



# Interference Detection and Mitigation and GNSS Jammers

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# Regulations in the U.S.

U.S. Federal statutes and regulations generally prohibit the manufacture, importation, sale, advertisement, or shipment of devices, such as jammers, that fail to comply with FCC regulations.

Four different authorities:

- U.S. Federal Statutes – Communications Act
- Telecom Agency Rules – FCC
- The Criminal Code
- International Treaties

# U.S. Federal Statutes – Communications Act

## 47 U.S.C. § 301 Unlicensed (unauthorized) operation prohibited.

“No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio within the United States except under and in accordance with the Communications Act and with a license granted under the provisions of the Communications Act.”



# U.S. Federal Statutes – Communications Act

47 U.S.C. § 302a(b) Manufacturing, importing, selling, offer for sale, shipment or use of devices which do not comply with regulations are prohibited

- “No person shall manufacture, import, sell, offer for sale, or ship devices or home electronic equipment and systems, or use devices, which fail to comply with regulations promulgated pursuant to this section.”



# U.S. Federal Statutes – Communications Act

## 47 U.S.C. § 333 – Interference to authorized communications prohibited

– “No person shall willfully or maliciously interfere with, or cause interference to, any radio communications of any station licensed or authorized by or under this Act or operated by the United States Government.”



# U.S. Federal Statutes – Communications Act

## 47 U.S.C. § 503: Forfeitures

“Any person who is determined by the Commission, in accordance with paragraph (3) or (4) of this subsection, to have—(A) willfully or repeatedly failed to comply substantially with the terms and conditions of any license, permit, certificate, or other instrument or authorization issued by the Commission; (B) willfully or repeatedly failed to comply with any of the provisions of this chapter or of any rule, regulation, or order issued by the Commission under this chapter or under any treaty, convention, or other agreement to which the United States is a party and which is binding upon the United States; (C) violated any provision of section 317 (c) or 509 (a) of this title; or (D) violated any provision of Section 1304, 1343, 1464, or 2252 of title 18; shall be liable to the United States for a forfeiture penalty. “



# U.S. Federal Statutes – Communications Act

## 47 U.S.C. § 510: Forfeiture of communications devices

“Violation with willful and knowing intent Any electronic, electromagnetic, radio frequency, or similar device, or component thereof, used, sent, carried, manufactured, assembled, possessed, offered for sale, sold, or advertised with willful and knowing intent to violate section 301 or 302a of this title, or rules prescribed by the Commission under such sections, may be seized and forfeited to the United States. “



# Regulations in the U.S.

## Telecom Agency Rules – FCC

### 47 C.F.R. § 2.803(a)

- marketing is prohibited unless devices are authorized and comply with requirements...or
- (2) “In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.”





# Telecom Agency Rules – FCC

## 47 C.F.R. § 2.803(e)

- 47 C.F.R. § 2.803(e)(4) – marketing is defined as “sale or lease, or offering for sale or lease, including advertising for sale or lease, or importation, shipment, or distribution for the purpose of selling or leasing or offering for sale or lease.”



# The Criminal Code

## (Enforced by the Department of Justice)

- Title 18 of the U.S. Code (U.S.C.) contains the criminal and penal code of the U.S. government. It addresses federal crimes, criminal procedures, and general provisions.
- Section 32(a) includes a prohibition on acts that destroy or endanger an aircraft, including:
  - Interference with a navigation facility with intent to endanger the safety of any person or with a reckless disregard for the safety of human life
  - Communication of information known to be false and endangering the safety of any such aircraft in flight.



# The Criminal Code (Enforced by the Department of Justice)

- Title 18, Section 35 - prohibits communication of information known to be false regarding an attempt made to do any act prohibited by 18 U.S.C.
- Title 18, Section 1030 (a)(5) – prohibits damaging a computer system.



# The Criminal Code

## (Enforced by the Department of Justice)

- Title 18, Section 1362 - prohibits willful or malicious interference to U.S. government communications; subjects the operator to possible fines, imprisonment, or both (18 U.S.C. § 1362)
- Title 18, Section 1367(a) - prohibits intentional or malicious interference to satellite communications; subjects the operator to possible fines, imprisonment, or both (18 U.S.C. § 1367(a))



# The Criminal Code

## (Enforced by the Department of Justice)

- Section 46308 of 49 U.S.C. stipulates that “a person shall be fined under title 18, imprisoned for not more than 5 years, or both, if the person:
  - (1)with intent to interfere with air navigation in the United States, exhibits in the United States a light or signal at a place or in a way likely to be mistaken for a true light or signal established under this part or for a true light or signal used at an air navigation facility;
  - (2)after a warning from the Administrator of the Federal Aviation Administration, continues to maintain a misleading light or signal;
  - (3)knowingly interferes with the operation of a true light or signal.”



