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Detection of distribution circuit wildfire ignition mechanisms using substation-only sensors and data analytics

Dr. B. Don Russell, Dr. Jeff Wischkaemper, and Carl Benner – Texas A&M

Recent emphasis on wildfire mitigation has generated interest in many forms of distributed sensing to detect wildfire ignition mechanisms. These include PMUs, RF sensors, and line current sensors as well as sensors that detect light, vibration, weather, etc. It is postulated that distributed sensing provides data that allows for more sophisticated detection and location as compared to systems that only use substation current and potential transformers. This presentation explores the capabilities of substation only monitoring architectures and provides a benchmark for use in cost/benefit comparisons to distributed sensing architectures. Detection examples of ignition mechanisms on operating utility circuits are presented.

Dr. B. Don Russell is Regents Professor in the Department of Electrical and Computer Engineering at Texas A&M University where he directs the research activities of the Power Systems Automation Laboratory. For more than 35 years, he has investigated advanced signal processing and waveform analysis techniques applied to distribution system faults and device failures. He is best known for his work, beginning in the 1970s, which scientifically characterized the behavior of arcing faults and for developing the first algorithms to detection high impedance faults. These techniques were commercialized and are incorporated today in utility relay platforms.

Carl Benner holds B.S. and M.S. degrees in Electrical Engineering from Texas A&M University in 1986 and 1988. He serves as Research Professor in the Department of Electrical and Computer Engineering at Texas A&M University. His work centers on the application of advanced technologies to the solution of challenging power system problems, with an emphasis on waveform analytics. Mr. Benner is a registered Professional Engineer in the state of Texas. He is a Fellow of IEEE and a member of the IEEE Power and Energy Society, the IEEE Industry Applications Society, and CIGRE.

Dr. Jeff Wischkaemper received his B.S. and Ph.D. degrees from Texas A&M University in Electrical Engineering in 2003 and 2011 respectively. Dr. Wischkaemper is a Research Assistant Professor in the Power System Automation Laboratory and has worked on a variety of research projects including investigating arcing on low-voltage networks, characterizing transient response behavior for alternative distribution sensor technologies, and electrically characterizing vegetation contacts with conductors.

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