# **Principles of Internet Policy**

**Final Exam**

*Exam must be completed by 10 pm, Tuesday, May 5.*

When you have completed the Final Exam, type your name into the signature line below acknowledging that you have conformed with the University of Colorado Honor Code statement below:

*“On my honor as a student at the University of Colorado Boulder,  
I have neither given nor received unauthorized assistance on this work.”*

*Signature: Pourna Sengupta*

# Section 1

1. **(10 points) In 2002, the FCC's Spectrum Policy Task Force recommended an approach to spectrum management based on the principle that "one size does not fit all." The Task Force said that the FCC should consider a balance among the "exclusive use," "commons," and "command and control" models for assigning spectrum usage rights. The Task Force Report stated:**

***“The Task Force recommends that the Commission base its spectrum policy on a balance of the three basic spectrum rights models outlined above: an exclusive use approach, a commons approach, and (to a more limited degree) a command-and-control approach. … Thus, to the extent feasible, the Commission should identify more spectrum for both licensed and unlicensed uses under flexible rules, and should transition existing spectrum that is subject to more restrictive command-and-control regulation to these models to the greatest extent possible.***

**Answer the following questions about this recommendation:**

1. **(5 points) Describe each model of spectrum management (exclusive use, commons, and command-and-control).**

* Exclusive Use
  + Exclusive Use gives licensees exclusive and transferable rights for specific spectrum in areas. These rights are paired with rules that protect against interference. The rights are modeled after property rights and follow Coase’s Theorem. Coase’s Theorem states that with well-defined rights, resources will be allocated so that they are efficiently used. License distribution is conducted through auctions.
* Commons
  + The Commons model allows an unlimited number of unlicensed users that share spectrum. There is no right to protection from interference and usage rights are set by the common standard.
* Command-and-Control
  + The Command-and-Control model limits who can use spectrum and for what they can use it for. Renewable licenses are given based on approved uses. Rules include service restrictions and build-out requirements. The model does not allow for ownership of spectrum.

1. **(5 points) What does the Task Force mean by flexible spectrum rules? Why does the Task Force favor flexibility in spectrum management models (e.g., what are the benefits of flexible spectrum allocations)?**

* Flexible spectrum includes a broad variety of rights, such as choice of use and technology. Flexible spectrum rights include rights to lease, transfer, and subdivide spectrum.

1. **(5 points) Define spectrum management and explain the four basic elements of spectrum management.**

* Spectrum management is the process of allocating and assigning spectrum and enforcing the rules and rights defined.
* Allocation
  + Allocation of radio spectrum and frequencies. Allocation includes primary, co-primary and secondary allocation. Primary allocation gives specific services priority in spectrum usage. Co-primary allocation allows for multiple priority services within a frequency band. These services all share equal rights and are protected from each other. Secondary allocation prevents harmful interference to primary services within a band and can claim protection from interferences from stations.
* Service Rules
  + Service rules include the duration of a license and what the license can be used for, transferability rules, maximum power levels, technical standards, and build-out requirements.
* Assignment
  + Assignment of spectrum is done through auctions to allocate spectrum to users. Auctions encourage entry of new competition. But they can also be sold to monopolists and can reduce the amount of spectrum.
* Enforcement
  + Enforcement includes the enforcement of rights and rules that are defined when allocating and assigning spectrum. These rules include the service rules as well as other policies regarding interference or white space.

1. **(5 points) In ITU Region 2, the 7.2 – 7.3 MHz band is allocated on a primary basis to broadcast service and is allocated on a secondary basis to amateur radio service. For an amateur radio service operating in this band, explain what rights the broadcast service has in using this spectrum as compared to the amateur radio service.**
2. **(5 points) Explain what is mean by the term “white space” in terms of spectrum management. Describe what the difference is between spectrum “underlay” and “overlay” technologies to fill in the white spaces.**

* White space is portions of unused spectrum. Underlay technologies transmit power levels under the electromagnetic noise floor. Overlay technologies find unused spectrum and utilize it.

1. **(5 points) Briefly describe the "Coase Theorem" and explain how this economic theory has been applied in the management of currently remaining spectrum used for broadcast digital television.**

* Coase’s Theorem states that the free market will efficiently allocate resources when property rights are well defined. This theory is applied to interference. The theorem states that by allowing interference, the positive gains are greater than the harm it may cause.

# Section 2

1. **This question explores the issues associated with domestic and international cybersecurity.**
   1. **(5 points) What are the objectives of the United States’ international cybersecurity policies?**

* The objectives of the United States’ international cybersecurity policies include working with other international partners to better the cyberspace, work through access barriers that restrict U.S. imports of ICT goods and services, and develop international standards through the cyberspace.
  1. **(5 points) Explain what confidence building measures (CBMs) are, and give examples of cyber CBMs that have been developed?**
* CBMs are used to reduce the risk of conflict between states by removing potential issues of trust. In 1998, the UN worked with the Russian Federation’s first draft which included CBM frameworks. THE OCSE also established CBM frameworks for use.
  1. **(25 points) Develop a framework (including a table) to compare and contrast the alternative cyber space norms of the United States, China, and Russia. Based upon this framework, can these views of cyber norms coexist together to support a global Internet? Explain your answer.**

|  |  |  |
| --- | --- | --- |
| **United States** | **China** | **Russia** |
| Promote multistakeholder model | Censorship to defend against domestic and foreign influences | Rules that limit development, deployment, and use of “information weapons” |
| Advance development of CBMs | Will not apply laws regarding war and armed conflict to the cyberspace | Promote speech and content controls |

* China and Russia are focused on government regulated systems while the U.S. is more focused on multistakeholder regulation. China is also focused on preventing what they see is a cyber arms race in the making whereas the U.S. and Russia are less concerned. China censors their cyberspace while Russia controls some speech and content. The U.S. believes in a free cyberspace without censoring and so far follows that.

# Section 3

1. **(15 points) Using at least three of the Fair Information Practice Principles as a guide, explain how the regulations of the GDPR’s *ex ante* approach differ from the FTC’s *ex post* approach in terms of implementation of each principle?**
2. **(5 points) Explain the differences and similarities between cybersecurity risk and privacy risk.**
3. **(5 points) Now explain the high-level differences and similarities between the NIST Cybersecurity Framework and the NIST Privacy Framework.**
4. **(10 points) Using FIPPs as a guide, critique the privacy statement of the University of Colorado Boulder website (accessed at:** [**https://www.colorado.edu/policies/privacy-statement**](https://www.colorado.edu/policies/privacy-statement)**). Your critique can identify both strong and weak points of the privacy statement.**