基于 LDAP 和动态 VLAN 的 eduroam 配置

Contents

香港中文大学（深圳）的 eduroam 无线网络，自 2016 年部署以来先已经稳定运行了 3 年，部署之初，为方便我校师生熟悉 802.1x 认证的使用，本校师生和访客在校内均能使用 eduroam 上网，且权限相同。但这也给网络管理带来一定困扰。考虑到即使是同一 AD 域账号，eduroam 的访问权限都需要依据角色而不同，所以本文在 freeradius 的基本配置上，添加了 LDAP 模块用于权限分配，认证仍然使用 eap，利用 LDAP-Group 实现动态 VLAN 下发，从而实现不同角色权限分离。

一．环境准备

两台 Radius 服务器分别模拟校外用户和校内用户认证。

一台校内 AD 域服务器作为 LDAP-Group 授权演示: Windows Server 2016

AD 域服务器集群：CUHK.EDU.CN 的 AD 域集群做访客登录测试。

radius 系统： CentOS Linux release 7.7.1908 (Core) 。

无线控制器：华为 AC-6805

软件：freeradius 3.0

二．Linux 服务器加 AD 域

1. 安装配置 samba

安装组件，关闭防火墙和 selinux

```
yum  update –y
yum install samba samba-client samba-winbind krb5-server  krb5-workstation samba-winbind-clients -y
```

2. 修改配置文件

配置 /etc/samba/smb.con

```
[global]
        workgroup = FREETEST                    #指定域的 netbios 名称
        security = ads                                  #指定 samba 的工作模式
        winbind use default domain = no
        password server = 10.10.9.86   #指定身份认证的服务器必须为域控
        realm = FREETEST.COM                    #指定 AD 域名
```

配置/etc/krb5.conf，这里严格区分大小写

```
[logging]
 default = FILE:/var/log/krb5libs.log
 kdc = FILE:/var/log/krb5kdc.log
 admin_server = FILE:/var/log/kadmind.log

[libdefaults]

 dns_lookup_realm = false
 dns_lookup_kdc = true
default_realm = FREETEST.COM                #指定 AD 域名
 default_ccache_name = KEYRING:persistent:%{uid}

[realms]
 FREETEST.COM = {
  kdc = 10.10.9.86:88                               #指域控为 kdc 服务器及端口
  admin_server = 10.10.9.86:749             #指定域控的管理端口
  default_domain = freetest.com
 }

[domain_realm]
 .freetest.com = FREETEST.COM
 freetest.com = FREETEST.COM

[kdc]
  profile =/var/kerberos/krb5kdc/kdc.conf
```

编辑/etc/nsswich.conf,在下列行末尾加 “winbind”

```
passwd:     files sss winbind
shadow:     files sss winbind
group:      files sss winbind

protocols:  files sss winbind

services:   files sss winbind

netgroup:   files sss winbind

automount:  files sss winbind
```

将 samba 和 winbind 服务设置为开机启动，然后重启服务器。

```
systemctl enable smb
systemctl enable winbind
```

3. samba 加入域并测试

重启后测试 samba 与域控的连通性，加入域并测试。

```
kinit user@FREETEST.COM    #域名必须大写，输入密码后不返回结果说明没错误
net ads join –U user          #加入域
systemctl restart smb                  #重启 smb
systemctl restart winbind  #重启 winbind
wbinfo  -u                          #查看域用户
wbinfo  -a user%password    #测试用户认证，最后结尾如下代表成功。
challenge/response password authentication succeeded
```

4. 测试 NTLM 认证

```
ntlm_auth  --request-nt-key --domain=FREETEST --username=user
NT_STATUS_OK: The operation completed successfully.  #表示结果正确
```

【ntlm 是 windows 域环境下的认证方式】

5. 修改/var/lib/samba/winbindd_privileged 权限

```
usermod –G wbpriv radiusd
```

三．安装 FreeRadius，并做基本配置测试

1. 安装 freeradius

```
yum install freeradius freeradius-utils freeradius-ldap -y
```

