SI4432 WS3000 Hack

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SI4432 Weather Station WS3000

last updated: nov 2014, Stef Mientki

Introduction

In the Raspberry and Arduino groups you can find some information, but it's still seeking for a needle in a haystack. For the weather station WS3000 (or WH1070) there seems to be 2 different protocols, the older based on OOK-modulation and the newer based on FSK-modulation.
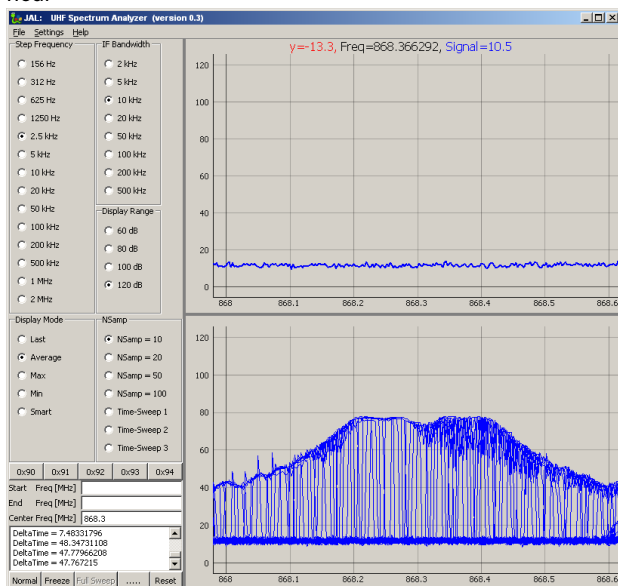
Frequency Deviation

according to some mail discussions, the new version of the WS3000 has FSK with an deviation of 134 kHz.
So let's try to verify that, leave the spectrum analyzer running in search mode for at least half an hour and we ge the picture below.
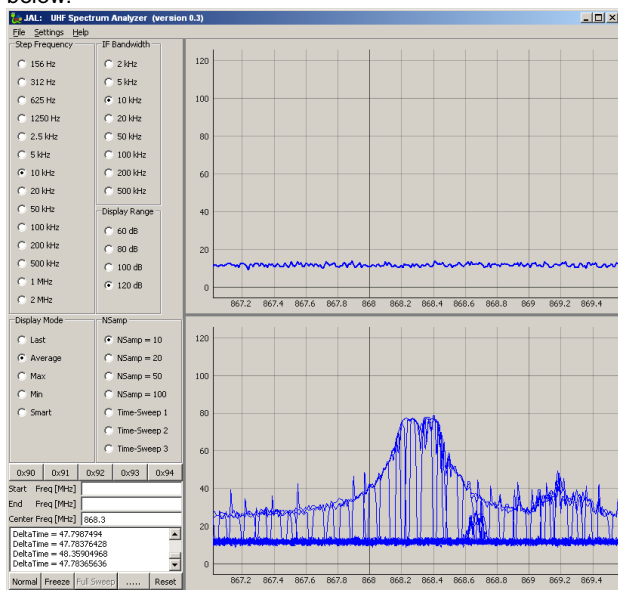
The picture above isn't accurate enough, so let's zoom by decreasing the stepsize and run the spectrum analyzer for another hour

