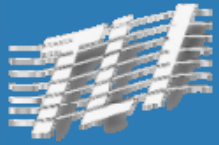




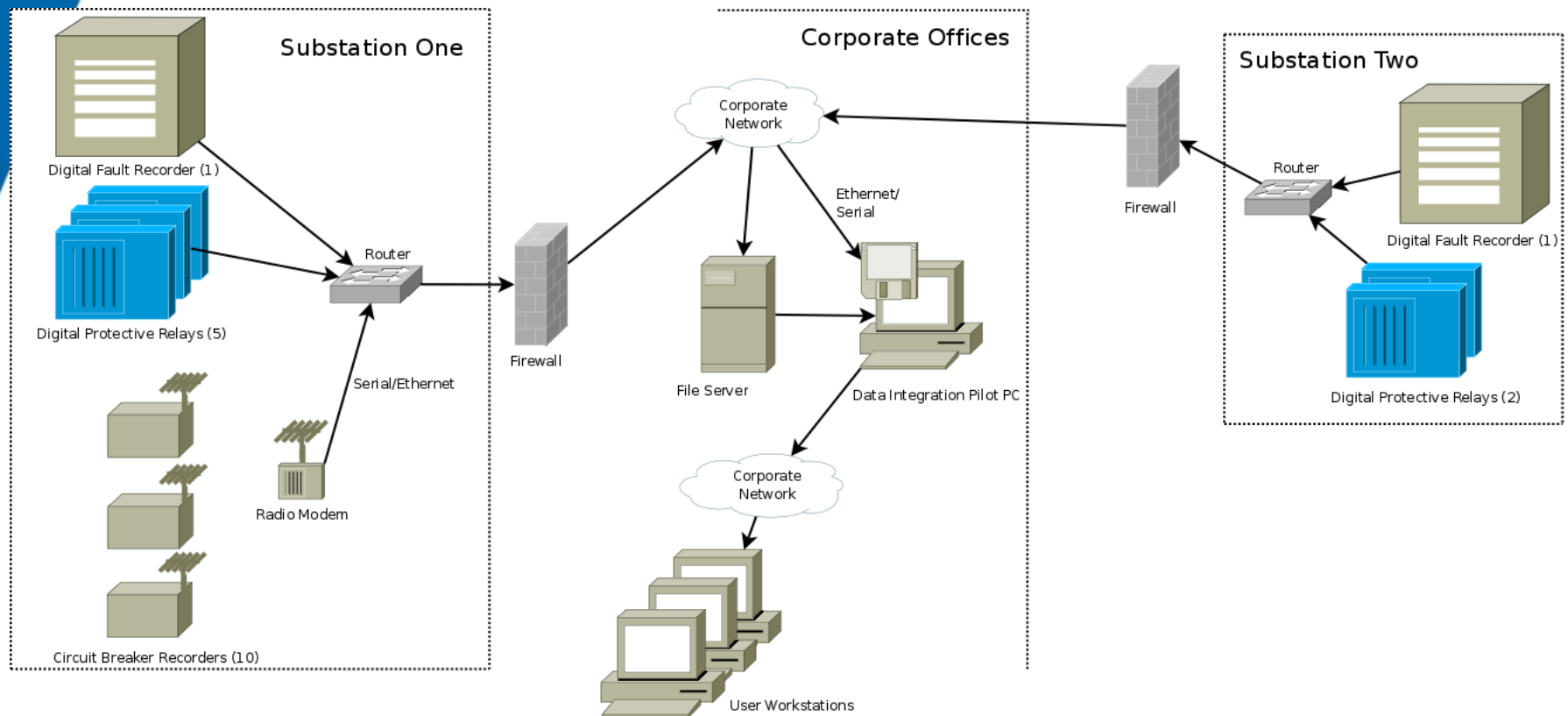
Outline

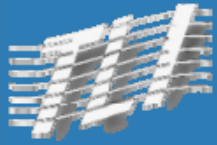
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Solution Overview and Data Flow

