



## RESEARCH ARTICLE

### A STUDY ON SOCIAL ENGINEERING ATTACKS: PHISHING ATTACK

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#### ABSTRACT

Recently, with the development of digital technology and the spread of the social media network and made the communication of human beings between each other more easily, but with the put the personal information and private evidence and the participation of others via the Internet, it causes a great danger that this information can be exploited and collected, and from this a new concept called social engineering has spread that is the attackers or whoever wants Damage to people searches and collects personal and confidential information to penetrate and cause harm to the victim. One of the most common threats facing people is phishing through social engineering. In this paper, Survey summarizes the concept of social engineering and how the attacker seeks For that, it starts with attack, phishing. It is a mixture of social engineering and technical methods to persuade the user to disclose his sensitive and personal data, in addition to phishing classifications via social engineering. Moreover, this paper will discuss Survey Techniques to reduce this attack and try to raise the awareness of defense and raise human culture from Being caught in a phishing scam. These attacks aim to trick individuals or companies into carrying out actions that benefit the attackers or provide them with sensitive data via e-mail messages or malicious and counterfeit software that represents a real site and asks them to do so. such as credit card and passwords. Social engineering is one of the biggest challenges to network security because it takes advantage of the natural human tendency to trust. In conclusion, Recommend Some Preventive Measures and Possible Solutions to the Threats and Weaknesses of Social Engineering.

#### INTRODUCTION

In recent times, social engineering attacks are increasing and spreading rapidly in today's networks, which has weakened the chain of cyber security. It seeks to manipulate institutions and companies as well as individuals and try to disclose valuable and sensitive data for the benefit of cyber criminals (1). Social engineering challenges network security regardless of the strength of its firewalls, intrusion detection systems, encryption methods and antivirus software systems (2). Social engineering, also known as human piracy, is the art of phishing and traces the victim to revealing his or her credentials and then is used to access networks or accounts. It uses deception and manipulation of the victim or just a follow-up, discovery and curiosity. Phishing and harmful activities affect victims psychologically by revealing their confidential information and breaking security barriers (3). Therefore, the attacks resulting from social engineering are the strongest and most dangerous attacks, threatening all networks and systems. That is why cyber criminals choose and go to this method, they do not find weaknesses to penetrate a specific system (4). This is based on what the US Department of Justice reached, where it highlighted and demonstrated that social engineering attacks are among the most serious threats to the world.

Since in 2016, a Cyence company to analyze cybersecurity stated that the United States was the target country in many social attacks and had a higher cost to it than Germany and Japan is ranked second (2). The cost of these attacks in the United States was estimated at \$ 121.22 billion. In particular, US companies are being targeted by cyber criminals and sneaking into them around the world. Companies deal with valuable and important data, and when these companies are caught and hacked, this significantly affects privacy and the economy around the world (5). Phishing attack is one of the biggest problems as it aims to trick people into revealing information from the user using a social engineering attack (6). For example phishing is by sending fake messages where you try to solicit the person and reveal private and sensitive information, he sends a message By e-mail or Social Media "You have won an amount" to receive it click on the following link and fill in your personal data, confidential numbers and bank accounts to transfer the amount and the attackers social engineering techniques with to obtain and disclose all user data. This paper is present survey about social engineering attacks, it will present an in-depth phishing attacks this paper organized as follows, in section 2 What is social engineering, in section 3.1 Social Engineering Attacks, after that will be discussed in detail type of phishing attacks in in section 3.2, After discussing the types of phishing and how to implement it through social engineering, we will discuss methods and techniques for detecting phishing in section 3.3,

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then we will discuss a theoretical analysis of threats in social engineering in general and for phishing and its types in particular in section 4, In the last I will conclude my paper with the recommendation of the community the importance of protecting himself and not sharing his sensitive and personal information through the social network and wary of any email that does not know its source or any text message or phone call so that to be not a victim of phishing and social engineering in section 5.

**What is social engineering:** Social engineering is defined as one of the simple and easy methods and it depends on the attacker's ability to search and collect the information that the victim wants by using the victim, exploiting the human weaknesses is the basis of the attack and the attacker obtaining confidential and sensitive information about the individual or organization (7). Social engineering is a technic that aims to manipulate and track victims to creep into accessing private information, revealing their data and trying to harm an individual or organization, by luring them to download malicious files and software, by clicking on malicious links or downloading harmful applications that serve the attacker to reveal the victim's data(8).

