<table>
<thead>
<tr>
<th>Frequency Band</th>
<th>Designation</th>
<th>Propagation Characteristics</th>
<th>Typical Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>3–30 kHz</td>
<td>Very low frequency (VLF)</td>
<td>Ground wave; low attenuation day and night; high atmospheric noise level</td>
<td>Long-range navigation; submarine communication</td>
</tr>
<tr>
<td>30–300 kHz</td>
<td>Low frequency (LF)</td>
<td>Similar to VLF, slightly less reliable; absorption in daytime</td>
<td>Long-range navigation and marine communication radio beacons</td>
</tr>
<tr>
<td>300–3000 kHz</td>
<td>Medium frequency (MF)</td>
<td>Ground wave and night sky wave; attenuation low at night and high in day; atmospheric noise</td>
<td>Maritime radio, direction finding, and AM broadcasting</td>
</tr>
<tr>
<td>3–30 MHz</td>
<td>High frequency (HF)</td>
<td>Ionospheric reflection varies with time of day, season, and frequency; low atmospheric noise at 30 MHz</td>
<td>Amateur radio; international broadcasting, military communication, long-distance aircraft and ship communication, telephone, telegraph, facsimile</td>
</tr>
<tr>
<td>30–300 MHz</td>
<td>Very high frequency (VHF)</td>
<td>Nearly line-of-sight (LOS) propagation, with scattering because of temperature inversions, cosmic noise</td>
<td>VHF television, FM two-way radio, AM aircraft communication, aircraft navigational aids</td>
</tr>
<tr>
<td>0.3–3 GHz</td>
<td>Ultrahigh frequency (UHF)</td>
<td>LOS propagation, cosmic noise</td>
<td>UHF television, cellular telephone, navigational aids, radar, GPS, microwave links, personal communication systems</td>
</tr>
</tbody>
</table>

**Letter designation**

| 1.0–2.0 | L |
| 2.0–4.0 | S |
| 3–30 GHz | Superhigh frequency (SHF) |
| 2.0–4.0 | S |
| 4.0–8.0 | C |
| 8.0–12.0 | X |
| 12.0–18.0 | Ku |
| 18.0–27.0 | K |
| 27.0–40.0 | Ka |
| 26.5–40.0 | R |
| 30–300 GHz | Extremely high frequency (EHF) |

Same; high water-vapor absorption at 183 GHz and oxygen absorption at 60 and 119 GHz

Radar, satellite, experimental
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<tr>
<td>27.0–40.0</td>
<td>Ka</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.5–40.0</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.0–50.0</td>
<td>Q</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40.0–75.0</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75.0–110.0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110–300</td>
<td>mm (millimeter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10^3–10^7) GHz</td>
<td>Infrared, visible light, and ultraviolet</td>
<td>LOS propagation</td>
<td>Optical communications</td>
</tr>
</tbody>
</table>

\(^a\) kHz = 10\(^3\) Hz; MHz = 10\(^6\) Hz; GHz = 10\(^9\) Hz.
(a) Ground-Wave Propagation (Below 2 MHz)

(b) Sky-Wave Propagation (2 to 30 MHz)

(c) Line-of-Sight (LOS) Propagation (Above 30 MHz)