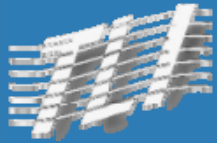




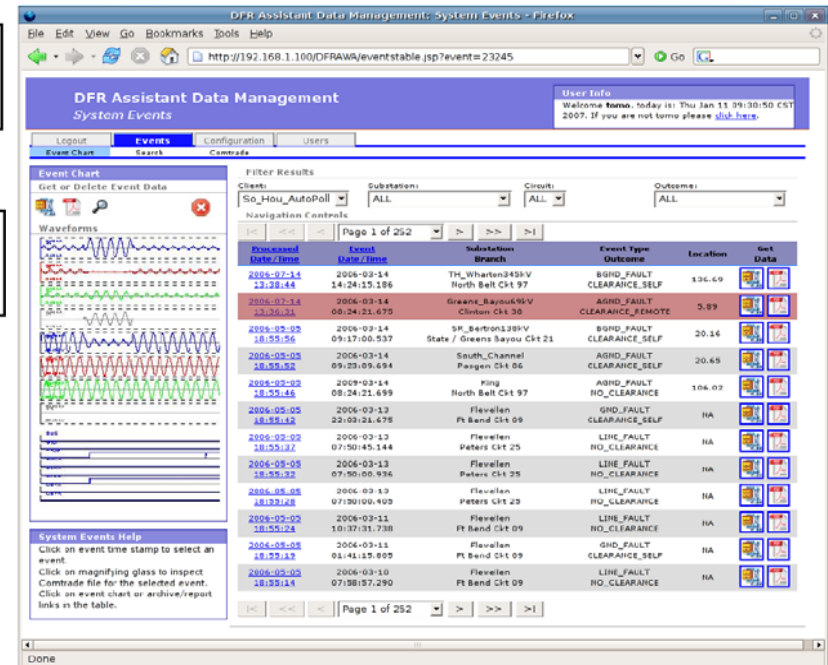
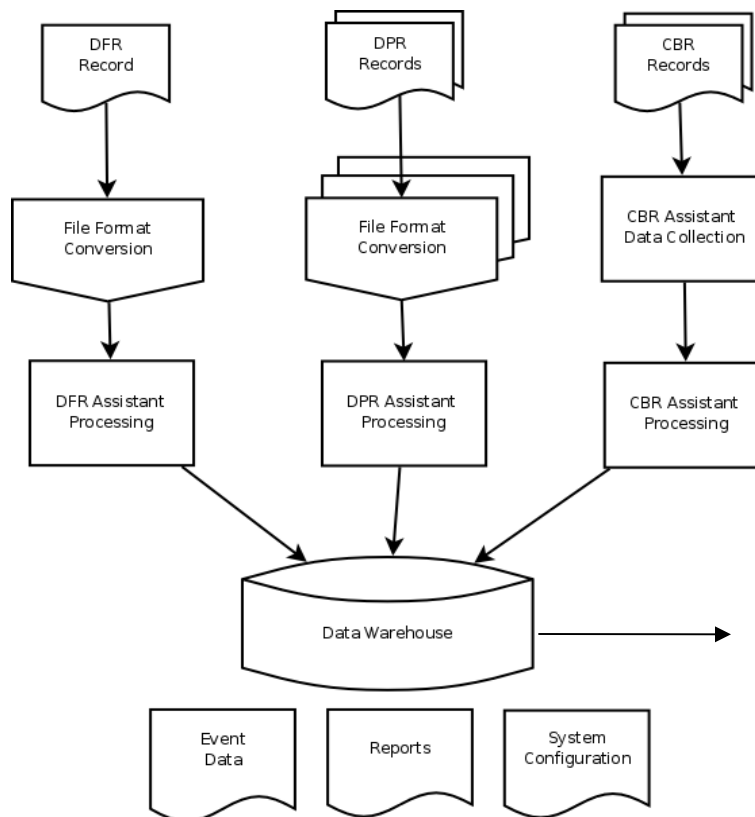
Data Integration Goals

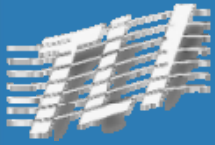
- Data integration from variety of substation IEDs (DFR, DPR, CBR)
- Automated data processing functions
- Centralized data warehouse
- Universal user interface