### Social Engineering Attacks

Social engineering attacks has become one of the most dangerous and greatest threats and concerns facing cyber security (2, 5, 9).Through social engineering, it can obtain confidential and sensitive information, and it can be used for specific purposes such as blackmailing the victim or commercial purposes sold on the black market (10).Social engineering attacks differ in terms of purpose, target, and reason, except that they have a common pattern with fixed or approved stages for attackers, which are four consecutive stages. The first is gathering information about the victim, secondly, progress and development of the relationship with the target, and thirdly, the information obtained through the first two phases is then exploited After that, it starts carrying out the attack. Fourth, and it is the last stage that the attacker exits without traces(11).Fig1 illustrates the four common stages of a social engineering attack.(12)

In the first stage, which is the stage of research and collection, the attacker searches and collects information about the victim based on specific requirements for a specific purpose. In the second stage which is the stage of phishing and exploitation and is about the way to develop the relationship with the victim and gain confidence through direct or indirect methods to obtain what he wants, the third stage It is the stage of exploiting the victim through several axes, either emotionally or by security errors, to provide sensitive information and begin carrying out the attack on it. The fourth stage is the last stage, which is the exit of the attacker without a trace or evidence.(12, 13).

**Type of social engineering attacks:** Type of social engineering attacks into two main categories according to which entity is involved human-based or computer-based. The attacker executes the attack personally by interacting with the victim so that he can collect information and affect the victim by using phones or computers to obtain his purpose and collect the information the attacker wants from the victim(14). In addition to classifying social engineering attacks into three categories in terms of how to conduct the attack, which are

social, technical and physical. We know that social engineering attacks are carried out by means of relationships, the exploitation of victims, play and deception of victims, and are considered to be among the most dangerous attacks as discussed previously(15). Moreover, there is a classification of social engineering attacks into two categories in terms of carrying out the attack remotely, which are direct and indirect. under direct attacks, which is the direct contact between the attacker and the target, and the attacker begins to carry out the attack directly, through several methods such as eye contact, physical contact, or through voice interactions. Social engineering telephone, pretending to impersonate and identity in addition to theft such as stealing important and sensitive documents and there are many tricks and methods to enable the attacker to obtain what he wants directly from the victim. The attacks that fall under indirect attacks do not require the presence of the attacker directly in the target area or the victim, as opposed to the direct one. The attacker must be present in the target area. In indirect attacks, the attacker can carry out the attack on the target through malware that is designed by the attacker until it falls to the target He gets what he wants, and it is sent from several ways of sending it via e-mail or from social networking sites. Examples and forms of these attacks are phishing, ransom ware, pop-ups, social engineering, through the Internet, SMS, fake programs, baiting, pretexting, tailgating, dumpster diving(2).fig2. Summarizes the types of social engineering attacks.

**Phishing attacks:** One of the most common and widely used attacks among social engineers is phishing attacks (13, 15). Phishing attacks are the attempt of the victim to fall into a fishing net in order to obtain confidential information and reveal sensitive data, and the victim is phishing through several methods of sending e-mail or phone calls, and includes malicious sites, fake prize announcements, fake offers, fake online shopping sites, and there are a lot of methods and tricks are used by the attacker to hunt the victim. For example sending a fraudulent email to the victim, you won an award with us to receive the award, click on the link and complete your details and bank card numbers in addition to secret numbers, or enter any sensitive and confidential information that benefits the attackers and serves them online(16).There are five types of phishing attacks through social engineering, which are whaling phishing, spear phishing, interactive voice response phishing, vishing phishing, and business email compromise phishing(17).Phishing targets an individual or organization that is why Spear phishing attacks are phishing fraud that defrauds an organization, group or Individual, by targeting an individual or group concerned with his name, and then begins through the data available online to collect them and search for all that reveals to them the individual or group. This type is more than the types in phishing attacks are difficult to distinguish from any legitimate user(18).The second type, which is whaling phishing, is a special case and part of spearfishing, which it is target the great of importance in companies and organizations such as CEO or CFO,this is in order to steal sensitive and important information given to those in high positions in companies(13).The third and fourth type of phishing is the derivative attack from voice fraud that is made by calls called Vishing this attack is described as fraudulent statement urging the victim to share sensitive and personal information that is implemented on interactive responses and the victim responds phonetically(13, 19).These attacks were carried out after the victim's response via the Internet protocol (VoIP)(20).

