

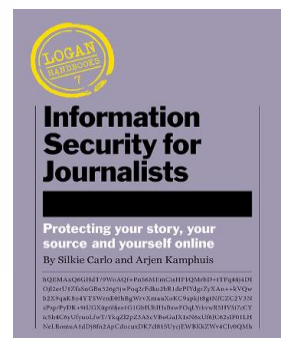
# Information Security for investigative journalists and for you

Protect yourself, your story and your source



Based on the book 'Infosec for investigative journalists'  
by Silkie Carlo en Arjen Kamphuis, edited by Helma de Boer

January 2020



# Information Security for investigative journalists

This handbook is a very important practical tool for journalists. And it is of particular importance to investigative reporters. Since the revelations of Snowden in 2013, journalists are aware that virtually every electronic communication we make or receive is being recorded, stored and subject to analysis. As this surveillance is being conducted in secret, without scrutiny, transparency or any realistic form of accountability, our sources, our stories and our professional work itself is under threat. In addition more and more governments make a disconcerting departure from legal principles of source protection in favour of unbridled spying powers.

This document explains the need for secure communications for journalists, activists, politicians and anyone else who seeks to change the status-quo in the world somehow and also retain their basic right to privacy.

After Snowden's disclosures we also know that there are real protective measures available. The 2014 handbook *Information Security For Journalists* from the CIJ was the first to lay out the most effective means of keeping your work private and safe from spying. It explains how to write safely, how to think about security and how to safely receive, store and send information that a government or powerful corporation may be keen for you not to know, to have or to share. To ensure your privacy and the safety of your sources, Information Security For Journalists will help you to make your communications indecipherable, untraceable and anonymous.

Although this handbook is largely about how to use your computer, you don't need to have a computer science degree to use it. Its authors Silkie Carlo and Arjen Kamphuis and the experts advising the project, are ensuring its practical accuracy and usability, and work with the latest technology.

*Based on Gavin MacFadyen's intro in the original book from 2014 (when he was Director of the Centre for Investigative Journalism)*

Free download

This handbook is, in the tradition of Silkie and Arjen, offered as a free download. If you think the book is of use to you, please consider a [donation](#) to the Centre for Investigative Journalism (CIJ, UK), the Dutcht NVJ (Nederlandse Vereniging voor Journalisten) or the Dutch VVOJ (Vereniging van Onderzoekjournalisten).

January 2020

## Acknowledgements

I would like to express my deep gratitude to Arjen Kamphuis for his patient and generous teaching.

Many thanks to Gavin MacFadyen and the CIJ for commissioning and trusting us with the responsibility of writing a handbook that aims to protect his journalists and their sources, and for his information security advocacy generally.

We collectively thank the whistleblowers and hacktivists, none more than Edward Snowden, for democratising the information that we now profit from in defending ourselves, our sources, and a free press.

With solidarity and gratitude to the journalists who intend to use this manual,

*Silkie Carlo, 2016*

Thanks to the heroes of the Free Software Foundation who foresaw the problems we now have 30 years ago and moved to make sure we have alternatives.

Thanks to the developers and hackers who freely share their work with all humanity.

Thanks to Gavin, Juliet and Minal at CIJ for all their great work in support of journalism (including supporting us in making this book).

Thanks to the whistleblowers for their courage and sacrifice.

And thanks to Silkie Carlo, my co-author, for curiosity, drive, grace under fire and never settling for less than her best.

I dedicate this book to my parents, Ida & Andre Kamphuis, who raised me to stand up for principles and never bow down to authorities trying to destroy them.

*Arjen Kamphuis, 2017*

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## Preface

With journalist [Silkie Carlo](#) I have co-authored a 'handbook' on practical information security for journalists commissioned by the UK [Centre for Investigative Journalism](#). The CIJ handbook '[Information Security for Journalists](#)' was launched at the [CIJ Summer School 2014](#) in London. The book will be forever freely available in a range of electronic formats..

Although this book was originally written for investigative journalists most of the described concepts and technical solutions are just as usable by lawyers or advisors protecting communications with their clients, doctors protecting medical privacy and of course politicians, activists or anyone else who engages powerful state and corporate organisations. Really, we're all journalists now.

If you have reasons to suspect your online movements are already under some form of surveillance you should not download this book using a computer or network associated with your identity (such as your home or work systems).

In the 12 months after Snowdens revelations, all the most extreme paranoid fears of privacy activists and information security experts have turned out to be but cuddly little problems compared to the reality of industrialised espionage on the entire planet. Anyone who has kept abreast of the ongoing revelations as a journalist with the desire to protect their sources and their stories from government or corporate snoopers may have felt despair. Is everything with a chip and a battery spying on us? When considering most off-the-shelf computing devices such as laptops, tablets and smartphones, the situation is indeed dire. But there are steps you can take and those steps are not expensive nor do they require a PhD in computer science. Using a computer system that can withstand all but the most advanced attacks by the most advanced nation state-level attackers is well within the reach of everyone.

That is, anyone who is willing to spend a few days learning to use software that is free of cost and hardware that is already available to you or that can be bought for under £200. This handbook can get you started on understanding how to secure your data and communications and those of your sources, and to use tools and methods that have been proven to work in the most extreme situations by experts all over the world.

Depending on your pre-existing computer skills this may be a bit of a learning experience, but trust that many have gone before you who also did not consider themselves experts and yet they managed to become comfortable with the concepts and tools described in this book.

If you are a journalist in the 21<sup>st</sup> century, you need these tools. After all, William Randolph Hearst said decades ago: journalism is writing down what powerful people and institutions do not want written. If you don't consider yourself to be a journalist but merely insist on actually having the right to privacy guaranteed to you under the UN Declaration Of Human Rights [1948] Article 12 - this book is for you too.

Like almost everyone who ever created anything, we could only do so by standing on the shoulders of a thousand generations that came before us. Thus, this book will be forever

freely available in a range of electronic formats without any restrictions. If the format you would like is missing, just let us know.

If you appreciate this work, please spread it around as much as possible and help us make the next version better. Constructive feedback of any kind is most welcome. The problem will keep developing and so will our response. Please contribute to sharing this knowledge and promoting these tools in any way you can.

Arjen Kamphuis

## Introduction

Imagine opening your inbox to find an anonymous email from someone offering to share important, sensitive documents of international significance with you. The source, and the information, requires the highest level of protection. What do you do?

This manual is designed to instruct journalists and media organisations on how to practise information security in the digital age, protecting your work, your sources, and your communications at a variety of risk levels.

Information security, or 'InfoSec', is the practice of defending information from unauthorised access. The information at stake may include a news report you are working on and any associated files, the identity of your source(s), your communication with them, and at times, your own identity.

You don't need to be an I.T. expert to practise InfoSec (although you will certainly learn a lot as you go along!). Using this manual, you could learn to send encrypted emails and documents from your own highly secure laptop within days!

### ***Who Poses a Threat?***

#### **Targeted threats**

The Snowden revelations exposed the extraordinary abilities of certain government intelligence agencies to intercept communications and gain unauthorised access to data on almost any personal computer or electronic communication device in the world. This could pose an information security risk to investigative journalists working on stories concerning the interests of those governments, their agencies, and their private intelligence contractors.

Many states lack these sophisticated surveillance technologies – but all states do possess surveillance capabilities, some of which can be, and at times have been, used against journalists, with potentially severe consequences. Ethiopia, a less technologically advanced state, is alleged to have launched remote attacks against journalists stationed in US offices.

In the globalised age, some transnational corporations have greater wealth and power than many sovereign nation states. Correspondingly, some transnational corporations possess greater 'security' or surveillance capabilities than many nation states.

It is not only corporations, but sophisticated criminal organisations that have also been known to employ impressive surveillance technologies – and some criminal organisations may overlap with criminal elements in government. The Mexican army spent \$350 million on surveillance tools between 2011-2012, and reportedly now possess technologies to collect text messages, phone calls and emails; to remotely automate audio recording on mobile phones; and even to detect movement through walls using radar technology. Also between 2011-2012, nine journalists were killed in Mexico in association with their work.



Unauthorised access to your data may entail its use, disclosure, disruption, modification, inspection, recording or destruction. You and your source could invoke legal or physical risks, and the information at the heart of your story could be compromised. In high-risk situations, InfoSec may be as important as wearing a bulletproof vest and travelling with bodyguards. However, because digital threats are invisible, complex and often undetectable they can be underestimated or overlooked.

## Dragnet threats

You may also wish to protect yourself from 'dragnet' surveillance programs, led by the US National Security Agency (NSA) and the UK Government Communications Headquarters (GCHQ).

These are programs that collect and sometimes analyse the world's online and telecommunication data - potentially enabling retroactive investigation. Even police forces in the UK have accessed stored communications data to identify hundreds of journalistic sources.<sup>1</sup>

## *Practising InfoSec*

As an effective journalist, you will find yourself disturbing a few hornets' nests in the course of your career. Therefore, practising good InfoSec means normalising several permanent strategies that easily fit into your everyday work. It also means employing case-by-case protection strategies, as you will need to use stronger and more effortful InfoSec methods when working on sensitive topics, and with vulnerable sources.

The first step to practising good InfoSec is to be aware of the threats; the second is to be aware of your hardware and software vulnerabilities. Understanding how and why unauthorised access happens is the first step in learning how to protect yourself from it.

## Legalities

Despite the fact that the pervasive surveillance of law-abiding citizens almost certainly contravenes international human rights laws, use of certain privacy tools can be illegal.

Several of the privacy tools discussed in this handbook are cryptographic tools. This cryptography may be illegal, or require a license, in several countries including China, Cuba, Iran, Libya, Malaysia, North Korea, Singapore, Sudan, and Syria. When entering some of these countries, you may need to declare any IOCCO inquiry into the use of Chapter 2 of Part 1 of the Regulation of Investigatory Powers Act (RIPA) to identify journalistic sources, 4 February 2015 encryption technology on your laptop. You should consider the legal implications of using cryptography and make informed decisions about where and when it is safe for you to do so. You can find out more about cryptography laws for each country here: <http://www.cryptolaw.org>

## Threat modeling

There is a lot of information in this handbook about various possible threats, and measures that can be taken to defend against them. However, since attack technologies are always changing and much of their use is entirely secret, we rarely confidently know the exact threats; when, where and to whom they apply; or the efficacy of our defenses.

Therefore, it is down to you to perform a personal risk assessment and design an appropriate defensive response during the course of reading this book. You may also want to factor in practicalities – some users may compromise their InfoSec, whilst aware of the risks, to meet other practical demands in their work, whereas some users practice sophisticated InfoSec above their perceived need because they find it practically doable.

Some basic questions you may wish to ask yourself when threat modeling for your InfoSec strategies are:

1. Who could your adversaries or potential attackers be?
2. What tools might your potential attackers possess?
3. How likely is your potential attacker to use their available tools against you?
4. What risks could arise, for you and those you communicate/work with, from a targeted attack?
5. What risks arise from passive surveillance? How extensive are the tools used in passive surveillance?
6. What defence strategies are practical, safe, and effective in light of your evaluated risks?
7. What defence strategies are practical, safe, effective, and instructible for my sources and colleagues, in light of their evaluated risks and/or the risks incurred by our communication?

The threats will change, with time – but so too will the technologies available to protect journalists and citizens. So, it is important to understand InfoSec in theory, and to always continue learning about InfoSec in practice.

## Chapter 1: Protecting the System

Your security and/or encryption methods will only be effective if each level of your system is secure. You can send your emails with unbreakable encryption, or use the strongest conceivable passwords, but if your system is hacked, or otherwise vulnerable, your efforts may be futile, as your encryption can be circumvented without any need to break it.

Depending on your risk level and the sophistication of your adversary, protection strategies range from simply keeping your laptop or phone on you at all times, to using a second-hand, cash-bought, laptop and practising robust InfoSec, during a specific project.

Think of 'protecting your system' as building a house of cards – for it to work, you must build your security from the bottom up.

In this chapter, you will learn how to build the foundations of a secure system by managing the security of your hardware and firmware.

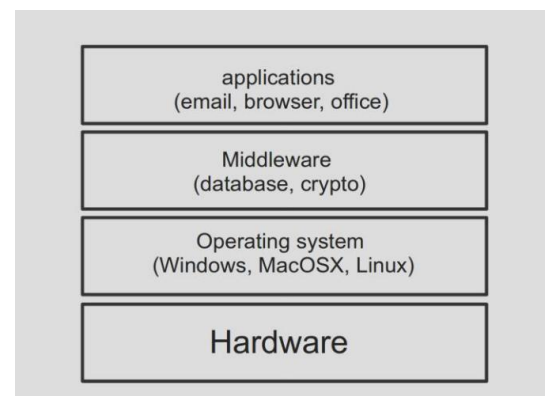
This chapter is the most important of the book. It is also fairly technical, and contains the most challenging information of any chapter in the book. The solutions here are many, but ultimate security is the outcome of only one. Here, we lay out the horrible reality of the extent of hardware vulnerabilities, and leave you to decide what the appropriate security measures are for yourself. For several of the solutions described here (such as specialist modifications to hardware, and the replacement of firmware) you will need expert help.

As lengthy and technical as much of this chapter is, please do read on! You should be aware of the vulnerabilities within your own system, even if you do not have the ability or need to currently solve them. This is important information that will guide your trust and use of your system, and prepare you for the future, simpler solutions that we hope will soon be developed.

### 1. Your computer model

#### Definitions

- **Interface** – *screen*
- **Applications** – your software/programs
- **Middleware** - programming that "glues together"/mediates between two separate and often already existing programs: e.g. allows programs to access databases
- **Operating System** – Windows XP/7/8/10, Mac OS X, Linux, etc.
- **Firmware** – fundamental software programmed onto hardware that provides instructions for how the device communicates with the other computer hardware
- **Hardware** – the physical elements that comprise a computer system



In this chapter, we will primarily consider security at the most fundamental level: hardware and firmware.

## 2. Hardware and firmware

‘Hardware’ refers to your physical machine. Desktop computers are not recommended for important journalistic work as they are immobile and as such not only impractical, but vulnerable to physical intervention when you are not around. Laptops will be discussed here.

For our purposes, ‘laptop’ refers to all physical components, including the battery, hard disk drive, CD drive, Wi-Fi card, microphone, and webcam. Let’s also consider additional hardware: any keyboard, mouse, scanner/printer, webcam, and so on that you connect to your laptop.



Threats to hardware may be:

- Theft or damage
- Physical attack
- Virtual/remote attack

The main risks to your hardware are that it will be stolen, damaged, physically tampered with or ‘bugged’; or virtually/remotely accessed in order to transmit signals (i.e. collect and deposit your information).

## 3. Hardware protection

Five key measures are important for hardware protection:

- > **Preventing virtual and physical attacks on your hardware**
  - a. Buying the right laptop
  - b. Modifying your hardware
- > **Preventing physical attacks on your hardware**
  - c. Buying your laptop anonymously
  - d. Guarding your laptop
  - e. Detectability measures (should you be separated from your laptop/s)

Although these five steps may sound confusing and even daunting at first, they are all entirely doable for journalists who are new to I.T. and InfoSec. How to obtain and maintain your secure hardware is explained in this chapter – all you have to do is choose the risk level you want to prepare yourself for, and take the appropriate steps.

## 4. Preventing virtual and physical attacks on your hardware

### 4.a *Buying the right laptop*

What laptop you buy determines the security level you will be able to achieve. As we learn more about extensive surveillance capabilities from the Snowden documents, we learn too what machines are and are not securable. Hopefully, with time, we will be able to develop

more secure solutions. However, at the moment, very few laptops are entirely securable against the greatest threats.

This may not be a problem for you or your source, depending on who your adversary is. If you are defending your communications and data from a powerful government or an ally (which, in practical terms, may include significant banks and corporations), you will need excellent security for your laptop/s. Otherwise, whether you are defending against corporations, political, military, terrorist or rebel groups, private security firms, or specific individuals, you will have to estimate how sophisticated the tools of your adversary are; how easy those tools would be to employ against you; how important you are as a target; and thus, what measures you wish to take.

There are four issues to consider when buying a laptop that determine the securability of your system.

### **Hardware maintenance**

You may wish to have a laptop that allows you to unscrew the casing and get inside the machine, so you can do some basic hardware 'maintenance', and choose which components to keep or disable. Many IBM/Lenovo, HP, and Dell laptops are suitable for this, and provide extensive hardware documentation on their websites that assists with DIY hardware modification<sup>2</sup>.

You cannot easily open the casing of MacBooks – this requires some skill and even so, performing your own hardware maintenance on a MacBook may void its warranty.

### **Firmware**

Firmware is the software programmed onto your laptop's hardware at a deep, foundational level. In basic terms, firmware provides instructions for how parts of your laptop should communicate with each other. Firmware is another possible attack point, as highly sophisticated hackers (likely state-level) may be able to remotely access it and gain privileged control over your machine. This could undermine your subsequent security efforts.

You can 'lock' your firmware on a MacBook, making your firmware accessible only via a password that you set for it. The ability to lock firmware on a Mac provides a specific security advantage over other laptops, of which only a limited number of models can be secured by the highly technical, specialist task of replacing closed source firmware (whereby the code is privately owned and not publicly available or auditable) with open source firmware (called 'Coreboot', <sup>1</sup>which is free to all and has publicly available and auditable code). Of course, confidence in the security provided by the MacBook 'lock' depends on one's trust for Apple. Likewise, confidence in Coreboot depends on one's trust

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<sup>1</sup> Such hardware flexibility and documentation is also available for other brands – the above suggestions are not endorsements of these brands or their products

for the auditors of the code. However, the Mac firmware lock has no known vulnerabilities, and using it could make a hack more effortful.

