CSE 5231 - Network Packet Generator Using Scapy

Shivani Somireddy, Kalpana Nakka, Prathibha Mopidevi
Dept. of Computer Information Systems
Florida Institute of Technology
Melbourne, FL, USA

December 8, 2023

TO

Abdullah Aydeger
Dept. of Electrical Engineering and Computer Science
Florida Institute of Technology, Melbourne, FL, USA
aaydeger@fit.edu

Contents

1 Abstract

The "Network Packet Generator Using Scapy" project aims to develop a versatile and efficient tool for creating network packets using the Scapy framework. Scapy, a powerful Python library, provides a comprehensive set of functionalities for crafting, sending, and receiving network packets, making it an ideal choice for network protocol development, testing, and analysis.

This project focuses on designing a user-friendly interface that enables users to dynamically create custom network packets with specified protocols, headers, and payloads. The packet generator will support a range of protocols, including but not limited to Ethernet, IP, ARP, DNS. Users will be able to define packet structures, set various parameters, and customize payload content, allowing for the simulation of diverse network scenarios.

2 Introduction

The "Network Packet Generator Using Scapy project aims to develop a versatile and efficient tool for creating network packets using the Scapy framework. Scapy, a powerful Python library, provides a comprehensive set of functionalities for crafting, sending, and receiving network packets, making it an ideal choice for network protocol development, testing, and analysis.

This project focuses on designing a user-friendly interface that enables users to dynamically create custom network packets with specified protocols, headers, and payloads. The packet generator will support a range of protocols, including but not limited to Ethernet, IP, ARP, DNS. Users will be able to define packet structures, set various parameters, and customize payload content, allowing for the simulation of diverse network scenarios.

Key features of the "Network Packet Generator Using Scapy project include:

- Protocol Support: The tool will provide support for a wide array of network protocols, allowing users to create packets tailored to their specific testing or development needs.
- Customization Options: Users can easily configure packet parameters such as source and destination addresses, protocol headers, payload content, and more, providing flexibility for diverse use cases.
- Graphical User Interface (GUI): The project will include an intuitive GUI to enhance user experience, making it accessible to both novice and experienced network engineers.

The "Network Packet Generator Using Scapy project serves as a valuable resource for network engineers, cyber security professionals, and developers involved in network protocol development and testing. Its versatility and ease of use make it a valuable asset for simulating diverse network scenarios and ensuring the robustness and security of networked systems.

3 Problem Definition

The field of network protocol development, testing, and analysis requires efficient tools that allow engineers, developers, and cybersecurity professionals to create, manipulate, and analyze network packets. However, existing solutions often lack user-friendly interfaces, comprehensive protocol support, and aids for packet customization. To address these limitations, the "Network Packet Generator Using Scapy" project aims to solve the following key problems:

Limited Protocol Support: Many existing packet generation tools offer support for only a subset of network protocols, restricting the ability to simulate diverse network scenarios. Lack of support for emerging or less common protocols can hinder the testing and development of systems relying on these protocols.

Complex Packet Customization: Existing tools may require users to have an in-depth understanding of protocol structures and may lack intuitive interfaces for easily customizing packet parameters.

Inaccessible for Novice Users: Some existing tools are designed primarily for experienced users and lack a user-friendly interface, making them inaccessible to individuals with limited networking knowledge. Novice users may find it challenging to create and manipulate packets without a tool that provides a clear and intuitive interface.

The "Network Packet Generator Using Scapy" project seeks to address these problems by developing a versatile, user-friendly, and feature-rich tool that supports a wide range of protocols, offers intuitive customization options, and provides a graphical user interface. This tool will bridge the gap between novice and experienced users, facilitating effective network protocol development, testing, and analysis.

4 Objectives

Objectives for the "Network Packet Generator Using Scapy" Project:

- **Comprehensive Protocol Support:** Develop support for a diverse set of network protocols, including but not limited to Ethernet, IP, DNS, ARP, ensuring that the tool can accommodate a wide range of testing and development scenarios.
- **Intuitive User Interface:** Design a user-friendly graphical interface that enables both novice and experienced users to easily create network packets. The interface should provide a clear representation of packet structures and parameters.
- **Flexible Packet Customization:** Implement robust customization options, allowing users to define packet parameters such as source and destination addresses, protocol headers, payload content, and other relevant attributes. Ensure that customization is both accessible for beginners and powerful for advanced users.
- **Documentation and Tutorials:** Provide comprehensive documentation, including user guides and tutorials, to assist users in understanding the tool's features and capabilities. This will facilitate a smooth onboarding process for users with varying levels of expertise.
- **Error Handling and Reporting:** Implement effective error handling mechanisms to alert users about potential issues during packet generation. Include detailed error reporting to aid users in diagnosing and resolving problems.
- **Community Engagement:** Foster a community around the tool by encouraging user feedback, feature requests, and contributions. Establish communication channels such as forums, mailing lists, or social media to facilitate community engagement.

By achieving these objectives, the "Network Packet Generator Using Scapy" project aims to deliver a powerful, accessible, and versatile tool that meets the diverse needs of network engineers, developers, and cyber security professionals.

5 Scope

The scope of the "Network Packet Generator Using Scapy" project encompasses the development of a robust and versatile tool with features and capabilities that cater to the needs of network engineers, developers, and cybersecurity professionals. The project aims to provide a comprehensive solution for creating network packets. The key scope elements include:

- **Protocol Support:** The tool will support a broad range of network protocols, including commonly used ones such as Ethernet, IP, ARP, DNS and potentially extending to support emerging or less common protocols.
- **User Interface:** A graphical user interface (GUI) will be designed to provide an intuitive and user-friendly environment for creating and modifying network packets. The GUI will facilitate easy navigation and customization of packet parameters.
- **Documentation and Tutorials:** Comprehensive documentation, including user guides and tutorials, will be provided to assist users in understanding and utilizing the tool effectively. This documentation will serve as a valuable resource for onboarding and troubleshooting.
- **Community Engagement:** The project aims to foster a community around the tool by encouraging user engagement, feedback, and contributions. Establishing communication channels will facilitate ongoing support and improvement through community collaboration.

By addressing these aspects, the "Network Packet Generator Using Scapy" project seeks to create a tool that not only meets the immediate needs of users but also provides a foundation for ongoing development and community involvement in the realm of network protocol testing and analysis.

6 System Requirements

The "Network Packet Generator Using Scapy" project has the following system requirements:

- **Python Version:** 3.10
- **Inbuilt Python Libraries:** Included with the Python installation
- **Scapy Library:** Required for packet crafting and manipulation
- **CGI (Common Gateway Interface):** Used for web applications
- **OS Library:** Operating system interaction in Python
- **HTML, CSS, Bootstrap, JavaScript:** Front-end web development technologies
- **Operating System:** Windows 11
- **Text Editor/IDE:** Visual Studio Code

Make sure your system meets these requirements to successfully develop and run the "Network Packet Generator Using Scapy" project.

7 Literature Review

Network Packet Generator is used to generate network packets by utilizing Scapy, providing a graphical user interface (GUI) where users have the flexibility to select the protocol and enter the details required to generate the packets. It supports IP, DNS, and ARP packet generation through a simple UI.

7.1 How does Network Packet Generator work?

The home page displays all the available options to generate packets, where the user has to select the packet type they would like to generate. Once a protocol is selected, it directs the user to the respective page and displays the corresponding options to generate the packets. After the user enters all the mandatory details and clicks on the submit button, the details are validated, and the packet is generated if the details are valid. Successfully generated packets can be captured using any network capturing tools like Wireshark.

7.2 Important Uses of Network Packet Generator

Network Packet Generator is used to generate network packets using IP, ARP, and DNS protocols. A simple UI is provided to generate the packets, making it accessible to any kind of user.

7.3 Benefits of Network Packet Generator

A simple tool to generate network packets using Scapy, which can be used by any kind of user.

This literature review provides an overview of the Network Packet Generator, highlighting its usage, functionality, and benefits. The project aims to build on this foundation by developing a versatile and user-friendly tool for network protocol development, testing, and analysis.

8 Proposed Method

The below representation is the block diagram of the proposed method for the online assignment plagiarism checker for images.

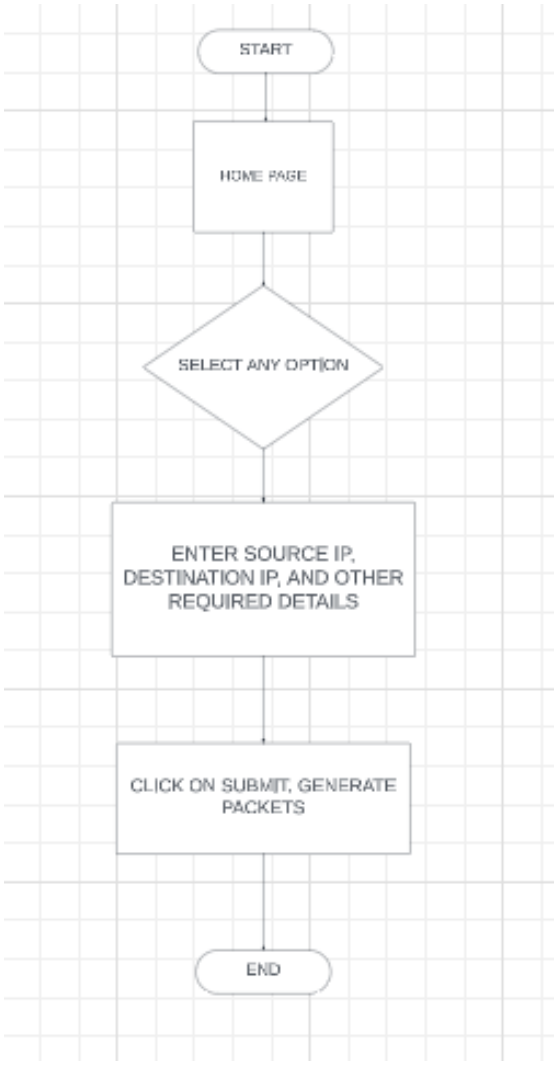

Figure 1: Flow Chart describing the proposed method

8.1 How does the Proposed System Work?

Step 01: HomePage displays all the available options to the user like DNS, ARP, IP packet generation packets. The user has to select the one for which

they would like to generate packets.

Step 02: Once an option is selected, control is navigated to the corresponding page, and displays the options to generate that particular packet. Mainly, source IP and destination IP are mandatory details to be provided.

Step 03: After the user has submitted all the required details and clicks on the submit button, the packet is generated, which can be checked using network capturing tools like Wireshark.

Step 04: Similarly, the user can generate different packets using protocols like DNS, ARP, IP.

Step 05: The user also has the flexibility of providing feedback and access to contact info.

8.2 How Scapy Works?

Scapy is a powerful and flexible packet manipulation tool and library for Python. It enables users to create, send, sniff, and manipulate network packets. Here's an overview of how Scapy works:

Packet Creation: Scapy allows users to create network packets from scratch or modify existing ones. Users can specify various parameters such as source and destination addresses, protocol headers, and payload content.

Packet Layers: Scapy represents packets as a series of layers. Each layer corresponds to a specific protocol (e.g., Ethernet, IP, TCP, UDP) or a payload. Users can stack multiple layers to create complex packets with nested protocols.

Interactive Shell: Scapy provides an interactive shell (REPL) that allows users to dynamically create, modify, and inspect packets. This shell is particularly useful for testing and exploring packet structures.

```
# Example of using Scapy in an interactive shell
>>> from scapy.all import *
>>> packet = IP(dst="www.example.com")/TCP(dport=80)
>>> packet
<IP  dst=Net("www.example.com") |<TCP  dport=http |>>
```

Packet Manipulation: Scapy offers a wide range of functions for manipulating packet fields. Users can modify individual fields, append or remove layers, and perform various operations on packets.

```
# Example of modifying a packet using Scapy
>>> packet = IP(dst="www.example.com")/TCP(dport=80)
>>> packet[IP].dst = "192.168.1.1"
>>> packet
<IP  dst=192.168.1.1 |<TCP  dport=http |>>
```

Packet Sending: Scapy enables users to send packets over the network using different transport mechanisms. Users can send packets at different layers, allowing for various testing scenarios.

```
# Example of sending a packet using Scapy
>>> packet = IP(dst="www.example.com")/TCP(dport=80)
>>> send(packet)
```

Packet Sniffing: Scapy can be used to capture and analyze network traffic by sniffing packets on a network interface. Users can apply filters to capture specific types of packets.

```
# Example of sniffing packets using Scapy
>>> sniff(filter="icmp", count=5)
```

Integration with Other Tools: Scapy can be integrated with other networking tools and libraries. It works well in conjunction with tools like Wireshark for detailed packet analysis.

