INVENTION DISCLOSURE

1. **Invention Title.**

Improved Splitters with Filters for Home Wiring

2. **Invention Summary.**
By incorporating filters into splitters/combiners inside homes, required CM transmit power drops by 3dB, eliminating in many cases the need for home rewiring. The filters also prevent noise from bad coaxial STB connections from interfering with upstream CM transmissions. Embodiment are shown for one-way STBs and two-way STBs.

3. **Invention Description**.

a. Describe the invention in detail.
See below.

b. Why was the invention developed? What problem(s) does the invention solve? How is it better?
Cable operators frequently have too much attenuation in home wiring, particularly with bonded DOCSIS 3 systems with reduced power on each of multiple upstream channels.

c. Briefly outline the potential commercial value and customers of the invention.
It should be valuable to Cable operators if it keeps them from having to rewire homes.

4. **HOW is this invention different from existing products, processes, systems?**
Not known.

Improved Splitters with Filters for Home Wiring

Problem:

Broadband bidirectional splitters are frequently installed near an entry point for cable connections into houses. Splitters are required so that broadband service can be supplied to both cable modems (CMs) and set top boxes (STBs). Typically the splitters have a 3dB insertion loss, providing equal signals on both legs. While splitters split downstream signals, they also act to combine upstream signals. Typically CMs (or multimedia terminal adapters) transmit upstream between 15 and 42MHz because this frequency band is relatively quieter than the noisy 5-15 MHz band. STBs, on the other hand, typically transmit below 15 MHz and use a more robust modulation technique (QPSK or FSK). One problem is that CMs frequently do not have sufficient transmit power due to a high tap value at the pole and/or excessive losses in the home wiring. The conventional solution is to have a technician re-wire the coax in the house. This is time consuming (expensive) and often requires crawling around in an attic or crawl space, or drilling holes in walls. Another problem is that noise introduced on the line going to a one-way STB can cause interference with the upstream plant, even though the one-way STB does not transmit upstream.

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Solution:

See Fig. 1. The broadband splitter has been modified with a pair of diplex filters. The filtered splitter has two ports, one for the CM that provides full 2-way service, and one for a one-way STB that provides only downstream service. By not combining the upstream signal from the CM, 3dB more RF transmit power is available. This will prevent re-wiring in many cases. Additionally the lack of an upstream path for the one-way STB prevents upstream noise on its line from entering the cable system.

This leaves a second solution needed for two-way STBs. See Fig. 2. The incoming cable signal is fed into a triplex filter that produces 3 connections. The first is signals 54MHz - 1GHz for downstream reception by both CM and STB. The second is a 15-42 MHz connection for upstream CM transmissions, and a third is 5-15 MHz connection for upstream STB transmissions. A splitter splits the downstream signals and connects the signals to two different diplexers. A first diplexer feeds the CM and has a 54MHz – 1GHz downstream and a 15-42MHz upstream. A second diplexer feeds the STB and has a 54 – 1GHz downstream and a 5-15MHz upstream.

This improved splitting device allows both STBs and CMs to transmit with 3dB less power. It also prevents noise from the line feeding the two-way STB from interfering with CM upstream traffic on the plant.

Another improvement: devices can incorporate one-way (or bidirectional) amplifiers if necessary.

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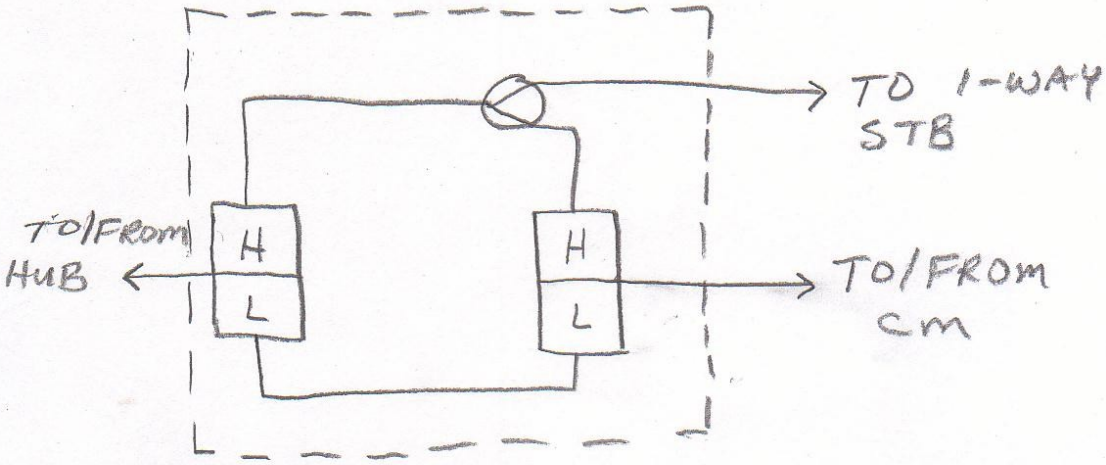

