Effective Network Monitoring Application for Security

Prasanna Phanindran S, Srivathsan G, Ananthi N, Surender Rangaraju

Abstract— **Although this Technologically-driven world, creates more opportunities and offers state-of-the-art features, it certainly has its downsides. The downsides of this world are cyber threats, especially networking and spoofing threats. These cyber threats lead to reconnaissance, enumeration of a target device, and major security breaches.**

These networking-based threats include spying on the target to obtain crucial information. This spying is done by having a direct connection with the target system. Usually, this connection is offline and offline connections can be spotted by the target user, but the target user can't determine the offline connection to be an unauthorized source. Spoofing threats not only involve listening to crucial information but, also using the obtained information to spoof a user.

Spoofing includes man-in-the-middle attacks in which the hacker acts as a trusted source to the communicating systems. The use of a VPN is generally a solution to spoofing threats but, using a VPN affects the speed of the internet connection. An unstable internet connection may result in a loss of information. Although the market offers various kinds of features, there exists no standalone application to solve these issues.
The objective of this research is to develop an efficient, simple, and standalone networking application to aid the user by improving the security.

Index Terms— **Network, Network Monitoring, Network Monitoring Application, Security, Standalone Networking Application.**

I. INTRODUCTION

Security breaches are ubiquitous in the current digital era, where almost everything is connected with the help of networking. These security breaches are carried out by crackers and black-hat hackers, who exploit the system for a myriad of criminal purposes. These security breaches are accomplished through various means, such as exploiting vulnerabilities in the network and IP address tracking.

In February 2018, a diet and exercise application that goes by the name "MyFitnessPal" had a security breach where about 150 million user's data(such as IP addresses, usernames, and email id) got exposed. The main goal of the attackers is to sell these user data on the dark web which they successfully did.

In March 2021, About 300,000 records of Hobby Lobby got exposed due to a misconfiguration. In the following months, the Personal details of almost 100,000 current and former employees of California Pizza Kitchen were exposed. According to the organization, the hackers gained access to the system and accessed some files which involves employee

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details and social security numbers.

The method these hackers use to bypass the system security is through information obtained from reconnaissance or scanning. By reconnaissance, the attacker collects information about the user and through scanning, the attacker scans the system for vulnerabilities. These kinds of data thefts are quite difficult on an individual's personal computer. For instance, on a personal network, detection of unwanted or idle devices is pretty simple, but on an organizational level, discovering such intrusions is an arduous task and prone to human errors.

In addition, if an unauthorized user gets hold of a target's IP address, it can be used to determine the location or even can be used to frame the target for illegal activities. To avoid such risks which may lead to potential breaches, an efficient network monitoring application is necessary.

II. LITERATURE SURVEY

At Present, there are many open-source network scanners in the market. Each scanner is efficient and provides many features.

Free IP Scanner is a lightweight, standalone IP scanner that has multi-thread scan technology. OpUtils is a switch port and IP address management software with an excellent user interface that has features like network bandwidth tracking. SolarWinds IP Address Manager is an advanced IP scanner with schedule scan functionality.

Spiceworks IP Scanner is a Multi OS-supported IP scanner with time-efficient scanning. Advance IP Scanner, Angry IP Scanner, and IP Range Scanner are the famous and the most efficient scanners with top-notch features like scheduling, MAC Address detection, etc. Tools such as NMAP can also be used to find IP addresses connected to the network.

The Common features of these IP Scanners are :
- They are standalone.
- They are fast, efficient, and reliable
- They can retrieve device information
- They have an attractive user Interface

The same goes for the Internet Speed test applications as there are almost many in the market.

Meteor is a speed test application that can be used to check the connection between the system and the applications. Speed Test master is another application that can conduct ping tests to ensure that network stability is maintained. FAST is a simple, free, and Netflix-Powered application that is proven efficient in terms of accuracy.

The Common features of these Internet speed test applications are :

- They are Standalone
- Each and every application is unique
- They have servers around the world to conduct these tests.

III. PROPOSED SOLUTION

Although there are IP Scanners and Internet Speed Test applications in the market that can provide excellent features which are proven to be a merit, there are demerits as well. For Instance, There are no standalone applications that combine the two separate applications into one.

In addition, IP Scanners in the market don't use ARP to scan the IP Addresses and the Internet Speed test applications don't give the user the choice of choosing servers. Finally, most Internet speed test applications are inaccurate when the user tests the speed over connecting to a VPN.