Extensibility: Scapy is extensible, allowing users to define custom protocols or add support for new ones. This makes it a versatile tool for handling a wide range of network protocols.

```
# Example of defining a custom protocol in Scapy
>>> class MyProtocol(Packet):
...   name = "MyProtocol"
...   fields_desc = [IntField("my_field", 0)]
```

In summary, Scapy provides a Pythonic interface for creating, manipulating, and analyzing network packets. Its interactive shell and extensive functionality make it a valuable tool for network engineers, security professionals, and developers working on various networking tasks and protocols.

9 Desgin

9.1 HTML Pages

9.1.1 ARPPage.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css">
    <script src="http://localhost/NPG/Scripts/ARPScript.
        js"></script>
    <title>NPG</title>
</head>
<body>
    <!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <script src="http://localhost/NPG/Scripts/ARPScript.
        js"></script>
    <title>NPG</title>
</head>

<body>
    <div>
        <div class="row page-header-row">
            <div class="col-sm-2">
                <a title="Click here to navigate to
                    Welcome Page." href="./WelcomePage.
                    html">
```

```
                    <img src="http://localhost/NPG/Images
                        /PageLogoImage.png" class="img-
                        thumbnail" width="80px" height="60
                        px">
                </a>
            </div>
            <div class="col-sm-8 text-center page-header"
                >
                <!-- Content for column 2 -->
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>
            <div class="col-sm-2 text-right">
                <a title="Click here to navigate to
                    Website Information Page." href="./
                    InfoPage.html"><img
                        src="http://localhost/NPG/Images/
                            PageInfoImage.png" class="img-
                            thumbnail" width="80px" height
                            ="60px">
                </a>
            </div>
        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br />
    <div class="container">
        <div class="row">
            <div class="col-sm-12">
                <form class="row g-3" name="arp-form"
                    onsubmit="return validateARPDetails()"
                     action="http://localhost/NPG/Server/
                    ARPPacketGenerator.py" method="post">
                    <div class="col-12">
                        <label for="destinationIP" class=
                            "form-label">Destination IP</
                            label>
```

```
                    <input type="text" class="form-
                        control" id="destinationIP"
                        name="destinationIP"
                        placeholder="192.168.1.1">
                </div>
                <div class="col-12">
                    <label for="destinationMAC" class
                        ="form-label">Destination MAC<
                        /label>
                    <input type="text" class="form-
                        control" id="destinationMAC"
                        name="destinationMAC"
                        placeholder="00:00:00:00:00:00
                        " value="00:00:00:00:00:00">
                </div>
                <div class="col-12">
                    <label for="sourceIP" class="form
                        -label">Source IP</label>
                    <input type="text" class="form-
                        control" id="sourceIP" name="
                        sourceIP" placeholder="
                        192.168.1.2">
                </div>
                <div class="col-12">
                    <br /><button type="submit" class
                        ="btn btn-primary">generate</
                        button>
                </div>
            </form>
        </div>
    </div>
</div>
<div class="contact">
    <button class="contact-btn" title="Click here to
        navigate to Contact Info Page.">
        <a class="pg" href="./ContactInfoPage.html">
            <img src="http://localhost/NPG/Images/
                contactInfoImage.png" width="20px"
                height="20px" />Contact
        </a>
    </button>
</div>
<div class="feedback">
    <button class="feedback-btn" title="Click here to
        navigate to Feedback Page.">
        <a class="pg" href="./FeedbackPage.html"><img
```

```
                    src="http://localhost/NPG/Images/
                    feedbackImage.png" width="20px"
                        height="20px" />Feedback</a>
            </button>
        </div>
        <!-- Bootstrap JS and Popper.js (optional, but
            required for some Bootstrap components) -->
        <script src="https://code.jquery.com/jquery-3.2.1.
            slim.min.js"></script>
        <script src="https://cdnjs.cloudflare.com/ajax/libs/
            popper.js/1.12.9/umd/popper.min.js"></script>
        <script src="https://maxcdn.bootstrapcdn.com/
            bootstrap/4.0.0/js/bootstrap.min.js"></script>
</body>

</html>

</body>
</html>
```

Document Structure and Metadata

The HTML document begins with the standard Document Type Declaration (`<!DOCTYPE html>`), indicating that it adheres to the HTML5 specification. The root element, `<html>`, includes the "lang" attribute set to "en" for English. The head section contains essential metadata, such as character set and viewport configuration, to ensure proper rendering across devices.

External Resources

Within the head section, the document references external resources, including the Bootstrap CSS framework (`bootstrap.min.css`) and a custom stylesheet (`HomePageStyle.css`). Additionally, an external JavaScript file (`ARPScript.js`) is linked, suggesting the inclusion of dynamic client-side functionality.

Page Title

The title of the web page, set within the `<title>` tag, is specified as "NPG." This title is typically displayed in the browser's title bar or tab.

Body Content

The body of the HTML document contains the main content of the web page. It is structured with various divisions (`<div>`) to organize different sections.

Header Section

The first `<div>` contains the page header, which consists of a logo, site name, and navigation links. The logo and site name are hyperlinked, providing navigation to different pages within the website.

Scrolling Marquee

A `<marquee>` element is used to create a scrolling text banner within another `<div>`. The marquee text communicates that the webpage serves as a comprehensive tool for generating network packets using ARP, IP, and DNS.

Form Section

The main content includes a form for generating Address Resolution Protocol (ARP) packets. The form utilizes the Bootstrap grid system with responsive columns. Input fields for destination IP, destination MAC, and source IP are provided, along with a "Generate" button. The form is set to trigger a JavaScript validation function (`validateARPDetails()`) upon submission and directs the form data to a server-side script (`ARPPacketGenerator.py`) using the HTTP POST method.

Contact and Feedback Buttons

Following the form, two separate `<div>` elements contain buttons that serve as links to the contact information and feedback pages. Each button includes an icon and text, providing users with convenient navigation options.

Bootstrap JavaScript

Finally, the HTML document includes references to external JavaScript files (`jquery.slim.min.js, popper.min.js, and bootstrap.min.js`) from the Bootstrap framework. These scripts enhance the webpage's functionality and are particularly important for certain Bootstrap components.

9.1.2 ContactInfoPage.html

```
<!DOCTYPE html>
<html lang="en">
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
```

```
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <title>NPG</title>
</head>

<body>
    <div>
        <div class="row page-header-row">
            <div class="col-sm-2">
                <a title="Click here to navigate to
                    Welcome Page." href="./WelcomePage.
                    html">
                    <img src="http://localhost/NPG/Images
                        /PageLogoImage.png" class="img-
                        thumbnail" width="80px" height="60
                        px">
                </a>
            </div>
            <div class="col-sm-8 text-center page-header"
                >
                <!-- Content for column 2 -->
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>
            <div class="col-sm-2 text-right">
                    <a title="Click here to navigate to
                        Website Information Page." href="
                        ./InfoPage.html"><img src="http://
                        localhost/NPG/Images/PageInfoImage
                        .png" class="img-thumbnail" width=
                        "80px"
                            height="60px">
                        </a>
            </div>
        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
```

```
        network packects
        using ARP, IP, DNS.</marquee>
</div>
<br />
<br />
<br />
<br />
<div class="container">
    <div class="row">
        <div class="col-sm-3">
            Twitter: <img src="http://localhost/NPG/
                Images/twitter.png" alt="twitter"
                title="@random">
        </div>
        <div class="col-sm-3">
            Linkedin: <img src="http://localhost/NPG/
                Images/linkedin.png" alt="linkedin"
                title="random-user">
        </div>
        <div class="col-sm-3">
            Google+: <img src="http://localhost/NPG/
                Images/google-plus.png" alt="google+"
                title="random.user@gmail.com">
        </div>
        <div class="col-sm-3">
            Facebook: <img src="http://localhost/NPG/
                Images/facebook.png" alt="facebook"
                title="random-user">
        </div>
    </div>
</div>
<div class="feedback">
    <button class="feedback-btn" title="Click here to
        navigate to Feedback Page.">
        <a class="pg" href="./FeedbackPage.html"><img
            src="http://localhost/NPG/Images/
            feedbackImage.png" width="20px" height="20
            px" />Feedback</a>
    </button>
</div>

<!-- Bootstrap JS and Popper.js (optional, but
    required for some Bootstrap components) -->
<script src="https://code.jquery.com/jquery-3.2.1.
    slim.min.js"></script>
```

```
    <script src="https://cdnjs.cloudflare.com/ajax/libs/
        popper.js/1.12.9/umd/popper.min.js"></script>
    <script src="https://maxcdn.bootstrapcdn.com/
        bootstrap/4.0.0/js/bootstrap.min.js"></script>
</body>

</html>
</html>
```

Social Media Links

Following the scrolling marquee, a container `<div>` uses the Bootstrap grid system to display social media links. Each column represents a different social media platform (Twitter, LinkedIn, Google+, Facebook). The platform names are displayed alongside image icons linked to relevant profiles.

Feedback Button

Another `<div>` is dedicated to a feedback button styled with Bootstrap classes. The button is linked to a feedback page and includes an image icon alongside the text "Feedback." The distinctive elements in this HTML code include the presentation of social media links and a feedback button, contributing to user engagement and interaction on the webpage. The rest of the structure and components are similar to the previously described HTML code.

9.1.3 DNSPage.html

```
<!DOCTYPE html>
<html lang="en">
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,-
        initial-scale=1.0">
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <script src="http://localhost/NPG/Scripts/DNSScript1.
        js"></script>
    <title>NPG</title>
</head>
```

```
<body>
    <div>
        <div class="row page-header-row">
            <div class="col-sm-2">
                <a title="Click here to navigate to
                    Welcome Page." href="./WelcomePage.
                    html">
                    <img src="http://localhost/NPG/Images
                        /PageLogoImage.png" class="img-
                        thumbnail" width="80px" height="60
                        px">
                </a>
            </div>
            <div class="col-sm-8 text-center page-header"
                >
                <!-- Content for column 2 -->
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>
            <div class="col-sm-2 text-right">
                <a title="Click here to navigate to
                    Website Information Page." href="./
                    InfoPage.html"><img
                        src="http://localhost/NPG/Images/
                            PageInfoImage.png" class="img-
                            thumbnail" width="80px" height
                            ="60px">
                </a>
            </div>
        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br />
    <div class="container">
        <div class="row">
            <div class="col-sm-12">
```

```
                <form class="row g-3" name="dns-form"
                    onsubmit="return validateDNSDetails()"
                     action="http://localhost/NPG/Server/
                    DNSPacketGenerator.py" method="post">
                    <div class="col-12">
                        <label for="destinationIP" class=
                            "form-label">Destination IP</
                            label>
                        <input type="text" class="form-
                            control" id="destinationIP"
                            name="destinationIP"
                            placeholder="192.168.1.1">
                    </div>
                    <div class="col-12">
                        <label for="sourceIP" class="form
                            -label">Source IP</label>
                        <input type="text" class="form-
                            control" id="sourceIP" name="
                            sourceIP" placeholder="
                            192.168.1.2">
                    </div>
                    <div class="col-12">
                        <label for="dnsQuery" class="form
                            -label">DNS Query</label>
                        <input type="text" class="form-
                            control" id="dnsQuery" name="
                            dnsQuery" placeholder="example
                            .com" value="example.com">
                    </div>
                    <div class="col-12">
                        <br /><button type="submit" class
                            ="btn btn-primary">generate</
                            button>
                    </div>
                </form>
            </div>
        </div>
    </div>
    <div class="contact">
        <button class="contact-btn" title="Click here to
            navigate to Contact Info Page.">
            <a class="pg" href="./ContactInfoPage.html">
                <img src="http://localhost/NPG/Images/
                    contactInfoImage.png" width="20px"
                    height="20px" />Contact
            </a>
```

```
        </button>
    </div>
    <div class="feedback">
        <button class="feedback-btn" title="Click here to
            navigate to Feedback Page.">
            <a class="pg" href="./FeedbackPage.html"><img
                src="http://localhost/NPG/Images/
                feedbackImage.png" width="20px"
                    height="20px" />Feedback</a>
        </button>
    </div>
    <!-- Bootstrap JS and Popper.js (optional, but
        required for some Bootstrap components) -->
    <script src="https://code.jquery.com/jquery-3.2.1.
        slim.min.js"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/
        popper.js/1.12.9/umd/popper.min.js"></script>
    <script src="https://maxcdn.bootstrapcdn.com/
        bootstrap/4.0.0/js/bootstrap.min.js"></script>
</body>
</html>
</html>
```

This HTML code defines a webpage for a Network Packet Generator (NPG) with a focus on DNS packet generation. Let's delve into the specific details of this code:

- **DNS Form Section:** The primary content of the webpage is a form designed for DNS packet generation. The form is encapsulated in a container with Bootstrap styling. It utilizes the grid system to create a single-column layout within a Bootstrap row. The form is specifically named `dns-form` and is configured to invoke the JavaScript function `validateDNSDetails()` when submitted. The form's action attribute points to a server-side script, `DNSPacketGenerator.py`, using the HTTP POST method.
- **Form Input Fields:** The form consists of three input fields: `Destination IP`, `Source IP`, and `DNS Query`. Each input field is contained within a Bootstrap grid column. The `Destination IP` and `Source IP` fields are for entering IP addresses, while the `DNS Query` field allows users to input a domain for DNS packet generation. Placeholder text is provided for guidance, and default values are set for the `DNS Query` field.
- **Submit Button:** A submit button with the label `generate` is included at the end of the form. The button has the Bootstrap classes for styling and is set to trigger the DNS packet generation when clicked.
- **Contact and Feedback Buttons:** The webpage includes contact and feedback buttons, each contained within their respective `<div>` elements.

These buttons are linked to contact and feedback pages and are styled with Bootstrap classes. The contact button features an image icon alongside the text `Contact`, while the feedback button similarly includes an image icon with the text `Feedback`.

This HTML code specializes in providing a form for DNS packet generation within the broader context of a Network Packet Generator webpage. The form allows users to input destination and source IP addresses, as well as a DNS query, initiating the generation process upon submission. The webpage also features navigation buttons for contact and feedback, contributing to a user-friendly interface.

9.1.4 EndPage.html