2. 编辑/etc/raddb/clients.conf，定义客户端

```
client AC {
      ipaddr = *                #定义客户端 IP 地址，*表示任意 IP 地址
      secret = testing123       # 设置预共享密钥
      shortname = AC            #设置客户端项的友好名称
}
```

3. 编辑/etc/raddb/users ，编辑用户名和密码

```
testing Cleartext-Password := "testing"
```

4. 自带客户端简单测试

```
firewall-cmd --zone=public --add-port=1812/udp –permanent

firewall-cmd --zone=public --add-port=1813/udp --permanent

firewall-cmd –reload

radius   -X   # 用 debugging 模式开启 radius 服务
```

testing testing localhost 0 testing123 # 第一 testing 是用户名，第二 testing 是密码，testing123 客户端对接的共享密码。显示如下表示基本测试成功

Sent Access-Request Id 48 from 0.0.0.0:44835 to 127.0.0.1:1812 length 77

User-Name = "testing"

User-Password = "testing"

NAS-IP-Address = 127.0.0.1

NAS-Port = 0

Message-Authenticator = 0x00

Cleartext-Password = "testing"

Received Access-Accept Id 48 from 127.0.0.1:1812 to 0.0.0.0:0 length 20

四．eduroam 的基本配置

1. 安装测试依赖包

利用 wpa_supplicant 下的一个工具 eapol_test 用来测试 eduroam，安装依赖包。

```
yum groupinstall “Development Tools”
yum install git openssl -devel pkgconfig libn13-devel
```

2. 设置外虚拟服务器

在/etc/raddb/sites-available 目录下新建 eduroam 文件。

```
operator_name = "freetest.com"
server eduroam {
    listen {
        type = "auth"
        ipaddr = *
        port = 0
    }
    listen {
        type = "acct"
        ipaddr = *
        port = 0
    }
    authorize {
                split_username_nai  #分离用户名和域名
                if (noop || !&Stripped-User-Domain) {
            reject
        }
                if (Stripped-User-Domain != "${operator_name}") {
            update {
                control:Load-Balance-Key := &Calling-Station-ID
                control:Proxy-To-Realm := 'eduroam_flr'
                  #request:Operator-Name,告诉 flr 你的信息，用于 debugging
                request:Operator-Name := "${operator_name}"
            }
            return
        }
        suffix
        eap
    }
    authenticate {
        eap
    }
```

```
preacct {
        suffix
    }

    accounting {
    detail
    exec
    attr_filter.accounting_response
   }
    post-auth {
        Post-Auth-Type REJECT {
            attr_filter.access_reject
            reply_log
                        }
    }

    pre-proxy {
        if("%{Packet-Type}" != "Accounting-Request") {
            attr_filter.pre-proxy
        }
    }

    post-proxy {
        attr_filter.post-proxy
    }
}
```

3. *配置 eudroam 的内虚拟服务器*

在/etc/raddb/sites-available 目录下新建 eduroa-inner-tunnel 文件。

```
server eduroam-inner-tunnel {
authorize {
                        split_username_nai
            if (noop || (&Stripped-User-Domain && \
               (&outer.Stripped-User-Domain != &Stripped-User-Domain))) {
                  reject
            }
      update {
                  &outer.session-state:Stripped-User-Name := &Stripped-User-Name
            }

      auth_log
      eap
      files
      mschap
      pap
                        }

            authenticate {
      Auth-Type PAP {
            pap
      }
      Auth-Type MS-CHAP {
            mschap
      }
      mschap
      eap
      ntlm_auth
            }

            post-auth {
      reply_log
      Post-Auth-Type REJECT {
            reply_log
      }

            }
}
```

