

## **Cloud Project Report on AWS OpenVPN Access Server**

**Title: PRIVACY SHEILD: A USER FRIENDLY VPN CLIENT**

**Submitted by:**

*D. Sujith kumar*

*AP22110011092*

### **Abstract**

This project focuses on deploying a secure VPN (Virtual Private Network) using OpenVPN Access Server hosted on Amazon Web Services (AWS) EC2. By Using cloud infrastructure, the project enables encrypted, private internet access for remote users. The VPN server setup is cost-effective, scalable, and uses AWS Free Tier eligibility. The OpenVPN Admin and Client interfaces provide easy management and access for VPN users.

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### **Introduction**

Internet privacy and security now require Virtual Private Networks to become essential components for both people and businesses. The project implements AWS EC2 capabilities to operate an OpenVPN Access Server which creates a protected connection between users and their internet access through a single server point. Remote management becomes possible by using this setup to watch clients and their usage as well as manage their access.

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## Tools and Technologies Used

- **Amazon Web Services (AWS)**
    - EC2 (Elastic Compute Cloud)
    - Key Pairs
    - Security Groups
  - **OpenVPN Access Server (Self-Hosted AMI)**
  - **Operating System:** OpenVPN Access Server Image
  - **Protocol:** TCP (Port 443), Admin UI (Port 943)
  - **Key Pair:** vpn-key (PEM format)
- 

## Implementation Steps

### 1. EC2 Instance Launch

- Chose **OpenVPN Access Server** from AWS Marketplace.
- Selected **t2.micro** instance (Free Tier eligible).
- Used **default Security Group** settings.
- Created a new key pair named vpn-key.

### 2. Connecting to Instance

- Connected using **EC2 Instance Connect**.
- On first login, a configuration wizard was launched in the terminal.

### 3. Initial Configuration via Wizard

- **License Agreement:** Accepted terms and conditions select yes .
- **Primary Access Server:** Selected Yes.
- **Network Interface:** Chose *0.0.0.0* (all interfaces).
- **CA Configuration:** Used default (secp384r1).
- **Web Certificate:** Used default (secp384r1).
- **Admin Web UI Port:** Left default (943).
- **OpenVPN TCP Port:** Left default (443).
- **DNS Routing:** Enabled routing of all client DNS traffic.

- **Subnet Access:** Enabled access to AWS subnet.
- **Admin Login User:** Chose *openvpn* as admin user name (by default).
- **Password:** Used random password generate (can be changed in Admin UI).
- **Activation Key:** Skipped; to be done later via Admin UI.

#### 4. Admin and Client Web Interfaces Generated

- Two URLs provided:
    - **Admin UI:** <https://<public-ip>:943/admin>
    - **Client UI:** <https://<public-ip>:943>
- 

##### Admin UI Features

- Login with the openvpn admin user.
  - **Dashboard Options:**
    - View connected clients.
    - Monitor data usage per user.
    - Block or disconnect users.
    - Change user credentials.
    - Configure connection settings: TCP/UDP, ports, routing.
- 

##### Client UI Features

- Users can:
    - Download the OpenVPN Connect app.
    - Login using provided credentials.
    - Download .ovpn configuration files.
    - Establish a secure VPN connection to the server.
- 

##### Testing the VPN

- After user login, client IP changes to the **AWS region's IP** where the EC2 is hosted.

- Verified data encryption by observing secure connection through OpenVPN client.
- Internet browsing was routed through the VPN server.

