

Putting Control into the Network: A Comparison of Deep Packet Inspection Technology Use in Canada, the US and China

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http://deeppacket.info

<THE NETWORK IS AWARE> SOCIAL SCIENCE RESEARCH ON DEEP PACKET INSPECTION

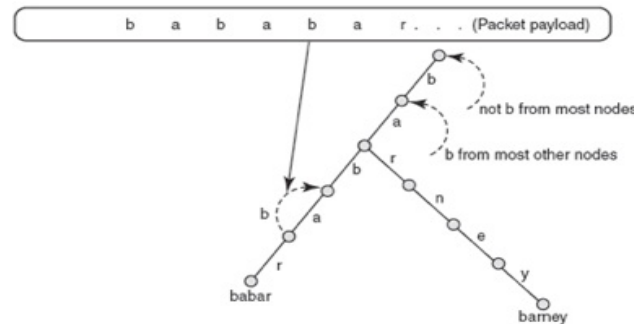
This website features the ongoing activities and results of research investigating whether deep packet inspection is changing the way the Internet is governed.

Deep packet inspection (DPI) is a network surveillance technology that enables operators to scan Internet traffic in real time and make automated decisions about what to do with it.

We analyze DPI deployments that generated political, legal and regulatory conflicts. We explore how its capabilities led to strategic interactions among network operators pursuing their business interests, government agencies seeking control, activists fighting for privacy or net neutrality, politicians and regulators responding to publicity, legislators and courts resolving disputes.

Drawing on theories from science, technology and society studies (STS), Internet governance studies and political science, we investigate how Internet governance is evolving in response to new network surveillance and management capabilities.

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An illustration of the Aho-Corasick algorithm, one of the methods used by DPI engines for pattern matching. From [Network Security: Know it All](#) (Elsevier, 2008)

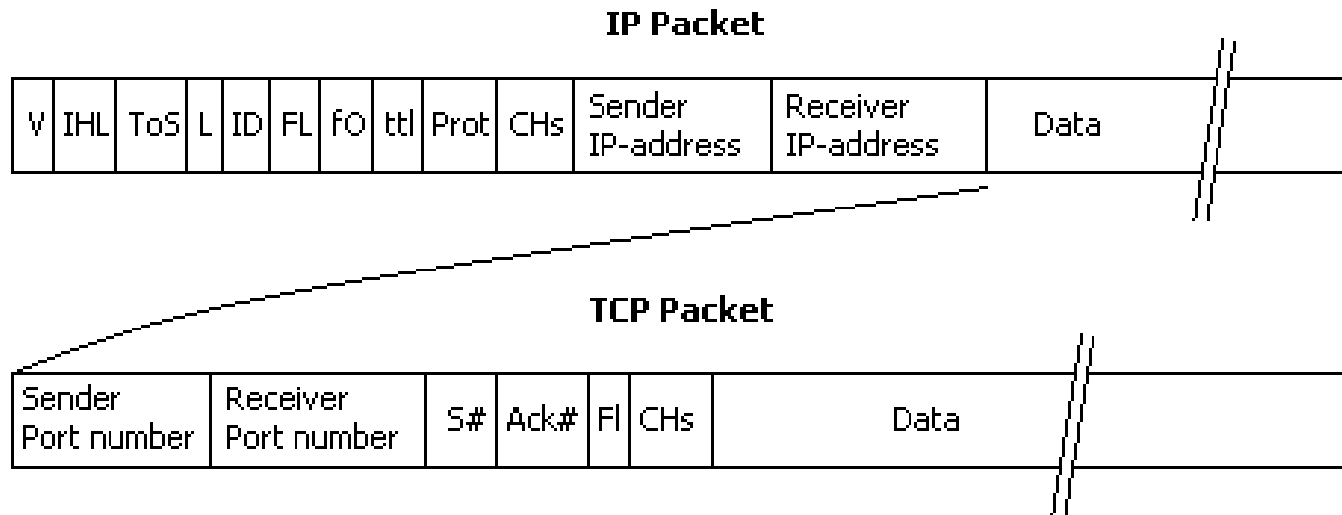
[CASE STUDIES OF DPI DEPLOYMENTS](#)

[STATISTICAL DATA FROM MLAB ON DPI USE](#)

