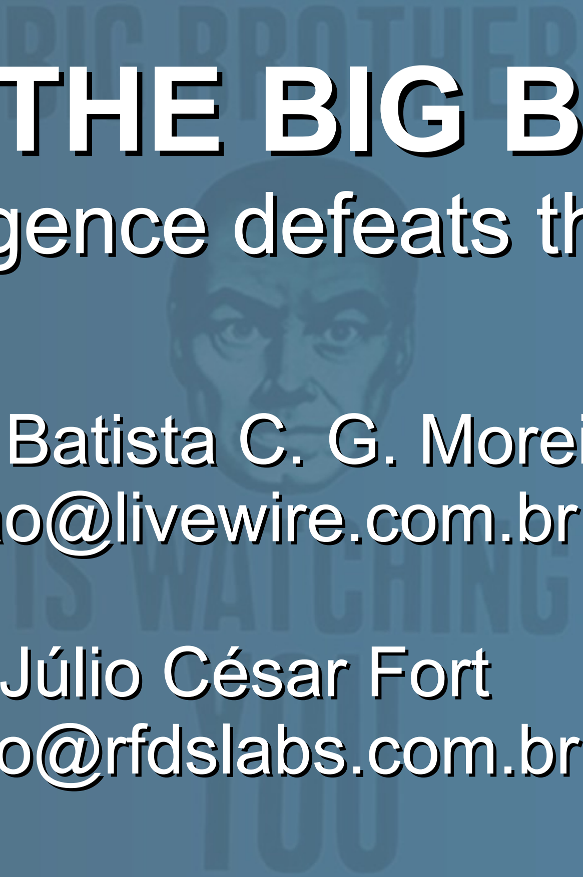
HACKING THE BIG BROTHER

When intelligence defeats the iron fist



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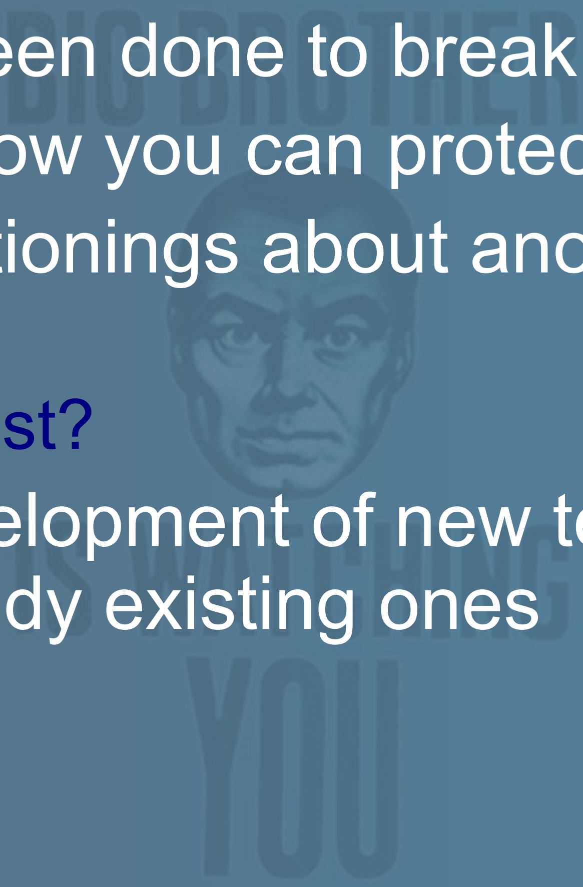
Main Goals

- What is this lecture about?
  - Show what has been done to break your privacy...
  - ...but also show how you can protect yourself
  - Raise some questionings about anonymity and privacy in digital era
    - Who can you trust?
  - Stimulate the development of new techniques and tools and improve already existing ones



Breakpoints

- The Network Eye
  - Eavesdropping, traffic analysis and shapping, Narus
  - SSL, public-key cryptography, Tor, privacy boxes
  - Telephony
    - Wiretapping, satellites
    - Voice cryptography, secure phones
- Defective by Design?!
  - DRM, trusted computing
  - Reverse engineering, hardware hacking
- Personal Tracking
  - RFID and its hacks, BSN, WSN

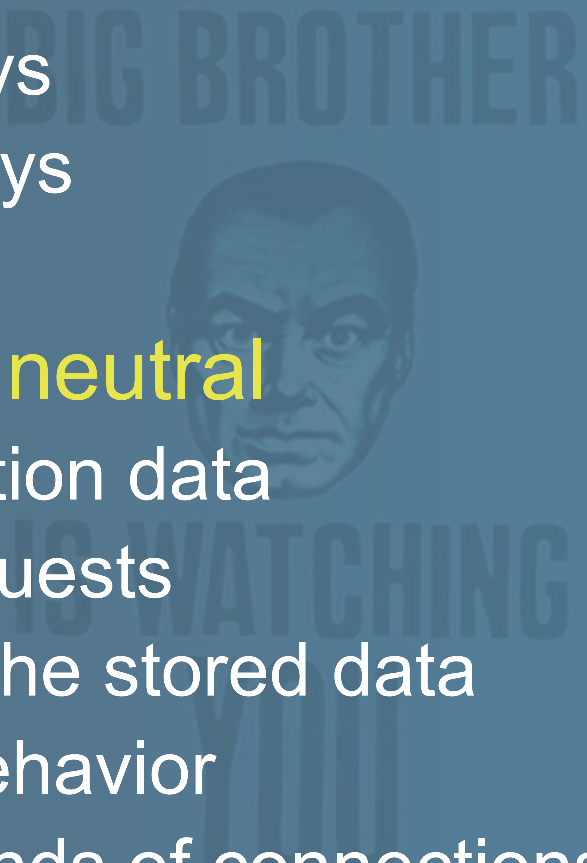
Breakpoints

- Personal Information
  - Google, social networks, data mining, direct marketing.
- Discussion, Questions, Answers...

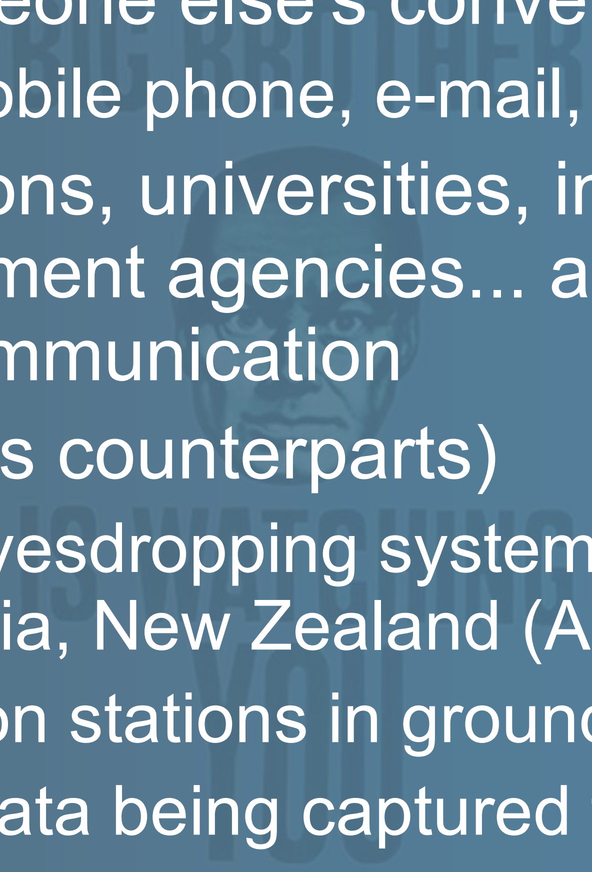
The Network Eye

The Network Eye

- Internet communication is unsafe
  - Unknown gateways
  - Corporate gateways
  - Unsafe gateways
- Gateways are not neutral
  - Store communication data
  - Store network requests
  - Allow analysis of the stored data
  - May change its behavior
  - May stop some kinds of connections, allow others
  - May capture data like passwords, logs, etc...



