

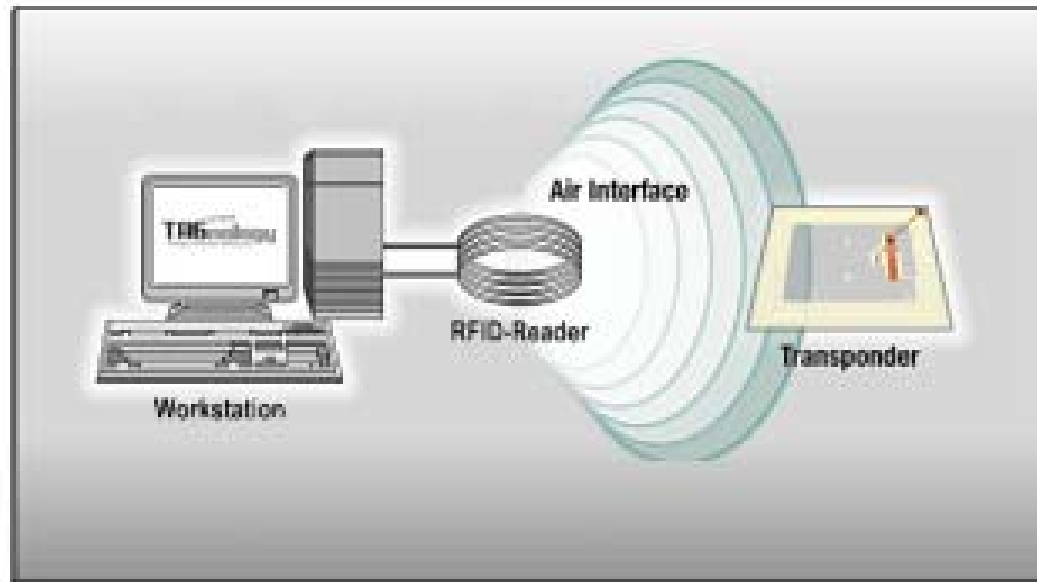
RFID and The City of Berkeley

What is RFID?

Are there verifiable health effects?

What is City Policy?

RFID System

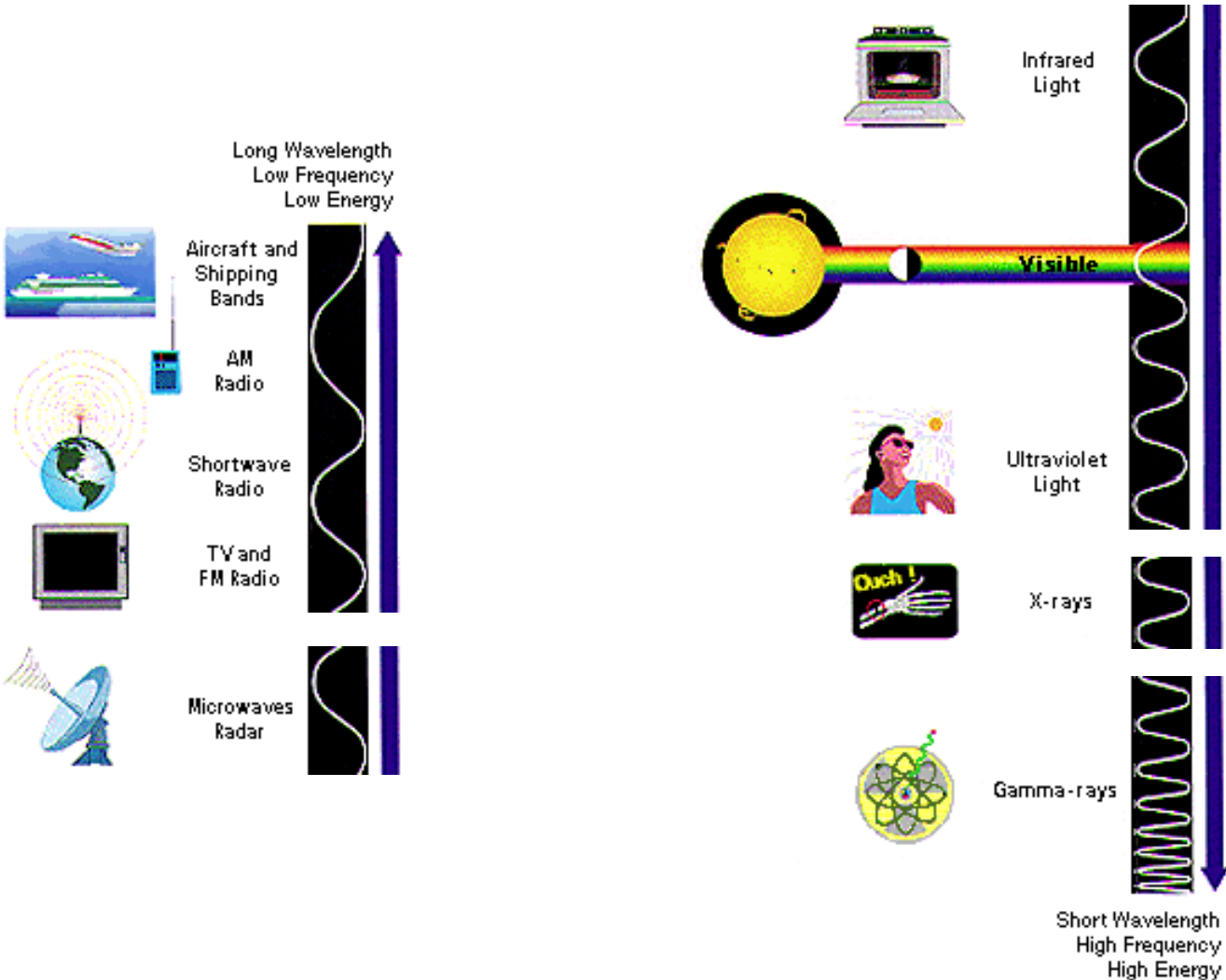


The RFID reader emits a radio wave which triggers the transponder to send back its ID number. In essence this RFID system is a very weak radio transmitter – receiver – transmitter system.