4. 配置 EAP 和 mschap

在/etc/raddb/mods-available/， 配置 eap 和 mschap 文件

```
eap {
	default_eap_type = peap

	timer_expire     = 60

	max_sessions = ${max_requests}

	tls-config tls-common {
		private_key_password = 123456
		private_key_file = ${certdir}/server.pem

		certificate_file = ${certdir}/server.pem

		ca_file = ${cadir}/ca.pem

		fragment_size = 1000
	}

	tls {
		tls = tls-common

	}
	peap {
		tls = tls-common

		default_eap_type = mschapv2

		virtual_server = "eduroam-inner-tunnel"
	}

	mschapv2 {

	}
}
```

修改配置 mschap

```
ntlm_auth = "/usr/bin/ntlm_auth --request-nt-key --username=%{%{Stripped-User-Name}:-%{%{User-Name}:-None}} --challenge=%{%{mschap:Challenge}:-00} --nt-response=%{%{mschap:NT-Response}:-00}--domain=%{%{mschap:NT-Domain}:-FREETEST}"
```

5. *proxy.conf 配置*
   在/etc/raddb/proxy.conf 下配置

```
home_server antarctica-flr-1 {
        type                = auth+acct
        ipaddr               = 10.21.3.253
        port                = 1812
        secret               = testing123
}
home_server_pool EDUROAM {
        type                = fail-over
        home_server     = antarctica-flr-1
}
 realm eduroam_flr {
        nostrip
        auth_pool               = EDUROAM
}
```

6. 配置 ntlm_auth
编辑/etc/raddb/mods-enabled/ntlm_auth，修改如下

```
exec ntlm_auth {
        wait = yes
        program = "/usr/bin/ntlm_auth --request-nt-key --domain=MYDOMAIN --username=%{mschap:User-Name} --password=%{User-Password}"
}
```

7. 建立软链接

```
ln –s  /etc/raddb/sites-available/eduroam   /etc/raddb/sites-enable/eduroam
ln –s  /etc/raddb/sites-available/eduroam-inner-tunnel   /etc/raddb/sites-enable/eduroam-inner-tunnel
```

8. 配置客户端

```
client AC {
      ipaddr = *                  #定义客户端 IP 地址，*表示任意 IP 地址
      secret = testing123       # 设置预共享密钥
      shortname = AC            #设置客户端项的友好名称
     virtual_server = eduroam  #设置虚拟服务器

}
```

9. 配置 peap-mschap 测试文件

```
#   eapol_test -c peap-mschap.conf -s testing123
network={
      ssid="example"
      key_mgmt=WPA-EAP
      eap=PEAP
      identity="francisco@freetest.com"
      anonymous_identity="francisco@freetest.com"
      password="ITSM@1234"
      phase2="autheap=MSCHAPV2"
}
```

