Survey of
Advanced Fault Location, Prediction and Detection for Distribution Systems

Conducted by
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on Behalf of
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1. Types of distribution line devices used to interrupt and sectionalize faults

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic reclosers</td>
<td>12</td>
</tr>
<tr>
<td>SCADA-controlled load break switches</td>
<td>14</td>
</tr>
<tr>
<td>Hydraulic reclosers</td>
<td>6</td>
</tr>
<tr>
<td>Automatic line sectionalizers</td>
<td>6</td>
</tr>
<tr>
<td>Remotely controlled vacuum interrupters</td>
<td>4</td>
</tr>
<tr>
<td>Network protectors</td>
<td>2</td>
</tr>
<tr>
<td>Load break switches</td>
<td>2</td>
</tr>
</tbody>
</table>
2. What are approaches for which automatic switches are currently applied?

<table>
<thead>
<tr>
<th>Approach</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local control strategy with no communications</td>
<td>8</td>
</tr>
<tr>
<td>Distributed control strategy with SCADA supervision</td>
<td>8</td>
</tr>
<tr>
<td>Centrally-controlled sectionalizing scheme via SCADA</td>
<td>8</td>
</tr>
<tr>
<td>Normally-open tie points</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>0</td>
</tr>
</tbody>
</table>
3. Key issue with deployment of automated switches?
4. What approaches are being considered for future automation schemes?

![Bar chart showingApproaches for Future Automation](image-url)
5. What types of sensors do you use on your distribution feeders?

![Distribution Sensors Currently Used](chart.png)
6. What types of sensors are you planning/considering for use on your distribution feeders?

Planned Distribution Sensors

- Line voltage sensors: 12
- Fault current indicators with communication: 10
- Line current sensors: 8
- Power quality monitors: 2
- Other: 2
- Conductor temperature monitors: 1
- None: 0
7. What type of fault location techniques do you currently use on your distribution circuits?
8. What distribution field equipment do you monitor for equipment diagnostics?

![Field Equipment Monitored for Equipment Diagnostics](image)
9. What type of communications technologies do you currently use to exchange information with distribution circuit elements?

![Current Types of Communications Used](chart.png)

- RF unlicensed
- RF licensed
- Cell
- Fiber
- Phone (Modem)
- Other
- Satellite systems
- Power line carrier
- Broadband over power line
- None
10. What type of communications technologies are you planning to use to exchange information with distribution circuit elements in the near future?
11. What types of devices in use are time synchronized (by GPS clocks or other means?)

![Time Synchronized Devices](chart.png)