Integrated Public Number Database (IPND)

IPND Data Users and Data Providers Access to Internet Interface Service (IIS)

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Approved by: Penelope Waite

Title: IPND Manager

Author(s): LogicalTech Pty Ltd

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Document Control

Version	Release Date	Written By	Reviewed By	Notes
1.9	30/11/2023	LogicalTech		IIS updates
2.0	22/02/2024	LogicalTech The IPND Support team	Penelope Waite IPND Manager	Document revised to integrate both command-line interface (CLI) and graphical user interface (GUI) functionalities within key sections. Additional trouble shooting added to relevant sections.

Document Updates and Corrections

If you have identified any additional errors or have suggestions for improvement, we encourage you to share them with us. Your feedback is invaluable in helping us maintain the accuracy and quality of our documents.

To submit corrections or provide feedback, please email us at: IPND-Support@logicaltech.com.au

with the subject line "Document Errata - [Document Title] - [Version Number]." Include the page number, a brief description of the error, and the corrected information.

Thank you for your understanding and collaboration.

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1. Overview

This document describes how to establish a connection to the IPND Internet Interface Service (IIS). It details the technology required.

In order to ensure the confidentiality of the data uploaded and downloaded from the IPND the following measures will be deployed as part of the IIS:

- VPN Secure Sockets Layer (SSL) tunnels
- SSH Based file transfer tool with Public Key Infrastructure (PKI) for authentication.
- Encryption of files using GnuPG (open source) tools also using PKI.

1.1. Assumptions

It is assumed that the user has applied and been authorised to become an IPND User by the IPND Manager according to defined processes.
Refer to https://www.telstra.com.au/consumer-advice/ipnd

Linux/WSL users predominantly utilize command-line options.

Windows users predominantly utilise Graphic User Interfaces (GUIs).

Both Linux/WSL and Windows platforms support command-line options.

All CLI commands quoted in this document have been tested in both Windows CLI (PowerShell/CommandPrompt) and Linux/WSL, with differences highlighted where they occur to ensure compatibility.

FileZilla and WinSCP have been tested as file transfer utilities to ensure compatibility.

Windows users utilise Kleopatra for GPG encryption and decryption tasks.

The IIS solution assumes the utilisation of OpenVPN Client.

Users may require the assistance of / coordination with their organisations IT / network personnel to enable user access or trouble shoot connection issues.

Important reminder: Maintaining updated client utilities is the responsibility of Data Users and Data Providers.

Screenshots included in this document are indicative and appearance may change as versions of Windows and Linux applications are updated.

1.1.1. User Toolsets

There are three essential toolsets:

(1) **OpenVPN Client:** For managing VPN connections.
(2) **SSH (Secure Shell) Suite:** For secure remote access and file transfer.
(3) **GPG (GNU Privacy Guard):** For encryption, decryption of files.

The below is an overview of required toolsets for two environments:

- Command Line Interface (CLI), and
- Graphical User Interface (GUI).

The options include:

a) Linux/WSL for CLI,
b) Windows: PowerShell (PoSh) or CommandPrompt (CMD) for CLI, and
c) Windows Desktop for GUI.

Choose the environment suitable for your organisation from the options presented in the table, which includes details for CLI and Windows GUI.

Environment (CLI/GUI)	***Command Line Interface (CLI)***		***Graphical User Interface (GUI)***
Tools (1-3)	*a) Linux/Windows Subsystem for Linux (WSL)*	*b) Windows: PowerShell or CommandPrompt (CMD)*	*c) Windows Desktop*
(1) VPN Client	openvpn	Not available (Must use GUI client)	OpenVPN Connect, OpenVPN GUI
(2) SSH (Secure Shell suite)	ssh, scp, sftp, ssh-keygen, ssh-agent*, ssh-add*	ssh, scp, sftp, ssh-keygen, ssh-agent*, ssh-add*	PuTTY, WinSCP, FileZilla
(3) GPG (GNU Privacy Guard)	gpg	gpg	Kleopatra

1.1.2. Installing the Toolsets in the user operating environment

The User is responsible for installation of their preferred operating environment.

1.1.2.1. CLI: Linux, WSL

For Debian based systems:

```
Ubuntu 20.04.6 LTS. Installing (1) ssh, (2) gpg, (3) VPN client

sudo apt-get install openssh-client gnupg2 openvpn -y
```

For Red Hat based systems:

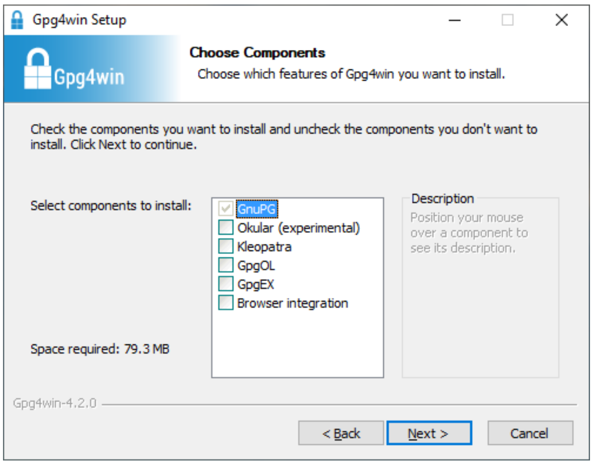
```
Red Hat Enterprise Linux release 8.5 (Ootpa). Installing (1) ssh, (2) gpg, (3) VPN client

sudo apt-get install openssh-clients gnupg2 openvpn -y
```

CLI: PowerShell, CommandPrompt:

1. VPN Client: Not Available, Use the Windows (GUI) option
2. Windows OpenSSH Suite: Open PowerShell as an administrator, then run:

```
As administrator: Windows PowerShell

Add-WindowsCapability -Online -Name OpenSSH.Client~~~~0.0.1.0
```

3. GPG: Users will need to download (https://www.gpg4win.de/index.html) and run the GPG4Win installer. Deselect all selectable components (Okular, Kleopatra, GpgOL, GpgEX, Browser integration) leaving only the CLI GnuPG component.