```
<!DOCTYPE html>
<html lang="en">
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <title>NPG</title>
</head>

<body>
    <div>
        <div class="row page-header-row">

            <div class="col-sm-12 text-center page-header
                ">
                <!-- Content for column 2 -->
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>

        </div>
```

```
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br />
    <div class="container">
        <div class="row">
            <div class="col-sm-12 text-center">
                Thank you for visiting network packet
                    generator.
            </div>
        </div>
    </div>


    <!-- Bootstrap JS and Popper.js (optional, but
        required for some Bootstrap components) -->
    <script src="https://code.jquery.com/jquery-3.2.1.
        slim.min.js"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/
        popper.js/1.12.9/umd/popper.min.js"></script>
    <script src="https://maxcdn.bootstrapcdn.com/
        bootstrap/4.0.0/js/bootstrap.min.js"></script>
</body>
</html>
</html>
```

Header Section

The webpage starts with a header section containing a single-row Bootstrap grid (`row`). Within this row, there is a centered column (`col-sm-12`) that spans the entire width of the page. The content of this column is a bolded link labeled "NETWORK PACKET GENERATOR." This link, titled "NPG" and styled with the "hd" class, serves as a navigational link to the homepage (`HomePage.html`).

Scrolling Marquee

Below the header, a `<marquee>` element is used to create a scrolling text banner. The marquee displays the message "One stop tool to generate network packets using ARP, IP, DNS." This scrolling banner provides a concise and dynamic description of the Network Packet Generator's capabilities.

Thank You Message

Following the marquee, there is a container with a single row and column (`col-sm-12`). The content of this column is a centered text message: "Thank you for visiting network packet generator." This expresses gratitude to users for visiting the webpage, enhancing the user experience with a polite acknowledgment.

9.1.5 FeedBackPage.html

```
<!DOCTYPE html>
<html lang="en">
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <script src="http://localhost/NPG/Scripts/
        FeedbackScript.js"></script>
    <title>NPG</title>
</head>

<body>
    <div>
        <div class="row page-header-row">
            <div class="col-sm-2">
                <!-- Content for column 1 -->
                <button title="Click here to navigate to
                    Welcome Page.">
                    <a href="./WelcomePage.html"><img src
                        ="http://localhost/NPG/Images/
                        PageLogoImage.png" width="60px"
                        height="50px"></a>
                </button>
            </div>
            <div class="col-sm-8 text-center page-header"
                >
                <!-- Content for column 2 -->
```

```
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>
            <div class="col-sm-2-text-right">
                <!-- Content for column 3 -->
                <button title="Click here to navigate to
                    Website Information Page.">
                    <a href="./InfoPage.html"><img src="
                        http://localhost/NPG/Images/
                        PageInfoImage.png" width="60px"
                            height="50px"></button></a>
            </div>
        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br />
    <br />
    <br />
    <div class="container">
        <div class="row">
            <div class="col-sm-12">
                <form name="feedback-form" onsubmit="
                    return feedbackSubmitted()" action="
                    http://localhost/NPG/Server/
                    feedbackSubmission.py" method="POST">
                    <label name="feedback-person-id">User
                        </label><br />
                    <input type="text" placeholder="
                        please enter your name/email" name
                        ="feedback-person-id"
                         size="40"><br /><br />
                    <div class="form-floating">
                        <label for="floatingTextarea">
                            Comments</label>
                        <textarea class="form-control"
                            placeholder="Leave a comment
                            here" id="floatingTextarea"
```

```
                                name="comments"></textarea>
                            <br />
                            <button type="submit" class="
                                feedback-submit-btn">Submit</
                                button>
                        </div>
                    </form>
                </div>
            </div>
        </div>
        <div class="contact">
            <button class="contact-btn">
                <a class="pg" href="./ContactInfoPage.html">
                    <img src="http://localhost/NPG/Images/
                        contactInfoImage.png" width="20px"
                        height="20px" />Contact
                </a>
            </button>
        </div>

        <!-- Bootstrap JS and Popper.js (optional, but
            required for some Bootstrap components) -->
        <script src="https://code.jquery.com/jquery-3.2.1.
            slim.min.js"></script>
        <script src="https://cdnjs.cloudflare.com/ajax/libs/
            popper.js/1.12.9/umd/popper.min.js"></script>
        <script src="https://maxcdn.bootstrapcdn.com/
            bootstrap/4.0.0/js/bootstrap.min.js"></script>
    </body>
    </html>
</html>
```

Header Section

The header consists of a Bootstrap grid with three columns (`col-sm-2`, `col-sm-8`, `col-sm-2`). Column 1 and Column 3 contain buttons with links to the Welcome Page and Website Information Page, respectively. Column 2 is the main header, featuring a bolded link titled "NETWORK PACKET GENERATOR" that serves as a navigational link to the homepage.

Scrolling Marquee

A `<marquee>` element is implemented below the header to create a scrolling text banner. It displays the message "One stop tool to generate network packets using ARP, IP, DNS."

Feedback Form

A Bootstrap container holds a feedback form named "feedback-form." The form triggers the JavaScript function `feedbackSubmitted()` on submission. The form's action attribute points to the server-side script `feedbackSubmission.py` using the HTTP POST method. It includes fields for the user's name or email (`feedback-person-id`) and comments. A submit button allows users to submit feedback.

Contact Button

A contact button is included, linked to a Contact Information Page. The button includes an image icon and text for a visually appealing way to access contact details.

Bootstrap JavaScript

The webpage incorporates Bootstrap's JavaScript and Popper.js libraries through script tags. These scripts enhance interactivity and functionality, providing support for various Bootstrap components.

In summary, this webpage is designed for a Network Packet Generator, featuring a header with navigation links, a scrolling banner highlighting the tool's features, a feedback form for user comments, and a contact button for easy access to contact information. The use of Bootstrap ensures a responsive design, and the included JavaScript enhances the webpage's functionality.

9.1.6 HomePage.html

```
<!DOCTYPE html>
<html lang="en">
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <script src="http://localhost/NPG/Scripts/
        FeedbackScript.js"></script>
    <title>NPG</title>
```

```
</head>

<body>
    <div>
        <div class="row page-header-row">
            <div class="col-sm-2">
                <!-- Content for column 1 -->
                <button title="Click here to navigate to
                    Welcome Page.">
                    <a href="./WelcomePage.html"><img src
                        ="http://localhost/NPG/Images/
                        PageLogoImage.png" width="60px"
                        height="50px"></a>
                </button>
            </div>
            <div class="col-sm-8 text-center page-header"
                >
                <!-- Content for column 2 -->
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>
            <div class="col-sm-2 text-right">
                <!-- Content for column 3 -->
                <button title="Click here to navigate to
                    Website Information Page.">
                    <a href="./InfoPage.html"><img src="
                        http://localhost/NPG/Images/
                        PageInfoImage.png" width="60px"
                            height="50px"></button></a>
            </div>
        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br />
    <br />
    <br />
    <div class="container">
```

```
    <div class="row">
        <div class="col-sm-12">
            <form name="feedback-form" onsubmit="
                return feedbackSubmitted()" action="
                http://localhost/NPG/Server/
                feedbackSubmission.py" method="POST">
                <label name="feedback-person-id">User
                    </label><br />
                <input type="text" placeholder="
                    please enter your name/email" name
                    ="feedback-person-id"
                     size="40"><br /><br />
                <div class="form-floating">
                    <label for="floatingTextarea">
                        Comments</label>
                    <textarea class="form-control"
                        placeholder="Leave a comment
                        here" id="floatingTextarea"
                         name="comments"></textarea>
                    <br />
                    <button type="submit" class="
                        feedback-submit-btn">Submit</
                        button>
                </div>
            </form>
        </div>
    </div>
</div>
<div class="contact">
    <button class="contact-btn">
        <a class="pg" href="./ContactInfoPage.html">
            <img src="http://localhost/NPG/Images/
                contactInfoImage.png" width="20px"
                height="20px" />Contact
        </a>
    </button>
</div>

<!-- Bootstrap JS and Popper.js (optional, but
    required for some Bootstrap components) -->
<script src="https://code.jquery.com/jquery-3.2.1.
    slim.min.js"></script>
<script src="https://cdnjs.cloudflare.com/ajax/libs/
    popper.js/1.12.9/umd/popper.min.js"></script>
<script src="https://maxcdn.bootstrapcdn.com/
    bootstrap/4.0.0/js/bootstrap.min.js"></script>
```

</body>

</html>
</html>

Header Section

The header consists of a Bootstrap grid with three columns. The first and third columns each contain a button linked to the Welcome Page and Website Information Page, respectively. The second column is the main header, featuring a bolded link titled "NETWORK PACKET GENERATOR," serving as a navigation link to the homepage.

Scrolling Marquee

Below the header, a `<marquee>` element creates a scrolling text banner displaying the message "One stop tool to generate network packets using ARP, IP, DNS."

Feedback Form

Within a Bootstrap container, there's a feedback form named "feedback-form." When submitted, the form triggers the JavaScript function `feedbackSubmitted()`. The form's action attribute points to the server-side script `feedbackSubmission.py` using the HTTP POST method. It includes fields for the user's name or email (`feedback-person-id`) and comments. A submit button allows users to submit feedback.

Contact Button

A contact button is included, linked to a Contact Information Page. The button contains an image icon and text, providing users with an engaging way to access contact details.

Bootstrap JavaScript

The webpage incorporates Bootstrap's JavaScript and Popper.js libraries through script tags, enhancing interactivity and functionality. These scripts contribute to the responsiveness of the design and support various Bootstrap components.

9.1.7 InfoPage.html

<!DOCTYPE html>
<html lang="en">
<!DOCTYPE html>
<html lang="en">

```
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <title>NPG</title>
</head>

<body>
    <div>
        <div class="row page-header-row">
            <div class="col-sm-2">
                <a title="Click here to navigate to
                    Welcome Page." href="./WelcomePage.
                    html">
                    <img src="http://localhost/NPG/Images
                        /PageLogoImage.png" class="img-
                        thumbnail" width="80px" height="60
                        px">
                </a>
            </div>
            <div class="col-sm-8 text-center page-header"
                >
                <!-- Content for column 2 -->
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>
            <div class="col-sm-2 text-right">
                <a title="Click here to navigate to
                    Website Information Page." href="./
                    InfoPage.html"><img
                        src="http://localhost/NPG/Images/
                            PageInfoImage.png" class="img-
                            thumbnail" width="80px" height
                            ="60px">
                </a>
            </div>
```

```
    </div>
</div>
<div>
    <marquee class="header-scroll" direction="right"
        background="#FFFFCC">One stop tool to generate
         network packects
         using ARP, IP, DNS.</marquee>
</div>
<br />
<br />
<div class="container-info">
    <div class="row">
        <div class="col-sm-12">
            <p class="text-center">
                A network packet generator is a
                    software or hardware tool designed
                     to generate and send network
                packets over a computer network.
                    These packets are the basic units
                    of data that travel across a
                network, and
                they contain information necessary
                    for communication between devices
                    and systems. Network packet
                generators are often used for various
                     purposes, including network
                    testing, performance analysis,
                security testing,
                and network troubleshooting.

