

## Noise and Vibration data acquisition without wires

The availability of low cost wireless networking products should have made a real difference to data acquisition; but it hasn't why? Probably because the range and data rates are just not good enough; let us examine what is possible within the regulations governing wireless emissions in the UK.

1. The standard is 802.11g with 54 million bits per second possible. The carrier frequency is 2.4GHz and the stated range is 50 Metres.

This translates to 3.375 Million 16 bit samples per second but is likely to deliver 1/10th of this when all overheads are taken into consideration so 375kHz is the likely global maximum. A very useful number leading to 10 channels of NVH data with a 15kHz bandwidth per channel.

The 2.4GHz carrier frequency is a problem however as this unregulated low power band is full of almost everything including a lot of Wireless networks, Bluetooth and microwave ovens! The relatively high frequency means that it is strictly line of sight and is well absorbed by most things.

Range at permitted transmission powers is stated as 50 metres and is certainly less than 100 metres in most environments.

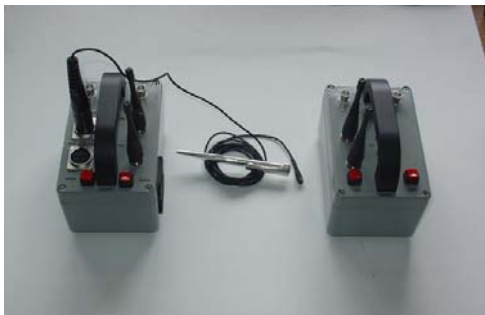
The conclusion is that the transmissions are likely to be prone to interference and the vehicle is going to be out of range before the recording has been made.

Applications.

Typically any measurement situation where you do not want long runs of wire that will be tripped over or impractical to lay. Some obvious examples are: -

1. Outdoor sound power measurements.
2. Vehicle Pass-by noise measurements.
3. Simultaneous interior and exterior vehicle noise measurements
4. Pop concert/event environmental noise monitoring.
5. ....

In contrast the Bay Systems radio link delivers interference free data over a wide bandwidth ( 50-15kHz ) and with a considerable range.



With the standard aerials shown the range was 200+ metres i.e.. further than the large tree

With the high gain receiving antenna the range was more than 600 metres i.e. to the power pylon shown in the picture.



**Description of the system.**

Number of Radio Link Channels	1 to 4 without site radio licence
Frequency bandwidth per channel	50Hz to 15kHz +/- 3.5 dB
Signal to noise ratio	90dBA
Total Harmonic distortion	<2%
Operating temperature	0-50 degrees C

Battery type used throughout the system is PP3 9v. Suggested battery high power alkaline such as Maxcel with 880m Amp hours capacity. The battery life > 16 hours  
NiMH rechargeable batteries will have a shorter life but will typically > 4 hours

**Radio Link Specification.**

Carrier frequency	863.125, 863.625, 864.500 and 864.875MHz
Transmitted radio power	5 mW
Type of link	Variable reactance modulation
Regulatory certificates	EN 300 422 and EN 301 489
Operating Range with	
- standard aerial	200+ metres - line of sight
- High gain receiving aerial	600+ metres - line of sight

**General characteristics.**

The systems are designed for individual customer requirements; typically the requirement has been for twin channel transmit and receiver systems for use with the GLM100 omni-directional microphones. System input sensitivity can be adjusted from -20 to 75 dB of gain to accommodate any input signal. System output is normally set for a 94dB input signal to generate an output from the receiver of approximately 100mVolts. This is particularly well suited to most modern ADC systems as they will typically have a 1 volt input range which will be well matched to this signal while a more basic ADC with only a 10 volt range will still function well for all normally encountered sound pressure levels.