Choose Components

Choose which features of Gpg4win you want to install.

Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.

Select components to install:

☑ GnuPG
□ Okular (experimental)
□ Kleopatra
□ GpgOL
□ GpgEX
□ Browser integration

Description

Position your mouse over a component to see its description.

Space required: 79.3 MB

Gpg4win-4.2.0

GPG4Win installer screen

1.1.2.2. GUI: Windows

1. OpenVPN Client: Download the either 1 of the 2 available Windows OpenVPN clients by following Section 3.3 or visit

   a) https://openvpn.net/client/client-connect-vpn-for-windows/ (OpenVPN Connect)

   or

   b) https://openvpn.net/community-downloads/ (OpenVPN GUI).

Note:
This guide refers to using OpenVPN Connect.
OpenVPN Connect supports a single VPN connection at a time.
OpenVPN GUI allows users the ability to initiate multiple concurrent VPN connections to different servers using multiple profiles.

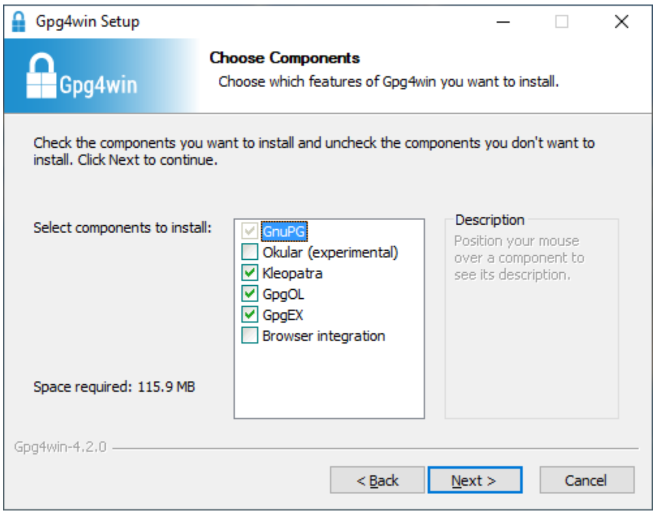
2. SSH Suite: For the complete PuTTY suite, download MSI (‘Windows Installer’) from the putty developer’s official web site below, or select the individual components required for download:
   - **putty.exe** (the SSH and Telnet client itself)
   - **pscp.exe** (an SCP client, i.e. command-line secure file copy)
   - **psftp.exe** (an SFTP client, i.e. general file transfer sessions much like FTP)
   - puttytel.exe (a Telnet-only client)
   - plink.exe (a command-line interface to the PuTTY back ends)
   - pageant.exe (an SSH authentication agent for PuTTY, PSCP, PSFTP, and Plink)
   - **puttygen.exe** (a RSA and DSA key generation utility)
   - pterm.exe (a PuTTY-style wrapper for Windows command prompts)

https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html

⚠ Other download sites have been known to plant RATs (Remote Access Tools) into putty packages.

3. GPG: Download (https://www.gpg4win.de/index.html) and run the GPG4Win installer.
   Install the default selectable components as shown below.
   When the Installer completes it will launch Kleopatra.
   Exit Kleopatra.

Note:
Older versions of GPG4Win will also install GNU Privacy Assistant (GPA) which is an alternative program for managing certificates.
The use of GNU Privacy Assistant (GPA) is no longer required and has been deprecated in this document.



Choose Components

Choose which features of Gpg4win you want to install.

Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.

Select components to install:

- ☑ GnuPG
- □ Okular (experimental)
- ☑ Kleopatra
- ☑ GpgOL
- ☑ GpgEX
- □ Browser integration

Description

Position your mouse over a component to see its description.

Space required: 115.9 MB

Gpg4win-4.2.0

GPG4Win installer screen

1.1.3. Updating Toolsets

It is the user's responsibility to ensure that the chosen tools are kept up to date (with the current version) to mitigate security risks and benefit from performance improvements.

1.2. Information provided to Users by the IPND Support team

The following table includes the information provided to Users for User Setup:

Element	Purpose	Section(s) referred
OpenVPN GUI Credentials (Username and Password)	Access to OpenVPN gateway	2.3 Downloading VPN Client and Configuration
IPND Public Key	Encrypt data sent to the IPND	4.4 Import, Fingerprint and trust the IPND Public GPG key
Comment details (optional)	Input into GPG-key pair	4.3 Creating user GPG key pair, Finger Printing, Exporting

1.3. Information Users must provide the IPND Support team

The following table includes the information Users are required to send to the IPND Support team for User Setup, via email:
ipnd-support@logicaltech.com.au

Element	Purpose	Section(s) referred
SSH Public Key	Enable SFTP and SCP access	3-SSH KEY KEY PAIRS
GPG Public Key	Enable encryption of files received from the IPND	4-GPG KEY PAIRS

1.4. Additional Information

The following table includes additional information that will need to be verified.

This **must not** be done via email. Users will be contacted by the IPND Support team to verbally verify fingerprints.

Element	Purpose	Section(s) referred
Key Fingerprints	Key fingerprints will need to be **verbally** verified.	Appendix 1 – Fingerprints

2. VPN

2.1. Overview

To mitigate the risks linked to exposing sensitive data over the internet, access to the IIS will be granted exclusively through TLS VPNs.

This section provides users the steps required to:

- Download their User VPN configuration file,
- Establish a VPN tunnel
- Check that the VPN tunnel has been established successfully.

Note:
The VPN configuration file includes the Fully Qualified Domain Name (FQDN) necessary for establishing the VPN tunnel.

Organizations enforcing firewall restrictions or access controls must use this FQDN instead of a fixed IP address.

The correct DNS resolution for this URL is critical for the IPND VPN server's high-availability setup. In the event of a failover to a new instance, the IP address will change.

Any user who has hard coded the IP address will be unable to connect to the new instance post-failover.

