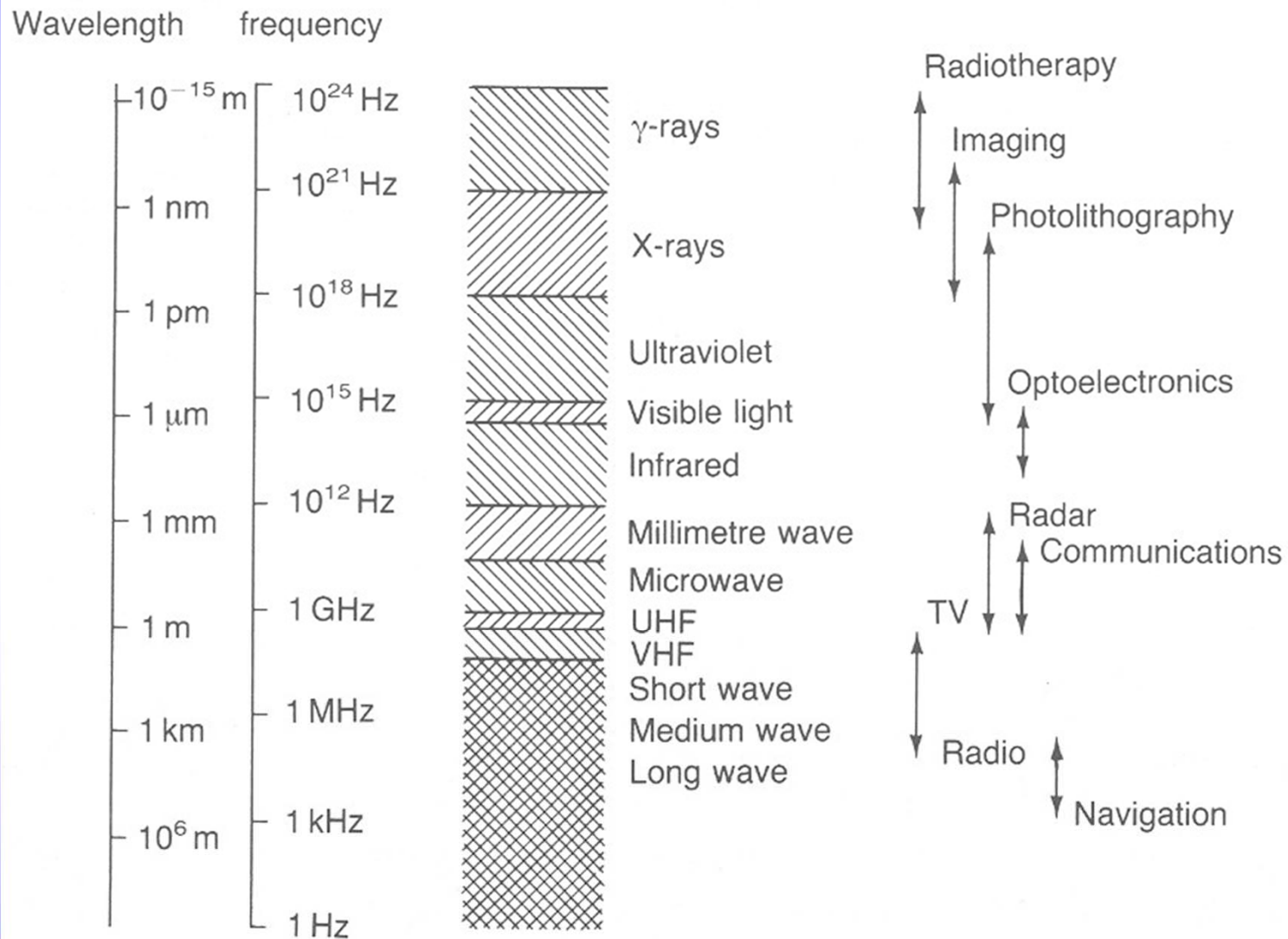


Frequency Spectrum and Applications

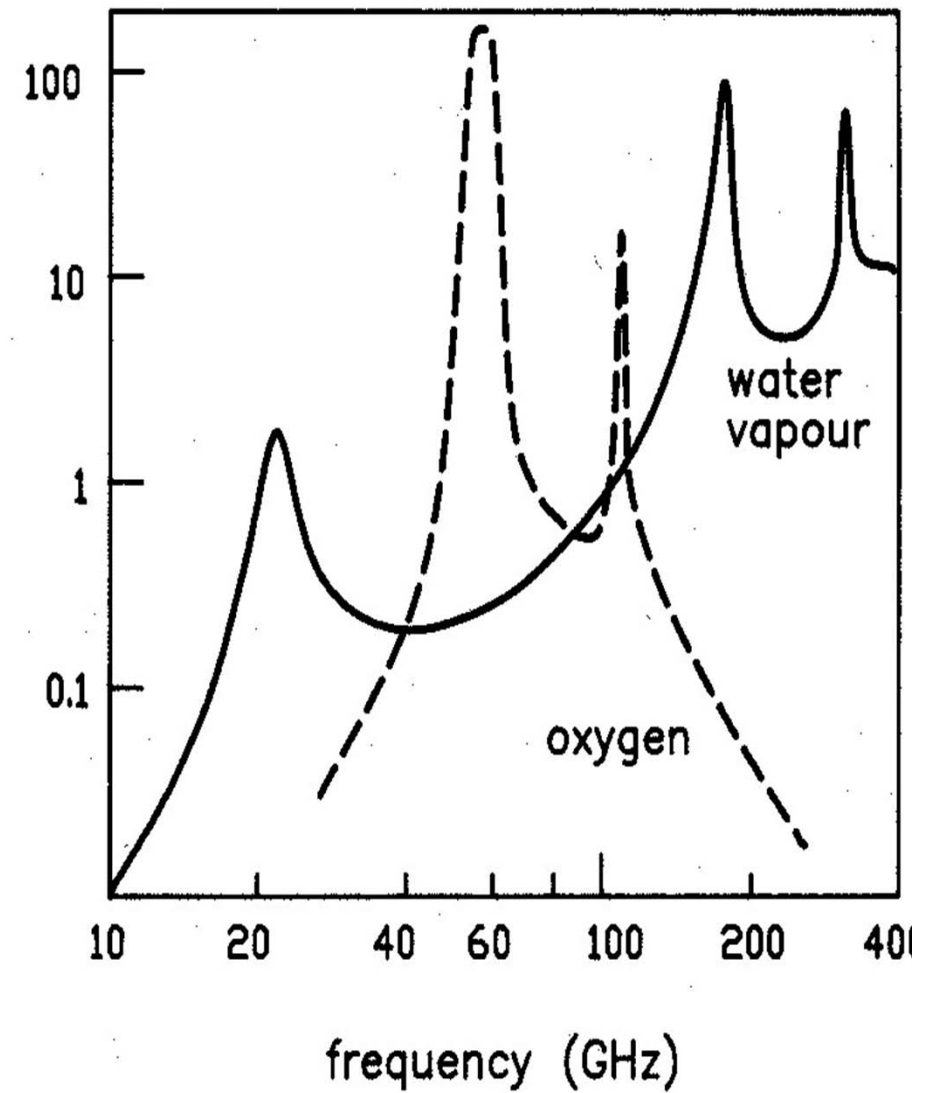
