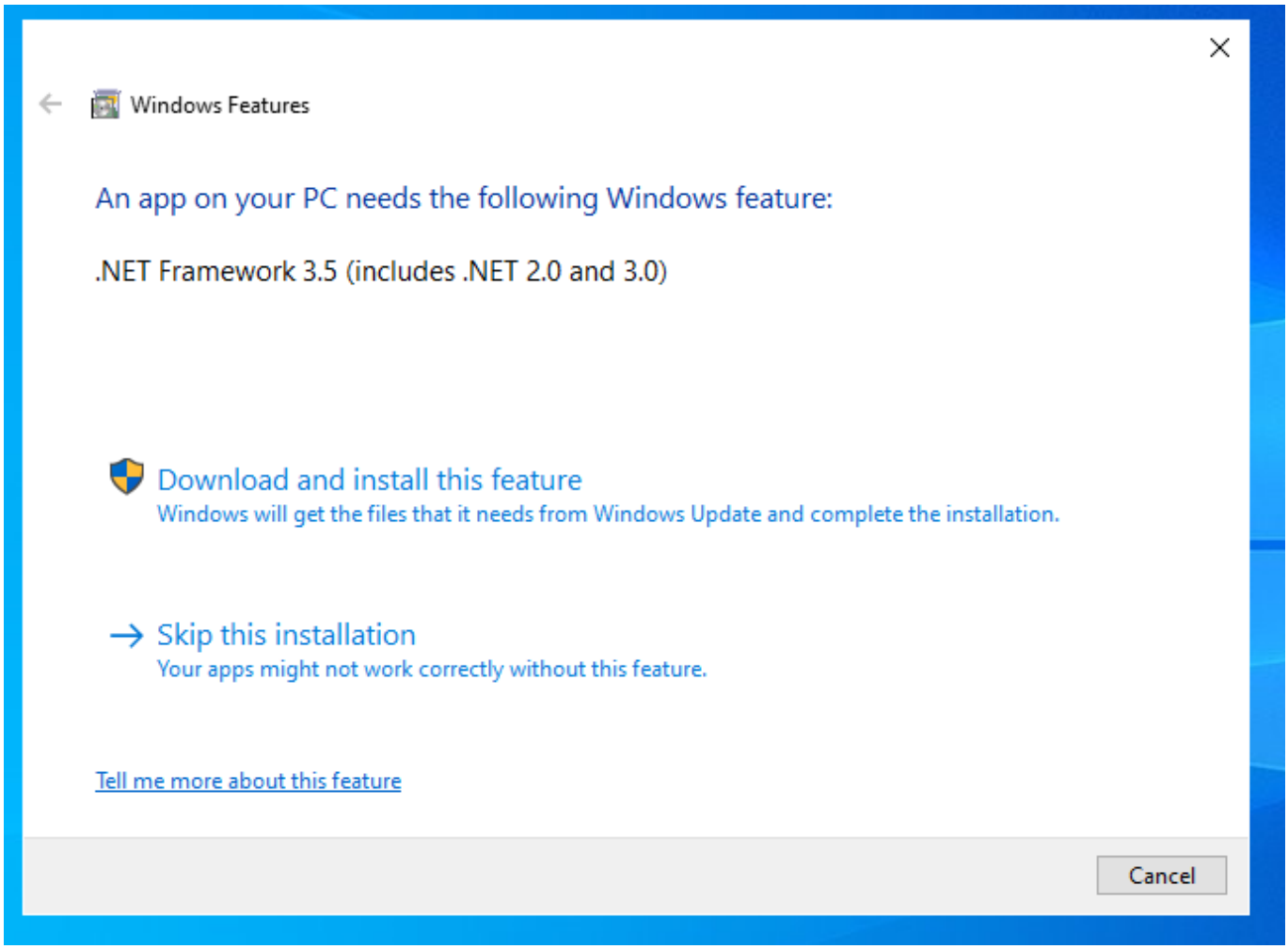
C#: Packet Sniffer in C#

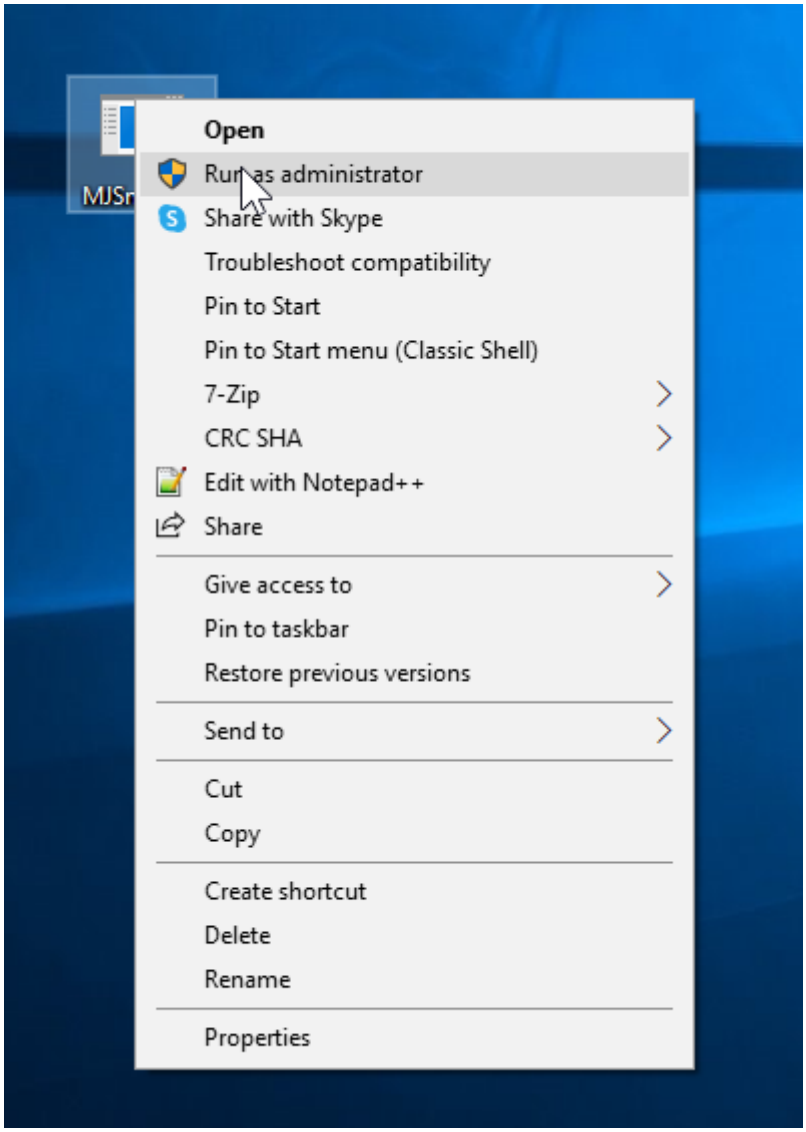