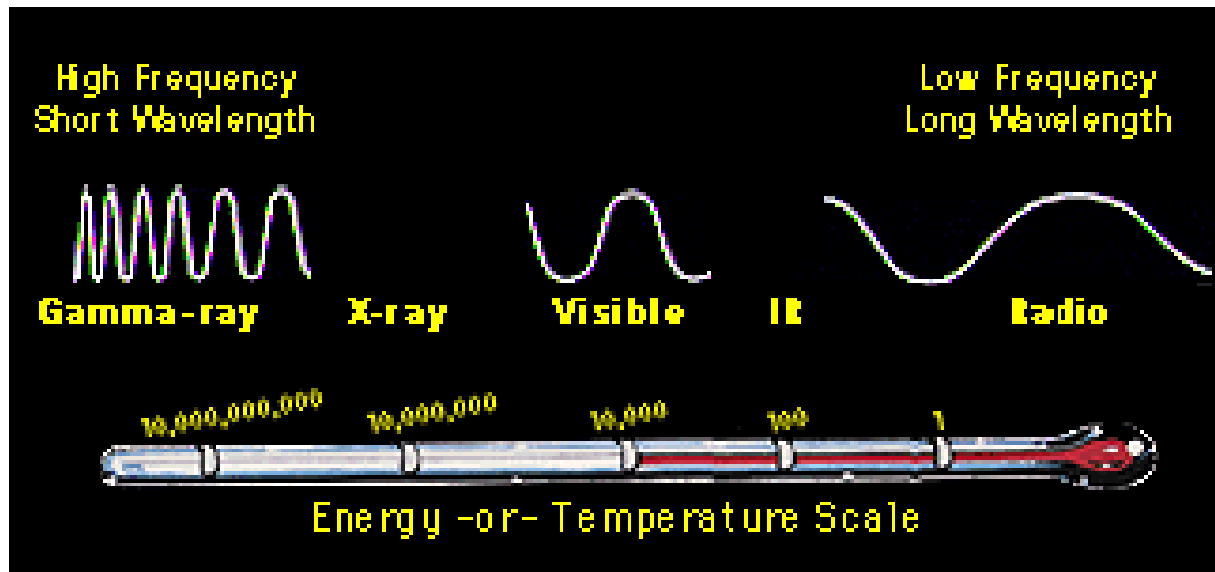
RFID Tags

- Two kinds
 - Active: internal power source
 - Passive: no internal power source - uses induced power
- Four frequency ranges
 - Low frequency: 125 or 134.2 kHz
 - High frequency: 13.56 MHz
 - UHF tags: 868 to 956 MHz
 - Microwave tags: 2.45 GHz

Electromagnetic Spectrum



Electromagnetic Spectrum



The electromagnetic spectrum can be expressed in terms of energy, wavelength, or frequency

What biological effects can be caused by Electromagnetic energy?

Ionizing radiation (high energy)

- X-rays
- Gamma rays
- Electrons can be stripped away from molecules
 - can damage biological tissues, including DNA

Non ionizing radiation (low energy)

- Radio, TV
- Cell phones, Wi-Fi
- Large amounts can heat tissue
 - Causes molecules to rotate & vibrate faster
- Increases in body temperature can damage tissues

What levels of RF energy are considered safe?

- Many countries in Europe and elsewhere use exposure guidelines developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP)
- Threshold level of exposure at which harmful biological effects may occur
 - Whole-body Specific Absorption Rate (SAR)
 - 4 watts per kilogram (4W/kg)

Epidemiology of Health Effects of RF exposure

- ICNIRP Standing Committee of Epidemiology (2004)
 - “We have undertaken a *comprehensive* review of epidemiologic studies about the effects of radiofrequency fields (RF) on human health in order to summarize the current state of knowledge.”
 - “Results of these studies to date give no consistent or convincing evidence of a causal relation between RF exposure and any adverse health effects.”
 - “On the other hand, the studies have *too many deficiencies* to rule out an association.”

Health Effects of low energy RF exposure

- What do we know?
 - Data consistent with either *no effect* or possibly a *weak effect*
 - One can interpret the Precautionary Principle to say that we shouldn't have built radio and TV stations, since one can't prove that they are totally safe.
 - AM & FM radio and TV stations have been broadcasting for 60 - 80 years in a similar frequency range to RFID
 - City of Berkeley has employed RFID systems since 2000

City of Berkeley/Library RFID Systems

- RFID systems installed by the City and the Library
 - 2000 - Employee ID badges: all employees
 - 2002 - Animal Shelter: dogs & cats tagged
 - 2004 - Library: collection items tagged

RFID Technology



Cat at Animal Shelter

RFID Technology



Proximity card at City Hall

RFID Technology



Check out at library

Other RFID Systems

- Electronic toll collection - Calif. FasTrak
- Talking Prescriptions for Visually Impaired Veterans
- Toyota Prius - starting with 2004 model year - active RFID
- Credit cards - American Express Blue Card

Where do we go from here?

- Health risks appear to be
 - Negligible to to the general public
 - Minimal to workers
- Significant concern from some segments of the Community
- Ask City Health Officer, in conjunction with Health Commission, to carefully review the existing City/Library RFID systems for potential health risks to staff & the general public in a written report to City Council.