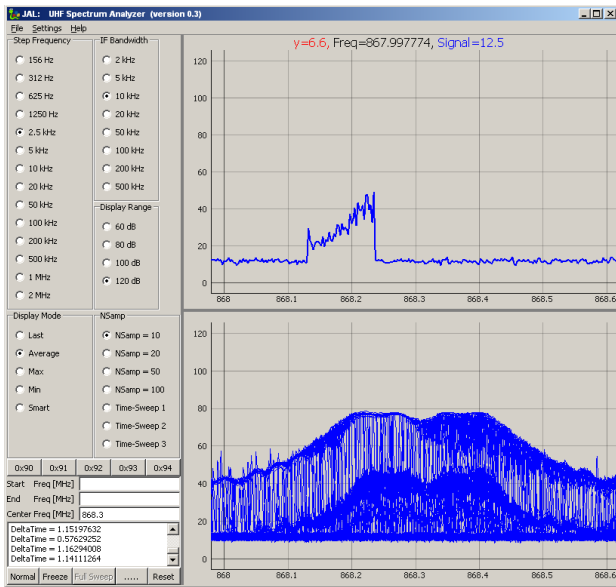The above picture is better, measuring gives the following values:
Freq-Left   = 868.254 MHz
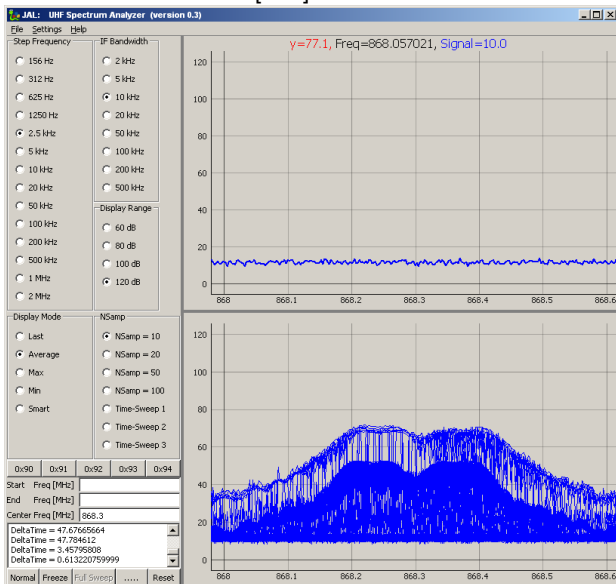Freq-Center = 868.317 MHz
Freq-Right   = 868.366 MHz
Resulting in a frequency deviation (max difference from the center) of about 50 to 60 kHz.
The next step is to verify the above measurement by simulating the above signal with the UHF-Generator.

-- Frequency Deviation : 67.0 [kHz]
-- Manchester   : OFF
-- Carrier Frequency : 868.3 [MHz]
-- Data Rate   : 2.5 [kb/s]

OOK or FSK modulation

With the Spectrum Analyzer in Time Sweep mode you can easily detect if the WS3000 is sending a OOK-signal or a FSK-signal. The picture below shows that we have a FSK signal. If you set the Spectrum Analyzer in Search-mode you can also see that a signal is send each 48 seconds and if you wait long enough until an whole hour is reached, you'll see that there's a silence of a few minutes.
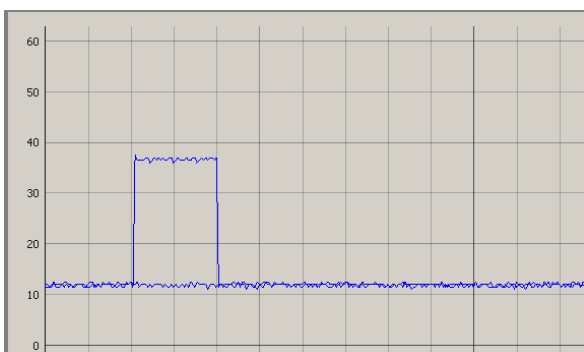
An OOK-signal will look like this:
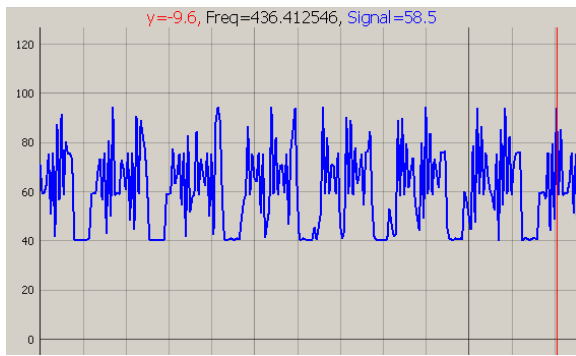
The textcontrol indicates a very stable 48 second repetition (Sometimes the time is broken in 2 pieces by the Spectrum Analyzer, in the picture below line 2 and 3 should be added)

```
DeltaTime = 0.1271178
DeltaTime = 47.89758792
DeltaTime = 0.11048596
DeltaTime = 47.8957386
DeltaTime = 48.02231032
DeltaTime = 48.02291624
DeltaTime = 47.90974804
DeltaTime = 0.11400764
DeltaTime = 47.89693344
DeltaTime = 0.13803972
DeltaTime = 47.88539504
DeltaTime = 0.12682156
DeltaTime = 47.89594484
DeltaTime = 48.02407744
DeltaTime = 48.02232228
DeltaTime = 47.90846392
DeltaTime = 0.10096816
DeltaTime = 47.91029872
DeltaTime = 0.11091364
```