sniffer.exe

Below are instructions on how to use the application

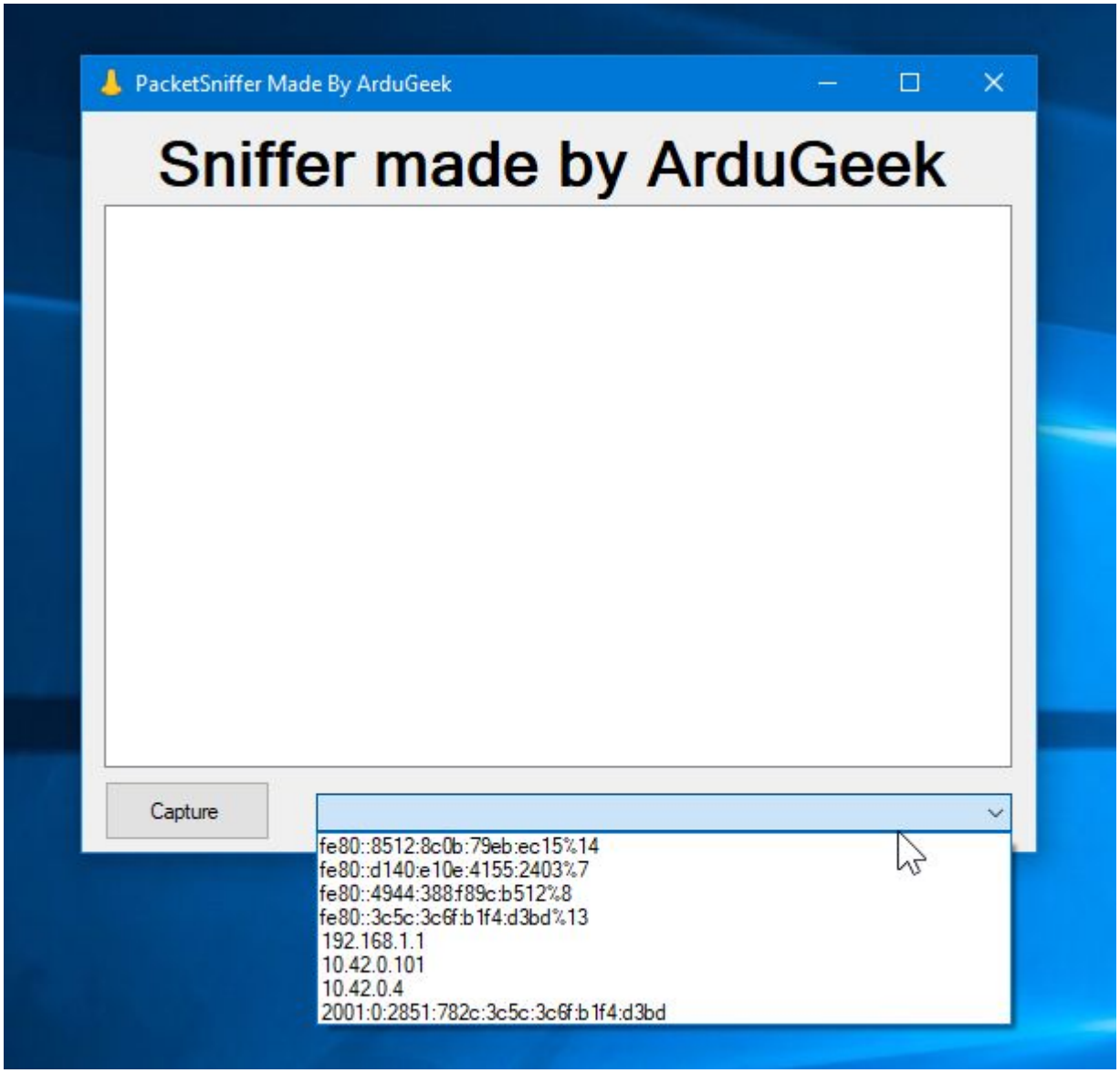


before starting it, you may see this window,

