

TagMaster

North America, Inc.

Bluetooth and W-LAN Interference Guide

Table of contents

| | |
|---|---|
| 1: REVISIONS..... | 2 |
| 2: INTRODUCTION..... | 2 |
| 3: BLUETOOTH TEST..... | 2 |
| 4: WIRELESS LOCAL AREA NETWORK (W-LAN)..... | 3 |
| 5: APPENDIX A..... | 5 |
| 5.1: W-LAN Frequency table..... | 5 |
| 5.2: Reader Frequency table..... | 6 |

1 Revisions

| Revision | Date | Issued by | Comment |
|----------|------------|---------------|---------|
| 01 | 2002-11-07 | Josip Udovcic | |

2 Introduction

This document describes how BlueTooth and W-LAN interferes with the Reader during the identification of a tag.

Conclusion of the tests:

BlueTooth and a Reader do not interfere with each other.

By using the W-LAN channels 1-3 the possibility of interference between the W-LAN connection and the Reader is minimized. If the channels 4-13 are used, interference may occur, but can be avoided by using the frequency tables in Appendix A.

3 BlueTooth test

The test is performed using a BlueTooth Compact Flash-card from Socket inserted in the Reader PDA expansion slot. To get the BlueTooth card to work and start sending and receiving signals, an Internet connection with a Sony Ericsson T68i mobile phone is

established via BlueTooth-link. From the mobile phone, GPRS is used to access Internet. Once the connection is up, a large web page is downloaded, making the BlueTooth units (PDA to mobile phone) communicating at full speed.

Simultaneously the Reader starts reading a tag. An application is used that shows the percentage of the reading range. 100% means full reading and 0% means no reading.

The reader starts reading from a short distance, and is then slowly moved away from the tag. The distance is measured when the reader drops below 100% and at 0%.

The results where the following:

| Percentage | Distance |
|-------------------|-----------------|
| 100% | 70 cm |
| 0 | 100 cm |

The reading results of the Reader in an interference free environment are the same as the result shown above. The channel used on the reader was channel 50.

Conclusion:

The results indicate that there is no interference between the Reader and BlueTooth unit. An explanation could be that BlueTooth uses frequency hopping while the Reader uses one settable frequency.

4 Wireless Local Area Network (W-LAN)

The tests where performed in the same way as the tests with BlueTooth. The W-LAN hub (access point) was placed 10m from the Reader. Then a large website is downloaded to the PDA using W-LAN to access the Internet. Simultaneously the Reader starts reading a tag using the same application as in the BlueTooth test.

The result was the following:

| Percentage | Distance |
|-------------------|-----------------|
| 100% | 70 cm |

| | |
|---|--------|
| 0 | 100 cm |
|---|--------|

Note: The channels where set to:

W-LAN: 7 (of 13)

Reader: 50 (of 99)

Conclusion:

As the results show, there is no interference on the reading range on the Reader. But there was interference on the W-LAN unit, breaking the connection between the PDA and WLAN access point. Moving closer to the hub, 2 m away, regains the connection.

By changing the channels, so that they are as far away as possible from each other, the interference is reduced. A few other tests were performed with the following channels settings:

| W-LAN channel | Reader channel | Result |
|---------------|----------------|--|
| 1 | 1, 50, 99 | W-LAN connection up to 25 m (test not done in free space), no reading interference |
| 2 | 1, 50, 99 | W-LAN connection up to 25 m (test not done in free space), no reading interference |
| 3 | 1 | W-LAN connection not working. Reading not affected. |
| | 50 | W-LAN connection working excellent. Reading not affected. |
| | 99 | W-LAN connection working excellent. Reading not affected. |
| 13 | 1 | W-LAN connection working poorly. Reading not affected. |

5 Appendix A

5.1 W-LAN Frequency table.

| Channel ID | FCC | Start Freq. | End Freq. |
|-------------------|------------|-------------------------------|------------------|
| 1 | 2412 | 2400 | 2424 |
| 2 | 2417 | 2405 | 2429 |
| 3 | 2422 | 2410 | 2434 |
| 4 | 2427 | 2415 | 2439 |
| 5 | 2432 | 2420 | 2444 |
| 6 | 2437 | 2425 | 2449 |
| 7 | 2442 | 2430 | 2454 |
| 8 | 2447 | 2435 | 2459 |
| 9 | 2452 | 2440 | 2464 |
| 10 | 2457 | 2445 | 2469 |
| 11 | 2462 | 2450 | 2474 |
| 12 | 2467 | Not supported inIEEE Standard | |
| 13 | 2472 | Not supported inIEEE Standard | |
| 14 | 2484 | Japan Only | |

5.2 Reader Frequency table

| Ch | F (kHz) | Ch | F (kHz) | Ch | F (kHz) |
|----|---------|----|---------|-----|---------|
| 1 | 2435100 | 34 | 2445000 | 67 | 2454900 |
| 2 | 2435400 | 35 | 2445300 | 68 | 2455200 |
| 3 | 2435700 | 36 | 2445600 | 69 | 2455500 |
| 4 | 2436000 | 37 | 2445900 | 70 | 2455800 |
| 5 | 2436300 | 38 | 2446200 | 71 | 2456100 |
| 6 | 2436600 | 39 | 2446500 | 72 | 2456400 |
| 7 | 2436900 | 40 | 2446800 | 73 | 2456700 |
| 8 | 2437200 | 41 | 2447100 | 74 | 2457000 |
| 9 | 2437500 | 42 | 2447400 | 75 | 2457300 |
| 10 | 2437800 | 43 | 2447700 | 76 | 2457600 |
| 11 | 2438100 | 44 | 2448000 | 77 | 2457900 |
| 12 | 2438400 | 45 | 2448300 | 78 | 2458200 |
| 13 | 2438700 | 46 | 2448600 | 79 | 2458500 |
| 14 | 2439000 | 47 | 2448900 | 80 | 2458800 |
| 15 | 2439300 | 48 | 2449200 | 81 | 2459100 |
| 16 | 2439600 | 49 | 2449500 | 82 | 2459400 |
| 17 | 2439900 | 50 | 2449800 | 83 | 2459700 |
| 18 | 2440200 | 51 | 2450100 | 84 | 2460000 |
| 19 | 2440500 | 52 | 2450400 | 85 | 2460300 |
| 20 | 2440800 | 53 | 2450700 | 86 | 2460600 |
| 21 | 2441100 | 54 | 2451000 | 87 | 2460900 |
| 22 | 2441400 | 55 | 2451300 | 88 | 2461200 |
| 23 | 2441700 | 56 | 2451600 | 89 | 2461500 |
| 24 | 2442000 | 57 | 2451900 | 90 | 2461800 |
| 25 | 2442300 | 58 | 2452200 | 91 | 2462100 |
| 26 | 2442600 | 59 | 2452500 | 92 | 2462400 |
| 27 | 2442900 | 60 | 2452800 | 93 | 2462700 |
| 28 | 2443200 | 61 | 2453100 | 94 | 2463000 |
| 29 | 2443500 | 62 | 2453400 | 95 | 2463300 |
| 30 | 2443800 | 63 | 2453700 | 96 | 2463600 |
| 31 | 2444100 | 64 | 2454000 | 97 | 2463900 |
| 32 | 2444400 | 65 | 2454300 | 98 | 2464200 |
| 33 | 2444700 | 66 | 2454600 | 99 | 2464500 |
| | | | | 100 | 2464800 |

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