The Spectrum

There is only one...

Frequency	Wavelength	Designation
30–300 kHz	10–1 km	LF (Low Frequency)
300–3000 kHz	1000–100 m	MF (Medium Frequency)
3–30 MHz	100–10 m	HF (High Frequency)

The Spectrum

There is only one...

Frequency	Wavelength	Designation
3–30 kHz	100–10 km	VLF (Very Low Frequency)
30–300 kHz	10–1 km	LF (Low Frequency)
300–3000 kHz	1000–100 m	MF (Medium Frequency)
3–30 MHz	100–10 m	HF (High Frequency)
30–300 MHz	10–1 m	VHF (Very High Frequency)

The Spectrum

There is only one...

Frequency	Wavelength	Designation
300–3000 Hz	1 Mm–100 km	ULF (Ultra Low Frequency)
3–30 kHz	100–10 km	VLF (Very Low Frequency)
30–300 kHz	10–1 km	LF (Low Frequency)
300–3000 kHz	1000–100 m	MF (Medium Frequency)
3–30 MHz	100–10 m	HF (High Frequency)
30–300 MHz	10–1 m	VHF (Very High Frequency)
300–3000 MHz	1000–100 mm	UHF (Ultra High Frequency)

The Spectrum

There is only one...

Frequency	Wavelength	Designation
30–300 Hz	10–1 Mm	SLF (Super Low Frequency)
300–3000 Hz	1 Mm–100 km	ULF (Ultra Low Frequency)
3–30 kHz	100–10 km	VLF (Very Low Frequency)
30–300 kHz	10–1 km	LF (Low Frequency)
300–3000 kHz	1000–100 m	MF (Medium Frequency)
3–30 MHz	100–10 m	HF (High Frequency)
30–300 MHz	10–1 m	VHF (Very High Frequency)
300–3000 MHz	1000–100 mm	UHF (Ultra High Frequency)
3–30 GHz	100–10 mm	SHF (Super High Frequency)

The Spectrum

There is only one...

Frequency	Wavelength	Designation
3–30 Hz	100–10 Mm	ELF (Extra Low Frequency)
30–300 Hz	10–1 Mm	SLF (Super Low Frequency)
300–3000 Hz	1 Mm–100 km	ULF (Ultra Low Frequency)
3–30 kHz	100–10 km	VLF (Very Low Frequency)
30–300 kHz	10–1 km	LF (Low Frequency)
300–3000 kHz	1000–100 m	MF (Medium Frequency)
3–30 MHz	100–10 m	HF (High Frequency)
30–300 MHz	10–1 m	VHF (Very High Frequency)
300–3000 MHz	1000–100 mm	UHF (Ultra High Frequency)
3–30 GHz	100–10 mm	SHF (Super High Frequency)
30–300 GHz	10–1 mm	EHF (Extra High Frequency)

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300–3000 MHz	1000–100 mm	UHF (Ultra High Frequency)
3–30 GHz	100–10 mm	SHF (Super High Frequency)
30–300 GHz	10–1 mm	EHF (Extra High Frequency)
300–3000 GHz	1000–100μm	Submillimeter/InfraRed

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3–30 GHz	100–10 mm	SHF (Super High Frequency)
30–300 GHz	10–1 mm	EHF (Extra High Frequency)
300–3000 GHz	1000–100μm	Submillimeter/InfraRed
500–900 THz	0.6μm–0.3μm	Visible!

The Spectrum

Use Thereof...

- $\lambda/2$ is "size" of antenna.

$$\lambda = \frac{300}{f(\text{MHz})}$$

$$\delta = \sqrt{\frac{1}{\omega\mu\sigma}}$$

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- "Small" (ito λ) does not radiate well...

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- History...
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- Hz: k,M,G,T,P,E,Z,Y: $10^{3,6,9,12,15,18,21,24}$ ie $>$ 1PHz...

$$\lambda = \frac{300}{f(\text{MHz})}$$

$$\delta = \sqrt{\frac{1}{\omega\mu\sigma}}$$

The Spectrum

Use Thereof...

Frequency	Wavelength	IEEE Designation
1–2 GHz	300–150 mm	L
2–4 GHz	150–75 mm	S
4–8 GHz	75–37.5 mm	C (5m (big) dish)
8–12 GHz	37.5–25 mm	X
12–18 GHz	25–16.7 mm	Ku (1m (small) dish)
18–26 GHz	16.7–11.5 mm	K
26–40 GHz	11.5–7.5 mm	Ka
40–300 GHz	7.5–1 mm	mm

The Spectrum

Use Thereof...

AM Radio	550–1720 kHz
FM Radio	88–108 MHz
ClassicFM	102.7 MHz
TV 123	200 MHz
MNET/eTV	615/679 MHz
GSM-2 MTN & Vodacom	900 MHz
GSM-2 CellC	1800 MHz
DECT	1880–1900 MHz
GPS	1.23 & 1.58 GHz
ISM	403/433MHz
ISM	906–928MHz
ISM	2.4–2.5 GHz
ISM	5.8–5.9 GHz
μwave oven (K5–513)	2.45 GHz
DSTV	Ku band (11.7 & 12.3GHz)