

A Comparison Between European and North American Wireless Regulations

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- Wireless regulation & standardisation are divided into two major camps: Europe and N. America
 - Different approach to top-down mandated standards: collectivism and intervention vs. *individualism* and 'light touch'
 - Licensing: Part 15 and R&TTE; influence of EU on the rest Europe (& Region 1) is parallel to the influence of the US on Canada
 - Harmonisation: *E Pluribus Unum*, probability of interference
 - Europe: 50 Hertz, GSM, 7-8MHz PAL&SECAM TV into DVB-T
 - N. America: 60 Hertz, CDMA, 6 MHz NTSC TV switched to ATSC
- Diverse cellular penetration and digital TV standards are derived from dissimilar coverage zones and population densities



Comparing Cellular Penetration

- Average cellular subscription rate in 2010 in 27 EU countries was **114%**, versus **90%** in US and **71%** in Canada; lower than any EU country
- Reasons:
 - Calling Party Pays (CPP) and average cost
 - Superior landline telephone services in N. America
 - Fragmented standards : TDMA, CDMA, GSM
 - Multiple SIM cards in Europe



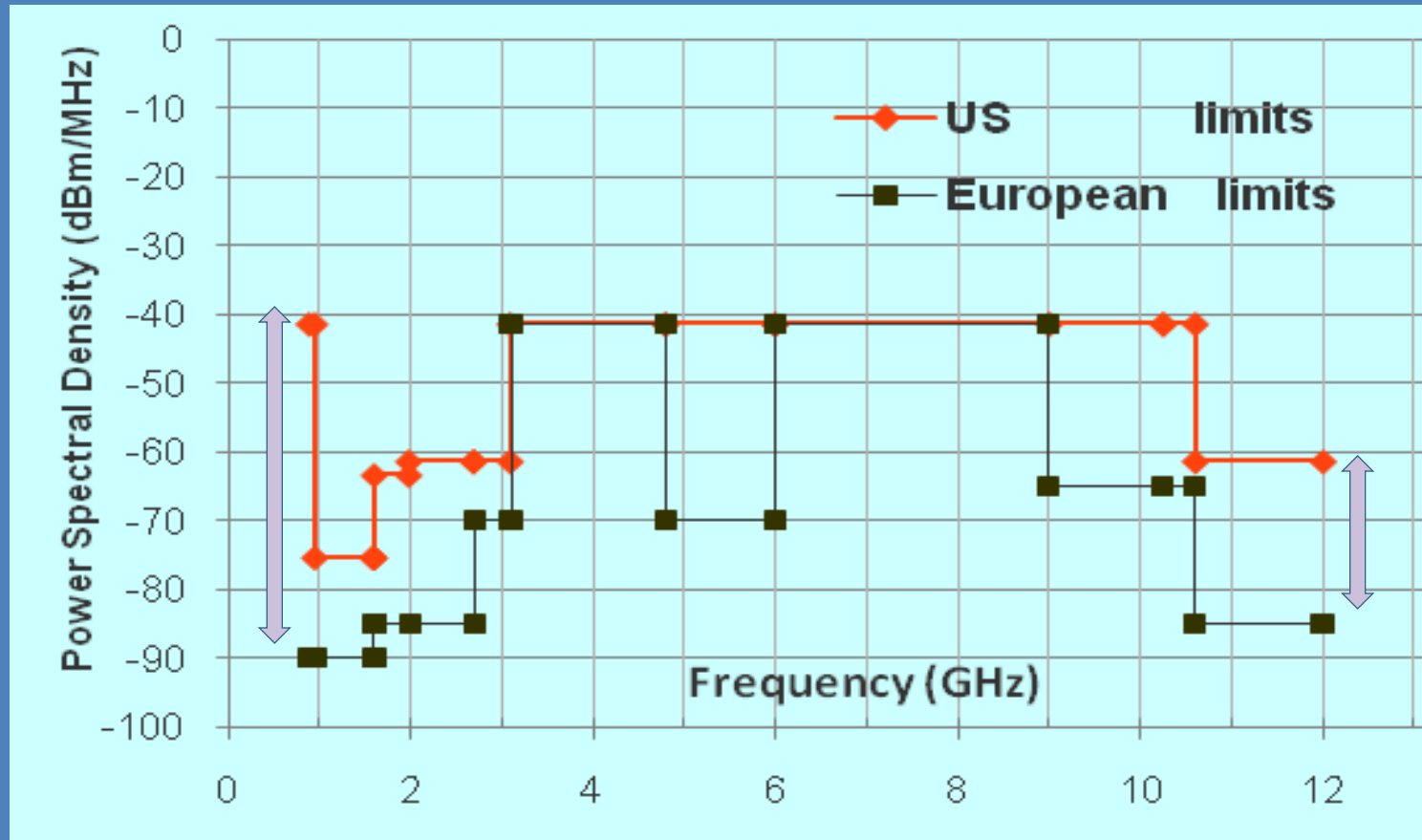
GSM Triumph (The Leviathan of Thomas Hobbes)

