**Doxing Methodologies and Defenses:**

**The Inevitable (or Avoidable?) Plastering of Sensitive Information**

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**Abstract**

Over the past two decades, billions of people have become comfortable with treating the Internet like a second home. Many, if not most, of these people take for granted how the Internet works and how secure (or not) their communications and information really are. Various security issues have challenged this comfort, from password cracking to database breaching, but there is one particularly unnerving issue that has stormed into the limelight over the past couple of years: doxing. Doxing is so dangerous because it is easy to execute, hard to avoid, and personalized in its targeting; doxing has arguably the greatest potential for not only physical or monetary harm to its victims but also lasting psychological trauma. Here we will not only investigate doxing methodologies and preventative measures, but ultimately decide if it is even possible to avoid being doxed.

**To the Community**  
 While I am not here to claim that doxing is inherently an evil methodology—in fact I will later discuss some cases of “hacktivist” doxing—we need to talk about the dark and ugly consequences of doxxing[[1]](#footnote-1). While it is certainly not the only example, GamerGate[[2]](#endnote-1) might be the epitome of doxing can be used to harass, threaten, and nearly destroy people’s lives. Doxers involved in GamerGate have obliterated any chance at normalcy for some prominent female game developers and game critics such as Zoe Quinn[[3]](#endnote-2), Brianna Wu[[4]](#endnote-3), and Anita Sarkeesian[[5]](#endnote-4). All three women have stood up and condemned all forms of harassment, but disgusting and violent comments are only the tip of the iceberg. All three women have had to leave their homes at some point after their addresses were leaked through doxing; all three have had family and friends around them doxed as well; all three work in the tech industry, meaning they don’t have the option of going of the grid if they want to continue their work. And they are not the only ones: there are countless other people, most often women, people of color, and LGBT folks, whose lives have been shaken if not ripped apart because of doxing. What’s even scarier, as I will detail later on, is how easy it is to dox someone and how hard it is to hide your personal information and prevent attackers from building a complete profile of your life. Plus there is the added irony that legal repercussions are all but non-existent for attackers, despite the fact that all the threats and information posts are publically available. I don’t envision doxing going away anytime soon, and, as an outspoken queer woman in the tech industry, this terrifies me. That is why I chose this topic: to educate, investigate, and arm others and myself with information about doxing so that maybe someone can avoid this kind of calamity.

**Introduction**

Doxing (alternatively doxxing) is an attack method by which a group of people, or sometimes an individual, seek out publically available information on their target (often connecting simple information such as a name or hometown to more personal information such as bank account passwords) and then post that information across various sites in the hopes of shaming, angering, or scaring the target.[[6]](#endnote-5) The four cornerstones to doxing are the mob mentality/hive mind of the attackers, the fact that the information is publicly available, the ability to connect information and build a detailed profile of the victim, and the fact that these attacks are motivated by wanting to harm to the victim (with no benefits or gains to the attackers). Attackers vary widely from case to case, but two of the most well known groups who have claimed responsibility for numerous high-profile doxings are the supporters of GamerGate and Anonymous. The act of doxing, unlike sneaky researching or stalking, is most often executed in a very vocal manner (e.g. attackers announcing who they are attacking, what information they plan on exposing, etc.) by posting information on twitter, reddit, 8chan, or pastebin. Additionally, “really big problems come when someone connects all of the dots and builds up a profile that covers all aspects of your life.”[[7]](#endnote-6) Finally, attackers’ main goal is not to expose information for the sake of exposure or even to expose credit card information in the hopes of buying themselves things; in fact, in one relatively harmless case, a man’s credit card information was doxed and used to send him 50 Qurans and $287 of Chick-Fil-A.[[8]](#endnote-7) These factors all combine to make doxing an extremely powerful tool that can be wielded by anyone. It’s also a tool, one might argue, that it isn’t inherently evil; in fact, many point to cases such as the Anonymous doxing of some Missouri KKK members[[9]](#endnote-8) or alleged ISIS recruiters[[10]](#endnote-9). Others counter that Anonymous has doxed innocent people (accidentally[[11]](#endnote-10) and maliciously[[12]](#endnote-11)) and, as discussed earlier, there are harassment groups such as GamerGate who have used doxing to devastate their victim’s lives.

Now that we understand the mentality of a doxer, we will dive deep into their methods and tools for finding information as well as how you can prevent, detect, and minimize damage from doxing.