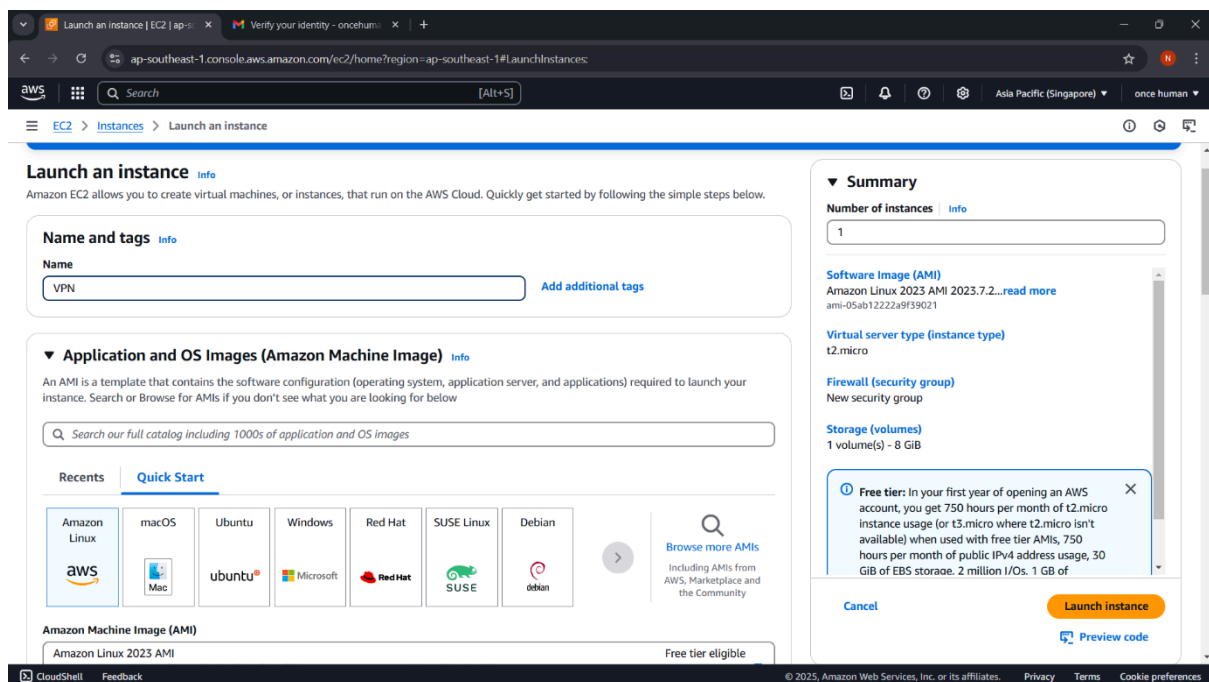
---

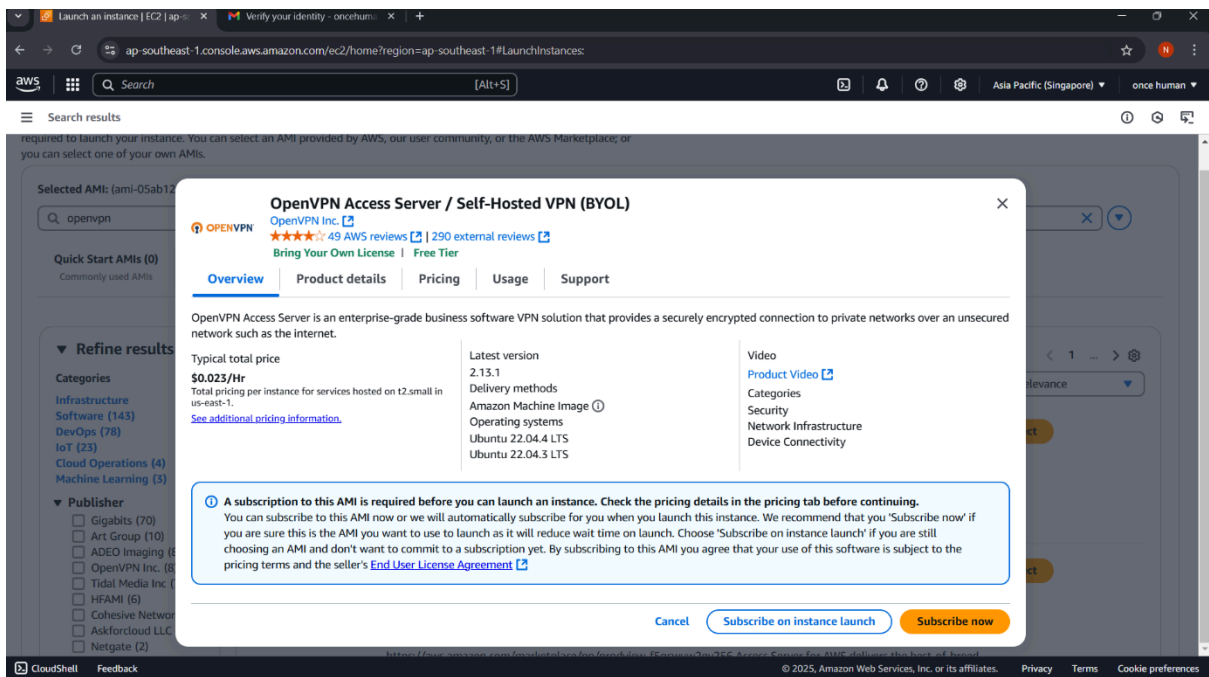
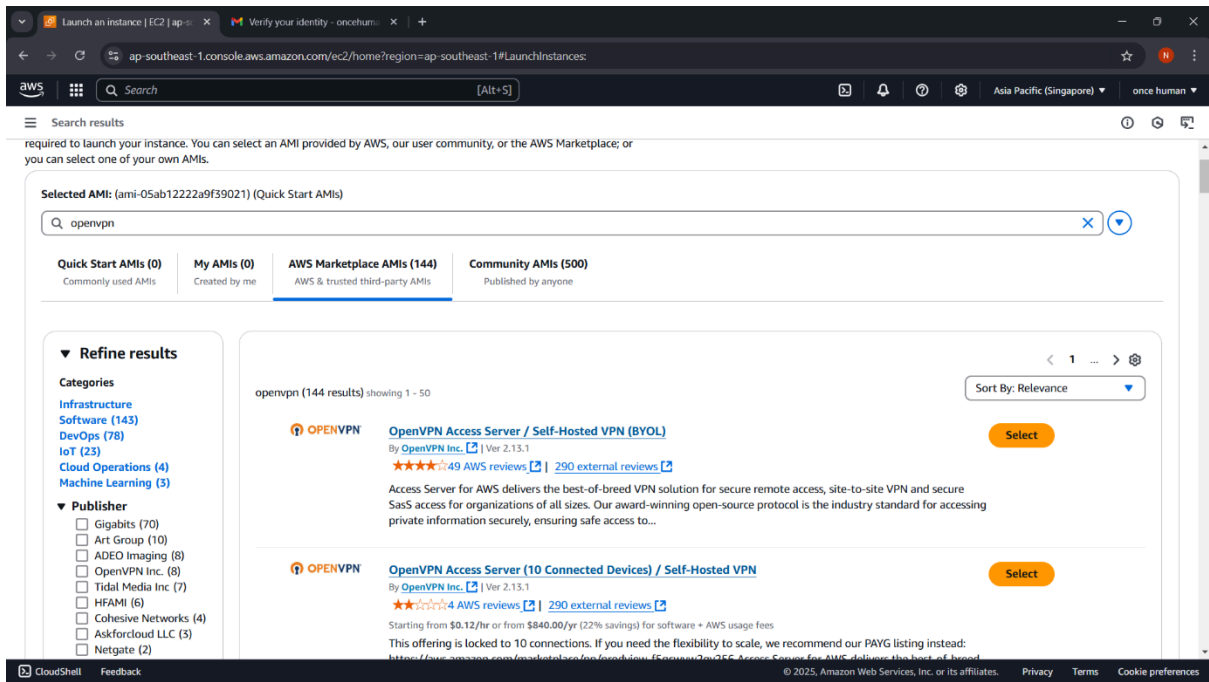
## Conclusion

The implementation of OpenVPN Access Server on AWS EC2 serves as an active solution for secure hosted VPN deployment in cloud environments. OpenVPN Access Server provides users with privacy together with encrypted communications and controlled access at no additional cost when utilizing Free Tier resources. The project illustrates how cloud computing technologies provide dependable security structures through simple implementation.

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## Screenshots





Launch an instance | EC2 | ap-

Verify your identity - oncehum-

ap-southeast-1.console.aws.amazon.com/ec2/home?region=ap-southeast-1#LaunchInstances

Search

Asia Pacific (Singapore)once human

Search results

AMI from catalogRecentsQuick Start

Name

OpenVPN Access Server Community Image-fe8020db-5343-4c43-9e65-5ed4a825c931

Verified provider

Description

OpenVPN Access Server 2.13.1 publisher image from https://www.openvpn.net/.