2.2. VPN Settings

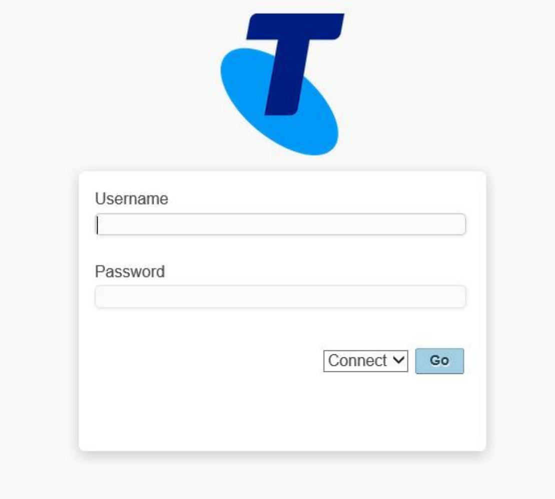
VPN Settings are included in the VPN Configuration file available for download as explained in the following section. More information is included in **APPENDIX 2 – OPENVPN CONFIGURATION FILE EXAMPLE**.

VPN Gateway URI	gw1.ipnd.com.au
VPN Connection Port UDP	1194
VPN Connection Port TCP	443
VPN Provisioning URL	https://gw1.ipnd.com.au

2.3. Downloading VPN Client and Configuration

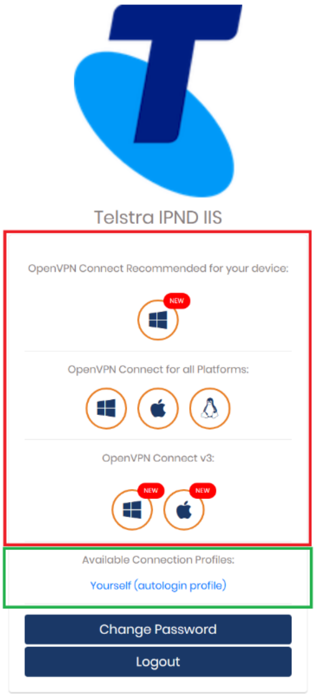
The IPND Support team will issue OpenVPN credentials to Users.

Upon receiving credentials, Users are required to log in and download the IIS OpenVPN Client and configuration files via the VPN Provisioning URL: https://gw1.ipnd.com.au



Screen 1 - VPN Login Page

Upon successful login, users will be directed to the following screen:


Telstra IPND IIS
OpenVPN Connect Recommended for your device:
NEW
OpenVPN Connect for all Platforms:
OpenVPN Connect v3:
NEW
NEW
Available Connection Profiles:
Yourself (autologin profile)
Change Password
Logout

VPN Client Application/Profile Download Page

There are 2 basic types of links on the Download page - Application links (3 levels) and a Connection Profile link.

1. Application Links: □

   The 1st Application link is recommended based on the users operating system and browser.
   The 2nd Application level links is for OpenVPN Connect v2 for all supported platforms.
   The 3rd Application level is for OpenVPN Connect v3.

   The Windows and Apple links will allow users to download signed msi (Windows) and dmg (Apple) files to install.
   The Android and IOS links will navigate users to the appropriate app stores.
   The Linux link will navigate users to additional instructions on how to deploy a Linux distribution OpenVPN client app.

2. Available Connection Profiles link: □

   The "Available Connection Profiles" link enables users to download their specific client.ovpn configuration file for import into their OpenVPN client.

   The 'autologin profile' enables users to establish a connection without the need for direct authentication with a password via their OpenVPN client. It is essential to keep this file secure and refrain from sharing it with unauthorized individuals. Please ensure the security of this file and use it exclusively on a secure server.

2.4. Establishing a VPN Tunnel

2.4.1. Pre VPN Client Installation DNS resolution check

It is recommended that users confirm that the DNS resolution of the VPN Provisioning URI (gw1.ipnd.com.au) is working.

Do NOT edit your VPN config file to use a fixed IP address.

2.4.2. CLI: Linux, WSL, PowerShell, CommandPrompt

To test local DNS resolution run:

Linux terminal, Windows PowerShell or Windows CommandPrompt Pre start VPN checks

```
## Test your default DNS resolution
        nslookup gw1.ipnd.com.au
        # You will get something like the following back

        Server:          <Your DNS Server Name>
        Address:         <Your DNS Server IP>
        Non-authoritative answer:
        Name:   gw1.ipnd.com.au
        Address: <Current IP of gw1 server>
```

If local DNS resolution fails, then test external resolution by running:

Linux terminal, Windows PowerShell or Windows CommandPrompt Pre start VPN checks

```
## Test external server DNS resolution via Google's Public DNS (8.8.8.8)
        nslookup gw1.ipnd.com.au 8.8.8.8
        # You will get something like the following back

        Server:          8.8.8.8
        Address:         8.8.8.8#53
        Non-authoritative answer:
        Name:   gw1.ipnd.com.au
        Address: <Current IP of gw1 server>
```

Please consult your Network Support Team to resolve any DNS resolution issues.

2.4.3. GUI: Windows

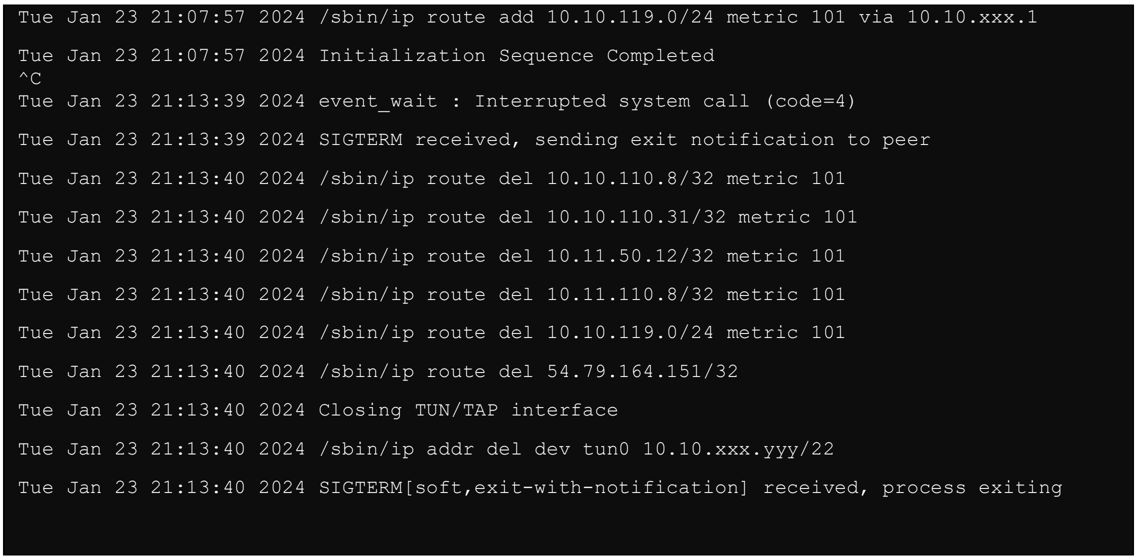
A GUI check is not available. Users must use the CLI option(s) above.

