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Sample Implementation of Adaptive Protection for Low Voltage Microgrid Alexandre Oudalov*, Luca Milani, Enrico Ragaini, Antonio Fidigatti *ABB Corporate Research Presented by: Dr. Britta Buchholz, ABB

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Mitigate protection blinding by reducing the OC pickup

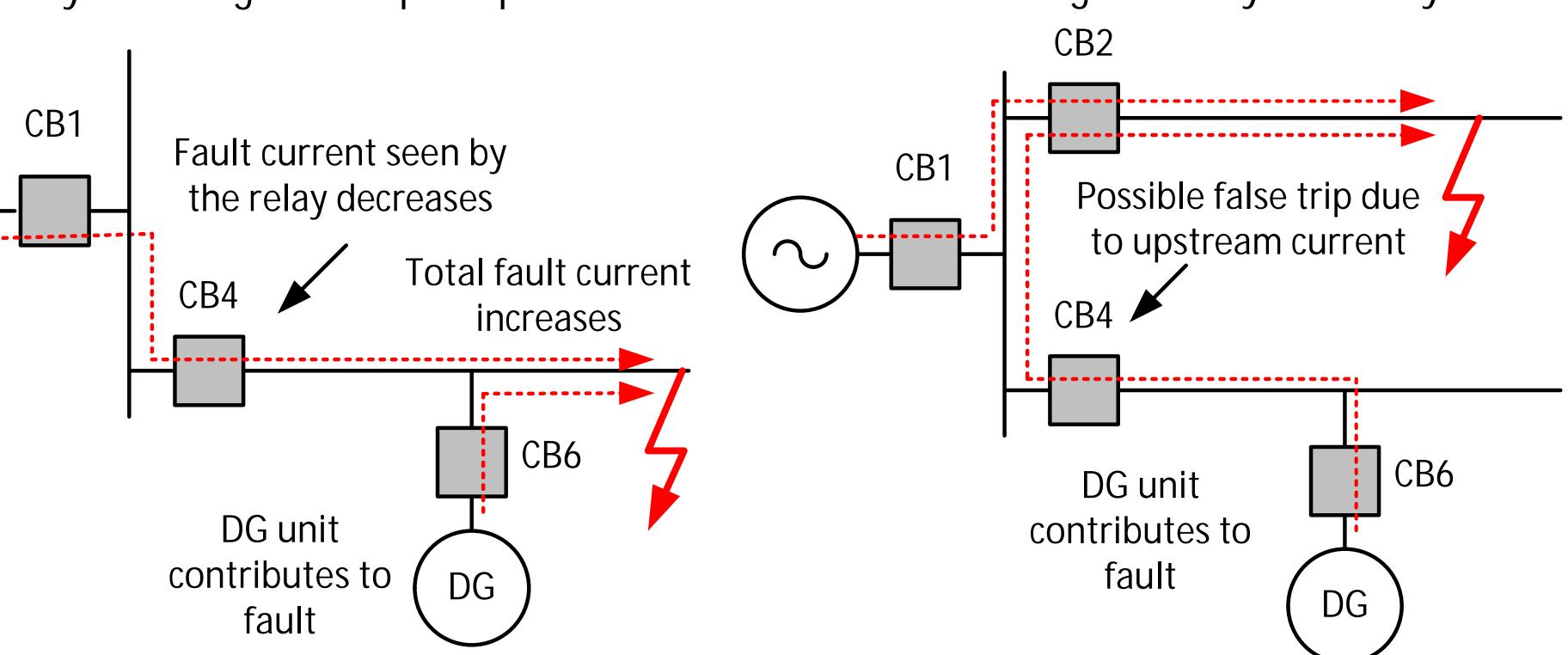
Avoid sympathetic tripping by accelerating the relay for faulty feeder

Motivation:

- Distribution grid evolution poses new protection challenges:
 - Increased Distributed Energy Resources penetration
 - Various possible operation modes: open loop, closed loop, meshed, islanded
 - Automatic feeder reconfiguration creates new topologies

Results:

- Real-time protection coordination on a remote terminal unit at secondary substation
- Use standard Modbus mechanism to control

