

September 23, 2020

Markets Gateway Browserless C# .NET Via PKI Certification Authentication

Instructions & Coding Examples

Configuring C# for Markets Gateway Sandbox

A C# project was developed for the purposes of connecting to the Markets Gateway Sandbox, which uses token authentication, and is able to send/receive XML.

1. Open Visual Studio. **Note:** Code was developed using Visual Studio 2015.
2. Copy the code provided below into your project.
3. Invoke the various methods of the class below (provided later) to accomplish sending and receiving the XML to Markets Gateway.
4. Provide your own file specification for the line containing
`certificates.Import(@"C:\Personal\yourcertpath\yourcert.pfx", "yourCertPassword",...`

(WebControl.cs) :

C# Markets Gateway Class

```

using System;
using System.Linq;
using System.Collections.Generic;
using System.Text;
using System.Net;
using System.IO;
using System.Windows.Forms;
using System.ComponentModel;
using System.Globalization;
using System.Security.Cryptography.X509Certificates;

namespace MarketsGatewayUsingCerts
{
    static class Program
    {
        /// <summary>
        /// The main entry point for the application.
        /// </summary>
        [STAThread]
        static void Main()
        {
            Application.EnableVisualStyles();
            Application.SetCompatibleTextRenderingDefault(false);
            Application.Run(new frmGateway());
        }
    }
}

namespace MarketsGatewayUsingCerts
{

```

```

class WebControl
{
    public string User { get; set; }
    public string Password { get; set; }
    public string XML_SendStr { get; set; }
    public string OpenAM_URL { get; set; }
    public string Web_URL { get; set; }
    private string Token { get; set; }
    public enum XMLTypes { XMLQuery, XMLSubmit };
    public XMLTypes XMLType { get; set; }
    private const string querySoapAction = "/xml/query";
    private const string submitSoapAction = "/xml/submit";
    public string sendXMLRoutine()
    {
        string soapaction;
        HttpPost hp = new HttpPost();
        string response = "";
        soapaction = (XMLType == XMLTypes.XMLQuery) ? querySoapAction : submitSoapAction;
        hp.Password = Password;
        hp.User = User;
        hp.WebURL = OpenAM_URL;
        Token = hp.openamGetToken();
        hp = null;
        hp = new HttpPost();
        hp.TokenID = Token;
        hp.WebURL = Web_URL + soapaction;

        if (hp.systemConnect())
        {
            //Send your packet
            response = hp.Upload(XML_SendStr);
            hp = null;
        }
        return response;
    }
}

class HttpPost
{
    private HttpWebRequest Connection;
    private Dictionary<string, string> openAM_KeyValuePairs;
    private string url;
    private bool isOpenAM = false;
    public string User { get; set; }
    public string Password { get; set; }
    public string TokenID { get; set; }
    public string WebURL
    {
        get { return url; }
        set
        {
            url = value;
            if (Connection == null)
            {
                try
                {
                    Connection = (HttpWebRequest)WebRequest.Create(url);
                }
            }
        }
    }
}
    
```

```

        catch (Exception e)
        {
            MessageBox.Show("Exception attempting to connect:" + e.Message);
        }
    }
}
}
public string openamGetToken()
{
    string tokenResult = "";
    StringBuilder responseData = null;
    try
    {
        if (User != "" && Password != "")
        {
            X509Certificate2Collection certificates = new X509Certificate2Collection();
            certificates.Import(@"C:\Personal\yourcertpath\yourcert.pfx",
"yourCertPassword", X509KeyStorageFlags.MachineKeySet | X509KeyStorageFlags.PersistKeySet);
            Connection.ClientCertificates = certificates;

            Connection.ContentType = "application/json";
            Connection.Headers.Set("X-OpenAM-Username", User);
            Connection.Headers.Set("X-OpenAM-Password", Password);
            Connection.ContentLength = 0;
            Connection.ProtocolVersion = System.Net.HttpVersion.Version11;
            Connection.Method = "POST";
            Connection.Accept = "*/*";
            Connection.KeepAlive = true;

            //Get the response back and store into responsedata
            responseData = GetResponseData();
            openAM_KeyValuePairs = responseData.ToString().Remove(0,
1).Split(',').Select(value => value.Split(':'))
.ToDictionary(pair => pair[0].Replace("\\"", "\""), pair =>
pair[1].Replace("\\"", "\""));
            //Get the tokenid and use as Cookie back in main request
            tokenResult = openAM_KeyValuePairs["tokenId"];
        }
        else
        {
            MessageBox.Show("You must first provide a username and password");
        }
    }
    catch (Exception ex)
    {
        MessageBox.Show("Exception attempting to obtain token:" + ex.Message);
    }
    finally
    {
        //Connection.KeepAlive = false;
        Connection = null;
    }
    return tokenResult;
}
//Call this After openAM_GetToken Routine
public bool systemConnect()
{