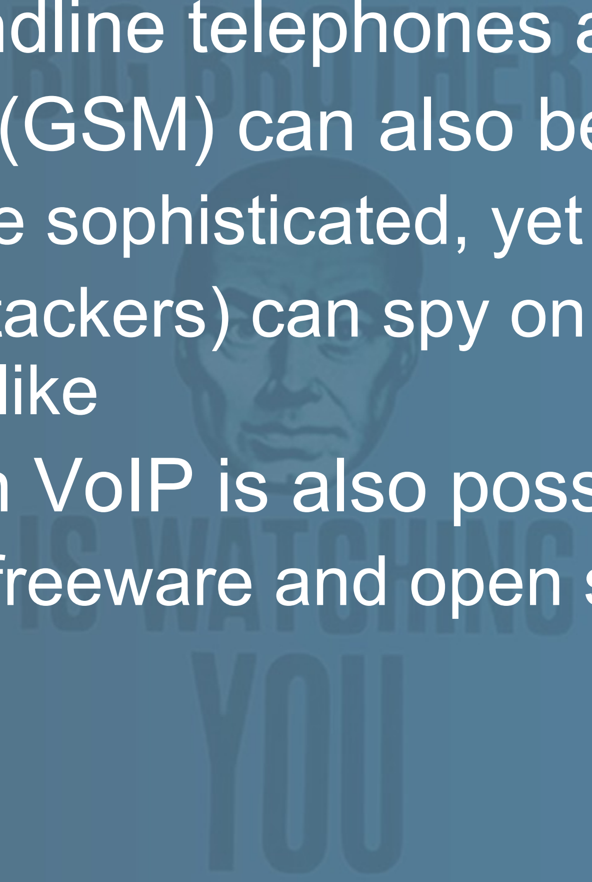
The Network Eye



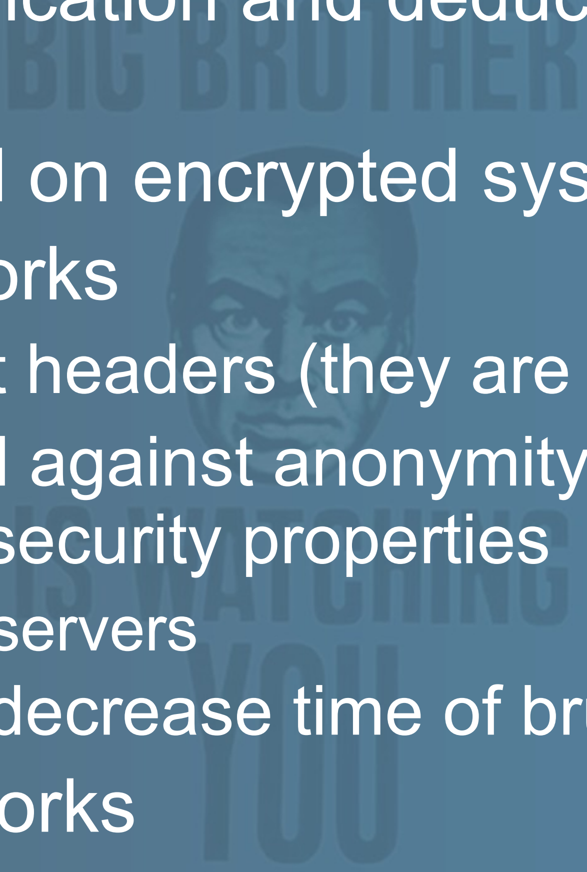
- Eavesdropping
  - Snooping on someone else's conversation
    - Landline and mobile phone, e-mail, instant messaging...
  - Used in corporations, universities, internet cafes, home networks, government agencies... and everywhere else where there is communication
  - ECHELON (and its counterparts)
    - International eavesdropping system evolving USA, UK, Canada, Australia, New Zealand (AUSCANZUKUS)
    - Many interception stations in ground and orbit
    - Rumors about data being captured for commercial endings

The Network Eye

- Telephony
  - Wiretapping in landline telephones are very well known
  - Mobile telephony (GSM) can also be tapped
    - Attacks are more sophisticated, yet possible
    - Carriers (and attackers) can spy on your conversations, SMS and stuff alike
  - Eavesdropping on VoIP is also possible
    - Many available freeware and open source tools can do the task

