



**Ministry of Information  
and Communications  
Government of Nepal**



**International  
Telecommunication  
Union**



**Ministry of  
Communications  
Government of Israel**



**Ministry of Foreign Affairs  
MASHAV-Center for  
International Cooperation  
Government of Israel**

# RF Regulation (exclusive views of the author)

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# Items which need to be regulated



1. RF allocations to radio services
2. Assignment of licence and RF to Tx Stations
3. Type approval of equipment; not in CE countries
4. Fee collection
5. Notifying ITU to the Main International Frequency Register (MIFR)
6. Coordination with neighbour countries (no borders to the electromagnetic waves)
7. External relations: toward regional commissions (CEPT) for European Countries) and International (ITU)



# Aims of the national Spectrum Management



- Protect the licensed channels
- Solve & avoid interference
- Design long and short range RF spectrum
- Support Engineering: Propagation, DTM
- Assist in solving Near-field, Co-site, Co-ship, Co-a/c
- Exercise and simulate for dense RF environment
- Advance new RF technologies; Participate in R&D of new RF systems
- Coordinate with other Administrations
- Consult all stake holders and interest orgs



# RF Spectrum Management in Developed Countries



- Wealthy countries are similar *All happy families are alike (so begins Leo Tolstoy's Anna Karenina)*
- 'Government of the people, by the people, for the people' A. Lincoln 'Gettysburg Address' (19.11.1863)
- Optimal use of RF
- Fair, Objective, Transparent, Nondiscriminatory, Proportionate
- Flexible, Dynamic
- Privatisation, Liberalisation, Competition
- Deregulation; Minimum Intervention (learn from Internet); Light Touch
- Neutral Technology
- More RF Spectrum and more RF power for Unlicensed (unprotected devices)
- Exempt Receivers from any licensing
- Take reasonable risks
- All RF operators may pay fees for the RF spectrum



