Measuring Electrosmog

Physics

Introduction
Electrosmog is the 21st century name for man-made Radio Frequency Radiation or emissions.
The Radio Frequency band is part of the Electromagnetic Spectrum and the frequency is usually measured in Hz (Hertz/waves per second) and Field Strength in w/m (watts per metre).

Although it is hard to trace the precise origin of the term, it is probably called Electro*smog* because with the many wire-less broadcasting signals, equipment and gadgets in most countries, there is so much of it around us that some people feel it is actually a pollution which can affect general health and interfere with the correct operation of some pieces of equipment, such as hospital instruments or aircraft avionics.

The Electrosmog sensor can be considered as a very wide band radio receiver which does not measure the actual signal content (ie speech), but the signal level, called Field strength. In this way you can take relative and comparative measurements from different pieces of everyday equipment and investigate how their strength is affected by distance and obstructions.

The sensor has a built in dipole aerial which is made of two very thin copper strips located at the rear (long edge) of the Arrowhead. When fitted in most LogIT dataloggers the arrow, and so the antenna, will naturally be vertical (technically called vertically polarised) which will suit the majority of products being measured as most of these have vertical antenna, but you can experiment by rotating its orientation to detect different signals.

Ideas for the Lab...
Plug the Electrosmog sensor into a LogIT datalogger (ideally a remote LogIT with display such as DataVision or Voyager) and move around the room.
• Without switching specific wireless devices on, investigate the radio waves around the lab coming from different areas in the lab, room, building or outside. Are you surprised by the amount of radio frequency activity?

• Are there any particularly strong areas of signal - can you locate the source using the signal strength levels?

• Is the signal continuous or intermittent?
i Some mobile devices do not transmit a signal all of the time. For example mobile phones transmit in bursts, either when they are on standby to tell the cell station they are available or when they are transmitting actual speech where this is digitally compressed into small 'packets'. This is so that one mobile phone does not use its frequency on the radio spectrum all of the time, allowing several mobile phones to use the same frequency but at different slices in time. In practice this all happens extremely quickly many times a second and is not heard by the callers as the packets are decompressed and 'stretched' out in the other phone.

• Compare signal field strengths from different mobile phones on different mobile phone networks by switching on one phone at a time and making a brief call, recording 10 seconds or so of signal strength from each one taking care to always measure the same distance from each phone, because field strength reduces with distance. Do all phones transmit similar power?

i A mobile phone's transmitted power level is dynamic and they only transmit sufficient power to communicate with the nearest 'cell' base station for their network - this reduces inteference to other cells and improves battery life. But it means that telephones on different networks need to transmit at different powers depending on how far away they are from their nearest Cell base station mast.

• Try the same experiment with a Cordless DECT telephone (ie a standard home digital cordless phone) if available and compare results - you may be surprised! We found that most DECT cordless phones we tried transmitted with much more power than the mobile phones we tested!

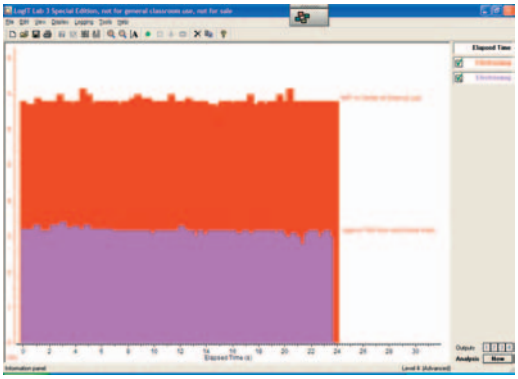
Ideas for outside....

Electrosmog is all around us now in most countries in the Western world.

• You can take a LogIT and Electrosmog sensor out when you go on school / college trips. Does the amount of Electrosmog vary greatly between City, Rural and very remote places like hills and mountains?

• Is there a mobile phone cell mast near you? Does the signal strength change a lot as you get nearer?

• Record a signal a usual distance from a mobile phone mast (ie a nearby path) and another a usual distance from near a WiFi station at school or home. How do the signal strengths compare?



NEVER GO CLOSER TO ANY MAST OR WIFI ANTENNA THAN IS SAFE TO DO SO - FOLLOW YOUR LOCAL RISK ASSESSMENT GUIDANCE WITH ANY EXPERIMENTATION INSIDE OR OUTSIDE THE SCHOOL OR COLLEGE.

• If you have more than one Electrosmog sensor and LogIT, try logging several simultaneously in different places over the same period. Does the signal strength vary a lot in a similar area?

Screening and Reflecting Radio frequency waves

Radio Waves can be reduced or blocked. Metal is often used to 'screen' or shield radio waves but other solid objects like walls also restrict and reflect signals.

• Experiment with different types of material to cut down radio signals such as aluminium foil, glass, plastic, wood, hands, sweet tins etc - it is usually better practice to screen the receiver (in this case the Electrosmog sensor). Does the thickness of the material or whether it is completely sealed make any difference?

• Radio waves can be reflected in a similar way to light - that is why there is a curved disc behind a satellite dish to reflect and focus the waves onto the antenna.
See if you can reflect radio waves onto or away from the Electrosmog sensor.
What does this tell you about Radio waves?