                Here are some key features and use
                    cases for network packet
                    generators:
            <ol list-style-type="1">
                <li>
                    Network Testing: Network
                        administrators and engineers
                        use packet generators to test
                        the
                    performance and reliability of
                        network devices
                    and infrastructure. They can
                        simulate different types of
                        traffic to assess how a
                        network handles
                    various workloads.
```

```
</li>
<li>
    Load Testing: Packet generators
        can create a high volume of
        network traffic to stress-test
    network components and identify
        bottlenecks
    or weaknesses in the network.
</li>
<li>
    Security Testing: In
        cybersecurity, packet
        generators are used to
        simulate various types of
    network attacks and intrusion
        attempts. By
    sending packets that mimic
        malicious behavior, security
        professionals can evaluate the
    effectiveness
    of network security measures and
        intrusion detection systems.
</li>
<li>
    Protocol and Application Testing:
         Developers and testers use
        packet generators to simulate
        the
    behavior of network protocols and
         applications.
    This helps ensure that software
        or devices conform to industry
         standards and work as
        expected in
    various network environments.
</li>
<li>
    Troubleshooting: When network
        issues arise, packet
        generators can help identify
        problems by
    sending packets and analyzing the
         responses.
    This can be especially useful in
        diagnosing connectivity issues
         or determining the cause of
```

```
                    network
                    slowdowns.
                </li>
                <li>
                    Benchmarking: Network
                        administrators can use packet
                        generators to establish
                        performance
                    benchmarks and compare the
                        results with future
                    network tests. This allows them
                        to track improvements or
                        degradation in network
                        performance over
                    time.
                </li>
            </ol>
            Packet generators can be software-based
                or hardware-based. Software-based
                packet generators run on
            standard computer hardware and can be
                customized
            to generate specific types of packets and
                 simulate various network conditions.
                Hardware-based
            generators are specialized devices
                designed for high-performance
            network testing and can generate packets
                at high speeds with precision.
            Overall, network packet generators are
                valuable tools for maintaining and
                optimizing network
            performance, ensuring network security,
                and diagnosing network issues
            in various IT and networking environments
                .
            </p>
        </div>
    </div>
</div>
<div class="contact">
    <button class="contact-btn">
        <a class="pg" href="./ContactInfoPage.html">
            <img src="http://localhost/NPG/Images/
                contactInfoImage.png" width="20px"
                height="20px" />Contact
```

```
            </a>
        </button>
    </div>
    <div class="feedback">
        <button class="feedback-btn">
            <a class="pg" href="./FeedbackPage.html"><img
                src="http://localhost/NPG/Images/
                feedbackImage.png" width="20px"
                    height="20px" />Feedback</a>
        </button>
    </div>

    <!-- Bootstrap JS and Popper.js (optional, but
        required for some Bootstrap components) -->
    <script src="https://code.jquery.com/jquery-3.2.1.
        slim.min.js"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/
        popper.js/1.12.9/umd/popper.min.js"></script>
    <script src="https://maxcdn.bootstrapcdn.com/
        bootstrap/4.0.0/js/bootstrap.min.js"></script>
</body>

</html>
</html>
```

Header Section

The header includes a Bootstrap grid with three columns (`col-sm-2`, `col-sm-8`, `col-sm-2`). Each column contains content related to navigation: Column 1 has a button linking to the Welcome Page, Column 2 features the main header "NETWORK PACKET GENERATOR" with a hyperlink to the homepage, and Column 3 has a button leading to the Website Information Page.

Scrolling Marquee

Below the header, a `<marquee>` element is implemented, displaying a scrolling message: "One stop tool to generate network packets using ARP, IP, DNS."

Information Section

The main content is organized within a Bootstrap container with a row and a single column (`col-sm-12`). It provides detailed information about network packet generators, serves as user manual for users without having any prior knowledge of this.

Contact and Feedback Buttons

Two buttons are included for contact and feedback. The contact button links to a Contact Information Page, while the feedback button links to a Feedback Page. Each button has an associated image for a visual representation.

Bootstrap JavaScript

The webpage incorporates Bootstrap's JavaScript and Popper.js libraries to enhance interactivity and functionality.

Overall, this webpage serves as an informative platform, providing insights into network packet generators, their uses, and offering links for user interaction through contact and feedback. The use of Bootstrap ensures a responsive and visually appealing design.

9.1.8 IPPage.html

```
<!DOCTYPE html>
<html lang="en">
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <script src="http://localhost/NPG/Scripts/IPScript.js
        "></script>
    <title>NPG</title>
</head>

<body>
    <div>
        <div class="row page-header-row">
            <div class="col-sm-2">
                <a title="Click here to navigate to
                    Welcome Page." href="./WelcomePage.
                    html">
                    <img src="http://localhost/NPG/Images
                        /PageLogoImage.png" class="img-
```

```
                    thumbnail" width="80px" height="60
                    px">
                </a>
            </div>
            <div class="col-sm-8 text-center page-header"
                >
                <!-- Content for column 2 -->
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>
            <div class="col-sm-2 text-right">
                <a title="Click here to navigate to
                    Website Information Page." href="./
                    InfoPage.html"><img
                        src="http://localhost/NPG/Images/
                            PageInfoImage.png" class="img-
                            thumbnail" width="80px" height
                            ="60px">
                </a>
            </div>
        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br />
    <div class="container">
        <div class="row">
            <div class="col-sm-12">
                <form class="row g-3" name="ip-form"
                    onsubmit="return validateIPDetails()"
                    action="http://localhost/NPG/Server/
                    IPPacketGenerator.py" method="post">
                    <div class="col-12">
                        <label for="destinationIP" class=
                            "form-label">Destination IP</
                            label>
                        <input type="text" class="form-
                            control" id="destinationIP"
```

```
            name="destinationIP"
            placeholder="192.168.1.1">
    </div>
    <div class="col-12">
        <label for="sourceIP" class="form
            -label">Source IP</label>
        <input type="text" class="form-
            control" id="sourceIP" name="
            sourceIP" placeholder="
            192.168.1.2">
    </div>
    <div class="col-12">
        <label for="ttl" class="form-
            label">TimeToLive</label>
        <input type="number" class="form-
            control" id="ttl" name="ttl"
            placeholder="0" min="0" max="
            100">
    </div>
    <div class="col-12">
        <div class="form-check form-
            switch">
            <input class="form-check-
                input" type="checkbox" id=
                "IPOption_RR" name="
                IPOption_RR" checked>
            <label class="form-check-
                label" for="IPOption_RR">
                IPOption_RR</label>
        </div>
        <div class="form-check form-
            switch">
            <input class="form-check-
                input" type="checkbox" id=
                "IPOption_TS" name="
                IPOption_TS" checked>
            <label class="form-check-
                label" for="IPOption_TS">
                IPOption_TS</label>
        </div>
    </div>
    <div class="col-12">
        <br /><button type="submit" class
            ="btn btn-primary">generate</
            button>
    </div>
```

```
                </form>
            </div>
        </div>
    </div>
    <div class="contact">
        <button class="contact-btn" title="Click here to
            navigate to Contact Info Page.">
            <a class="pg" href="./ContactInfoPage.html">
                <img src="http://localhost/NPG/Images/
                    contactInfoImage.png" width="20px"
                    height="20px" />Contact
            </a>
        </button>
    </div>
    <div class="feedback">
        <button class="feedback-btn" title="Click here to
            navigate to Feedback Page.">
            <a class="pg" href="./FeedbackPage.html"><img
                src="http://localhost/NPG/Images/
                feedbackImage.png" width="20px"
                height="20px" />Feedback</a>
        </button>
    </div>
    <!-- Bootstrap JS and Popper.js (optional, but
        required for some Bootstrap components) -->
    <script src="https://code.jquery.com/jquery-3.2.1.
        slim.min.js"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/
        popper.js/1.12.9/umd/popper.min.js"></script>
    <script src="https://maxcdn.bootstrapcdn.com/
        bootstrap/4.0.0/js/bootstrap.min.js"></script>
</body>

</html>
</html>
```

Header Section

Similar to the previous examples, the header contains a Bootstrap grid with three columns (`col-sm-2`, `col-sm-8`, `col-sm-2`). Column 1 and Column 3 have buttons linking to the Welcome Page and Website Information Page, respectively. Column 2 is the main header with a bolded link "NETWORK PACKET GENERATOR" leading to the homepage.

Scrolling Marquee

Beneath the header, a `<marquee>` element is used to create a scrolling banner with the message "One stop tool to generate network packets using ARP, IP, DNS."

IP Packet Generator Form

The main content includes a form for generating IP packets. The form is enclosed in a Bootstrap container and consists of several form elements:

- **Destination IP and Source IP:** Text input fields for entering the destination and source IP addresses.
- **Time to Live (TTL):** A numeric input field for specifying the Time to Live value, constrained between 0 and 100.
- **IP Options Checkboxes:** Checkboxes for including IP options such as IPOption_RR and IPOption_TS.
- **Generate Button:** A button to submit the form and generate IP packets.

Contact and Feedback Buttons

Two buttons for contact and feedback, each linking to a respective page. They include images for visual representation.

Bootstrap JavaScript

The webpage incorporates Bootstrap's JavaScript and Popper.js libraries for enhanced interactivity and functionality.

In summary, this webpage serves as a tool for generating IP packets, allowing users to input destination and source IP addresses, TTL, and choose IP options. The navigation and styling are facilitated by Bootstrap, ensuring a responsive design.

9.1.9 OthersPage.html

```
<!DOCTYPE html>
<html lang="en">
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
```

```
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <title>NPG</title>
</head>

<body>
    <div>
        <div class="row page-header-row">
            <div class="col-sm-2">
                <a title="Click here to navigate to
                    Welcome Page." href="./WelcomePage.
                    html">
                    <img src="http://localhost/NPG/Images
                        /PageLogoImage.png" class="img-
                        thumbnail" width="80px" height="60
                        px">
                </a>
            </div>
            <div class="col-sm-8 text-center page-header"
                >
                <!-- Content for column 2 -->
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>
            <div class="col-sm-2 text-right">
                <a title="Click here to navigate to
                    Website Information Page." href="./
                    InfoPage.html"><img
                        src="http://localhost/NPG/Images/
                            PageInfoImage.png" class="img-
                            thumbnail" width="80px" height
                            ="60px">
                </a>
            </div>
        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
```

```
        network packects
        using ARP, IP, DNS.</marquee>
</div>
<br />
<br />
<div class="container">
    <div class="row">
        <div class="col-sm-12">
            <p>Would you like to add any feedback? </
                p>
            <button class="btn btn-outline-primary"><
                a href="./FeedbackPage.html">Yes</a></
                button>
            <button class="btn btn-outline-danger"><a
                 class="btnLink" href="./EndPage.html"
                >No</a></button>
        </div>
    </div>
</div>
<div class="contact">
    <button class="contact-btn" title="Click here to
        navigate to Contact Info Page.">
        <a class="pg" href="./ContactInfoPage.html">
            <img src="http://localhost/NPG/Images/
                contactInfoImage.png" width="20px"
                height="20px" />Contact
        </a>
    </button>
</div>
<div class="feedback">
    <button class="feedback-btn" title="Click here to
        navigate to Feedback Page.">
        <a class="pg" href="./FeedbackPage.html"><img
             src="http://localhost/NPG/Images/
            feedbackImage.png" width="20px"
                 height="20px" />Feedback</a>
    </button>
</div>

<!-- Bootstrap JS and Popper.js (optional, but
    required for some Bootstrap components) -->
<script src="https://code.jquery.com/jquery-3.2.1.
    slim.min.js"></script>
<script src="https://cdnjs.cloudflare.com/ajax/libs/
    popper.js/1.12.9/umd/popper.min.js"></script>
<script src="https://maxcdn.bootstrapcdn.com/
```

```
        bootstrap/4.0.0/js/bootstrap.min.js"></script>
</body>

</html>
</html>
```

Feedback Prompt

In the main content section, there is a prompt asking users if they would like to add any feedback. Two buttons are provided:

- **Yes Button:** An outline primary button with a link to the Feedback Page (`./FeedbackPage.html`).
- **No Button:** An outline danger button with a link to the End Page (`./EndPage.html`).

Feedback Prompt

In the main content section, there is a prompt asking users if they would like to add any feedback. Two buttons are provided:

- **Yes Button:** An outline primary button with a link to the Feedback Page (`./FeedbackPage.html`).
- **No Button:** An outline danger button with a link to the End Page (`./EndPage.html`).

9.1.10 WelcomePage.html

```
<!DOCTYPE html>
<html lang="en">
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width,
        initial-scale=1.0">
    <link rel="stylesheet" href="https://maxcdn.
        bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min
        .css">
    <link rel="stylesheet" href="http://localhost/NPG/
        StyleSheets/HomePageStyle.css" type="text/css"
        media="screen" />
    <script src="http://localhost/NPG/Scripts/
        WelcomeScript.js"></script>
    <title>NPG</title>
```

```
</head>

<body>
    <div>
        <div class="row page-header-row">
            <div class="col-sm-2">
                <a title="Click here to navigate to
                    Welcome Page." href="./WelcomePage.
                    html">
                    <img src="http://localhost/NPG/Images
                        /PageLogoImage.png" class="img-
                        thumbnail" width="80px" height="60
                        px">
                </a>
            </div>
            <div class="col-sm-8 text-center page-header"
                >
                <!-- Content for column 2 -->
                <b>
                    <a title="NPG" class="hd" href="./
                        HomePage.html">NETWORK PACKET
                        GENERATOR</a>
                </b>
            </div>
            <div class="col-sm-2 text-right">
                <a title="Click here to navigate to
                    Website Information Page." href="./
                    InfoPage.html"><img
                        src="http://localhost/NPG/Images/
                            PageInfoImage.png" class="img-
                            thumbnail" width="80px" height
                            ="60px">
                </a>
            </div>
        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br />
    <br />
    <br />
```

