Technical Note

WipLL 900 MHz

Wireless IP-Based Local Loop System

Hopping Algorithms and Compliance with FCC 15.247 (a) (1)

Connecting the World with Wireless Access Solutions

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Contents

1. Introduction

This document provides a description of the Hybrid system (HS) for WipLL 900 MHz products. The HS is for 1 Mbps, 2 Mbps, and 3 Mbps, and 1.33 Mbps and 4 Mbps.

2. Hybrid System Algorithms

- The hopping algorithm is defined by a table of ***n*** frequencies, where ***n*** is equal to 25 when the system is configured for 1 Mbps, 2 Mbps, and 3 Mbps, and where ***n*** is equal to 13 when the system is configured for 1.33 Mbps and 4 Mbps. The hopping sequence follows cyclically the frequencies in the table, remaining in each frequency for a constant period. The frequencies in the table are all in the 903 to 927 MHz range, with at least 1 MHz between any two frequencies in the table for systems configured for 1 Mbps, 2 Mbps, and 3 Mbps; and at least 2 MHz for systems configured for 1.33 Mbps and 4 Mbps. The order of frequencies in the table is pseudorandom.
- In Section **Error! Reference source not found.**, "**Error! Reference source not found.**", two modes (1 MHz-channel spacing and 2 MHz-channel spacing) are described in **Error! Reference source not found.**.

3. Hopping Time

The hopping time in a given is constant (typically WipLL uses 50 msec).

4. Number of Channels

The number of channels is determined by the table size ***n*** frequencies, depending on transmission speed configured for the WipLL system:

- For 1 Mbps, 2 Mbps, and 3 Mbps, ***n*** is equal to at least 25 (i.e., WipLL uses ***n*** = 25)
- For 1.33 Mbps and 4 Mbps, ***n*** is equal to 13

5. Resolution

The minimum difference between any two channels is:

- 1 MHz for 1 Mbps, 2 Mbps, and 3 Mbps
- 2 MHz for 1.33 Mbps and 4 Mbps

6. Channel Distribution

Since any used channel is included once in the table, all the channels are equally used, each channel occupying ***1/n*** of the time.

7. Pseudo-random Frequencies for Hybrid Mode

The following tables provide an example of pseudo-random hopping frequencies for the Hybrid mode for 4 Mbps and 3 Mbps.

Table 1: Example of Hybrid Mode with Pseudo-Random Hopping

4 Mbps	
Frequency Assignment	**Frequency (MHz)**
F1	921
F2	913
F3	919
F4	905
F5	903
F6	917
F7	909
F8	925
F9	915
F10	927
F11	907
F12	923
F13	911

3 Mbps	
Frequency Assignment	**Frequency (MHz)**
F1	908
F2	917
F3	903
F4	922
F5	909
F6	916
F7	907
F8	914
F9	923
F10	912
F11	927
F12	919
F13	926
F14	913
F15	925
F16	904
F17	910
F18	918
F19	905
F20	924
F21	911
F22	920
F23	906
F24	915
F25	921

8. Receiver and Transmitter Compliance

8.1. Receiver Compliance with 15.247 (a) (1) / 2.1033 (a) (10)

The system receiver has an input bandwidth that matches the hopping bandwidth of the corresponding transmitters. The receiver shifts its frequency in accordance with the same frequency hopping table and pattern as the transmitters.

8.2. Transmitter Compliance with 15.247 (g), 15.247 (h)

- **15.247 (g):**

  The equipment fully complies with the requirements of this section. In our case, each transmission employs all available hopping channels, performed according to the requirements of 15.247.

- **15.247 (h):**

  The equipment fully complies with the requirements of this section. There is no coordination between the systems to avoid simultaneous occupancy of the hopping frequencies by multiple transmitters. Each transmitter operates independently and there is no synchronization with other transmitters.