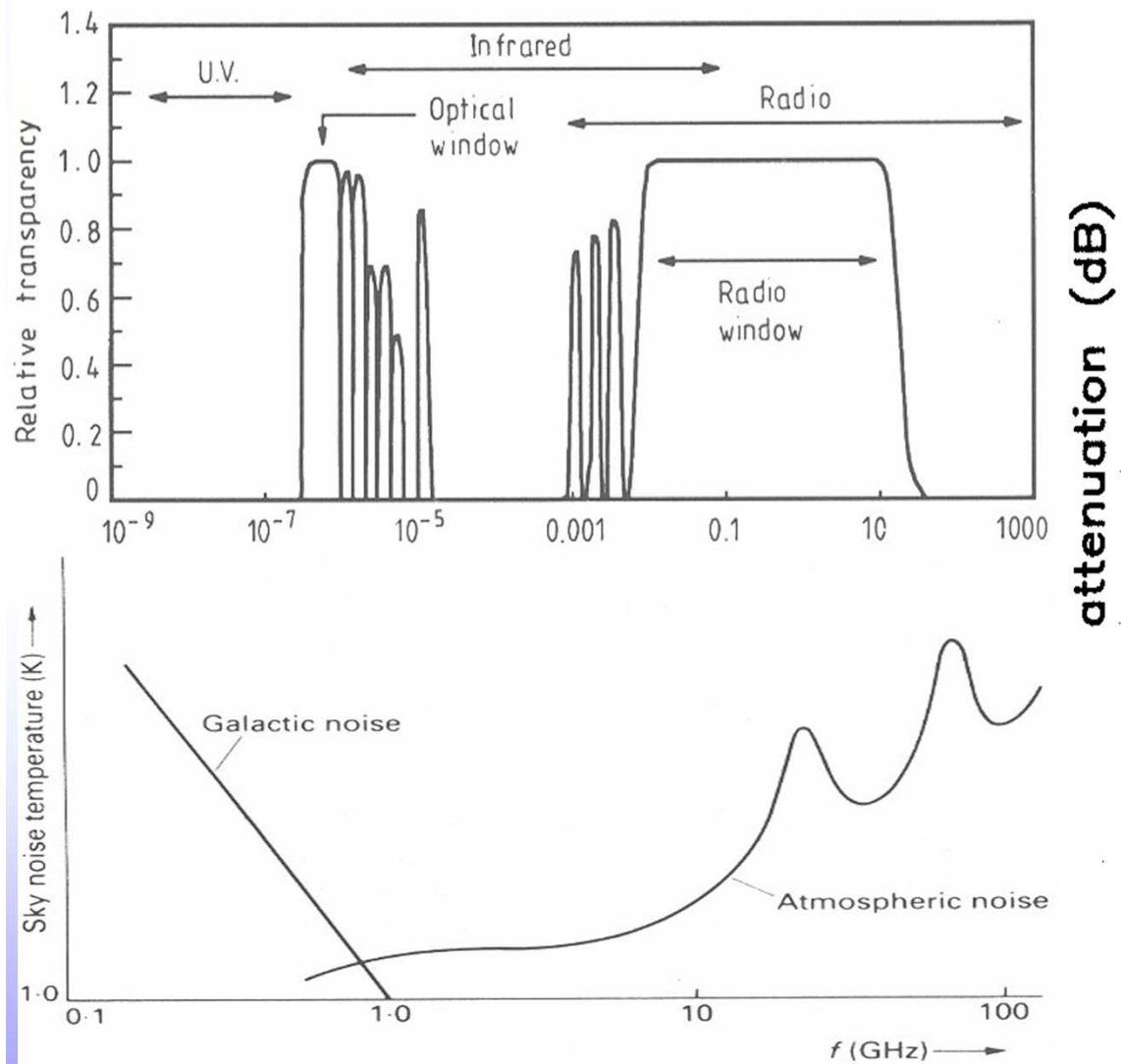
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