The Mac Firmware Lock: this is such an easy function to use on Mac, and one that provides considerable defence against firmware hacks. Therefore, Mac users at various risk levels may wish to use this.

To set a firmware lock on your Mac (OS X), boot the machine up, holding down 'cmd' and 'R' keys as it boots to enter Recovery mode. On the top menu bar, go to 'Utilities' > 'Firmware Password Utility' > 'Turn On Firmware Password'. Choose a strong password (see chapter 8) and click 'Set Password'. It is very important that you remember this password, or you may lose access to your Mac.

## Chipsets

From around 2006, Intel started putting special components in their chipsets (combinations of chips that work together on laptop motherboards) to allow the automated management of systems over a network. This is called 'Intel Active Management Technology', and means that an I.T. technician in a large office/university I.T. suite can update software, or do other things to machines, without having to be physically near them. The problem, of course, is that the same functionality can be abused to install spyware or manipulate the systems in other ways. All laptops made after 2008 contain these chipsets, and are therefore vulnerable to these types of attacks when they are on a network.

The 'Intel 945' chipset is the most recently made chipset without this automatable feature, and hence lends itself to a securable motherboard/computer. When choosing a laptop, you can see what its chipset is on the specification.

## Operating system

You may also wish to buy a laptop that allows you to install the operating system of your choice (ideally, open source, whereby the source code is publicly available). You can do this fairly easily on most laptops, except MacBooks, where it is a bit more tricky.

You can either totally wipe a pre-installed operating system and install a new one, or you can use 'virtual machines' or 'sandboxes' on your pre-installed operating system, essentially running multiple operating systems at once. Proprietary operating systems (Windows, Mac) are closed source and may have various inbuilt security backdoors, intentional or otherwise – so it is not known how much security simultaneously running alternate operating systems actually provides. Whilst most laptops allow users to easily wipe their Windows operating system, wiping a MacBook of its operating system is inadvisable as it may compromise the system's overall functioning.

It is possible to use various operating systems on Mac, but this requires knowledge of how to run a 'virtual machine', which we won't go into here for the reasons set out above. Alternatively, you can use the operating system Tails on a Mac, which bypasses the hard drive and runs from a USB drive (see Chapter 2).

How can you interpret these four fundamental security issues for your own threat modelling? Remote hardware, firmware and chipset accessibilities are likely to be possible only by the intelligence agencies of technologically advanced and wealthy nations – but all technology tends to be democratised to less powerful groups over time. Therefore, if could potentially list such an intelligence agency as an adversary, you may wish to consider those three vulnerability factors. Even if you do not face such a risk level, you may wish to take some security precautions as a safe measure nevertheless (particularly those that require little effort, such as locking firmware on a Mac).

It is likely that technologically advanced intelligence agencies have access to backdoors in operating systems. However, it may also be the case that especially large or powerful corporations can obtain such knowledge or access too – so if your adversary is a corporate giant, you should consider the security implications of your operating system.

Choosing what laptop to use is not easy – you should take your time processing this information, assessing your risk levels, and deciding how much effort and discipline you will invest into your information security.

### Risk level suggestions

Here are some suggestions of what laptops you could buy at various generalized risk levels:

- **Low risk:** *dragnet surveillance, low grade individual hacking, theft*

You can start with any laptop. A good investigative journalist will outgrow this category before long! Most systems are fairly securable against unsophisticated threats at the software level. By keeping your machine on you at all times, you can defend against theft or physical interventions. You can also avoid the digital dragnet through software and application choices.

- **Medium risk:** *targeted surveillance, by an adversary who is prepared or able to invest relatively limited resources*

Use either a laptop on which you can wipe the current operating system and install your own (ideally, an open source Linux operating system); or use the Tails operating system for project work from any computer. See chapter 2 for more information on operating systems.

- **High risk:** *targeted surveillance by an intelligence agency*

There are only a handful of machines that can be confidently secured against remote hardware, firmware and chipset accessibility. Currently, the model that is being most frequently secured in this way is the IBM ThinkPad X60 (and X60s). It has an Intel 945 chipset (i.e. pre-AMT), and specialist work can be done to secure the hardware and firmware (the proprietary firmware can be replaced by open source firmware, 'coreboot'). You should then use the Tails operating system (see chapter 2) on this secure machine, to maintain system security.

If you require one of these secure machines, please safely make contact with us at the Centre for Investigative Journalism. You can send an encrypted email to [infosec@tcij.org](mailto:infosec@tcij.org) or contact the office (<http://www.tcij.org/about-cij/contact-cij>).

If you want to do-it-yourself, you could buy a laptop with a pre-AMT chipset that allows you to open the casing, and use online documentation for the laptop to guide you through some basic hardware maintenance. For instance, you could remove your laptop's hard disk drive, and remove/disable your laptop's microphone, webcam, Wi-Fi card, Bluetooth card, or 3G modem, and Ethernet port (see point 2 in this chapter). However, unless you have been specifically trained, you will be unable to do the more minute hardware modifications for top security, or to replace the firmware.

- **Top risk level:** *targeted, directed surveillance by an intelligence agency*

In very high-risk situations, you should have at least two laptops that have all the above security measures implemented – only, one of those laptops must never connect to the internet by any means. This will be your 'airgapped' machine – a laptop that never, ever goes online. This can be a very useful machine for storing or accessing files (for example, that you may have on a USB stick), writing articles, and producing your reports on. You, or the specialist helping you, should remove or disable all of the laptop's connectivity devices, to ensure it is truly offline at all times (see point 2). Ideally, both your airgapped and your online machine should be two specially secured IBM ThinkPad X60s.

Fact: Glenn Greenwald uses an airgapped laptop to work on the Snowden documents.

The airgap adds an extra level of security to your/your source's data, because your important documents are stored not only on a secure machine, but also entirely offline. Even the most secure machine may be exposed to some degree of risk when it goes online – particularly if the user is the subject of a directed attack.

#### **4.b    *Modifying your hardware***

Let's take a look at all of the modifiable internal components that could potentially be used to surveil you, your source and your work.

- Webcam
- Microphone
- Hard disk drive
- Wi-Fi card
- Bluetooth card
- 3G modem
- Ethernet port

##### **Webcam**

Not only can webcams be remotely and covertly activated for specific targets, but webcam images have also been intercepted as part of dragnet surveillance programs (see the



[Snowden revelation of GCHQ's OPTIC NERVE program](#)). A simple solution is to place a sticker over your webcam.

## Microphone

Your laptop's microphone can also be remotely and covertly activated, to capture audio. You could try putting hot glue over the microphone input on your laptop casing, to muffle sounds. Better still, open your casing and cut the microphone wire.

## Hard disk drive

Some hard disk drives have been found to contain 'bad' firmware – that is, they could potentially be activated to compromise your security, should you become a target to an agency with a very sophisticated toolkit.

At high-risk levels, it is advisable to remove the hard disk drive and instead work from USB drives. USB drives are also ideal for storing the highly secure operating system, Tails (see chapter 2) – that is, they can hold a small, anonymising system for you to work from. USB sticks are highly portable, replicable (to share with colleagues/sources), and are easily protectable by high-grade encryption (see chapter 4). This also means that, if your laptop is stolen or damaged, the data stored on your USB is still safe. However, you may wish to keep the hard disk drive for your general day-to-day work, and work from USB drives or Tails sticks for specific projects.

## Wi-Fi card, Bluetooth card, 3G modem

At high-risk levels, any element that permits connectivity could be remotely and covertly activated to install surveillance tools, or indeed to send your data back to an adversary. Therefore, you should aim to have as much control over your laptop's connectivity as possible.

The best way to do this is to physically remove connectivity components. This means opening the laptop casing, and unscrewing the Wi-Fi card, as well as any Bluetooth card and 3G modem if your laptop has these (consult your laptop's handbook if you are unsure – copies can often be found online). This may feel like a daunting task at first, but anyone with a steady hand and correct instruction can easily do this first-time.

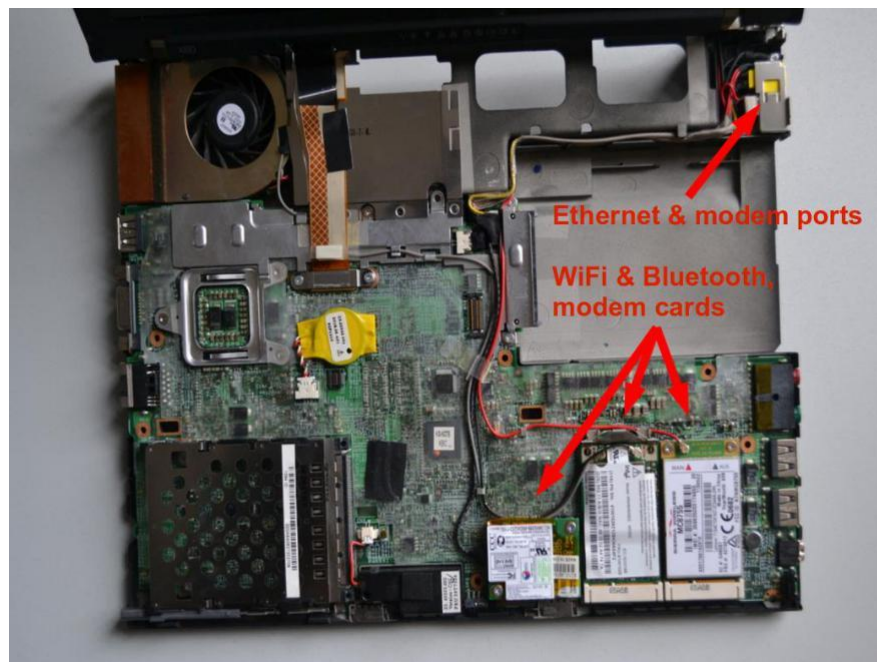
Then you can control when you are online and offline. You could buy a Wi-Fi USB adapter, which functions in the same way as your Wi-Fi card – it allows you to connect to the internet. The difference is, that you can easily connect and disconnect the adapter from the USB port, and so *you* decide when you go online and offline. Alternatively, you could choose when to go online via an Ethernet cable.

## Ethernet port

The Ethernet port is what you use to physically connect to a 'local area network' (LAN), which can be anything from a network in a large office building or a home router box

from your internet provider. Of course, Wi-Fi is now much more commonly used than wired Ethernet connections.

It is known that Ethernet ports have specific security vulnerabilities that can be exploited against especially high-risk targets. If you wish to defend your machine against Ethernet exploitation (e.g. for an airgapped machine), you could fill the port with hot glue. Alternatively, you could disconnect the port wiring inside the laptop.



## 5. Preventing physical attacks on your hardware

### 5.a. *Buying your laptop anonymously*

As you learn about InfoSec, you may wish to purchase one or two new laptops. This is not only a wise decision when working with a new high-risk source, or when working on a very sensitive project, but to prepare yourself for the possibility of such eventualities, and to implement your new InfoSec learning.

The process of buying secure laptops should be as anonymous as possible in high-risk situations to prevent an adversary from pre-positioning surveillance tools in your hardware; being alerted to your new hardware and thus being motivated to physically or virtually invade your machine after purchase; or tracing your laptop/data back to you and/or your source.

If you are working with a high-risk source, such as an intelligence whistleblower, that person may already be under surveillance. You should assume that the surveillance risk that applies to your source could also apply to you.

The Snowden documents revealed that intelligence agencies intercept devices such as laptops, phones and other electronics, to implant surveillance tools before factory sealing

them and putting them back into transit – so you should avoid purchasing any hardware (even chargers) online. Most elements of hardware can be modified to act as surveillance tools.

You should decide what model of laptop you want to buy first (after reading this chapter), and be sure to do any research before buying using the anonymous Tor browser (see chapter 3). To be safe, you can buy your laptop/s in person, with cash. If you are buying an older model you may wish to find an area, preferably some distance from where you normally shop, with several second hand electronics shops. At higher risk levels, you may wish to use several different shops to buy each laptop and accessory (e.g. USB sticks), and whilst shopping, place any device that could track you (i.e. your phone) in a Faraday cage (a metallic enclosure that prevents signal transmission) or leave it somewhere safe at home.

For media and campaign organisations, it is a good idea to pre-emptively tool up with pre-prepared secure equipment (that should be stored in a safe until use) and to train several employees in how to use it. For advice on ready-made toolkits and training, contact [infosec@tcij.org](mailto:infosec@tcij.org).

### **5.b     *Guarding your laptop***

Preventing theft, damage (intentional or not), and physical attacks on your hardware, if you deem yourself to be at risk of targeted surveillance, means adopting an important new behaviour: keeping your laptop on you, near you, or within your sight at all times. Adopting such behaviour is sometimes called ‘OpSec’, or ‘Operational Security’. If at any point your laptop is left unattended (for example, at home, in a café, or at the office) or is in someone else’s possession (for example, checked-in baggage on a flight; or being held by the police/authorities), you should consider, depending on your risk level, the possibility that the system may no longer be secure.

Keep your secure system as simple, small, and light as possible – avoid connecting the laptop with a mouse, keyboard, printer, docking station, or other devices (which, for high-risk targets, could conceivably be ‘bugged’) to limit the hardware you need to carry with you or be responsible for.

You need to consider the physical security of your hardware not only presently and in the future, but also retrospectively. Could it have been physically attacked before? How was it manufactured – could the hardware already be compromised?

Since we know that shipment may be a risk, we discussed buying new hardware in person, with cash (point 3). Not only is this a more anonymous way of acquiring a new laptop, but you can take physical responsibility for it immediately.

### **5.c     *Detectability measures***

Detecting possible physical interventions with your laptop is extremely difficult. If you do need to securely store your laptop for some reason (for example, if you wish to cross a country’s border without your laptop) you should try to do so in a way whereby any security breach would be detectable. Be creative - but it will be a challenge to outsmart a

sophisticated adversary. Ideally, you will leave it under the close protection of someone you trust, if you cannot guard it yourself.

Snowden developed the app 'Haven' in 2017 that you can use for OpSec. Be creative, but it will prove to be a challenge to be smarter than a capable adversary. Sometimes it is even clear your laptop has been compromised (by missing or damaged screws for example).

For technological defence against low levels of risk, and as a general safety measure, you could download an open source application called Prey: see <https://preyproject.com>. This is tracking software that helps users find, lock and recover their computers. It also enables you to take screenshots of the stolen laptop's screen, and to activate the webcam to take a photo of its new owner. Downloading tracking software may feel counter-intuitive for a journalist who wants to strictly defend their privacy! Since the application is open source, it is thought to be fairly trustworthy. However, a sophisticated adversary will not be caught out by it. It is only recommended that you use this application as a defence against less advanced adversaries.

If you wish to continue using non-securable hardware, there are still measures you can take to protect your data and communications from less intrusive surveillance activities – so do read on. Just be aware that, if you become a surveillance target of someone with the resources, ability, and motivation to obtain your data, it is a fait accompli.

## Chapter 2: Operating System

If your hardware is secure against automated and pre-positioned surveillance, it is vital to prevent the introduction of software that will make the system vulnerable again. Even if you are operating at low-risk levels, using the right software can help protect the security of your data and communications from automated and dragnet surveillance.

The most important software on a computer, in addition to the firmware (see 'Firmware' in Chapter 1), is the operating system. This is the software that takes control of the computer as it boots up and is the interface through which you use the computer. In short, the operating system tells the computer what to do, and how to do it. Popular operating systems include versions of Windows (e.g. XP, Vista, 8, 10), OS X (for Mac), and Linux distributions.

We now know that intelligence agencies often have access to 'backdoors' in popular operating systems, which enable them to gain covert access to users' data.

Threats associated with operating systems:

- Malware, viruses
- Surveillance 'backdoors' within an operating system, accessible to the intelligence community

Two key measures are important for protection against operating system threats:

- Use an open source operating system (for medium risk)
- Use Tails, an amnesic, incognito operating system (for high - top risk)

### 1. Open source operating systems

To increase confidence that your operating system does not have potential surveillance 'backdoors' (i.e. that it cannot be abused for surveillance purposes), it should be 'open source'. 'Open source' software is freely distributed software for which the source-code, the very fabric of the operating system, is 'open' and publicly available. This allows independent experts to view the source code anytime, and verify that there are no security flaws in the makeup of the operating system. A full, ten-point definition is available at [www.opensource.org/osd](http://www.opensource.org/osd).

Furthermore, open source operating systems are less susceptible to malware (malicious software, typically spyware) and viruses. This is because they are much less frequently used than proprietary operating systems and have a correspondingly low market share.

#### ***Open source software***

Open source software is also known as 'free software' – not only for the freedom of access to its source code, but because it is also distributed on a free/donations-only basis.

It should be noted that open source software is only as trustworthy as the trust one puts in the expertise and frequency with which the source code is created and examined. However, open source software that is widely used is more likely to be frequently examined, and is preferable (at least for InfoSec purposes) to closed source software.

Operating systems by Microsoft and Apple (e.g. Windows, OS X) are closed source, and are expected to contain surveillance backdoors accessible to GCHQ, the NSA and allied interests. Microsoft's operating systems are particularly unsuitable, since more of its code is closed source than Apple's code, and their systems are more susceptible to malware and viruses. Such closed source operating systems are unsuitable for important data and communications if you think you, or someone you are communicating with, could be (or become) a target of surveillance.

