UM 2111

Technical Topics Workstream

Workshop 1, DTT

December 5th, 2024

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Agenda

- Introduction and welcoming comments
- Joint utilities present on DTT
  - Address any follow-up questions
- PUC staff's discussion topics

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General Introduction

- Thank you for attending
- This technical workstream is part of Phase 2 of UM 2111
- The parallel workstream regarding interconnection delays has a workshop coming up on 12/17/24
- The next technical workshop in this workstream is planned for 01/22/25

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Topic Introduction

- DTT, when required, can substantially increase project costs, potentially to the point of making them not financially viable.
- Preliminary review indicates it may be an overengineered solution in most cases, making the high costs unjustified.
- Today's workshop provides an opportunity to discuss the requirements in detail, with stakeholders' engineers, utility engineers, and PUC staff together.

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Meeting etiquette

1. Assume good faith and respect differences
2. Listen actively and respectfully
3. Use "Yes and" to build on others' ideas
4. Please self-edit and encourage others to speak up

[Transition to/from JU Presentation on DTT]

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Reclosing open interval

Pros and cons of various reclosing open intervals. In particular, less than vs greater than 2 seconds. Context:

- Grid following inverters meeting IEEE 1547-2018 are required to disconnect from the grid within 2 seconds if an unintentional island is created. If a reclosing open interval is less than 2 seconds, there's risk of reclosing into an island, prompting additional protection like DTT and/or reclose blocking with voltage sensing.

- A positive for customers on circuits with nearly instantaneous reclosing is that they may barely notice a flicker when an upstream recloser clears some temporary faults.

- A negative is that most temporary faults in Oregon involve an object – like a tree branch, bird, or squirrel – and these objects typically need more time to fall away from the line. In these cases, when the first open interval is short, the system is subjected to an additional fault(s) until the reclose sequence gets to a longer open interval. It could be argued that it may have been better to start with the longer open interval.

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Assumptions for discussion

For the next discussion topics, initially assume the following:

- Any existing or proposed generation is inverter based and solar
- Inverters meet IEEE 1547-2018 and UL 1741 standards as required by the utility
- DER service transformers are connected grounded-wye – grounded-wye

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Additional reasons for DTT

For a given feeder or line recloser, where daytime minimum load and generation are estimated to be closely balanced, and utility reclosing open intervals are greater than 2 seconds, what are other reasons for implementing DTT?

Assumptions pasted for reference:

- Any existing or proposed generation is inverter based and solar
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- DER service transformers are connected grounded-wye – grounded-wye

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Additional reasons for DTT, cont.

1. For the other reasons discussed in previous slide:
    a. What alternatives are there to DTT?
    b. Can voltage, frequency, ROCOF, or other elements be reliably used to detect unacceptable conditions like unintentional islands, open phase conditions, or overvoltages? [It is understood that overcurrent protection at the PCC is not helpful in clearing faults or preventing unintentional islands in this case]
    c. Possible examples to discuss:
        i. Medium voltage recloser at PCC with CT's and PT's and appropriate relay, such as SEL-651R
        ii. Breaker and utility specified relay (such as SEL-751) on the generation side of the service transformer.
            1. CT's and PT's either on the utility side or generation side of the service transformer.

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Hot Line Work

Impacts of the above discussions on hot line work.

a. Fault clearing speed with DTT vs without
b. Would disconnecting the generation during hot work be a solution parties would be interested in?

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Wildfire mitigation

Impacts of the above discussions on wildfire mitigation.

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Optional topic:

Altering the first assumption, are any of the above discussions different if the generation includes significant battery storage?

Assumptions pasted for reference:

- Any existing or proposed generation is inverter based ~~and solar~~
- Inverters meet IEEE 1547-2018 and UL 1741 standards as required by the utility
- DER service transformers are connected grounded-wye – grounded-wye