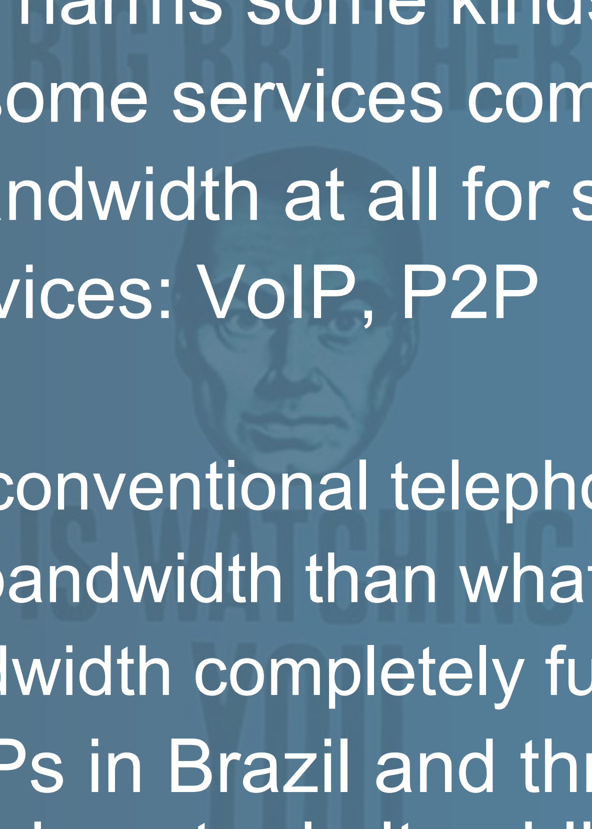


The Network Eye



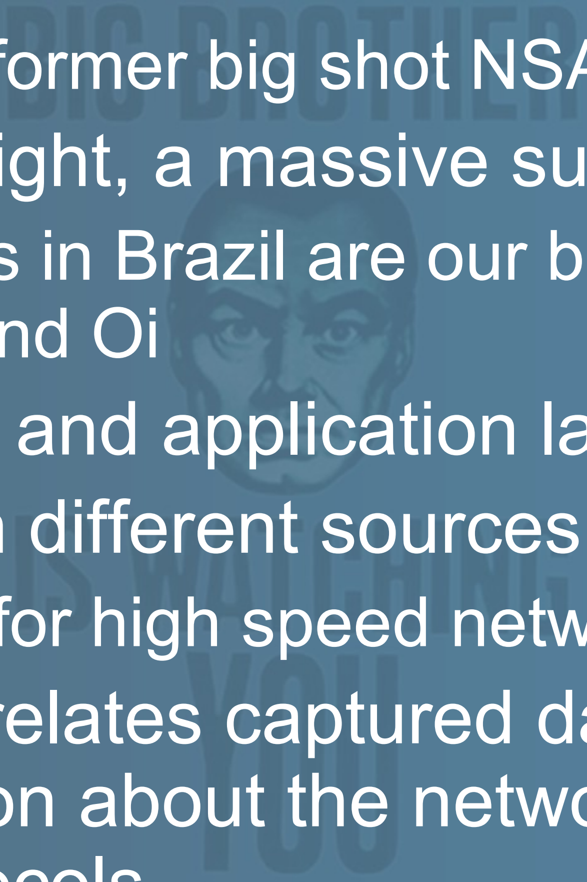
- Traffic Analysis
  - Intercept communication and deduce information from patterns
  - Can be performed on encrypted systems
  - In computer networks
    - Focus on packet headers (they are not encrypted)
    - Are usually used against anonymity systems – aims to compromise its security properties
      - Tor, re-mailer servers
    - Can be used to decrease time of brute forces
  - In telephone networks
    - Narus, AT&T's Hancock and others are also crafted to provide CDRs with accuracy

- Traffic Shapping
  - Network favors or harms some kinds of traffic
  - Can interfere on some services communication
  - Reduced or no bandwidth at all for some kinds of traffic
  - Main affected services: VoIP, P2P
  - Reasons?
    - VoIP threatens conventional telephony
    - ISPs sell more bandwidth than what they can support
    - P2P keeps bandwidth completely full
  - Used by many ISPs in Brazil and throughout the world, even though they do not admit publicly



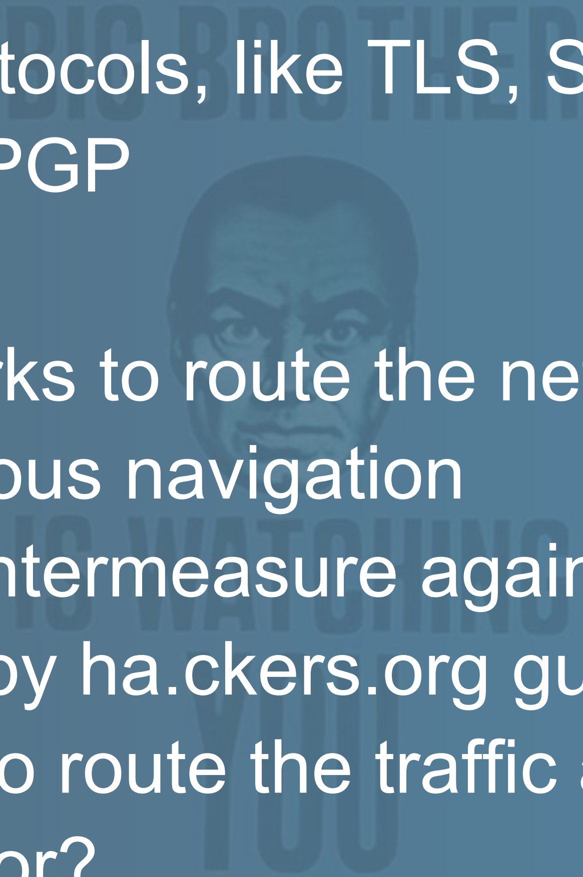
The Network All-Seeing Eye

- Narus
  - Private company founded in 1997
    - Currently has a former big shot NSA spook as chairman
  - Created NarusInsight, a massive surveillance system
    - Among its clients in Brazil are our beloved carriers BrasilTelecom and Oi
  - Focus on network and application layer traffic
  - Collects data from different sources
    - Perfectly suited for high speed networks
  - Analyzes and correlates captured data to provide detailed information about the network users, applications, protocols...

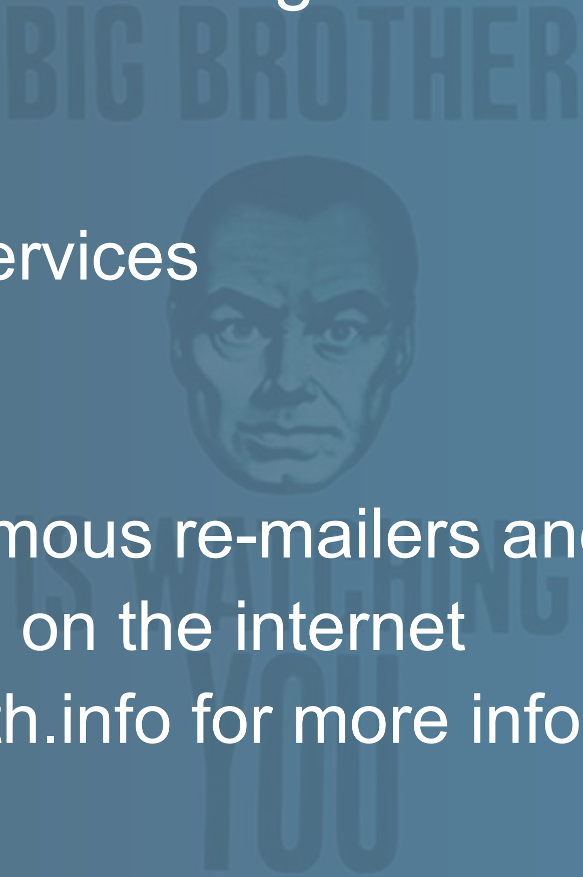


Hacking the Network Eye

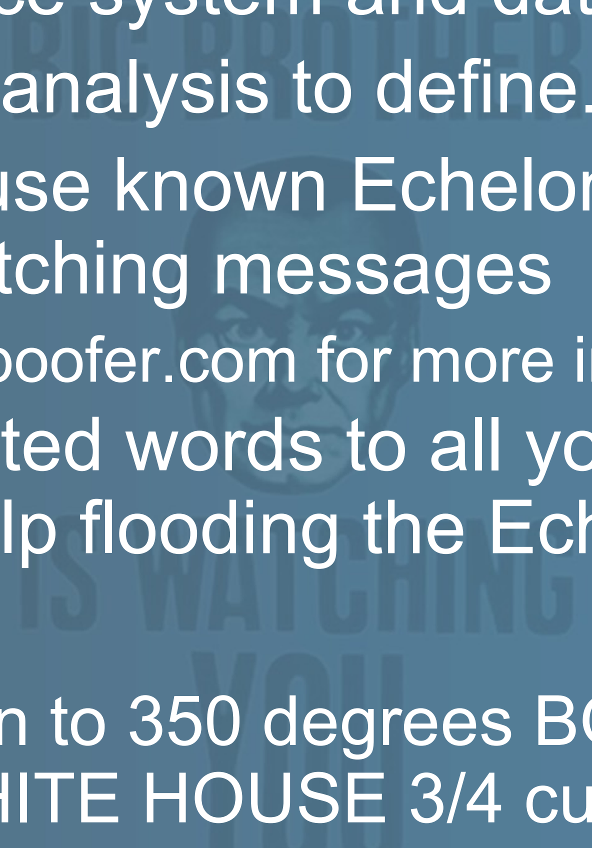
- Cryptography
  - Hiding traffic from the watchers
  - Use of secure protocols, like TLS, SSL
  - Use of tools, like PGP
- Onion Routing
  - Using P2P networks to route the network traffic
  - Provides anonymous navigation
  - Most popular countermeasure against traffic analysis
  - Recently hacked by ha.ckers.org guys
  - P2P nodes used to route the traffic are not neutral
  - How to improve Tor?