Image ID

ami-0c2639422d6fc7d69

Username

root

Catalog

AWS Marketplace AMIs

Published

2024-03-07T15:11:03.000Z

Architecture

x86\_64

Virtualization

hvm

Root device type

ebs

ENA Enabled

Yes

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

▼ Instance type

InfoGet advice

Instance type

t2.small

Family: t21 vCPU2 GiB MemoryCurrent generation: true

All generations

Compare instance types

▼ Summary

Number of instancesInfo

1

Software Image (AMI)

OpenVPN Access Server / Self-H...read more

ami-0c2639422d6fc7d69

Virtual server type (instance type)

t2.small

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year of opening an AWS account, you get 750 hours per month of t2.micro instance usage (or t3.micro where t2.micro isn't available) when used with free tier AMIs, 750 hours per month of public IPv4 address usage, 30 GiB of EBS storage, 2 million I/Os, 1 GiB of snapshots, and 100 GB of bandwidth to the internet.

CancelLaunch instance

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Launch an instance | EC2 | ap-

Verify your identity - oncehum-

ap-southeast-1.console.aws.amazon.com/ec2/home?region=ap-southeast-1#LaunchInstances

Search

Asia Pacific (Singapore)once human

Search results

Instance type

t2.micro

Family: t21 vCPU1 GiB MemoryCurrent generation: true

Free tier eligible

All generations

Compare instance types

The AMI vendor recommends using a t2.small instance (or larger) for the best experience with this product.

▼ Key pair (login)

Info

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required

vpn-key

Create new key pair

▼ Network settings

Info

Network

vpc-013396de9dda0209f

Subnet

No preference (Default subnet in any availability zone)

Auto-assign public IP

Enable

Additional charges apply when outside of free tier allowance

Firewall (security groups)

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Edit

▼ Summary

Number of instancesInfo

1

Software Image (AMI)

OpenVPN Access Server / Self-H...read more

ami-0c2639422d6fc7d69

Virtual server type (instance type)

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CancelLaunch instance

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Launch an instance | EC2 | ap-southeast-1 | Verify your identity - oncehuman

ap-southeast-1.console.aws.amazon.com/ec2/home?region=ap-southeast-1#LaunchInstances

Search results

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

☒ Create security group ☐ Select existing security group

We'll create a new security group called 'OpenVPN Access Server / Self-Hosted VPN (BYOL)-2.13.1-AutogenByAWSMP--3' with the following rules:

- ☒ Allow SSH traffic from
- ☒ Allow CUSTOMTCP traffic from
- ☒ Allow CUSTOMTCP traffic from
- ☒ Allow CUSTOMUDP traffic from
- ☒ Allow HTTPS traffic from the internet  
To set up an endpoint, for example when creating a web server
- ☐ Allow HTTP traffic from the internet  
To set up an endpoint, for example when creating a web server

Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

**Configure storage** [Info](#) [Advanced](#)

1x  GiB  Root volume, Not encrypted

**Summary**

Number of instances [Info](#)  
1

**Software Image (AMI)**  
OpenVPN Access Server / Self-Hosted VPN (BYOL)-2.13.1-AutogenByAWSMP--3  
ami-0c263942206fc7d69

**Virtual server type (instance type)**  
t2.micro

**Firewall (security group)**  
New security group

**Storage (volumes)**  
1 volume(s) - 8 GiB

**Free tier:** In your first year of opening an AWS account, you get 750 hours per month of t2.micro instance usage (or t3.micro where t2.micro isn't available) when used with free tier AMIs, 750 hours per month of public IPv4 address usage, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

[Cancel](#) [Launch instance](#)

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Launch an instance | EC2 | ap-southeast-1 | Instances | Verify your identity - oncehuman

ap-southeast-1.console.aws.amazon.com/ec2/home?region=ap-southeast-1#Instances:instanceId=i-00f7520e84cceb127,v=3,\$case=tags:true%5Cclient:false,\$regex=tags:false%5Cclient:false

EC2 > Instances

**Instances (1)** [Info](#) Last updated less than a minute ago [Connect](#) [Instance state](#) [Actions](#) [Launch instances](#)

[All states](#)

[Clear filters](#)

<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4
<input type="checkbox"/>	VPN	i-00f7520e84cceb127	Running	t2.micro	Initializing	<a href="#">View alarms +</a>	ap-southeast-1a	ec2-3-0-78-

**Select an instance**

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Launch an instance | EC2 | ap-southeast-1

Instance details | EC2 | ap-southeast-1

Verify your identity - oncehuman

ap-southeast-1.console.aws.amazon.com/ec2/home?region=ap-southeast-1#InstanceDetails:instanceId=i-00f7520e84cceb127

aws

Search

[Alt+S]