**Doxing Attacks**

***Common Attacks***

One of the reasons doxing is so powerful is because the majority of attacks require very little technical skill and are mostly free. These attacks have two main components: gathering as much data as possible and then creating a web of information from that to access more sensitive information. Much of this can be accomplished through a combination of social engineering and persistence. In this first step, attackers are looking for everything and anything, and they are usually going off of only a small snippet of information such as a username.[[13]](#endnote-12)[[14]](#endnote-13) Throughout my research, the most common items that were sought out were: full name, age, picture, usernames, social media accounts, email, phone number, and personal details[[15]](#footnote-2). Most of this can be found through a little digging on various search engines (e.g. Google, Bing, Yahoo). After that preliminary search, attackers will then look into search engines that are designed to find information about people such as Spokeo[[16]](#endnote-14), Whitepages[[17]](#endnote-15), and Pipl[[18]](#endnote-16). Additionally, attackers may repeat this steps on the victim’s family or friends to gain further leverage. These pieces of information are good for two purposes: building a profile and spam harassment. Some common types of spam harassment include text or sms bombing[[19]](#endnote-17) and unwanted Skype calls, Facebook messages, tweets, Skype calls, or emails[[20]](#endnote-18).

Remember that doxing is usually a group operation, so together a group will be able to collaborate and share information faster and with greater detail than just a single individual. Once enough information is collected, attackers begin on the more important and scary phase: getting personal information. This includes: IP address, passwords, credit cards, bank accounts, social security number, medical history, and home/work address. This information is particularly lethal, since it could lead to someone causing the victim physical harm. MAC and IP addresses are fairly easy to find; attackers can use the target’s website or email address. Attackers can use the UNIX commands ping, lookup, traceroute, and finger to get the IP address of a given website.[[21]](#endnote-19) Similarly, if any attacker has an email sent from the victim, you can use various sites to read the email’s full header to find the source IP address.[[22]](#endnote-20) Once an IP address is acquired (assuming this is the victim’s actual IP address), a quick lookup of the location can be found on places like iplocation.[[23]](#endnote-21) Cracking passwords can be done in a variety of ways as well. You can combine brute force password cracking (with tools such as John the Ripper or Hashcat) with some social engineering. Most sites now have an “I forgot my password” button or something that asks the user to answer a security question; many of these questions (e.g. mother’s maiden name, first pet name, etc.) can be answered with information gained earlier in the doxing process. If any of these passwords happen to be a master password to a password manager such as Last Pass or 1Password, this could potentially unlock credit card information and passwords to online health sites (e.g. Blue Cross Blue Shield, Atrius Health, etc.) or online banking services (e.g. Bank of America, Chase, etc.). Having any of this information posted or used against you is a huge threat that would involve a large amount of clean up, as we’ll discuss later. But what might be even scarier are attackers finding your home or work address. If the victim owns a domain name, they are required to have resisted and publicly listed contact information, which often contains a physical address; this information can be found on sites like whois[[24]](#endnote-22), 411 and whitepages.[[25]](#endnote-23)

***Advanced Attacks***

While a huge amount of damage can be done with the common attacks described above, it is worth mentioning a few other attack methods that are more technically advanced or require the attacker to be in close physical proximity to the victim. A few of these techniques rely on being on the same network as the victim. Packet sniffing, the process of looking at all the traffic on your network with the potential of accessing information in the clear,[[26]](#endnote-24) is one possible way to steal unencrypted data. Another possibility is creating a fake wireless access point; this technique is rare for doxing because it not only requires the attacker to be in the same location as the target but also they need to get the target to use the fake WAP, which requires some further social engineering. Other techniques involve compromising the victim’s computer or database to gain information. This can include things such as the bait and switch, whereby the victim thinks they are downloading a harmless file but it is switched out for a malicious one, or changing file names or file extensions to dupe the victim into downloading nasty software.[[27]](#endnote-25) Additionally, an attacker could go so far as to break into a victim’s database via SQL injection or cross-site request forgery. Again, these methods are not common, but they are important to discuss since they highlight how vulnerable we are and how often we take things such as the safe transfer of sensitive information for granted.

