

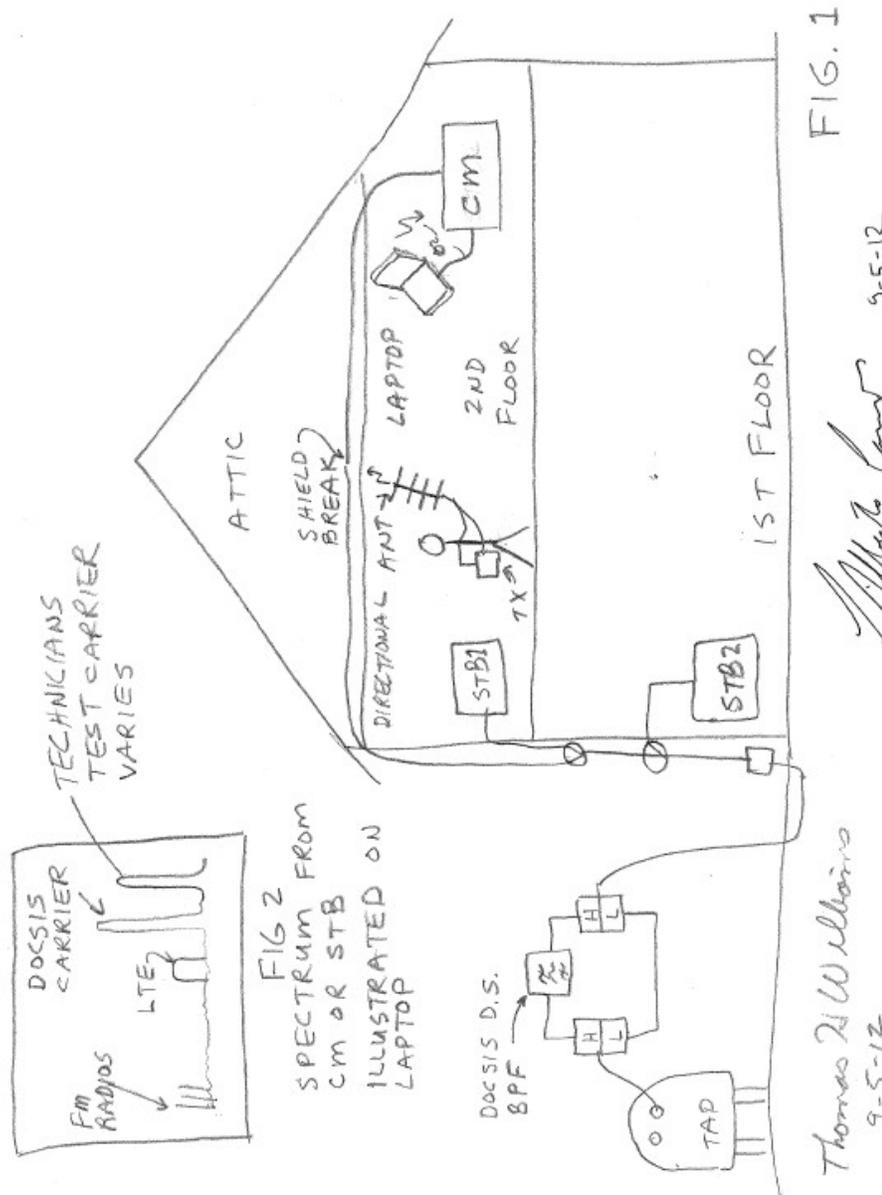
INVENTION DISCLOSURE

1. **Invention Title.**

Cable Modem Spectrum Analyzer Reveals Ingress Points in Home Wiring

2. **Invention Summary.**

A technician with a transmitter and an antenna walks around a house looking for his test signal to peak on a spectrum analyzer to indicate bad coaxial shielding. The spectrum analyzer is built into the CM, STB or Gateway. A downstream bandpass filter allows the DOCSIS CM (with SA function) to communicate with hub site.



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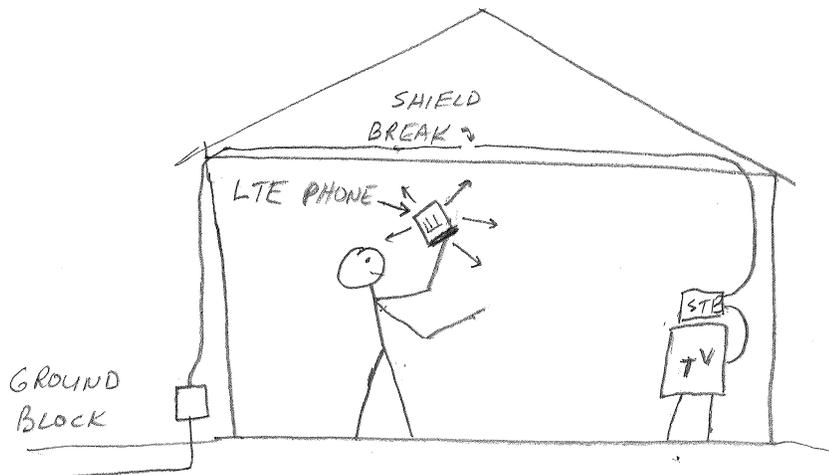


FIG. 3

LTE PHONE SHOWS SPECTRUM SEEN BY STB VIA RELAY FROM OSS SYSTEM. WHEN LTE PHONE GETS CLOSE TO A SHIELD BREAK, VIEWED SPECTRUM FROM INTERFERENCE INCREASES, AS ILLUSTRATED IN FIG. 2.

AN IMPROVEMENT WOULD BE TO PUT A DIRECTIONAL ANTENNA ON LTE PHONE.

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3. Invention Description.

a. Describe the invention in detail.

See Fig. 1. Downstream signals are filtered out with a bandpass filter at the tap except for the DOCSIS carrier. This removes downstream carriers and creates vacant spectrum where ingress can be viewed. Ingress is viewed on a laptop by a technician in the home. The spectral plot is obtained from the CM using SNMP and sent to a technicians laptop. The technician also has a transmitter and an antenna that is ideally directional. As the

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technician walks around and points the antenna he sees the spectral plot of his test signal rise and fall. See Fig. 2 Ideally the test signal is at a high frequency where antennas are small and directional. As the technician tightens connectors he sees the entire spectrum fall if he finds a corroded or loose connector.

Note that in Fig. 2 there will also be other naturally-occurring signals, such as FM broadcasts and UHF 8-VSB transmission. These are good indicators of a problem, but don't tell you where the shielding problem occurred.

This test method will also work to detect hard line breaks as long as the CM supplying the spectrum is downstream. The CM can be viewed by a connection to the CMTS.

Alternately, the technician can use a 4-G LTE cell phone that is doing a speed check to make it transmit continuously.

Alternately, the spectrum plot information can be supplied on the CM's custom web page.

**b. Why was the invention developed? What problem(s) does the invention solve?
How is it better?**

High frequencies, like 900MHz allow antennas to be small and directional. Testing for signal leakage around the aeronautical band (120MHz) does not represent what is going on at high frequencies, as the industry recently learned.

c. Briefly outline the potential commercial value and customers of the invention.

Very large. There is approximately one technician per 1000 subscribers. There are millions of homes with bad wiring integrity, and bad wiring integrity is hard to troubleshoot, degrades service, and creates egress issues (FCC fines, LTE interference)

4. HOW is this invention different from existing products, processes, systems?

Trilithic inserts a signal at the tap and the technician looks for egress with a probe. This doesn't work well because they use a low frequency. (not directional, follows AC power lines)