

INVENTION DISCLOSURE

1. **Invention Title.**
DOCSIS Light Sleep Mode

2. **Invention Summary.**

A new operational mode for DOCSIS equipment, which is aimed at reducing power consumption of cable modems during periods of very low data throughput.

3. **Invention Description.**

a. Describe the invention in detail.

The CMTS signals a CM that it can shut off receiver for a set period of time using a DOCSIS MAC Management Message (such as the CM-CTRL message). During that period, the CMTS will not send DS packets or MAPs containing grants (incl. station maintenance) to the CM. The time period could be on scale of seconds. At any point, the CM can wake up if it needs to send upstream packets, but DS packets will get queued at the CMTS until the CM wakes, and then delivered once the CM is active: the CMTS would have no way of waking up the CM, it simply has to wait for the CM to wake up on its own.

At the end of the scheduled sleep cycle, the CMTS would schedule a station maintenance opportunity for the CM. To wake up, the CM would first lock to the DS and start listening to MAPs. If the CM has a packet to send, it would send a contention request per usual. If the CM doesn't have a packet to send, it would respond to the station maintenance opportunity. In either case, the CMTS will then have detected that the CM is awake and it can then forward any queued-up packets.

During sleep the CM will need to free-run its clock, and so the accuracy of that clock will determine how long the CM can sleep without needing to re-establish sync. There may be multiple regimes. In this mode, the assumption is that the station maintenance interval is unchanged, so the sleep time will be less than a station maintenance interval and the limiting factor is purely the CM's free-running clock (not plant drift). So, there may be a threshold below which the CM can resume lock on the DS, find a MAP, and then immediately transmit in an upstream burst (i.e. a contention slot). Above that threshold, the CM might need to receive a SYNC message in order to regain clock sync. Clearly it will matter as to which kind of US channel we're talking about (SCDMA vs. TDMA). On SCDMA channels it might be necessary to complete station maintenance prior to any other transmission.

This light sleep mode might be applicable to a data modem, gateway, or possibly even an MTA (if the sleep cycle were short enough).

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

Energy consumption is a growing concern. Both operators and customers have an increased interest in minimizing energy consumption while in the process maintaining functionality. This invention provides a way to retain the "always on" connectivity that DOCSIS provides, without consuming the full operational wattage of the cable modem.

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

All cable modems and CMTS.

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

EPON power savings mode – While in some ways similar in concept to the mechanism used in EPON, due to the specific mechanism by which this invention enables the CM to sleep, it can power down for periods of time measured in seconds rather than the 200ms used in EPON chips.