The Proposed Network Monitoring application involves two modules :

- Network Scanner
- Internet Speed Test

These modules can be used effectively not only to monitor the network but also to aid in terms of security.

Let's understand the overview of the application with a help of an example. A user, before proceeding with the task, checks the ports with the help of the Network Scanner.

After ensuring network security, proceeds with the task and if the task involves sending files via the internet, in order to prevent man-in-the-middle attacks, the user has to use VPN to hide the IP Address from attackers.

In that case, the user has to ensure that the Internet speed is reliable. That's when the Internet Speed test module comes in handy. It pings a particular server in that specific country and displays the Internet speed which benefits the user.

A. Network Scanner

The main aim of the network scanner application is to scan the ports and determine the active devices connected to the network. The requirements are :

.NET Framework
In-Built Libraries
System.Linq
System.Windows
System.Net
System. Threading
System. ComponentMode1
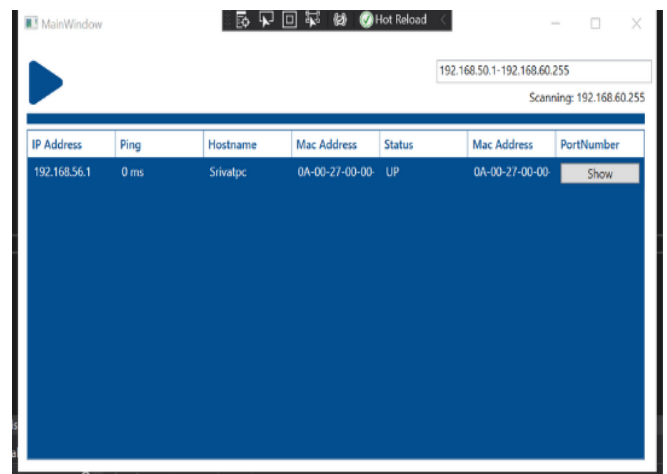System.Runtime
System.Diagnostics
System.Text

Initially,when the application is starts, the basic dashboard is displayed as below :
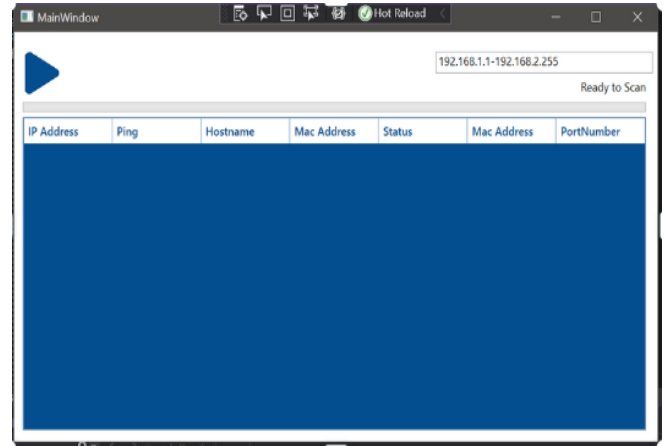
When the user presses the play button i.e. the Scan Button, The Scan() function is invoked. The Scan() function uses the IP address range(specified in the text box) and loops through every IP address.
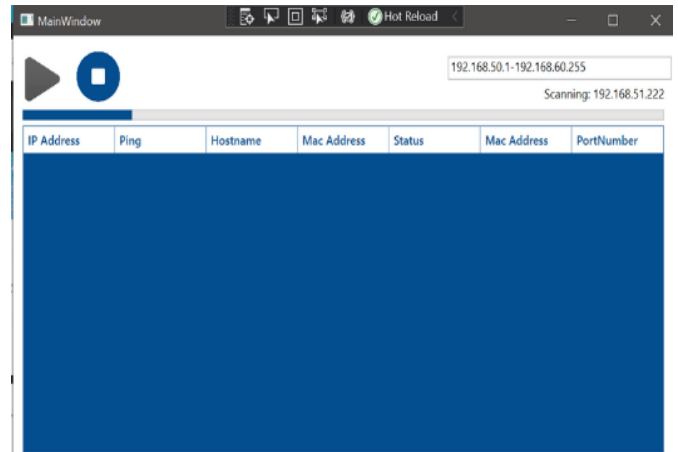
On looping the Getipaddress(ippadress) function pings the IP addresses and tries to retrieve information like host information, MAC address, ping speed.

