INVENTION DISCLOSURE

1. **Invention Title: CM or STB Power Efficiency Improvements Using Energy Storage Components While In Sleep Mode**

2. **Invention Summary.**

A CM (or STB) charges up a supercapacitor from the main switching regulated power supply. The CM runs on the supercapacitor's charge while in standby or sleep mode. This solves a problem of CM power supplies running with poor efficiency if they are not operated at their design load (e.g. 30 watts). After the supercapacitor runs down, the CM's power supply recharges it and then powers down, always operating the power supply in an efficient load range.

3. **Invention Description**.

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

Switching regulated power supplies are typically about 85% efficient in converting 110VAC power into DC for transistor circuitry while running at rated load. If the load is decreased because a CM or STB is in sleep or other low-power mode, the power conversion efficiency falls severely. The solution is to have the CM's power supply charge a supercapacitor and then run off of the supercapacitor's energy while the CM is in the sleep mode. Other energy storage devices could also work, such as rechargeable batteries or conventional capacitors.

When the supercapacitor runs down, the CMs power supply will recharge the supercapacitor while operating at its most efficient load point. While the CM is charging the supercapacitor, the CM does not need to be in a full power mode, but can remain in sleep mode.

A supercapacitor is better than a battery because of its long life expectancy.

In the case of a MTA (multimedia terminal adaptor) or Gateway device, the internal standby battery can be used in place of the supercapacitor. In this case, it would not be good to fully discharge the battery in case a power outage occurred while little charge remained in the battery. 10% of the charge could be used without materially affecting time on standby.

Likewise, if a power outage occurred while the CM or STB was not sleeping, the supercapacitor could supply power for a several second power outage.

Another use that can be made of a storage element is to lower the peak power demand from the switching regulator, allowing the switching regulator to operate at a more efficient point. In this case, power surges could be supplied by a storage device, keeping the switching regulator at a most-efficient operating point.

A description of the supercapacitors is at:

http://en.wikipedia.org/wiki/Electric_double-layer_capacitor. They can be purchased from components supplier such as Newark or Digikey.

b. Why was the invention developed? What problem(s) does the invention solve? How is it better?
Solves the design problem of power supplies designed for 30 watts running efficiently at a few watts or less.

c. Briefly outline the potential commercial value and customers of the invention.
Very large. Millions sold.

4. **HOW is this invention different from existing products, processes, systems?**
This idea would compete with a power supply designer claiming he can make a power supply that operates efficiently at two load points, full power and standby. This is not easy to do, or free.

Conceptually this idea is roughly comparable to a hybrid automobile. An internal combustion engine is operated at its most efficient RPM to charge a battery.