Asia Pacific (Singapore)

once human

EC2

Dashboard

EC2 Global View

Events

Instances

Instance Types

Launch Templates

Spot Requests

Savings Plans

Reserved Instances

Dedicated Hosts

Capacity Reservations

Images

AMIs

AMI Catalog

Elastic Block Store

Volumes

Snapshots

Lifecycle Manager

Network & Security

Instance summary for i-00f7520e84cceb127 (VPN)

Updated less than a minute ago

Instance ID

i-00f7520e84cceb127

IPv6 address

-

Public IPv4 address

3.0.78.23 | open address

Instance state

Running

Private IPv4 addresses

172.31.26.90

Public IPv4 DNS

ec2-3-0-78-23.ap-southeast-1.compute.amazonaws.com | open address

Private IP DNS name (IPv4 only)

ip-172-31-26-90.ap-southeast-1.compute.internal

Instance type

t2.micro

VPC ID

vpc-013396de9dda0209f

Subnet ID

subnet-07ad937f62ddb43cf

Instance ARN

arn:aws:ec2:ap-southeast-1:756157247479:instance/i-00f7520e84cceb127

Hostname type

IP name: ip-172-31-26-90.ap-southeast-1.compute.internal

Answer private resource DNS name

IPv4 (A)

Auto-assigned IP address

3.0.78.23 [Public IP]

IAM Role

-

IMDSv2

Optional

EC2 recommends setting IMDSv2 to required | Learn more

Elastic IP addresses

-

AWS Compute Optimizer finding

Opt-in to AWS Compute Optimizer for recommendation s. | Learn more

Auto Scaling Group name

-

Managed

false

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Launch an instance | EC2 | ap-southeast-1

Connect to instance | EC2 | ap-southeast-1

Verify your identity - oncehuman

ap-southeast-1.console.aws.amazon.com/ec2/home?region=ap-southeast-1#ConnectToInstance:instanceId=i-00f7520e84cceb127

aws

Search

[Alt+S]

Asia Pacific (Singapore)

once human

EC2

Instances

i-00f7520e84cceb127

Connect to instance

Connect to instance

Connect to your instance i-00f7520e84cceb127 (VPN) using any of these options

EC2 Instance Connect

Session Manager

SSH client

EC2 serial console

Instance ID

i-00f7520e84cceb127 (VPN)

Connection Type

Connect using EC2 Instance Connect

Connect using the EC2 Instance Connect browser-based client, with a public IPv4 or IPv6 address.

Connect using EC2 Instance Connect Endpoint

Connect using the EC2 Instance Connect browser-based client, with a private IPv4 address and a VPC endpoint.

Public IPv4 address

3.0.78.23

IPv6 address

-

Username

Enter the username defined in the AMI used to launch the instance. If you didn't define a custom username, use the default username, root.

root

Note: In most cases, the default username, root, is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

Cancel Connect

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```
no discounts will be given for license maintenance renewals unless this is
specified in your contract with OpenVPN Inc.

Please enter 'yes' to indicate your agreement [no]: yes

Once you provide a few initial configuration settings,
OpenVPN Access Server can be configured by accessing
its Admin Web UI using your Web browser.

Will this be the primary Access Server node?
(enter 'no' to configure as a backup or standby node)
> Press ENTER for default [yes]:

Please specify the network interface and IP address to be
used by the Admin Web UI:
(1) all interfaces: 0.0.0.0
(2) eth0: 172.31.26.90
Please enter the option number from the list above (1- 2).
> Press Enter for default [1]:

What public/private type/algorithms do you want to use for the OpenVPN CA?

Recommended choices:
rsa - maximum compatibility
secp384r1 - elliptic curve, higher security than rsa, allows faster connection setup and smaller user profile files
showall - shows all options including non-recommended algorithms.
> Press ENTER for default [secp384r1]:

What public/private type/algorithms do you want to use for the self-signed web certificate?