- Privacy Boxes
  - Closed boxes with one single button
  - What it provides:
    - Firewall
    - Local network services
    - Web server
    - Mail server
    - Supports anonymous re-mailers and privacy services
    - Different models on the internet
    - See winstonsmith.info for more information

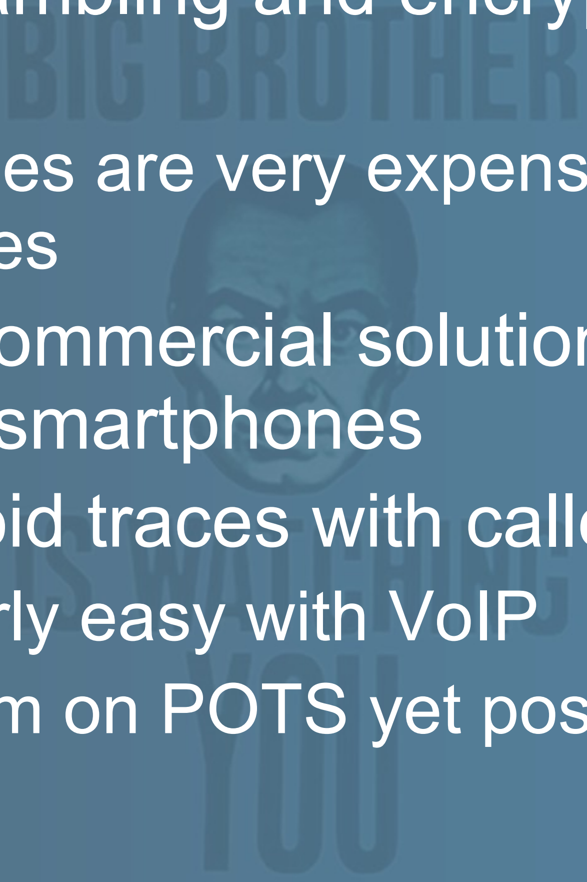


Hacking the Network Eye



- ECHELON
  - Artificial intelligence system and data miner
  - Based on pattern analysis to define...
  - Echelon spoofer use known Echelon patterns to generate fake matching messages
      - See echelonspoofer.com for more information
  - Attach the generated words to all your unimportant messages and help flooding the Echelon system
  - Eg.:
    - Preheat the oven to 350 degrees BOMB In a large bowl, mix the flour WHITE HOUSE 3/4 cup sugar, 1/4 cup cocoa PRESIDENT Stir in the milk, oil, and vanilla RED CELL Spread in the prepared pie plate VIRUS

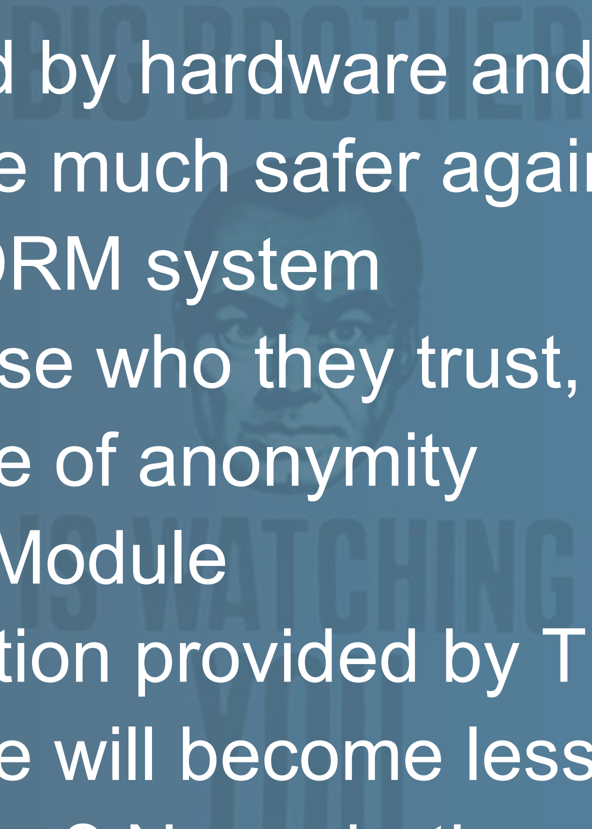
- Secure telephony
  - Voice mixing, scrambling and encryption exist but are not popular
    - Secure telephones are very expensive and mostly require ISDN lines
  - There are many commercial solutions for encrypting voice and text on smartphones
  - You can try to avoid traces with caller ID spoofing
    - Can be done fairly easy with VoIP
    - Harder to perform on POTS yet possible with orange box



Defective by Design?!

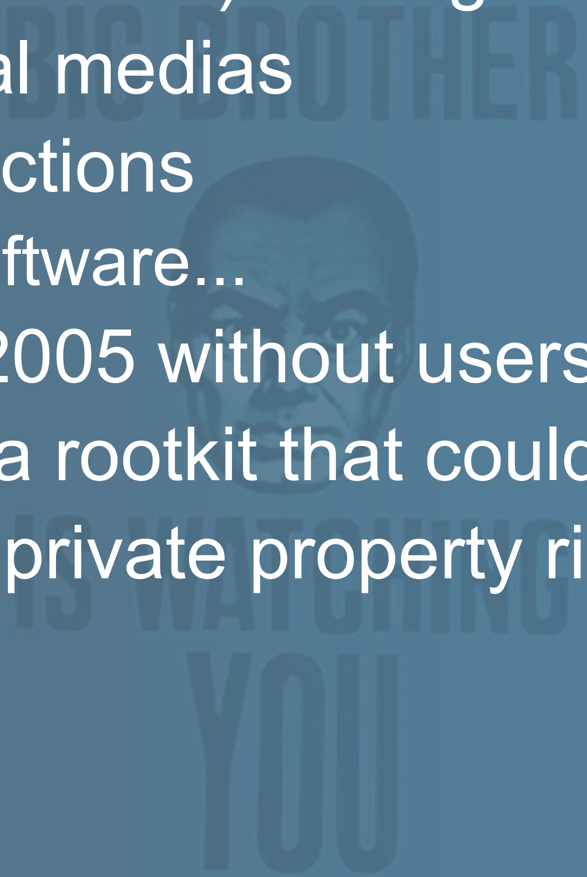
Defective by Design?!