```

```

bool connectionConfigured = false;
try
{
    if (TokenID != "")
    {
        Connection.ContentType = "text/xml";
        Connection.ProtocolVersion = System.Net.HttpVersion.Version11;
        Connection.Method = "POST";
        Connection.KeepAlive = false;
        Connection.Headers.Set("Cookie", "pjmauthtrain="+ TokenID);
        //Uncomment this line if using SUMA but provide sub-account

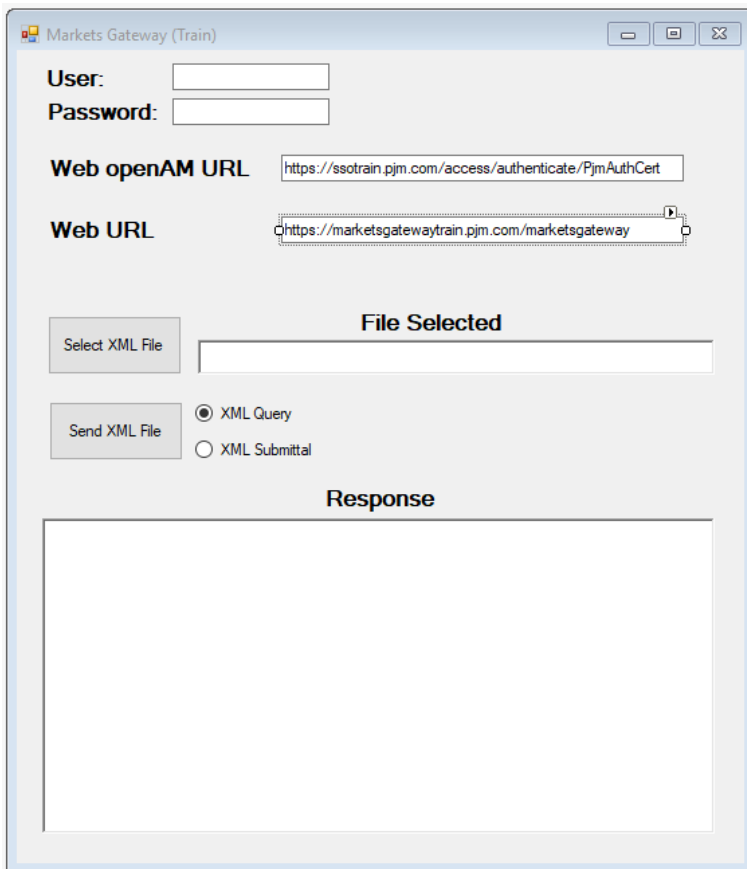
        //Connection.Headers.Set("XParticipantName", sub-account);
        connectionConfigured = true;
    }
    else
    {
        MessageBox.Show("No token ID provided");
    }
}
catch (Exception ex)
{
    MessageBox.Show("Exception attempting to connect to web using token:" +
ex.Message);
}
return connectionConfigured;
}
public string Upload(string uploadString)
{
    StringBuilder rd = null;
    byte[] byteArray = Encoding.ASCII.GetBytes(uploadString);
    Connection.ContentLength = byteArray.Length;
    Stream postStream = Connection.GetRequestStream();
    postStream = Connection.GetRequestStream();
    postStream.Write(byteArray, 0, byteArray.Length);
    postStream.Close();
    //Assign the response object of 'WebRequest' to a 'WebResponse' variable.
    rd = GetResponseData();
    Connection = null;
    return rd.ToString();
}
private StringBuilder GetResponseData()
{
    StringBuilder rd = new StringBuilder();
    WebResponse WebResponseObject = Connection.GetResponse();
    using (Stream stream = WebResponseObject.GetResponseStream())
    {
        StreamReader reader = new StreamReader(stream, Encoding.UTF8);
        rd.Append(reader.ReadToEnd());
    }
    WebResponseObject.Close();
    WebResponseObject = null;
    return rd;
}
}
}

```

C# Sample Code for the Sandbox Using the Class Above

To use and invoke the appropriate routines defined in the class code above, a screenshot of the form is provided below.