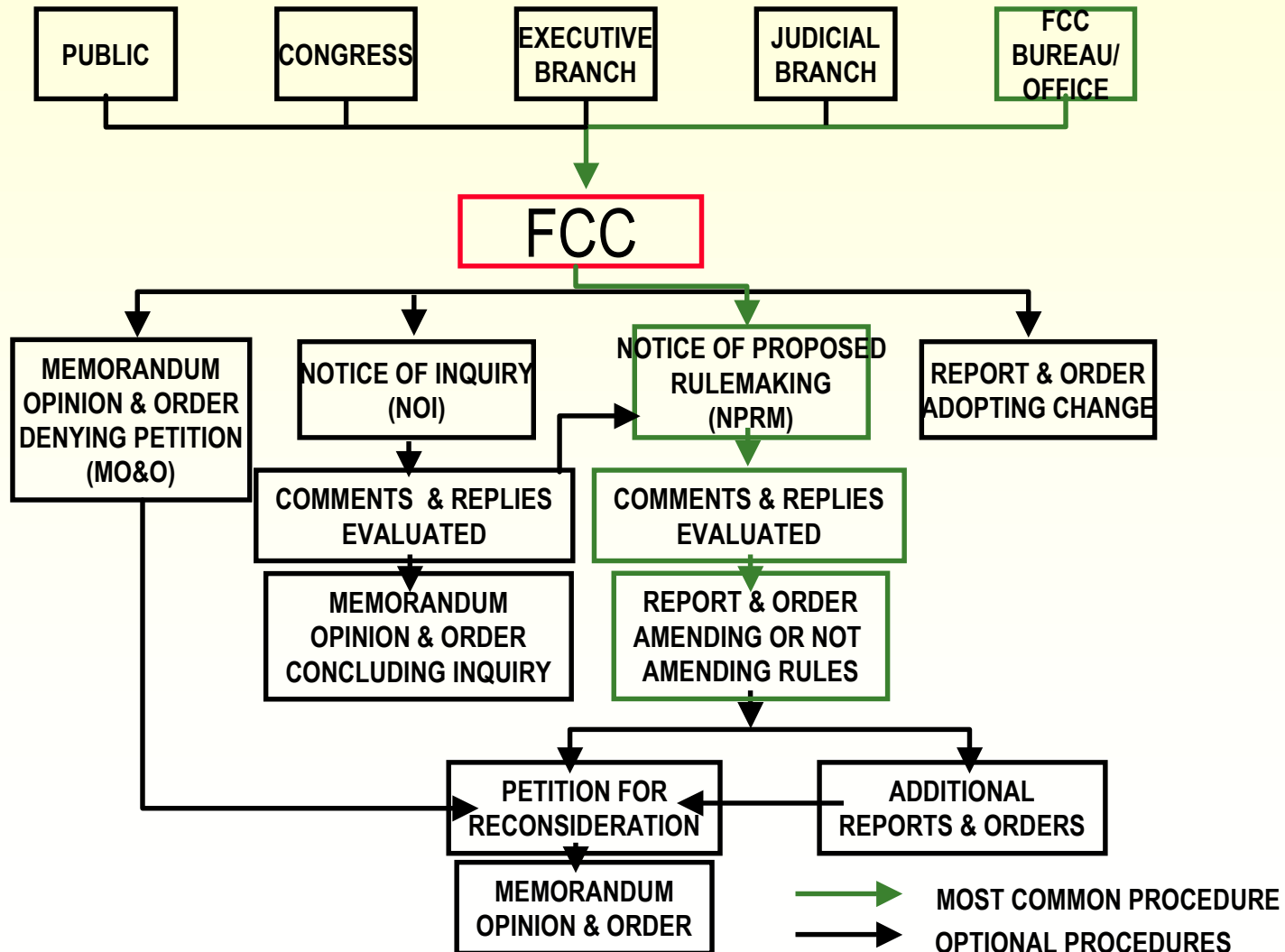
# FCC and NTIA differences; Bill Luther



- FCC is an independent regulatory agency, but the U.S. Congress has oversight and controls the FCC budget
- The U.S. president delegates government spectrum management (SM) responsibilities to NTIA, which acts as telecom advisor to the president
- FCC and NTIA serve different interests
  - Federal laws such as the Communications Act and Administrative Procedure Act (APA) govern the FCC interaction with the public and the management of public resources (RF Spectrum)
  - NTIA only governs federal government operations and is not held to the same laws as the FCC
  - Changes to SM policy in government are not subject to rule making (APA); no notice to private industry is required
  - Private industry can meet with NTIA without filing *Ex Parte* notices



