LoadMaster Duo Integration Guide

Technical Note

UPDATED: 20 March 2021

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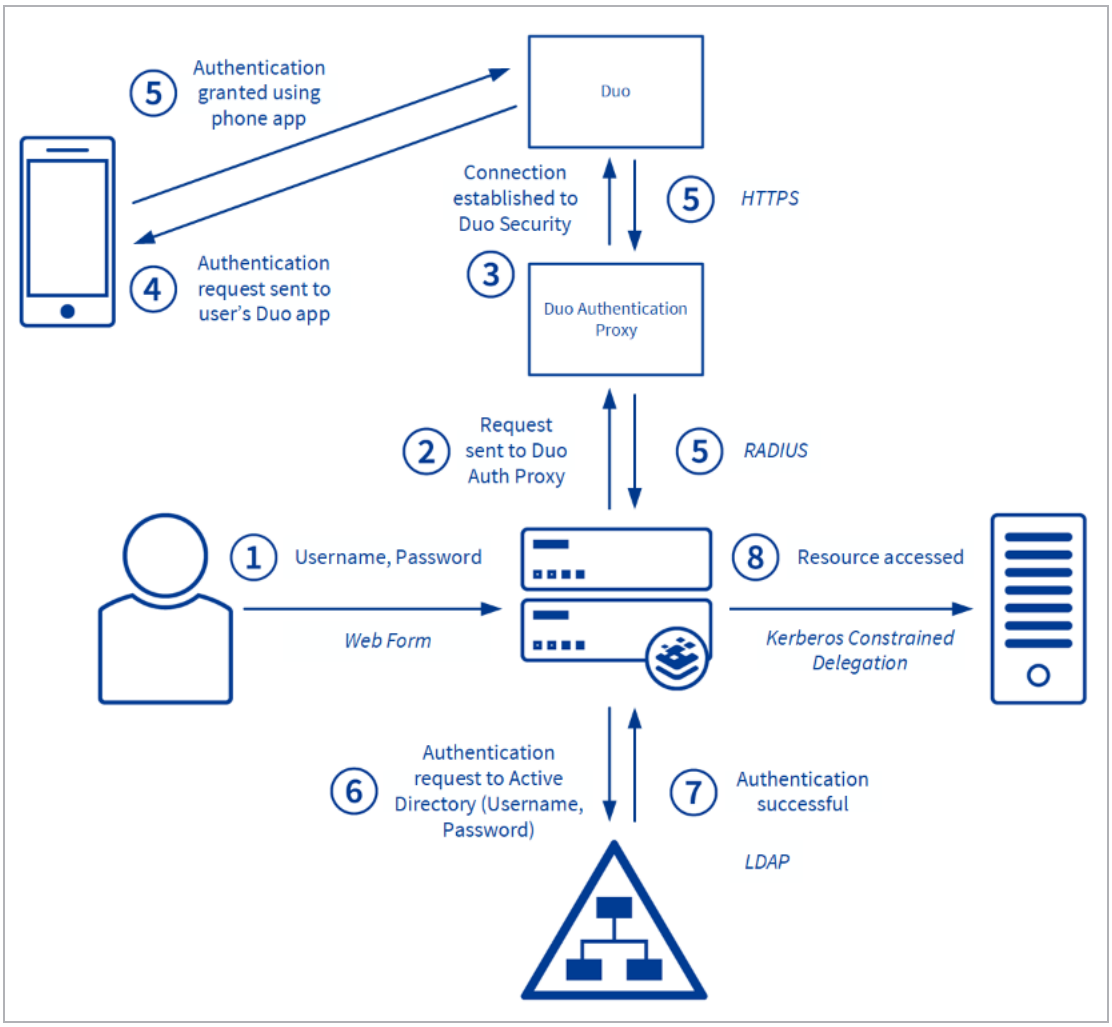
Table of Contents

1 LoadMaster Duo Two Factor Authentication

In this guide we will configure Duo Push along with username and password validation through Active Directory to implement a two factor authentication for our sample application. In this example, the authentication used with the application server is Kerberos Constrained Delegation (KCD).

Once configured the user flow for accessing the application will look like this:



The flow is outlined below:

1. The user provides their username and password.
2. The LoadMaster queries the Duo RADIUS proxy for the user.
3. A connection to Duo Security is established.
4. An authentication request is sent to the user's Duo app.
5. The user validates the request on the app.
6. The LoadMaster performs pre-authentication using the supplied username and password with the Local Domain Controller.
7. Authentication is successful.
8. The resource is accessed through Kerberos Constrained Delegation.