2.4.4. Starting the VPN Client

2.4.4.1. CLI: Linux, WSL example

Linux/WSL Initial VPN Tunnel Test

```
## This initial Test will only exit if there is a problem or when you press ^C
sudo openvpn -- config client.ovpn
## You should see something like the following ##
Tue Jan 23 21:07:45 2024 OpenVPN 2.4.7 x86_64-pc-linux-gnu [SSL (OpenSSL)] [LZO] [LZ4]
[EPOLL] [PKCS11] [MH/PKTINFO] [AEAD] built on Apr 28 2021

Tue Jan 23 21:07:45 2024 library versions: OpenSSL 1.1.1d  10 Sep 2019, LZO 2.10

..
..

Tue Jan 23 21:07:57 2024 /sbin/ip route add 54.79.164.151/32 via 192.168.4.1

Tue Jan 23 21:07:57 2024 /sbin/ip route add 10.10.110.8/32 metric 101 via 10.10.xxx.1

Tue Jan 23 21:07:57 2024 /sbin/ip route add 10.10.110.31/32 metric 101 via 10.10.xxx.1

Tue Jan 23 21:07:57 2024 /sbin/ip route add 10.11.50.12/32 metric 101 via 10.10.xxx.1

Tue Jan 23 21:07:57 2024 /sbin/ip route add 10.11.110.8/32 metric 101 via 10.10.xxx.1
```

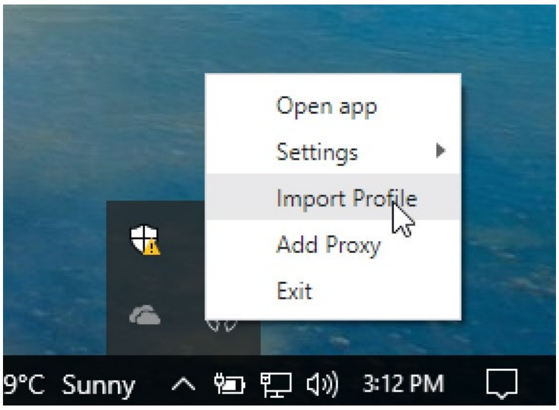


```
Tue Jan 23 21:07:57 2024 /sbin/ip route add 10.10.119.0/24 metric 101 via 10.10.xxx.1

Tue Jan 23 21:07:57 2024 Initialization Sequence Completed
^C
Tue Jan 23 21:13:39 2024 event_wait : Interrupted system call (code=4)

Tue Jan 23 21:13:39 2024 SIGTERM received, sending exit notification to peer

Tue Jan 23 21:13:40 2024 /sbin/ip route del 10.10.110.8/32 metric 101

Tue Jan 23 21:13:40 2024 /sbin/ip route del 10.10.110.31/32 metric 101

Tue Jan 23 21:13:40 2024 /sbin/ip route del 10.11.50.12/32 metric 101

Tue Jan 23 21:13:40 2024 /sbin/ip route del 10.11.110.8/32 metric 101

Tue Jan 23 21:13:40 2024 /sbin/ip route del 10.10.119.0/24 metric 101

Tue Jan 23 21:13:40 2024 /sbin/ip route del 54.79.164.151/32

Tue Jan 23 21:13:40 2024 Closing TUN/TAP interface

Tue Jan 23 21:13:40 2024 /sbin/ip addr del dev tun0 10.10.xxx.yyy/22

Tue Jan 23 21:13:40 2024 SIGTERM[soft,exit-with-notification] received, process exiting
```

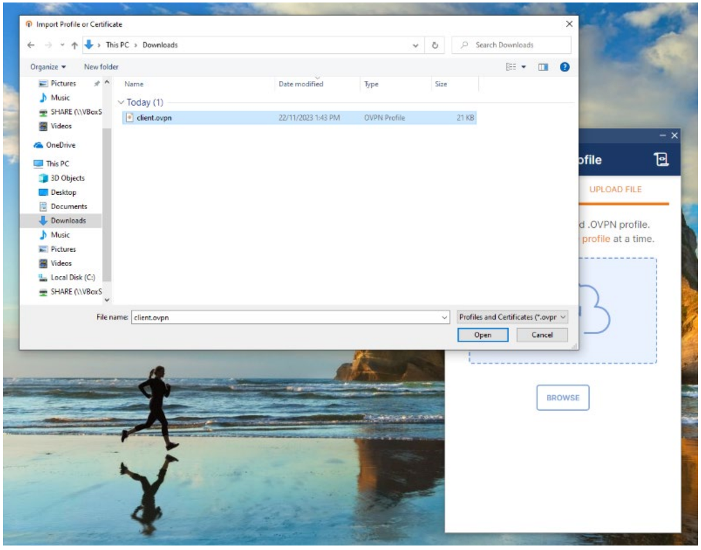
2.4.4.2. GUI: OpenVPN GUI/Connect

Upon completion of installation of the OpenVPN client, users should have a desktop icon and an app icon in their notification area.