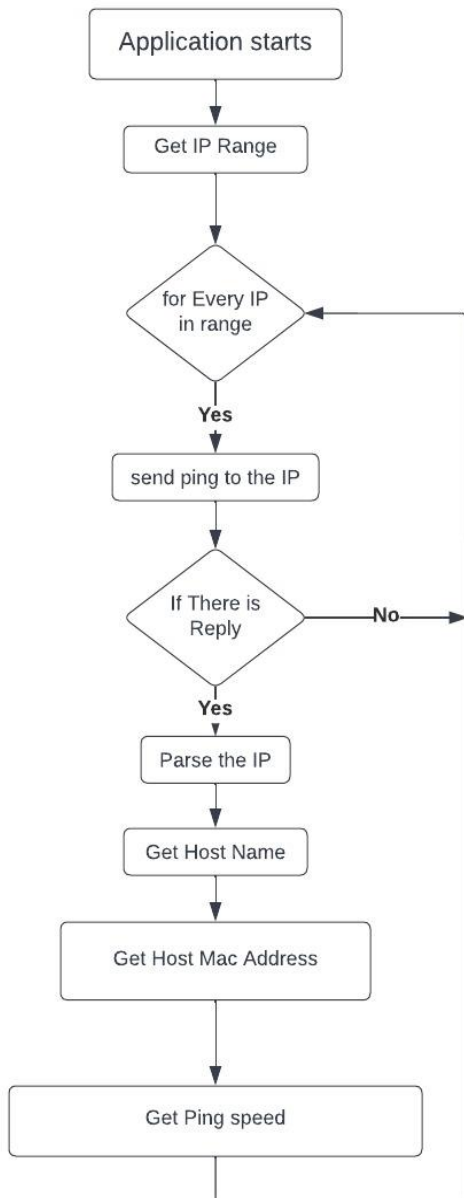If the information is retrieved, it will be displayed as below:

Figure: IP Scanner working

B. Internet speed test

The main aim of the internet speed test module is to determine the internet speed by connecting to a particular server in the location. The requirements are:

.NET Framework
In-Built Libraries
System.Linq
System.Windows
System.Net
System. Threading
System. ComponentMode1
System.Runtime
System.Diagnostics
System.Text

Initially, when the application starts, the basic dashboard is displayed as below:
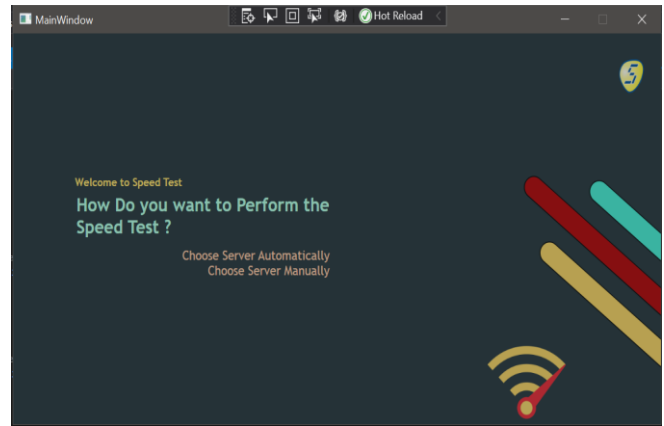
The user has 2 options to choose from. One would be the automatic server selection and the other would be a manual server selection. In the automatic server selection, according to the location details of the user, the best nearest server in that location will be selected automatically and results will be displayed.
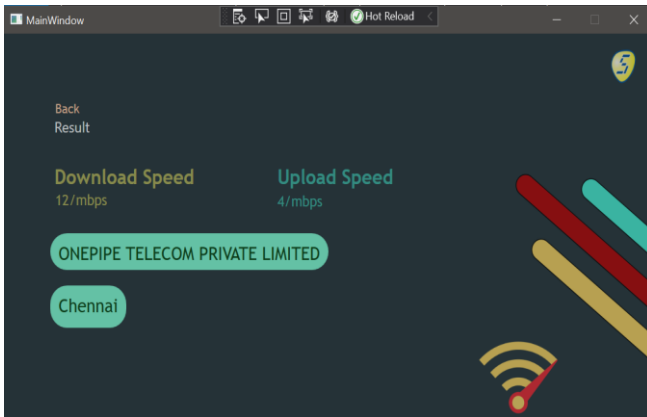
In the manual server selection, a list of available servers will be displayed as below:
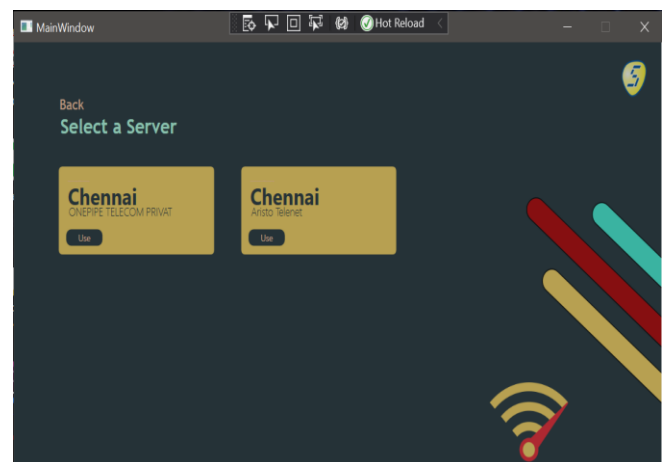
The user is required to select a server of his/her choice and the system will start scanning by sending data packets to the selected server. The user will be showed a prompt as below :
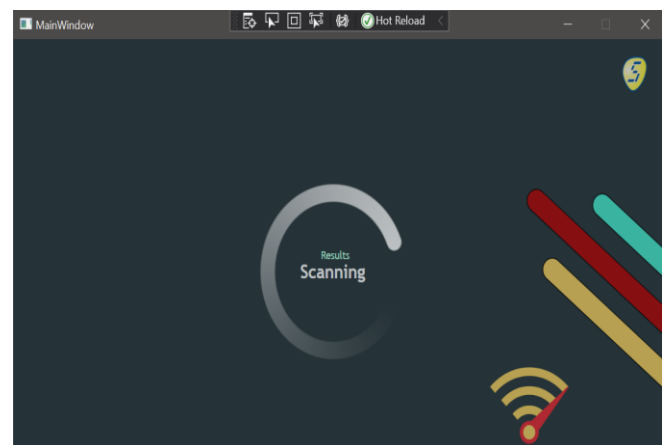
Once the scanning is done, The results of the scan will be displayed as below:

We can see that the result is displayed with the upload and download speed and the selected server.

Note: Before the server selection process, the user can change his or her location by using an efficient VPN in the market.
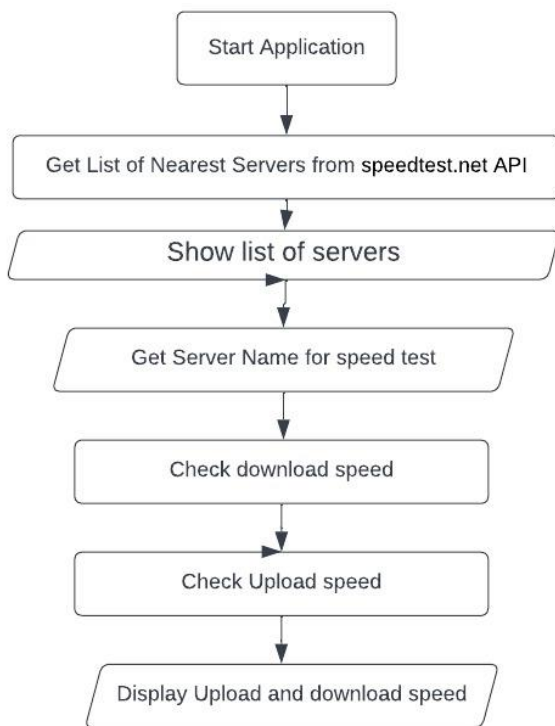

Figure : Internet speed test working

IV. CONCLUSION

New technologies and features help in the development of an individual. These features generally require a device and a stable internet connection. Although the requirements are less, the threats and vulnerabilities of these requirements are certainly a problem. These threats and vulnerabilities include reconnaissance, enumeration, and security breaches of a personal device. These threats are done by various networking and spoofing attacks. Although these can be prevented by different applications available on the market, the proposed solution is a standalone application that aids the user to prevent these kinds of attacks.

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Prasanna Phanindran S, B.Tech (Information Technology), Easwari Engineering College, *Chennai, India*.

Srivathsan G, B.Tech (Information Technology), Easwari Engineering College, *Chennai, India*.

Ananthi N, Head of Department, Department of Information Technology, Easwari Engineering College, *Chennai, India*.

Surender Rangaraju, Director, SNETEL Technologies, *Ho Chi Minh City, Vietnam.*