- US is dominant in networking, computing, μ processor technologies and software industries, whereas Europe leads the cellular market- base stations (and handsets)
- 3GPP evolution: GSM (2G), GPRS (2.5G), EDGE (2.75G), W-CDMA/UMTS (3G), HSPA (3.5G), and LTE (4G)
- "Tier 1" suppliers provide UMTS/HSPA base stations; the 4G LTE is already integrated in
- GSM success opened markets to other ETSI standards, such as the DVB

- Limits in Europe are much lower
- US/Canada let FS spurious up to 37 dB higher
- Europe is more stringent in protecting natural (RF) resources
- N. America is more sensitive to market needs

Spurious Emissions for various systems

Type of equipment	Category B: Europe (dBm)	Category C: US/Canada (dBm)
Land mobile service, 465MHz, 1 W, 12.5 kHz channels	-36	-20
Fixed Service, 325 MHz, 10 W	-50	-13
HF Broadcasting, 100 kW	17	0
FM Broadcast, 100 MHz, 10 kW	-15	-10



UWB emission masks in Europe and the US

Differences up to 49 dB@900-960MHz

Europe allowed UWB in 2005, US in 2001



Licence-Exempt Devices, Short Range Devices

- FCC Part 15 originated in 1938, inspired the European SRD concept (~1990) and ERC/REC 70-03
- In US and Canada most of the RF is available to SRD
- Europe permits lower emissions: e.g., 0.1W versus 4W at 2.4 GHz
- Europe constrains Wideband Data Transmission in 5150–5350 MHz, to only indoor use
- EU R&TTE is more liberal: self-conformity not FCC *ex-ante* certification; *laissez passer*; tests *ex-post*



Cognitive Radio System (CRS)

- CRS should prove use of vacant RF spectrum **without** interfering with incumbent services
- “Super Wi-Fi” was allowed recently for license-exempt use of TV bands by FCC (not in Canada)
- In US, the TV “white space” is the first public application of geo-location and a RF data-base
- UK is a frontrunner in regulating telecoms; UK will provide a national rural broadband Wi-Fi service and M2M as early as 2013 in “white spaces”



Human Hazards- thresholds

- At 400-1500 MHz, the allowed ICNIRP and Eur. Power Density for the general public is: $f(\text{MHz})/200$ [W/m²]
- Europe follows ICNIRP levels; but: SUI (0.01 ICNIRP for BTS), Italy (0.03 ICNIRP) and Slovenia (0.1 ICNIRP)
- US & Canada limit is 4/3 higher: $f(\text{MHz})/150$ [W/m²]
- US & Canada threshold on terminal's SAR is 1.6 W/kg (5/4 more risk averse). ICNIRP & EU limit is 2.0 W/kg.



Human Hazards, ITU activities

- The tolerability of the human body to RF radiation is independent of geography, so there is no technical justification for the different allowed exposure levels around the world, from cellular BTS or handsets
- Following ITU PP-10 Res 176 “Human exposure to and measurement of electromagnetic fields”, WTDC-10 Res 62 and WTSA-08 Res 72, ISR contributes to adopt globally at ITU-D Q23/1 & ITU-T Q 3/5 the ICNIRP level



Compare

- So begins Tolstoy's *Anna Karenina*: “*happy families are all alike; every unhappy family is unhappy in its own way*”. Between 2 points there is one shortest way, but indefinite wrong approaches
- *Wealthy countries are alike*: Europe and North America properly regulate their RF Spectrum; regulation is objective, transparent, non-discriminatory, flexible, dynamic, fair and proportionate; it promotes competition and secures an optimal use of RF
- Some developing countries invent their ruling

Compare and Contrast

- the British and French colonial inheritance and the parallel latitude of Europe and N. America (both above 30°) explain their similarities
- The goal is the same: benefit of the consumer; the differences are in risk-tolerability
- RF allocations and broadcasting (Video V-UHF, Audio MW and VHF) channel separations in Europe and America are historically diverse

Conclusion

- **RF human hazards thresholds** and regulation of **licence-exempt, spurious emissions, UWB masks** and **cognitive radios** reveal that the US and Canada are generally more tolerable to risk than Europe
- Globalisation and harmonisation create a “connected world”, offering
 - free circulation of wireless equipment
 - worldwide roaming and interoperability

Thank you

[Hyperlink to the World-Telecom 2011 full-text](#)

[Hyperlink to PhD Thesis](#)

[Hyperlink to the Book](#)

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