1.1 Related Firmware Version

Published with LMOS version 7.2.48.4 LTS. This document has not required substantial changes since 7.2.48.4 LTS. However, the content is in sync with the latest LoadMaster LTS firmware.

1.2 Add an Application to Duo

First you must log in to the Duo Admin Panel and navigate to **Applications > Protect an application**. Click **Radius**. Then, follow the remaining steps in the sub-sections below.

1.2.1 Install Duo Auth Proxy on Linux

The following Duo guide outlines the steps on installing Duo Authentication Proxy: Authentication Proxy - Reference.

Below is an example configuration using CentOS with Wget installed:

```
yum install gcc make libffi-devel perl zlib-devel
wget https://dl.duosecurity.com/duoauthproxy-latest-src.tgz
tar xzf duoauthproxy-latest-src.tgz
cd duoauthproxy-5.1.1-7484191-src/
make
cd duoauthproxy-build/
./install
```

At this point step through the prompts, for example:

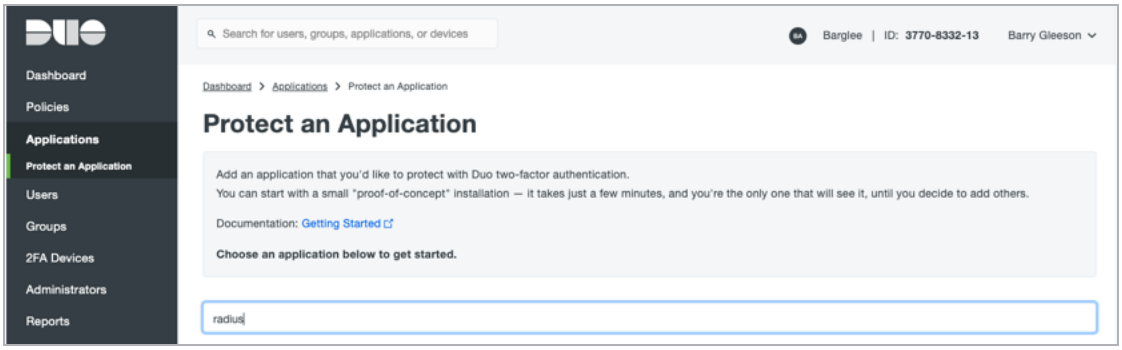
```
In what directory do you wish to install the Duo Authentication Proxy?
```



```
[/opt/duoauthproxy]

Enter the name of a user account under which the Authentication Proxy should be run. We
recommend a non-privileged and locked down account.

Or you can press <Enter> and our default locked down user will be created for you:

[duo_authproxy_svc]

Enter the name of a group under which the Authentication Proxy logs will be readable. Or
press <Enter> and a default group will be created for you:

[duo_authproxy_grp]
```

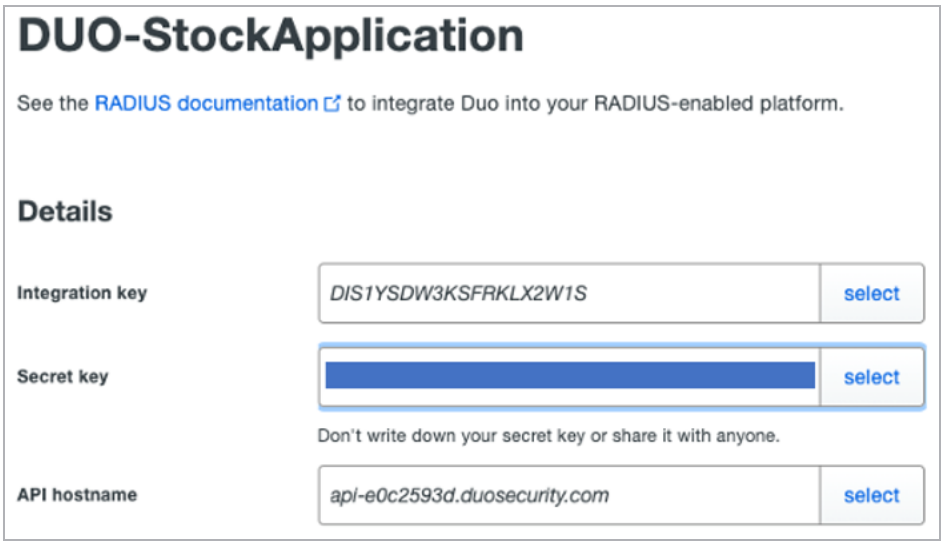
1.2.2 Create an Application in Duo

To create an application in Duo, follow these steps:



