

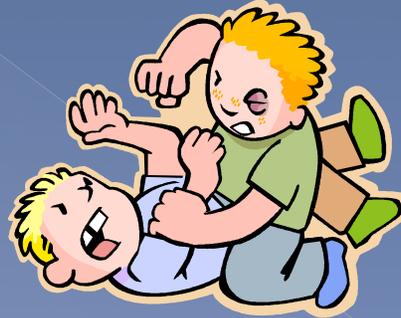
# Tussle in Cyberspace: Defining Tomorrow's Internet

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(Adapted from slides by Ao-Jan Su & Gergely Biczok)

## What is "Tussle"?



- ◉ define: tussle
  - > to struggle or fight roughly or vigorously [Dictionary.com]

## Tussle in Cyberspace

- ◉ 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!

## “Formal” Definition

- 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?*