- Trusted Computing
  - Computers will behave in well-known ways
  - Behavior enforced by hardware and software
  - “Computers will be much safer against viruses”
  - Also a hardcore DRM system
  - Users will not chose who they trust, or how to work
  - Complete absence of anonymity
  - Trusted Platform Module
  - Needs authentication provided by TPM to execute code
  - Switching software will become less simple
  - Security or freedom? Never both, maybe none...



Defective by Design?!

- DRM
  - Digital Rights (restriction) Managers
  - Used to limit digital medias
  - Lots of copy protections
    - Movies, CDs, software...
  - Used by Sony in 2005 without users knowledge
  - Sony's DRM was a rootkit that could be exploited
  - DRMs breaks the private property rights



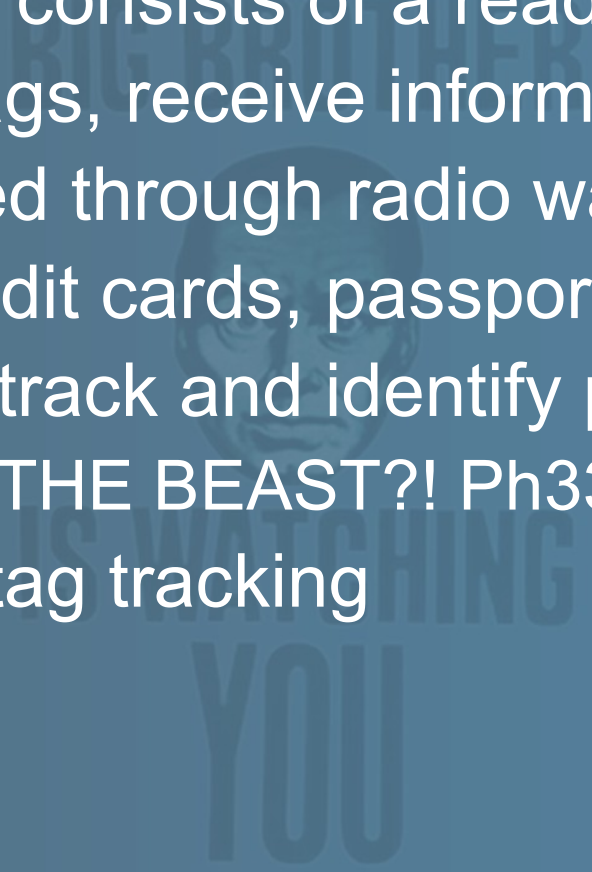
Fixing It!

- Reverse Engineering
  - Process of discovering internal details of a system through a top-bottom point of view
  - Understand how systems work is the main task before hacking it
  - Might be useful to understand DRMs and TC modules
  - Blackest box ever...
- Hardware Hacking
  - Changing default hardware to work as you wish
  - Used to hack hardware DRMs (like iPhone's)
  - A way to hack the Trusted Platform Module?

Personal Tracking

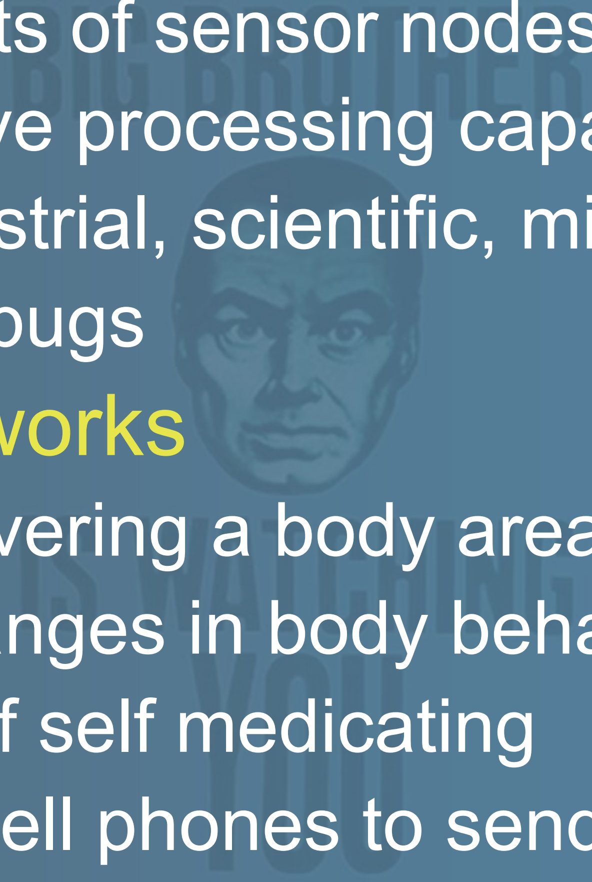
Personal Tracking

- RFIDs
  - RFID architecture consists of a reader and tags
  - Reader queries tags, receive information and act
  - All data transmitted through radio waves
  - Access cards, credit cards, passports, AVI, pets...
  - Could be used to track and identify people
    - THE MARK OF THE BEAST?! Ph33r!
  - Enables full-time tag tracking