1. Log in to Duo and go to **Dashboard > Applications > Protect an Application** and search for **radius**.

2. Set the app Name and Users that can access the app.



3. Copy the values for:

- Integration key

- Secret key

- API hostname

1.2.3 Configure Duo Auth Proxy and Start

To configure the Duo auth proxy, you must modify the **authproxy.cfg** file. For example:

```
vi /opt/duoauthproxy/conf/authproxy.cfg
```

Below is an example configuration containing the details copied above in addition to the IP address of the LoadMaster which is the RADIUS Client (**radius_ip_1**) and the RADIUS password to use (**radius_secret_1**).

In our case we are only doing one validation step with Duo so use:

```
client= duo_only_client


[main]
test_connectivity_on_startup=true
[duo_only_client]
[radius_server_auto]
ikey=DIS1YSDW3KSFRKLX2W1S
skey=eEqgB1BUP7dfasdasdasdhAPDZOSwLvLp
api_host=api-e0c2593d.duosecurity.com
radius_ip_1=10.1.151.61
radius_secret_1=duoradius
client=duo_only_client
port=1812
```

1.2.3.1 Add a Firewall Rule to Allow Inbound RADIUS

This may vary across Linux OSS:

```
firewall-cmd --add-service=radius --permanent
sudo firewall-cmd --reload
```

1.2.3.2 Start Duo Auth Proxy

Whenever changes are made the configuration you must stop and start the process.

```
[root@localhost log]# /opt/duoauthproxy/bin/authproxyctl start
Running The Duo Authentication Proxy Connectivity Tool. This may take several minutes...
[info] Testing section 'main' with configuration:
```



```
[info] {'test_connectivity_on_startup': 'true'}
[info] There are no configuration problems
[info] ------------------------------
[info] Testing section 'duo_only_client' with configuration:
[info] {}
[info] There are no configuration problems
[info] ------------------------------
[info] Testing section 'radius_server_auto' with configuration:
[info] {'api_host': 'api-e0c2593d.duosecurity.com',
'client': 'duo_only_client',
'ikey': 'DIS1YSDW3KSFRKLX2W1S',
'port': '1812',
'radius_ip_1': '10.1.151.61',
'radius_secret_1': '*****',
'skey': '*****[40]'}
[info] There are no configuration problems
[info] ------------------------------
[info] Testing section 'main' with configuration:
[info] {'test_connectivity_on_startup': 'true'}
[info] There are no connectivity problems with the section.
[info] ------------------------------
[info] Testing section 'duo_only_client' with configuration:
[info] {}
[info] No testing to be done for section.
[info] ------------------------------
[info] Testing section 'radius_server_auto' with configuration:
[info] {'api_host': 'api-e0c2593d.duosecurity.com',
'client': 'duo_only_client',
'ikey': 'DIS1YSDW3KSFRKLX2W1S',
'port': '1812',
'radius_ip_1': '10.1.151.61',
'radius_secret_1': '*****',
'skey': '*****[40]'}
[info] The RADIUS Server has no connectivity problems.
[info] ------------------------------
[info] SUMMARY
[info] No issues detected
```

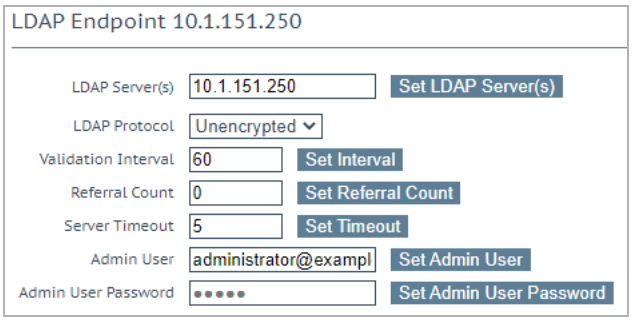


```
The results have also been logged in /opt/duoauthproxy/log/connectivity_tool.log
Checking updates for Duo Authentication Proxy...
[info] No updates detected. Your Duo Authentication Proxy is up to date.
```