[WHAT IS DPI AND HOW DOES IT WORK?](#)



Deep packet inspection



DPI technology from the standpoint of Internet governance studies: An introduction

http://dpi.ischool.syr.edu/Technology_files/WhatisDPI-2.pdf

DPI applications and incidents

- Bandwidth management
 - USA, Canada, Netherlands, China
- Advertising
 - USA, UK/Europe, South Korea, Brazil
- Governmental surveillance
 - USA (NSA), Iran, Tunisia
- Censorship/content regulation
 - China, Tunisia, Iran
- Copyright protection
 - USA, Europe
- Intrusion Detection/Intrusion Prevention

DPI as “disruptive technology”

- **Tension or conflict with three fundamental principles of Internet governance:**
 - The end to end argument (a.k.a. net neutrality)
 - Intermediary immunity
 - Expectations of privacy

General Research question

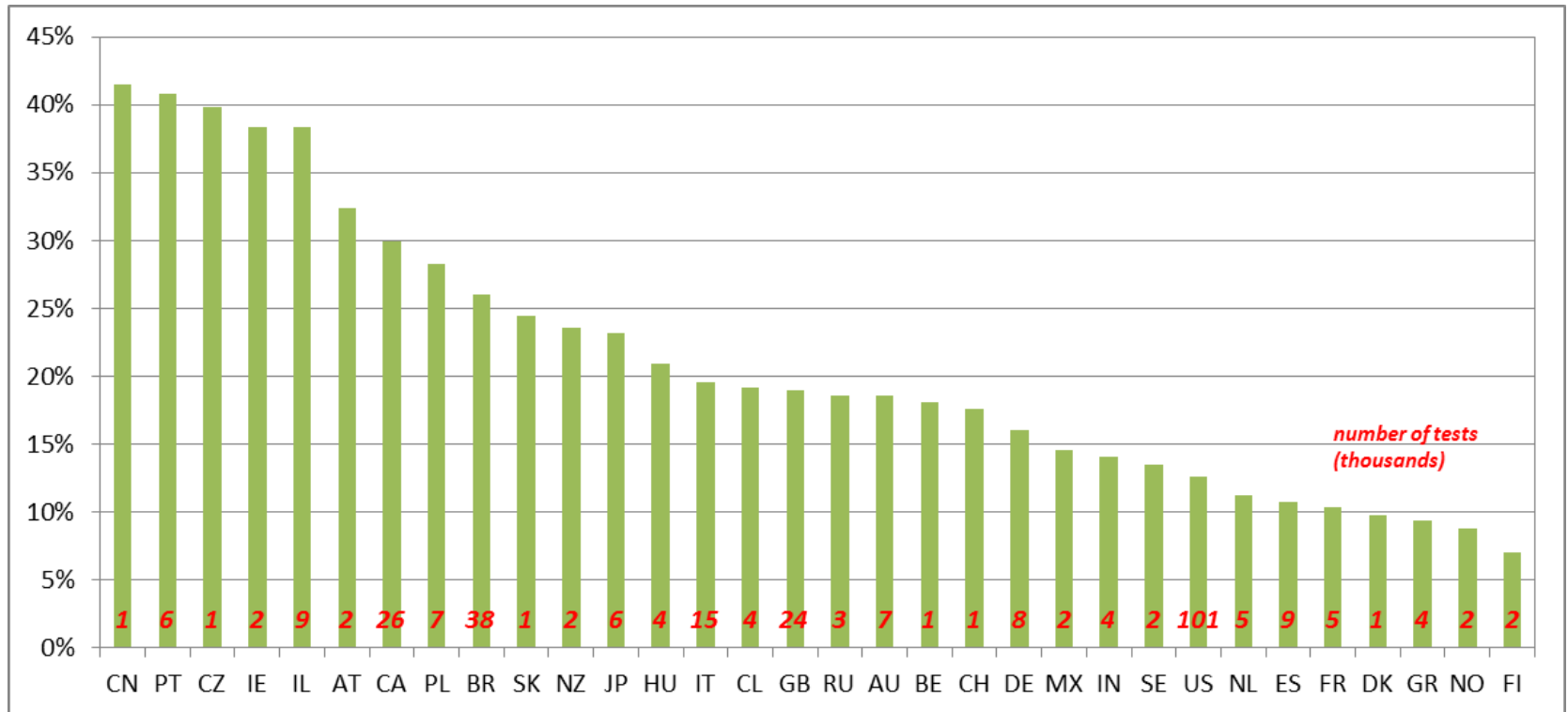
- **Is the disruptive potential of DPI being realized?**
 - Will DPI transform Internet governance, or will Internet regulation “tame” or control DPI capabilities to keep them consistent with prior norms?