Substation Assistant™ Solution

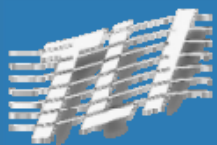




Substation Assistant™ Features

- Universal solution for substation IED event data integration and processing
- Supports variety of DFRs and other substation IEDs
- Main features:
 - Data Integration (Data Warehouse)
 - Automated Processing (IED data)
 - Data Presentation (User Interface)





Substation Assistant™ Data Management System Events

User Info

Welcome **admin**, today is: Wed Mar 25 10:23:18 CDT 2009. If you are not admin please [click here](#).

Events Search Users About

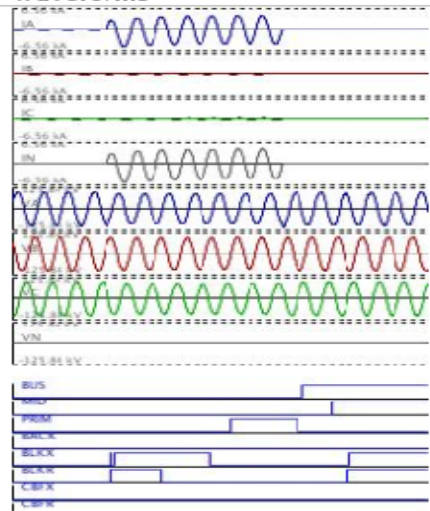
Logout

Event Chart

Get or Delete Event Data



Waveforms



User Comments

No comment has been added for this event.

System Events Help

Click on event time stamp to select an

Filter Results

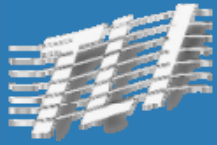
Client: CenterPoint IED: ALL Circuit: ALL Outcome: CLEARANCE_LOCAL

Event Table

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Processed Date/Time	Event Date/Time	Substation Branch	Event Type Outcome	Location 1-End/2-End	Get Data
2009-03-04 21:45:35.385 CST	2007-11-27 10:23:26 084 CST	Obrien 138kV Auto #1	GND_FAULT CLEARANCE_LOCAL	NA NA	
2009-03-04 21:45:21.884 CST	2008-01-01 15:43:44 317 CST	P.H. Robinson 138kV Unit #3 PHR-SOE-95	SWITCHING CLEARANCE_LOCAL	NA NA	
2009-03-04 21:45:11.897 CST	2007-11-01 09:40:12.580 CDT	W.A. Parish CH#3 (E) WAP-BI-50	GND_FAULT CLEARANCE_LOCAL	NA NA	
2009-03-04 21:45:07.422 CST	2007-12-05 06:43:09 014 CST	Obrien 138kV OB-FL-73	GND_FAULT CLEARANCE_LOCAL	NA NA	
2009-03-04 21:44:31.403 CST	2007-12-29 00:34:08 695 CST	East Bernard EB-DYN-60	AGND_FAULT CLEARANCE_LOCAL	107.5 NA	
2009-03-04 21:42:26.121 CST	2007-10-07 04:02:35.517 CDT	Greens Bayou 345kV Bottom GBY-KG-75	GND_FAULT CLEARANCE_LOCAL	NA NA	
2009-03-04 21:41:53.716 CST	2007-11-01 09:53:33.539 CDT	W.A. Parish CH#3 (E) WAP-BI-50	LINE_FAULT CLEARANCE_LOCAL	NA NA	
2009-03-04 21:40:41.578 CST	2007-11-01 07:29:23.805 CDT	West Columbia WC-WAP-02	AGND_FAULT CLEARANCE_LOCAL	20.6 NA	
2009-03-04 21:38:41.390 CST	2008-01-15 07:47:59 369 CST	Webster WE3-AK-04	CGND_FAULT CLEARANCE_LOCAL	21.4 NA	
2009-03-04 21:35:29.884 CST	2007-10-10 14:08:30.574 CDT	W.A. Parish CH#2 (W) WAP-JN-64	GND_FAULT CLEARANCE_LOCAL	NA NA	
2009-03-04 21:34:52.839 CST	2008-01-04 20:15:32 509 CST	P.H. Robinson 138kV Unit #3 PHR-GV-92	GND_FAULT CLEARANCE_LOCAL	NA NA	
2009-03-04 21:34:48.344 CST	2007-11-15 12:27:20 892 CST	Bellaire 345kV BI-JN-64	GND_FAULT CLEARANCE_LOCAL	NA NA	