1.2.4 Configure the LoadMaster

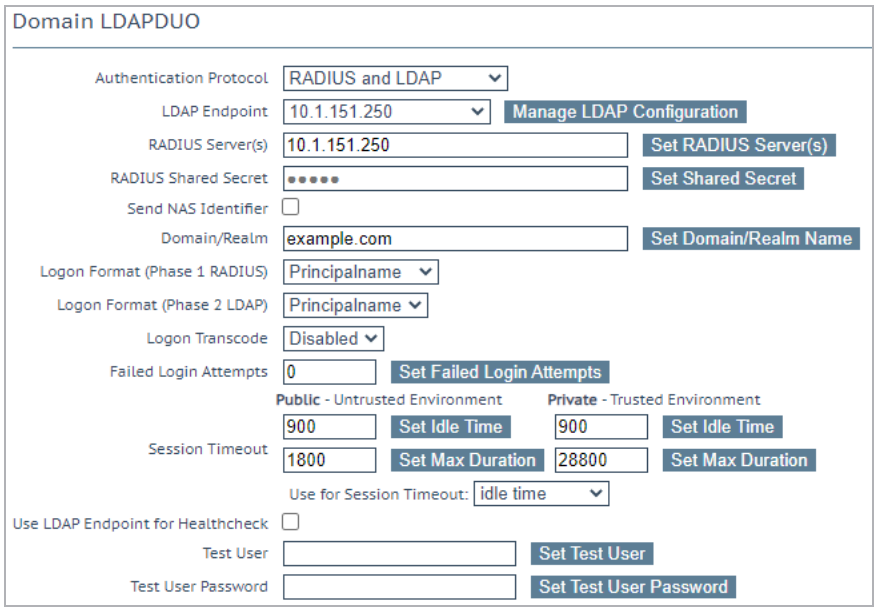
Create an SSO domain using LDAP and RADIUS. To do this, follow the steps below:

1. In the LoadMaster User Interface (UI), go to **Certificates & Security > LDAP Configuration**.
2. Specify the name of the LDAP endpoint configuration and click **Add**.

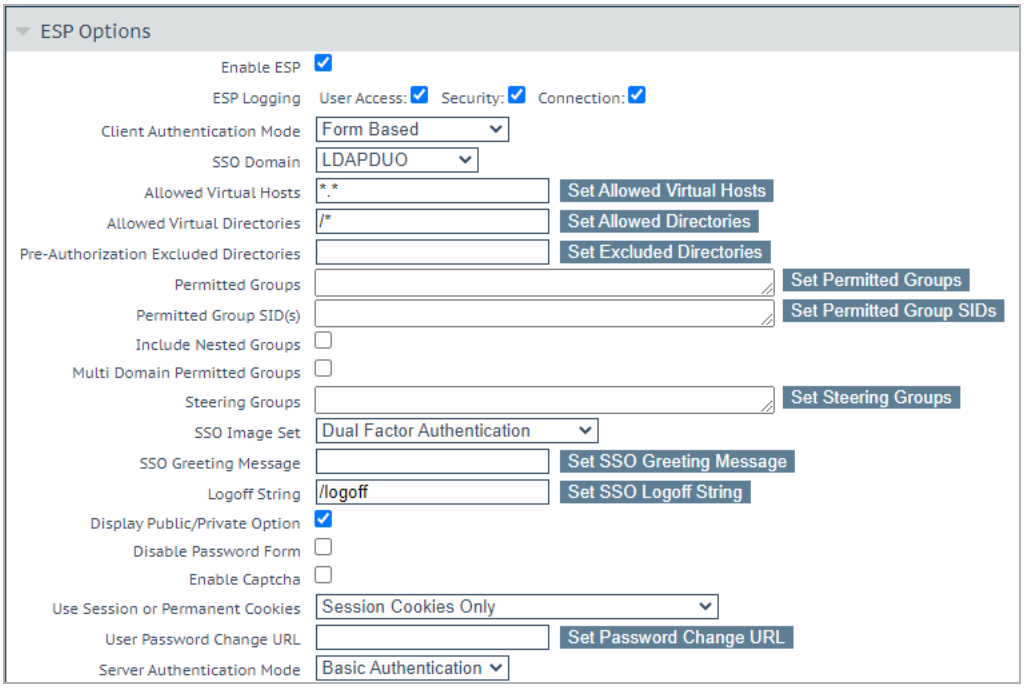


3. Configure the settings of the LDAP endpoint as needed.
4. In the LoadMaster UI, go to **Virtual Services > Manage SSO**.