# How FCC rules are made; Bill Luther

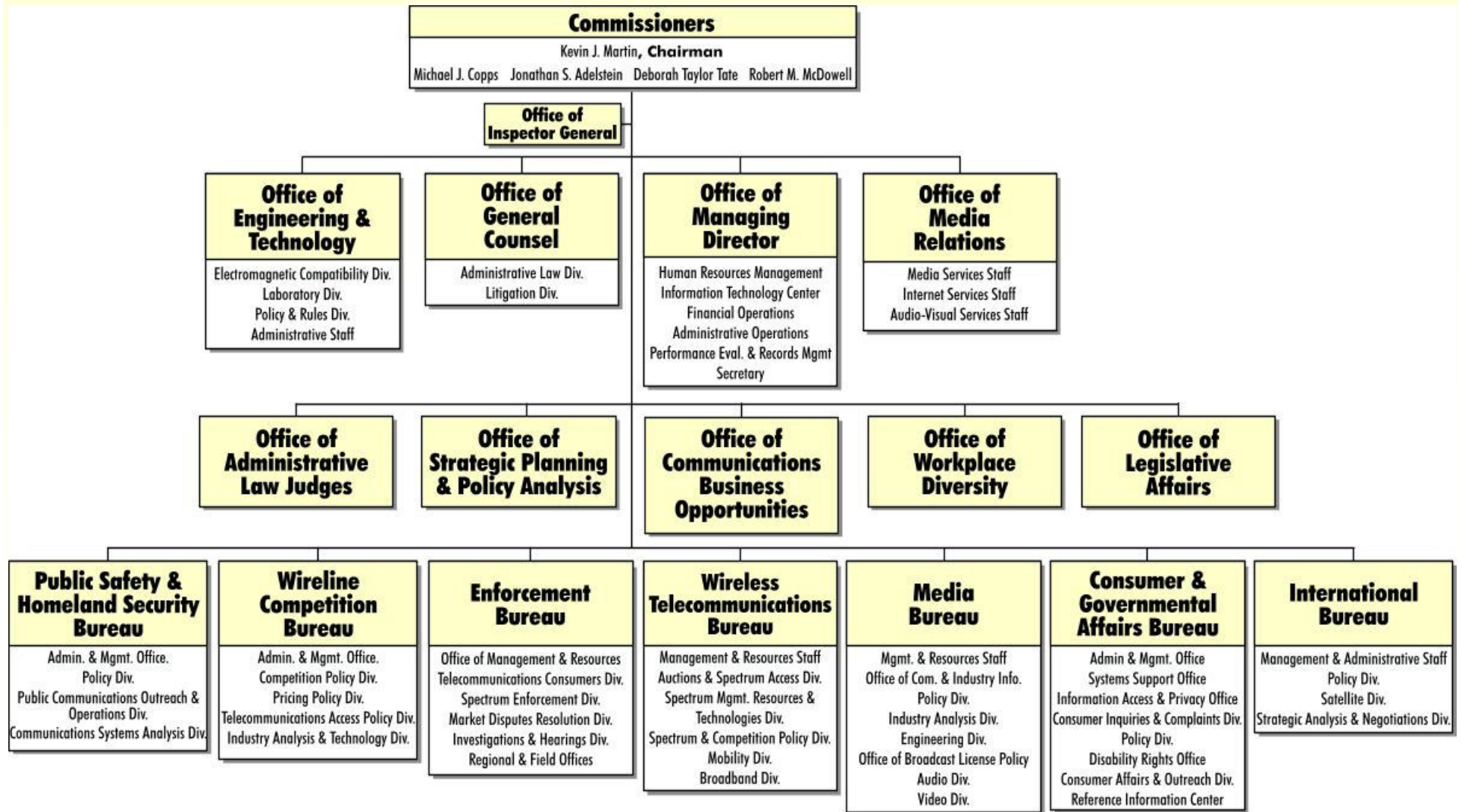




# FCC Organizational Chart

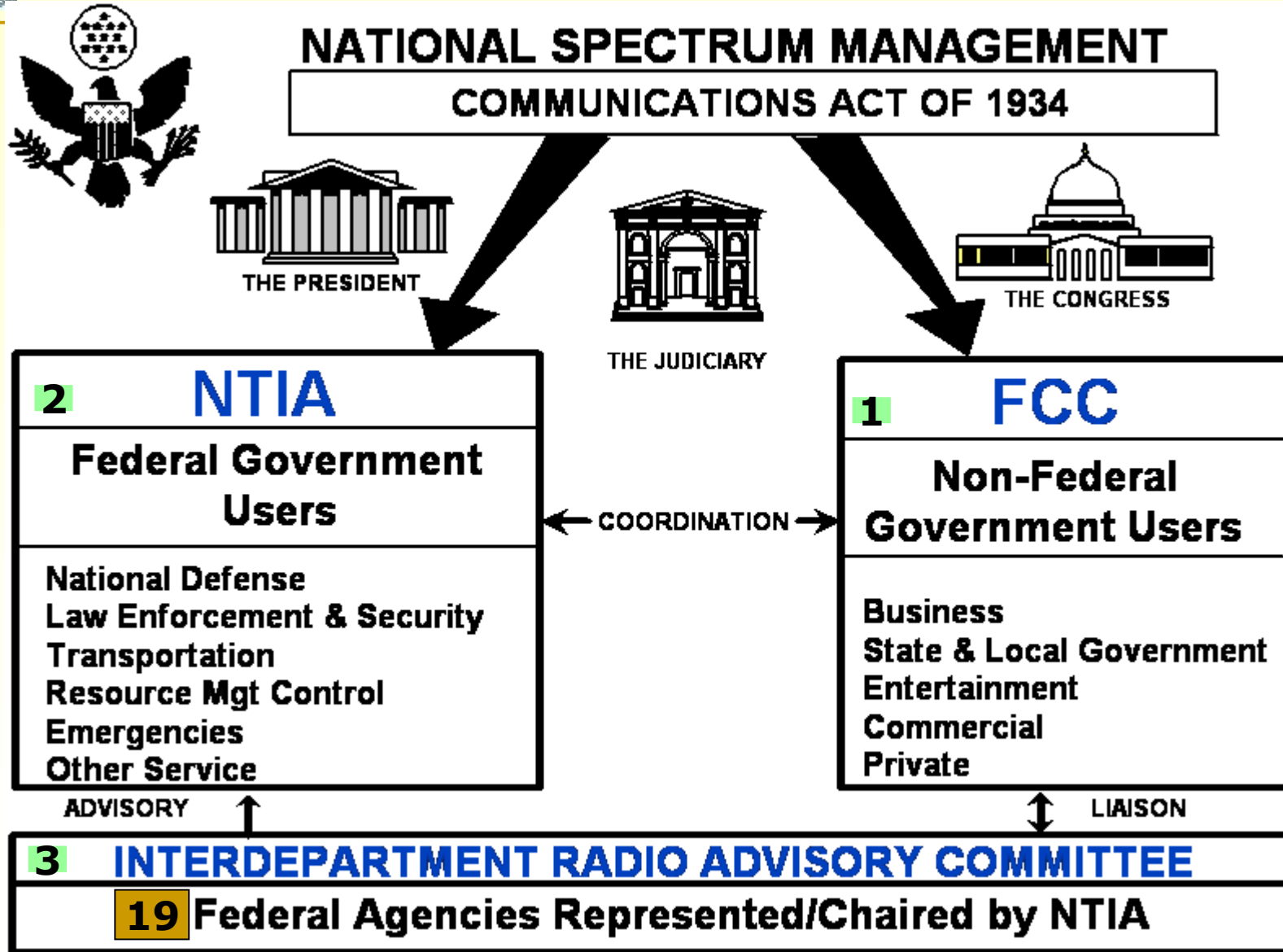


All spectrum users, except federal government





# US National Spectrum Management, Bill Luther







# CFR 47, the Code of Federal Regulations



National Archives and  
Records Administration



1. <http://www.access.gpo.gov/cgi-bin/cfrassemble.cgi?title=199847>
2. [http://www.access.gpo.gov/nara/cfr/waisidx\\_98/47cfr22\\_98.html](http://www.access.gpo.gov/nara/cfr/waisidx_98/47cfr22_98.html)
3. <http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi?TITLE=47&PART=22&SECTION=905&YEAR=1998&TYPE=PDF>
4. [PP10Tables/get-cfr22\\_905Cellular.pdf](http://PP10Tables/get-cfr22_905Cellular.pdf)