Note: closed source mobile operating systems, such as iOS and Android, are ubiquitous on smart phones, which are therefore indefensible against targeted attacks – see chapter 7 for mobile InfoSec.

## **2. Linux**

Linux is the leading open source, community developed, operating system. There are many different versions of Linux operating systems that you can use.

## **3. Ubuntu**

[Ubuntu.com](http://Ubuntu.com)

Ubuntu is the most widely used Linux operating system. It is easy to install, highly functional, and user friendly.

You can replace your Windows operating system with Ubuntu, or you can run both Windows and Ubuntu on the same laptop (should you wish to familiarise with the new system before committing to it). Ubuntu is very user friendly and not too dissimilar from other operating systems, so we would recommend the former - that you replace your Windows operating system with Ubuntu. This removes the Windows operating system altogether, which is recommended for InfoSec purposes (otherwise, potential 'backdoors' may remain). Note that removing your old operating system will also remove all files associated with it – so be sure to backup any files you wish to keep that are on that laptop.

It is not recommended that inexperienced users wipe a MacBook of its operating system in order to install Ubuntu, as this could cause problems with a Mac's functionality. You could use Ubuntu through a 'virtual machine' on a Mac, but we will not discuss that here – it is unclear what security advantages can be achieved by simultaneously running the two operating systems.

It should be noted that a few elements within Ubuntu are currently closed source

– it is assumed (though not definitively known) that these do not pose a security risk. However, other popular variations of Linux, including Debian and Trisquel, are entirely open

source. Note that they may be slightly less intuitive for those new to Linux to use and maintain.

#### 4. Tails

[tails.boum.org](https://tails.boum.org)

Use an amnesic, incognito operating system for the greatest security: Tails. Tails stands for 'The Amnesic Incognito Live System'. It is an open source, Linux-based operating system that protects users' privacy and anonymity.

*Amnesic*: because no trace of your computer use is left on the system after shut down

*Incognito*: because it is privacy and security orientated, accessing internet anonymously by default, and thus circumventing any censorship

Tails is purposefully designed as an anti-surveillance system, and comes with several built-in (entirely open source) security-oriented applications:

##### **Built-in online anonymity**

Once connected to the internet, various software on our computers frequently send and receive packets of data via the internet, whether in active use or not. We know that intelligence agencies routinely surveil this network activity and are working to increase this surveillance. However, all software on Tails is configured to connect to the internet anonymously, via Tor (see chapter 3), thus protecting you from network surveillance.

Furthermore, the in-built Tor web browser includes popular security extensions like HTTPS Encryption and HTTPS Everywhere which encrypt your browsing data; Adblock Plus to block ads and tracking; and NoScript to block harmful JavaScript and Flash (as they can compromise anonymity). Using Tails on its high security settings can mean some web features won't work – but it is a worthwhile compromise for an incomparable privacy gain when working on sensitive projects. Alternatively, you can lower the security settings (in Tor's security slider) or use the 'Unsafe Browser' on Tails.

Note: if you use the unsafe browser, or attempt to log in to an online account that is clearly linked to your real identity on any browser, you will compromise your anonymity for that entire Tails session. Shutdown and restart Tails every time you use a new identity. Files and documents can also contain metadata that may indicate your location via GPS – see chapter 4 for tips on removing such metadata.

##### **Built-in encrypted email and chat**

Tails offers in-built encrypted and private messaging. Tails includes the Icedove (Thunderbird) email client with OpenPGP for email encryption (see chapter 5) and the instant messaging client Pidgin (see chapter 6) which supports private and anonymous messaging.

## Built-in file encryption

Tails comes with LUKS, to encrypt files. If you want to store files on the same USB stick you are running Tails from, you can create permanent storage space, or a 'persistent volume' on the USB stick. Tails will encrypt the persistent volume by default, requesting your password to view or access any of the files stored.

Expert info: Whilst the persistent volume is useful for storing relatively unimportant information and documents, you should not use it to store or transport the most sensitive documents. This is because the persistent volume is not 'hidden'. That is, should an adversary obtain the USB stick, they will be able to see that an encrypted volume exists on the device, and they may force or trick you into giving them the password. You should create a 'hidden' volume for the most sensitive documents (perhaps on a different USB stick), which appears to take up no memory – only you know it is there. This can be easily done with an application called VeraCrypt – see chapter 4.

## Built in password protection

Tails comes preloaded with KeePassX, a password manager that stores usernames and passwords in an encrypted, local database, protected by your master password. It also comes with PWGen, a strong random password generator.

Tails is designed for use from a USB stick independently of the computer's original operating system. This means that you can remove your laptop's hard disk drive (recommended for high-risk work), but still boot up the laptop through a Tails USB stick. Alternatively, you can put a Tails USB stick into a computer with the hard disk drive intact, and boot up via Tails – the machine will ignore the original hard disk and operating system, and run from the USB drive with Tails instead.

The provision of a 'mini system' on a Tails USB stick makes it ideal for sensitive journalistic projects. Your machine can essentially be 'clean' with no trace of your work on there, and your documents can be stored on the highly portable, inexpensive USB stick. Tails even comes preloaded with open source editing software such as LibreOffice for creating, reading and editing documents, PiTiVi for editing videos, and Audacity for editing sound.

The USB stick is ideal for travelling, and you can plug it into any computer, if you set the computer to boot up from USB (explained within instructions below). It is wise to have separate Tails USB sticks for separate projects, to spread your identity trace and minimise the risk, should you lose a USB stick. If appropriate, you could also give a prepared Tails USB stick to your source, with a few instructions, so they have secure means of communicating with you. In high risk scenarios, you may wish to use Tails on an entirely separate machine to your usual laptop (see Chapter 1, 'Top risk level').

Using Ubuntu is a good option for day-to-day, non-sensitive work. However, it is wise to also create a Tails USB stick and switch over to Tails when working on sensitive projects – particularly when working with important documents, communicating with high-risk individuals, or researching for sensitive projects online. Furthermore, taking serious InfoSec



measures pre-emptively can prolong your anonymity and thus the time you, and most importantly your source, have before you become targeted for surveillance.

You have now learnt how to robustly protect your system. In the following chapters, you will learn how to protect your communications, anonymise your browsing data, and encrypt and transport sensitive documents.

## 5. Step-by-step instructions

### 4.a Installing Ubuntu

Note: all Windows documents, programs, files, etc. will be deleted if you replace Windows with Ubuntu (recommended).

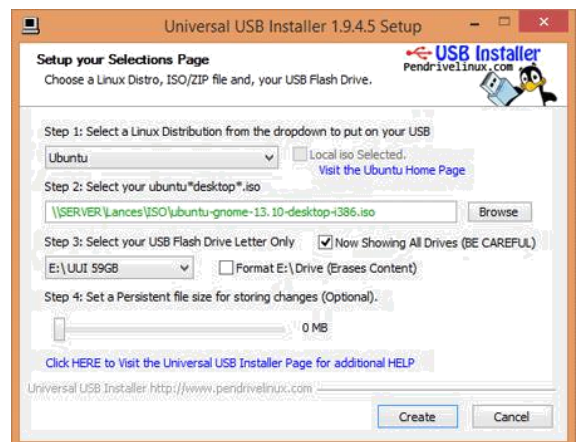
#### 1. Download Ubuntu

Download Ubuntu from <http://www.ubuntu.com/download/desktop>. You will need to know how much RAM your laptop has, and download either 32-bit (for older machines, such as the recommended ThinkPads, with 2GB or less RAM) or 64-bit (for newer machines with 4GB or more RAM). The download may take 20-60 minutes.

#### 2. Download Linux's USB Installer

Go to <http://www.ubuntu.com/download/desktop/create-a-usb-stick-on-windows>, click 'Download Pen Drive Linux's USB Installer', and scroll down to click on the big 'Download UUI' button. This will download the USB installer, allowing you to store Ubuntu on a USB drive, which you will use to install Ubuntu.

Expert info: During the installation, the hard disk cannot run any other software – so you need another source, in this case a USB stick, to run the install software.



#### 3. Put Ubuntu on the USB Installer

When both downloads are complete, insert a clean USB stick and open the USB Installer.

Select the Linux Distribution from the dropdown menu (Ubuntu); use the 'Browse' button to locate the Ubuntu download; and select the USB Flash Drive Letter (where the computer has located your USB stick). Click 'Create'.

When this is complete, safely remove the USB stick, and shut down the computer.

## Install Ubuntu Booting from USB

You need to set your machine to boot from USB – a setting that is located in the BIOS menu of your laptop. You can access the BIOS menu as your machine powers up. Before attempting this, you may wish to search online to find out which key to press to access the BIOS menu on your particular laptop. On many machines an ‘entering setup’ message appears as it powers up, informing you that you can press [key] to enter BIOS/setup/system configuration, in which case you can follow that instruction. It is often a key such as f1, F2, F3, F12 or DEL.

You may also wish to research how, via your particular machine’s BIOS menu, to boot the machine from the USB drive. Insert the USB stick into the laptop whilst switched off, then boot up and enter the BIOS menu. This setting may be in a menu item such as Startup > Boot; or a menu tab such as ‘Boot’, ‘Boot options’, or ‘Boot selection menu’. Select your USB drive, or make sure your USB drive is top of any boot priority order (if an item on the list has a ‘+’ it means it has a submenu, where your USB listing may be hiding!). You can often change the order using + and – keys. Navigate to the ‘Exit’ or ‘Save and exit’ menu, and select ‘Exit saving changes’ (or similar) option to make sure your boot preference has been saved.

So: power up the laptop with the USB stick already inserted, enter the BIOS menu, and opt to boot from your USB drive.

After saving and exiting the BIOS menu, the machine should boot from the USB and thus the Ubuntu installer boot menu should load.

Select ‘Install Ubuntu on a Hard Disk’. The automatic installer will now guide you through the Ubuntu set up.

You may be prompted to set up Wi-Fi, but you don’t have to worry about setting up Wi-Fi now, especially if you have removed your Wi-Fi card.

Under ‘Installation type’:

- Select: Replace Windows with Ubuntu (if you want to wipe Windows)
- Select: Encrypt the new Ubuntu installation for security
- Select: Use LVM with the new Ubuntu installation Choose a strong password (see chapter 8 for guidance).

The software will ask you to register your name (but you don’t have to enter anything here). Pick a computer name and username for your log-in. Choose a strong password, and tick ‘require my password to log in’ and ‘encrypt my home folder’.

Ubuntu will now complete the install. Once installed, turn off the laptop and remove the USB. Turn the laptop on and Ubuntu should launch!

When you connect to the internet, go to the top left Ubuntu icon on the desktop and search ‘updates’. Click to accept any updates.

## Ubuntu privacy tweaks

- Select 'System Settings' on the desktop > Security and Privacy
- Under 'Files and Applications' you can control whether records are kept of your file and applications usage.
- Under 'Search' you can disable online search results when searching in the Dash. This stops Ubuntu's Amazon integration, and prevents your Dash searches being sent back to Ubuntu servers and Amazon. You can right-click the Amazon icon on the desktop and select 'Unlock from Launcher' to remove it from the desktop.
- Under 'Diagnostics' you can opt out of sending 'error reports' and 'occasional system information' to Canonical.

### 4.b *Installing Tails*

There are several ways to create a Tails USB stick:

1. Via a cloned Tails USB stick from a trusted source (recommended - contact [infosec@tcij.org](mailto:infosec@tcij.org) for help finding a cloned Tails stick)
2. Manually via TailsInstaller (requires Ubuntu 15.10 or later)
3. Manually via GNOME Disks (Ubuntu)
4. Manually via Universal USB Installer (Windows)
5. Manually via the command line (Mac. N.B. this is the most difficult method)

We highly recommend starting with Tails via a cloned USB stick. Manual installation is not always easy, and as such does not have a perfect success rate.

#### Installation tips:

- Before you start the installation, prepare your USB stick/s. Tails include instructions for doing so in Windows and Mac installation guides – to prepare sticks on Ubuntu, see the next page.
- Before attempting your first boot-up using a Tails USB stick (including any intermediary Tails stick if installing manually) you should set your machine to boot from USB. See the 'Bootling from USB' box on page 25.
- We recommend downloading Tails via the Firefox browser. This is because there is a 'Tails Download and Verify' extension available for Firefox, which automatically verifies that your download is the intended download and has not been tampered with. (The link and instructions for this extension are within Tails' installation instructions)
- Instructions for the variety of installation methods can be found on the Tails website, here: <https://tails.boum.org/install/index.en.html>.

Note: whilst many more users are successfully using the latest versions of Tails from Mac computers, Tails developers have less experience using Mac and problems (such as inability to access WiFi) have been reported.

#### Clean and prepare the USB stick (Ubuntu)

You will need a USB stick which is 4GB or bigger – ideally 16GB if you intend on storing documents on it too. Perhaps you have used this USB stick before, or perhaps it came with pre-installed software. Either way, opening the USB drive on a computer and moving the files to Trash only stops them being visibly listed, and does not really ‘delete’ them. For your new Tails USB stick, you want to start with a totally clean device.

We also need to change some settings on the USB stick, so that it is prepared to boot up the computer and host Tails.

1. Install GParted - Go to the Ubuntu Software Centre on your computer, and search for ‘GParted’. Install.
2. Insert your USB stick into the laptop.
3. Open GParted. Go to GParted > Refresh Devices
4. Your USB should appear as a drive in the top right drop down menu (e.g. listed as /dev/sdb or dev/sdc) and will display the size of the available space on the USB stick. Select this device.
5. Now at the top of the window is a long rectangle, outlined green, possibly with some space on the left of the rectangle shaded yellow. Right click, select ‘unmount’; right click again, and select ‘delete’.
6. Any colours in the rectangle are now gone and replaced by grey. Right click on the rectangle, and select ‘New’.
7. A screen titled ‘Create new Partition’ appears. Under ‘File System’ select ‘fat32’, and under ‘Label’ type ‘TAILS’. Click ‘Add’. fat32 = File Allocation Table 32 bits
8. Click the green ‘tick’ (just under the ‘Partition’ option on the toolbar at the top of the window)
9. In the pop up box, select ‘Apply’ to apply operations to device, and ‘Close’ when the message appears: “All operations successfully completed”.
10. Now, right click on the long green rectangle and click ‘Manage Flags’ > select ‘boot’, and close.

This will tell the computer that this is a drive that can be used to start the system from. You can safely remove the USB stick – it is ready for a Tails installation.

## Cloning Tails USB sticks

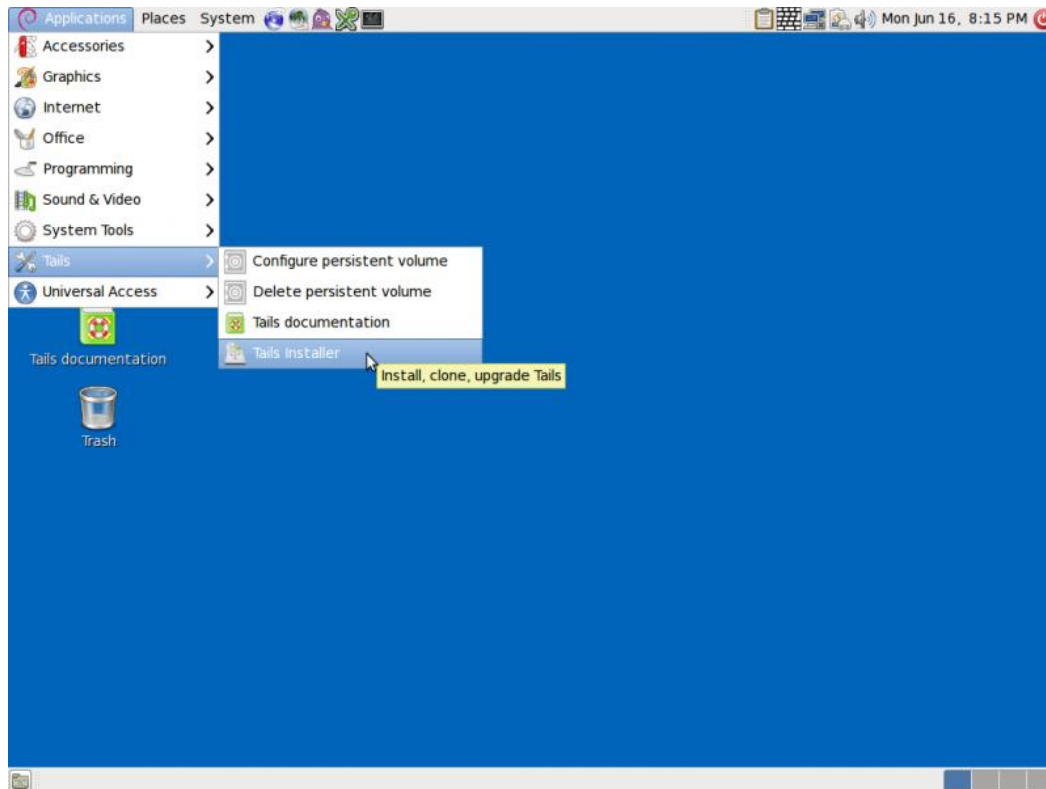
If you receive a cloned Tails USB stick, all you have to do is set your machine to boot from the USB drive (see page 24), and insert your Tails stick to get started.

If you wish to clone a Tails USB stick (for example, if you are making your own Tails stick by cloning a friend’s, or if you are cloning your own Tails stick to equip a source or colleagues), follow these instructions.