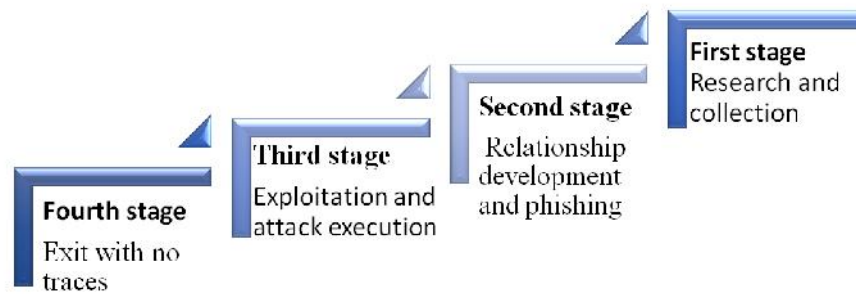


Fig. 1. Stages of social engineering attacks

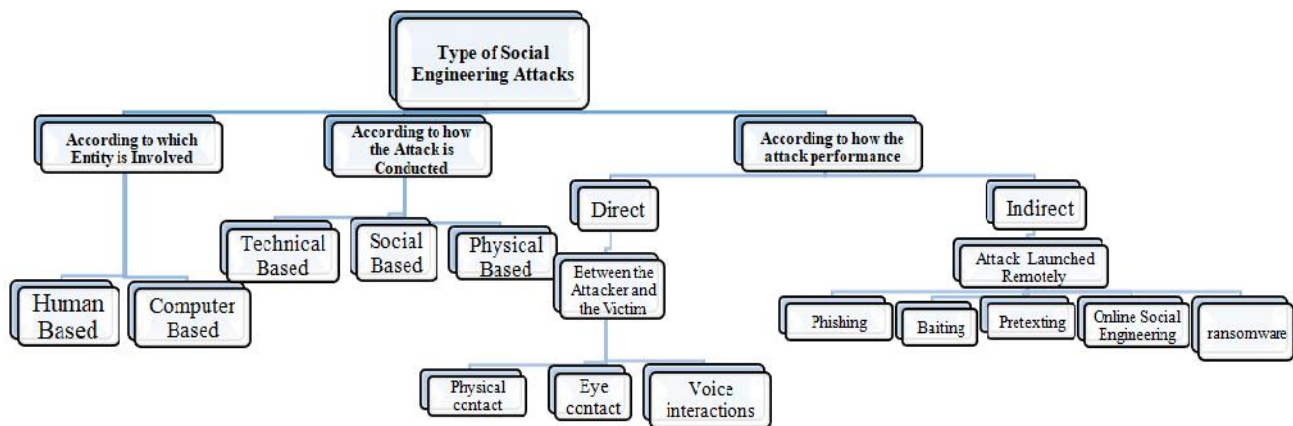


Fig. 2. Type of social engineering attacks

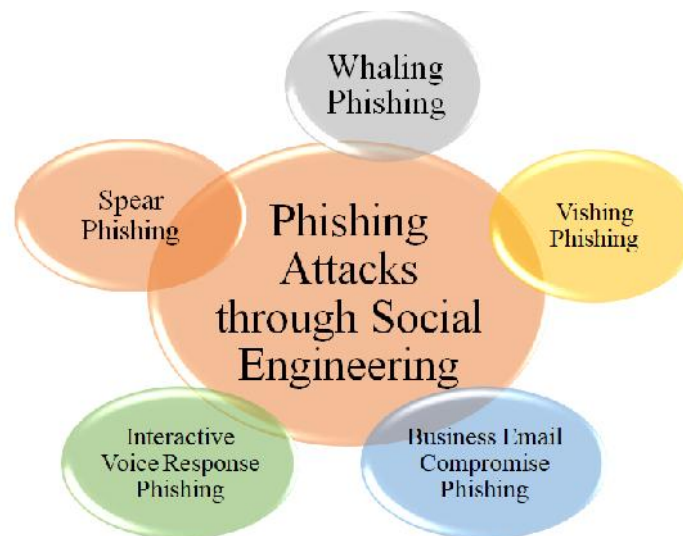


Fig. 3. Phishing attacks type

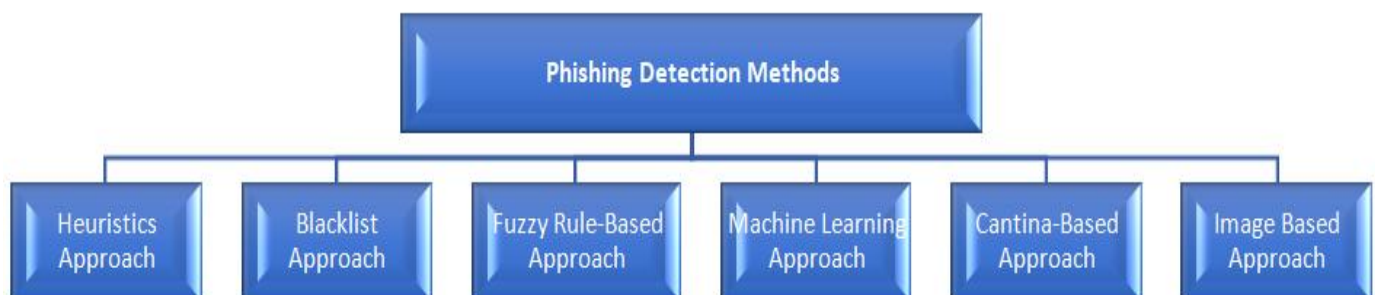


Fig. 4. Phishing detection methods

Table 1. Related Work on phishing attack

ref	year	Whaling Phishing	Spear Phishing	Vishing Phishing	BusinessEmail Compromise Phishing	Interactive Voice Response Phishing	Heuristics Approach	Blacklist Approach	Fuzzy Rule-Based Approach	Machine Learning Approach	Cantina-Based Approach	Image Based Approach
[2]	2019											
[9]	2019											
[25]	2019											
[19]	2018											
[17]	2017											
[18]	2017											
[21]	2017											
[15]	2016											
[27]	2016											
[20]	2015											
[23]	2014											
[29]	2014											
[32]	2013											
[26]	2013											

Table 2. Related Work on accuracy of phishing detection

ref	Year	accuracy of each phishing detection method					
		Heuristics Approach	Blacklist Approach	Fuzzy Rule Based Approach	Machine Learning Approach	Cantina-Based Approach	ImageBased Approach
[25]	2019	96.76%	84.36%	100%	>98.4%	97%	98%
[26]	2013		zero-hours = 20%after 12 hours =47% to 83%				

The fifth type is called the Business email compromise phishing (BEC). It is an attack that penetrates whaling phishing, and whaling phishing has been discussed in the third type, because it targets the big characters, in this type it works to target those personalities in order to obtain the authority to enter e-mail, get access to calendar and private information such as payments and accounting in addition to personal and sensitive information (21). After obtaining get authorization, the social engineer begins using this data and information such as he changes emails, sends email messages, changes the meeting schedule, cancels meetings, places fake meetings, sends emails and gets important and confidential information, reads all professional information about the company, collects The social engineer has information about employees and large companies and knows the entire scope of the company from expenses and revenues and achieving all the profits that the company or the bank gets (22). After that, the attacker starts playing his game and carrying out the attack, which is to send a regular email at a specific time, which he chooses according to what he got of information, he chooses an ordinary employee, then sends him the link, and the employee downloads the link files to disrupt the company's network and makes it urgent to make the employee act very quickly (2). Fig. 4 describe the type of phishing through social engineering

**Phishing detection methods:** In this section, we will discuss several methods for detecting phishing attacks and some approaches existing for detecting some phishing attacks. Attacks are renewed and innovated from time to time, we have to review and try to detect and mitigate their effects. In the section, we will discuss 6 different types of methods for detecting and reducing phishing attacks. This means trying to understand and analyse phishing sites in addition to identifying phishing attacks by inferring various features that include the age of the domain, the spelling error, the domain name, its source, and many other features that it can infer(23).