运行 eapol_test –c peap-mschap.conf –s testing123 返回测试成功。

五．基于 LDAP-Group 动态 VLAN 的 eduroam 配置更新

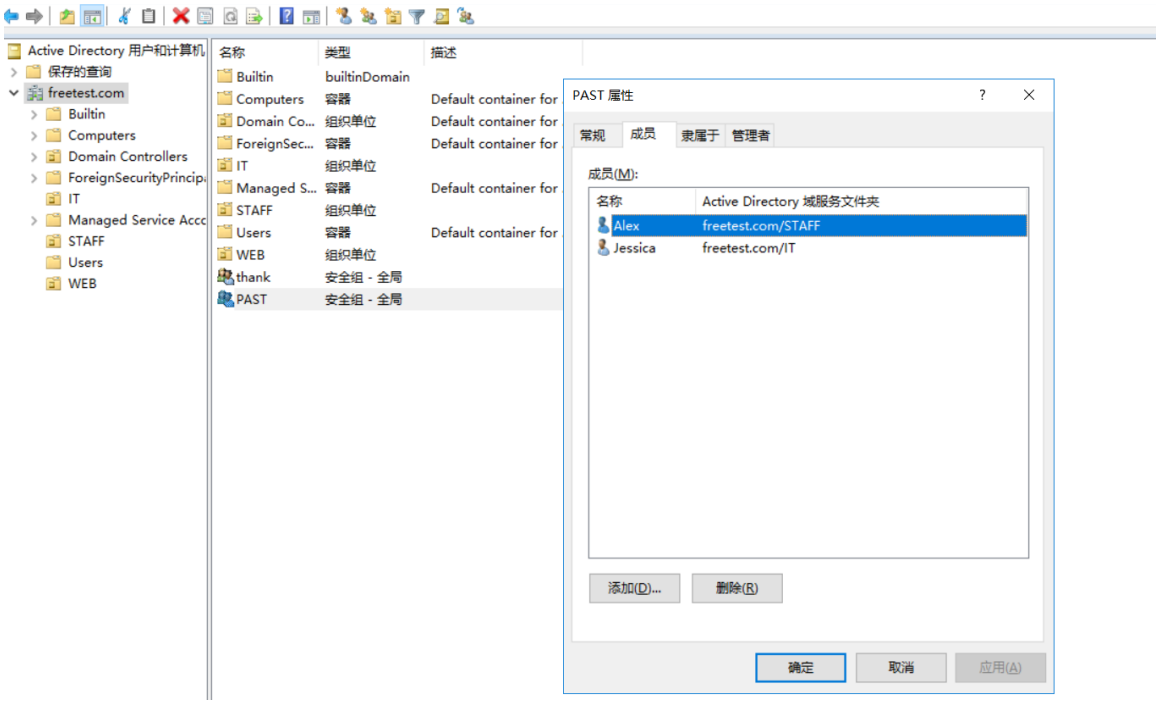
1. /etc/raddb/sites-available/eduroam 更新

```
eduroam_default_guest_vlan = "2156"    #客户 vlan
eduroam_default_local_vlan = "2166"     #本地账号 vlan
    post-auth {
        update reply {

                    Tunnel-Type := VLAN
                    Tunnel-Medium-Type := IEEE-802
                }
                if (&control:Proxy-To-Realm) {
                    update reply {
                        Tunnel-Private-Group-ID = ${eduroam_default_guest_vlan}
                    }
                }
                if (LDAP-Group == "cn=PAST,dc=freetest,dc=com") {
                    update reply {

                        Tunnel-Private-Group-ID = ${eduroam_default_local_vlan}
                    }
                }
                if (LDAP-Group != "cn=PAST,dc=freetest,dc=com" && Stripped-User-
Domain == "${operator_name}") {

                    reject

                }    #不在 LDAP-Group 组里就拒绝。

                if (&session-state:Stripped-User-Name) {
                    update reply {
                        User-Name := "%{session-state:Stripped-User-
Name}@%{Stripped-User-Domain}"
                    }
                }

        Post-Auth-Type REJECT {
            attr_filter.access_reject
            reply_log
        }
    }
```

2. 1dap 配置文件更新

```
ldap {
    server = '10.10.9.86'                    #LDAP 服务器，AD 域服务器配置参考第三部分

    port = 389

    identity = 'cn=admin,ou=IT,dc=freetest,dc=com'   #连接 LDAP 的管理员账号，密码
    password = password

    base_dn = 'dc=freetest,dc=com'

    user {
        base_dn = "${..base_dn}"

        filter = "(samaccountname=%{%{Stripped-User-Name}:-%{User-Name}})"

    }
         group {
        base_dn = "${..base_dn}"
        membership_filter = "(|(member=%{control:Ldap-UserDn})(memberUid=%{%{Stripped-
User-Name}:-%{User-Name}}))"
        membership_attribute = 'memberOf'
    }
```

3. AD 域配置




```
PS C:\Users\Administrator> get-adgroup PAST


DistinguishedName : CN=PAST,DC=freetest,DC=com
GroupCategory     : Security
GroupScope        : Global
Name              : PAST
ObjectClass       : group
ObjectGUID        : 8b622b9d-1b02-4a78-bac0-cf6459806b15
SamAccountName    : PAST
SID               : S-1-5-21-3981203917-699721617-3262906265-1118
```