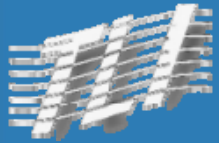
Page 4 of 23



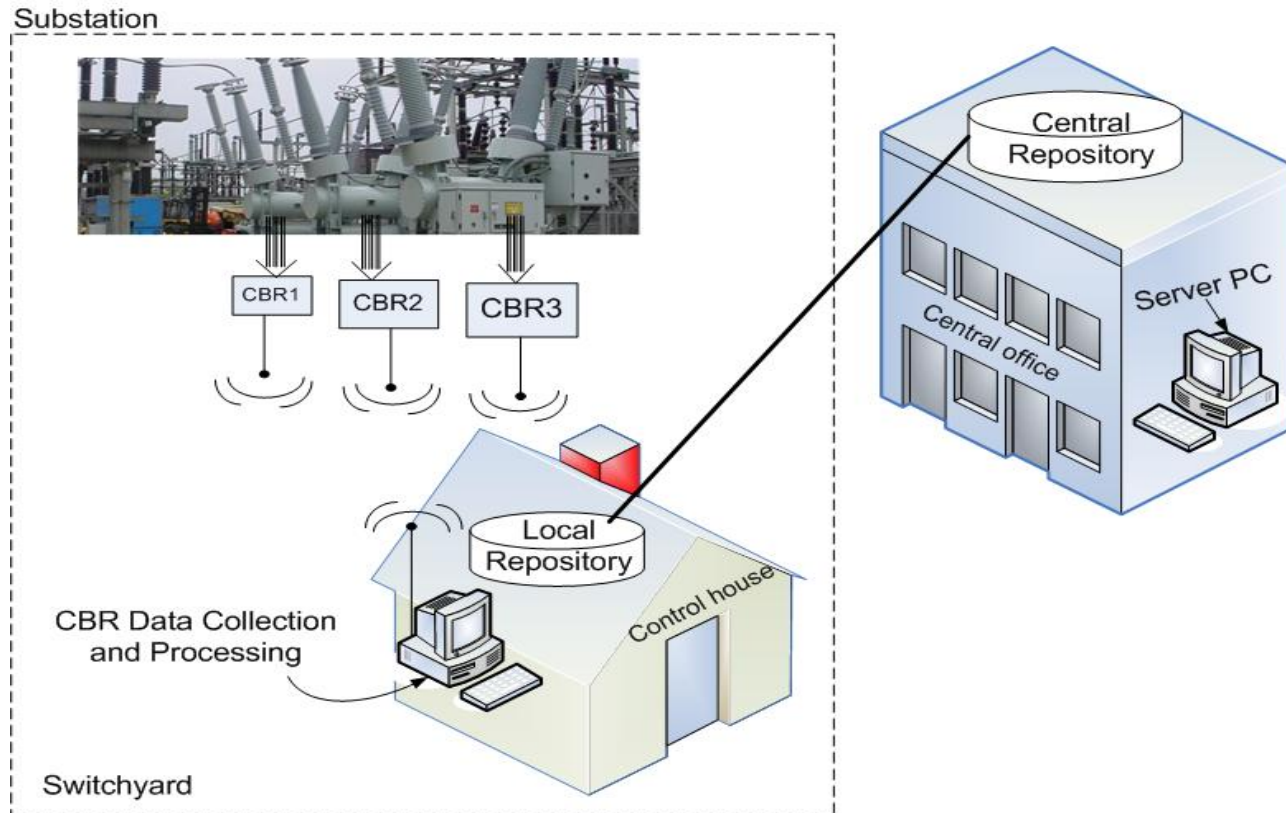