```
    <br />
    <br />
    <br />
    <br />
    <br />
    <div class="container">
        <div class="row">
            <div class="col-sm-12">
                <div class="welcome-images">
                    <img class="welcome-image" id="img"
                        src="http://localhost/NPG/Images/
                        Web-Dark.png" width="200px" height
                        ="200px">
                    <b><p class="text-center">Network
                        Packet Generator</p></b>
                </div>
            </div>
        </div>
    </div>
    <div class="contact">
        <button class="contact-btn">
            <a class="pg" href="./ContactInfoPage.html">
                <img src="http://localhost/NPG/Images/
                    contactInfoImage.png" width="20px"
                    height="20px" />Contact
            </a>
    </div>
    <div class="feedback">
        <button class="feedback-btn">
            <a class="pg" href="./FeedbackPage.html"><img
                 src="http://localhost/NPG/Images/
                feedbackImage.png" width="20px"
                     height="20px" />Feedback</a>
        </button>
    </div>

    <!-- Bootstrap JS and Popper.js (optional, but
        required for some Bootstrap components) -->
    <script src="https://code.jquery.com/jquery-3.2.1.
        slim.min.js"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/
        popper.js/1.12.9/umd/popper.min.js"></script>
    <script src="https://maxcdn.bootstrapcdn.com/
        bootstrap/4.0.0/js/bootstrap.min.js"></script>
</body>
```

</**html**>
</**html**>

Header Section

The header includes a Bootstrap grid with three columns (`col-sm-2, col-sm-8, col-sm-2`). Column 1 and Column 3 have buttons linking to the Welcome Page and Website Information Page, respectively. Column 2 contains the main header with a bolded link `"NETWORK PACKET GENERATOR,"` leading to the homepage.

Scrolling Marquee

A `<marquee>` element creates a scrolling banner with the message `"One stop tool to generate network packets using ARP, IP, DNS."`

Welcome Content

In the main content section, there is a container with a row and column structure. The column contains an image and a text block. The image has the ID `"img"` and initially displays the `"Web-Dark.png"` image. Below the image, there is a bolded and centered text `"Network Packet Generator."`

Contact and Feedback Buttons

Two buttons for contact and feedback, each linking to a respective page. They include images for visual representation.

Bootstrap JavaScript

The webpage incorporates Bootstrap's JavaScript and Popper.js libraries for enhanced interactivity and functionality.

In summary, this welcome page is designed to provide a visually appealing introduction to the Network Packet Generator. The use of Bootstrap ensures responsiveness and styling consistency across devices. Users can navigate to other pages using the provided buttons in the header.

9.2 JavaScript's

9.2.1 ARPScript.js

```
function validateARPDetails(){
    var destinationIP = document.forms["arp-form"]["
        destinationIP"].value;
    var destinationMAC = document.forms["arp-form"]["
        destinationMAC"].value;
```

```
    var sourceIP = document.forms["arp-form"]["sourceIP
        "].value;

    if(!destinationIP){
        alert('please enter destinationIP');
        return false;
    }
    if(!destinationMAC){
        alert('please enter destinationMAC');
        return false;
    }
    if(!sourceIP){
        alert('please enter sourceIP');
        return false;
    }

    var regex =
        /^(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)
        \.(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)
        \.(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)
        \.(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)$/

    if(!regex.test(destinationIP)){
        alert('Destination IP address should be in this
            format - [0-255].[0-255].[0-255].[0-255]');
        return false;
    }
    if(!regex.test(sourceIP)){
        alert('Source IP address should be in this format
            - [0-255].[0-255].[0-255].[0-255]');
        return false;
    }

    return true;
}
```

The provided JavaScript function validateARPDetails is designed to validate user inputs in an Address Resolution Protocol (ARP) form. The function performs several checks to ensure that essential details, such as destination IP, destination MAC, and source IP, are provided. It uses the alert function to notify the user if any of the validations fail, prompting them to correct the input.

The validation includes checking whether the destination IP, destination MAC, and source IP fields are not empty. Additionally, it verifies that the entered IP addresses (destination and source) follow the standard IPv4 format using a

regular expression.

In summary, this JavaScript function enhances the user experience by validating ARP form inputs on the client side, helping to prevent submission of incomplete or incorrectly formatted data.

9.2.2 DNSScript1.js

```
function validateDNSDetails(){
    var destinationIP = document.forms["dns-form"]["
        destinationIP"].value;
    var sourceIP = document.forms["dns-form"]["sourceIP
        "].value;

    if(!destinationIP){
        alert('please enter destinationIP');
        return false;
    }
    if(!sourceIP){
        alert('please enter sourceIP');
        return false;
    }

    var regex =
        /^(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)
        \.(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)
        \.(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)
        \.(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)$/

    if(!regex.test(destinationIP)){
        alert('Destination IP address should be in this
            format - [0-255].[0-255].[0-255].[0-255]');
        return false;
    }
    if(!regex.test(sourceIP)){
        alert('Source IP address should be in this format
            - [0-255].[0-255].[0-255].[0-255]');
        return false;
    }

    return true;
}
```

The JavaScript function validateDNSDetails is crafted to validate user inputs in a Domain Name System (DNS) form. Similar to the previous function, it ensures that crucial details, specifically destination IP and source IP, are provided by

the user. The function uses the alert function to notify users if any of the validations fail, prompting them to correct the input.

The validation process includes checking whether the destination IP and source IP fields are not empty. Furthermore, it employs a regular expression to verify that the entered IP addresses (destination and source) follow the standard IPv4 format.

In summary, this JavaScript function serves to enhance user interaction by performing client-side validation of DNS form inputs. It helps prevent the submission of incomplete or improperly formatted data, contributing to a smoother and more error-resistant user experience.

9.2.3 FeedbackScript.js

```
function feedbackSubmitted(){

    var feedbackPerson = document.forms["feedback-form
        "]["feedback-person-id"].value;
    var feedback = document.forms["feedback-form"]["
        comments"].value;

    if(!feedbackPerson){
        alert('please enter your name or email');
        return false;
    }
    if(!feedback){
        alert('please provide some feedback');
        return false;
    }
    if(feedback.length < 50){
        alert('your feedback should contain minimum 50
            characters.');
        return false;
    }
    return true;
}
```

The JavaScript function **feedbackSubmitted** is designed to validate user inputs in a feedback form, ensuring that users provide necessary information and feedback that meet specific criteria before submitting the form.

The function performs the following checks:

- **Feedback Person Information:** Verifies whether the user has entered their name or email in the `"feedback-person-id"` field. If not, an alert is displayed, prompting the user to provide this information.

- **Feedback Content:** Ensures that users have provided feedback in the `"comments"` field. If not, an alert is triggered, prompting the user to provide feedback.
- **Feedback Length:** Checks if the length of the feedback is at least 50 characters. If the feedback is shorter than this requirement, an alert is displayed, encouraging the user to provide more detailed feedback.

The function utilizes the `alert` function to notify users about any issues with their input. By performing these validations, the function helps enhance user engagement by ensuring that feedback submissions meet specified criteria, contributing to a more meaningful and constructive feedback process.

9.2.4 IPScript.js

```
function validateIPDetails(){
    var destinationIP = document.forms["ip-form"]["
        destinationIP"].value;
    var sourceIP = document.forms["ip-form"]["sourceIP"].
        value;

    if(!destinationIP){
        alert('please enter destinationIP');
        return false;
    }
    if(!sourceIP){
        alert('please enter sourceIP');
        return false;
    }

    var regex =
        /^(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)
        \.(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)
        \.(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)
        \.(?:25[0-5]|2[0-4][0-9]|[01]?[0-9][0-9]?)$/

    if(!regex.test(destinationIP)){
        alert('Destination IP address should be in this
            format - [0-255].[0-255].[0-255].[0-255]');
        return false;
    }
    if(!regex.test(sourceIP)){
        alert('Source IP address should be in this format
            - [0-255].[0-255].[0-255].[0-255]');
        return false;
    }
```

```
    return true;
}
```

The JavaScript function **validateIPDetails** is designed to validate user inputs in a form, specifically focusing on IP address details. The primary purpose of this function is to ensure that users provide valid destination and source IP addresses before submitting the form.

The function performs the following validations:

- **Destination IP and Source IP Presence:** It checks whether the user has entered values for both the destination and source IP addresses. If either of these fields is empty, an alert is displayed, prompting the user to enter the required information.
- **IP Address Format:** It uses a regular expression (regex) to verify that both the destination and source IP addresses follow the standard IPv4 format. If either IP address does not match this format, an alert is triggered, instructing the user to provide IP addresses in the correct format, which typically looks like [0-255].[0-255].[0-255].[0-255].

The function employs the `alert` function to notify users about any issues with their input. By performing these validations, the function ensures that the IP addresses entered by users are not only present but also adhere to the standard IPv4 format. This contributes to the accuracy and reliability of the data submitted through the form.

9.2.5 WelcomeScript.js

```
var images = new Array()
                images = [ "http://localhost/NPG/Images/
                    Web-Dark.png", "http://localhost/NPG/
                    Images/Web-Light.png"];

                setInterval("Animate()", 400);
                var x = 0;

                function Animate() {
                        document.getElementById("img").
                            src = images[x]
                        x++;
                        if (images.length == x) {
                                x = 0;
                        }
                }
```

This JavaScript code creates a simple image animation on a webpage. It uses an array of image URLs to toggle between two images, creating a visual effect.

The setInterval function is employed to repeatedly call the Animate function at regular intervals, in this case, every 400 milliseconds. Inside the Animate function, the source (src) attribute of an HTML element with the ID "img" is updated to display the images sequentially from the array. The variable x keeps track of the current image index, and if it reaches the end of the array, it resets to the beginning, ensuring a continuous loop of image switching. This code essentially implements a basic slideshow with two images, creating a visual animation on the webpage.

9.3 Python

9.3.1 ARPPacketGenerator.py

```
# import cgi module:
import cgi
import os
os.environ["ProgramFiles"] = 'C:\\Program Files'

import scapy.all as scapy

# output http header:
print ('Content-type: text/html')
print ('')
# note the empty print above is required!

print ('<html lang="en"><head><title>NPG</title></head>')
print('<meta charset="UTF-8">')
print('<meta name="viewport" content="width=device-width,
    initial-scale=1.0">')
print('<link rel="stylesheet" href="https://maxcdn.
    bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css
    ">')
print('<link rel="stylesheet" href="http://localhost/NPG/
    StyleSheets/HomePageStyle.css">')
print ('<body>')
print('''
    <div><div class="row page-header-row"><div class="col
        -sm-12 text-center page-header">
      <b><a title="NPG" class="hd" href="http://localhost
          /NPG/HtmlPages/HomePage.html">NETWORK PACKET
          GENERATOR</a>
                </b>
            </div>

        </div>
```

```
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br /> ''')


theRequest = cgi.FieldStorage()
# get the name & sport fields
destinationIP = theRequest.getfirst("destinationIP", "
    undefined")
destinationMAC = theRequest.getfirst("destinationMAC", "
    undefined")
sourceIP = theRequest.getfirst("sourceIP", "undefined")



# Create an ARP request packet
arp_packet = scapy.ARP(
    op=1,  # 1 for ARP request, 2 for ARP reply
    pdst=destinationIP,  # Destination IP address
    hwdst=destinationMAC,  # Destination MAC address
    psrc=sourceIP  # Source IP address
)

# Send the ARP request packet
response = scapy.send(arp_packet)

# You can also print the packet to see its structure
if(arp_packet) :
    print('Successfully generated ARP Packet with the
        specified details, please check in the packet
        capture tool.')
else:
    print('Failed to generate ARP Packet with the
        specified details, please try after sometime.')

print ('</body></html>')
```

This Python script is designed to be executed as a CGI (Common Gateway Interface) script for a web server. It utilizes the Scapy library to generate an ARP (Address Resolution Protocol) packet in response to an HTTP request.

The script first sets up the necessary HTTP headers and HTML structure.

The information required for the ARP packet (destination IP, destination MAC, and source IP) is obtained from the HTTP request using the CGI module. The script then creates an ARP packet using the Scapy library, setting the operation code (1 for ARP request), destination IP, destination MAC, and source IP.

After creating the ARP packet, the script attempts to send it using the scapy.send function. The response from the send operation is captured in the response variable. The script then prints a message indicating whether the ARP packet was successfully generated or if there was a failure.

The generated HTML includes a title, character set, viewport settings, and links to Bootstrap and custom stylesheets. The body of the HTML contains a header with the name of the tool, a scrolling marquee with a brief description, and the result message from the ARP packet generation attempt.

It's worth noting that the script may need appropriate permissions to execute Scapy's send function, and the web server environment needs to support CGI scripts for this code to work as intended.

9.3.2 DNSPacketGenerator.py