1. To import the client.ovpn profile file, the user must right click on the OpenVPN Connect icon and select: Import Profile



Users will be prompted to BROWSE and select their client.ovpn profile file by clicking Open:

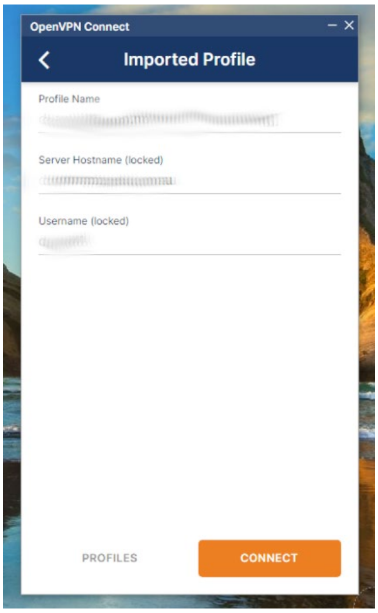


client.ovpn 22/11/2023 1:43 PM OVPN Profile 21 KB

File name: client.ovpn

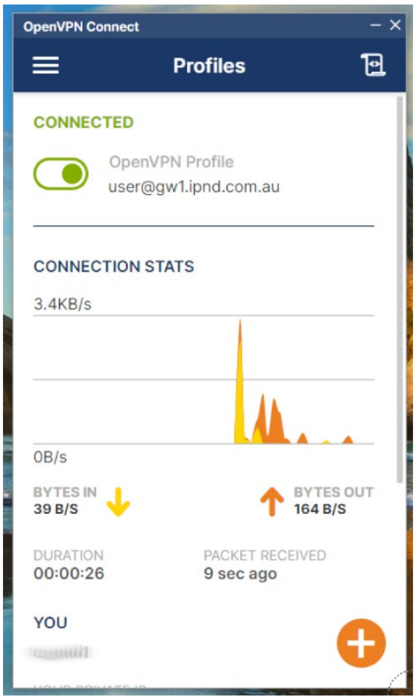
Profiles and Certificates (*.ovpr

Once the profile file is imported, the user must click on either ‘PROFILES’ (to save and return to main app page) or ‘CONNECT’ to save the file. Clicking the back arrow causes the profile to be un-saved.



2. To connect

When back on the main app page simple click on button near the top left to connect.



CONNECTED

OpenVPN Profile
user@gw1.ipnd.com.au

CONNECTION STATS

BYTES IN
39 B/S

BYTES OUT
164 B/S

DURATION
00:00:26

PACKET RECEIVED
9 sec ago

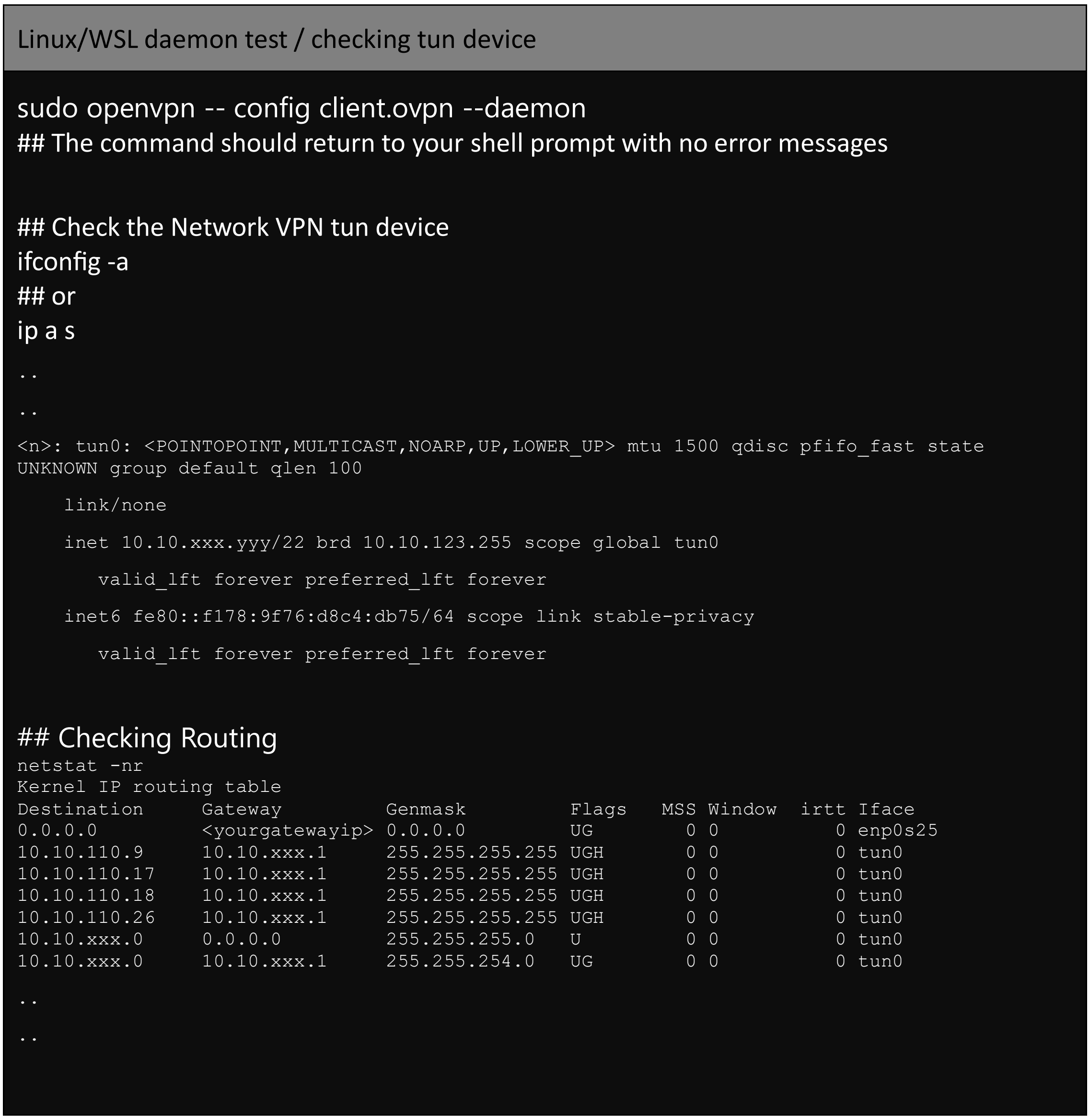
YOU

OpenVPN Client – Connected

2.5. Checking the Tunnel

The VPN tunnel will have been created in the form of a network interface. For examples see the screen shots below:

2.5.1. CLI: Linux, WSL



Linux/WSL daemon test / checking tun device

```
sudo openvpn -- config client.ovpn --daemon
## The command should return to your shell prompt with no error messages


## Check the Network VPN tun device
ifconfig -a
## or
ip a s
..
..
<n>: tun0: <POINTOPOINT,MULTICAST,NOARP,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state
UNKNOWN group default qlen 100
    link/none
    inet 10.10.xxx.yyy/22 brd 10.10.123.255 scope global tun0
       valid_lft forever preferred_lft forever
    inet6 fe80::f178:9f76:d8c4:db75/64 scope link stable-privacy
       valid_lft forever preferred_lft forever


## Checking Routing
netstat -nr
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
0.0.0.0         <yourgatewayip> 0.0.0.0         UG        0 0          0 enp0s25
10.10.110.9     10.10.xxx.1     255.255.255.255 UGH       0 0          0 tun0
10.10.110.17    10.10.xxx.1     255.255.255.255 UGH       0 0          0 tun0
10.10.110.18    10.10.xxx.1     255.255.255.255 UGH       0 0          0 tun0
10.10.110.26    10.10.xxx.1     255.255.255.255 UGH       0 0          0 tun0
10.10.xxx.0     0.0.0.0         255.255.255.0   U         0 0          0 tun0
10.10.xxx.0     10.10.xxx.1     255.255.254.0   UG        0 0          0 tun0
..
..
```

The above information shows that a virtual networks interface labelled tun0 has been created by the TLS VPN software. It shows that the local IP address assigned to the interface is 10.10.120.6.

To ensure that data intended for the IIS is routed accordingly users should have a routing table like the one displayed above.

2.5.2. CLI: PowerShell

Open a Windows PowerShell as a standard user.

- Check VPN network interface:

Windows PowerShell - Checking VPN tun/tap device

```
## Run the following command

Get-NetAdapter | Where-Object { $_.InterfaceDescription -like "*TAP*" -or $_.InterfaceDescription -like
"*TUN*" } | Format-Table -AutoSize


## You should see something like


## If you have installed OpenVPN Connect

Name                  InterfaceDescription                       ifIndex Status      MacAddress        LinkSpeed
----                  --------------------                       ------- ------      ----------        ---------
..
Local Area Connection TAP-Windows Adapter V9 for OpenVPN Connect      18 Up          00-FF-D8-1A-97-1E    1 Gbps
..



## If you have installed OpenVPN GUI

Name                  InterfaceDescription                       ifIndex Status      MacAddress        LinkSpeed
----                  --------------------                       ------- ------      ----------        ---------
..
OpenVPN TAP-Windows6  TAP-Windows Adapter V9                           4 Up          00-FF-0D-53-86-19    1 Gbps
..
```

- Check VPN Network details:

Windows PowerShell - Checking VPN network details

```
## If you have installed OpenVPN Connect
## Ensure you copy/use the InterfaceDescription from the previous command in the "" quotes
Get-NetAdapter | Where-Object { $_.InterfaceDescription -eq "TAP-Windows Adapter V9 for OpenVPN Connect" } | Get-
NetIPAddress


IPAddress         : fe80::5112:910d:d77c:e26a%18
InterfaceIndex    : 18
InterfaceAlias    : Local Area Connection
AddressFamily     : IPv6
Type              : Unicast
PrefixLength      : 64
PrefixOrigin      : WellKnown
```

```
SuffixOrigin      : Link
AddressState      : Preferred
ValidLifetime     : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource      : False
PolicyStore       : ActiveStore

IPAddress         : 10.10.xxx.yyy
InterfaceIndex    : 18
InterfaceAlias    : Local Area Connection
AddressFamily     : IPv4
Type              : Unicast
PrefixLength      : 22
PrefixOrigin      : Manual
SuffixOrigin      : Manual
AddressState      : Preferred
ValidLifetime     : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource      : False
PolicyStore       : ActiveStore


## If you have installed OpenVPN GUI
## Ensure you copy/use the InterfaceDescription from the previous command in the "" quotes
Get-NetAdapter | Where-Object { $_.InterfaceDescription -eq "TAP-Windows Adapter V9" } | Get-NetIPAddress


IPAddress         : fe80::cc4a:f658:6a3f:8c61%4
InterfaceIndex    : 4
InterfaceAlias    : OpenVPN TAP-Windows6
AddressFamily     : IPv6
Type              : Unicast
PrefixLength      : 64
PrefixOrigin      : WellKnown
SuffixOrigin      : Link
AddressState      : Preferred
ValidLifetime     : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource      : False
PolicyStore       : ActiveStore

IPAddress         : 10.10.xxx.yyy
InterfaceIndex    : 4
InterfaceAlias    : OpenVPN TAP-Windows6
AddressFamily     : IPv4
Type              : Unicast
PrefixLength      : 22
PrefixOrigin      : Dhcp
SuffixOrigin      : Dhcp
AddressState      : Preferred
ValidLifetime     : 364.23:57:00
```

```
PreferredLifetime : 364.23:57:00
SkipAsSource      : False
PolicyStore       : ActiveStore
```

- Check routing by running the following command from a PowerShell or CommandPrompt:

Windows PowerShell - Checking VPN network routing

## Run the following to check network routing

```
Netstat -nr
..

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0         10.0.2.2        10.0.2.15     25
         10.0.2.0    255.255.255.0         On-link         10.0.2.15    281
        10.0.2.15  255.255.255.255         On-link         10.0.2.15    281
       10.0.2.255  255.255.255.255         On-link         10.0.2.15    281
      10.10.110.8  255.255.255.255      10.10.120.1     10.10.xxx.yyy   126
     10.10.110.31  255.255.255.255      10.10.120.1     10.10.xxx.yyy   126
      10.10.119.0    255.255.255.0      10.10.120.1     10.10.xxx.yyy   126
      10.10.120.0    255.255.252.0         On-link      10.10.xxx.yyy   281
     10.10.xxx.yyy 255.255.255.255         On-link      10.10.xxx.yyy   281
    10.10.123.255  255.255.255.255         On-link      10.10.xxx.yyy   281
       54.66.2.26  255.255.255.255         10.0.2.2        10.0.2.15    281
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link         10.0.2.15    281
        224.0.0.0        240.0.0.0         On-link      10.10.xxx.yyy   281
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link         10.0.2.15    281
  255.255.255.255  255.255.255.255         On-link      10.10.xxx.yyy   281

..
```

3.SSH KEY PAIRS

3.1. Overview

This section provides an overview of SSH key pair management. It covers the generation of key pairs, offering examples for both Linux/WSL and Windows. The content also addresses fingerprinting and sharing public keys. Additionally, this section explains the utilization of SSH Agent, including examples for both Linux and Windows. The section concludes by offering guidance on SSH access configuration, with a focus on CLI (Linux, WSL, Windows - PowerShell and CommandPrompt) examples.

SSH Keys provide a secure method for authenticating with the IPND IIS-File Transfer Server (FTS) through public-key cryptography. This cryptographic technique involves a pair of keys: a private (secret) key and a public key.
Uses are required to generate an SSH Key Pair and provide the generated Public Key to the IPND Support team. The public SSH key will be used to give a user authenticated access to their account on the IIS-FTS.

3.2. Generate an SSH Key-Pair

The following examples show how to create an SSH key-pair for the IPND user account <user>.

3.2.1. CLI: Linux, WSL, PowerShell, CommandPrompt

SSH key pair creation
It is highly recommended that the user is in their home directory (referred to from this point forward as **<TheCurrentDirectory>**) to run the below command:

As a standard user <user>: Linux, WSL, Windows – PowerShell or CommandPrompt

```
## GENERATE A SSH KEY-PAIR
## NB: It Is recommended that you copy the generated location where the keys are being saved (shown in orange) and change the id part of the file name to a short (without spaces) version of your company name, and paste this as ‘file in which to save the key’.
ssh-keygen -t ed25519 -C "<LongCompanyName>"
        Generating public/private ed25519 key pair.
        Enter file in which to save the key (<TheCurrentDirectory>/.ssh/id_ed25519):
        <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519
        Created directory '<TheCurrentDirectory>/.ssh'  ## Not Displayed if directory already exists
        Enter passphrase (empty for no passphrase):
        Enter same passphrase again:
        Your identification has been saved in <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519.
        Your public key has been saved in <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519.pub.
        The key fingerprint is:
        SHA256:V0+1gTGVBrxTxEwHPo+e5dChLgdagjpAGCBQR7dtBV8 <LongCompanyName>
        The key's randomart image is:
        +--[ED25519 256]--+
        |=. .E*+oo=..     |
        |+.o.=Booo.+      |
        |*.=o+o*.+.       |
        |.B.+ o =         |
        |... o o S        |
        |   . o o o       |
        |    . B o .      |
        |     = .         |
        |                 |
        +----[SHA256]-----+
```

Note:
Take note of the SSH key’s fingerprint (Shown in red) for verbal verification with the IPND Support team.

⚠ Linux/WSL places greater emphasis on SSH key pair files and directory permissions in comparison to Windows.

It is recommended that users inspect the permissions of the existing directory and those of the generated key-pair files after key-pair generation in the event that the "Created directory" message didn’t appear.

As a standard user <user>: **Linux only**

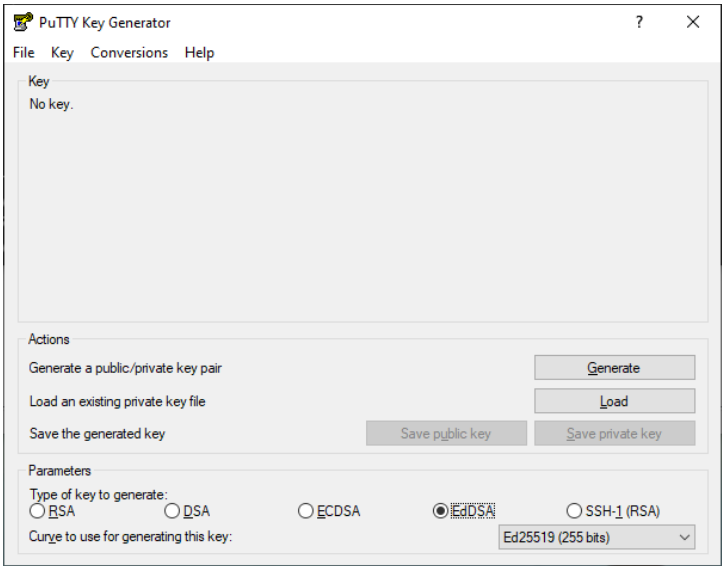
Setting/Correcting file permissions

```
        chmod 700 <TheCurrentDirectory>/.ssh
        chmod 600 <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519

        chmod 644 <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519.pub
```

3.2.2. GUI: Windows Putty

Run the PuTTygen application

Users will be navigated to a screen similar to the below:



Key
No key.