# NTIA Manual of Regulations and Procedures for Federal Radio



## Frequency Management (Redbook)

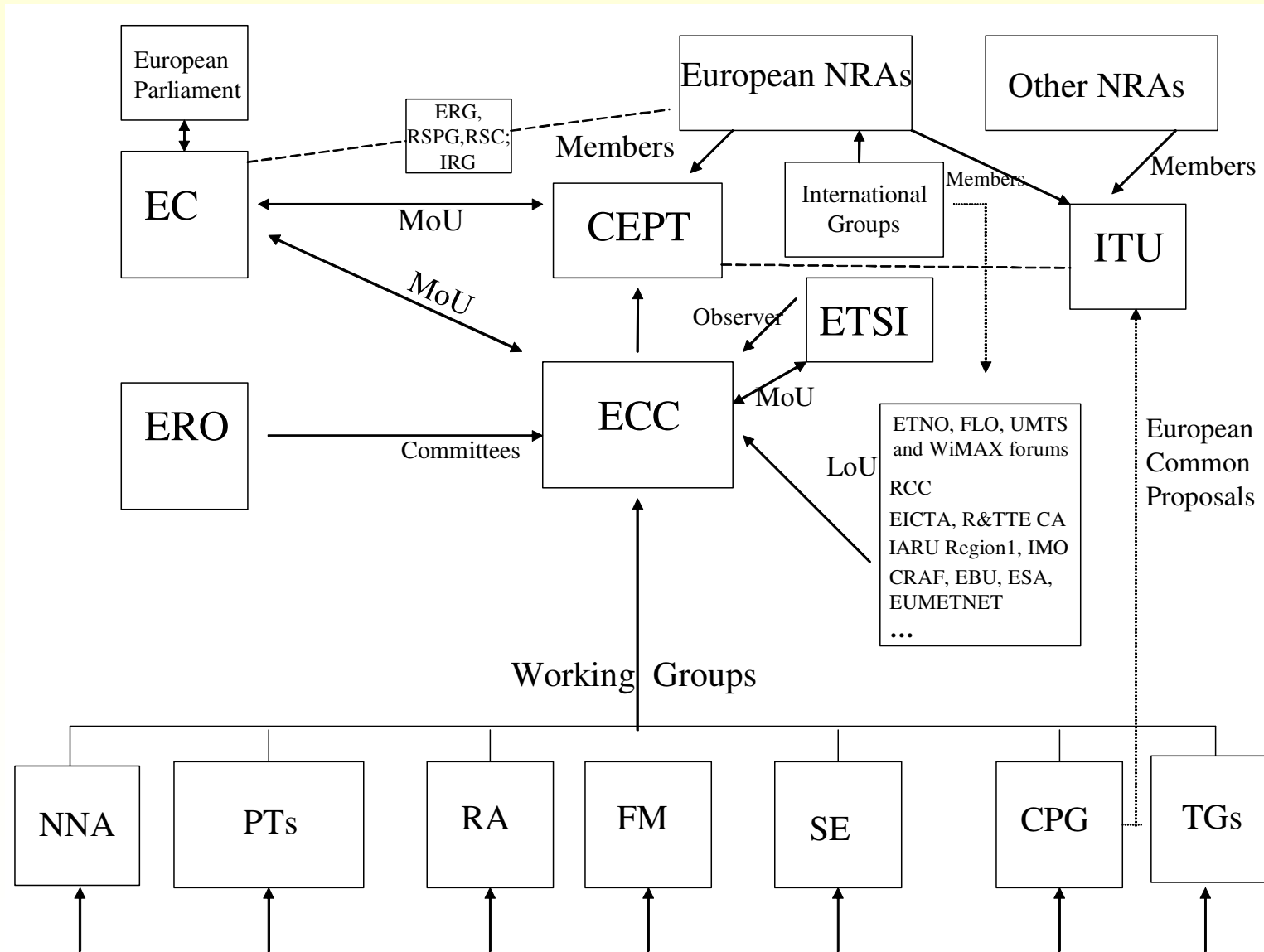


# National Telecommunications & Information Administration (NTIA)

<http://www.ntia.doc.gov/osmhome/redbook/redbook.html>



# The Main Players in European RF regulation





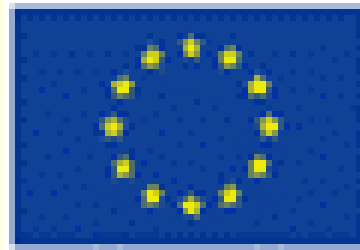
# Key of Abbreviations



CPG: Conference Preparatory Group (preparations for ITU Conferences); CRAF: Committee on Radio Astronomy Frequencies; EBU: European Broadcasting Union; EC: European Commission; ECC: Electronic Communications Committee (formerly European Radiocommunications Committee ERC); EICTA: European Information and Communications Technology Industry Association; ERG: European Regulators Group (EC body); ERO: European Radiocommunications Office; ESA: European Space Agency; ESOA: European Satellite Operators Association; ETNO: European Telecommunications Network Operators; EUMETNET: European National Meteorological Services; FLO Forward Link Only; FM: Frequency Management; IARU: International Amateur Radio Union; IMO International Maritime Organisation; IRG: Independent Regulators Group (pan-European body); NRA: National Regulatory Authority; NNA: Numbering, Naming and Addressing (non RF); Project Teams PT PT<sub>1</sub>: IMT2000, PT<sub>2</sub>: TRIS Technical Regulation and Interconnection Standards, PT<sub>9</sub>: Maritime issues; Task Groups TG: UWB (TG3) and Digital Dividend (TG4). RA: Radio Affairs (Radio and e-Communications); RRC: Regional Commonwealth in Communications; R&TTE CA: The Radio and Telecommunications Terminal Equipment Compliance Association; RSPG: Radio Spectrum Policy Group (EC body); RSC: Radio Spectrum Committee (EC body); SE: Spectrum Engineering. Industry Stakeholders, namely companies, consultants, industry groups and international agencies, contribute to the ECC Working Groups.



# The 2008 European table of frequency allocations and utilisations in the frequency range 9 kHz to 3000 GHz



[PP10Tables/ErcRep025.pdf](#)