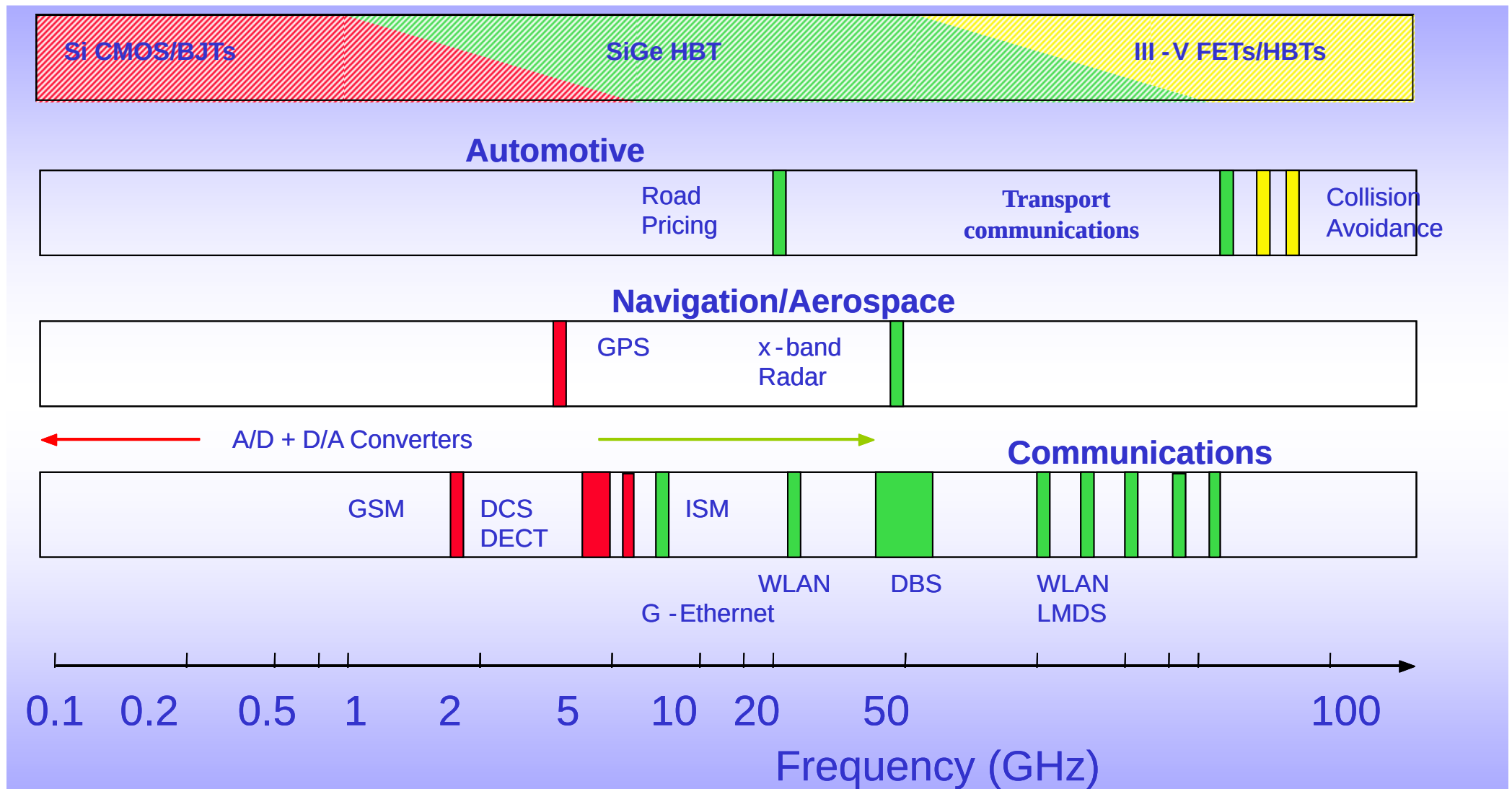
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UNITED
STATES
FREQUENCY
ALLOCATIONS

THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

[illegible]

ACTIVITY CODE

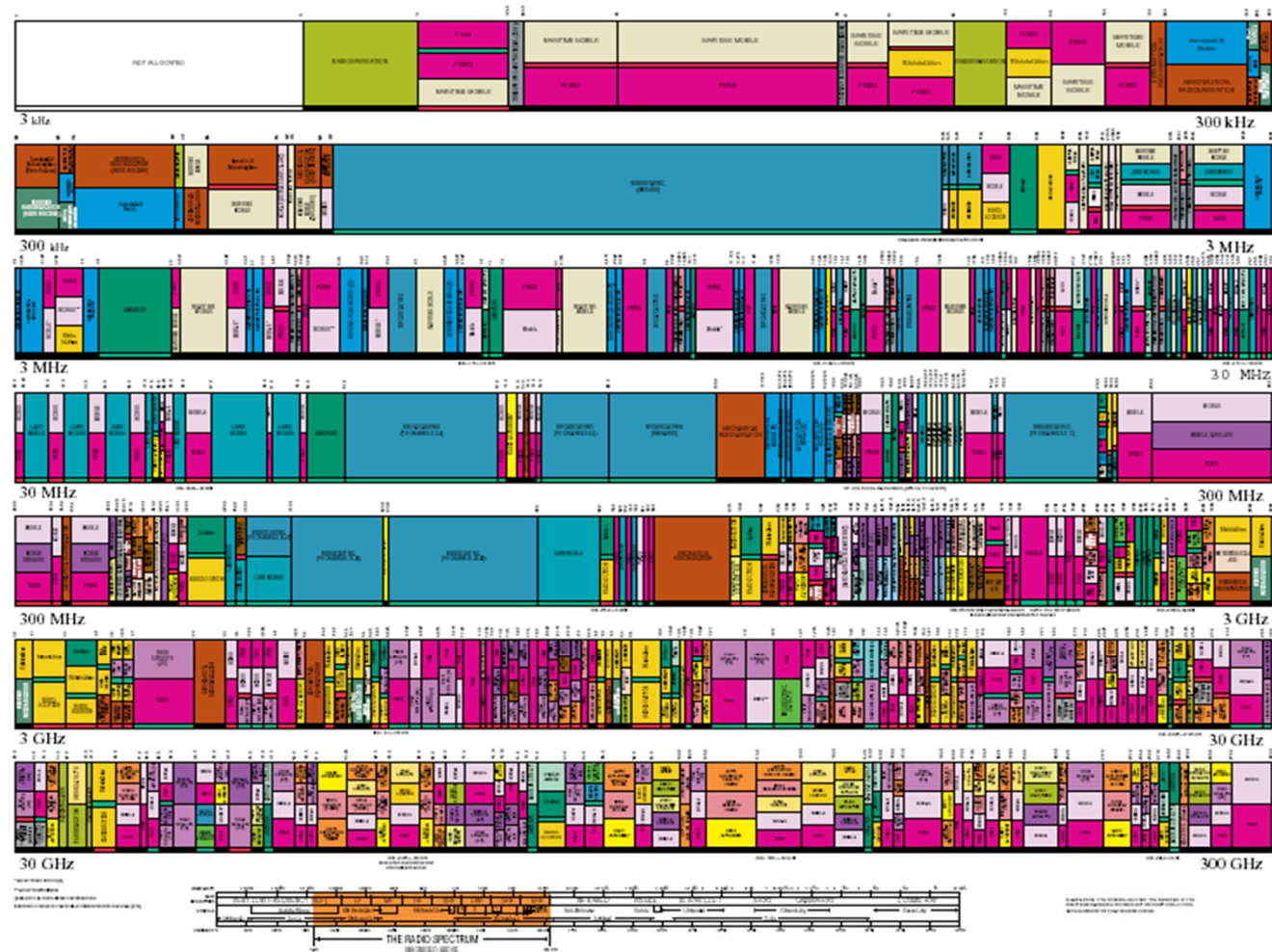
2018 RELEASE UNDER E.O. 14176

ALLOCATION USAGE DESIGNATION

INDEX	EXAMPLE	DESCRIPTION
Priority	P000	CyberAlert
Severity	0000	Low Criticality/Impact/Status/Value
ParentRef	000000000000	CyberAlert Information/Details/Status



U.S. DEPARTMENT OF COMMERCE
National Trade Council, Customs and International Administration
Office of Operations Management
ESTABLISHED 1964



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Table 1-1 IEEE Frequency Spectrum

Frequency Band	Frequency	Wavelength
ELF (Extreme Low Frequency)	30–300 Hz	10,000–1000 km
VF (Voice Frequency)	300–3000 Hz	1000–100 km
VLF (Very Low Frequency)	3–30 kHz	100–10 km
LF (Low Frequency)	30–300 kHz	10–1 km
MF (Medium Frequency)	300–3000 kHz	1–0.1 km
HF (High Frequency)	3–30 MHz	100–10 m
VHF (Very High Frequency)	30–300 MHz	10–1 m
UHF (Ultrahigh Frequency)	300–3000 MHz	100–10 cm
SHF (Superhigh Frequency)	3–30 GHz	10–1 cm
EHF (Extreme High Frequency)	30–300 GHz	1–0.1 cm
Decimillimeter	300–3000 GHz	1–0.1 mm
P Band	0.23–1 GHz	130–30 cm
L Band	1–2 GHz	30–15 cm
S Band	2–4 GHz	15–7.5 cm
C Band	4–8 GHz	7.5–3.75 cm
X Band	8–12.5 GHz	3.75–2.4 cm