```
# import cgi module:
import cgi
import os
os.environ["ProgramFiles"] = 'C:\\Program Files'

from scapy.all import *
from scapy.all import IP

# output http header:
print ('Content-type: text/html')
print ('')
# note the empty print above is required!

print ('<html lang="en"><head><title>NPG</title></head>')
print('<meta charset="UTF-8">')
print('<meta name="viewport" content="width=device-width,
    initial-scale=1.0">')
print('<link rel="stylesheet" href="https://maxcdn.
    bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css
    ">')
print('<link rel="stylesheet" href="http://localhost/NPG/
    StyleSheets/HomePageStyle.css">')
print ('<body>')
print('''
```

```
    <div><div class="row page-header-row"><div class="col
        -sm-12 text-center page-header">
      <b><a title="NPG" class="hd" href="http://localhost
          /NPG/HtmlPages/HomePage.html">NETWORK PACKET
          GENERATOR</a>
                </b>
            </div>

        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br /> ''')


theRequest = cgi.FieldStorage()
# get the name & sport fields
destinationIP = theRequest.getfirst("destinationIP", "
    undefined")
dnsQuery = theRequest.getfirst("dnsQuery", "undefined")
sourceIP = theRequest.getfirst("sourceIP", "undefined")

# Create a DNS query packet
dns_query = IP(dst=destinationIP) / UDP(dport=53) / DNS(
    rd=1, qd=DNSQR(qname=dnsQuery))

# Send the packet and receive the response
response = sr1(dns_query)

# You can also print the packet to see its structure
if(response) :
    print('<br/>Successfully generated DNS Packet with
        the specified details, please check in the packet
        capture tool.')
else:
    print('<br/>Failed to generate DNS Packet with the
        specified details, please try after sometime.')

print ('</body></html>')
```

This CGI script, designed to run on a web server, serves as a dynamic web page

for generating DNS query packets. It begins by importing necessary modules, including cgi for handling CGI requests and scapy for packet manipulation. The script then initializes the HTTP header and basic HTML structure before retrieving parameters from the HTTP request, such as destination IP, DNS query, and source IP. Utilizing the Scapy library, the script constructs a DNS query packet with the provided parameters and sends it using the sr1 function, receiving a response. Finally, based on the success or failure of the DNS packet generation, the script prints a corresponding message in the HTML response.

In essence, this script acts as a bridge between a web interface and network packet generation, allowing users to dynamically create and send DNS query packets through a web page, with real-time feedback on the success of the packet generation process.

9.3.3 feedbackSubmission.py

```
# import cgi module:
import cgi
import os
os.environ["ProgramFiles"] = 'C:\\Program Files'

import mysql.connector
# output http header:
print ('Content-type: text/html')
print ('')
# note the empty print above is required!

print ('<html lang="en"><head><title>NPG</title></head>')
print('<meta charset="UTF-8">')
print('<meta name="viewport" content="width=device-width,
    initial-scale=1.0">')
print('<link rel="stylesheet" href="https://maxcdn.
    bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css
    ">')
print('<link rel="stylesheet" href="http://localhost/NPG/
    StyleSheets/HomePageStyle.css">')
print ('<body>')
print('''
    <div><div class="row page-header-row"><div class="col
        -sm-12 text-center page-header">
      <b><a title="NPG" class="hd" href="http://localhost
          /NPG/HtmlPages/HomePage.html">NETWORK PACKET
          GENERATOR</a>
                </b>
            </div>
```

```
    </div>
</div>
<div>
    <marquee class="header-scroll" direction="right"
        background="#FFFFCC">One stop tool to generate
         network packects
         using ARP, IP, DNS.</marquee>
</div>
<br />
<br />
      <div class="container">
    <div class="row">
        <div class="col-sm-12 text-center">
            Feedback submitted successfully, Thank
               you, Please visit again.
        </div>
    </div>
</div>''')

print ('</body></html>')
```

This CGI script, configured to run on a web server, serves as a dynamic web page for acknowledging successful feedback submission. It starts by importing necessary modules, such as cgi for handling CGI requests, os for environment configuration, and mysql.connector for database interaction (although not utilized in this specific script). The script then initializes the HTTP header and basic HTML structure, including stylesheets and a header with a link to the homepage of the Network Packet Generator (NPG) application.

The HTML content includes a marquee displaying the purpose of the NPG tool, emphasizing its capabilities in generating network packets using ARP, IP, and DNS. Further, it features a container with a row indicating the successful submission of feedback. The acknowledgment message, "Feedback submitted successfully, Thank you, Please visit again," is presented in the center of the page.

In summary, this script creates a dynamic web page that communicates a positive feedback submission response to users. It serves as a confirmation interface, offering a user-friendly experience within the broader NPG web application.

9.3.4 IPPacketGenerator.py

```
# import cgi module:
import cgi
import os
os.environ["ProgramFiles"] = 'C:\\Program Files'
```

```
import scapy.all as scapy

# output http header:
print ('Content-type: text/html')
print ('')
# note the empty print above is required!

print ('<html lang="en"><head><title>NPG</title></head>')
print('<meta charset="UTF-8">')
print('<meta name="viewport" content="width=device-width,
    initial-scale=1.0">')
print('<link rel="stylesheet" href="https://maxcdn.
    bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css
    ">')
print('<link rel="stylesheet" href="http://localhost/NPG/
    StyleSheets/HomePageStyle.css">')
print ('<body>')
print('''
    <div><div class="row page-header-row"><div class="col
        -sm-12 text-center page-header">
      <b><a title="NPG" class="hd" href="http://localhost
          /NPG/HtmlPages/HomePage.html">NETWORK PACKET
          GENERATOR</a>
                </b>
            </div>

        </div>
    </div>
    <div>
        <marquee class="header-scroll" direction="right"
            background="#FFFFCC">One stop tool to generate
             network packects
             using ARP, IP, DNS.</marquee>
    </div>
    <br />
    <br />''')


theRequest = cgi.FieldStorage()
# get the name & sport fields
destinationIP = theRequest.getfirst("destinationIP", "
    undefined")
sourceIP = theRequest.getfirst("sourceIP", "undefined")
ttl = theRequest.getfirst("ttl", 0);
IPOption_RR = theRequest.getfirst("IPOption_RR", "
    undefined");
```

```
IPOption_TS = theRequest.getfirst("IPOption_TS", "
    undefined");

from scapy.all import IP, TCP, send

# Create an IP packet with Scapy
ip_packet = IP(src=sourceIP, dst=destinationIP)

# Create a TCP packet and add it as a payload to the IP
    packet
tcp_packet = TCP(sport=12345, dport=80)
ip_packet /= tcp_packet

# Send the packet
send(ip_packet)

# You can also print the packet to see its structure
if(ip_packet) :
    print('Successfully generated IP Packet with the
        specified details, please check in the packet
        capture tool.')
else:
    print('Failed to generate IP Packet with the
        specified details, please try after sometime.')

print ('</body></html>')
```

Shebang and Imports: The script begins with the shebang line specifying the Python interpreter's location. It then imports necessary modules, including `cgi` for handling CGI requests, `os` for environment configuration, and `scapy.all` for packet manipulation.

HTTP Header and HTML Structure: The script outputs the HTTP header required for CGI scripts. It then generates the basic structure of an HTML page, including the definition of the HTML document, meta tags for character set and viewport configuration, and links to Bootstrap stylesheets.

Page Content: The HTML content includes a marquee displaying a scrolling message that describes the purpose of the NPG tool: "One-stop tool to generate network packets using ARP, IP, DNS." Below the marquee, the script reads input parameters (destination IP, source IP, TTL, IPOption_RR, IPOption_TS) from the CGI request.

Packet Generation and Transmission: The script utilizes Scapy to create an IP packet with the specified source and destination IP addresses. It also includes a TCP packet as payload, with specific source and destination ports. The resulting packet is then sent using the `send` function from Scapy.

Acknowledgment Message: Finally, the script prints an acknowledgment message indicating whether the IP packet generation was successful or not. This message is displayed on the dynamically generated web page.

Overall, this script provides a web-based interface to generate and send IP packets using Scapy, making it a part of the broader functionality of the Network Packet Generator application.

9.4 StyleSheets

9.4.1 HomepageStyle.css

```
body {
    background-color: antiquewhite;
    font-family: 'Comic Sans MS';
}

.page-header {
    font-size: 3em;
    color: black;
    background-color: aliceblue;
}

.page-header-row {
    padding: 0.1em;
    background-color: aliceblue;
}

.header-scroll {
    font-size: 1em;
    line-height: 1em;
    color: #996600;
    padding: 1.5em;
    background-color: lavender;
}

.generators {
    background-color: #31B0D5;
    color: white;
    padding: 10px 20px;
    border-radius: 4px;
    border-color: #46b8da;
    font-size: 1.5em;
}

.generators:hover{
    background-color: #58ccef;
```

```
    border-color: #58ccef;
}

.feedback-btn {
    background-color: #31B0D5;
    color: white;
    padding: 10px 20px;
    border-radius: 4px;
    border-color: #46b8da;
}

.feedback {
    position: fixed;
    bottom: 10px;
    right: 20px;
    font-size: 1em;
}

.feedback-btn:hover{
    background-color: #58ccef;
    border-color: #58ccef;
}

.contact-btn {
    background-color: #31B0D5;
    color: white;
    padding: 10px 20px;
    border-radius: 4px;
    border-color: #46b8da;
}

.contact {
    position: fixed;
    bottom: 10px;
    left: 20px;
    font-size: 1em;
}

.contact-btn:hover{
    background-color: #58ccef;
    border-color: #58ccef;
}

.pg {
    color: white;
}
```

```
.pg:hover{
    text-decoration: none;
    color: whitesmoke;
}

.info {
    font-size: 1em;
    text-align: center;
}

.welcome-image {
    height: 250px;
    width: 250px;
}

.welcome-images {
    position: absolute;
    top: 50%;
    left: 50%;
    transform: translate(-50%, -50%);
    width: 250px;
    height: 250px;
    padding: 2px;
}

.hd {
    color: black;
}

.hd:hover{
    color: lightslategray;
    text-decoration: none;
}

.feedback-submit-btn {
    background-color:green;
    color: white;
    padding: 10px 20px;
    border-radius: 4px;
    border-color: green;
}