# Standards, Thresholds, Regulatory Framework: Europe-N.America

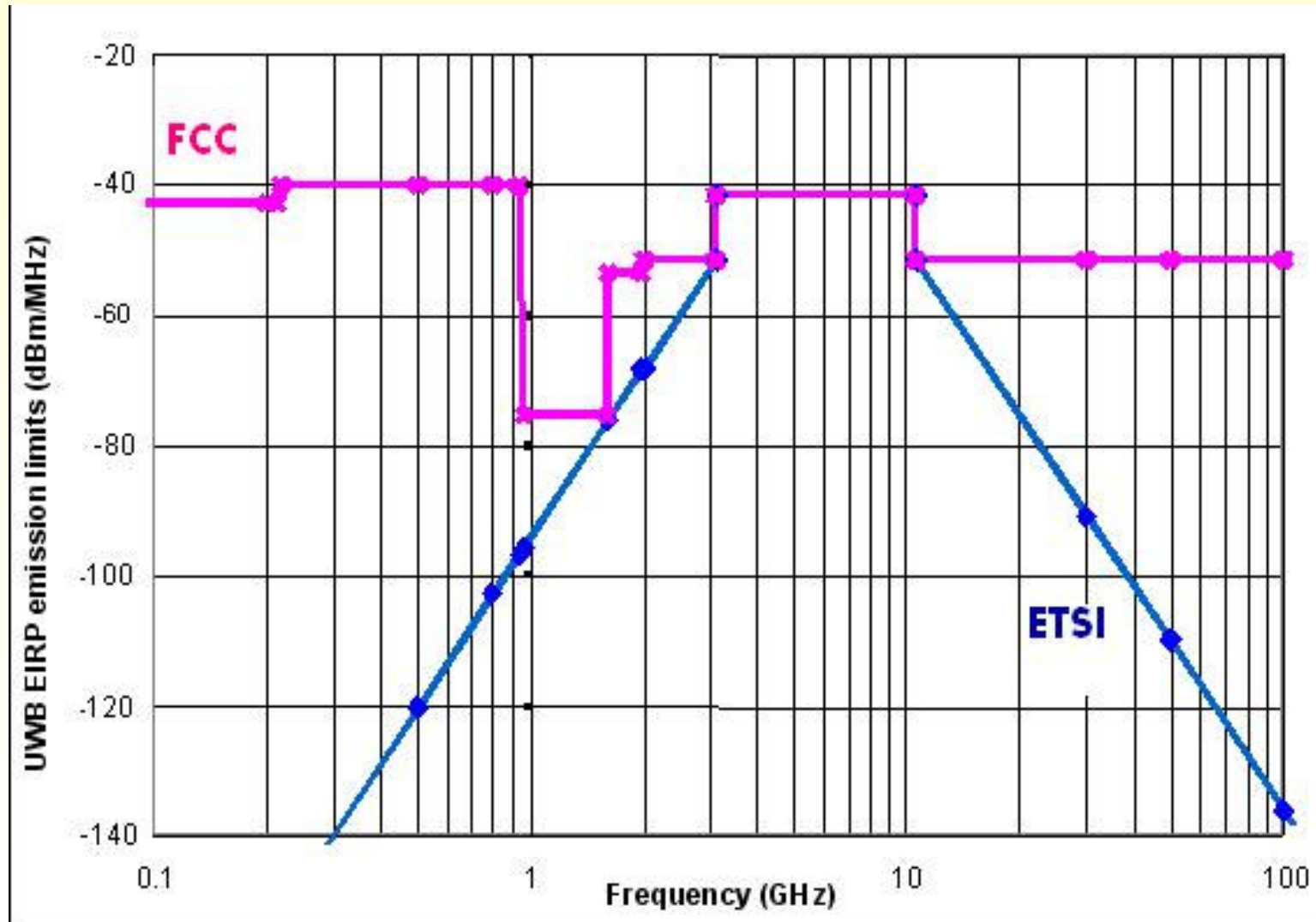


Standard	TV			Cellular standardised	Main Power and TV frames/s	Spurious Emissions	Human Hazards	
	Analog	Digital	Bandwidth				Base Stations	Handsets
Europe	PAL-SECAM	DVB-T	7-8 MHz	UMTS/ TETRA	50 Hz	Stringent	Flexible	
North America	NTSC	ATSC	6 MHz	CDMA2000	60 Hz	Flexible	Stringent	

[PP10Tables/Standards%20and%20thresholdsEU US.doc](#)