Prepare a new clean, bootable USB stick (4 GB or more) with GParted, as before (page 27), to clone Tails to.

1. Start the Tails system with your current Tails stick
2. Insert the clean, bootable USB-drive into one of the free USB-ports on the computer.
3. On the Tails desktop go to Applications > Tails > Tails Installer.

4. A new window will open. Select: Install by cloning
5. The Tails Installer window should list your clean USB stick under 'Target Device'. Click 'Install Tails' on the bottom of the window and click 'Yes' on the pop-up window to confirm your device selection. A clone of your Tails installation will now be made to the other USB drive.



When done the Tails Installer will tell you: Installation complete! When completed, shutdown the system and try to start from the newly created drive to ensure it works properly.

## Upgrading Tails

Your Tails system should automatically look for, and download, updates. It is important to keep your system updated. After booting Tails and connecting to Tor, if an upgrade is available, a dialog box appears and proposes you to upgrade the system.

However, it can often take a while for Tails to connect to the internet after booting, in which case it may be unable to check for upgrades at start up. You can check for upgrades anytime by opening the Terminal (black box icon on the top toolbar on the Tails desktop) and typing the following command: *tails-upgrade-frontend-wrapper*

And press enter. Tails will check for updates, or inform you whether your system is up to date.

More information on upgrading Tails, and troubleshooting when Tails does not upgrade automatically, can be found on the Tails website:

[https://tails.boum.org/doc/first\\_steps/upgrade/index.en.html](https://tails.boum.org/doc/first_steps/upgrade/index.en.html)

## Using Tails

First, you need to instruct your laptop to boot up from a USB drive – see page 24 for instructions.

When you boot up in Tails, you will see a screen load up with options 'Live' and 'Live failsafe'. Use the arrow keys to highlight 'Live' and hit the enter key.

You will then be offered, 'More options?'. It is not essential that you enter this menu, unless you need to configure Tails to circumvent Tor censorship. Otherwise you can select no, 'Login', and start exploring Tails. If you do select yes for more options, you will see:

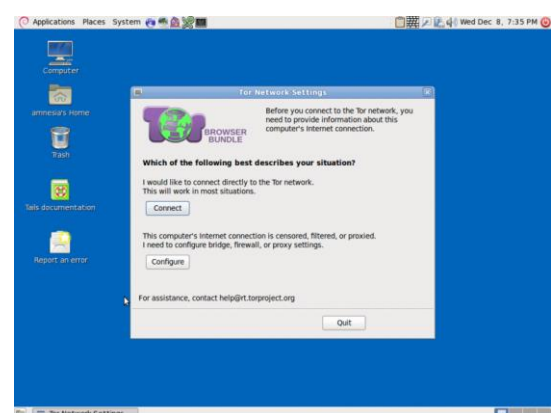
- '*Administrative password*'. It is unlikely you would need to create one unless you want to access the internal hard disk of the computer (which is not recommended, and can lead to unnecessary security risks).
- '*Spoof all MAC addresses*', which should be automatically selected. This is a good option to hide the serial numbers of your network cards, and thus is another function that helps to hide your location.
- '*Network configuration*', under which you have two options: connect directly to the Tor network, or 'This computer's internet connection is censored, filtered or proxied. You need to configure bridge, firewall or proxy settings'. If your network does not allow Tor connections, select the latter.
- '*Disable all networking*' if you wish to have offline use

## Using Tails via bridges/circumventing censorship

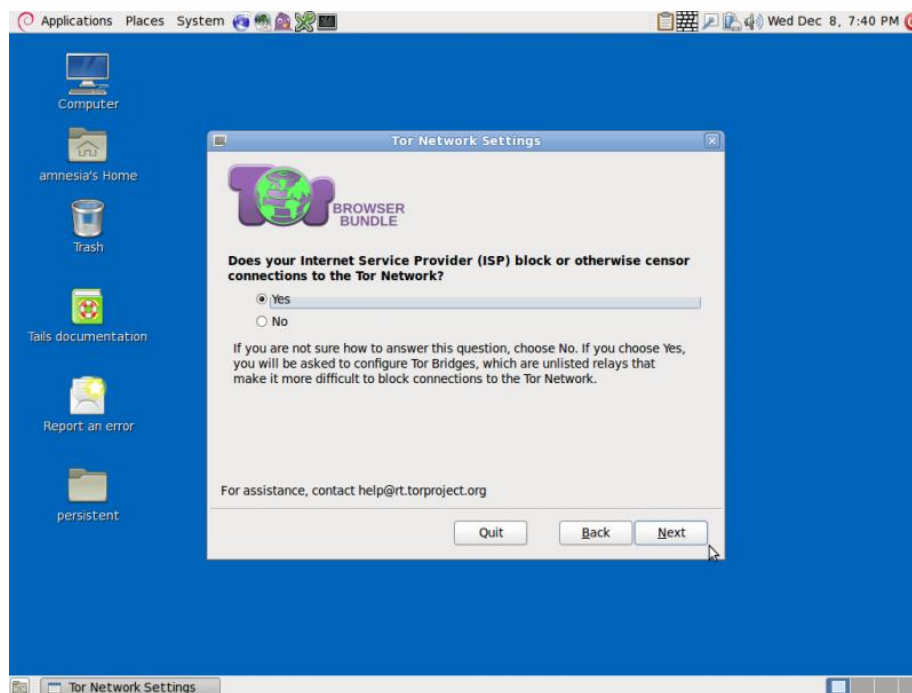
This helps people to connect to the Tor network in situations where their network disallows Tor connections. Bridges are Tor relays (nodes or computer points that receive traffic on the Tor network and pass it along) that help circumvent censorship.

When you boot up using the Tails USB stick and are offered 'More options?', select 'Yes' and continue. Under 'Network configuration', select 'This computer's internet connection is censored, filtered or proxied. You need to configure bridge, firewall or proxy settings'.

Then, when you connect to the internet the Tor browser bundle window will appear asking the same question.



If the latter option applies, click 'Configure'. You'll be asked if your ISP blocks / censors connections to the Tor network. If you need to configure bridges, select 'yes' here and press next.



You now have a box to enter one or more 'bridges' - strings of numbers that identify a Tor relay. To get bridges, go to <https://bridges.torproject.org> or if you cannot access that site, send an email to [bridges@torproject.org](mailto:bridges@torproject.org) from a gmail.com or yahoo.com email address, with the line 'get bridges' by itself in the body of the message, and some should be sent back to you. Using a bridge can be an extremely slow way of connecting to the internet – but if you need it to circumvent censorship, it works very well.

### Persistent storage space on your Tails USB stick.

To create a persistent volume in Tails, go to Applications > Tails > Configure persistent volume. Once you have entered a (very strong, see chapter 8) password, you can choose what types of files you will save in the persistent volume. You could select all types, to keep your options open.

Now, every time you boot up with the Tails USB stick, you will be asked two questions: 'Use persistence?' and 'More options?' (as before). If you click 'Yes' to 'use persistence' and enter the password, you can access any data (e.g. configured email client, IM client, password manager, or files) you have saved to the persistent volume in previous sessions.

### Using KeePassX

KeePassX is a password manager that stores usernames and passwords in a local encrypted database, protected by a master password. It also comes with PWGen, a strong random password generator. You will find KeePassX in Applications > Accessories > KeePassX.

❖ To create a new password database:

File > New database. Create a strong master password that will protect your password database. You can then name your database file and choose the location where it will be saved.

Groups > New groups (e.g. 'Jabber' group, for your Jabber usernames and passwords – more on Jabber in chapter 6).

❖ To add a new password:

Click on a group > Entries > Add new entry. Here you have the option of entering a password, or generating a random one (click 'Gen'). If you click on the eye icon, you can see the text of the password – otherwise, it will remain obscured.

❖ To retrieve a password:

When you have added a password to a group, you can right click on the desired password and select 'copy password to clipboard'. You can then paste it in to a login form.

## Email in Tails

\*You should read chapter 5 on email before continuing to read the rest of this chapter. Also see Tails' documentation on Icedove (Thunderbird) at: [https://tails.boum.org/doc/anonymous\\_internet/icedove/index.en.html](https://tails.boum.org/doc/anonymous_internet/icedove/index.en.html).\*

Tails comes with a pre-installed mail client, Icedove (this is a rebranded copy of Thunderbird, which is documented in chapter 5). It is also pre-installed with Enigmail, an extension for Icedove which supports email encryption. If you are used to using Thunderbird/Enigmail and encrypting email on your regular operating system, you should have no problem using Icedove on Tails, and the instructions in chapter 5 also apply here.

❖ Importing your key from another laptop/operating system

Lots of people use separate Tails sticks, email addresses, PGP keys, etc., for different projects, which is a great way to work securely and compartmentalise your activities. However, you may wish to add a key that was made on another laptop to your Tails key manager (but consider whether this could compromise your anonymity on Tails). For this, you'll need a spare USB stick.

Insert a USB stick into the laptop that has the key you wish to move. Open Thunderbird, and go to Enigmail > Key management. Find your email address/key on your contact list and right-click it to select > Export keys to file > Export secret keys. Find your USB device and select it as the location to save your key to. Safely remove the USB device.

Start up your Tails system. Once Tails has booted up and connected to the internet, insert the USB device with your key saved on it. Click on Tails' OpenPGP encryption applet (the



clipboard icon on the top right of the menu bar) and select > Manage keys > File > Import. Open your USB device files to find the key to import, and select Import.

Once you have imported your key to Tails, you may wish to securely delete your key from the USB device you used to transport it, as it is unwise to have your secret key saved on an unprotected USB device/s. Using the 'Wipe' function on Tails (right-click on the key file on the USB device) will securely delete the file.

#### ❖ OpenPGP encryption applet

Because *all* internet connections on Tails run through the Tor network, connections to your email provider via your email client will also be run through Tor. Users of some email providers sometimes have problems configuring their email accounts with Icedove through Tails, because the connection is re-routed through the Tor network to disguise your location.

Tails offers an alternative method you can use to encrypt email and email attachments. Rather than using an email client to encrypt the entire email, you can highlight text and encrypt it to the desired recipient's key, before pasting the encrypted text into an email (e.g. when composing email on the web browser).

#### ❖ Import contact's public key

Go to the OpenPGP encryption applet (the clipboard icon in the top right of the top menu toolbar) > Manage keys > then either

Remote > Find remote keys (if you do not already have the person's key).

Enter the contact's name, and click search.

Or

File > Import (if you have the key already saved in a file).

#### ❖ Encrypt the text

Applications (left on the top menu toolbar) > Accessories > gedit Text Editor. Type your message. Then select all (Ctrl + A) and copy (Ctrl + C, or right click > copy) the message to the clipboard. Go to the OpenPGP encryption applet > Sign/encrypt Clipboard with Public Keys > select the recipient of your email (you need to have already imported their key), sign the message as the email address from which you will be sending the email, and click OK. Then paste the message (Ctrl + V) into the composing window in your email account, and send.

Note that you have encrypted the message to only allow decryption by the desired recipient. This means that once encrypted, you cannot decrypt it to read it yourself. Therefore, if you use this method, it is a good idea to select your own public key, as well as

that of the recipient of the email, when you encrypt the message. You will then be able to decrypt it if you want to read your sent messages.

#### ❖ Decrypt the text

Select the encrypted text that you want to decrypt. Include the lines “-----BEGIN

PGP MESSAGE-----” and “-----END PGP MESSAGE-----”. Copy the text to the

clipboard (Ctrl + C, or right click > copy). The OpenPGP Applet (clipboard icon) now shows a padlock, meaning that it contains encrypted text. If the text that you selected is only signed but not encrypted, the OpenPGP Applet now shows a seal, meaning that the clipboard contains signed text.

Click on the OpenPGP Applet (clipboard icon) and select ‘Decrypt/Verify Clipboard’ from the menu. The decrypted text appears in the Output of GnuPG text box.

#### ❖ Encrypting email attachments

It is easy to encrypt files using public keys and to send these as email attachments with Tails. Right click the desired file > Encrypt > tick the recipient’s email address (sign the message as the address from which you will send the email) > OK. You will now see a duplicate of the selected file, with the ‘.pgp’ extension – this means it is an encrypted file. Attach the .pgp file to your email, which can only be decrypted and opened by your chosen recipient.

## Chapter 3: Safe Browsing

Web browsing risks:

- Data collection of your identity
- Data collection of your browsing behaviours, including the pages you have visited, and when
- Data collection of your passwords and autofill information
- Data collection of your location (and previous locations)
- Malware (malicious software, sometimes spyware) injections
- Being blocked from accessing certain sites
- Being blocked from using anonymous browsers

InfoSec action:

- Use a general purpose browser, with privacy-enhancing extensions, for daily activities
- Use the Tor browser for anonymous browsing, for censorship resistance, and to hide your real location

A web browser is the software you use to access the World Wide Web. For many of us, web browsing *is* 'The Internet', and in many senses it is a window to the world.

Because of the huge opportunities in web browsing, some states impose restrictions on access to certain websites, which impedes people's freedom, and of course poses a problem to local journalists, researchers, and foreign correspondents. Whilst web access is largely unrestricted in the West, we have serious privacy issues with our web browsing. It remains that most service providers and websites collect vast amounts of data about their users. The British Government is currently trying to pass legislation that would force internet providers to record every single internet connection of every single person, including location data and device identifiers.

This chapter explains some options to minimise the impositions on freedom and privacy in web browsing, under a range of circumstances.

### 1. What browsers to use

Many people are unaware of the privacy issues with browsers, and use whatever browser is already on their system. However, there are alternatives that are more integrally secure, and that can be vastly improved by adding 'extensions' – extra software that improves the functionality of your browser.

While there are dozens of browsers with specialised purposes, here we will recommend three open source browsers:

- [Brave Browser](#) or [Midori Web Browser](#) or [Chromium](#) or perhaps Firefox as a general purpose web browser for Linux and Windows
- Chromium, as a general purpose web browser for Mac

- [Tor](#) as a secure browser that anonymises your location and identity, and overcomes web censorship (suitable for Linux, Windows and Mac).

We recommend Firefox for Linux and Windows but not Mac as Firefox can conflict with Tor on a Mac (Firefox and Tor are based on the same code).

### **1a     *A general-purpose browser***

Your daily web browsing centres around generally unrestricted sites and sites that you log in to, such as social media platforms, LinkedIn, newspapers, YouTube, shops, and so on.

#### **Firefox**

A popular open source web-browser

For Windows, download Firefox for your operating system and language at [www.getfirefox.com](http://www.getfirefox.com).

On Linux distributions/Ubuntu, Firefox should already be installed.

#### **Brave and Midori**

Less known, but safe open source browser are [Brave Browser](#) or [Midori Web Browser](#)

#### **Chromium**

An open source clone of Google Chrome, without the additional Google services

Download Chromium for Mac at

<https://www.macupdate.com/app/mac/36244/chromium>

(Alternatively, go to <https://www.macupdate.com> and search for Chromium)

#### **Extensions to enhance privacy**

A general-purpose browser is certain to make your identity, location and activity available. However, there are some extensions we can use to increase our privacy and security somewhat. You can find a range of privacy enhancing extensions at <https://addons.mozilla.org/en-US/firefox/extensions/privacy-security/>, which should be suitable for both Firefox and Chromium.

We particularly recommend the following open source extensions:

- HTTPS Everywhere: forces encryption for all connections between your web browser and the webserver you are visiting. <https://www.eff.org/https-everywhere>
- NoScript: blocks JavaScript. JavaScript is an essential element of many websites, but can be exploited to track your browsing behaviour, leak your passwords, and to inject

malware. NoScript is very effective but you will need to grant or deny privileges on a per website basis depending on how much you trust them. <https://noscript.net/>

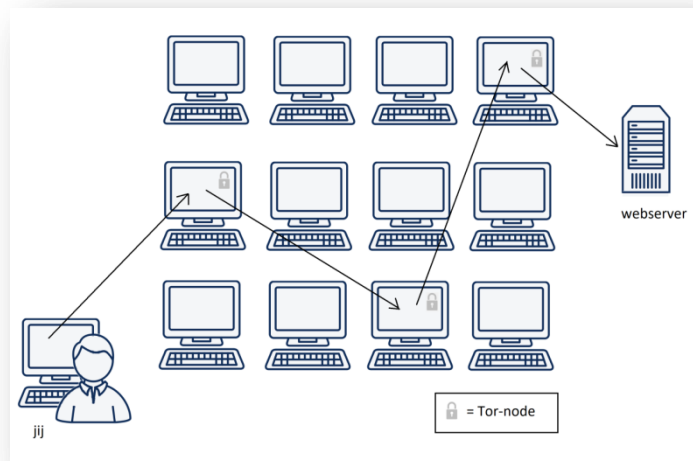
- Ghostery: blocks a wide range of trackers in its database, which track your browsing behaviour. Do make sure to switch off 'GhostRank' under Settings > Options, as this itself reports back data for marketing purposes. <https://ghostery.com>
- LastPass: is a password generator and manager for Firefox. <https://lastpass.com/>

### 1.b Browser for anonymous surfing: Tor

<https://www.torproject.org/>

#### About Tor

The Tor browser was especially designed for anonymity by routing all its traffic through the Tor ('The Onion Router') network. Therefore, this browser prevents internet providers storing accurate information about your web browsing history.



