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Emerald System - 2% Transmit duty cycle calculation

1. Background (refer to the attached slides)

1.1. The Emerald System consists of:

- The Emerald Terminal.
- The Emerald Scanner (The Ring Scanner).
- The WLAN system.
- The UPS Host computer

1.2. The scanner flashes (maximum) twice every second searching for available Bar-Code label. Once the scanner identifies a valid Bar-Code Label, it opens its beam and reads the label. The Bar-Code data is transmitted to the Terminal via the Bluetooth link and than transmitted to the UPS host computer via the WLAN network. The host computer verifies and registers the package, and sends back acknowledge to the Terminal, which acknowledges the Scanner via the Bluetooth link, than the scanner can start the next scan.

2. Duty Cycle Calculation

2.1. Each Bar-code label consist of up to 18 characters which is 18 bytes of information = 180 bits

2.2. The overhead of the WLAN link is:

- TCP/IP – 40 Bytes per each transmission = 400 bits
- 802.11 protocol – 192uSec.

2.3. The WLAN baud rate is self-adjusted to 1,2,5,11Mbit during the 802.11 preamble time pending on the communication quality. The 802.11 overhead takes always 192uSec.

2.4. Table 1 summarizes the transmit duration of each Bar-Code label pending on the WLAN baud rate:

Communication Rate	1Mb/Sec	2Mb/Sec	5Mb/Sec	11Mb/Sec
Bar- Code 180 bits	180	90	36	16.36
TCPIP Overhead 400 bits	400	200	80	36.36
802.11 protocol overhead 192uSec	192	192	192	192
Total uSec	772	482	308	244.72

Table 1

2.5. Conclusion: The maximum communication duration is 772uSec every 500msec. If we assume transmit duration of 1msec (worst case), than the DUTY CYCLE is 0.2%.