

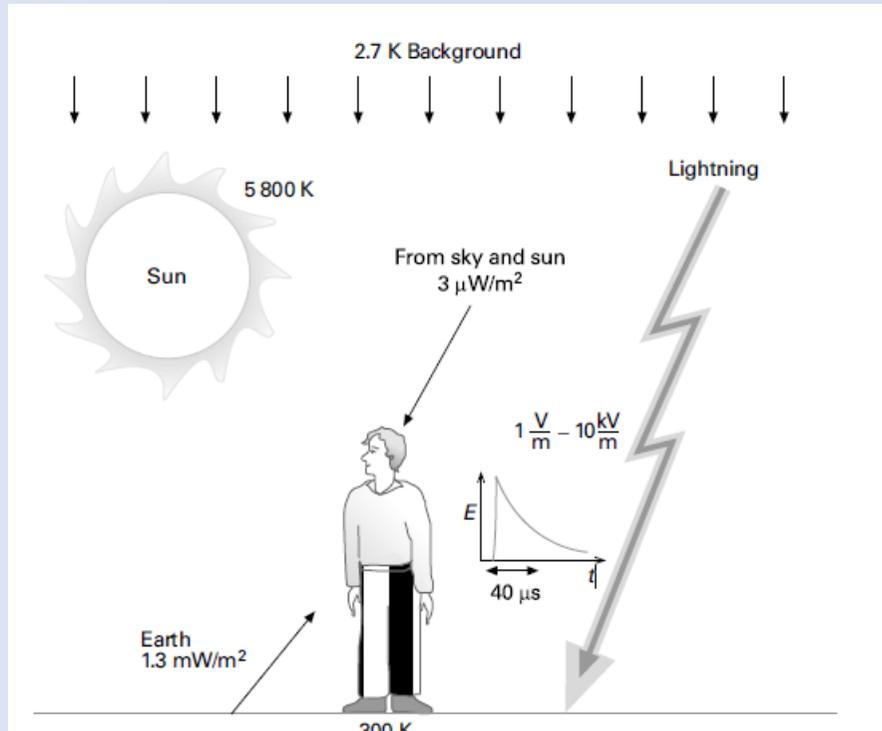


# Sources, use and measurement of electromagnetic field

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- People are continuously exposed to electromagnetic fields. This environment consists of natural electromagnetic radiation and man-made electromagnetic fields that are produced either intentionally or as a side effect of the operation of equipment.



•An natural electromagnetic environment comes from terrestrial and extraterrestrial sources such as radiation from space and the sun, or from electrical discharges in the Earth's atmosphere.

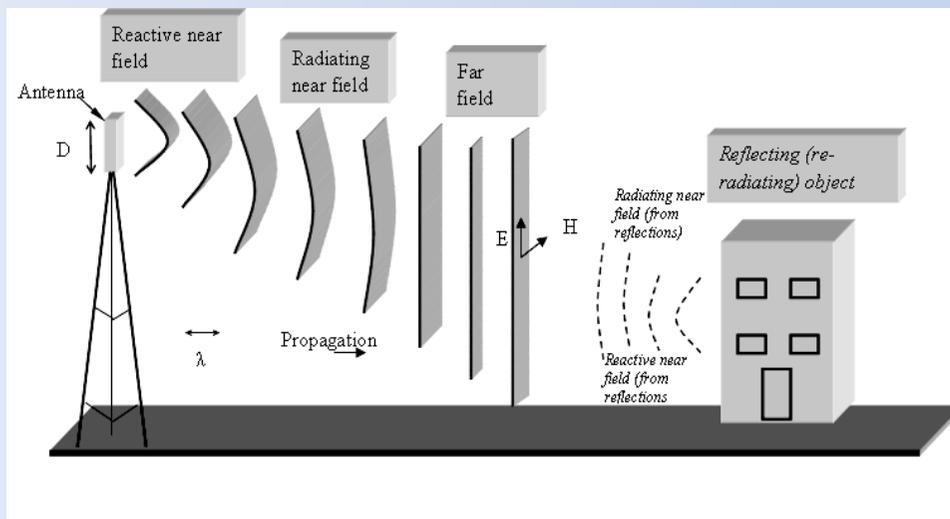
- Man-made electromagnetic fields spread from sources such as power lines, telecommunication, radio-television and many other devices such as electric motors, railways, and other welding equipment

## USE OF MAN-MADE SOURCES OF ELECTROMAGNETIC RADIATION

- *Telecommunication and broadcasting* - The main objective is to spread the transmission of electromagnetic energy into the space around the transmitter. Generally, antennas of transmitting stations are the strongest permanent sources of radio frequency energy radiated into free space intentionally. Regarding the impact of radiation on humans, the critical groups are those, who are working in broadcast towers.
- *Use in medical applications*– electromagnetic fields were primarily used in diathermy. Another possibility is the use for electromagnetic resonance. It is used to create images of apparatus and structures inside the human body.
- *Use in industrial and domestic applications*– electric and magnetic fields are used in the processing of various materials such as those used in heating and sometimes forming a plasma discharge in the material
- *Dielectric heating*– high-frequency dielectric heating is one of the largest sources of radiation. It is used in the welding of plastics. It is used to 20kV voltage and frequencies of 5 to 40 MHz.
- *Microwave heating and drying*– microwave energy is used for heating and drying of various materials such as food, construction materials, health and so on. The used frequency is 2450 MHz, and 915MHz in some countries

## MEASURING OF ELECTROMAGNETIC FIELD

- Measuring devices with sufficient accuracy must be able to measure necessary values with respect to the characteristic properties of the signal. It must also have sufficient sensitivity and frequency range. Measurement results can be affected by environmental parameters such as temperature, humidity, the device itself or interference.
- When selecting a measuring device is necessary to take into account a number of key factors such as instrument response, peak power, sensor limits, dynamic range and the ability to measure near and far fields, depending on the measurement conditions in the field



### *Measurement of the Far- Field*

Far field represents an area away from the source of the electromagnetic field. Electric E and magnetic H component is essentially independent of distance from the source. The field has a mainly plane wave character, which means the uniform distribution of the electric and magnetic field in the plane vertical to the direction of propagation.

### *Measuring Near- Field*

Spatial distribution of electric and magnetic components are independent of one another. Amplitudes of E and H components vary depending on the distance of the source and therefore must be measured at each point of interest

Thank you for your attention