Ku Band	12.5–18 GHz	2.4–1.67 cm
K Band	18–26.5 GHz	1.67–1.13 cm
Ka Band	26.5–40 GHz	1.13–0.75 cm
Millimeter wave	40–300 GHz	7.5–1 mm
Submillimeter wave	300–3000 GHz	1–0.1 mm

Wireless Applications

Defence Applications

Phased-array radar

Secure Communications

**Electronic warfare
(e.g. Electronic Surveillance
Measures, ECM, ECCM, decoys)**

**Explosive/Biological
weapon Detection**

Smart munitions

Altimeters

**Remote sensing, for surveillance
(e.g. Synthetic aperture radar,
Radiometers for passive millimetre-wave imaging)**

Space Applications

**Communications satellites
(e.g. Low earth orbit mobile systems,
Steerable phased-array antennas
For footprint control)**

**Astronomy (using
radiometers)**

Altimeters

Station-keeping

**Remote sensing, for environmental monitoring
(e.g. Synthetic aperture radar, Radiometers)**

Civil Applications

Direct Broadcasting by Satellite (DBS)

Satellite TVRO

VSAT earth terminals

Mobile phones

LOS communications

Fibre-optic systems

Global positioning (GPS)

Broadband Wireless

(e.g. MVDS → LMDS)

Wireless local loop

Wireless WANs, LANs, HANs, PANs

Bluetooth

Autonomous cruise control

Automatic tolling & telematics

Search & rescue

Security scanners

RFID and tagging

Smart cards

Medical systems