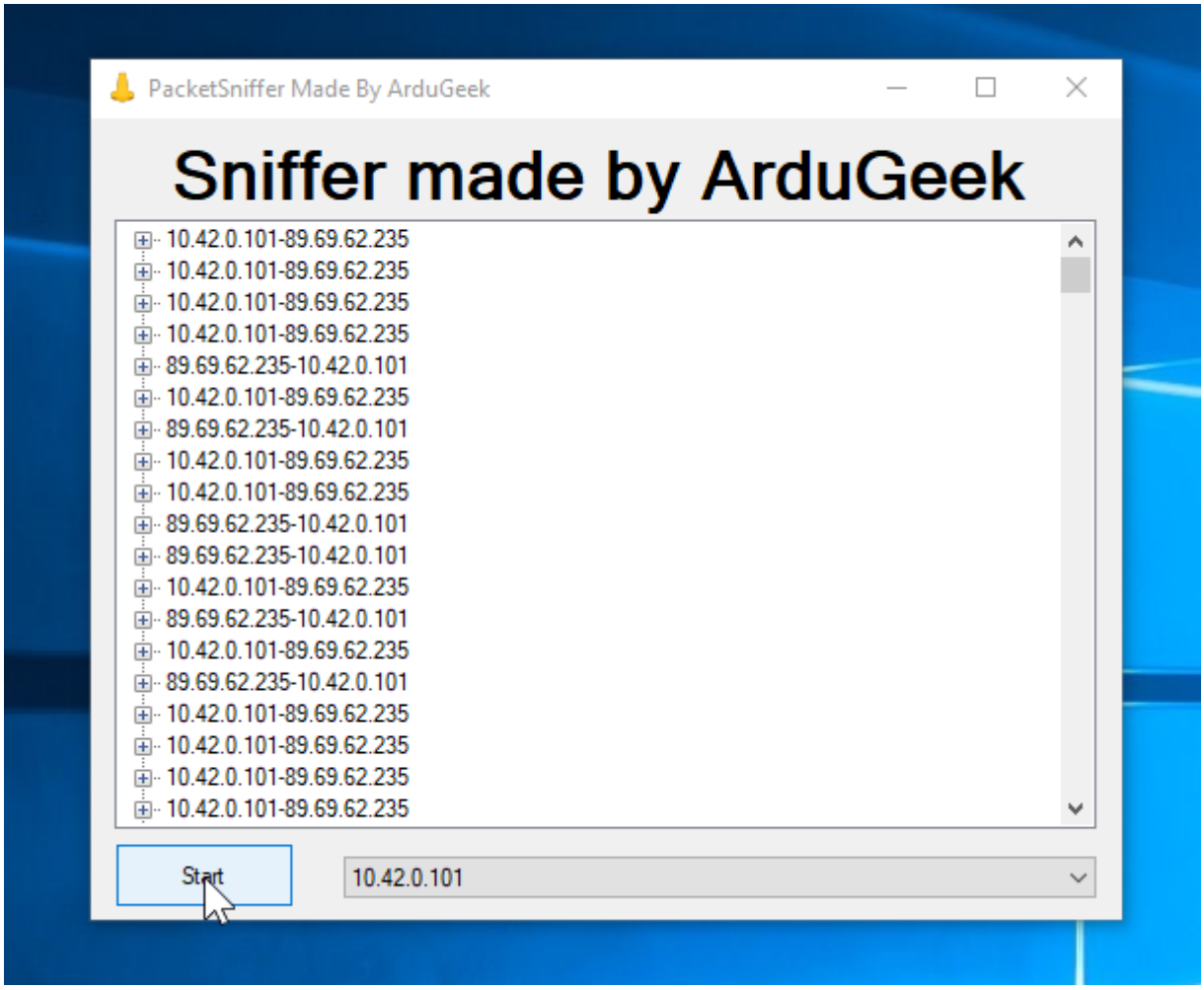
if this happens, download the framework and then move on