FIG. 1

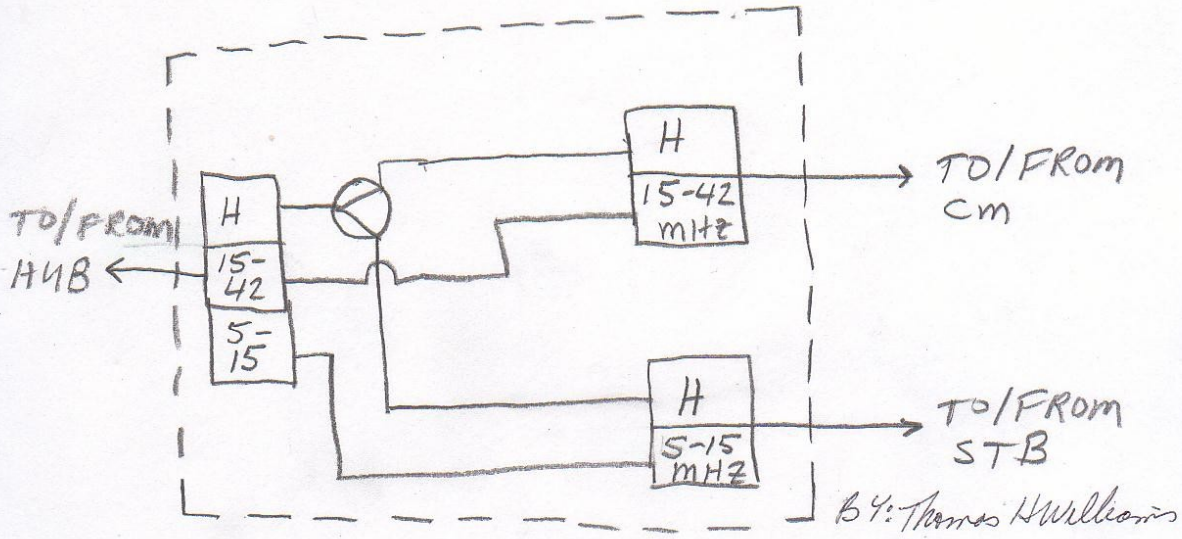

FIG. 2

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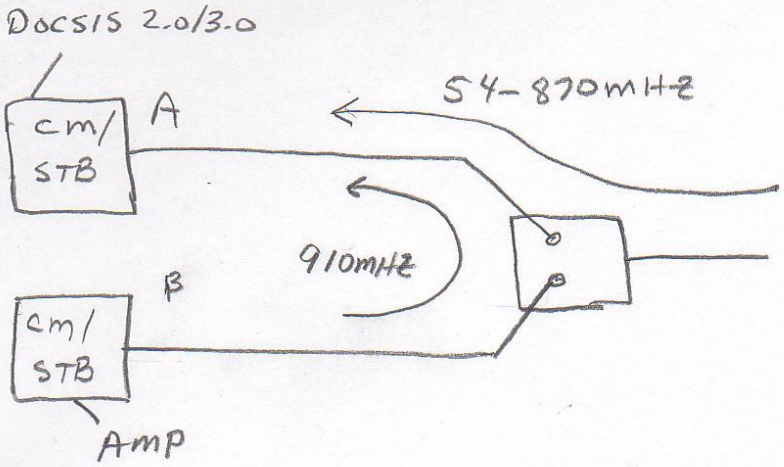
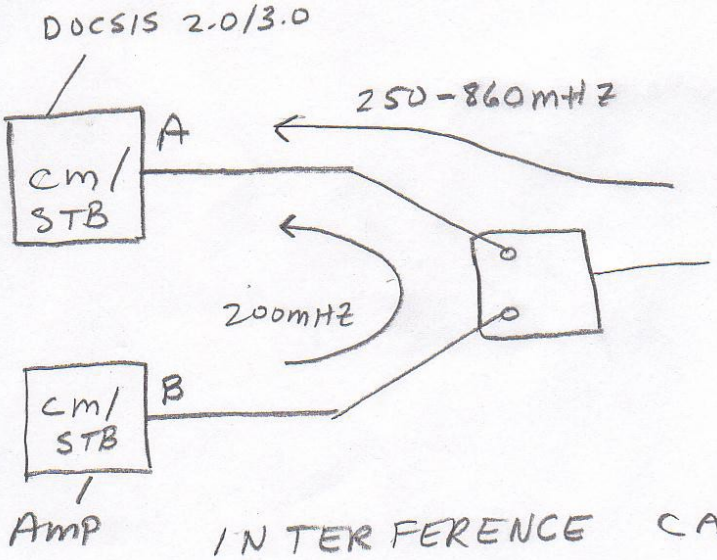


INTERFERENCE CASE 1

TOP SPLIT TRANSMITTER



INTERFERENCE CASE 2

MID-SPLIT TRANSMITTER

THW
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