Tussle in Cyberspace: Defining Tomorrow’s Internet
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(Adapted from slides by Ao-Jan Su & Gergely Biczók)
What is “Tussle”? 

**define: tussle**
- to struggle or fight roughly or vigorously
  [Dictionary.com]
Examples
- Music lovers share vs. copyright holders
- People want to talk in private vs. government wants to tap
- ISPs must interconnect but are sometimes fierce competitors

The time has changed!
- Beginning: users shared a common goal
- Now: different people different goals
- New design philosophy for Internet needed!
Define: tussle

“Different stakeholders that are part of the Internet milieu (society) have interests that may be adverse to each other, and these parties each vie (compete) to favor their particular interests”

(from the abstract, brackets mine)
Our Old Mindset

- Engineers: solve the problems by designing mechanisms with predictable consequences.
- Society: dynamic management of evolving and conflicting interests.
- Accommodating tussle is crucial to Internet’s evolution.
Principles

- Highest-level: Design for tussle
  - Design for choice
  - Design for variation in outcome
  - Be flexible
  - Tussle in the design, not by violating the design

- Second: Modularize along tussle boundaries
  - Tussle does not spill over
  - Avoid distortion to unrelated functions
Example – Design for Choice

- Economics
  - Providers want to “lock in” customers
  - Customers want to change among providers
  - Design for choice accommodates such tussle

- Provider lock-in from IP addressing
  - Since 2002: Change your cell phone carrier without changing your cell phone number
  - Incorporate mechanisms that make it easy for a host to change providers
  
  Bias in our design?
  
  Tussle during standardization and deployment?
Example – Modularize along Tussle Boundaries

- Fighting over trademarks
  - Domain names name machines & express trademark
  - Fights over trademark lead to DNS design debate
  - Design should isolate trademark expression & naming of machines

- Technically inefficient, yet decrease collateral damage due to tussle
Revisiting the End to End Arguments

- Innovation, reliability, robustness
- Transparency eroded
  - Loss of trust → firewall
  - ISP control → filtering, redirection
- In-network “enhancement” inevitable
- Keep the net open/transparent for new applications!
  
  **This is vague. How to preserve the end-to-end arguments?**
Then What?

- **Conclusion**
  - Do not deny the reality of the tussle
  - Recognize our power to shape it
  - Change our way of thinking as a system designer

- **Discussion**
  - How to take this into our research?