5. Enter the name of the SSO configuration in the text box under **Add new Client Side Configuration** and click **Add**.



6. Select **RADIUS and LDAP** as the **Authentication Protocol**.
7. Select the relevant **LDAP Endpoint**.
8. Configure the other settings as needed.
9. In the LoadMaster UI, go to **Virtual Services > View/Modify Services**.
10. Click **Modify** on the relevant Virtual Service (or add a new one).
11. Expand the **ESP Options** section.



12. Select the **Enable ESP** check box.
13. Select the relevant **SSO Domain**.
14. Configure any other settings as needed.

1.3 Create the Duo Image Set

In this example the dual factor custom image set is updated to include an image prompt for the user to authorize access using the app. You can customize this to use your chosen image. In this example, the custom image form is modified to include just one Username and one Password input field and an image is added to indicate to the user that they must approve access in response to the initiated Duo push. The image being displayed in this example is **PhoneApprove.png** and must be added to the custom image set manifest directory (as described in the **Add the Image Name to the Manifest** section). For details on how to modify a custom image set, refer to the following document: Custom Authentication Form Technical Note.

1.3.1 Modify lm_initial_dfa.html

Modify the **lm_initial_dfa.html** file to add the following HTML:

```
<script type="text/javascript">

function picture(){
```



```
var pic = "/lm_auth_proxy?LMimage=PhoneApprove.png"
document.getElementById('bigpic').src = pic.replace('90x90', '225x225');
document.getElementById('bigpic').style.display='block';

}

</script>

<script>
function hidebutton(button){
button.style.visibility = "hidden";
}

</script>
```

Change Submit Action:

Before

```
<form action="/lm_auth_proxy?LMLogon" method="post" id="logonForm" autocomplete="off"
onSubmit="return save_usernames_dfa(this.dusername, this.username, this.pubpriv);">
```

After

```
<form action="/lm_auth_proxy?LMLogon" method="post" id="logonForm" autocomplete="off"
onSubmit="return save_usernames_dfa(this.dusername, this.dusername, this.pubpriv);">
```

Before

```
<tr id="remotecredsid">
<td class="nowrap"><label for="remotecreds"><b>Remote Credentials</b></label></td>
</tr>
<tr id="dpasscodeid">
<td class="nowrap"><label for="dpasscode">Passcode:</label></td>
<tr id="dpasscodeid style="display:none;">
```

Before

```
<input class="txt" id="dpasscode" type="password" name="dpasscode" autocomplete=off
required maxlength=128 />
```

After

```
<input class="txt" id="dpasscode" value="XXX" type="hidden" name="dpasscode"
autocomplete=off maxlength=128 />
```


Before

```
<tr id="interncredsid">
<td class="nowrap"><label for="interncreds"><b>Internal Credentials</b></label></td>
</tr>
<tr id="userid">
<td class="nowrap"><label for="username">Internal Username:</label></td>
```

After

```
<tr id="userid" style="display:none">
<td class="nowrap"><label for="username">Ignore Username:</label></td>
```

Before

```
<input type="submit" value="Log On" name="submit" />
```

After

```
<input type="submit" value="Log On" onclick="hidebutton(this);picture();" name="submit"
/>
<tr id="interncredsid">
<td class="nowrap" align="center" colspan="2"><label for="interncreds"><b><img max-
width:45px; max-height:45px; id="bigpic" src="bigpic" style="display:none;"
/></b></label></td>
</tr>
```

1.3.2 Modify lm_sso.js

Replace all references to **username** with **dusername**.

1.3.3 Add the Image Name to the Manifest

Add the image used to the manifest and include in the imageset/Duo directory, for example, **PhoneApprove.png**.

Within the <head> portion of the page, add the following JavaScript to enable dynamic display of the Duo image and hiding of the button once credentials are entered.

Add:

```
<script type="text/javascript">
function picture(){
var pic = "/lm_auth_proxy?LMimage=PhoneApprove.png"
document.getElementById('bigpic').src = pic.replace('90x90', '225x225');
document.getElementById('bigpic').style.display='block';
}
</script>
```



```
<script>
function hidebutton(button){
button.style.visibility = "hidden";
}
</script>
```

Remove the use of two separate usernames. This enables the same username to be used for both Duo (RADIUS) and LDAP queries.