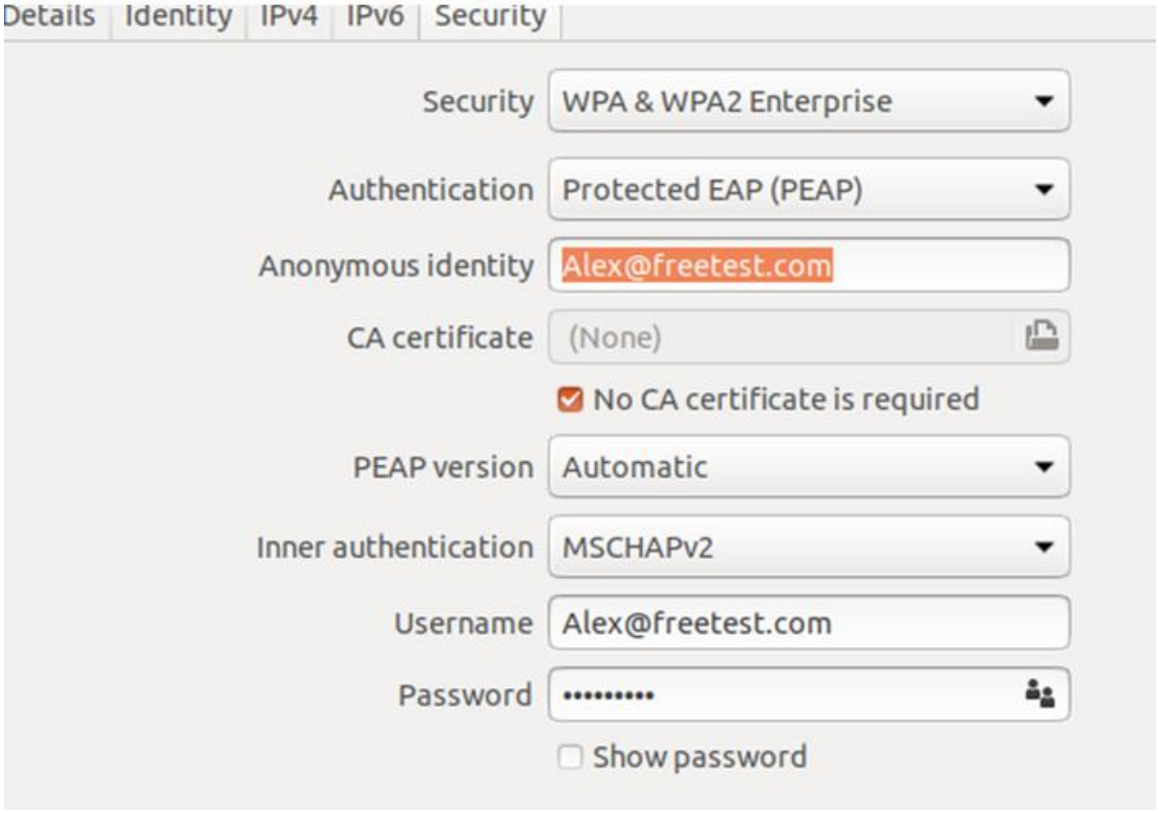
```
PS C:\Users\Administrator> Get-ADGroupMember PAST


distinguishedName : CN=Alex,OU=STAFF,DC=freetest,DC=com
name              : Alex
objectClass       : user
objectGUID        : a6294fdd-7151-4f5f-b185-a1db2dd1fad7
SamAccountName    : Alex
SID               : S-1-5-21-3981203917-699721617-3262906265-1116

distinguishedName : CN=Jessica,OU=IT,DC=freetest,DC=com
name              : Jessica
objectClass       : user
objectGUID        : 54e3854a-98c5-4d00-a782-d3753eee4dd1
SamAccountName    : Jessica
SID               : S-1-5-21-3981203917-699721617-3262906265-1119
```