Measuring DPI use for bandwidth control

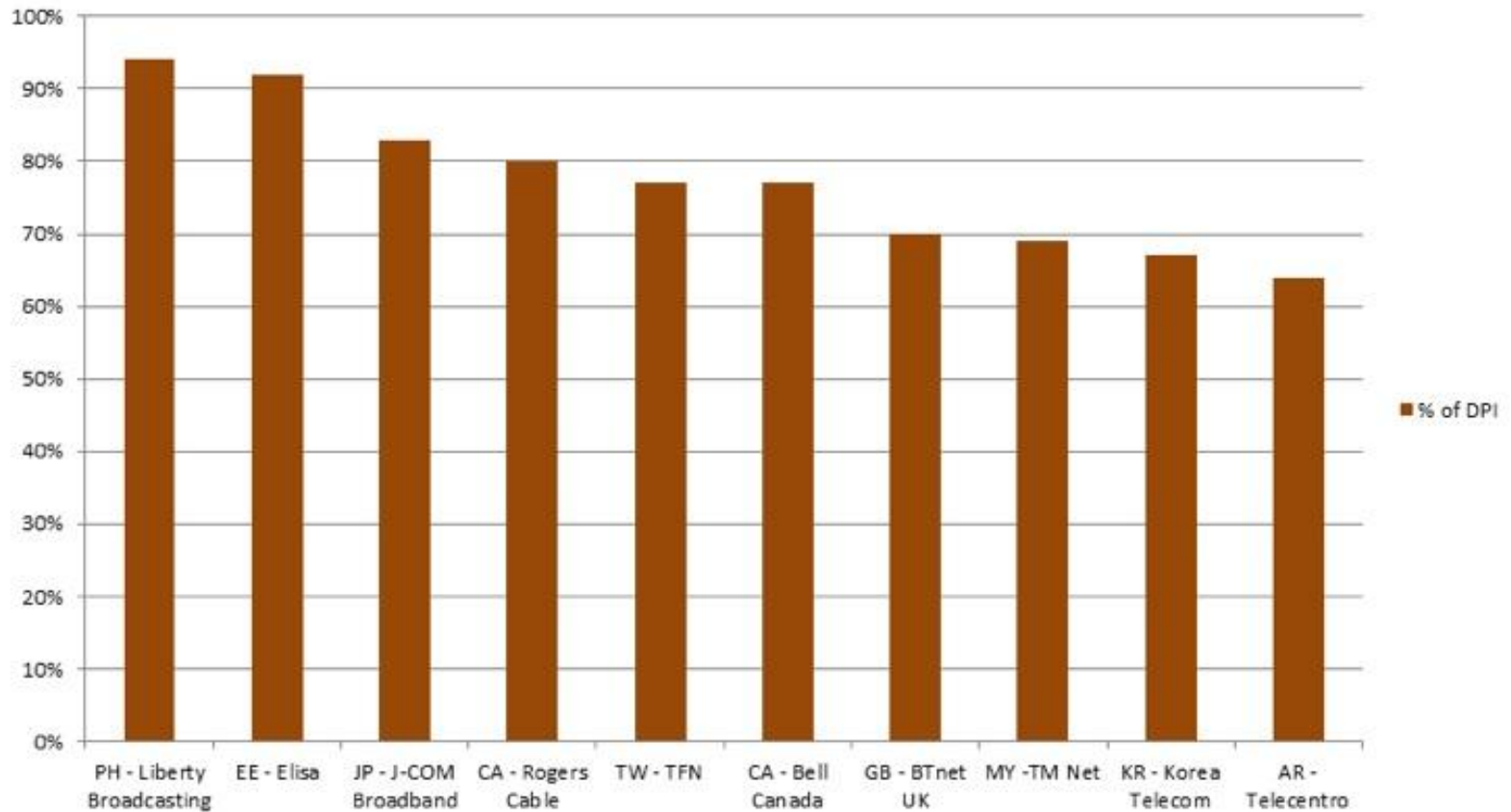
- Glasnost test (Dischinger et al)
 - Crowd-sourced network test
- How Glasnost works:
 - Upload file using bittorrent (BT) on BT port
 - Upload file using non-BT protocol on BT port
 - Upload file using BT on random port
 - Upload file using non-BT protocol on random port
 - Repeat 4 steps above for downloads
 - 24 flows in all (about 6 minutes)
 - Comparisons of BT and non-BT results reveals application-specific throttling (significantly different speeds)
 - Also detects port blocking and application-specific blocking

