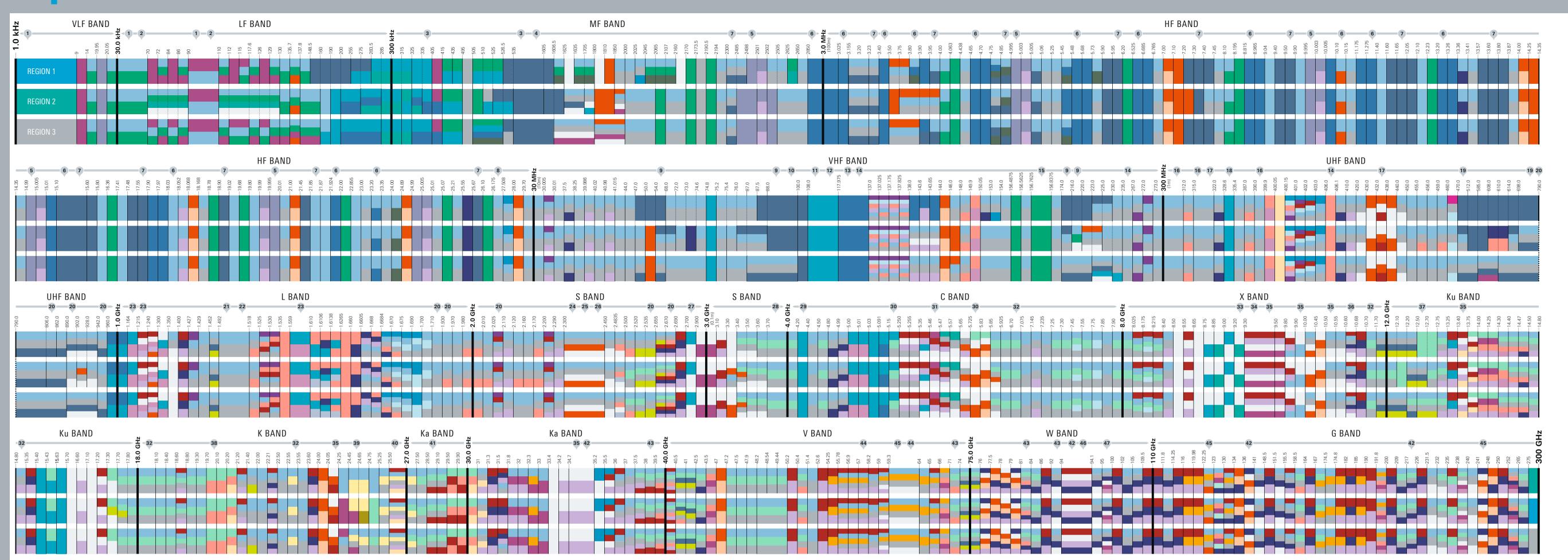
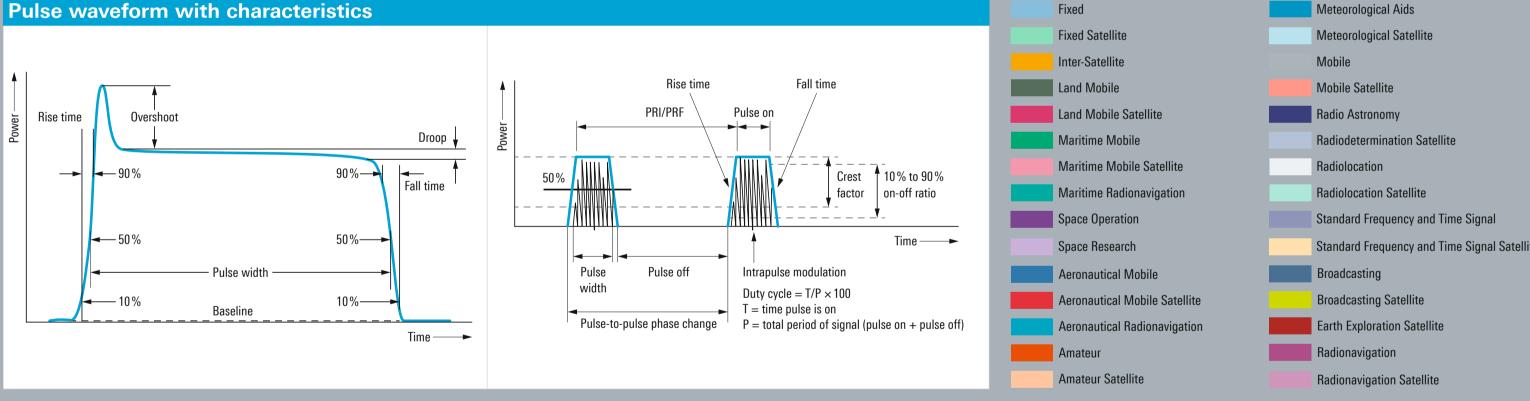
pectrum allocation