Recommended choices:
rsa - maximum compatibility
secp384r1 - elliptic curve, higher security than rsa, allows faster connection setup and smaller user profile files
showall - shows all options including non-recommended algorithms.
> Press ENTER for default [secp384r1]:
```

```
Recommended choices:
rsa - maximum compatibility
secp384r1 - elliptic curve, higher security than rsa, allows faster connection setup and smaller user profile files
showall - shows all options including non-recommended algorithms.
> Press ENTER for default [secp384r1]:

Please specify the port number for the Admin Web UI.
> Press ENTER for default [943]:

Please specify the TCP port number for the OpenVPN Daemon
> Press ENTER for default [443]:

Should client traffic be routed by default through the VPN?
> Press ENTER for default [no]:

Should client DNS traffic be routed by default through the VPN?
> Press ENTER for default [no]: yes
Admin user authentication will be local

Private subnets detected: ['172.31.0.0/16']

Should private subnets be accessible to clients by default?
> Press ENTER for EC2 default [yes]:

To initially login to the Admin Web UI, you must use a
username and password that successfully authenticates you
with the host UNIX system (you can later modify the settings
so that RADIUS or LDAP is used for authentication instead).

You can login to the Admin Web UI as "openvpn" or specify
a different user account to use for this purpose.

Do you wish to login to the Admin UI as "openvpn"?
> Press ENTER for default [yes]:
Type a password for the 'openvpn' account (if left blank, a random password will be generated):
```

```
modifying new user as superuser in userdb...
auto-generated pass = "wRp6336rDKf2". Setting in db...
Setting hostname...
hostname: 3.0.78.23
Preparing web certificates...
Setting web user account...
Adding web group account...
Adding web group...
groupadd: group 'openvpn_as' already exists
adjusting license directory ownership...
initializing confdb...
initial version is not set. Setting it to 2.13.1...
Generating PAM config for openvpnas ...
Enabling service
Created symlink /etc/systemd/system/multi-user.target.wants/openvpnas.service -> /lib/systemd/system/openvpnas.service.
Starting openvpnas...

NOTE: Your system clock must be correct for OpenVPN Access Server
to perform correctly. Please ensure that your time and date
are correct on this system.

Initial Configuration Complete!

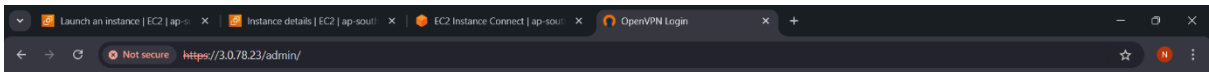
You can now continue configuring OpenVPN Access Server by
directing your Web browser to this URL:

https://3.0.78.23:943/admin

During normal operation, OpenVPN AS can be accessed via these URIs:
Admin UI: https://3.0.78.23:943/admin
Client UI: https://3.0.78.23:943/
To login please use the "openvpn" account with "wRp6336rDKf2" password.

See the Release Notes for this release at:
https://openvpn.net/vpn-server-resources/release-notes/

root@ip-172-31-26-90:~#
```



### Admin Login

@	<input type="text" value="Username"/>
🔑	<input type="password" value="Password"/>
<input type="button" value="Sign In"/>	

OPENVPN

Access Server

v2.13.1

STATUS

Status Overview

Current Users

Log Reports

CONFIGURATION

USER MANAGEMENT

AUTHENTICATION

TOOLS

DOCUMENTATION

SUPPORT

Logout

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Status Overview

VPN services are currently ON

Stop VPN services

① We also now offer OpenVPN Cloud, a cloud-delivered service that integrates virtual networking with essential security capabilities.

Learn More or dismiss notification.

Active Configuration

Access Server version:	2.13.1
Server Name:	3.0.78.23
Allowed VPN Connections:	2 VPN Connections
Current Active Users:	0
Authenticate users with:	local
Accepting VPN client connections on IP address:	all interfaces
Port for VPN client connections:	tcp/443, udp/1194
OSI Layer:	3 (routing/NAT)
Kernel data channel offloading:	Inactive. Kernel module not loaded.

OPENVPN  
Access Server  
v2.13.1

STATUS

Status Overview

Current Users

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https://3.0.78.23/admin/current\_users

Current Users

Search:

Common Name	Real Address	VPN Address	Bytes Sent Received	Connection Duration	Block
No data available in table					

OPENVPN  
Access Server  
v2.13.1

STATUS

CONFIGURATION

USER MANAGEMENT

User Permissions

User Profiles

Group Permissions

AUTHENTICATION

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User Permissions

Search By Username/Group (use % as wildcard)

No Default Group

Search/Refresh

Username	Group	More Settings	Admin	Allow Auto-login	Deny Access	Delete
openvpn	No Default Group		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<div>New Username</div>	No Default Group		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Save Settings