4. 分别用客户账号，组账号，非组账号测试

测试结果，当用 francisco@freetest.com 测试时，因为不在 PAST 组里，被拒绝。

```
(9)      Performing search in "cn=PAST,dc=freetest,dc=com" with filter
"(|(member=CN\3dfrancisco\2cOU\3dWEB\2cDC\3dfreetest\2cDC\3dcom)(memberUid=francisco))
", scope "sub"
(9)      Waiting for search result...
(9)      Search returned no results
(9)    Checking user object's memberOf attributes
(9)      Performing unfiltered search in "CN=francisco,OU=WEB,DC=freetest,DC=com", scope "base"
(9)      Waiting for search result...
(9)    No group membership attribute(s) found in user object
rlm_ldap (ldap): Released connection (1)
(9)    User is not a member of "cn=PAST,dc=freetest,dc=com"
(9)    if (LDAP-Group != "cn=PAST,dc=freetest,dc=com" && Stripped-User-Domain ==
"freetest.com" )  -> TRUE
(9)    if (LDAP-Group != "cn=PAST,dc=freetest,dc=com" && Stripped-User-Domain ==
"freetest.com" )  {
(9)      [reject] = reject
(9)    } # if (LDAP-Group != "cn=PAST,dc=freetest,dc=com" && Stripped-User-Domain ==
"freetest.com" )  = reject
(9)  } # post-auth = reject
```

当用 Alex@freetest.com 测试时，因为在 PAST 组里，分配到 2166 动态 VLAN。


Details
Identity
IPv4
IPv6
Security
Security
WPA & WPA2 Enterprise
Authentication
Protected EAP (PEAP)
Anonymous identity
Alex@freetest.com
CA certificate
(None)
No CA certificate is required
PEAP version
Automatic
Inner authentication
MSCHAPv2
Username
Alex@freetest.com
Password
Show password

```
Performing search in "cn=PAST,dc=freetest,dc=com" with filter
"(|(member=CN\3dAlex\2cOU\3dSTAFF\2cDC\3dfreetest\2cDC\3dcom)(memberUid=Alex))", scope
"sub"
(9)      Waiting for search result...
(9)    User found in group object "cn=PAST,dc=freetest,dc=com"
rlm_ldap (ldap): Deleting connection (0)
Need 6 more connections to reach 10 spares
rlm_ldap (ldap): Opening additional connection (5), 1 of 28 pending slots used
rlm_ldap (ldap): Connecting to ldap://10.10.9.86:389
TLSMC: MozNSS compatibility interception begins.
tlsmc_convert: INFO: cannot open the NSS DB, expecting PEM configuration is present.
tlsmc_intercept_initialization: INFO: successfully intercepted TLS initialization. Continuing with
OpenSSL only.
TLSMC: MozNSS compatibility interception ends.
rlm_ldap (ldap): Waiting for bind result...
rlm_ldap (ldap): Bind successful
(9)    if (LDAP-Group == "cn=PAST,dc=freetest,dc=com")  -> TRUE
(9)    if (LDAP-Group == "cn=PAST,dc=freetest,dc=com")  {
(9)      update reply {
(9)        Tunnel-Private-Group-ID = 2166
(9)      }
```

当用 testfs@cuhk.edu.cn 测试时，因为这不属于 freetest.com 域，属于客户账号,分配到 2156 动态 VLAN。

```
(12) # Executing section post-auth from file /etc/raddb/sites-enabled/eduroam
(12)   post-auth {
(12)     update reply {
(12)       Tunnel-Type := VLAN
(12)       Tunnel-Medium-Type := IEEE-802
(12)     } # update reply = noop
(12)     if (&control:Proxy-To-Realm) {
(12)     if (&control:Proxy-To-Realm)  -> TRUE
(12)     if (&control:Proxy-To-Realm)  {
(12)       update reply {
(12)         Tunnel-Private-Group-ID = 2156
(12)       }
```

六．参考文档

eduroam 基本配置参考链接：

https://wiki.freeradius.org/guide/eduroam

eduroam samba 加域配置：

https://wiki.freeradius.org/guide/FreeRADIUS-Active-Directory-Integration-HOWTO