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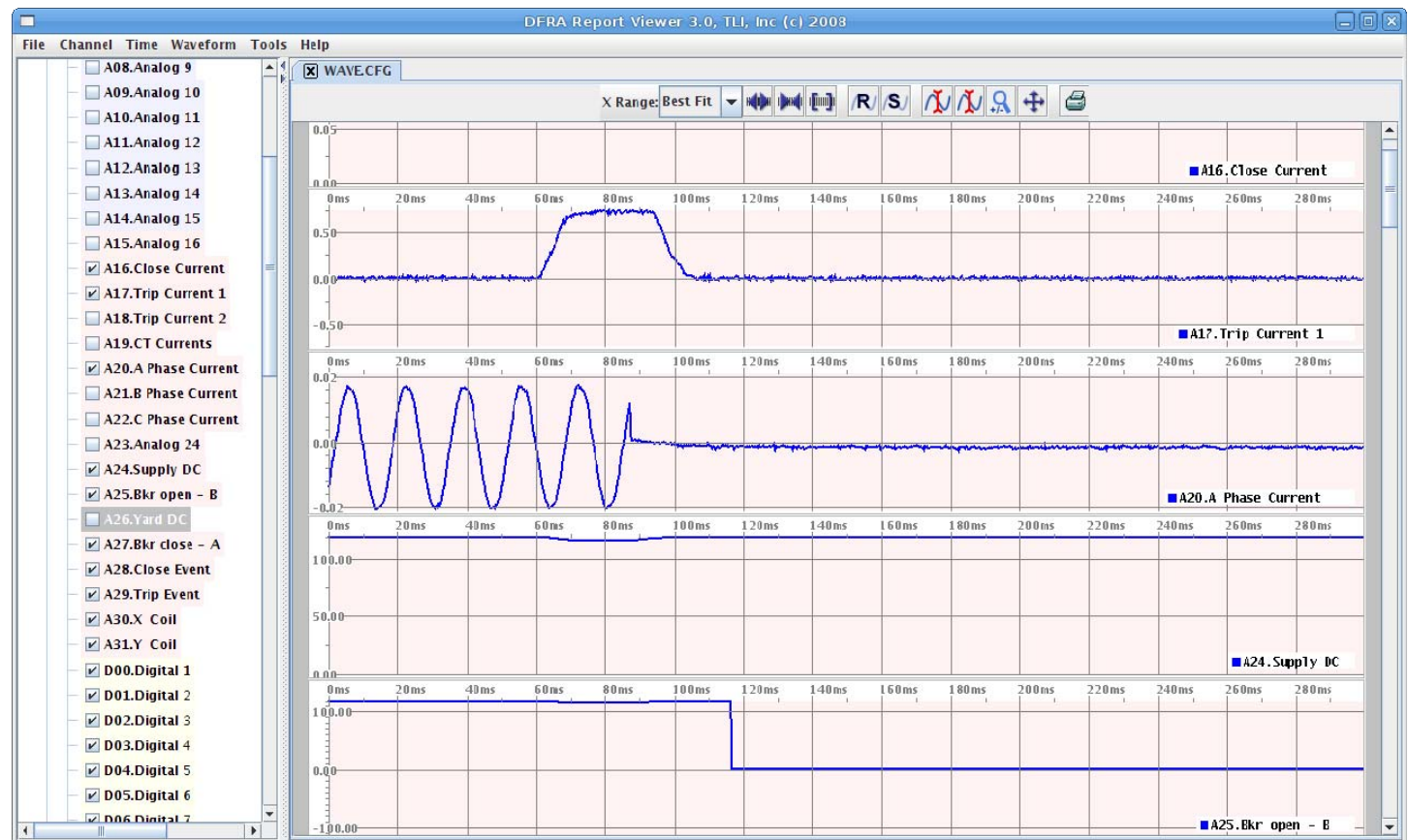