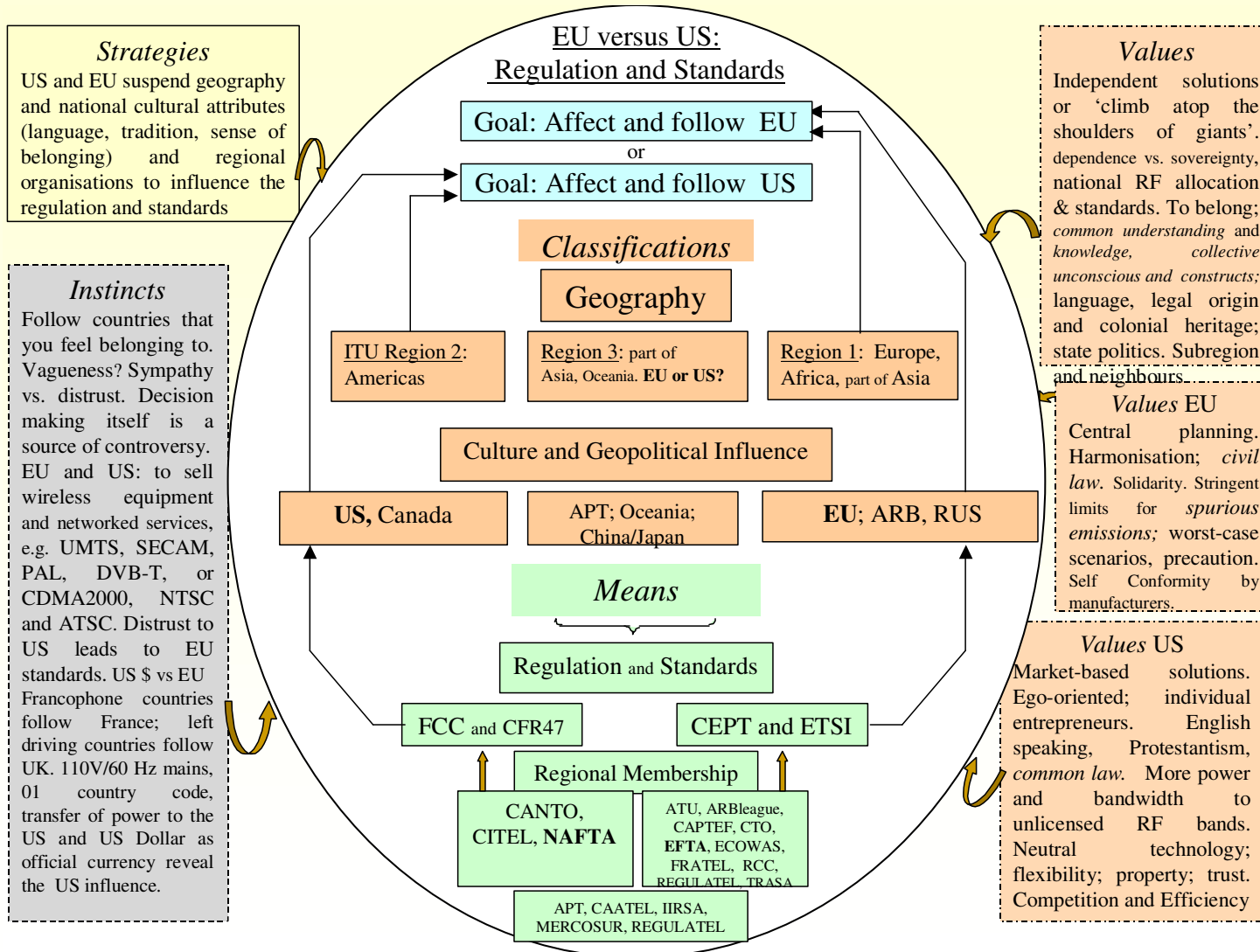


# UWB emissions masks ETSI-FCC





# EU versus US; Regulation & Standards







# Europe vs the US: Values



1. Independent solutions or ‘climb atop the shoulders of giants’
2. Dependence vs. Sovereignty
3. National RF allocation & standards
4. To belong; *common understanding and knowledge, collective unconscious and constructs*
5. Language
6. Legal origin and colonial heritage
7. State politics
8. Subregion and neighbours



# Values EU and the US



1. EU: Central planning. Harmonisation; *civil law*. Solidarity. Stringent limits for *spurious emissions*; worst-case scenarios, precaution. Self Conformity by manufacturers.
2. USA: Market-based solutions. Ego-oriented; individual entrepreneurs. English speaking, Protestantism, *common law*. More power and bandwidth to unlicensed RF bands. Neutral technology; flexibility; property; trust. Competition and Efficiency.



# *Strategies*



1. US and EU suspend geography and national cultural attributes
2. language, tradition, sense of belonging, clothes, food;
3. regional organisations to influence the regulation and standards



# *Instincts*



1. Follow countries that you feel belonging to.
2. Vagueness? Sympathy vs. distrust.
3. Decision making itself is a source of controversy.
4. EU and US: to sell wireless equipment and networked services, e.g. UMTS, SECAM, PAL, DVB-T, or CDMA2000, NTSC and ATSC.
5. Distrust to US leads to EU standards.
6. US \$ vs EU
7. Francophone countries follow France; left driving countries follow UK. 110V/60 Hz mains, 01 country code, transfer of power to the US and US Dollar as official currency reveal the US influence.