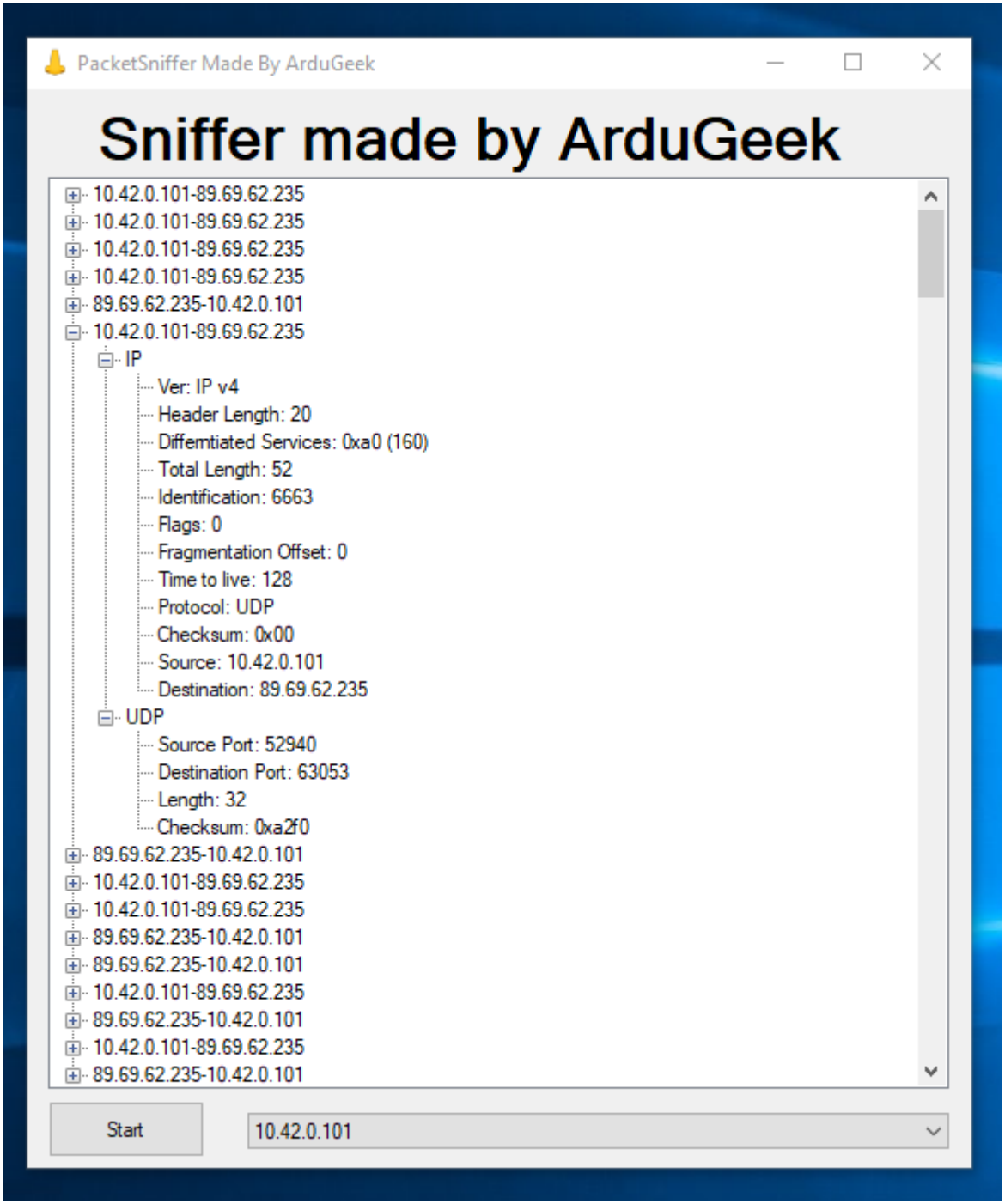
start the application with administrator privileges



then select the IP address on which you want to listen on



press start button



and then watch the network traffic the application should display UDP TCP DNS

main.cs

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Text;
using System.Windows.Forms;
using System.Net.Sockets;
using System.Net;
```

```
namespace MJsniffer
{
    public enum Protocol
    {
        TCP = 6,
        UDP = 17,
        Unknown = -1
    };

    public partial class MJsnifferForm : Form
    {
        private Socket mainSocket; // Socket który przechwytuje
wszystkie pakiety
        private byte[] byteData = new byte[4096];
        private bool bContinueCapturing = false; // flaga która
sprawdza czy pakiety zostały złapane poprawnie
        private delegate void AddTreeNode(TreeNode node);

        public MJsnifferForm()
        {
            InitializeComponent();
        }

        private void btnStart_Click(object sender, EventArgs e)
        {
            if (cmbInterfaces.Text == "")
            {
                MessageBox.Show("Select an Interface to capture the
packets.", "Sniffer",
                    MessageBoxButtons.OK, MessageBoxIcon.Error);
                return;
            }

            try
            {
                if (!bContinueCapturing)
                {
                    btnStart.Text = "&Stop";
                    bContinueCapturing = true;

                    mainSocket = new Socket(AddressFamily.InterNetwork,
SocketType.Raw, ProtocolType.IP);
                    mainSocket.Bind(new
IPEndPoint(IPAddress.Parse(cmbInterfaces.Text), 0));

                    mainSocket.SetSocketOption(SocketOptionLevel.IP,
SocketOptionName.HeaderIncluded, true);

                    byte[] byTrue = new byte[4] { 1, 0, 0, 0 };
                    byte[] byOut = new byte[4] { 1, 0, 0, 0 };
```

