TX Duty Cycle Calculations for Ascom WH1 WLAN-handset

1 General

This document describes the calculations of the TX duty cycle for Ascom WH1 WLAN VoIP handset.

2 Prerequisites

The calculations are based on an ideal radio link, i.e. good signal strength and no re-transmissions.

The data size is derived from a phone call with codec G.711, 20 ms frame size and no silence suppression.

The prerequisites above shall be interpreted as “best radio conditions” and “worst codec options”.

The calculations are done for five types of radio scenarios:

802.11b with a payload data rate of 1Mbit/s, long preamble

802.11b with a payload data rate of 11Mbit/s, long preamble

802.11g with a payload data rate of 6 Mbit/s

802.11g with a payload data rate of 54 Mbit/s

802.11n with a payload data rate of 6.5 Mbit/s (MCS0)

802.11n with a payload data rate of 65 Mbit/s (MCS7)

Note: For 802.11n mixed format is assumed, i.e. coexistence with 802a/b/g. Greenfield mode, only 11n in the system, would result in shorter duty cycles.

Since Ascoms handsets are capable of three-way conferencing where two TX streams are sent to each recipient, the duty cycle is doubled in the final summary.

3 Payload Data

The payload consists of an IP-telephony call with codec G.711, 20ms frame size encapsulated with RTP, UDP and IP headers.

	Bytes
G.711 20 ms	160
RTP	12
UDP	8
IP	20
802.11	36
Bytes per packet	240

4 Time to send a packet – Duty Cycle

Function	**Time in 802.11b 1Mbit/s (us)**	**Time in 802.11b 11Mbit/s (us)**	**Time in 802.11g 54Mbit/s (us)**	**Time in 802.11g 6 Mbit/s (us)**	**Time in 802.11n 6.5 Mbit/s (us)**	**Time in 802.11n 65 Mbit/s (us)**
Preamble	192	192	20	20	36	36
Data time	1920	175	35	320	295	30
Preamble	192	192	20	20	36	36
ACK	10	10	10	10	10	10
Total TX time	2300	569	85	370	377	112
Duty cycle %	11.5	2.8	0.43	1.85	1.89	0.56
Duty cycle 3 party call %	23	5.7	0.85	3.7	3.78	1.12
20*log(3party duty)	-12.76	-24.88	-41.42	-28.64	-28.45	-39.02