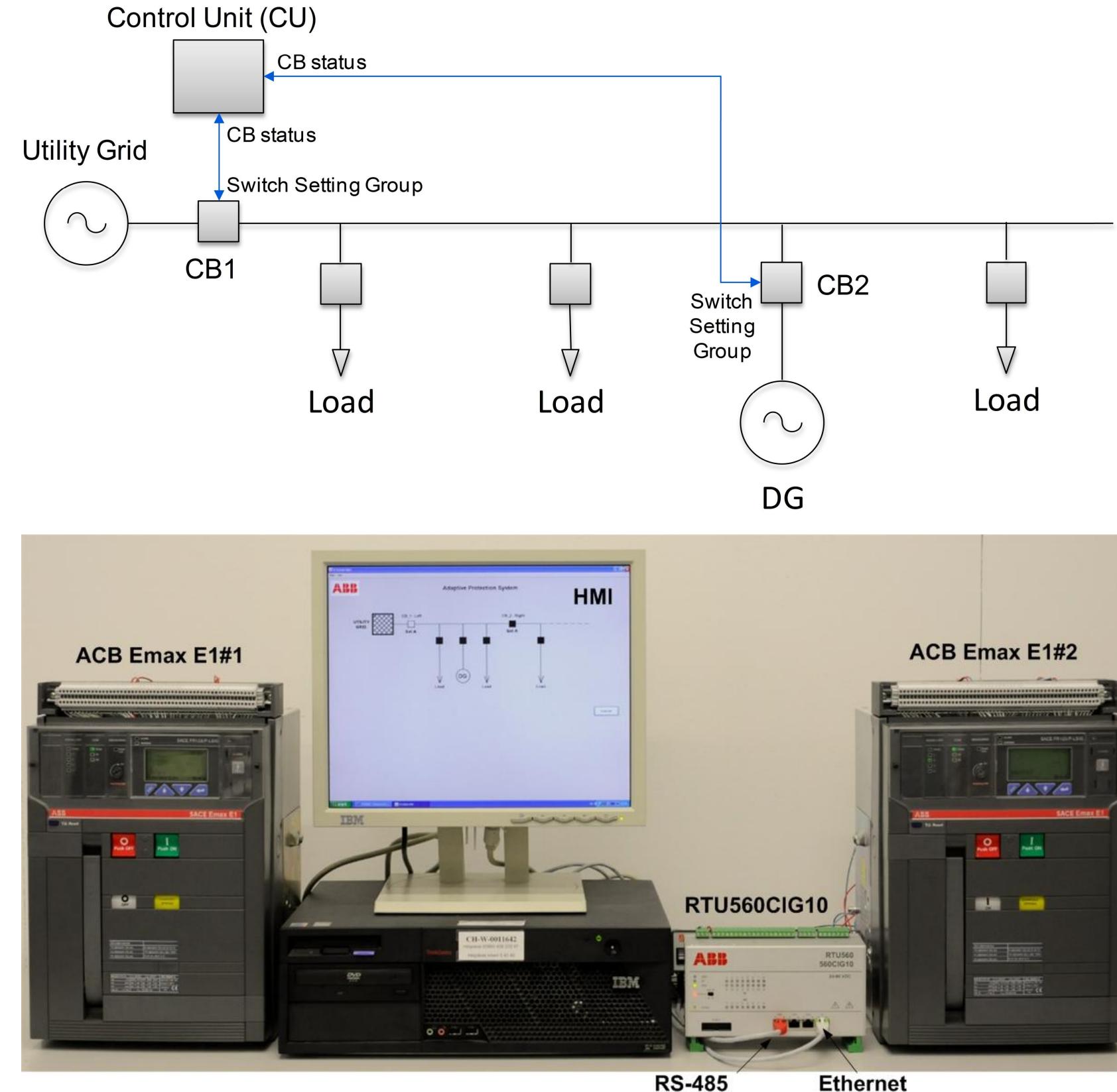


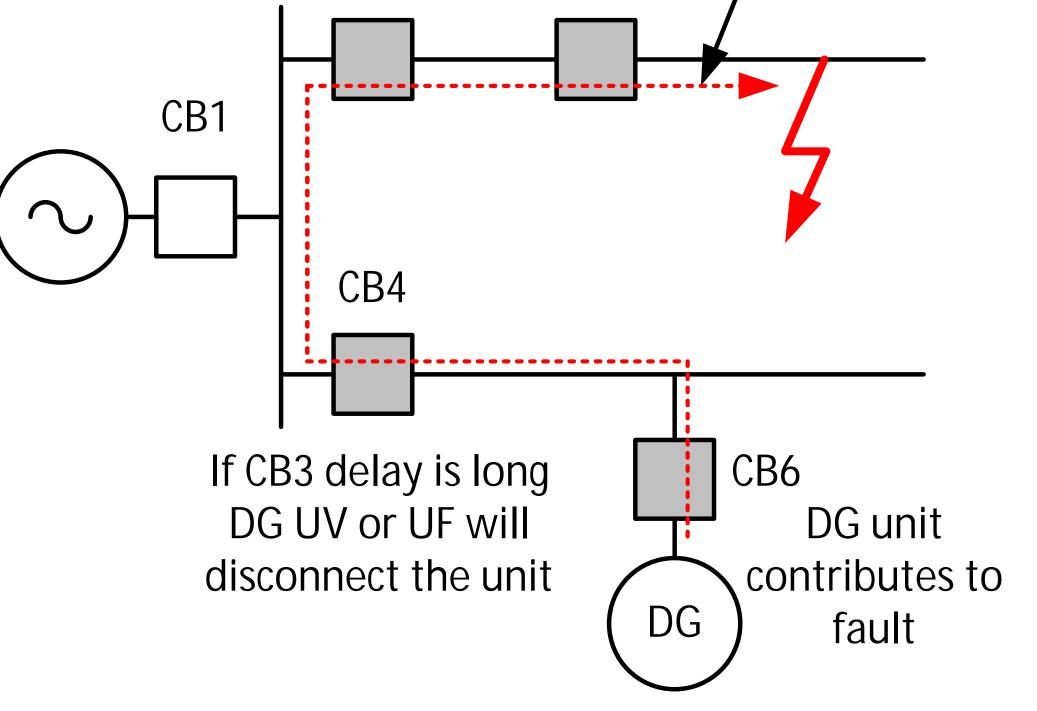
Support islanded operation by increasing the OC protection sensitivity