BitTorrent manipulation by country

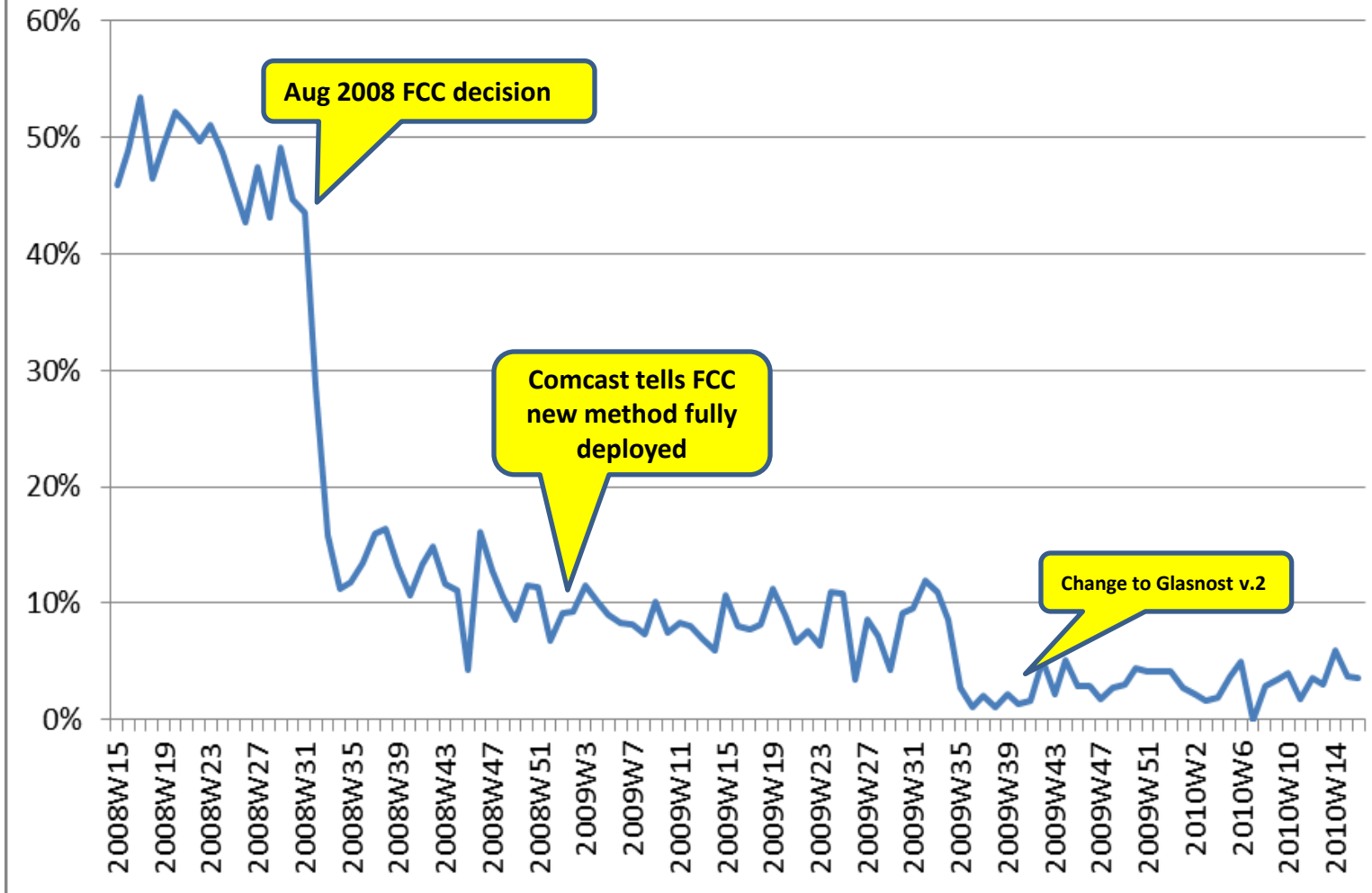
(Positive tests as a percentage of all valid tests)