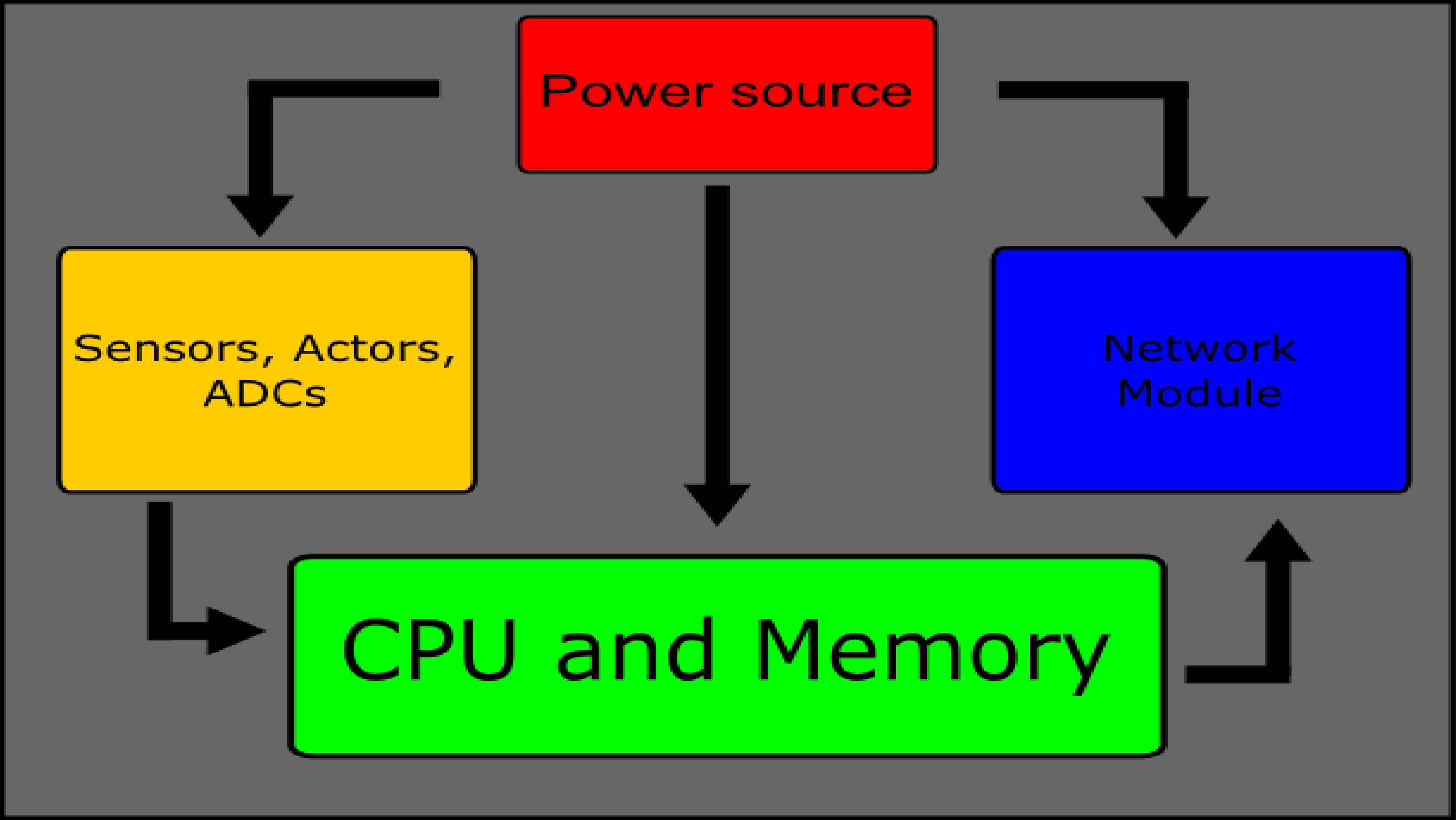


Personal Tracking

- Wireless Sensor Networks
  - WSN Arch consists of sensor nodes and main node
  - Sensor nodes have processing capabilities
  - Commercial, industrial, scientific, military applications
  - New tech, lots of bugs
- Body Sensor Networks
  - BSN are WSN covering a body area
  - Able to sense changes in body behavior or health
  - Can be capable of self medicating
  - System can use cell phones to send data



Sensor Nodes Basic Architeture

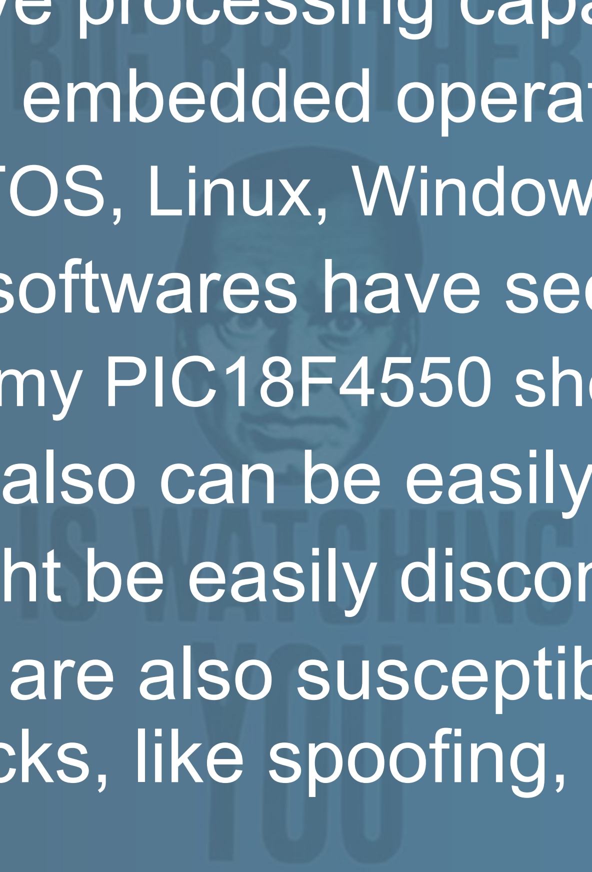


Stealth Yourself

- Lots of RFIDs well known hacks
  - Easily blocking the RFID signal with metallic material
  - RF noise can be a very good jammer
  - Many RFIDs can be easily read
  - Tags and reader communication can be intercepted
  - RF manipulation allows spoofing, replays and jamming
  - Perhaps you want more than being undetected, but also making trackers think you are somewhere else

Stealth Yourself

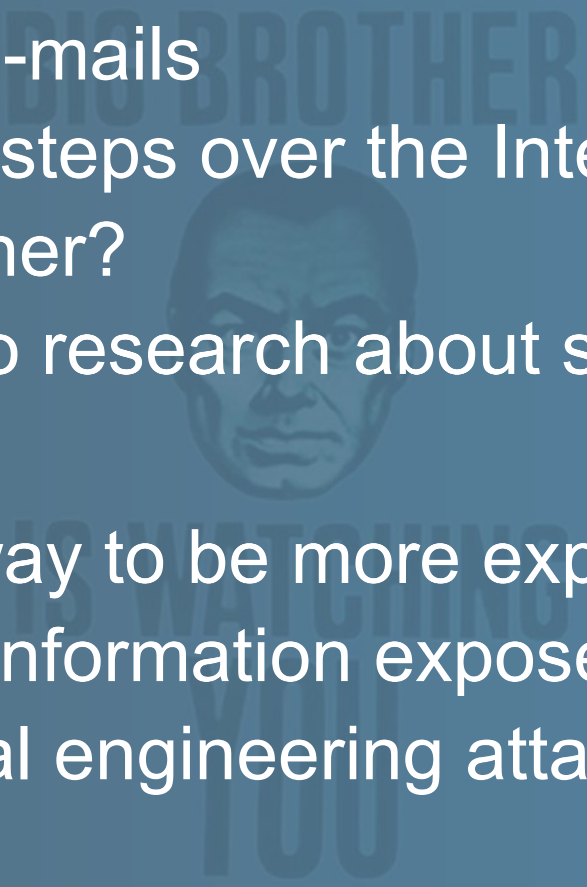
- Sensor Networks
  - Sensor nodes have processing capabilities
  - Many nodes have embedded operating systems
    - TinyOS, FreeRTOS, Linux, Windows...
  - We all know that softwares have security flaws
    - Where did I put my PIC18F4550 shellcode, damn it?!
  - Analogic sensors also can be easily deceived
  - Power supply might be easily disconnected
  - Network modules are also susceptible to the RF manipulation attacks, like spoofing, replays and DoS