```
                    mainSocket.IOControl(IOControlCode.ReceiveAll,
byTrue, byOut);

                    mainSocket.BeginReceive(byteData, 0,
byteData.Length, SocketFlags.None,
                        new AsyncCallback(OnReceive), null);
                }
                else
                {
                    btnStart.Text = "&Start";
                    bContinueCapturing = false;
                    mainSocket.Close();
                }
            }
            catch (Exception ex)
            {
                MessageBox.Show(ex.Message, "Sniffer",
MessageBoxButtons.OK, MessageBoxIcon.Error);
            }
        }

        private void OnReceive(IAsyncResult ar)
        {
            try
            {
                int nReceived = mainSocket.EndReceive(ar);
                ParseData(byteData, nReceived);

                if (bContinueCapturing)
                {
                    byteData = new byte[4096];
                    mainSocket.BeginReceive(byteData, 0,
byteData.Length, SocketFlags.None,
                        new AsyncCallback(OnReceive), null);
                }
            }
            catch (ObjectDisposedException) { }
            catch (Exception ex)
            {
                MessageBox.Show(ex.Message, "Sniffer",
MessageBoxButtons.OK, MessageBoxIcon.Error);
            }
        }

        private void ParseData(byte[] byteData, int nReceived)
        {
            TreeNode rootNode = new TreeNode();
            IPHeader ipHeader = new IPHeader(byteData, nReceived);
            TreeNode ipNode = MakeIPTreeNode(ipHeader);
            rootNode.Nodes.Add(ipNode);
```

```
            switch (ipHeader.ProtocolType)
            {
                case Protocol.TCP:
                    TCPHeader tcpHeader = new TCPHeader(ipHeader.Data,
ipHeader.MessageLength);
                    TreeNode tcpNode = MakeTCPTreeNode(tcpHeader);
                    rootNode.Nodes.Add(tcpNode);

                    if (tcpHeader.DestinationPort == "53" ||
tcpHeader.SourcePort == "53")
                    {
                        TreeNode dnsNode =
MakeDNSTreeNode(tcpHeader.Data, (int)tcpHeader.MessageLength);
                        rootNode.Nodes.Add(dnsNode);
                    }
                    break;

                case Protocol.UDP:
                    UDPHeader udpHeader = new UDPHeader(ipHeader.Data,
(int)ipHeader.MessageLength);
                    TreeNode udpNode = MakeUDPTreeNode(udpHeader);
                    rootNode.Nodes.Add(udpNode);

                    if (udpHeader.DestinationPort == "53" ||
udpHeader.SourcePort == "53")
                    {
                        TreeNode dnsNode =
MakeDNSTreeNode(udpHeader.Data,
                            Convert.ToInt32(udpHeader.Length) - 8);
                        rootNode.Nodes.Add(dnsNode);
                    }
                    break;

                case Protocol.Unknown:
                    break;
            }

            AddTreeNode addTreeNode = new AddTreeNode(OnAddTreeNode);
            rootNode.Text = ipHeader.SourceAddress.ToString() + " - " +
ipHeader.DestinationAddress.ToString();
            treeView.Invoke(addTreeNode, new object[] { rootNode });
        }

        private TreeNode MakeIPTreeNode(IPHeader ipHeader)
        {
            TreeNode ipNode = new TreeNode("IP");
            ipNode.Nodes.Add("Ver: " + ipHeader.Version);
            ipNode.Nodes.Add("Header Length: " +
ipHeader.HeaderLength);
            ipNode.Nodes.Add("Differentiated Services: " +
ipHeader.DifferentiatedServices);
```