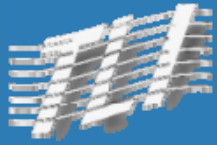
CBR Assistant™ Concept





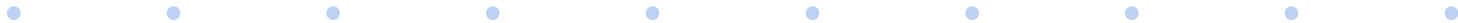
Example: Reference Trip

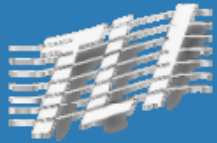




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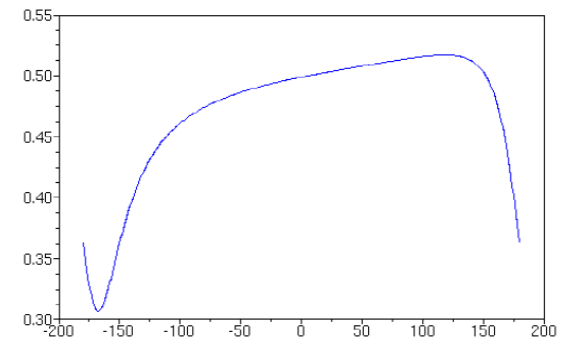
Fault Locator Evaluation

- ATP simulated fault data
- Artificially time stamped
- Single- and Two-End

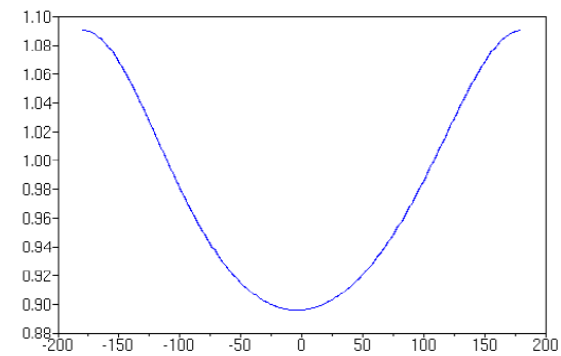
TABLE I
IN-HOUSE EVALUATION RESULTS

#	Fault Type	Number of cases	Single-end Error [%]	Two-End Error [%]
1	A-G	10	0.61 - 3.75	0.05 - 0.27
2	AB	10	0.59 - 2.57	0.01 - 0.48
3	AB-G	10	0.61 - 2.57	0.05 - 0.21
4	ABC	10	0.42 - 2.57	0.05 - 0.44

Note: error % relative to line length

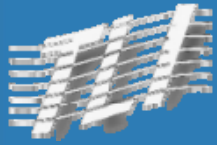


a) A-G fault at 0.50 (50%)



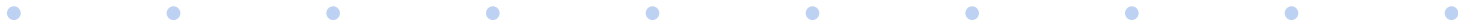
b) A-G fault at 0.90 (90%)

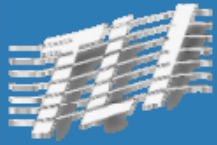
Fig. 6. Two-end fault location vs. angle difference



Fault Location Calculation

- Single-end algorithm
 - Expected accuracy 1-5%
 - Data from one end of the line
- Two-end algorithm
 - GPS synchronized data required
 - Data from both ends of the faulted line required
 - Targeted accuracy 0.5%
- Reference
 - IEEE Guide for Determining Fault Location

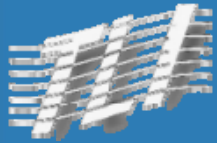




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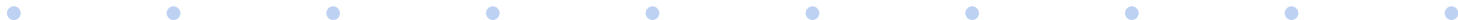
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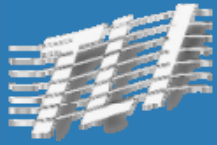




Relay Assistant™ Software

- Use of simulated and field data
- Automated testing and reporting
- Advanced editing features
- Testing aimed at application

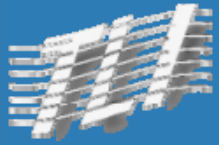




Relay Assistant™ New Hardware

- Based on Relay Assistant™ simulator components
- 16-bit D/A synchronized outputs
- USB 2.0 communication to host PC
- External replay start (i.e. for use with GPS)
- Small factor

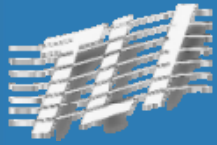




Relay Assistant™ LV-Simulator



Slide 19



Contact

<http://www.tli-inc.com>

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