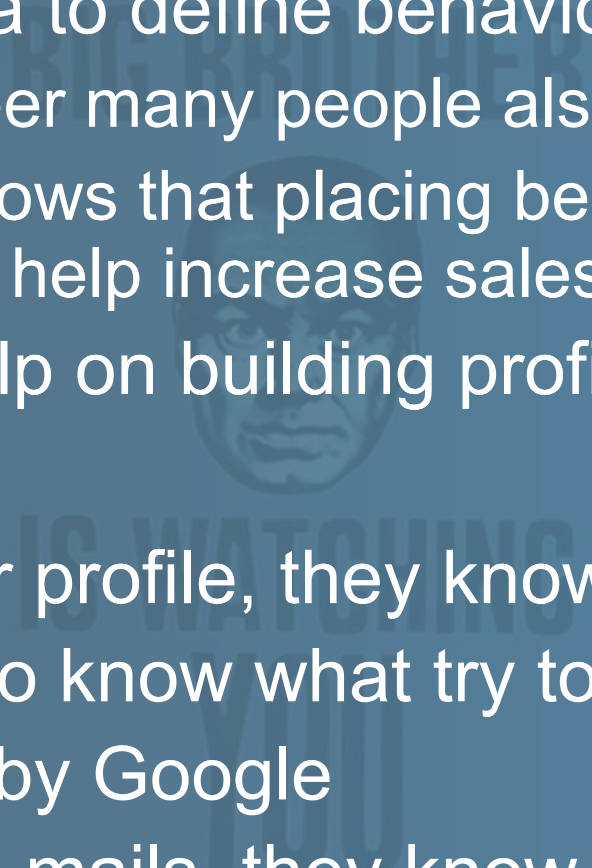
Building Profiles

Building Your Profile

- Google
  - Store data about your searches
  - Own your Gmail e-mails
  - Track lots of your steps over the Internet
  - The new Big Brother?
  - Also a tool used to research about someone else
- Social networks
  - Is there another way to be more exposed nowadays?
  - Tons of personal information exposed
  - Very used in social engineering attacks



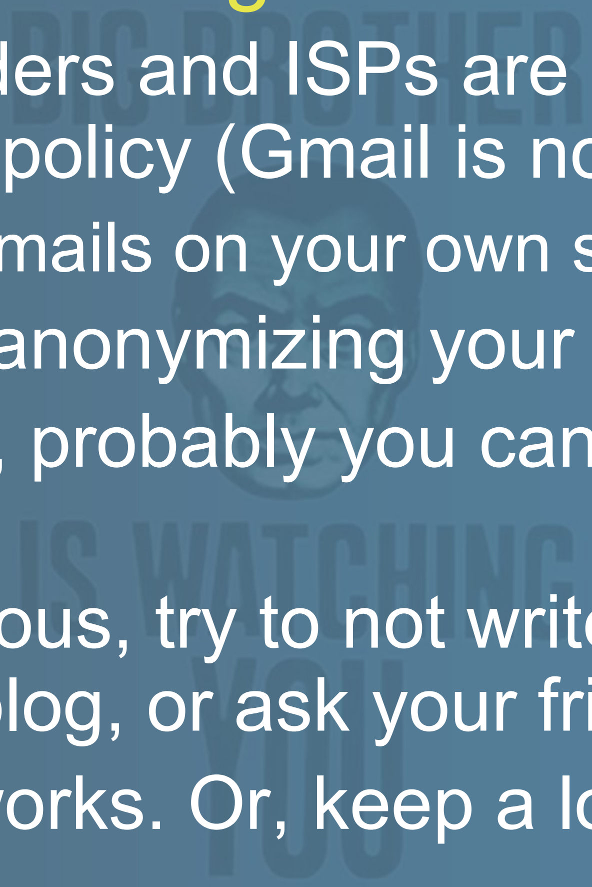
Building Your Profile



- Data mining
  - Correlation of data to define behaviors and patterns
    - When buying beer many people also buy nuts...
    - ...this pattern shows that placing beers in the same shelf as the nuts may help increase sales
  - Patterns might help on building profiles
- Direct marketing
  - After building your profile, they know what you like
  - It is much easier to know what try to sell to you
  - Extensively used by Google
  - They know your e-mails, they know what you are interested in, thus they make the right advertisement

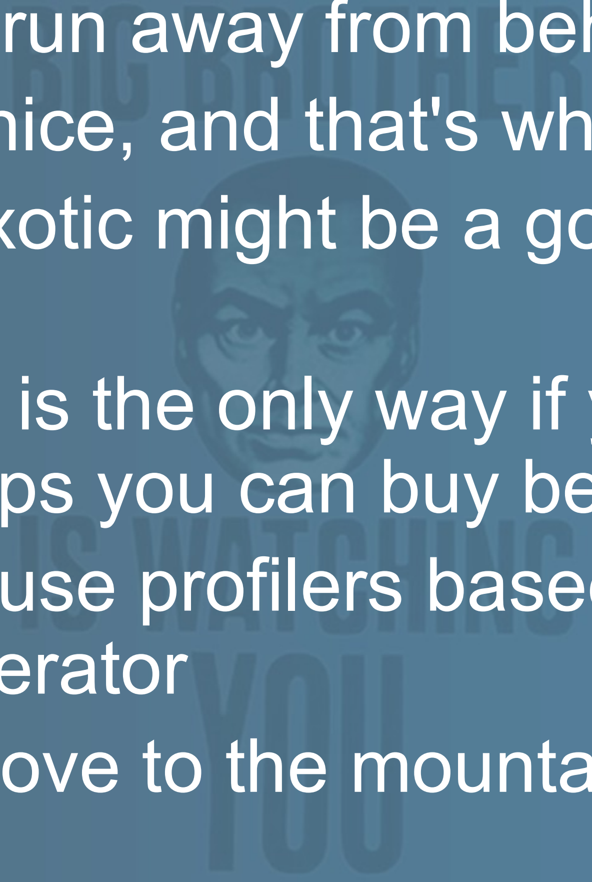
Hiding Yourself

- Hide and seek with Google?
  - Free e-mail providers and ISPs are not neutral, never trust their privacy policy (Gmail is not the only one)
    - Keeping your e-mails on your own server is much safer
  - Tor can help you anonymizing your navigation
  - If you are famous, probably you cannot hide from Google
  - If you are not famous, try to not write too much about yourself on your blog, or ask your friends not to do it
  - Leave social networks. Or, keep a low info profile

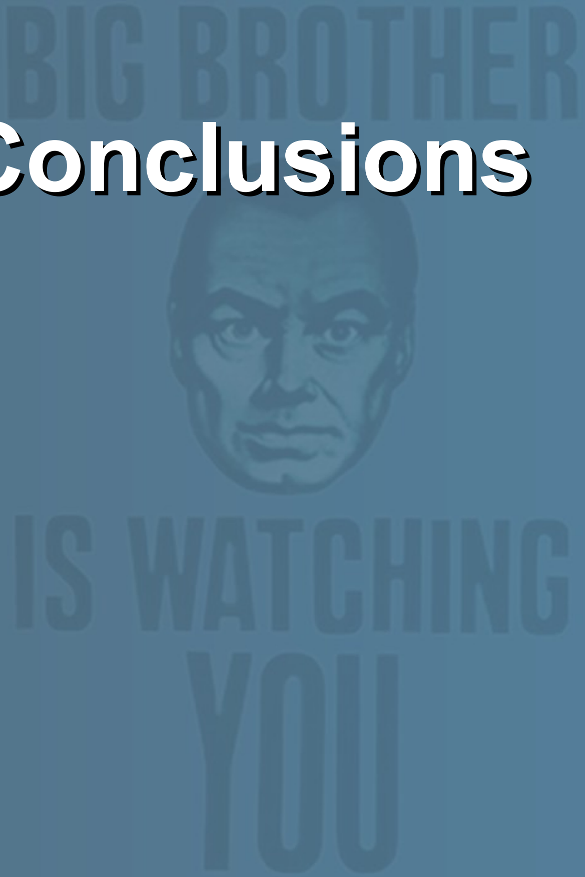


Hiding Yourself

- Hiding from profilers?
  - It is really hard to run away from behavior patterns
  - Beer with nuts is nice, and that's why the pattern exists
  - Being wacky or exotic might be a good choice, but it may not be easy
  - Breaking patterns is the only way if you do not want to be profiled (perhaps you can buy beer with eggs)
  - It is easier to confuse profilers based on text, using a random word generator
  - Maybe you can move to the mountains too...

