



Field Area Network Testing Platform Helps Utilities in Technology Selection Process

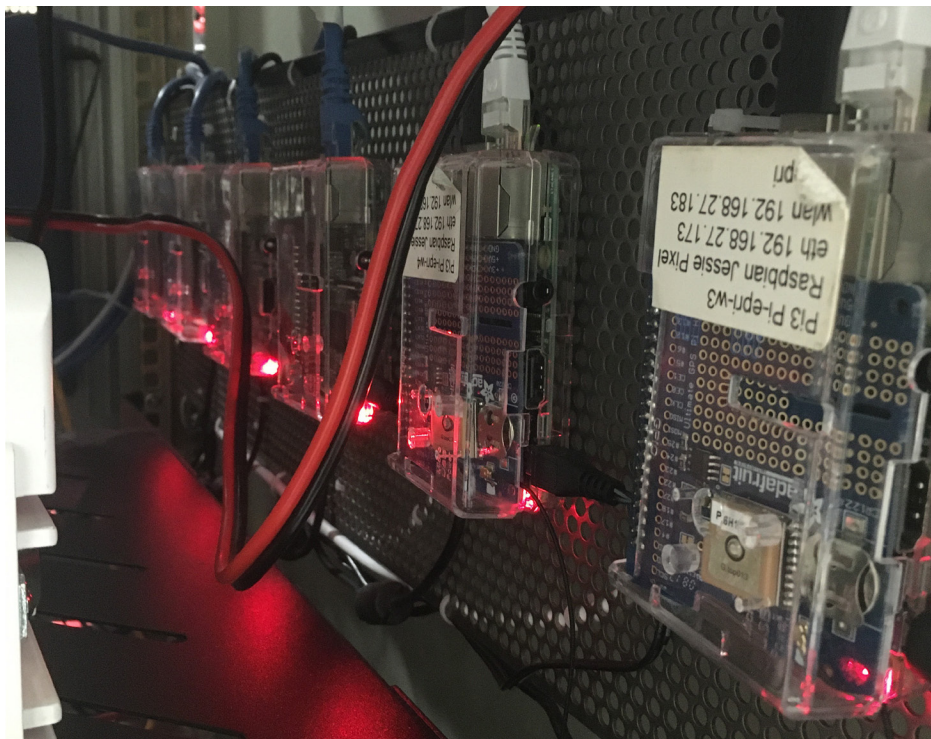
The Field Area Network (FAN) is an essential feature of the modernized grid, providing ubiquitous connectivity to an increasing number and variety of devices. Many utilities are deploying their first FAN, or upgrading an existing FAN. Many technology solutions from vendors are available for FAN deployments. The type of equipment is dependent on the type of wireless spectrum the FAN operates in. Unlicensed spectrum is one option used for certain FAN use cases where shared access and less predictable performance is acceptable. Licensed spectrum is desirable due to the exclusive ownership and access to the spectrum, which allows for a more reliable and predictable network. Licensed FAN spectrum can be broadly divided into two types. Where the spectrum allocation can support a pair of channels of at least 1.4 MHz, private LTE is the preferred solution. Where the spectrum is smaller, there are multiple options on the market, based on standardized or proprietary wireless technologies.

The EPRI Field Area Network Testing Platform has been developed by the 161G project set over the past several years. It is applicable to all types of FAN equipment, technology, and spectrum types. The platform has been used by EPRI members to evaluate and test private LTE networks, FAN technologies operating in the 700 MHz Upper A block spectrum, and operation in unlicensed spectrum such as the Wi-SUN FAN.

The EPRI FAN Testing Platform provides several benefits:

- Open source software – can be edited, adapted, and applied to many types of technology and vendor equipment. No software cost or licensing issues.
- Open platform – the test servers run on the Raspberry Pi, which is widely available, small, and low-cost. The control server runs on Linux, and can be a local physical machine, a virtual machine, or cloud hosted.

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"During 2019, Portland General Electric was conducting testing and evaluation of radio systems for the Field Area Network (FAN). The EPRI FAN Testing Platform, which is developed as part of the 161G Telecom Project Set, was well suited to PGE's testing needs, providing in-depth automated testing of the radios for throughput and latency. EPRI provided assistance and guidance configuring and using the FAN test platform. The results were valuable to PGE in making the vendor selection for the PGE Field Area Network."

*Melvin Sam Charuvilayil
Substation & Grid Integration - Telecom
Portland General Electric*

The FAN testing platform has a unique architecture that makes it well suited for FAN testing in the lab or field. The data sent to and from the devices under test is on a separate test network, independent from the control network used to orchestrate the testing. The test network carries only the actual testing payload data. This prevents the data used for managing the test and reporting the results from affecting the measurements in any way. Another benefit of the separate control network is for testing at remote sites. If the operator reconfigures a radio to a setting that causes the link to lose communication, the settings can be reconfigured remotely over the control network. Without the independent control and test networks, a remote radio that loses communication would require a site visit to recover. The control network can be distributed over a wide area to support testing in the field. The test servers can be integrated with cellular modems and connected to the control network over a VPN. The automated testing process measures throughput and one-way

latency under a variety of conditions. Various packet sizes and repetition rates are used to fully exercise the radios across a range of actual operating conditions. The platform supports testing with multiple Quality of Service (QoS) packet priorities, to verify the proper support of QoS in the products.

In the 2020 portfolio for 161G, the FAN Test Platform will be upgraded and updated. The primary focus will be on improving ease of use and operation. The number of configuration settings will be reduced, and an improved user interface for the control server will be developed. The documentation will be expanded. Project Set members will provide input on features and functions during the upgrade.

The FAN Testing Platform provides value to EPRI members by facilitating and automating the FAN testing and evaluation process, providing consistent, actionable data to enable making the best choices for designing and deploying a FAN.

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