.btnLink{
    color: red;
}
```

```
.btnLink:hover{
    color: red;
}
```

Global Styling The first rule sets the background color of the entire webpage to `"antiquewhite"` and specifies the `'Comic Sans MS'` font for the body. This defines a consistent look and feel across the page.

Page Header Styling The `.page-header` class is applied to an element with a font size of `3em`, black text color, and a background color of `"aliceblue"`. This likely represents a prominent header on the webpage.

Header Row Styling The `.page-header-row` class styles a row, perhaps a navigation bar, with a light blue background and padding. This styling enhances the visual appeal of the header row.

Header Scroll Styling The `.header-scroll` class applies styles to a scrolling marquee element. It has a lavender background, orange-brown text color, and padding. This could be used for displaying dynamic or important messages on the webpage.

Generators Button Styling The `.generators` class styles buttons, giving them a blue background, white text, and a hover effect that lightens the background color. These buttons likely represent some functionality related to network packet generation.

Feedback and Contact Buttons Styling The `.feedback-btn` and `.contact-btn` classes style buttons positioned at the bottom right and left corners of the page, respectively. They have similar blue styling with white text and a hover effect to enhance visibility.

Feedback and Contact Positioning The `.feedback` and `.contact` classes use the `position: fixed` property to position the feedback and contact buttons at fixed locations on the page. This ensures they stay visible when scrolling.

Link Styling The `.pg` class styles links with white text. The hover effect changes the color to `"whitesmoke"` and removes text decoration, providing a visual cue to users that the links are interactive.

Information Styling The `.info` class is applied to elements with a font size of `1em` and centered text. This could be used for styling informational text or messages.

Welcome Image Styling The `.welcome-image` and `.welcome-images` classes define styling for an image, including its height, width, and positioning. This suggests the presence of a welcome image on the webpage.

Header Link Styling The `.hd` class styles header links with black text. The hover effect changes the color to `"lightslategray"` and removes text decoration.

Feedback Submission Button Styling The `.feedback-submit-btn` class styles a button with a green background, white text, and a border. This button might be used for submitting feedback, as suggested by its name.

Link Button Styling The `.btnLink` class styles links with red text, and the hover effect maintains the red color. This class might be used for specific types of links in the application.

10 Implementation

10.1 Xampp

XAMPP is the initial set up before we launch the application It is mainly used for web application testing in localhost It is a cross platform web server which free open source. We have inject our program folder into the explorer and start Apache.

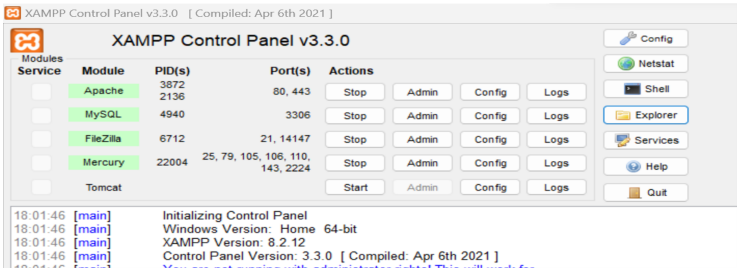

Figure 2: Xampp Overview

10.2 Page Descriptions

HomePage The `HomePage` is the main page where all possible options are displayed. Users can select any option from the available choices.

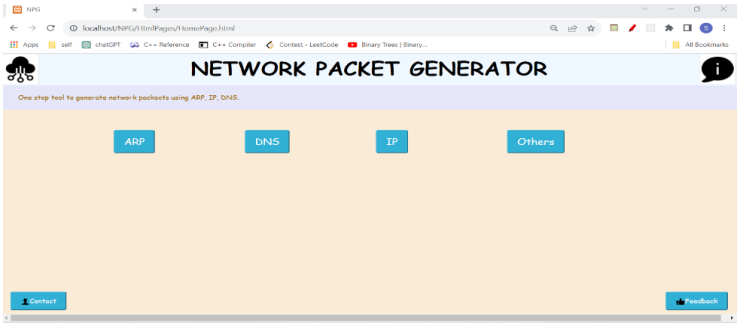

Figure 3: Home Page of Network Packet Generator

ContactInfoPage The `ContactInfoPage` provides information regarding whom to contact in case of any concerns.

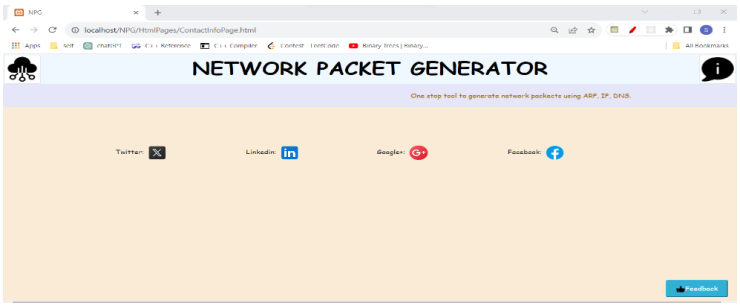

Figure 4: ContactInfo Page of Network Packet Generator

InfoPage The `InfoPage` provides detailed documentation of the UI.

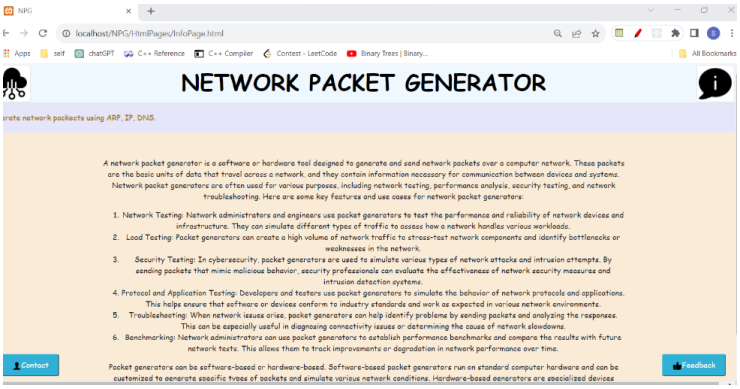

Figure 5: Info Page of Network Packet Generator

FeedbackPage The `FeedbackPage` is used to provide feedback by the user. Users can suggest enhancements and improvements in the UI.

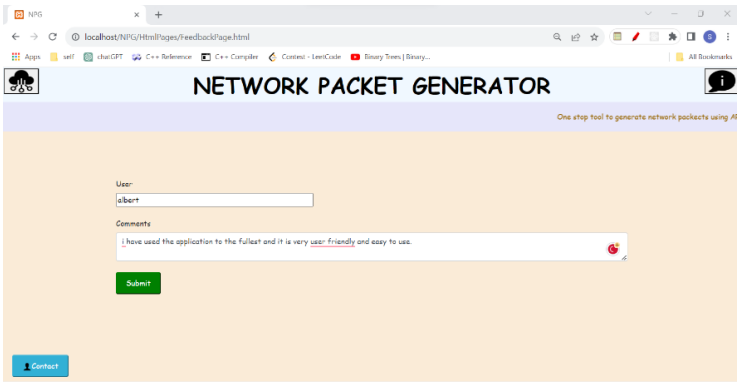

Figure 6: Feedback Page of Network Packet Generator

DNSPage The `DNSPage` is used to generate DNS packets, requesting source IP, destination IP, and DNS query. Placeholder text serves as hints to the user. Source IP and destination IP are mandatory, and alerts are shown if the user tries to generate a packet without providing valid details.

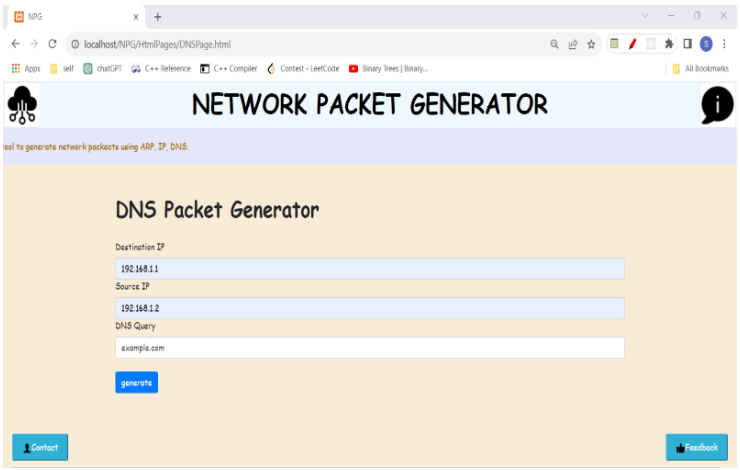

Figure 7: DNS Page of Network Packet Generator

ARPPage The `ARPPage` is used to generate ARP packets, requesting source IP, destination IP, and destination MAC. Similar to the DNSPage, it has placeholder text and mandatory fields with alerts for invalid details.

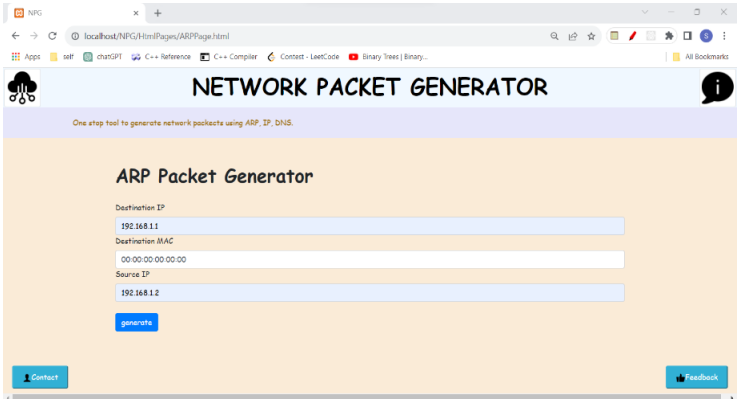

Figure 8: ARP Page of Network Packet Generator

IPPage The `IPPage` is used to generate IP packets, requesting source IP, destination IP, IPOption_RR, and IPOption_TS. Similar to previous pages, it has placeholder text and mandatory fields with alerts for invalid details.

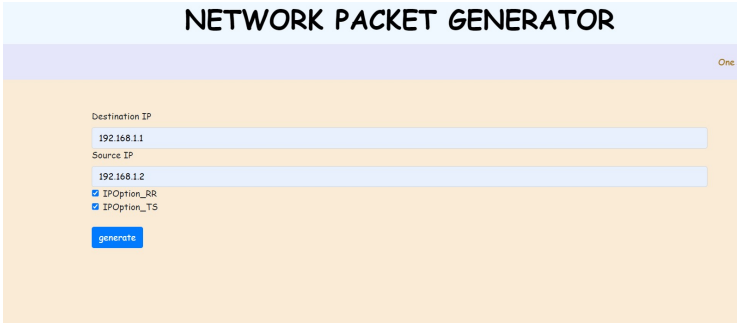

Figure 9: IP Page of Network Packet Generator

OthersPage The `OthersPage` displays other options available, such as feedback, etc.

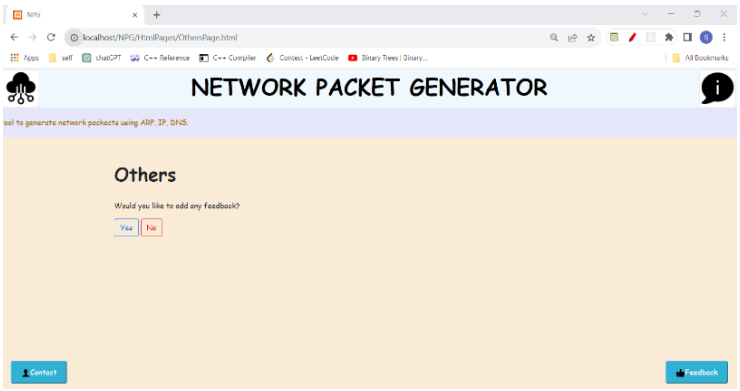

Figure 10: Others Page of Network Packet Generator

EndPage The `EndPage` displays a thank-you note for using the UI.

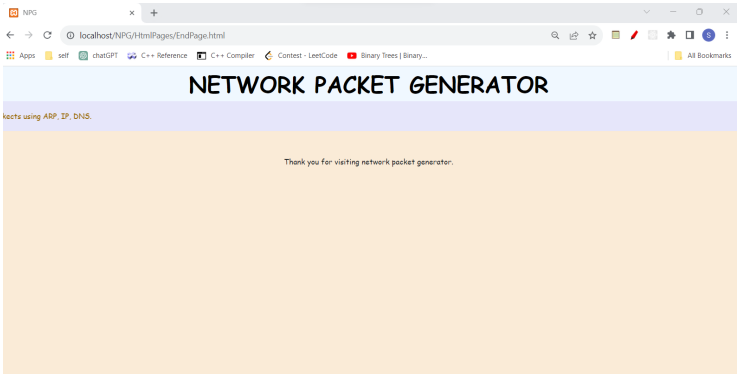

Figure 11: Thank You Page of Network Packet Generator

10.3 Packet Capture

ARPCapture The `ARPPage` is used to generate ARP packets, requesting source IP, destination IP, and destination MAC. Placeholder text serves as hints to the user. Source IP and destination IP are mandatory, and the UI displays alerts if a user attempts to generate a packet without providing valid required details. Once valid details are provided, packets are generated successfully, and the generated packets can be captured using Wireshark.