Note 1: The code above is exclusively for the sandbox due to the cookie definition highlighted in yellow above. You can also configure the cookie value to generalize the parameter for the sandbox (pjmauthtrain)/production (pjmauth) environment.



Note 2: The code that creates the above screen is MarketsGatewayForm.designer.cs:

```
namespace MarketsGatewayUsingCerts
{
    partial class frmGateway
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
    }
}
```

```

/// </summary>
/// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
protected override void Dispose(bool disposing)
{
    if (disposing && (components != null))
    {
        components.Dispose();
    }
    base.Dispose(disposing);
}

#region Windows Form Designer generated code
/// <summary>
/// Required method for Designer support - do not modify
/// the contents of this method with the code editor.
/// </summary>
private void InitializeComponent()
{
    this.txtResponse = new System.Windows.Forms.RichTextBox();
    this.lblResults = new System.Windows.Forms.Label();
    this.btnSelectFile = new System.Windows.Forms.Button();
    this.btnUploadFile = new System.Windows.Forms.Button();
    this.lblFileSelected = new System.Windows.Forms.Label();
    this.lblUser = new System.Windows.Forms.Label();
    this.lblPassword = new System.Windows.Forms.Label();
    this.txtUser = new System.Windows.Forms.TextBox();
    this.txtPassword = new System.Windows.Forms.TextBox();
    this.txtOpenAMURL = new System.Windows.Forms.TextBox();
    this.lblURL = new System.Windows.Forms.Label();
    this.txtGatewayURL = new System.Windows.Forms.TextBox();
    this.lblWebURL = new System.Windows.Forms.Label();
}
    
```

```

this.radQuery = new System.Windows.Forms.RadioButton();
this.radSubmit = new System.Windows.Forms.RadioButton();
this.txtFileSelected = new System.Windows.Forms.RichTextBox();
this.SuspendLayout();
//
// txtResponse
//
this.txtResponse.DetectUrls = false;
this.txtResponse.Location = new System.Drawing.Point(19, 349);
this.txtResponse.Name = "txtResponse";
this.txtResponse.Size = new System.Drawing.Size(501, 235);
this.txtResponse.TabIndex = 0;
this.txtResponse.Text = "";
//
// lblResults
//
this.lblResults.AutoSize = true;
this.lblResults.Font = new System.Drawing.Font("Microsoft Sans Serif", 12F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)0));
this.lblResults.Location = new System.Drawing.Point(226, 324);
this.lblResults.Name = "lblResults";
this.lblResults.Size = new System.Drawing.Size(90, 20);
this.lblResults.TabIndex = 1;
this.lblResults.Text = "Response";
//
// btnSelectFile
//
this.btnSelectFile.Location = new System.Drawing.Point(23, 198);
this.btnSelectFile.Name = "btnSelectFile";
this.btnSelectFile.Size = new System.Drawing.Size(100, 44);
    
```

```

this.btnSelectFile.TabIndex = 2;
this.btnSelectFile.Text = "Select XML File";
this.btnSelectFile.UseVisualStyleBackColor = true;
this.btnSelectFile.Click += new System.EventHandler(this.btnFileSelected_Click);
//
// btnUploadFile
//
this.btnUploadFile.Location = new System.Drawing.Point(24, 262);
this.btnUploadFile.Name = "btnUploadFile";
this.btnUploadFile.Size = new System.Drawing.Size(100, 44);
this.btnUploadFile.TabIndex = 3;
this.btnUploadFile.Text = "Send XML File";
this.btnUploadFile.UseVisualStyleBackColor = true;
this.btnUploadFile.Click += new System.EventHandler(this.btnSendFile_Click);
//
// lblFileSelected
//
this.lblFileSelected.AutoSize = true;
this.lblFileSelected.Font = new System.Drawing.Font("Microsoft Sans Serif", 12F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)0));
this.lblFileSelected.Location = new System.Drawing.Point(252, 193);
this.lblFileSelected.Name = "lblFileSelected";
this.lblFileSelected.Size = new System.Drawing.Size(114, 20);
this.lblFileSelected.TabIndex = 4;
this.lblFileSelected.Text = "File Selected";
//
// lblUser
//
this.lblUser.AutoSize = true;
    
```



```

        this.lblUser.Font = new System.Drawing.Font("Microsoft Sans Serif", 12F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)0));
        this.lblUser.Location = new System.Drawing.Point(18, 11);
        this.lblUser.Name = "lblUser";
        this.lblUser.Size = new System.Drawing.Size(52, 20);
        this.lblUser.TabIndex = 6;
        this.lblUser.Text = "User:";

//
// lblPassword
//
        this.lblPassword.AutoSize = true;
        this.lblPassword.Font = new System.Drawing.Font("Microsoft Sans Serif", 12F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)0));
        this.lblPassword.Location = new System.Drawing.Point(19, 36);
        this.lblPassword.Name = "lblPassword";
        this.lblPassword.Size = new System.Drawing.Size(91, 20);
        this.lblPassword.TabIndex = 7;
        this.lblPassword.Text = "Password:";

//
// txtUser
//
        this.txtUser.Location = new System.Drawing.Point(116, 10);
        this.txtUser.Name = "txtUser";
