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# Internet Privacy: Big Brother and Little Brother

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- “The right of individuals to control or influence what information related to them may be collected and stored and by whom and to whom that information may be disclosed.” (OSI Reference Model)
- “Privacy is the interest that individuals have in sustaining a ‘personal space’, free from interference by other people and organisations.” (Clarke)
- “The right to be let alone.” (Future U.S. Supreme Court Justice Louis Brandeis, 1890)

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- What are you trying to protect?
- Who is the enemy?
- How much is your privacy worth? How much can your enemy spend?

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- From George Orwell's classic book *1984*
- Refers to the threat from dictators
- Is that a risk on the Internet?

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- Refers to corporations
- Often harder to stop
- But is it a threat?

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*It wags its tail,  
it barks, and it  
acts the same  
as last time.*

# A Third Vision of the Internet

*It snarls and  
bites; we have  
to deal with it.*

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*“On the Internet, no one knows you’re a dog.”*

*It wags its tail, it barks, and it acts the same as last time.*

*It snarls and bites; we have to deal with it.*

All three perspectives are valid; all three co-exist on the Internet.

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- Full content monitoring
- Behavior tracking
- Traffic analysis
- Linking multiple sources

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- Typically done via a wiretap
- In theory, easily prevented by encryption
- But — encryption is hard to use; very few people actually use it
- It's even harder to use *correctly*
- It can also be inefficient
- Result: rarely used except to protect passwords and credit card numbers

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- Monitor what sorts of sites users visit
- Can be done by login or “cookies”
- Often hard to block
- Very common on sites that require subscriptions

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- The New York Times and Wall Street Journal track what articles you read, and select appropriate ads
- Amazon.com tracks your purchases and recommends related items
- Google looks at queries and mail keywords; then serves up appropriate ads

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- Technically: cookies are small text files sent by a site to your web browser
- Intended uses: login name; shopping cart
- Actually: used to track you from session to session
- Third party cookies: a lot of Internet advertising is done by sites like Doubleclick.com, which set their own cookies
- Result: Doubleclick sees your behavior on *many* sites

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- If the web site ever learns who you are, they can associate that with your cookie
- Web bugs from third parties: one-pixel “clear GIFs”
- Going to just [www.nytimes.com](http://www.nytimes.com) resulted in cookies from [.atdmt.com](http://.atdmt.com), [.bluestreak.com](http://.bluestreak.com), [.doubleclick.net](http://.doubleclick.net), [.mediaplex.com](http://.mediaplex.com), [.nytdigital.com](http://.nytdigital.com), [.nytimes.com](http://.nytimes.com), and [.questionmarket.com](http://.questionmarket.com).
- If you visit another Doubleclick-using site, Doubleclick will know you’ve been to the N.Y. Times, and even something about what pages you viewed.

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- Use wiretaps to see what site a user visits
- Track email the same way
- *Very* hard to block with encryption
- Frequently used by law enforcement or intelligence agencies

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- Combine multiple sources of information
- Example: link address from online purchase to cookies
- Privacy principle: the secondary uses of the data are much more troublesome

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- Many governments spy on some Internet traffic
- Some, of course, do it more than others
- Generally aimed at government purposes

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- Foreign intelligence
- Law enforcement
- Tracking domestic dissidents
- These categories can overlap
- Scope depends on type of government

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- Generally must be completely invisible to person being monitored
- Result: done by wiretaps and by obtaining ISP and web site logs
- (Cookies aren't used)

# Threat Level

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- Not a major threat in most democracies
- Some democratic governments abuse their authority, but this can be dealt with politically
- Volume of traffic limits the amount of monitoring possible
- Even democracies monitor foreign traffic
- Dictatorships monitor much more internal traffic

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- Primary goal: making money
- Privacy issue: can corporations make money by tracking users?
- Many of them think so!

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From a Wall Street Journal article on how Nielsen will use set-top boxes to monitor viewership:

Supporters of set-top-box data say it is more useful to marketers and less burdensome to participants than traditional Nielsen ratings. The set-top boxes cover many more households, and, unlike the panels, researchers don't have to secure agreement from those households to participate.