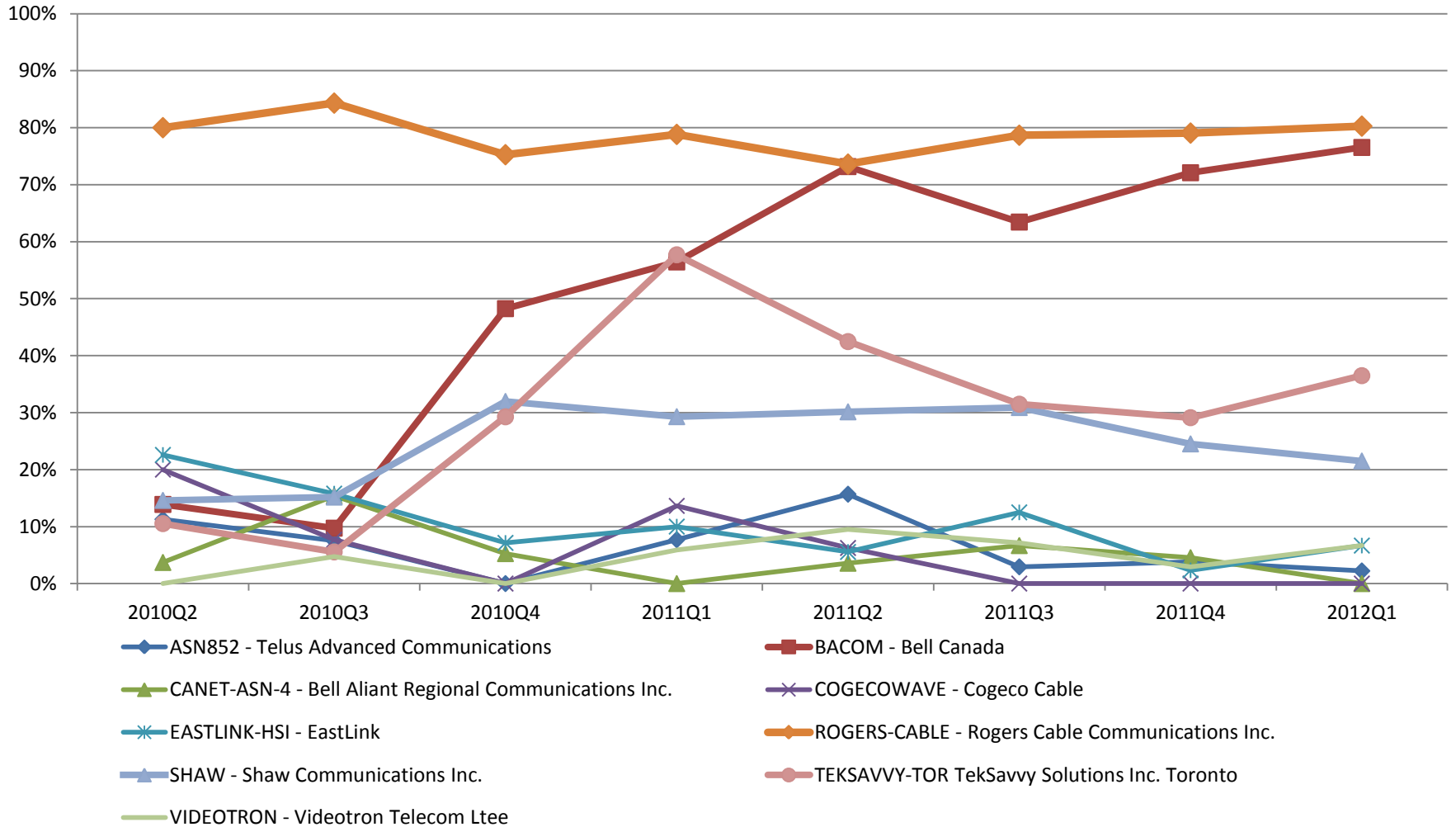
Top 10 throttlers, 2012 (Q1)