Replace:

```
<form action="/lm_auth_proxy?LMLogon" method="post" id="logonForm" autocomplete="off"
onSubmit="return save_usernames_dfa(this.dusername, this.username, this.pubpriv);">
```

With:

```
<form action="/lm_auth_proxy?LMLogon" method="post" id="logonForm" autocomplete="off"
onSubmit="return save_usernames_dfa(this.dusername, this.dusername, this.pubpriv);">
```

Remove the following section because there is no need for separate remote credentials:

```
<tr id="remotecredsid">
<td class="nowrap"><label for="remotecreds"><b>Remote Credentials</b></label></td>
</tr>
```

Remove the first password field from view.

Replace:

```
<tr id="dpasscodeid">
<td class="nowrap"><label for="dpasscode">Passcode:</label></td>
```

With:

```
<tr id="dpasscodeid style="display:none;">
```

Update the RADIUS password to have a pre-populated value which in this case is not used because the RADIUS query requires the username only to trigger the push notification.

Replace:

```
<input class="txt" id="dpasscode" type="password" name="dpasscode" autocomplete=off
required maxlength=128 />
```

With:

```
<input class="txt" id="dpasscode" value="XXX" type="hidden" name="dpasscode"
autocomplete=off maxlength=128 />
```

Remove the second username field:

```
<tr id="interncredsid">
```



```
<td class="nowrap"><label for="interncreds"><b>Internal Credentials</b></label></td>
</tr>
```

Remove the displaying of the internal username because we will reuse a single username.

Replace:

```
<tr id="userid">
<td class="nowrap"><label for="username">Internal Username:</label></td>
```

With:

```
<tr id="userid" style="display:none"><td class="nowrap"><label for="username">Ignore
Username:</label></td>
```

Update the internal password field to simply be called password.

Replace:

```
<td class="nowrap"><label for="password">Internal Password:</label></td>
```

With:

```
<td class="nowrap"><label for="password">Password:</label></td>
```

On submit, ensure the Duo image is displayed.

Replace:

```
<input type="submit" value="Log On" name="submit" />
```

With:

```
<input type="submit" value="Log On" onclick="hidebutton(this);picture();" name="submit"
/>
```