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- Cookies
- Third-party cookies
- Cooperation with third-party advertising sites:  
pass information both ways
- Web site registration

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- Some ISPs monitor user traffic
- Often for traffic engineering
- Example: Comcast (a US ISP) interfering with BitTorrent
- Some ISPs (i.e., Rogers in Canada) insert ads in some traffic
- In some countries, monitoring is done to deal with copyrighted material

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- Corporations can sell data about users
- Often, they won't do that — but they'll sell aggregate data
- User behavior data used for targeted ads, online and offline
- Sometimes, they sell data to the government that the government can't collect by itself

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- As noted, hard for most users
- Only protects against wiretappers
- Does not protect against attacks from end-site, such as cookies or third-party cookies

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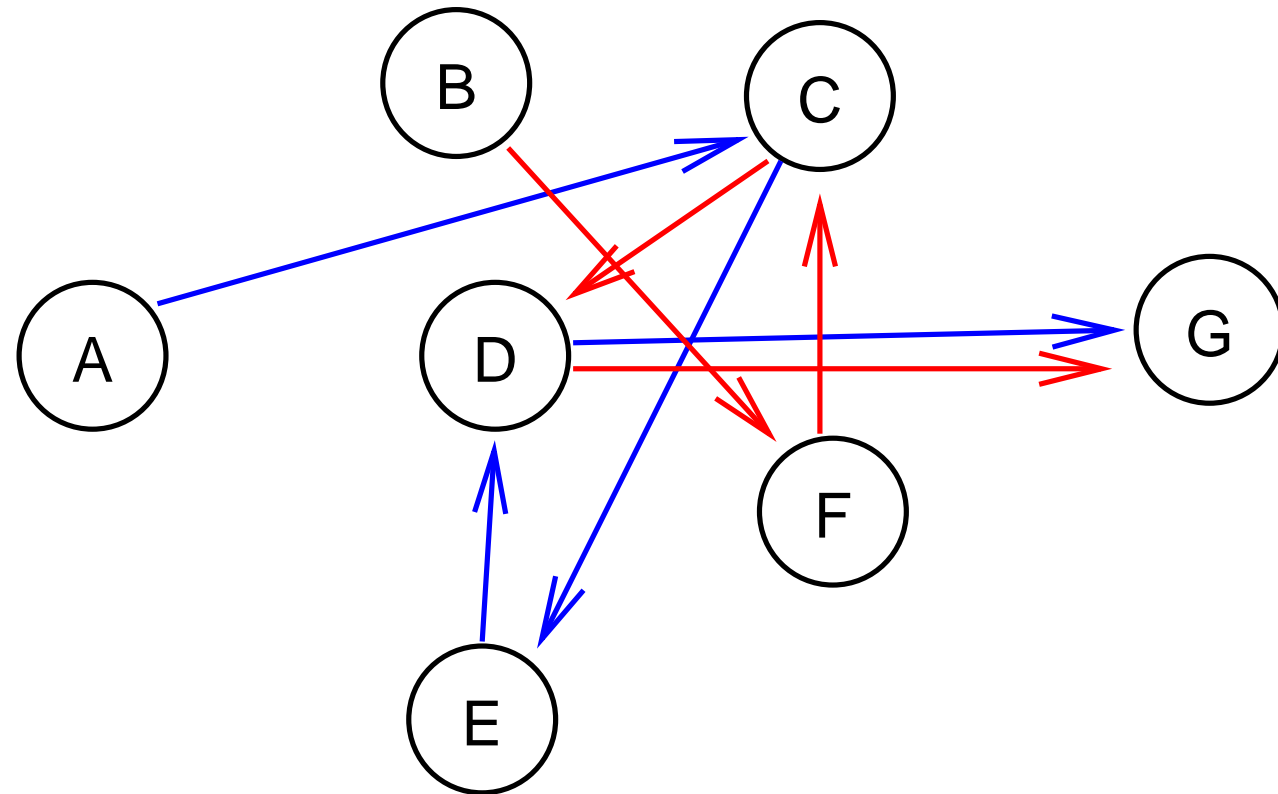
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- Forward through random path
- Defeat wiretappers and traffic analysts
- But — slow
- Doesn't protect against attacks from end-site

# Onion Routing Example



To G, both traffic streams are coming from D. However, the two streams would have different cookies.

# Discarding Cookies

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- Some people delete all of their cookies periodically
- Most people don't
- Other tracking technologies exist, i.e., Macromedia Flash cookies

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- Some people lie when registering for web sites
- Give fake ages, location, gender
- Some sites notice, some don't; most don't care

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- Some countries have strong privacy laws
- But — the net is international
- Does EU privacy law apply to American companies?
- Laws won't stop foreign intelligence

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- Without outside information, there is some privacy against ordinary attackers — they don't know if you're a dog
- Corporations mostly care about behavior, and track that
- Governments have to deal with criminals

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- What is the balance?
- How can governments track real criminals without invading the rights of others?
- Advertising pays for the net; it's more effective with tracking
- What is the right answer?