**Doxing Defenses**

***Realistic Prevention Methods***

There are many equally quick and easy ways of protecting yourself on the Internet, with the caveat that these are realistic, not perfect, prevention methods. There are two big myths about preventing doxing that I want to dismiss: you can just go online and be totally safe and that you won’t get doxed if you keep quiet. First, the only way to truly prevent doxing is never being born. Even if you stopped going on the Internet today, you probably have lots of information about you already floating around; plus, even if you had never even been on the Internet, your friends or family might and they could be used against you. Second, not only are people doxed for just existing or on unfounded claims, but also people should be able to be themselves and speak out on issues without fear for their lives. Now, the first step in preventing doxing is learning what information is out there. The simplest way to do this is to dox yourself: use the methods above to find as much information as you can, though obviously if you realize your address is out in the open, don’t go posting it around. Pay attention not only to what obvious information you can find but also what subtle connections you can make. For example, if you are publicly associated with your school or work, this can be an indication of your address. At this point, there is some more bad news: there are many 3rd party vendors who collect sensitive information and sell it, meaning just because you can’t find the information doesn’t guarantee that it isn’t out there. The upside is that there are some thorough lists of common sellers and ways to delete your information from them.[[28]](#endnote-26) You should delete or obscure any sensitive information you find at this step in the process. Sometimes you’ll have sensitive information that you want some people to have access to, but not others. If this is for social media, such as Facebook, you can adjust your privacy settings so that only certain groups or people can see certain information. Some additional preventative measures can really be worth the trouble. Two-factor authentication and using a password manager are two of the most effective ways of keeping yourself safe. Sites like Gmail now encourage you to use two-factor authentication, a process in which new login attempts not only require your email address password but also a one-time code that is texted to your phone. This is great because it increases protection on your email and can be used to indicate that someone else is trying to log into your account. Password managers, such as Lastpass and 1Password, are not only convenient but also very safe (given your master password is strong). Since these extensions remember and auto-fill passwords, which can allow you to generate more complex passwords without having to worry about remembering them. Some more extreme preventative measures include using TOR to mask you IP address and creating fake social media accounts and multiple emails, in the hopes of throwing potential attackers off your trail. Finally, talk to your friends and family about these steps so you can protect each other.

***Defense and Damage Control***

If these methods are not enough or were not done in time and you are the victim of doxing, don’t lose hope. First, know that doxing is never the victim’s fault and that they may need a great deal of support both emotionally and with getting back their privacy. Next, the victim should assess what information is being posted and how potentially dangerous that information is. If you believe your physical safety to be in harm (a home or work address posted with threats), call the police and find a safe space. Additionally, document any information posted or threats, along with any of the attacker’s information (such as username). [[29]](#endnote-27) Once you are safe and able, the next step is assessing what information has been exposed. If it is your physical address, consider staying somewhere else if you feel unsafe. For credit card or bank account information, call your bank to freeze or cancel your cards immediately. Depending on the severity of the attack, if your phone number is compromised you can block any harassment or change your phone number. If your Skype account has been compromised, you can also freeze your account.[[30]](#endnote-28) The number one goal of this defensive reaction is to minimize damage and regain control.

If a doxing or harassment incident were to be prolonged or you become aware of it early on, there are some other things you can do to catch attackers and prevent further damage. The biggest tip, though probably the most nauseating, is to find where the attackers are coming from. The whole point of doxing is to post the information publicly and use it as a loud and scary weapon; we can use this to our advantage to monitor twitter, 8chan, reddit, or any other place where your doxers have congregated. Here is where you can see what a group of doxers is planning or trying to execute, and you can be one step ahead of them. Some other extreme measures you could take would be setting up honeypots or websites where you can detect unauthorized users attempting to break into your traps. Many sites and social media accounts have methods of alerting you if someone is attempting to log into your account.

The last piece of advice on defending against doxing is that your reaction to doxing is your own. Some people go to the police, some announce to the world that they are being doxed, some warn their work collogues or boss. There is not right or wrong way to handle doxing, and standing up to attackers is terrifying and not guaranteed to stop the harassment (but neither is staying silent).

**Conclusion**

With all the information and evidence before us, we can now finally ask ourselves: is doxing inevitable or avoidable? Can anyone really be safe from this kind of attack? Does privacy still exist? On the one hand, doxing is the fast food of privacy ruining: its quick, easy, cheap, and popular. It requires little skill or thought on the attacker’s part, yet the power it gives is enormous. Additionally, many people love or require the Internet for their school, work, or own enjoyment. Doxers often have the added strength of their anonymity, mob mentality, and lack of legal repercussions. Victims can, understandably, be confused and frightened in a way that no database breach or mass malware attack might feel; the personalized targeting, the screenshot of *your* home address posted on twitter, makes one feel sicker than practically any other privacy breach. This is, admittedly, a bleak prospect, a national issue that needs to be taken more seriously by technology companies (such as social media sites, internet providers, and 3rd party information sellers) and legal groups alike. In the meantime, we have the power to not only speak up about the issue but also to protect our loved ones and ourselves. We cannot underestimate the power of awareness, since many people have *no idea* how vulnerable they are. Once we know what data is out there, we can prune our public Internet presence and better secure private information. Additionally, we can all be more sensitive to how traumatizing doxing (and any form of harassment) can be and stop blaming people for having personal information on the Internet. There is no sure-fire way to prevent doxing or any other privacy invasion—short of becoming literally invisible—but that doesn’t mean we are powerless. The Internet is a double-edged sword, but if we wield it consciously and carefully, we might not get cut.

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