Comcast - percentage of tests indicating DPI

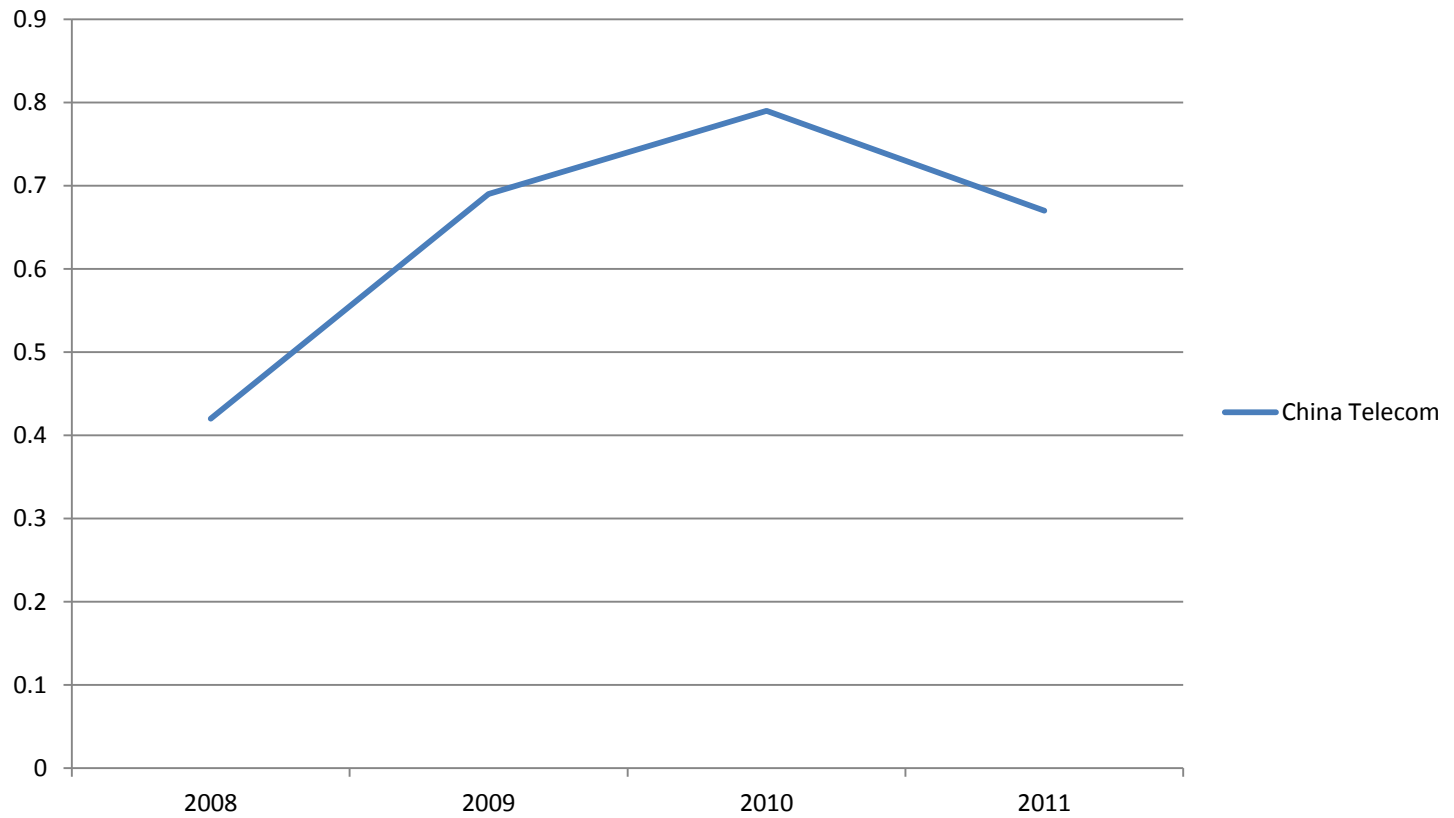


Canada



China

China Telecom

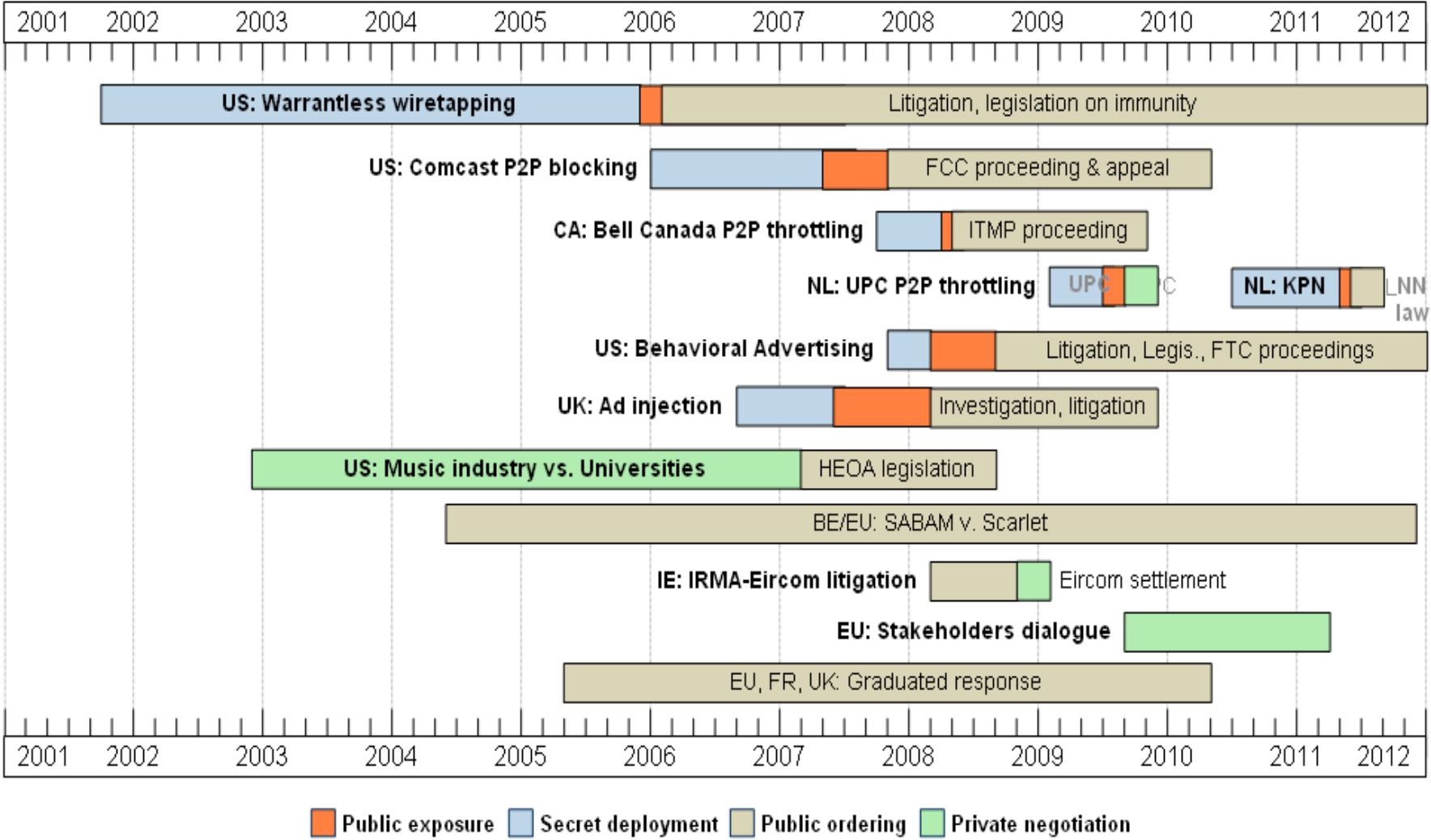


Comparison

- In the US and Canada, DPI deployment led to disruptive change in Internet regulation, but net neutrality norms reaffirmed
- In China regulators failed to respond to user agitation with a regulatory proceeding and nothing really changed
- In China bandwidth management issues are subordinate to the larger question of national security and how the state maintains economic and political control of information, public discourse and the economy

Q&A
Discussion

DPI Deployment and Governance



■ Public exposure
 ■ Secret deployment
 ■ Private negotiation
 ■ Public ordering