

# INVENTION DISCLOSURE

## 1. **Invention Title.**

Method to Reduce Power Consumption with Partial OFDM Demodulation

## 2. **Invention Summary.**

To wake up a sleeping cable modem use a low data rate signal using just a fraction of the OFDM subcarriers available. Demodulate them with a discrete Fourier transform instead of the conventional fast Fourier transform. This reduces power draw while in sleep mode.

## 3. **Invention Description.**

### a. **Describe the invention in detail.**

A problem is the power consumption required to demodulate a wide-bandwidth transmission that is using OFDM (orthogonal frequency division multiplexing) modulation. The high sample rates and large block size is incompatible with the low power draw associated with a CM or STB that is in light-sleep mode. The boxes need to be awakened periodically to respond to SNMP queries, to answer an incoming phone call, to load new channel guides, to change service levels etc. See page 152 of “The Fast Fourier Transform” by E. Oran Brigham for details about FFT computing time. Normally the FFT would be quicker than a full DFT, but not in a case where you need only a small fraction of the symbols demodulated. A partial DFT would involve multiplying the incoming time symbols in a frame by Sine and/or Cosine functions and summing the product to find the complex value of the frequency domain symbol.

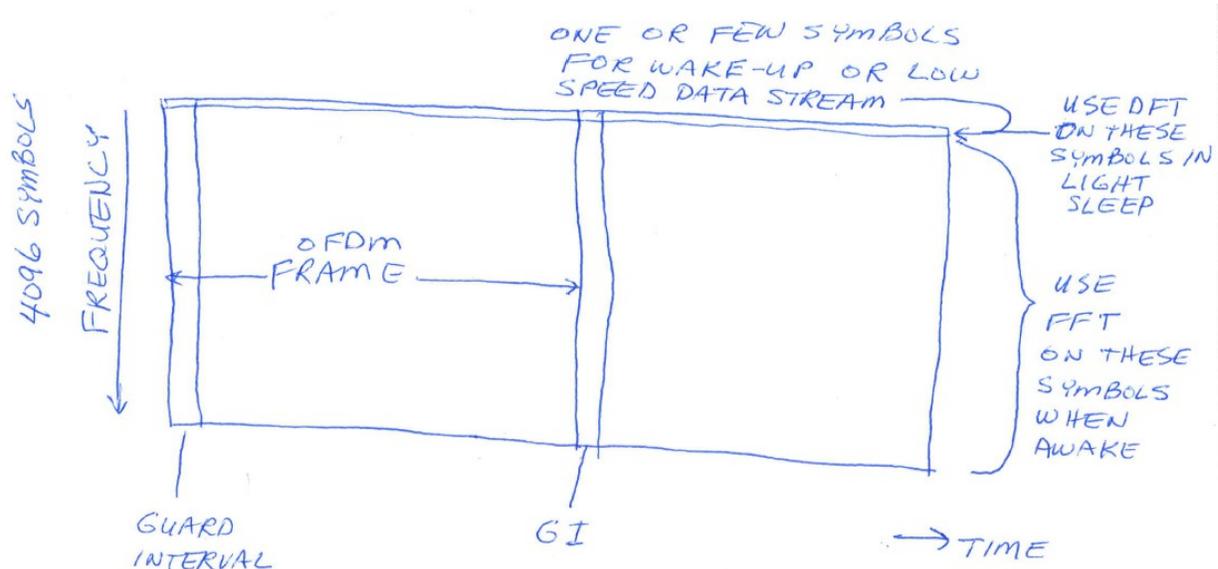
Furthermore, the few symbols to be decoded could be sent every Nth frame, where decoding would happen every half second, or so. This would save even more power.

This type of low power demodulation would also preserve synchronization with the carrier, allowing a faster wake-up time.

See Fig. 1 for details.

A variant to having just a few frequency domain symbols would be to have a few time-domain symbols (such as four) essentially creating a low speed data stream using SC-FDMA (single carrier-frequency domain multiple access) modulation. The guard interval would provide protection from echoes and other linear distortion.

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

Power conservation has become a system requirement.

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

Very large power savings at \$.10 per kwh, this idea, combined with other techniques, can save millions. It could be especially valuable for DOCSIS 3.1, which will utilize OFDM.

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

Not known.