Below is the updated file completed:

```
<!DOCTYPE html>
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; CHARSET=utf-8">
<title>Kemp Login Screen</title>
<meta content="NOINDEX, NOFOLLOW" name="Robots">
<link rel="shortcut icon" href="/lm_auth_proxy?LMimage=favicon.ico" type="image/x-icon">
<link href="/lm_auth_proxy?LMimage=kmgstyle.css" type="text/css" rel="stylesheet">
<style type="text/css">
body
{
font-family:Tahoma,Arial,Helvetica;
```



```
font-size:70%;
}
input, button
{
font-family:Tahoma,Arial,Helvetica;
}
.mid
{
font-size:70%;
}
input, button, label, table
{
font-size:100%;
}
</style>
<script>
var xx_msg10 = "Login Failed - The security service has blocked your request. Please
contact your System Administrator.<br><br>";
var xx_msg11 = "Login Failed - Please make sure that both your remote and internal
credentials are correct, and then try again.<br><br>";
</script>
<script type="text/javascript" src="/lm_auth_proxy?LMimage=lm_sso.js"></script>
<script type="text/javascript">
function picture(){
var pic = "/lm_auth_proxy?LMimage=PhoneApprove.png"
document.getElementById('bigpic').src = pic.replace('90x90', '225x225');
document.getElementById('bigpic').style.display='block';
}


</script>
<script>
function hidebutton(button){
button.style.visibility = "hidden";
}
</script>
</head>
<body style="font-size:100%" onload='sso_setup("%s", "%s", "%s", %s, %s, %s);'>
```



```
<noscript>
<div id="dvErr">
<table cellpadding="0" cellspacing="0">
<tr>
<td><img src="/lm_auth_proxy?LMimage=kmgerror.gif" alt=""></td>
<td style="width:100%">To use LoadMaster ESP Login, javascript must be enabled in your
browser.</td>
</tr>
</table>
</div>
</noscript>
<form action="/lm_auth_proxy?LMLogon" method="post" id="logonForm" autocomplete="off"
onSubmit="return save_usernames_dfa(this.dusername, this.dusername, this.pubpriv);">
<input type="hidden" id="curl" name="curl" value="">
<input type="hidden" id="curlid" name="curlid" value="">
<input type="hidden" id="curlmode" name="curlmode" value="0">
<table align="center" id="tblMain" cellpadding=0 cellspacing=0>
<tr>
<td colspan=3>
<table cellspacing=0 cellpadding=0 class="tblLgn">
<tr><td><img src="/lm_auth_proxy?LMimage=esptop.gif"></td>
</tr>
</table>
</td>
</tr>
<tr>
<td id="mdLft"> </td>
<td id="mdMid">
<table class="mid">
<tbody>
<tr>
<td class="align">
<table cellpadding="0" cellspacing="0">
<tr><td id="ssomsg"></td></tr>
</table>
</td>
</tr>
```



```
<tr id="reset_pass" style="display:none">
<td class="align">
<table cellpadding="0" cellspacing="0">
<tr><td>
<span style="display:none" id="expired_msg">Your password has expired.</span>
<span style="display:none" id="exp_p_msg">Password will expire in </span>
<span style="display:none" id="exp_p_numb"></span>
<span style="display:none" id="exp_p_numb_plur"> days</span>
<span style="display:none" id="exp_p_numb_sing"> day</span>
<span id="reset_msg"> </span> 
<a id="reset_link" href="#">Click Here</a>
</td></tr>
</table>
</td>
</tr>
<tr>
<td class="align">
<table cellpadding="0" cellspacing="0">
<tr><td class="wrng" id="badmsg"></td></tr>
</table>
</td>
</tr>
<tr>
<td>
<table cellspacing="0" cellpadding="0">
<colgroup>
<col class="nowrap">
<col class="w100">
<col>
<tbody>
<tr id="nopub"><td class="nowrap">
<input type=radio id=pubr name="pubpriv" value=0 checked="checked">
</td><td class="align"><label for="pubr">This is a public or shared computer</label></td>
</tr>
<tr id="nopub1"><td class="nowrap">
<input type=radio id=pubp name="pubpriv" value=1>
</td><td class="align"><label for="pubp">This is a private computer</label></td>
```



```
</tr>
<tr id="duserid">
<td class="nowrap"><label for="dusername">Username:</label></td>
<td class="txtpad">
<input class="txt" id="dusername" name="dusername" type="text"/>
</td>
</tr>
<tr id="dpasscodeid style="display:none;">
<td class="txtpad">
<input class="txt" id="dpasscode" value="XXX" type="hidden" name="dpasscode"
autocomplete=off maxlength=128 />
</td>
</tr>

<tr id="userid" style="display:none">
<td class="nowrap"><label for="username">Ignore Username:</label></td>
<td class="txtpad">
<input class="txt" id="username" name="username" type="text"/>
</td>
</tr>
<tr id="passid">
<td class="nowrap"><label for="password">Password:</label></td>
<td class="txtpad">
<input class="txt" id="password" type="password" name="password" autocomplete=off
required maxlength=128 />
</td>
</tr>

<tr>
<td class="nowrap"> </td>
<td class="txtpad" colspan="2">
<input type="submit" value="Log On" onclick="hidebutton(this);picture();" name="submit"
/>
</td>
</tr>
<tr id="interncredsid">
```



```
<td class="nowrap" align="center" colspan="2"><label for="interncreds"><b><img max-
width:45px; max-height:45px; id="bigpic" src="bigpic" style="display:none;"
/></b></label></td>
</tr>
</tbody>
</table>
</td>
</tr>
</tbody>
</table>
<div class="g-recaptcha" id=captchabox style="display:none" data-sitekey=""></div>
<table class="mid tblConn">
<tr>
<td class="tdConn" style="padding-top:0px;">Secured by Kemp LoadMaster</td>
</tr>
<tr>
<td style="font-size:80%;">&copy; 2002-2020 Kemp Technologies Inc. All rights
reserved.</td>
</tr>
</table>
</td>
<td id="mdRt"> </td>
</tr>
<tr>
<td colspan=3>
<table cellspacing=0 cellpadding=0 class="tblLgn">
<tr>
<td><img src="/lm_auth_proxy?LMimage=espbottom.gif" alt=""></td>
</tr></table>
</td>
</tr>
</tbody>
</table>
</form>
</body>
</html>
```


2 References

For further details, refer to the following Duo document: Authentication Proxy - Reference.

Last Updated Date

This document was last updated on 20 March 2021.