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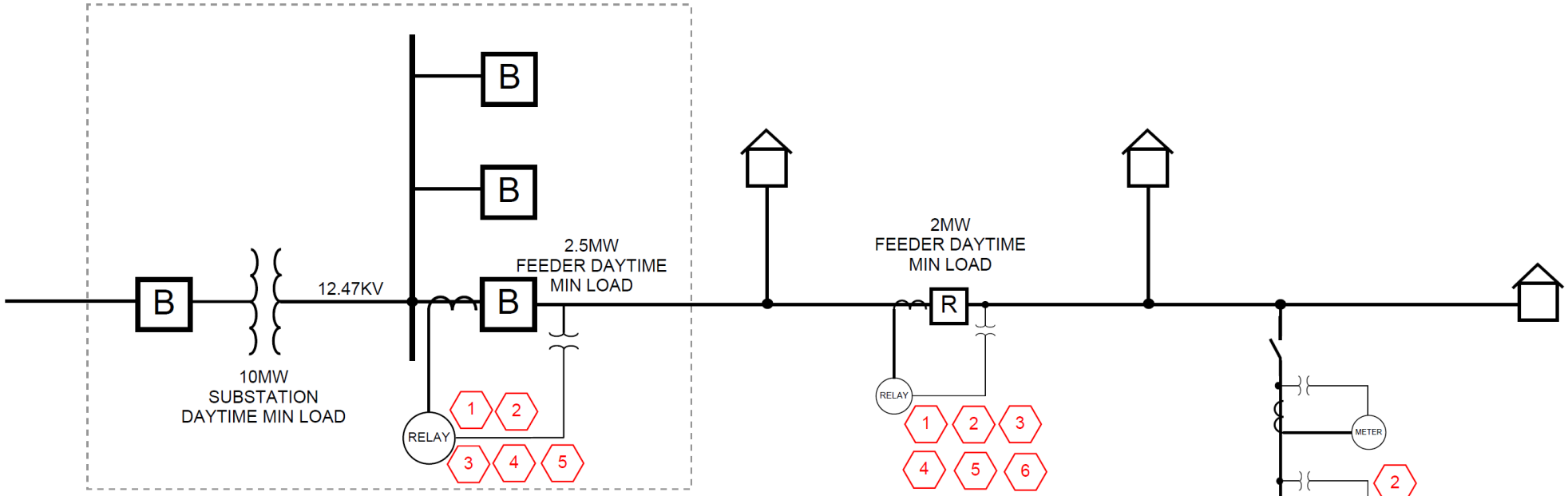
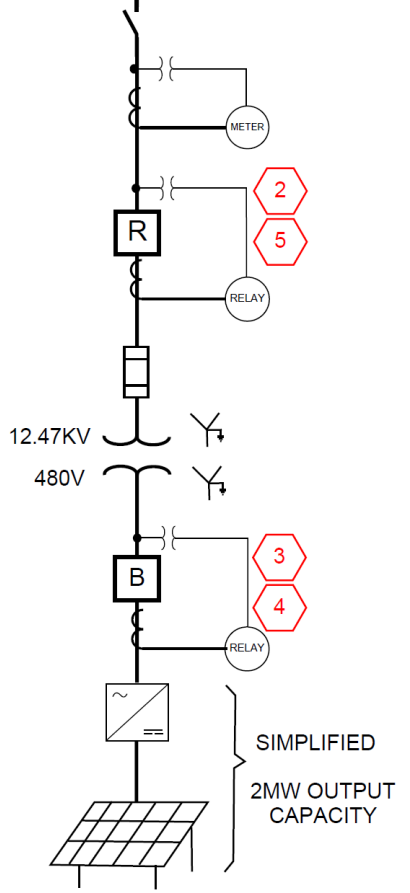


Basic example to initially look at as a group. Would like to determine if the utility would require DTT in this case. If there's not enough information to make a determination, then we can collectively add assumptions or modify information as needed during the meeting.

Some protection options to explore below:

1. Reclosing supervision with voltage sensing on utility devices upstream of generator
2. Reclosing supervision with voltage sensing on utility devices upstream of generator, and PCC recloser and relay with added protection functions
3. Reclosing supervision with voltage sensing on utility devices upstream of generator, and low side breaker and relay with added protection functions
4. DTT with low side breaker and relay.
   Would like to discuss whether this option also requires voltage sensing on utility devices upstream of generator.
5. DTT with PCC recloser and relay.
   Would like to discuss whether this option also requires voltage sensing utility devices upstream of generator.
6. DTT with either the PCC recloser or generator's low side breaker, but the trip signal only comes from the utility's line recloser, and not from the substation feeder breaker. Perhaps this assumes a higher feeder daytime minimum load.



For purposes of tackling one topic at a time, these examples assume the load-to-generation ratio for the overall substation does not exceed a threshold that may require 3V0 protection. It is understood that 3V0 and DTT have overlapping discussion points - it is planned to address those in a subsequent workshop.

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Other Engineering Topics

Topics for second or third workshop:

- Grounding transformers (at POI)
- 3V0 sensing on high voltage side of substation power transformers
- Testing procedures or requirements that are (or can be) used at IBR's that ensure operation as expected by the utility.

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Next Steps

- Provide summary of topics for second workshop
- Get feedback from participants
- Send out follow-up information

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Conclusion

Thank you for participating

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