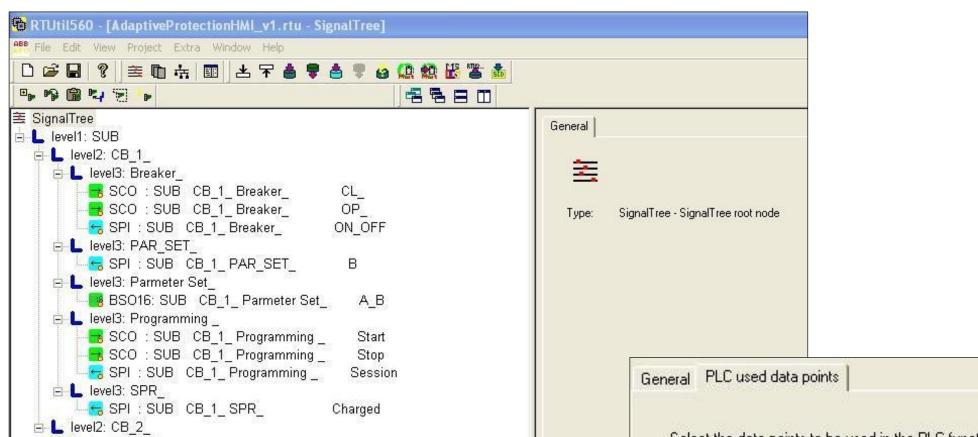
Delayed relay trip time due to low fault current in islanded mode CB2 CB3

pre-calculated "trusted" setting groups

 Identify network topology change; choose the appropriate setting group and execute control action







Select the data points to be used in the PLC function. 🖻 L level3: Breaker_ 📑 SCO : SUB CB_2_ Breaker_ 📑 SCO : SUB CB_2_ Breaker_ OP Available data points: Selected data points: 🚽 😽 SPI : SUB CB_2_ Breaker_ ON_OFF CB 1 SEV24 (SE 🖻 L level3: PAR_SET_ UB CB 1 Breaker ON_OFF (OP_(SCO CB_1_SEV48 (SEV) SUB CB_1_Breaker_ 🛛 😽 SPI : SUB CB_2_ PAR_SET_ CB_2_SEV24 (SEV) SUB CB_1_Breaker_ 🖻 📙 level3: Parmeter Set CB_2_SEV48 (SEV) SUB CB 1 PAR SET BSO16: SUB CB_2_ Parmeter Set_ SUB CB_1_Parmeter Set_ CS_SEV16 (SEV) 🖻 L level3: Programming CS_SEV17 (SEV) SUB CB_1_ Programming _ 📑 SCO : SUB CB_2_ Programming _ Start SUB CB_1_Programming_ CS_SEV18 (SEV) 📑 SCO : SUB CB_2_ Programming _ 🗌 Stop SUB CB_1_Programming_ SUB CB_1_SPR_ CS_SEV19 (SEV) 🔚 😽 SPI : SUB CB_2_ Programming _ 🗌 Session CS_SEV20 (SEV) Charged (S 🖻 📙 level3: SPR CS_SEV21 (SEV) SUB CB_2_Breaker_ CL (SCO - 😽 SPI : SUB CB_2_ SPR_ Charged CS_SEV22 (SEV) SUB CB_2_Breaker_ ON OFF SUB CB_2_Breaker CS_SEV23 (SEV) OP_(SCO SUB CB_2_PAR_SET >>SUB CB_2_Parmeter Set SUB CB_2_Programming_ SUB CB_2_Programming_ SUB CB_2_Programming_ 📥 RTU560 HMI Main Info SUB CB_2_SPR_ Charged (S ABB << Adaptive Protection System -CB_1 - Left CB_2 - Right UTILITY · — — — — Set B Set B DG Load Load Load

Event List

B (SPI)

A_B (BS

Session

Start (SI

Stop (SI

B (SPI)

A_B (BS

Session

Start (SI

Stop (SI

Ethernet