#### How Tor works

The Tor network is a global network of computers called Tor nodes that have encrypted connections with each other. When the Tor browser starts, it will connect to one of these nodes. This node will connect to a second node that will in turn connect to a third node. These nodes could be anywhere in the world, and the first and third node will not be aware of each other. The third node will connect to the wider internet and fetch webpages from the sites you're visiting. Those sites will not be able to see where you are or who you are (as long as you do not identify yourself by logging into services associated with your real identity).

Since the Tor browser runs all its traffic through several other places around the world it is slower than regular browsing but this is a price well worth paying for being online anonymously.

In order to ensure the safety of the browser, Tor automatically enables HTTPS- Everywhere, and automatically avoids extensions such as Flash, RealPlayer, and QuickTime. However, you can adjust the settings to improve usability as you like.

#### Overcoming restrictions and blocks to Tor

If the network provider you are using (this may be the entire country or just a University network) blocks access to the Tor network, you can use 'bridges' to achieve access.

*Bridges are 'private' Tor relays (nodes or computer points that receive traffic on the Tor network and pass it along) that are less likely to be blocked, and thus help circumvent censorship.*

This is how you use bridges: launch the Tor Browser . Click on the green onion (to the left of the address bar) and click Tor Network Settings > tick 'My ISP blocks connections to the Tor network'.

You now have a box to enter one or more 'bridges' - strings of numbers that identify a Tor relay. To get bridges, go to <https://bridges.torproject.org> or if you cannot access that site, send an email to [bridges@torproject.org](mailto:bridges@torproject.org), from a gmail.com or yahoo.com email address, with the line 'get bridges' by itself in the body of the message, and bridges should be sent back to you. Using a bridge can be an extremely slow way of connecting to the internet – but if you need it to circumvent censorship, it works very well.

## Staying anonymous

The latest version of the Tor browser gives users a security slider to determine their security options. In the Tor browser, click on the green onion (to the left of the address bar) and select 'Privacy and Security Settings' to see the slider and the various options. The slider is set to **low** by default, which increases usability. To benefit from the high level of privacy that Tor can offer, or if you need to browse anonymously, you should set the slider to the highest level.

Do not open documents (such as .doc and .pdf) downloaded via Tor while still being online. These document formats can contain elements that independently connect to the internet, thereby revealing your real IP address. Make sure you are offline first or use a separate computer for working with such documents.

Don't run bittorrent over Tor since this may betray your real IP address and will consume disproportionate amounts of capacity on the Tor network.

Make sure you use the latest version of the Tor browser. You will be alerted on the Tor browser homepage when updates are available, or you can click on the green onion in the browser window (to the left of the address bar) to 'Check for Tor Browser update'.

## Install Tor

❖ Mac, Windows:

Download and install the Tor browser for your operating system at <https://www.torproject.org/> following the installation instructions on the site.

❖ Linux/Ubuntu:

1. Download the Tor browser for Linux at <https://www.torproject.org/>, and select 'Save file'. Wait for the download to complete.

2. In your file directory, go to Downloads (or wherever you saved the download), right click on the Tor download, and select 'Extract here'. Open the extracted file (e.g. tor-browser\_en-US), and click 'Tor browser setup'.
3. You now have the option whether to 'Connect' or 'Configure'. Unless your network provider blocks access to the Tor network (in which case, refer to our previous section 'Overcoming restrictions'), select 'Connect'.
4. The Tor browser should now launch. The 'Tor browser setup' icon in your file directory should now be 'Tor browser' – this is your Tor launch icon. You can drag this icon to the desktop or lock it to the launch bar to make your Tor launcher easily accessible.

## Chapter 4: Data

When storing or transporting data, there are several risks that require attention: interception/theft, loss, corruption and incrimination. The difference between interception and theft is detectability by the original owner. Interception usually means a data copy has been covertly made while theft would suggest the storage device (laptop, USB-drive or hard-disk) containing the data, or the original data, has been taken. The latter case would be detectable, whereas the former might not be.

Risks:

- Loss
- Corruption
- Interception
- Theft
- 'Deleted' data recoverability
- De-anonymising/compromising metadata

InfoSec actions:

- Back up data
- Encrypt data
- Securely share files
- Securely delete data
- Delete metadata

If sensitive data falls into the hands of adversaries, there may be severe consequences for sources or the journalist. To protect digital files there are several options. Simply storing the material on a small device (USB drive, memory card or external hard disk) and hiding it may be effective in certain cases. In such a scenario, the entire security of the material is dependent on the hidden device not being found. To protect your data from unauthorised access, it is also important to encrypt it. VeraCrypt is an easy-to-use tool for encrypting files and entire disks, and can even hide their very existence.

### 1. VeraCrypt for encryption

VeraCrypt is open source encryption software. VeraCrypt allows you to create an encrypted 'container' that acts as a digital strongbox for files, locked by a password. Once this box is created and filled with files it can be moved to an external storage device such as a USB drive, or sent over the internet to others. Even if the file is intercepted, the strongbox will not reveal its contents to anyone who does not have the password.

\*Important! Do not forget your password, there is no other way to get to your data once it is encrypted. Losing your password means losing your data!\*

Download: <https://www.veracrypt.fr/en/Downloads.html>. Mac users will also need to download FUSE for OS X: <https://osxfuse.github.io/>) There is comprehensive documentation here: <https://www.veracrypt.fr/en/Documentation.html>

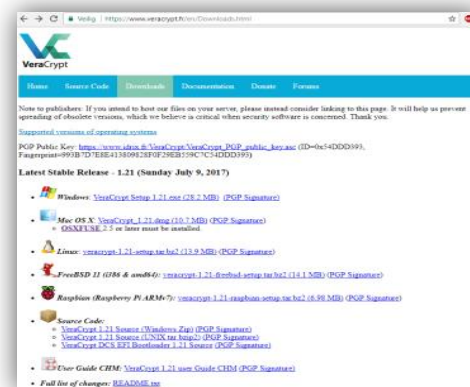


## Installing VeraCrypt

On the VeraCrypt download page, select your operating system to be directed to the latest download suitable for your system.

Mac users will also need to download FUSE for OS X, which can be found here:

<https://osxfuse.github.io/>



## Encrypt a file with VeraCrypt

### 1. Download

Download VeraCrypt from <https://www.veracrypt.fr/en/Downloads.html> (and, if on Mac, FUSE for OS X: <https://osxfuse.github.io/>) and install on your system like any other application. VeraCrypt works the same on Windows, Mac and Linux systems and the encrypted containers are cross-compatible between these systems. This allows you to work securely with other people without having to know what system they use. An extensive guide: [tutorial voor VeraCrypt](#).

### 2. Create an encrypted volume

To create an encrypted 'volume' (like a folder) start the program and click:

- 'Create Volume' > 'Create an encrypted file container' > select 'Standard VeraCrypt volume' > select the location where the container will be stored on your computer (it can be moved later) and give the container an (innocuous) name.

\*To encrypt an entire external hard drive such as a USB stick, select 'Create Volume' > 'Create a volume within a partition/drive'. Of course, you will need VeraCrypt to decrypt the USB drive, so if you are planning to decrypt on a computer on which VeraCrypt is not installed, you may wish to just create an encrypted container on the USB drive with your files, and also save VeraCrypt on the USB drive.\*

- The next screen is titled 'Encryption Options'. The default selections are fine. For the strongest encryption (encrypts multiple times), under 'Encryption Algorithm', select 'AES twoFish-Serpent', and under 'Hash Algorithm', select SHA-512.
- The next screen is titled 'Volume size'. Select the size of the container (this will determine the maximum amount of data that can be put into it).
- Set the volume password on the next screen. Make a good one (see chapter 8) and Do. Not. Forget!
- The next screen is titled 'Format Options'. Select FAT.

Expert info: FAT is compatible with all systems but is limited in the maximum size of files it can contain (individual files cannot be larger than 4 GB). Usually this should not be a problem. If you need to be able to store larger files and are certain that choosing

something other than FAT will not create problems with the sharing of the files, you could choose one of the other options.

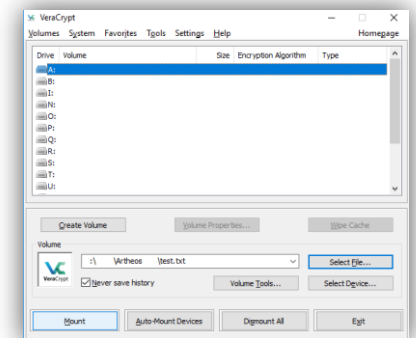
- The program will now generate a random dataset to encrypt the volume. Randomly move your mouse around for a moment, before clicking 'Format'. The program will now create the volume. Depending on the size, chosen encryption algorithm and speed of your computer this will take a few seconds to hours (for very large volumes).
- Once the system is finished press 'Exit' to return to the main program screen.

Congratulations - you have created your secure volume!

Put the files you want to encrypt into your new encrypted volume. Now the volume can be 'mounted' (i.e. activated). Select any slot or drive. Click 'Select File' > locate and select the volume you just made > click 'Mount'.

Now enter the password and click 'OK'.

The VeraCrypt container will now appear on your system as a separate drive (much like a USB drive or external hard disk), and you can put files into it in the same way you would a USB drive (go to My Computer or Finder and click and drag files into the container).



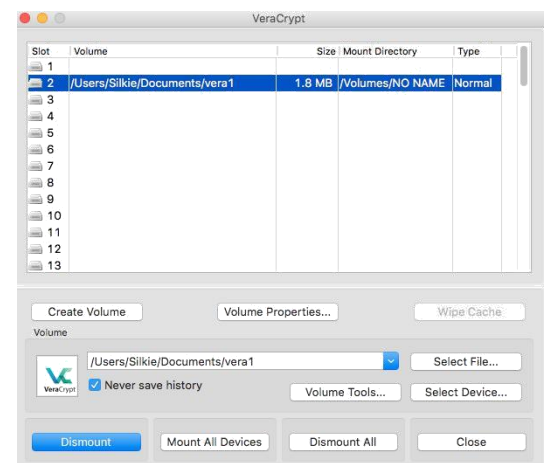
Once you have put the desired files in the container, 'close' the container by clicking 'Dismount' in VeraCrypt. The container will now appear to be just a file on your computer.

### **Hidden encrypted volumes**

Hidden volumes are encrypted volumes that sit undetectably within a regular VeraCrypt volume. The purpose of this is to provide plausible deniability, and an extra layer of protection should your password be forced from you.

You will create a password for the regular VeraCrypt 'outer' volume – the container that is visible in your directory. Inside this container you will put sensitive files that you could plausibly want to encrypt and keep secret (unless this is a convincing decoy, an adversary could keep pressing for the 'real' password) – but that, if worst comes to worst, you are prepared to share with an adversary, should you be subjected to pressure.

However, within that volume is a hidden volume. No one can see it, and as far as we know, even the most sophisticated examination cannot reveal the existence of VeraCrypt's hidden volumes. Only the creator knows it is there. You access it by entering an alternative password that you create specifically for access to that hidden volume. This is a password that you would be prepared to withhold much longer than the outer volume password.



#### a. Create the outer volume

- Start VeraCrypt and click: 'Create Volume' > 'Create an encrypted container' > select 'Hidden VeraCrypt volume' > select the location where the container will be stored on your computer (it can be moved later) and give the container an (innocuous) name.

\*To encrypt an entire external hard drive such as a USB stick, select 'Create Volume' > Create a volume within a partition/drive'.\*

- The next screen is titled 'Encryption Options'. The default selections are fine. For the strongest encryption (encrypts multiple times): under 'Encryption Algorithm, select 'AES twoFish-Serpent', and under 'Hash Algorithm', select SHA-512.
- The next screen is titled 'Volume size'. Select the size of the container (this determines the maximum amount of data that can be put into it).
- Set the volume password on the next screen. Make a good one (see chapter 8) and Do. Not. Forget!
- The next screen is titled 'Outer Volume Format'. The program will now generate a random dataset to encrypt the volume. Randomly move your mouse around for a moment, before clicking 'Format'. The program will now create the volume. Depending on the size, chosen encryption algorithm and speed of your computer this will take a few seconds to hours (for very large volumes).
- The next screen is titled 'Outer Volume Contents' – read this carefully. You must now copy some sensitive looking files into this volume (i.e. copy-paste some files into the VeraCrypt container 'drive' which now appears in My Computer/Finder). Then click 'Next'.
- The next screen is titled 'Hidden Volume'. Read this, and click Next.

#### b. Create the hidden volume

Now the outer volume has been created, you will be guided through the creation of the hidden volume. This will take you through the same procedure as in the previous step, but for your hidden volume. You will go through the screens for 'Encryption Options', 'Hidden Volume Size' (the space availability is the size of the outer volume you created minus the size of the files you saved as your decoy in the outer volume), 'Hidden Volume Password' (this **must** be different to your outer volume password) and 'Format Options' (choose FAT).

**Importantly**, you must choose a different password for the hidden volume to that of the outer volume. It is with these two different passwords that you gain access either the outer or the hidden volume.

#### c. Put the files you want to encrypt into your hidden volume

Now the volume can be 'mounted' (i.e. activated). Select any slot or drive. Click 'Select File' > locate and select the volume you just made > click 'Mount'.

Now enter **either** the password for the outer or hidden volume, depending on which you would like to access (it should be the hidden volume), and click 'OK'.

**Note** that if you add more data to the outer volume, it may overwrite space/data in the hidden volume. Ideally, you will not change or add any more data to the outer volume after the creation of the hidden volume.

The VeraCrypt container for that volume will now appear on your system as a separate drive (much like a USB drive or external hard disk) and you can put files into it in the same way you would a USB drive (go to My Computer or Finder and click and drag files into the container).

Once you have put the desired files in the container, 'close' the container by clicking 'Dismount' in VeraCrypt. The container will now appear to be just a file on your computer.

## 2. Encrypting hard drives

### Mac and Linux systems

These systems have inbuilt options to encrypt the entire hard drive.

#### Linux/Ubuntu

You will notice in our guidance on Ubuntu installation (chapter 2), we instructed you to opt to 'encrypt the Ubuntu installation' and 'encrypt the home folder'. These options encrypt the entire hard drive and the home directory with separate passwords.

#### Mac

Go to System Preferences > Security and Privacy > FileVault > Turn on FileVault.

#### Windows

The most secure way to encrypt a hard drive on a Windows system is using VeraCrypt.

The method is much the same as those described above, except to begin the process: click 'Create Volume' > select **Create a volume within a partition/drive** > 'Standard VeraCrypt volume' > **Select the hard disk drive**.

## 3. Sharing data securely

Risks:

- Interception
- Intervention
- Destruction of source documents
- Identification of source
- Identification of journalist

InfoSec action:

- Exchange encrypted USB drives or hard drives (if you can meet in person)

- Exchange small volumes of data via encrypted attachments with encrypted emails
- Exchange large volumes of encrypted data via a file-sharing service

## Physical exchange

The safest way to share large volumes of data is to physically exchange a storage device (ideally a USB drive or hard disk) with the data on it in encrypted form.

The entire device can be encrypted, or several folders stored on the device can be encrypted with separate passwords so that access to them can be given in a controlled manner by the source (who can release passwords over time through secure channels such as encrypted email or OTR-chat – see chapters 5 and 6).

So, all you need to securely exchange data in person is encryption software (such as VeraCrypt) and a USB drive. You can currently buy USB drives with large storage capacity (256GB) for under £30.

## Digital exchange

If you cannot physically meet face-to-face with your source to collect the documents, you will need to exchange your documents securely online.

Small volumes of data can be shared as encrypted email attachments, if both of you are using encrypted email (see chapter 5).

Large volumes of data can be encrypted using VeraCrypt, for example, and given an innocuous file name that does not relate in any way to the nature of the data or specifics of the contents. You can then exchange this file via a recommended file-sharing service, and send the recipient a link to the online file and the password(s) to decrypt via a separate, secure channel.

Again, you need a secure system for this to be a safe option. If your hardware or operating system is insecure, the files you exchange and passwords you share may also be insecure – an adversary could potentially have remote access or even control of your computer. Ideally, you will exchange documents between secure systems and both using Tails. For top security, you will only access the documents on an air-gapped machine.

## Mega for filesharing

'Mega' (<https://mega.co.nz/>) is an alternative to popular file-sharing platforms such as Dropbox and Google Drive. Mega runs some encryption inside the browser before the file is uploaded to protect the user against low-level snooping and to legally protect Mega against accusations of facilitating copyright infringement (since they then cannot know the contents of the files being shared). While their encryption should not be considered 'government-proof' it does add a thin layer of protection against snooping on data as it is being transmitted over an open Wi-Fi connection in your chosen anonymous upload café/library. Like most providers of online file storage, Mega will provide 50 GB for every

unique email address you have. As with any other aspect of InfoSec, compartmentalisation of data over several accounts that are not relatable to each other is advisable.

## SecureDrop

Some journalistic organisations with considerable resources and IT capabilities have implemented their own systems to facilitate the secure sharing of files – notably, SecureDrop. SecureDrop is an open source whistleblower submission system, and it is great news that organisations are using it. However, setting up such systems properly and keeping them secure is not a trivial matter and should not be done without involving specialists with extensive experience and a proven track record. It is not a realistic solution for an independent journalist.

For questions on these matters, contact your organisation's I.T. service provider who may be able to help (but ask them if they have done something like this before, and if not, seek help elsewhere). The CIJ may be able to provide some experienced contacts to get started.

## OnionShare

<https://onionshare.org>

OnionShare is an open source tool that lets you securely and anonymously (over the Tor network) share a file of any size. It offers a secure method of file-sharing because it allows users to share files directly from computer to computer, across Tor connections, without uploading files to any third party's server. Instead, the sender's computer becomes the server for the purpose of the transfer.