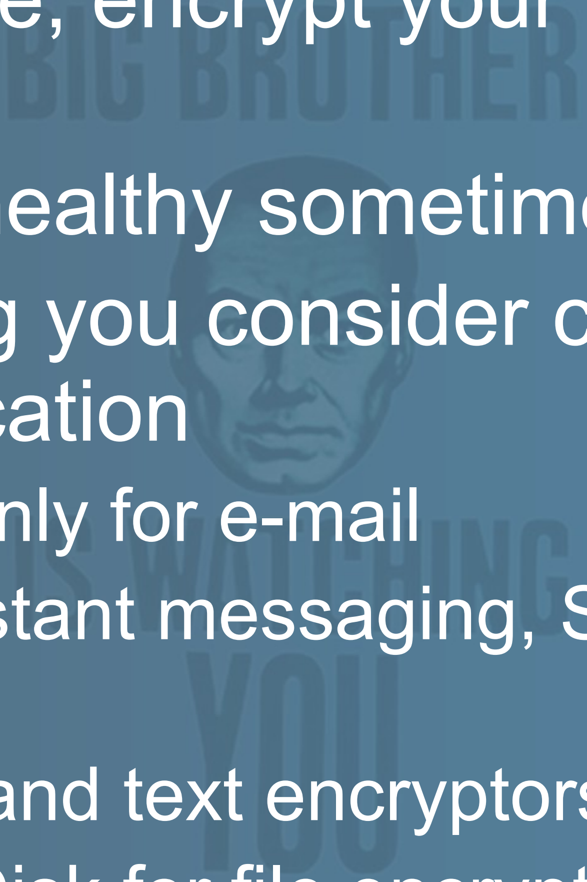


Conclusions



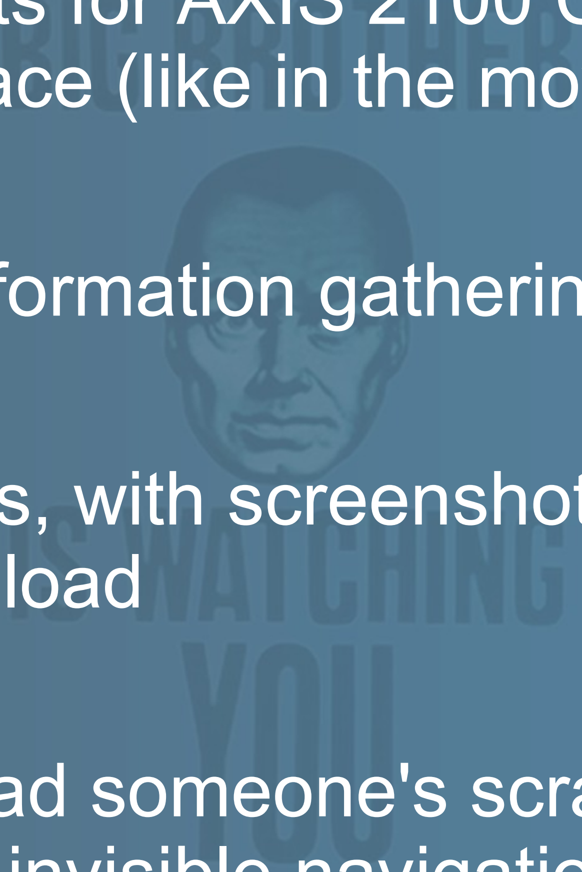
Conclusions

- “Buy yourself a rifle, encrypt your data and prepare for revolution”
- Paranoia can be healthy sometimes
- Encrypt everything you consider classified, as well as your communication
  - GnuPG, PGP mainly for e-mail
  - SIMP, OTR for instant messaging, SSL'd IRC, SILC for relay chat
  - VoIP VPN, voice and text encryptors for smartphones
  - TrueCrypt, PGP Disk for file encryption
    - and do not forget to wipe your files!



Other Cool Related Stuff

- AXIS Cameras
  - Public XSS exploits for AXIS 2100 Cameras, allowing video stream replace (like in the movies)
- MateIgo
  - Tool to perform information gathering
- Keyloggers
  - Tons of keyloggers, with screenshots, ftp connection available for download
- Orkut Stalking
  - Tools that download someone's scraps (before they delete), that allow invisible navigation, etc...



References and Links

- Books
  - 1984, Animal Farm (George Orwell)
  - Brave New World (Aldous Huxley)
  - Discipline & Punish (Michel Foucault)
- Links
  - bigbrotherawards.org
  - eff.org
  - dataretentionisnosolution.com
  - openbeacon.org
  - defectivebydesign.org
  - bigbrotherstate.com
  - research.att.com/~kfisher/hancock
  - burks.de/tron/tron.htm (Tron's cryptophon thesis – in german)
    - ftp://ftp.ccc.de/cryptron
  - blog.wired.com/27bstroke6
  - duplipensar.net

Kudos

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- Chaos Computer Club and all the privacy-concerned people around the world
    - And a special thanks to you for your patience

Questions?

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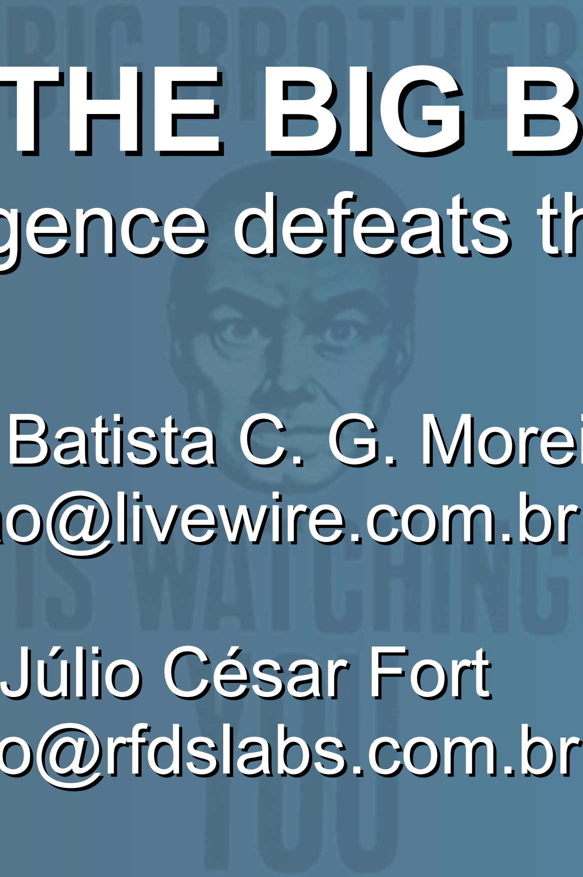

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