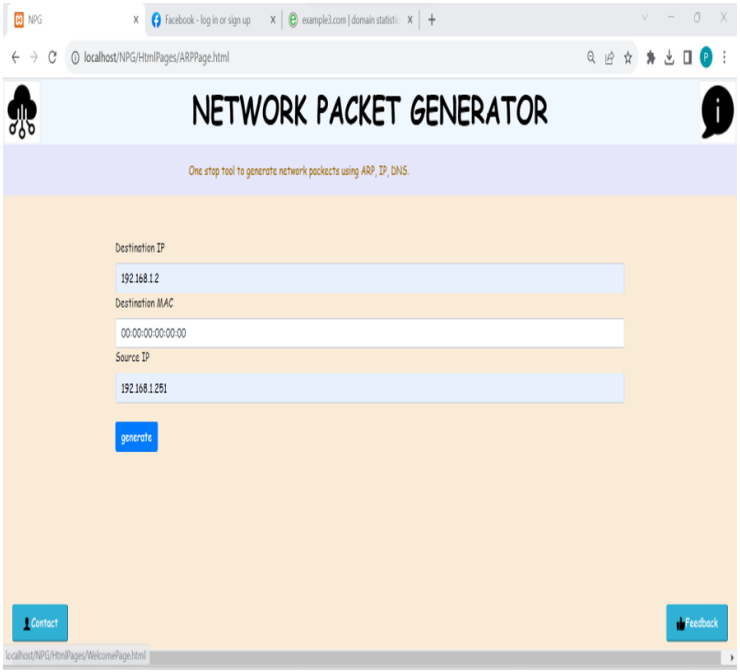

Figure 12: Sending ARP Packet

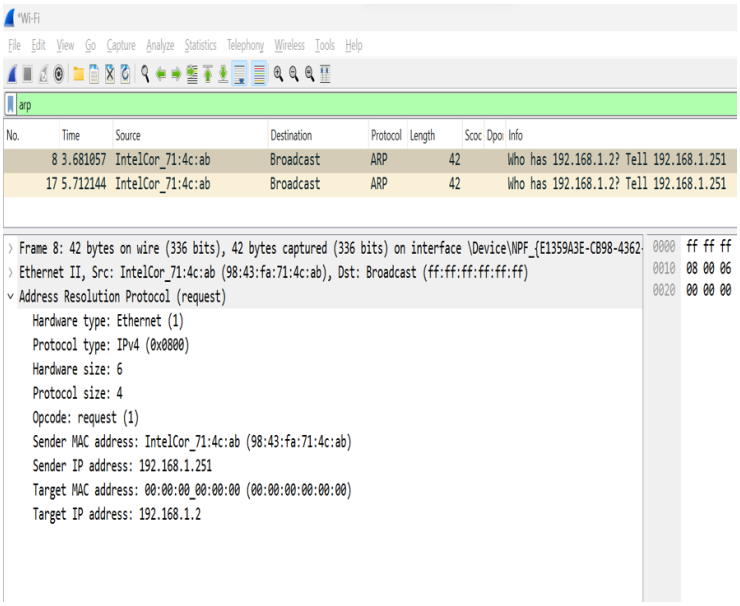

Figure 13: Capturing ARP Packet in Wireshark

DNSCapture DNS page is used to generate DNS packets, where it asks for source IP, destination IP and DNS query, with placeholder text works as hint to the user. Source IP and destination IP are mandatory and the UI shows alerts if a user tries to generate a packet without providing valid required details. Once valid details are provided, packets are generated successfully, which are captured using Wireshark.

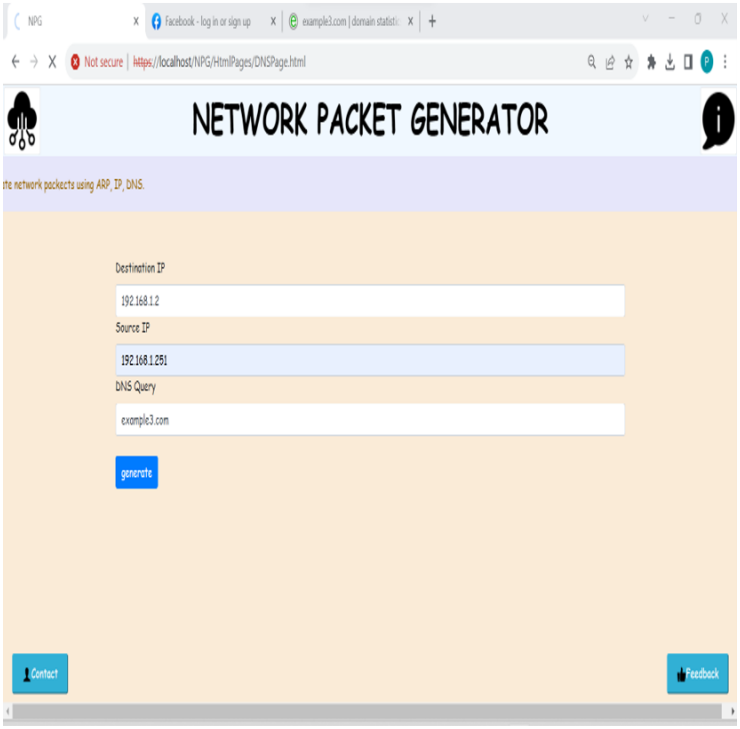

Figure 14: Sending DNS Packet

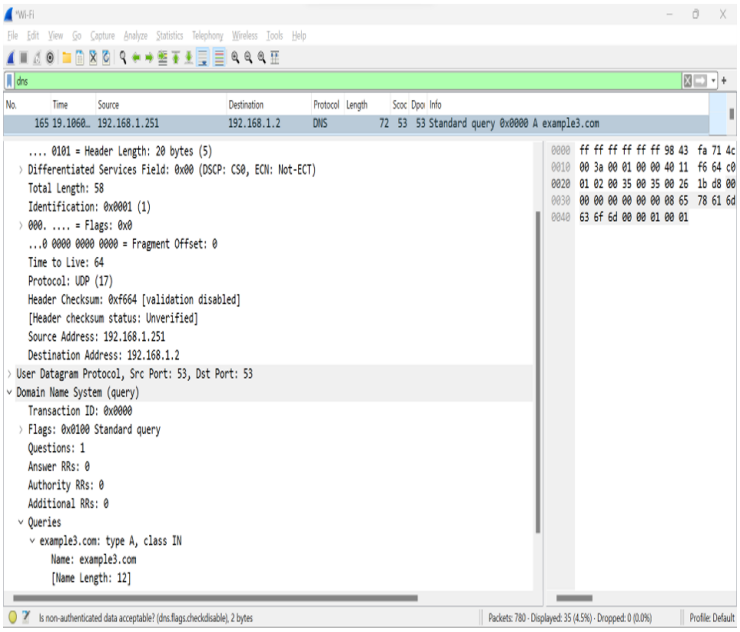

Figure 15: Capturing DNS Packet in WireShark

IPPage The `IPPage` is used to generate IP packets, requesting source IP, destination IP, TTL, IPOption_RR, and IPOption_TS. Placeholder text serves as a hint to the user. Source IP and destination IP are mandatory, and the UI displays alerts if a user attempts to generate a packet without providing valid required details. Once valid details are provided, packets are generated successfully, and the generated packets can be captured using Wireshark.

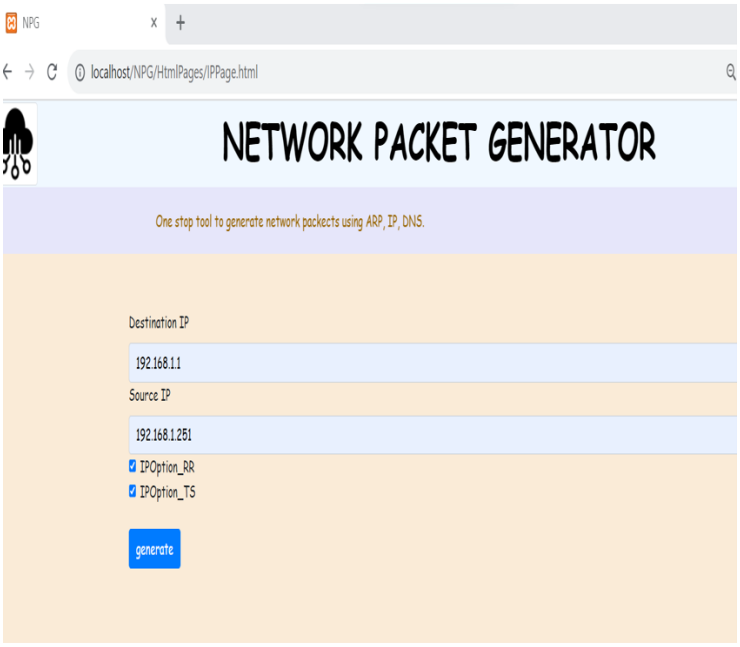

Figure 16: Sending IP Packet

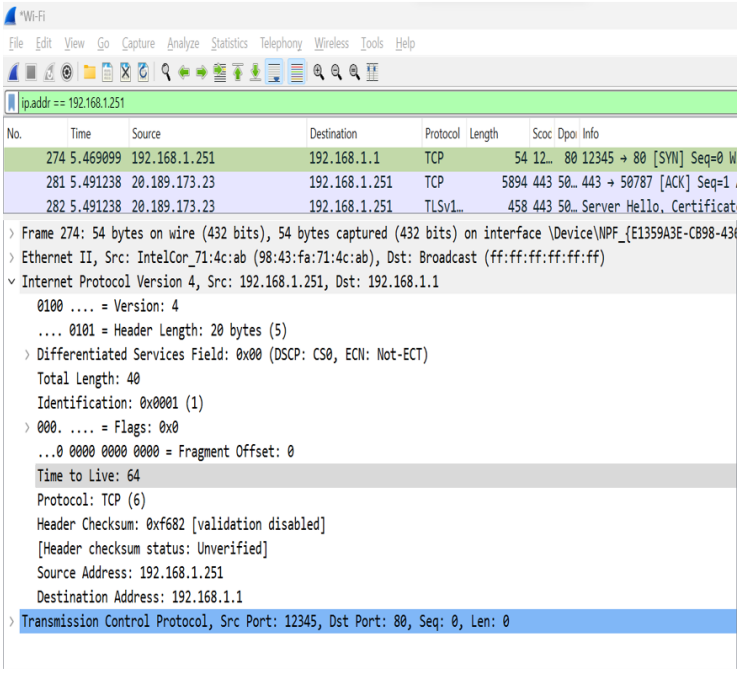

Figure 17: Capturing IP packet in Wireshark

11 Future Work

User Interface can be enhanced, and additional protocols that are supported can be added.

12 Conclusion

In conclusion, the "Network Packet Generator Using Scapy" project endeavors to deliver a powerful and versatile tool that fills critical gaps in the field of network protocol development, testing, and analysis. By addressing key challenges such as limited protocol support, complex packet customization, and the absence of user-friendly interfaces in existing solutions, this project aims to provide a comprehensive and accessible solution for a diverse user base.

The identified objectives, ranging from protocol support and intuitive user interfaces to scripting capabilities and community engagement, collectively contribute to the overarching goal of creating a tool that empowers both novice and experienced users. The emphasis on packet visualization, documentation, and error handling further ensures that users can effectively create, modify, and troubleshoot network packets with confidence.

The project's scope encompasses not only the immediate needs of network engineers, developers, and cybersecurity professionals but also acknowledges the evolving landscape of network protocols. By supporting a broad range of protocols, maintaining cross-platform compatibility, and fostering community engagement, the tool aspires to be a dynamic and adaptable resource for users across different environments.

As the project progresses, it is anticipated that the "Network Packet Generator Using Scapy" will contribute to advancing the state of network protocol testing, offering a valuable asset for educational purposes, system development, and cybersecurity assessments. The collaborative nature of community engagement is expected to drive continuous improvement, ensuring that the tool remains relevant and effective in an ever-changing technological landscape.

In summary, this project aspires to make significant strides in enhancing the accessibility, functionality, and versatility of network packet generation using the Scapy framework. Through careful consideration of user needs, robust development practices, and ongoing community involvement, the "Network Packet Generator Using Scapy" project seeks to make a meaningful impact in the realm of network protocols and packet manipulation.

13 References

1. https://www.youtube.com/watch?v=Nrrz$_0$$jEqGQab_channel = iqpopYouTubeVideo1 $https://chat.openai.com/c/9df7eb38 - 488d - 4d36 - 905e - 2905a197c3c6OpenAIChat1$
2. https://chat.openai.com/c/4190f31f-fb8d-48e3-a724-4a3bb097d842OpenAI Chat 2
3. https://chat.openai.com/c/9ce72f54-d310-48a3-9525-b57a462f54deOpenAI Chat 3
4. https://chat.openai.com/c/99238f4f-b463-46b2-b21a-8d91df6f3f1aOpenAI Chat 4
5. https://chat.openai.com/c/c9f6fa0f-1220-4f34-8e08-b99a81c109e1OpenAI Chat 5
6. https://chat.openai.com/c/f8ed50da-36cc-4790-8296-7eef654160aeOpenAI Chat 6
7. https://chat.openai.com/c/ac91241a-d259-4522-9931-343740258119OpenAI Chat 7
8. https://chat.openai.com/c/355d92cf-9860-4d7b-bd45-75cb393a399eOpenAI Chat 8
9. https://chat.openai.com/c/d82c47dd-720b-48a6-8279-f045ad564584OpenAI Chat 9
10. https://chat.openai.com/c/f589ef79-7b84-4a27-ac4f-46da37914916OpenAI Chat 10
11. https://chat.openai.com/c/d52fa231-86ad-40a7-b6cf-ffbe9d2609efOpenAI Chat 11
12. https://chat.openai.com/c/4a92dc5a-cd98-4b4b-bda6-d6e110d03c77OpenAI Chat 12
13. https://chat.openai.com/c/d1e5955b-2882-4804-b81a-5d0d049ca9daOpenAI Chat 13
14. https://chat.openai.com/c/940104b0-31fc-4852-9cfd-8bac408c6150OpenAI Chat 14
15. https://chat.openai.com/c/ae532bcf-e528-4a5f-894b-fbcffba72febOpenAI Chat 15
16. https://chat.openai.com/c/c552a355-c6af-47e3-a7e2-800fd78fa195OpenAI Chat 16
17. https://chat.openai.com/c/2320a38c-67c5-4801-ab6d-b3f7338d52a8OpenAI Chat 17

18. https://chat.openai.com/c/b4dee826-f05c-41f6-a5c8-1fd9f5afa93dOpenAI Chat 18

19. https://chat.openai.com/c/e2fb5351-a7c8-45d4-8c45-89520483a1d0OpenAI Chat 19

20. https://stackoverflow.com/questions/17440727/apache-shutdown-unexpectedlyStack Overflow Question

21. https://www.youtube.com/watch?v=8koH$_BDV6Hst = 555sab_channel = Nexample1YouTubeVideo2$