		Inter-Satellite	Mobile
	Rise time Fall time	Land Mobile	Mobile Satellite
	PRI/PRF Pulse on	Land Mobile Satellite	Radio Astronomy
<u> </u>	Power	Maritime Mobile	Radiodetermination Satellite
1	50% Crest 10% to 90%	Maritime Mobile Satellite	Radiolocation
1	factor on-off ratio	Maritime Radionavigation	Radiolocation Satellite
		Space Operation	Standard Frequency and Time Signal
	Time —	Space Research	Standard Frequency and Time Signal Satellite
	Pulse Pulse off Intrapulse modulation	Aeronautical Mobile	Broadcasting
	width $Duty cycle = T/P \times 100$ $T = time pulse is on$	Aeronautical Mobile Satellite	Broadcasting Satellite
<u> </u>	Pulse-to-pulse phase change $P = total period of signal (pulse on + pulse off)$	Aeronautical Radionavigation	Earth Exploration Satellite
		Amateur	Radionavigation
		Amateur Satellite	Radionavigation Satellite

Radio detection and ranging (radar) abbreviations

AESA = Active Electronically Scanned Array **AEW** = Airborne Early Warning **APAR** = Active Phase Array Radar **ASR** = Airport Surveillance Radar **ATC** = Air Traffic Control **BW** = Bandwidth (or Beamwidth)

CFAR = Constant False Alarm Rate **COHO** = Coherent Local Oscillator **DOA** = Direction of Arrival

DTM = Digital Terrain Model **EIRP** = Effective Isotropic Radiated Power **EMS** = Electromagnetic Spectrum

EMV = Electromagnetic Vulnerability **ESA** = Electronically Steerable Array **EW** = Electronic Warfare

FCW = Forward Collision Warning **FMCW** = Frequency-Modulated Continuous Wave **PD** = Pulsed Doppler **GCA** = Ground-Controlled Approach

IFF = Identification Friend or Foe **LADAR** = Laser Detection and Ranging **LIDAR** = Light Detection and Ranging **LPI** = Low Probability of Intercept

LRR = Long-Range Radar **MTD** = Moving Target Detection

OTH = Over the Horizon

PAR = Phased Array Radar **PAR** = Precision Approach Radar PC = Pulse Compression

PDF = Pulse Desensitization Factor **PESA** = Passive Electronically Scanned Array | **SMR** = Surface Movement Radar **PRF** = Pulse Repetition Frequency

PRI = Pulse Repetition Interval **PRT** = Pulse Repetition Time **PSR** = Primary Surveillance Radar **PW** = Pulse Width

RCS = Radar Cross Section **RESM** = Radar Electronic Support Measure **RWR** = Radar Warning Receiver **RX** = Receiver/Received **SAR** = Synthetic Aperture Radar

SLR = Side-Looking Radar **SRR** = Short-Range Radar **SSR** = Secondary Surveillance Radar

TBD = Track Before Detect **TRM** = Transmit/Receive Module **TX** = Transmitter/Transmitted