# The Criminal Code

## (Enforced by the Department of Justice)

- 49 U.S.C. section 46308 and 18 U.S.C. sections 32(a)–35 are referenced within FAA Order 6050.22c [5-3], which contains procedures for investigating and reporting radio frequency interference affecting the NAS.
- FAA Order 6050.22c includes an interagency agreement between the FAA, Federal Bureau of Investigation, and FCC on procedures the three agencies should follow to effectively interact in an attempt to locate, identify, and resolve any deliberate RFI acts such as “phantom controller” incidents.



# International

- The United Nations Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation is a multilateral treaty that was adopted by the International Conference on Air Law at Montreal on 23 September 1971.
- The Convention signatories agree to prohibit and punish acts that threaten the safety of civil aviation. It entered into force on 26 January 1973 after ratification by 10 nations. As of today, the Convention has 188 signatories.
- Several of the U.S. laws relevant to intentional interference and spoofing of civil aviation GNSS applications mentioned above were enacted to satisfy obligations made per this Convention.



# GNSS Jammers – National Legal Status (As Reported at ICG-9)

| Jammers     | US                                     | RU        | China     | EU               |
|-------------|--|-----------|-----------|------------------|
| manufacture | illegal                                | illegal   | illegal   | Nation-by-nation |
| sell        | illegal                                | illegal   | illegal   | illegal          |
| export      | illegal                                | illegal   | illegal   | Nation-by-nation |
| purchase    | Undefined<br>(consumer import illegal) | illegal   | illegal   | illegal          |
| own         | legal                                  | Undefined | Undefined | legal            |
| use         | illegal                                | illegal   | illegal   | illegal          |





# Interference Detection Task Force (as of 12 June 2015)

- **Co-Chairs:**

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## Recommendation 9A.3.1

The ICG recommends that GNSS providers and GNSS user community member states evaluate existing and emerging interference detection, localization, and characterization capabilities and consider developing, testing and implementing these or similar capabilities in their nations or regions of the world



# IDM Geolocation Systems

## ICG Interference Detection and Mitigation Workshops

- Workshop participants encourage system providers and user community members to evaluate the interference detection and characterization capabilities of the EU-funded DETECTOR project and consider testing a similar capability in other regions.

- Chronos Technology presented a briefing on the UK Sentinel Project targeting small jammers being used to defeat road use/tax monitoring.  
[http://www.chronos.co.uk/files/pdfs/gps/SENTINEL\\_Project\\_Report.pdf](http://www.chronos.co.uk/files/pdfs/gps/SENTINEL_Project_Report.pdf)

- Design Bureau «Vektor», Russia presented general guidelines and practical example of the analysis of spatial distribution of emissions in the frequency bands of GNSS

- Harris Corporation presented information about their Signal Sentry 1000 system, demonstrating a real-time geo-location system

[https://www.youtube.com/watch?feature=player\\_detailpage&v=bAK8Yil-njA](https://www.youtube.com/watch?feature=player_detailpage&v=bAK8Yil-njA)



## Recommendation 9A.3.2

System providers and user community member states are encouraged to work with industry groups to determine if standards for crowd sourcing interference detection and localization techniques should be developed and cost-effectively implemented by mobile telecom service providers.



# Crowd Sourcing for Interference Detection

- Discussed at June 2015 IDM Workshop
  - Suggestion that it might be better for detection networks to begin with cell-towers instead of mobile phones
  - Volume of data from nation-wide system may not be practical; regional monitoring centers might be more realistic.
  - Consensus that efforts aimed at initiating crowd-sourcing should begin with discussions between Task Force and individual companies before approaching user industry organizations such as 3GPP
  - Industry may be reluctant to act without market demand or government intervention through laws or regulations

## Way Forward

- **WG-A requested Task Force** to invite industry representatives to WG-A Meeting at ICG-10 to show how crowd-sourcing would work and discuss the feasibility
- Crowd Sourcing may also be discussed further at the next IDM Workshop



# Conclusion

- The threat from jammers is real and growing.
- Jammers are being used to commit crimes
- “Personal Privacy Jammers” are being used to defeat company tracking and
  
- ICG recommends that GNSS providers and GNSS user community member states evaluate existing and emerging interference detection, localization, and characterization capabilities and consider developing, testing and implementing these or similar capabilities in their nations or regions of the world



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