        this.txtUser.Size = new System.Drawing.Size(117, 20);
        this.txtUser.TabIndex = 8;

//
// txtPassword
//
        this.txtPassword.Location = new System.Drawing.Point(116, 36);
        this.txtPassword.Name = "txtPassword";
    
```

```

this.txtPassword.PasswordChar = '*';

this.txtPassword.Size = new System.Drawing.Size(117, 20);

this.txtPassword.TabIndex = 9;

//

// txtOpenAMURL

//

this.txtOpenAMURL.Location = new System.Drawing.Point(197, 78);

this.txtOpenAMURL.Name = "txtOpenAMURL";

this.txtOpenAMURL.Size = new System.Drawing.Size(300, 20);

this.txtOpenAMURL.TabIndex = 11;

this.txtOpenAMURL.Text = "https://ssotrain.pjm.com/access/authenticate/PjmAuthCert";

//

// lblURL

//

this.lblURL.AutoSize = true;

this.lblURL.Font = new System.Drawing.Font("Microsoft Sans Serif", 12F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)0));

this.lblURL.Location = new System.Drawing.Point(21, 78);

this.lblURL.Name = "lblURL";

this.lblURL.Size = new System.Drawing.Size(157, 20);

this.lblURL.TabIndex = 10;

this.lblURL.Text = "Web openAM URL";

//

// txtGatewayURL

//

this.txtGatewayURL.Location = new System.Drawing.Point(197, 124);

this.txtGatewayURL.Name = "txtGatewayURL";

this.txtGatewayURL.Size = new System.Drawing.Size(300, 20);

this.txtGatewayURL.TabIndex = 13;

this.txtGatewayURL.Text = "https://marketsgatewaytrain.pjm.com/marketsgateway";
    
```

```

//
// lblWebURL
//
this.lblWebURL.AutoSize = true;
this.lblWebURL.Font = new System.Drawing.Font("Microsoft Sans Serif", 12F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)0));
this.lblWebURL.Location = new System.Drawing.Point(21, 124);
this.lblWebURL.Name = "lblWebURL";
this.lblWebURL.Size = new System.Drawing.Size(86, 20);
this.lblWebURL.TabIndex = 12;
this.lblWebURL.Text = "Web URL";
//
// radQuery
//
this.radQuery.AutoSize = true;
this.radQuery.Checked = true;
this.radQuery.Location = new System.Drawing.Point(133, 262);
this.radQuery.Name = "radQuery";
this.radQuery.Size = new System.Drawing.Size(78, 17);
this.radQuery.TabIndex = 14;
this.radQuery.TabStop = true;
this.radQuery.Text = "XML Query";
this.radQuery.UseVisualStyleBackColor = true;
//
// radSubmit
//
this.radSubmit.AutoSize = true;
this.radSubmit.Location = new System.Drawing.Point(133, 289);
this.radSubmit.Name = "radSubmit";
this.radSubmit.Size = new System.Drawing.Size(93, 17);
    
```

```

this.radSubmit.TabIndex = 15;

this.radSubmit.Text = "XML Submittal";

this.radSubmit.UseVisualStyleBackColor = true;

//

// txtFileSelected

//

this.txtFileSelected.DetectUrls = false;

this.txtFileSelected.Location = new System.Drawing.Point(135, 216);

this.txtFileSelected.Multiline = false;

this.txtFileSelected.Name = "txtFileSelected";

this.txtFileSelected.ScrollBars = System.Windows.Forms.RichTextBoxScrollBars.Horizontal;

this.txtFileSelected.Size = new System.Drawing.Size(385, 26);

this.txtFileSelected.TabIndex = 16;

this.txtFileSelected.Text = "";

this.txtFileSelected.WordWrap = false;

//

// frmGateway

//

this.AutoScaleDimensions = new System.Drawing.SizeF(6F, 13F);

this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;

this.ClientSize = new System.Drawing.Size(542, 606);

this.Controls.Add(this.txtFileSelected);

this.Controls.Add(this.radSubmit);

this.Controls.Add(this.radQuery);

this.Controls.Add(this.txtGatewayURL);

this.Controls.Add(this.lblWebURL);

this.Controls.Add(this.txtOpenAMURL);

this.Controls.Add(this.lblURL);

this.Controls.Add(this.txtPassword);

this.Controls.Add(this.txtUser);
    
```

```

        this.Controls.Add(this.IblPassword);
        this.Controls.Add(this.IblUser);
        this.Controls.Add(this.IblFileSelected);
        this.Controls.Add(this.btnUploadFile);
        this.Controls.Add(this.btnSelectFile);
        this.Controls.Add(this.IblResults);
        this.Controls.Add(this.txtResponse);
        this.Name = "frmGateway";
        this.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen;
        this.Text = "Markets Gateway (Train)";
        this.ResumeLayout(false);
        this.PerformLayout();
    }
#endregion

private System.Windows.Forms.RichTextBox txtResponse;
private System.Windows.Forms.Label IblResults;
private System.Windows.Forms.Button btnSelectFile;
private System.Windows.Forms.Button btnUploadFile;
private System.Windows.Forms.Label IblFileSelected;
private System.Windows.Forms.Label IblUser;
private System.Windows.Forms.Label IblPassword;
private System.Windows.Forms.TextBox txtUser;
private System.Windows.Forms.TextBox txtPassword;
private System.Windows.Forms.TextBox txtOpenAMURL;
private System.Windows.Forms.Label IblURL;
private System.Windows.Forms.TextBox txtGatewayURL;
private System.Windows.Forms.Label IblWebURL;
private System.Windows.Forms.RadioButton radQuery;
private System.Windows.Forms.RadioButton radSubmit;
private System.Windows.Forms.RichTextBox txtFileSelected;
    
```

```

    }
}

