<table>
<thead>
<tr>
<th>Frequency</th>
<th>Wavelength</th>
<th>Common Sources of EM Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>hertz</strong></td>
<td><strong>kilometers</strong></td>
<td><strong>meters</strong></td>
</tr>
<tr>
<td>1,000,000</td>
<td>0.00000030</td>
<td>0.0030</td>
</tr>
<tr>
<td>2,000,000</td>
<td>0.00000060</td>
<td>0.0060</td>
</tr>
<tr>
<td>4,000,000</td>
<td>0.00000120</td>
<td>0.0120</td>
</tr>
<tr>
<td>8,000,000</td>
<td>0.00000240</td>
<td>0.0240</td>
</tr>
<tr>
<td>10,000,000</td>
<td>0.00000300</td>
<td>0.0300</td>
</tr>
</tbody>
</table>

**Notes:**
1. **Hz** (hertz) = 1/s
2. **kHz** (kilohertz) = 10<sup>3</sup> Hz
3. **MHz** (megahertz) = 10<sup>6</sup> Hz
4. **GHz** (gigahertz) = 10<sup>9</sup> Hz

**Sources:**
- FM radio<sup>9</sup>
- AM Radio<sup>10</sup>
- Dirty electricity<sup>12</sup>
- Solar inverters<sup>25</sup>
- Switch mode power supply<sup>11</sup>
- Dirty electricity<sup>12</sup>
- Electrical power<sup>14</sup>
- Cell phones, Bluetooth<sup>4</sup>, Wi-Fi<sup>3</sup>

**Conversions:**
- **GHz** = 10<sup>-3</sup> MHz = 10<sup>-6</sup> kHz = 10<sup>-9</sup> Hz
- **MHz** = 10<sup>-3</sup> GHz = 10<sup>-6</sup> kHz = 10<sup>-9</sup> Hz
- **kHz** = 10<sup>-3</sup> MHz = 10<sup>-6</sup> Hz
- **Hz** = 10<sup>-9</sup> GHz = 10<sup>-6</sup> MHz = 10<sup>-3</sup> kHz = 1 Hz

**Conversion Factors:**
- 1 km = 0.621371 miles
- 1 mile = 1.60934 km

**Units:**
- **km** (kilometers) = 10<sup>3</sup> meters
- **m** (meters) = 10<sup>0</sup> meters
- **cm** (centimeters) = 10<sup>-2</sup> meters
- **mm** (millimeters) = 10<sup>-3</sup> meters

**Additional Notes:**
- **Wavelength** is the distance light travels in one cycle of electromagnetic radiation.
- **Electrical power** includes sources such as solar inverters, power supplies, and cell phones.
- **Smart Meters** and **Television VHF** are common sources of EM fields.
- **FM radio** and **AM Radio** are examples of sources that can emit EM fields.
ENDNOTES

1 The conversion of frequency to wavelength, in free space, is governed by this equation:

\[ \lambda = \frac{c}{f} \]

where

- \( \lambda \) is the wavelength in meters (m).
- \( f \) is the frequency in hertz (Hz).
- \( c \) is the speed of light in free space, about \( 3 \times 10^8 \) meters per second (m/s).

The speed of light in air is only slightly less than the speed of light in free space, so the wavelength in air is only slightly shorter than the wavelength in free space for a given frequency.


5 900 MHz and 2.4 GHz in Maryland, USA.

6 1G does not appear here because it is now an old and analog technology that has been superseded by the following digital technologies: 2G (800, 850, 1900 MHz); 3G (850, 1700, 1900, 2100 MHz); and 4G (700, 800, 950, 1700, 1900, 2100, 2300, 2500 MHz). Wikipedia, Cellular frequencies in the US. (https://en.wikipedia.org/wiki/Cellular_frequencies_in_the_US)


12 Frequencies unwanted for any particular application.

13 20 kHz is one example, but other frequencies are also employed.

14 60 Hz.

Who am I?

I am a retired U.S. Government career scientist (Ph.D. in Applied Physics from Harvard University). During my Government career, I worked for the Executive Office of the President, the National Science Foundation, and the National Institute of Standards and Technology. I currently interact with other scientists, with physicians, and with aware individuals worldwide about the impact of radiofrequency radiation on human health.