Frequency Hopping Spread Spectrum Systems – 15.247

System Specifcations:

Operating Frequency	2400 to 2483.5 MHz
Transmit Power	125mW (max)
Transmit Power Control	NIL
Duplexing Technique	Time Division Duplex (TDD)
Multiplex Access	TDMA (24 time slot)
Spreading Scheme	Frequency hopping
Speech encoding	32K ADPCM
Hop Sequence	Pseudo PN code
Channel Symbol Rate	1.152Kbps
Channel Spacing	1.728MHz
Number of Channels	45 channels
Number of Active Channels	16 channels (minimum)
Dwell time	10mS (maximum)
Hopping rate	100 hop/sec
Modulation	GFSK

Frame Structure:
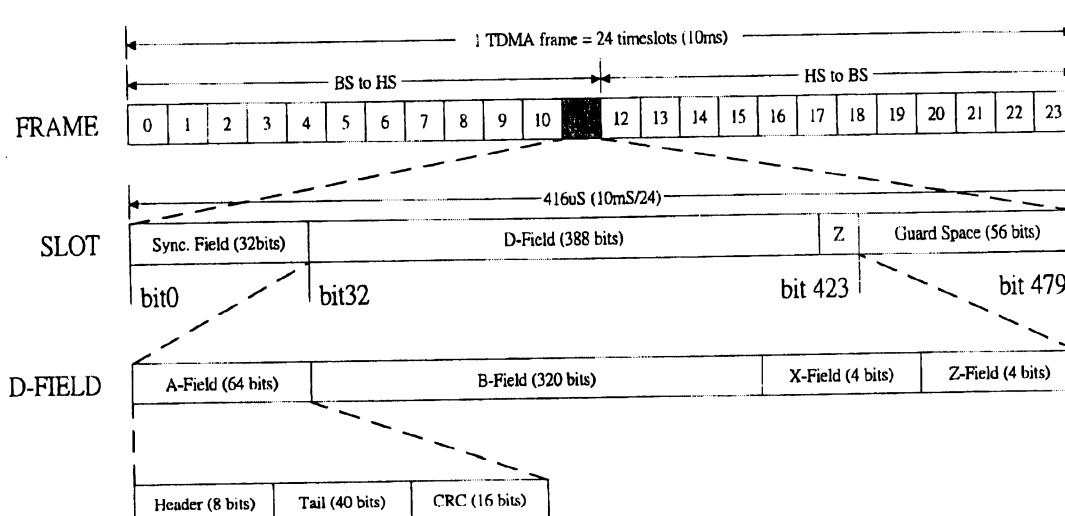
15.247 (a) (1) (iii):

__Yes___ Does the measured 20 dB bandwidth comply with the appropriate limit?
- The bandwidth of the system is 1.728MHz. The data rate is 1.152MHz. The modulation method is GFSK (BT=0.5).

__Yes___ Is the proper number of hopping channels employed, in all modes of operation?
- In idle mode (i.e. there is no voice communication), base will transmit a pilot signal for 416uS every 10mS in different frequencies. The number of frequencies of pilot signal is 16. The first channel (channel 0) is 2403.648MHz. The last channel (channel 44) is 2479.680MHz. The total span of is 76.032MHz. The hopping sequence is
[0, 8, 16, 22, 31, 37, 44, 4, 11, 18, 25, 34, 39, 42, 28, 40].

- In active mode (i.e. there is voice communication), another time slot (416uS) will be used. The active slot co-exists with the pilot time slot. The sequence of active time slot is calculated by following equation.

$Yn+1 = (Yn + delta) \bmod 45$, where Yn is current channel, Yn+1 is next channel and delta is 7, 11, 13, 14, 17 and 19.

__Yes___ Does the dwell time (average time of occupancy) per channel comply with the 0.4 second within the time period required to hop through all channels?
- The hopping rate is 10mS. The average time is 10mS maximum for each channel within 160mS.

15.247 (b) (1):
__Yes___ Does the peak output power comply with the 0.125 W limit?

__Yes___ We will require 2 complete samples. The units have to be modified so that we can turn the frequency hopping on and off and also when FH is turned off, we must be able to select any channel on handset and base.

Handset:
● When handset is in standby mode, press softkey <MENU> and following key sequence <*><#><8><3><2>, LCD display = RF TEST MODE
● Press softkey <PT> to enter PT RF test mode.
● Press softkey <Chan> to select channel from 0 to 44. Press softkey <OK> to confirm the choice. Then the handset will transmit at one time slot (416uS) every 10mS at the specified channel.
● Press softkey <Field> to select different data modulation. 1=0101, 2=1100, 3=random

After complete the testing, the handset need be turned off and on again for normal operation.

Base Station:
● The test mode of base station need be controlled through handset.
● Make sure handset has been registered to the base
● Make sure handset is synchronized with the base
● In the handset, press softkey <MENU> and the key sequence <*><#><8><8><1>, LCD display = Fixed freq MODE
● Press softkey <FT> to stop the hopping of base station
● Press softkey <PT> to sop the hopping of handset.
● Wait until handset is synchronized to the base again in NON hopping mode.
● Press softkey <MENU> and the key sequence <*><#><8><3><2>, LCD display = RF TEST MODE
● Press softkey <FT>, LCD display = FT RF test mode. Press softkey <OK> to confirm the choice
● Press softkey <Chan> to select channel from 0 to 44. Press softkey <OK> to confirm the choice. Then the handset will transmit at one time slot (416uS) every 10mS at the specified channel.
● Press softkey <Field> to select different data modulation. 1=0101, 2=1100, 3=random