OnionShare is easy to install and use on Windows, Mac, Ubuntu and Tails. Installation on Ubuntu does require minimal use of the command line. You can download OnionShare and find installation instructions here: <https://onionshare.org>

To send files using OnionShare, you must have the Tor browser running in the background. You must also use the Tor browser to download files shared via OnionShare.

The sender chooses the files they wish to share, and OnionShare makes the files available for download via a URL, accessible via the Tor browser. As the recipient downloads the file, the sender can see the download progress and completion.

If you are concerned about focused surveillance and attempts to intercept your shared files, you should be careful to share the URL with your contact securely (for example, over encrypted OTR chat or encrypted email) and anonymously (for example, using new anonymous throwaway email accounts created on the Tor browser).

When the download is complete, or when the sender closes OnionShare, the files are completely removed from the internet (unless you untick 'Stop sharing automatically' in OnionShare, which enables the files to be downloaded multiple times).

Further instructions for use can be found here: <https://github.com/micahflee/onionshare>

## 4. Securely deleting files

On most systems, deleting a file does not actually remove the data from the computer's hard disk (or the USB drive, if that is where it is located). The file still exists but the space it occupies is simply labeled as 'no longer in use', and will eventually be re-used and displaced by other files. However, until then, the 'deleted' files can still be retrieved with the correct forensic tools and expertise.

To securely delete files, you can use specific tools that overwrite files with random data several times. This method is very secure, but may take a significant amount of time for large data volumes (e.g. several hours for multi Gigabyte USB drives).

### ***Windows, Linux/Ubuntu***

On Linux and Windows systems BleachBit (<http://bleachbit.sourceforge.net/>) is the premier open source erasure tool that is considered highly trustworthy.

### ***Tails***

The Tails system has a secure erase feature that can be easily accessed by right clicking on a file and selecting 'Wipe'. You can securely delete all 'free' space in a folder by right-clicking on the folder space and selecting 'Wipe available disk space'.

### ***Mac***

❖ Securely deleting individual files:

The new OS X, 'El Capitan', no longer features the 'Secure Empty Trash' function due to concerns that secure erasure could not be guaranteed. Therefore, there is now no easy way to securely delete individual files on a Mac, so it is all the more important that you encrypt the hard drive, only allowing access to it with your password.

❖ Securely wiping a USB drive (or any external hard drive):

Insert the USB drive. Launch 'Disk Utility' > select the drive you wish to erase (see menu on the left) > select 'Erase' tab. Select 'Security Options' and set the slider to 'Most Secure'\* > 'OK' > "Erase".

### ***Physical erasure***

If an entire disk needs to be wiped there is also the option of physical destruction of the storage device. To be certain that no data can be retrieved afterwards the device needs to be ground up into very small parts no bigger than 1mm. Do not assume that specialised forensic techniques can be defeated by simply breaking a disk with a hammer or immersing the device in water. While this will almost certainly break the functioning of the device, data may still be retrieved if the adversary has the means and time to use advanced methods of data recovery.

## ***Opt for USB drives***

Since storing data on the internal disk of a laptop exposes the data to additional risks and possibly makes it harder to securely erase, storing sensitive material on an external storage medium such as a USB drive or external hard disk (for large volumes) is strongly recommended. Encryption of such devices or the files on them is also important to protect against loss or theft by adversaries.

## ***Metadata***

Metadata is data about data. Metadata could include the author of a Microsoft Word document, or the GPS co-ordinates of where a photo was taken. Audio, video, and PDF files also hold metadata and hidden data (such as comment or tracking history, file names, etc.). Most colour laser printers print their type and serial number in tiny invisible dots on every square centimetre of paper - so those pieces of paper are traceable if the serial number of the printer is in any way connected to you (e.g. if you ordered the printer online).

Each program used may have specific metadata settings, so you should do some research online (or consult an expert) on whatever program and file you plan to use to be aware of what information is being stored, how you can remove it and how to make sure this information is harmless.

## ***LibreOffice***

LibreOffice is a free, open source office suite. <https://www.libreoffice.org/>

In LibreOffice, user data can be viewed and cleared by going to:

File > Properties > General tab

- Click 'Reset' to reset general user data (e.g. total editing time, revision number)
- Uncheck 'Apply user data'

Then check the 'Description' and 'Custom Properties' tabs and clear any data you don't want disseminated. Under the 'Security' tab, uncheck 'Record changes' if not already clear.

Under Edit > Changes > Accept or Reject: you can clear these if the recipient doesn't need them.

If you use the Versions feature, go to File > Versions and delete any older versions of the document that may be stored there.

(Just for Writer) View > Hidden Paragraphs, check that all hidden paragraphs are visible.

(Just for Calc) Format > Sheet, check that there aren't any hidden sheets.



## Chapter 5: Email

Email is very likely the means by which you most frequently contact colleagues and sources. Vitality, it is the means by which a new source could contact you. Therefore, having secure email, not only for everyday use with colleagues but as a secure channel for initial contact, is important for any investigative journalist.

The risks to your email communications include an adversary doing any of the following:

- Reading email content
- Reading subject header
- Seeing who you are contacting, how often and when
- Intercepting email attachments
- “Man in the middle” attacks (an impersonator intercepting communications)
- Seeing where you are emailing from (location)

InfoSec action:

- Use strong passwords
- Use a trustworthy email provider
- Encrypt your email
- Verify your keys
- Put minimal information in your email subjects
- Email from Tails (if/when you need to)
- Use anonymous email addresses for select purposes

The risks

For protection against most non-state level actors, using a very strong password is a good defence against unauthorised access to your email account. However, for state level actors, it may be no defence at all.

An email provider that is ‘trustworthy’ is one who has a good basic security infrastructure, and who won’t hand over your data to an intelligence agency in a hurry. If you do not trust the country where the email provider is based, it is best not to use an email address there. For example, we know that the default position of the US and UK intelligence agencies is to record and store as many email communications as possible. Even if you don’t feel your email communications to be of relevance to these agencies now, they will be retroactively accessible should you and/or your work become relevant in the future. So, if you don’t trust the US approach to email privacy, be aware that the email providers based there (Outlook, Gmail, Riseup, etc....) may be subject to that approach.

Some email providers are thought to be more co-operative than others, but unless you run your own server (or the organisation you work for runs their own server in a country with good privacy laws, like Switzerland or Iceland), we should assume that your emails and email metadata are not secure with *any* email provider. Other considerations are whether you have to hand over your mobile phone number, a postcode/address, or another of your email addresses in order to register an account with a provider, as you may want to avoid

donating that information in future (and especially if/when you use an anonymous email address).

## 1. Email metadata

Metadata is data about data. Email metadata includes both the sender's and recipient's names, emails and IP addresses, server transfer information, date, time and time zone, unique identifier of email and related emails, content type and encoding, mail client login records with IP address, priority and categories, subject of email, status of the email, and any read receipt request.

This information is extensive and revealing alone, but many intelligence and law enforcement agencies (and in some cases, individual hackers) are also able to retrieve the full email content.

You can't easily protect the metadata of your emails, so you should be minimalistic or obfuscatory in your subject line, and you may wish to hide your real location/IP address by using the Tor browser.

*Example: US government authorities requested access to the metadata of an unnamed user of Lavabit, a secure email provider, as well as the company's private encryption keys (allowing access to user's passwords) in the summer of 2013. Presumably, they asked for this because they were unable to covertly gain access themselves. The attempted breach was thought to be because NSA whistleblower Edward Snowden had an email account with Lavabit. The founder of Lavabit was legally restricted from discussing the exact requests of the US government – as is anyone approached in this way (which makes evaluating the security of our email providers all the more difficult). Rather than allow a breach of users' privacy, the founder suspended Lavabit altogether, in August 2013.*

## 2. Email encryption

However, you can protect the privacy of your email content by using 'public key cryptography'. Public key cryptography scrambles the content of your email into (thus far) unbreakable code using the recipient's 'public key'. The encrypted email can then only be decrypted using the intended recipient's 'private key'.

The following instructions recommend the GNU Privacy Guard, 'GPG' (an open source implementation of Pretty Good Privacy, or PGP).

Using GPG, whilst very different to normal emailing, is not difficult and you will get used to it very quickly. Understanding exactly how it works, however, is slightly more challenging.

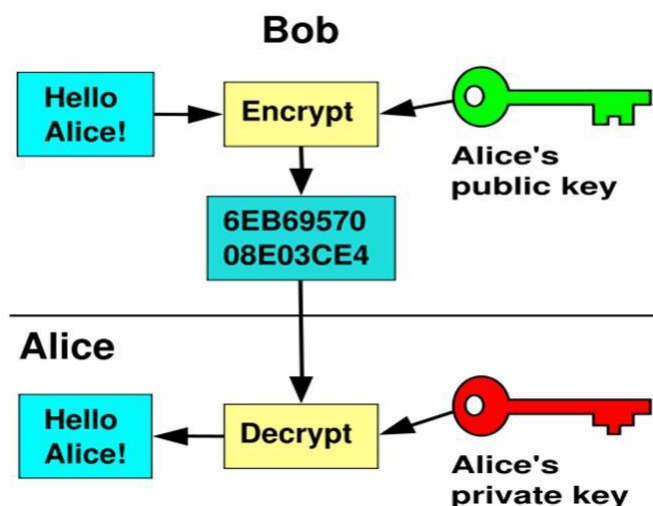
### **Key pairs**

Keys are essentially unique long sets of numbers, and each user of email encryption has a key pair – a public key, and a private key.

**Your public key:** Your public key is what people will use to encrypt emails that they send to you. Like listing a phone number in the phone book, you can choose whether to list your public key on the public keyserver or not (if it is a secret or anonymous email account, you may not wish to upload the key to the keyserver). If you choose to list your public key on the keyserver, it will be openly available so that anyone can contact you securely.

**Your private key:** Your private key allows you to decrypt emails from others who have contacted you using your public key. Although your public key is then freely available, the private key in the key pair is exactly that – private! A private key corresponds to your public key, ensuring that no one else can have unauthorised use of your public key. You will probably never even see your private key – it lives and works under the bonnet of your GPG software

The length, randomness, and sophistication of strong public key cryptography (4096 bit keys, as per our instructions below) are such that the encryption remains, as far as we know, unbreakable.



### Verifying keys

Importantly, you should always verify that the keys of the people who you send encrypted mail to really do belong to your intended recipient. Although the email address belongs to the person you want to contact, there is a small chance (at high-risk levels) that their purported public key might not. This is known as a 'Man-In-The-Middle' (MITM) attack – the covert interception of communications by the impersonation of a target. You need to make sure that both the email address *and* the public key definitely belong to the individual concerned. See 'verifying keys' later in this chapter.

### 3. Protecting your identity and location when emailing

At higher risk levels, for those who wish to hide the real identities of themselves and/or others communicating, anonymous email accounts should be used, unassociated with any other aspect of your online identity - they should not be connected with you in any way. Gmail and Hotmail tend to request a phone or alternate email address, so these providers

are not ideal for anonymous accounts. In many countries, GMX and Yandex, allow users to create accounts without such identifying information.

However, if you create an anonymous email address from an internet connection that is associated with you, your anonymity may already be compromised. Furthermore, when you send and receive emails, you are doing so by connecting to the internet – thus your location is known by the internet provider (and potentially, an adversary). If you want your identity *and* location to be anonymous, you can use an anonymous account to send unencrypted emails through webmail on the Tor browser (see chapter 3); or you can use the Tails operating system, which hides the real location of *all* of your laptop's communications with the internet (see chapter 2). Tails' desktop email client (which supports encryption) sends and receives information/mail to and from the internet through Tor, thus hiding the real location of the connection.

You might only want to protect your location in the field rather than identity per se. For this, using the Tails operating system is the only answer.

#### **4. Basic notes about email encryption**

Note that email encryption does not hide metadata such as who you are talking to, the email subject, or your location (though, as discussed, you can hide your real location by using Tor/Tails). For people at all risk levels, it is a good idea to be minimalistic or obfuscatory in your subject line.

You can't encrypt or decrypt email from your smart phone. Whilst it is possible to set up on some Android phones, it is highly inadvisable because mobile phones are fundamentally insecure anyway (see chapter 7).

Neither can you encrypt or decrypt mail in your web browser (unless you are using the Tails operating system) – you will use the Thunderbird email client on your desktop, with the added encryption software, to encrypt and decrypt mail.

Finally, you can only send encrypted emails to other people who also use encrypted email. This used to be a rather small community of people but in a post-Snowden world, it is growing exponentially.

#### **5. Installation instructions for encrypted email**

##### ***Download email client and encryption software***

##### **Ubuntu/Linux**

For Ubuntu/Linux, use Thunderbird as email client and GPG encryption software. Ubuntu comes pre-loaded with Thunderbird (email client) and GPG encryption software. Use the Ubuntu search tool on the top left hand of the desktop to find it.

## Mac

Download Thunderbird email client and GPG encryption software. You will need to download:

- An **email client**/mail manager for your desktop - we recommend Mozilla's open source 'Thunderbird' - o <http://www.mozilla.org/en-US/thunderbird/>
  - **GPG** – Gnu Privacy Guard, which is encryption software
    - o <https://gpgtools.org/> The first pink download box, 'Download GPG suite' will be the latest version – click on it to download. Click on the download when complete, and follow the wizard to install.

When the downloads are complete, open Thunderbird from your Downloads and drag the Thunderbird icon into the Applications folder.

## Windows

You will need to download:

- An **email client**/mail manager for your desktop - we recommend Mozilla's open source 'Thunderbird' <http://www.mozilla.org/en-US/thunderbird/>
- **GPG** – Gnu Privacy Guard, which is encryption software <http://www.gpg4win.org/download.html> . The first green download box will be the latest version of GPG – click on it to download. Click on the download when complete, and follow the install wizard to install.

### ***Installation in Ubuntu/Linux, Mac and Windows***

On Windows, click on your Thunderbird Setup download. Thunderbird will offer you a brief Setup Wizard – select the standard install, confirm the program file location, and click next to complete and finish the install.

Open Thunderbird. If you are opening Thunderbird for the first time, it may prompt 'Integration' - skip this, and uncheck 'Always perform this check when starting Thunderbird'.

Thunderbird will now prompt you to configure your email account, and offer you a new email address. Click 'Skip this and use my existing email'. Enter the email address you would like to use for encryption and the password. You should decide whether you select 'Remember password' or not. It may be safer if you don't allow your laptop to remember your password, but you will then need to enter the password every time you access the account on Thunderbird. Click 'Continue'. You should see, 'Configuration found in Mozilla ISP database'.

*Note – if you are using an anonymous email address, obviously, do not enter your real name!*

## Troubleshooting

If you receive the error message, 'Configuration cannot be verified', it may be because your email provider uses two-factor verification (e.g. lots of Gmail accounts use '2-step' verification). In this case, your mail provider may email you, or present a web browser, with a notification of an attempted login via a mail client, and ask for your authentication. Alternatively, some Gmail users who use 2-step verification may need obtain an 'application-specific password' – you can do this on the 'authorizing applications and sites' page on your Google Account settings. For more information, visit:

<https://support.google.com/mail/answer/1173270?hl=en>

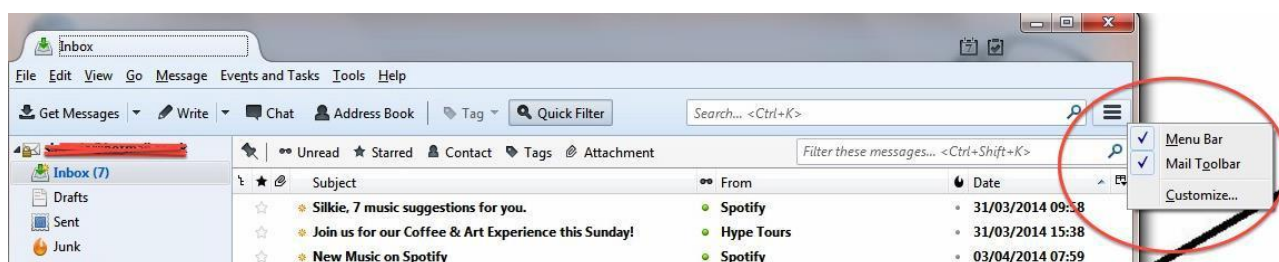
You now have the option to choose between IMAP or POP3. Choose IMAP if you use webmail, and click 'Done'.

Expert info: Unlike POP, IMAP offers two-way communication between your online email account and your desktop email client – so any changes you make in your email client are communicated back to your online account (e.g. if you mark an email as 'read' on Thunderbird, with IMAP, it will appear as 'read' on your webmail too).

### **Enigmail security extension**

At the top of the Thunderbird window, click on Tools > Add-ons > Extensions. If you see 'Enigmail', you already have Enigmail. If not, go to the search bar in the upper right of the window, and search for 'Enigmail'. Click 'Install', and restart Thunderbird. When Thunderbird restarts, you can close the 'Add-ons Manager' tab.

Note: if you do not have a menu bar at the top of the Thunderbird window, right-click on the 3-line menu icon on the top right hand side of the Thunderbird window and tick 'Menu bar'.