```
            ipNode.Nodes.Add("Total Length: " + ipHeader.TotalLength);
            ipNode.Nodes.Add("Identification: " +
ipHeader.Identification);
            ipNode.Nodes.Add("Flags: " + ipHeader.Flags);
            ipNode.Nodes.Add("Fragmentation Offset: " +
ipHeader.FragmentationOffset);
            ipNode.Nodes.Add("Time to live: " + ipHeader.TTL);

            string protocolStr = ipHeader.ProtocolType switch
            {
                Protocol.TCP => "TCP",
                Protocol.UDP => "UDP",
                _ => "Unknown"
            };
            ipNode.Nodes.Add("Protocol: " + protocolStr);

            ipNode.Nodes.Add("Checksum: " + ipHeader.Checksum);
            ipNode.Nodes.Add("Source: " +
ipHeader.SourceAddress.ToString());
            ipNode.Nodes.Add("Destination: " +
ipHeader.DestinationAddress.ToString());

            return ipNode;
        }

        private TreeNode MakeTCPTreeNode(TCPHeader tcpHeader)
        {
            TreeNode tcpNode = new TreeNode("TCP");
            tcpNode.Nodes.Add("Source Port: " + tcpHeader.SourcePort);
            tcpNode.Nodes.Add("Destination Port: " +
tcpHeader.DestinationPort);
            tcpNode.Nodes.Add("Sequence Number: " +
tcpHeader.SequenceNumber);

            if (!string.IsNullOrEmpty(tcpHeader.AcknowledgementNumber))
                tcpNode.Nodes.Add("Acknowledgement Number: " +
tcpHeader.AcknowledgementNumber);

            tcpNode.Nodes.Add("Header Length: " +
tcpHeader.HeaderLength);
            tcpNode.Nodes.Add("Flags: " + tcpHeader.Flags);
            tcpNode.Nodes.Add("Window Size: " + tcpHeader.WindowSize);
            tcpNode.Nodes.Add("Checksum: " + tcpHeader.Checksum);

            if (!string.IsNullOrEmpty(tcpHeader.UrgentPointer))
                tcpNode.Nodes.Add("Urgent Pointer: " +
tcpHeader.UrgentPointer);

            return tcpNode;
        }
```

```
        private TreeNode MakeUDPTreeNode(UDPHeader udpHeader)
        {
            TreeNode udpNode = new TreeNode("UDP");
            udpNode.Nodes.Add("Source Port: " + udpHeader.SourcePort);
            udpNode.Nodes.Add("Destination Port: " +
udpHeader.DestinationPort);
            udpNode.Nodes.Add("Length: " + udpHeader.Length);
            udpNode.Nodes.Add("Checksum: " + udpHeader.Checksum);
            return udpNode;
        }

        private TreeNode MakeDNSTreeNode(byte[] byteData, int nLength)
        {
            DNSHeader dnsHeader = new DNSHeader(byteData, nLength);
            TreeNode dnsNode = new TreeNode("DNS");
            dnsNode.Nodes.Add("Identification: " +
dnsHeader.Identification);
            dnsNode.Nodes.Add("Flags: " + dnsHeader.Flags);
            dnsNode.Nodes.Add("Questions: " +
dnsHeader.TotalQuestions);
            dnsNode.Nodes.Add("Answer RRs: " +
dnsHeader.TotalAnswerRRs);
            dnsNode.Nodes.Add("Authority RRs: " +
dnsHeader.TotalAuthorityRRs);
            dnsNode.Nodes.Add("Additional RRs: " +
dnsHeader.TotalAdditionalRRs);
            return dnsNode;
        }

        private void OnAddTreeNode(TreeNode node)
        {
            treeView.Nodes.Add(node);
        }

        private void SnifferForm_Load(object sender, EventArgs e)
        {
            string strIP = null;
            IPHostEntry hostEntry =
Dns.GetHostEntry(Dns.GetHostName());

            if (hostEntry.AddressList.Length > 0)
            {
                foreach (IPAddress ip in hostEntry.AddressList)
                {
                    strIP = ip.ToString();
                    cmbInterfaces.Items.Add(strIP);
                }
            }
        }

        private void SnifferForm_FormClosing(object sender,
```

```
FormClosingEventArgs e)
        {
            if (bContinueCapturing)
            {
                mainSocket.Close();
            }
        }

        private void treeView_AfterSelect(object sender,
TreeViewEventArgs e) { }

        private void label1_Click(object sender, EventArgs e) { }
    }
}
```