The first type heuristics approach, this approach also classifies the potential for phishing for a web page, using the degrees of reputation obtained from the anti-phishing community or that have been calculated from a specific web page. However, the reliability of recording it is a major challenge(24).the spoof guard it's a browser plug in for specific web browsers, for example Internet explorer(25).the Spoof guard this is done by means of an examination, such as checking the current domain name in addition to analyzing the information to indicate the origin of the site(25).The second approach is the blacklist This is done by adding untrusted URLs or placed in a list of banned websites and lists are called blacklist (26). The third approach is fuzzy rule-based approach in this way, an algorithm is used to explore those data and information that are indicated on logic, and then it is tried and tried to find those spoofing websites(27).This approach was applied to assess the risk of fraudulent phishing websites, which had 27 features, after which a special website prediction model is created that is based on the exploration of disorganized data(28).The fourth type is machine learning approach There are different types of algorithms for machine learning, for example, random forests, which is an integrated educational classification and an appropriate way for dealing with problems that involve collecting data and information from the classroom. Support vector machine (SVM) It is used effectively to solve many classification problems (25). In addition, machine learning contains two major phases They are the stage of training and testing. this means the work predictive accuracy during the training process depends only on that information gained (IG). When the information gained (IG) get low, therefore, the predictive accuracy will get low also but, in the case the information gained (IG) is high, the fairness accuracy will be high (29). The fifth type is cantina-based approach in this type uses two terms which are frequency and also the frequency of the inverse document (TF-IDF) in order to identify phishing sites (25). TF-IDF It is known as retrieval algorithm that is used to classify documents and comparisons(30).

The sixth type Image, it's based approach there is difference between phishing sites and its regular and normal websites that by using an image these depend on using visual similarity (31). This approach is based on dividing the web pages into blocking areas based on visual cues. There are measures that are used for example planning similarity, as well as the similarity of the area of the block and many of the measures that are taken into consideration and calculating the visual similarity between phishing and between untruthful and regular sites (32). In fig5, describe the six types of phishing detection methods.

**Theoretical analysis:** We know recently that social engineering has become a major threat and constitutes a major threat affecting the ordinary user and the large company and there are many types of attacks and phishing that occur through social engineering. Table 1 shows the details of phishing attacks that are through social engineering in addition to the mechanisms of the phishing detection approach. (2, 9, 17, 25) The latest research indicated five types of phishing attack through social engineering, and it is the most used type among attackers, as it collects and takes sensitive and confidential information from the victim and draws it without his knowledge. And if the type used varies, whether by phone, email, malware, or fake sites, the target of the attacker is one and he is trying to catch the victim in any way that a person or organization obtained to get from it and gets its goal from penetrating privacy or getting harmful information and revealing the victim's secrets. (15, 18, 21) Inducted to as a spear phishing attack is one of the most dangerous types of attack because it specifically targets users who have the type of privileges or distinct ability that the opponent is looking for. Where the attacker may also impersonate the username to be identical to the full real username, while also targeting to send mail messages E-mail trolling regularly in order to make money by tricking (18). The revelation of the last three models discussed the threat (20). It indicates that companies rely heavily on sound technology over Voice-IP technology. As it was verified, concluded, and identified many weaknesses in this technique, this technique is still under attack. (20) Discussed the treatment of this problem and try to gain a greater understanding of VoIP attacks and the contribution to current VoIP security assessments and solutions as they.

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## Conclusion

Social engineering threats has become a major threat and are considered the largest and most dangerous security threats that's violations facing the individual and institutions. Whereas, by means of social engineering, an organization can collapse or lose its privacy and important information. It is a social engineering attack as we discussed it is a technique and an art that attackers try to manipulate or lure users and institutions. Where our paper dealt with mentioning the types of social attacks and focused on one of the most dangerous and common types of social engineering attacks called the phishing attack, which is one of the types that are difficult to discover, because many people do not know about it. As our paper discussed many different types of tools that exist to locate phishing and detect phishing, unfortunately these attacks cannot be stopped and overcome by using technology only as attackers can easily overcome a strong security system and moreover new attacks appear frequently that are not known from Before, however, there are tools and methods that attempt to prevent and mitigate phishing damage. Protecting important and sensitive information and not disclosing it is very important in our modern society, and although security about information is constantly improving, the only weak point is still the person who is vulnerable to manipulation techniques.

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