### **Key pairs**

At the top of the Thunderbird window, click on Enigmail > Key Management. Back up to the top toolbar, click > Generate > New key pair

- The email address you wish to use for encrypted mail should be selected
- Tick 'Use generated key for the selected identity'. Select key to expire in 5 years

- Enter a passphrase (this is the passphrase for your encrypted mail – not just your online mail account – it should be very strong)
- The 'Comment' box adds a public comment to your public key if you list it on the keyserver (so don't use this for a password hint!)
- Under 'Key expiry', the Key should expire in 5 years
- Click the 'Advanced' tab, and select the maximum key size of 4096, and

### Key type 'RSA'

- Click 'Generate key' and move your mouse around the screen whilst it generates your key (this aids the 'randomness pool' from which the key is configured). This may take a few minutes.
- A box will appear informing you that the key generation is completed.

Click 'Generate Certificate' in this box (this creates a revocation certificate that you will need when you wish to invalidate your key, for example, if the key pair is lost or compromised). Save the revocation certificate somewhere safe. You will now be asked to enter your passphrase in order to complete this action.

### **Configuring Thunderbird**

Go back into Thunderbird to change some settings.

### Expert settings

Enigmail > Preferences > Display Expert Settings

- Basic > Passphrase settings: here you should select how long you want Thunderbird to remember your key pair passphrase for
- Sending: Select 'Manual encryption settings' and tick
  - 'Encrypt/sign replies to encrypted/signed messages'
  - 'If possible', under 'Automatically send encrypted'
  - 'All usable keys', under 'To send encrypted, accept'; or tick 'Only trusted keys' if you are able to carefully check contacts' keys and set trust levels from the beginning of your encrypted communications with them. 'Always', under 'Confirm before sending'

N.B. this is a very useful tool that tells you every time you send an email whether the email is signed and encrypted so you are much less likely to accidentally send an unencrypted email
- Key Selection: Tick 'By Per-Recipient Rules', 'By Email Addresses according to Key Manager', and 'Manually if Keys are Missing'
- Advanced: we recommended that you tick 'Re-wrap signed HTML text before sending' as HTML text does not work well with encrypted emails.

Click 'OK'.

### **Saving folders locally**

This is particularly useful for saving drafts – you don't want your draft, unencrypted emails being saved on your online mail folders. Rather, you should save them locally on your hard disk to have more control over their security.

In the menu bar on the left hand side of the Thunderbird window, you will see all your email folders. At the bottom, are 'Local Folders' – right click and select 'New Folder'. Creating 'Sent' and 'Draft' local folders may be helpful.

Click Edit (Linux) or Tools (Mac/Windows) > Account Settings > Copies & Folders. You can select where to store your messages here. For example, under 'Drafts and Templates', select 'Local Folders' as the location to keep your message drafts.

In the same window [Edit (Linux) or Tools (Mac/Windows) > Account Settings] click OpenPGP Security > tick 'Encrypt draft messages on saving'.

### ***Email in plain text***

HTML does not encrypt well, so you will write messages in plain text instead.

Edit (Linux) or Tools (Mac/Windows) > Account Settings > Composition & Addressing. Untick 'Compose messages in HTML format'

### ***Share your PGP signature with contacts***

You should always sign encrypted messages to help the recipient verify that you are the real sender. Sharing your PGP signature with the people you email, even when the email is not encrypted, also helps the recipient (if they also use Enigmail) verify that you are the real sender of the message (not an impersonator). If the recipient does not use PGP encryption, signing unencrypted mail indicates that you usually use PGP encryption – or to the uninformed, it may be mildly confusing!

Edit (Linux) or Tools (Mac/Windows) > Account Settings > OpenPGP Security 'Enable OpenPGP support (Enigmail) for this identity' should be ticked.

Tick 'sign encrypted messages by default'. If you wish, you may select 'Sign non-encrypted messages by default' – when you sign a message, whether encrypted or not, it helps the recipient (if they also use Enigmail) verify that you are the real sender of the message (not an impersonator). Click 'OK'.

### ***Publicly list your public key***

*Uploading your public key to the keyserver is like listing your phone number in a phonebook. It allows people to search for your name/email address, and locate your public key in order to send you an encrypted email. This is very useful for journalists who invite encrypted mail and wish to protect source confidentiality. However, if you are setting up encryption for an anonymous email address that you will use only to communicate with specific, high risk individuals, of course there is little to gain from uploading your public key to the keyserver.*



## Enigmail > Key management

Tick 'Display All Keys by Default'. Right click your email address, and select 'Upload Public Keys to Keyserver' if you want people to be able to contact you. The default keyserver (pool.sks-keyservers.net) is fine.

### To search for anyone's public key

Search for a name/email address to see if a person has a public key listed, so you can send them encrypted mail (like searching for a number in a phonebook).

Enigmail > Key management > Keyserver (in the top toolbar) > Search for keys. Enter the person's name or email address and browse the results. Tick the email address of anyone whose key you'd like to import and press ok.

### Import a key

If you already have your contact's key on a file or online, but need to import it to your key manager on Thunderbird.

Importing a key from file: In Thunderbird, go to Enigmail > Key management. Now go back up to the top toolbar to click on File > Import keys from file.

Importing a key from email: If your contact has attached their public key in an email, right-click on the .asc attachment and click 'Import OpenPGP Key'. The attachment may look like:



Importing a key from a public key block: Many people have their full public key 'block' (i.e. the full public key in text) on their website. This allows people to trust the website as the source of the key rather than the keyserver, and may help prevent man-in-the-middle attacks. Simply copy the whole key block (the entire block, as shown highlighted in yellow below), then in Thunderbird go to Enigmail > Key management > (back up the top toolbar) Edit > Import keys from clipboard > click 'Import' in the confirmation box.

```
-----BEGIN PGP PUBLIC KEY BLOCK-----[i] Version: GnuPG v1.4.11 (GNU/Linux)
```

```
mQINBFOypIgBEADEXjFLXnFDraRWa6YzzdnOSgKJKOzDSaonyQvh251QGVOIwbg2
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```

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ToHfdTNDZT4SVjhFzoBVslNIbXzF1rgDGgBax2aR856hHfx4GERROSZZVBvPtjqy  
5TrFSI9NsdNwmetMh8rxb+dz+fJYEE5yrNs9MJPHVgeVgj0U JLawhlCGME+/lPFJ  
Cr8XhDwzI2n6gFvwtWQ1NNMqdn1UiF+Y<sup>L</sup><sub>SEP</sub> =3DCe -----

END PGP PUBLIC KEY BLOCK-----

## Verifying keys

Make sure that the person you think you are communicating with is certainly who they say they are

In Thunderbird, go to Enigmail > Key management > right-click a selected email address > Key Properties. Here you will see the person's key ID and fingerprint.

You can verify that the key does indeed belong to the person by exchanging fingerprints by another communication means (in person, on the phone, on their business card/website), and checking they match exactly. In the same window you can then click Select Action > Set Owner Trust > and select how much you trust that the key does in fact belong to the individual concerned.

### ***Add a regular email signature***

With your name, job title, website, email address/es, PGP fingerprint, etc...

Edit (Linux) or Tools (Mac/Windows) > Account Settings Here you can enter signature text to attach to your emails.

Edit (Linux) or Tools (Mac/Windows) > Account Settings > Composition & Addressing

Select 'Include signature for replies'

### ***Receiving new mail***

You can decide how frequently the mail client searches for new messages.

Edit (Linux) or Tools (Mac/Windows) > Account Settings > Server settings

### ***Send an encrypted email!***

When you have completed the set up, send a test email to someone else who has encrypted mail. Import their key or find it on the keyserver, and be sure to verify it and sign your trust of their key before you try to send an email (otherwise the email client might not actually let you send them encrypted mail – Thunderbird will encourage good InfoSec in this way!).

Choose a recipient whose key you have already imported, verified, and set owner trust for. Write your email, and before you click 'Send', either click on the padlock icon to close it and encrypt the message, or go to 'Enigmail' within the email compose window and click on 'Encryption Off' to turn the encryption on. Press 'Send', and the confirmation box should tell you that the email is both signed and encrypted (if not, go back and check you ticked to encrypt). Click 'Send Message', and your encrypted email will be sent!

Now that you have sent this person an encrypted email, a default setting should be created whereby all future emails to this contact will automatically encrypt.

### ***Share your public key with an individual***

The first time you send a contact an encrypted email, you should attach your public key so that they can respond by encrypting an email back to your key. In the email compose window, to the right of the encryption padlock and signing pencil icons, there is an option to 'Attach My Public Key'. Select this to attach your public key to the email. Alternatively, click 'Enigmail' > 'Attach My Public Key'.

### ***Sending/receiving attachments***

You can encrypt and decrypt attachments to your emails with GPG too

When sending a file as an attachment to an encrypted email, you can choose whether or not to encrypt the attachment too. Write the email, attach a file as normal, and click 'Send'. Before the email sends, you will be given four options. The first option is to just encrypt the message but not the attachments. The second is to encrypt the message, and to also individually encrypt attachments. Opt for the second choice ('Encrypt and sign each attachment separately and send the message using inline PGP'), and click OK. Then your confirmation box will pop up as usual, telling you the message and attachments are signed and encrypted – click 'Send Message' to confirm, and the email and attachment will be sent.

When someone sends you an encrypted email attachment, right click the attachment and click 'Decrypt and Save As'. Save it in your chosen location, and then go to that location to find/open the attachment.

Of course, if you are mailing an attachment that has already been encrypted by other means (e.g. VeraCrypt), you don't need to encrypt it again using GPG.

### ***Add a new account***

You may wish to add another email account to Thunderbird, whether you intend on using encryption on that account or not.

In Thunderbird go to Tools (or 'Edit' on Linux) > Account Settings > Account Actions > Add mail account.

## Chapter 6: Instant Messaging

Instant messaging is a great way to start and maintain conversations with a source. It is very quick and easy to set up encrypted, 'off-the-record' (OTR) instant messengers (IM) – especially compared to setting up encrypted mail. Using an OTR IM, you can discuss necessary security protocols before you continue conversing, meeting, emailing, sharing documents/information, and so on. It is also a useful tool for talking to colleagues if you are collaborating remotely on a project. However, we strongly recommend not using smartphones for chatting from risk level medium and up because their safety can never be guaranteed.

Off-the-record instant messaging allows you to have private conversations that are not only encrypted, but that are not stored, and therefore 'deniable'. That is to say, it is plausible that a chat purportedly including a chat account associated with you, is not actually you.

Expert info: Like encrypted emailing, OTR IM uses public keys that are used to verify a contact really is who they purport to be. However, every time you begin a new chat with a contact (who has been verified by their public key), the chat is encrypted using new, throwaway keys. Don't worry – you don't have to do or even see this yourself – this is under-the-bonnet encryption that the messenger client does it for you.

### 1. Pidgin and Adium

If you are using Linux or Windows, we recommend that you use an IM client called Pidgin, with an OTR plug-in. If you are using Mac, we recommend an IM client called Adium.

Users of Pidgin and Adium can communicate easily with one another. However, in the current versions, the verification methods for the two messenger clients are different. See 'Verifying contacts'.



#### ***Pidgin instructions for Linux (Ubuntu)/Windows***

1. **Download Pidgin and OTR plug-in** Pidgin and OTR are often included software in Linux distributions, so simply search in your Ubuntu (or other Linux distribution) Software Centre.

Download and install Pidgin at [www.pidgin.im](http://www.pidgin.im) (Windows); if you're on Ubuntu, you will be directed from that page to the Pidgin PPA package, so download that.

For Windows, then download the OTR plug in from <https://otr.cypherpunks.ca>. On Ubuntu, go to the Ubuntu Software Centre, search for Pidgin OTR, and install the 'Pidgin Internet Messenger

Off-the-record Plug-in'.

## 2. Configure Pidgin

Open Pidgin. If this is the first time you are opening Pidgin, you will not have an account configured and will be prompted to 'Add an account'. Click 'Add' (if you are not prompted, you can find this at Accounts > Manage Accounts > Add).

- First, you may wish to configure Pidgin to only connect your IM account via Tor, thus shielding your real location – particularly useful if you want to use the account anonymously. Under the 'Proxy' tab, tick 'Connect using proxy' and choose 'SOCKS5' from the dropdown list. In the Server field type '127.0.0.1' and in the Port field type '9150'.

The username and password fields are optional, but if you use them Tor will use different circuits for this account in Pidgin than it will for everything else, increasing your anonymity. Note that you will now need to have the Tor browser open (see chapter 3) in the background when you wish to connect with this account.

- In the 'Basic' tab, select XMPP/Jabber (NOT Facebook XMPP) under 'Protocol' and choose an (anonymous) username. Under domain, type your selected domain (for example, jabber.ccc.de) – see a full list of domain options here : <https://list.jabber.at>. In the 'Resource' field, type 'anonymous'. Make a strong password
  - Click on the 'Advanced' tab and for 'Connection security', ensure 'Require encryption' is selected
  - Click back on the 'Basic' tab and be sure to tick 'Create this new account on the server' (bottom of the window) before you click 'Add'
3. **Create an IM account** Your Jabber address should appear in an 'Accounts' window. Tick the 'Enabled' box and then click 'register' in the 'Register New XMPP Account' window that appears.

## 4. Configure OTR

In Pidgin, go to Tools > Plug-ins > tick 'Off-the-record messaging'. Then click 'Configure plug-in'. Tick all the default OTR settings: Enable private messaging; Automatically initiate private messaging; Require private messaging, and Don't log OTR conversations. Now click 'generate' to generate a key for your account.

Go to Tools > Preferences > Logging, and untick all logging options.

Congratulations! You can now enjoy off-the-record, encrypted chat.

### ***Adium instructions for Mac***

#### 1. Download Adium

Download and install 'Adium' for Mac – <https://adium.im/>

#### 2. Create and configure an IM account.

Once downloaded, open Adium and go to (at the top) 'File' > 'Add account' > 'XMPP'.

- First, you may wish to configure Adium to only connect your IM account via Tor, thus shielding your real location – particularly useful if you want to use the account anonymously. Under the 'Proxy' tab, tick 'Connect using proxy' and choose 'SOCKS5' from the dropdown list. In the Server field type '127.0.0.1' and in the Port field type '9150'. The username and password fields are optional, but if you use them Tor will use different circuits for this account in Adium than it will for everything else, increasing your anonymity. Note that you will now need to have the Tor browser open (see chapter 3) in the background when you wish to connect with this account.
- In the 'Account' tab choose an (anonymous) name and add a domain at the end of it for your Jabber ID (for example, @jabber.ccc.de is popular – see a full list of options here <https://list.jabber.at>). A full Jabber ID may be, for example, [kissinger@jabber.ccc.de](mailto:kissinger@jabber.ccc.de). Under 'password', choose a strong password. Do not 'register account' yet.
- In the 'Options' tab tick 'Require SSL/TLS' and tick 'Do strict certificate checks'. Under 'Resource', type 'anonymous'.
- In the 'Privacy' tab and in the 'encryption' drop down menu click on 'Force encryption and refuse plain text' (last one on the list)
- Go back to the Account tab and click 'register account'. A new window appears: in 'server', type the domain you previously selected (e.g. 'jabber.ccc.de' if you went for that) then click 'Request new account'. In a moment, your account should be successfully created.

### 3. Configure Adium

Go to Adium > Preferences > General > untick 'Log messages'

## 2. Getting started with OTR chat

### *Add a contact*

Pidgin: In Pidgin, go to Buddies > Add a buddy and type in their full address before clicking 'Add'. When your contact is next online, they will receive an authorisation request from you.

To start a conversation with an online contact, double click on a buddy/contact in your list, and click OTR > 'start private conversation' in the chat window.

Adium: In Adium, go to Contact in the top toolbar > Add contact. Under 'Contact type', assuming your contact is also using Jabber, select XMPP/Jabber, enter their full address in 'Jabber ID', and click 'Add'.

### *Authenticating/verifying a contact*

Ideally, you will use fingerprint verification and if you know the person well enough, you will also ask a question of each other, that only the other person would know the answer to.

Pidgin: If you have not yet authenticated your contact, double click on their address to open a chat window with them, go to OTR in the chat window and click 'Authenticate buddy'. You can authenticate either by

- A question and answer - A good, personalised method

- A shared secret - Has to be pre-arranged via a different communication method
- Manual fingerprint verification. – A useful and strong method, - The only method by which Adium and Pidgin users can authenticate one another

In that window, select 'Manual fingerprint verification' as the method, and you will then see your contact's purported fingerprint. Check the fingerprint – if it is ok, select 'I have verified that this is in fact the correct fingerprint, and click 'Authenticate'.

Adium: If you have not yet authenticated your contact, double click on their address to open a chat window with them (even if they appear to be offline – they will appear offline and 'not authorised' until you verify them). Click the lock icon and select 'Initiate Encrypted OTR chat'. The lock should close. With the chat window still open, go to the top toolbar in Adium, click Contact > Encryption > Verify. You will then see your contact's purported fingerprint.

### Checking fingerprints

You should ideally check one another's fingerprints by a communication method other than IM (email, phone). If there is not a secure means by which to do this, a mutual friend/third party on IM can pass on a partly redacted version of your fingerprint to the contact (e.g. 0---A7-0 D—706-D 2—65--1 --3D-9C2 0-57B—1), and the contact's fingerprint to you, for you both to check alongside the purported fingerprint shown. Redacting parts of your fingerprint may help prevent a 'man-in-the-middle' impersonation attack.

### Finding your own fingerprint

Adium users can find their own fingerprint in Adium > Preferences > Advanced (horizontal tab) > Encryption (tab on the left hand side column).

Pidgin users can find their own fingerprint by opening a chat window with a contact, clicking the small buddy icon (right of 'OTR') > Re/Authenticate buddy > Manual fingerprint verification.

*Please note: do not allow Adium or Pidgin to automatically remember your Jabber password, as it may not be saved securely.*



## Chapter 7: Phones and Voice/Video Calling Over Internet

### 1. Mobile security

Many of us find our smart phones to be of great importance and value in our everyday lives and work. The benefits of being constantly connected to our email accounts, web browsers, social media, calendars, and also having easy access to a high quality camera and voice recorder, do indeed make them valuable tools. However, they are not feasibly securable tools.

An alternative is to use burner phones, with diligence and caution – but even this has its risks.

Phone risks:

- Automatic logging of your current/past locations
- Automatic collection of metadata, i.e. the phone number and location of every caller; unique serial numbers of phones involved; time and duration of call; telephone calling card numbers
- Theft and loss of data
- Remotely accessing data when phone connects to public Wi-Fi
- Remotely accessing all data at any point the phone is on
- Phone/voicemail tapping, intercepting, or recording
- Covert remote automation of microphone to record audio
- Covert remote automation of camera to capture images

### ***Dragnet phone surveillance***

All phones leak an enormous amount of information about us to intelligence agencies, and we know from the Snowden revelations that programs collecting the full audio of every single call within a nation are, at the very least, already being trialled in some countries. This type of surveillance is extremely dangerous for democracy, let alone journalism, and may permit the most invasive 'retroactive' investigation of individuals who become of interest to intelligence agencies at some point in the future.

Therefore, it is worth using any phone with this in mind, whether you, your sources or colleagues may be targets of intelligence agencies now, or years in the future. They are not secure communication devices, so consider carefully how you want to use them.

### ***Targeted phone surveillance***

#### **Low risk**

At a low risk level, the threat is mainly physical – someone gaining access to the handset. If this happens, even a fairly unsophisticated hacker/the police can normally crack your password (if you use a password lock) so this only provides minimal protection. If you are at

a low risk level, be sure to back up your data and stream or send any video or audio being recorded on the device to a secure storage cloud as soon as possible.

You can also use applications to track your device, should it be stolen. For iPhone, for instance, Apple offer a free app called 'Find my iPhone' which tells you the current location of your phone. Another free anti-theft app is 'Prey' which, once you report the phone as stolen, will record not only the current location of the phone, but any other locations of the phone registered since you reported it stolen.

## Medium risk

At a medium risk level, you may encounter an adversary trying to gain access to your data, not just physically, but remotely. When you connect a phone to a public Wi-Fi connection, for example, a fairly unsophisticated hacker can intercept lots of information about you and connected accounts such as email and social media. Therefore, at a medium risk level, you may already be thinking about avoiding a smart phone as a work tool, or at least guarding it closely, closing applications after use, turning off Wi-Fi in public, and using flight mode when you don't need to be connected.

*A note about smart phones: the vulnerabilities of smart phones are numerous, with some existing in the hardware, and they are not fixable. You can use open source software on smart phones, and even applications for encrypted chat (e.g. Signal). However, as we discovered in 'Protecting the System', when hardware is vulnerable, the software cannot provide you with real security. Therefore, we will not discuss such apps for the purpose of this guide.*

As the recent phone hacking scandal in the UK demonstrated, unsophisticated hackers working for unethical journalists were able to listen in on people's voicemail. Private investigators often also have the ability to 'phone tap' (i.e. eavesdrop) not only voicemail but general phone calls made and received by a number. Therefore, you should think before you discuss anything sensitive on your (mobile or indeed landline) phone.

## High risk

At a high risk level, a phone basically *is* your adversary. At the very least, it logs your location, and all associated metadata with the device is in the hands of a Five Eyes intelligence agency. At worst, it can be exploited to covertly collect the content of all of your phone calls, let alone all other data on the phone, and to covertly automate your microphone and camera to record audio and images (if it has a camera) too. This type of phone surveillance is very easy and basically comes at zero-cost to Five Eyes intelligence agencies.

## Burner phones

An alternative way of using phone communications is to use burner phones.

Ideally, your burner phone and regular phone will never both be emitting signals, since (if you are a target), your regular phone may pick up on the signal of the burner phone, making that a target too.

Before you use a burner, make sure the phone usually associated with you (e.g. your smart phone) is not emitting signals. Switching the phone to flight mode, removing the battery (don't bother trying to do this to the iPhone), and turning it off is good but is not enough. Do all of these things and then put it in a Faraday cage – popular solutions are biscuit tins, some fridges, or even a stainless steel cocktail shaker! The phone has to be completely sealed in metal (check it is working by trying to call the phone). It is a good idea to find and carry a small tin around with you to put your phone in, and in an important meeting, make sure all attending have done the same (a larger biscuit tin works well here!).

A burner phone is a cheap, cash-bought, throwaway, low-tech phone, with a prepaid SIM card not registered to you, to be used only for specific purposes. It can be hard, in some countries, to buy a SIM card without registering it with your personal details. Therefore, buying second-hand, or having a contact that can obtain such SIM cards, is ideal.

After some use of the phone, the phone may become associated with you and attract surveillance, at which point you should destroy it and use a new one. Changing the SIM card is not enough – each phone handset also has an IMEI (International Mobile Equipment Identity) number that identifies the phone. If the SIM has been identified as being yours, the IMEI will be too – so you will need to destroy the phone.

Due to intelligence agencies rolling out full audio recording of all phone calls, let alone the ease with which they can record a target's phone calls, you should avoid sharing particularly sensitive information - even on a burner phone.

**Warning:** intelligence agencies are increasingly developing methods to identify use of burner phones, by scanning bulk communications data patterns for anomalies. It is thought that they similarly surveil use of public phone booths. Therefore, one should conduct a risk assessment before using burner phones to communicate with a high-risk source.

## 2. Internet voice and video calling

Software that provides voice and video calling over the internet (Voice over Internet Protocol, VoIP), such as Skype, is enormously popular and useful, with Skype having over 700 million users itself. However, Skype does not offer much security, and there is not yet any user-friendly, secure alternative.

Among the Snowden revelations are details of the NSA's ability to intercept and store Skype communications. We should assume that all Skype communications are not just between us and our contacts, but with intelligence agencies too.

*Example: Glenn Greenwald tells a story of when he used Skype in Hong Kong to call his partner back in Rio, David Miranda, to tell him he would receive some encrypted documents by email, and to store them securely. Greenwald never did send those files – but 48 hours later, Miranda's laptop was stolen from their Rio home.*

We should also assume that it is not only the most sophisticated agencies that have covert access, or who have exploited security flaws. For example, Egypt's secret police are known

to have purchased Skype penetration tools, and man-in-the-middle Skype attacks have been reported by environmental campaigners working in Asia.

## Chapter 8: Passwords

All of the systems and tools in this book use passwords as a method to correctly identify authorised users and secure against unauthorised access. Strong passwords are a key line of defence at all levels of information security.

However, bear in mind that passwords to online accounts are mainly a defence against non-state hackers (who are also able to obtain increasingly sophisticated commercial password cracking programs). There may be backdoor access at a state level to your online accounts, ultimately rendering a password irrelevant. That is one good reason to encrypt your emails – you may have an incredibly strong Hotmail password, but it doesn't stop intelligence agencies forcing Hotmail to handover all of your emails anyway (or more likely, covertly intercepting and collecting them without permission). If your emails are encrypted, all Hotmail can hand over is a pile of (thus far) uncrackable code.

So, whilst strong passwords are always a good idea, passwords that protect your system (e.g. hard disk encryption) and your encryption programs are far more important than passwords to online accounts.

Risks:

- Forgetting and losing passwords
- Overriding passwords by backdoor access (online accounts)
- Hacking (relatively unsophisticated password hacking)
- Password cracking (sophisticated)
- Key logger
- Being coerced into revealing a password

InfoSec action:

- Learn how to create strong passwords
- Use KeePassX password manager (if you trust your system). KeePassX is an open source password manager that can generate and store usernames and passwords in an encrypted, local database, protected by your master password. It is available for Linux, Mac and Windows.
- Store the most important passwords in your head only
- Use hidden volumes for important encrypted files

### 1. Password cracking: understanding the risk

If your system is insecure, password cracking in a targeted attack is simple. An adversary could physically or remotely insert a key logger into your system, to record every keystroke. This would mean that an adversary captures everything you type, including your passwords. This is not a hugely sophisticated attack and yet totally invalidates other security measures. Therefore, it really is important to secure your system in the very first instance, as described primarily in chapters one and two.

However, if your system is secured and your adversary does/can not use key logging tools, an attacker may try to crack the passwords that protect your system, software and accounts (and this may be either in a large scale hack of thousands of users, or in a targeted attack against an individual).

Password cracking programs are used by authorities across the world, but sophisticated versions are also available as commercial products. A password cracker can automatically test at least eight million passwords per second and may run for days, on many machines simultaneously. For a high-profile target, a password cracker could run on multiple machines, for months.

Password crackers try the most common passwords first. A typical password consists of a root plus an appendage. The root isn't necessarily a dictionary word, but it's usually something pronounceable. An appendage is either a suffix (90% of the time) or a prefix (10% of the time). A cracking program would typically start with a dictionary of about 1,000 common passwords, such as "letmein," "temp," "123456," and so on, and then test them each with about 100 common suffix appendages: "1," "4u," "69," "abc," "!", and so on. It is thought that about a quarter of all passwords can be cracked with just these 100,000 combinations.

Crackers use different dictionaries: English words, names, foreign words, phonetic patterns and so on for roots; two digits, dates, single symbols and so on for appendages. They run the dictionaries with various capitalisations and common substitutions: "\$" for "s", "@" for "a," "1" for "l" and so on. This guessing strategy quickly breaks about two-thirds of all passwords.

The attacker can feed any personal information available about the password creator into the password crackers. A good password cracker will test names and addresses from the address book (post codes are common appendages), meaningful dates, and any other personal information it has.

A particularly comprehensive attack can be launched if your hardware is insecure (the root of all problems!). An attacker can index a target's hard drive and create a dictionary that includes every printable string, including deleted files. If you ever saved your password in an obscure file somewhere, or if your program ever stored it in memory, this process will grab it and aid the process of cracking your password.

## **2. How to create a strong password**

A strong password is one that the cracking process described will miss.

### ***Password manager***

One option is to use open source password management software such as KeePassX to generate a random, long, alphanumeric password (with symbols too, if they are permitted for the particular password), and then save it in your own encrypted password database. If you trust the other layers of your system, this is a fairly robust option.

Furthermore, this is a good way to store multiple complicated passwords for multiple accounts, with KeePassX also having entry fields for URLs, account names and comments for each password stored, so you can securely store all the information you need. The random passwords generated are unmemorable, which fulfils a security function in itself. However, KeePassX allows you to easily copy and paste passwords from the database, so you don't even have to type them.

There is some debate as to how good such programs are at effectively randomising, but the human brain is pretty awful at randomising too, so it remains one of the best options we currently have.

You will need to create a master password for KeePassX, which must be very strong. You should aim to store this password only in your own head.

### ***Schneier scheme***

You should use manually created passwords to encrypt your whole system, any encrypted USB stick or highly important file (e.g. source documents), and your password manager. These important passwords should be stored in your human memory only, and therefore need to be memorable.

Of course, to minimise any damage should a password be compromised, you should avoid re-using passwords.

To manually create a password, we recommend the 'Schneier scheme', a method advocated by Bruce Schneier, the internationally renowned cryptographer and security expert.

Schneier advises taking a memorable sentence and initialising, symbolising, and numbering the words to turn it into a password.

For example, "This little piggy went to market" might become "tlpWENT2m". That nine-character password won't be in anyone's dictionary. Choose your own sentence - something personal, but not obviously related to you through public data.

Here are some examples:

- Wlw7,mstmsritt... = When I was seven, my sister threw my stuffed rabbit in the toilet.
- Wow...doestcst = Wow, does that couch smell terrible.
- Ltime@go-inag~faaa! = Long time ago in a galaxy not far away at all.
- uTVM,TPw55:utvm,tpwstillsecure = Until this very moment, these passwords were still secure.

(Of course, do not use any of the above examples – now that they have been used, they are invalid as strong password options).

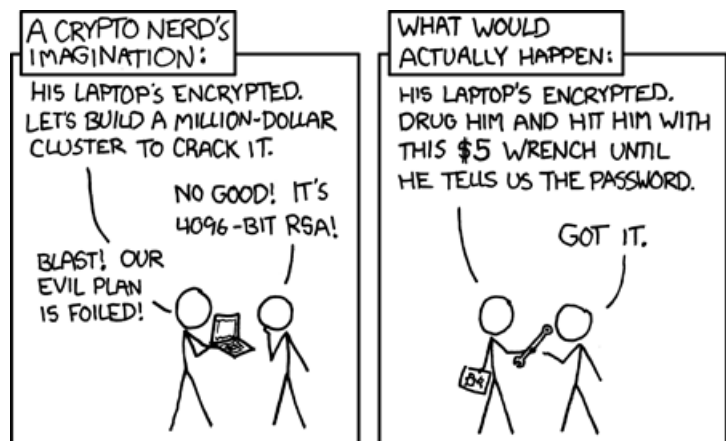
### 3. Being coerced into revealing a password

Let's hope that you are never in this situation. However, let's say a malicious group or agency has intercepted you, carrying an encrypted USB stick (with your most important files, or source documents), and they are prepared to go to extreme lengths to obtain the password in order to decrypt. What do you do?

In these instances, it may be helpful to have a hidden volume on your USB drive. A hidden volume is not visible to anyone and does not appear to take any space on a drive. As such, it can be overwritten easily. However, it means that the visible encrypted volume can act as a decoy, and provide you with plausible deniability. In the visible encrypted volume, you can store files that could reasonably warrant security and encryption, and this volume has its own password. However, the hidden encrypted volume sits undetected beneath the visible volume, and has a separate password.

You can create a hidden encrypted volume with VeraCrypt (see chapter 4). This method may help protect the information from interception, but not from loss – it can be easily destroyed or overwritten so you should always back up important files.

(Much of this chapter is adapted from Bruce Schneier's blog, <https://www.schneier.com/>. We thank Mr Schneier for allowing us to use his work).



bron: [xkcd](#)



## Glossary

Term	Definition
AMT chipset	Chipset with Intel Active Management Technology for automated management (vulnerable than older chipsets from before 2008)
Air-gapped	A security measure whereby a laptop is kept entirely offline, separate from other local networks and the internet
Backdoors	Covert security vulnerabilities that allow a system's known security mechanisms to be bypassed, allowing undetectable access to the computer or its data
BIOS	Basic Input/Output System - a set of computer instructions in firmware that control input and output operations
Bridges (Tor)	Bridges are Tor relays (nodes or computer points that receive traffic on the Tor network and pass it along) that help circumvent censorship
Dragnet	A mass surveillance system operated through programs that sift through and collect the world's online and telecommunication data
Faraday cage	A metallic enclosure that prevents the entry or escape of an electromagnetic field
Firmware	Software programmed onto hardware that provides instructions for how the device communicates with the other computer hardware (includes BIOS)
Hardware	The physical elements that comprise a computer system
Malware	Malicious software, typically spyware, designed to disrupt or damage a computer system
Man-in-the-middle attack (MITM)	The covert interception of communications by the impersonation of a target
Metadata	Data about data
Middleware	Programming that "glues" together"/mediates between two separate and often already existing programs: e.g. allows programs to access databases
Open source	Freely distributed software for which the source code is publicly available
Operating system	The software that takes control of the computer as it boots up, tells the computer what to do and how to do it, and is the interface through which you use the computer
Tor network	Worldwide network of computers , called Tor-nodes
Tor relay	Nodes of computer accesspoints that receive and pass on traffic

## About the authors

**Silkie Carlo** is the director of Big Brother Watch. Before joining Big Brother Watch, she was the Senior Advocacy Officer at Liberty where she led a programme on Technology and Human Rights and launched a legal challenge to the Investigatory Powers Act. She previously worked for Edward Snowden's official defence fund and whistleblowers at risk.

She is a passionate campaigner for the protection of liberties, particularly in the context of new and emerging technologies. She has worked to uphold rights in the fields of state surveillance, policing technologies, big data, artificial intelligence and free expression online. Silkie is also an information security trainer and organises 'Cryptoparty London'. She is the co-author of Information Security for Journalists.

**Arjen Kamphuis** was co-founder and Chief Technology Officer of Gendo. Kamphuis studied Natural Sciences at Utrecht University. Since 2006 he helped to secure the information systems of corporates, national government and NGO's. His work ranges from regular privacy-compliance and security-awareness up to countering espionage against companies, journalists and governments. Ever since Snowden leaked highly classified information from the National Security Agency (NSA) in 2013, he was especially dedicated to protecting investigative journalists. In 2016 Kamphuis started working for Brunel in Amsterdam as Lead Advisor Information Security and from then on he worked closely with former NSA director and whistleblowers William (Bill) Binney and Kirk Wiebe. In late 2017 he started the Brunel daughter company Pretty Good Knowledge as Technical Director. Bill Binney and Kirk Wiebe were co-founders and they contribute as Directors of Analytics.

In August 2018 Arjen disappeared. He is last seen in Bødo, Norway. The Norwegian police conclude that Kamphuis probably drowned due to a kayaking incident on the fjord near Rognan, Norway. His body has not been found.

If you would like to offer any feedback about this book, we would be most grateful to receive it.

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