```

Note 3: The code above resides and drives behind the screen, and the code that resides and defines behind the two critical buttons is provided below.

(MarketsGatewayForm.cs) :

```

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

namespace MarketsGatewayUsingCerts
{
    public partial class frmGateway : Form
    {
        private string XML_to_Upload;
        public frmGateway()
        {
            InitializeComponent();
        }
        private void btnFileSelected_Click(object sender, EventArgs e)
        {
            // Create an instance of the open file dialog box.
            OpenFileDialog openFileDialog1 = new OpenFileDialog();
            // Set filter options and filter index.
            openFileDialog1.Filter = "XML Files (*.xml)|*.xml|Text Files (.txt)|*.txt";
            openFileDialog1.FilterIndex = 1;
            openFileDialog1.Multiselect = false;
            // Call the ShowDialog method to show the dialog box.
            DialogResult userClickedOK = openFileDialog1.ShowDialog();
            // Process input if the user clicked OK.
            if (userClickedOK == DialogResult.OK)
            {
                this.txtFileSelected.Text = openFileDialog1.FileName;
                System.IO.StreamReader sr = new
                System.IO.StreamReader(this.txtFileSelected.Text);
                XML_to_Upload = sr.ReadToEnd();
                sr.Close();
            }
        }
        private void btnSendFile_Click(object sender, EventArgs e)
        {
            if (txtUser.Text != "" && txtPassword.Text != "")
            {
                WebControl c = new WebControl();
                c.User = txtUser.Text;
                c.Password = txtPassword.Text;
                c.XML_SendStr = XML_to_Upload;
                c.OpenAM_URL = this.txtOpenAMURL.Text;
                c.Web_URL = this.txtGatewayURL.Text;
            }
        }
    }
}

```

```

        c.XMLType = (this.radQuery.Checked) ? WebControl.XMLTypes.XMLQuery :
WebControl.XMLTypes.XMLSubmit;
        this.txtResponse.Text = "Sending...";
        this.txtResponse.Refresh();
        this.txtResponse.Text = c.sendXMLRoutine();
    }
}
}

```