## Parameters and spectrum requirements for SRDs devices; ITU, CEPT, FCC



1. [PP10Tables/SM1538SRD Tables.doc](#)
2. [PP10Tables/CEPT Rec7003e.pdf](#)
3. [PP10Tables/47cfr15 247.pdf](#)
4. [PP10Tables/Part15.htm](#)



## WiFi 802.11 and UWB Tables, Figures, Channels



1. [PP10Tables/RECM1450-3-20080RLAN%20Tables%20and%20Figures.doc](#)
2. [PP10Tables/WiFi%20Tables.doc](#)
3. [PP10Tables/RECSM1755-200605UWB%20tables.doc](#)



# RLAN characteristics



TABLE 2

Technical parameters associated with broadband RLAN standards

IEEE Std 802.11-2007 (Clause 15, commonly known as 802.11b)	IEEE Std 802.11-2007 (Clause 17, commonly known as 802.11a <sup>(1)</sup> )	IEEE Std 802.11-2007 (Clause 18, commonly known as 802.11g <sup>(1)</sup> )	IEEE Std 802.11-2007 (Clause 17, Annex I and Annex J, commonly known as 802.11j)	ETSI BRAN HIPERLAN2 <sup>(1), (2)</sup>	ARIB HiSWANa <sup>(1)</sup>
CSMA/CA, SSMA	CSMA/CA	CSMA/CA	CSMA/CA	TDMA/TDD	TDMA/TDD
CCK (8 complex chip spreading)	64-QAM-OFDM 16-QAM-OFDM QPSK-OFDM BPSK-OFDM 52 subcarriers (see Fig. 1)	DSSS/CCK OFDM PBCC DSSS-OFDM	64-QAM-OFDM 16-QAM-OFDM QPSK-OFDM BPSK-OFDM 52 subcarriers (see Fig. 1)	64-QAM-OFDM 16-QAM-OFDM QPSK-OFDM BPSK-OFDM 52 subcarriers (see Fig. 1)	64-QAM-OFDM 16-QAM-OFDM QPSK-OFDM BPSK-OFDM 52 subcarriers (see Fig. 1)
1, 2, 5.5 and 11 Mbit/s	6, 9, 12, 18, 24, 36, 48 and 54 Mbit/s	1, 2, 5.5, 6, 9, 11, 12, 18, 22, 24, 33, 36, 48 and 54 Mbit/s	3, 4.5, 6, 9, 12, 18, 24 and 27 Mbit/s for 10 MHz channel spacing 6, 9, 12, 18, 24, 36, 48 and 54 Mbit/s for 20 MHz channel spacing	6, 9, 12, 18, 27, 36 and 54 Mbit/s	6, 9, 12, 18, 27, 36 and 54 Mbit/s
2 400-2 483.5 MHz	5 150-5 250 MHz <sup>(5)</sup> 5 250-5 350 MHz <sup>(4)</sup> 5 470-5 725 MHz <sup>(4)</sup> 5 725-5 825 MHz	2 400-2 483.5 MHz	4 900-5 000 MHz <sup>(3)</sup>	5 150-5 350 <sup>(5)</sup> and 5 470-5 725 MHz <sup>(4)</sup>	4 900 to 5 000 MHz <sup>(3)</sup> 5 150 to 5 250 MHz <sup>(5)</sup>
5 MHz	5 MHz	5 MHz	5 MHz	20 MHz	20 MHz channel spacing 4 channels in 100 MHz
802.11b mask (Fig. 2)	OFDM mask (Fig. 1)	OFDM mask (Fig. 1)	OFDM mask (Fig. 1)	OFDM mask (Fig. 1)	OFDM mask (Fig. 1)
LBT	LBT/DFS/TPC	LBT	LBT	LBT/DFS/TPC	LBT
Listed in Standard	Listed in Standard	Listed in Standard	Listed in Standard	Listed in Standard	Listed in Standard

l layer are common between IEEE 802.11a and ETSI BRAN HIPERLAN2 and ARIB HiSWANa.

nd advanced IP with QoS are intended for use over ETSI BRAN HIPERLAN2 physical transport.

PAN MIC ordinance for Regulating Radio Equipment, Articles 49-20 and 49-21.

50-5 350 and 5 470-5 725 MHz bands in many administrations and administrations must be consulted.

) (WRC-03), operation in the 5 150-5 250 MHz band is limited to indoor use.



# Spectrum Control (see ITU-R HB)