Radar applications by IEEE standard radar bands

Wavelength

Application

Band Frequency

Dana	requeries	vavolongth	Application
HF	3 MHz to 30 MHz	100 m to 10 m	Coastal radar systems, over-the-horizon (OTH) radars
VHF	30 MHz to 300 MHz	10 m to 1 m	Applied retrospectively to early radar systems
UHF	300 MHz to 1 GHz	1 m to 0.3 m	Very long range (e.g. ballistic missile early warning), ground penetrating, foliage penetrating
L	1 GHz to 2 GHz	30 cm to 15 cm	Long-range air traffic control and surveillance
S	2 GHz to 4 GHz	15 cm to 7.5 cm	Terminal air traffic control, long-range weather, marine radar
С	4 GHz to 8 GHz	7.5 cm to 3.75 cm	Satellite transponders, weather radar; a compromise (hence C) between X and S bands
X	8 GHz to 12 GHz	3.75 cm to 2.5 cm	Missile guidance, marine radar, weather, medium-resolution mapping and ground surveillance; in the USA the narrow range 10.525 GHz ± 25 MHz is used for airport radar. Named X band because the frequency was kept secret during World War 2
Ku	12 GHz to 18 GHz	2.5 cm to 1.67 cm	High-resolution mapping, satellite altimetry; frequency just under K band (hence u)
K	18 GHz to 27 GHz	1.67 cm to 1.11 cm	K band is used by meteorologists for detecting clouds and by police for speed enforcement K band radar guns operate at 24.150 GHz \pm 0.100 GHz. Automotive radar uses 24 GHz to 26 GHz
Ka	27 GHz to 40 GHz	1.11 cm to 0.75 cm	Mapping, short range, airport surveillance, photo radar, used to trigger cameras that take pictures of license plates of cars running red lights, operates at 34.300 GHz ± 0.100 GHz; frequency just above K band (hence a)
V	40 GHz to 75 GHz	7.5 mm to 4.0 mm	Military communications below 50 GHz. FMCW short-range radar above 50 GHz
W	75 GHz to 110 GHz	4.0 mm to 2.7 mm	76 GHz LRR and 79 GHz SRR automotive radar, high-resolution meteorological observation and imaging

mm 110 GHz to 300 GHz 2.7 mm to 1.0 mm Experimental radar applications in sensing for security applications and imaging

1 Underground Cable Locating Equipment

2 Power Line Communications

3 ADF Non-Directional Beacons (NDB)

4 AM Radio Broadcast

5 WWV Time Standard Signals

6 Major World Air Route Areas (MWARA)

7 International Shortwave Broadcasters

8 Citizen Band Radios (CB) 9 VHF Television (TV)

10 FM Radio Broadcast

11 VHF Omni-Directional Range (VOR)

12 Instrument Landing System (ILS – LOC)

13 Civil Aircraft Communications Radio

14 Emergency Position-Indicating Radio Beacon (EPIRB)

15 International Maritime Channels

16 Garage Door Openers

17 Automobile Remote Keyless Entry (RKE)

19 UHF Television (TV)

18 Aircraft Landing Glide Slope (GS)

20 Cellular Phone Bands

21 Distance Measurement Equipment (DME)

22 Aircraft ATC Radar Transponders (Mode S)

23 Global Navigation Satellite Systems (L5, L2, L1)

24 Broadcast Satellite Radio Services 25 Wireless Local Area Networks 802.11b & g

26 Bluetooth Personal Area Networks (PAN)

27 ATC Surveillance Radar

28 Satellite Television Broadcast

29 Aircraft Radar Altimeters

30 Wireless Local Area Networks (WLAN) 802.11a

31 Weather Radar – Large Aircraft 32 Point-to-Point Telecom Infrastructure

33 Weather Radar – Small Aircraft

34 Maritime Radar

35 Police Radar Speed Measurement

36 Radar Motion Detectors (Doors & Alarms)

38 Fixed Satellite Service Space-to-Earth All Regions

37 Direct Broadcast Satellite

39 Inter-Satellite Radiolocation

40 Inter-Satellite Frequency & Time Standard Reference

41 Fixed Satellite Service: Earth-to-Space All Regions

42 Atmospheric Attenuation Windows

43 Point-to-Point Data Links

44 Wireless Local Area Networks (802.11 ad)

45 Millimeter Wave ISM Bands

46 EHF – Full Body Scanners

47 Active Denial Systems (US DoD)

'Selected Points of Interest' are based on popular allocation applications, and may not be exhaustive or applicable for all nations. This chart represents a single point in time of the International Telecommunications Union (ITU) worldwide spectral allocations summarized in the US FCC Code of Federal Regulations. As such, it does not completely reflect all aspects such as footnotes and recent changes. Users should always consult their national regulatory body for current allocations. This chart does not differentiate between Co-PRIMARY and Secondary allocations. Allocations are listed from top to bottom in the order they appear in table 2.106. Horizontal scale has been exaggerated on some very narrow bands for readability.

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