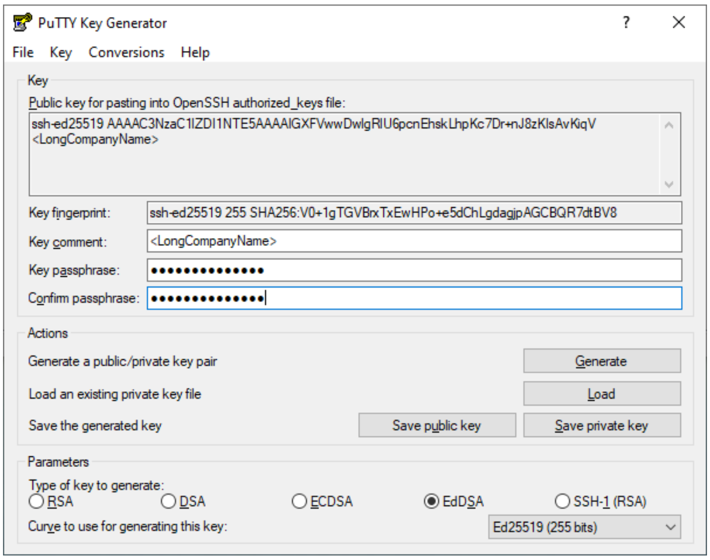
Actions
Generate a public/private key pair
Load an existing private key file
Save the generated key

Parameters
Type of key to generate:
○ RSA ○ DSA ○ ECDSA ● EdDSA ○ SSH-1 (RSA)
Curve to use for generating this key: Ed25519 (255 bits)

SSH Key Pair creation - Windows Example

Select **EdDAS** and **ED25519(255 bits)** in the dropdown as the key type.

Click “Generate”.
Once the key has been generated the following screen will appear:



Public key for pasting into OpenSSH authorized_keys file:

```
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIGXFVwwDwlgRIU6pcnEhskLhpKc7Dr+nJ8zKlsAvKiqV
<LongCompanyName>
```

Key fingerprint: ssh-ed25519 255 SHA256:V0+1gTGVBrxTxEwHPo+e5dChLgdagjpAGCBQR7dtBV8

Key comment: <LongCompanyName>

Key passphrase: ••••••••••••••

Confirm passphrase: ••••••••••••••

Generate a public/private key pair

Load an existing private key file

Save the generated key

Type of key to generate:
○ RSA ○ DSA ○ ECDSA ● EdDSA ○ SSH-1 (RSA)

Curve to use for generating this key: Ed25519 (255 bits)

SSH Key Pair creation – PuTTY Key Generator

Users must perform the following when presented the above screen:

- Take note of the Key Fingerprint.
- Enter the user’s Organisation / Business name in the Key comment field.
- Enter a secure passphrase.
- Save the public key in a known location with the Organisation / Business short form(spaceless) name as the key filename with a file extension .pub. Do NOT save the file in the default - C:\Program Files\PuTTY folder.
- Save the private key in a known location the same name as the public key filename without a file extension. It is given the file extension of **.ppk** by the application**.** Do NOT save the file in the default - C:\Program Files\PuTTY folder.

3.3. Fingerprinting and sharing the Public SSH Key

Upon successfully generating the keys, users are required to send the **SSH Public key** (<user>.pub) to the IPND Support team via email: ipnd-support@logicaltech.com.au

Upon receipt of the public key, the IPND Support team will be in contact to verbally validate the key fingerprint before it is deployed.

Notes: Do not send key fingerprints via email. The IPND Support team will be in contact to verbally verify key fingerprints. Do not email the private key. Private keys must be protected by passphrase and stored in a secure location.

The following section details how to obtain / regenerate fingerprints for SSH and GPG keys for verbal verification with the IPND Support team.

3.3.1. CLI: Linux, WSL, PowerShell, CommandPrompt

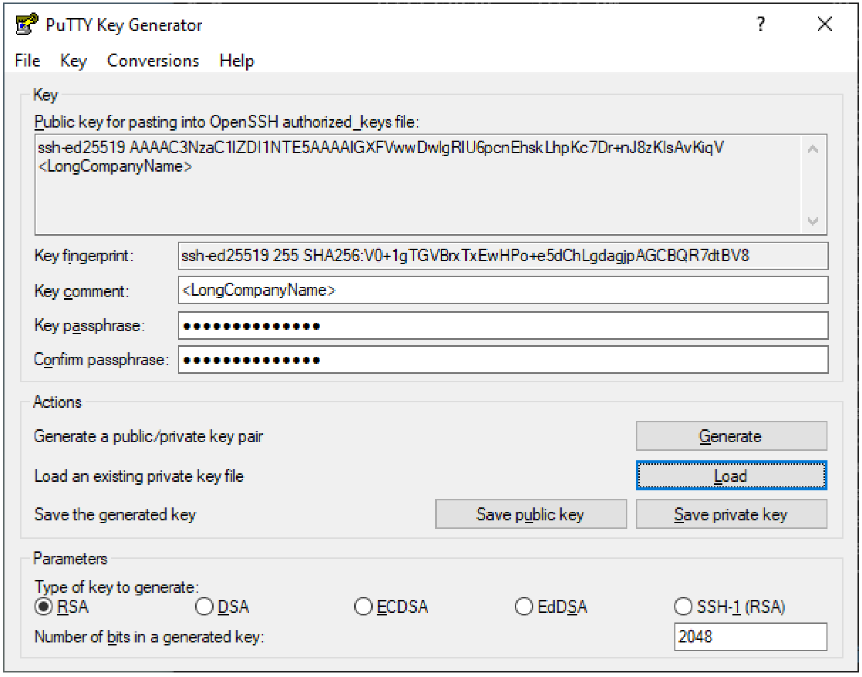
If the SSH Key-Pair was generated using ssh-keygen via CLI: Linux, WSL, Windows - Powe

As a standard user <user>: Linux, WSL, Windows – PowerShell or CommandPrompt

```
## FINGERPRINT AN EXISTING SSH PUBLIC KEY
ssh-keygen  -l -f '<TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519.pub'
        256 SHA256:V0+1gTGVBrxTxEwHPo+e5dChLgdagjpAGCBQR7dtBV8 <LongCompanyName> (ED25519)
```

3.3.2. GUI: Windows PuTTY

If the Key-Pair was generated via PuTTYgen, open the PuTTYgen application and click on load and browse to locate the saved private(.ppk) file. The passphrase is required to load the key.



Public key for pasting into OpenSSH authorized_keys file:

```
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIGXFVwwDwlgRIU6pcnEhskLhpKc7Dr+nJ8zKlsAvKiqV
<LongCompanyName>
```

Key fingerprint: ssh-ed25519 255 SHA256:V0+1gTGVBrxTxEwHPo+e5dChLgdagjpAGCBQR7dtBV8

Key comment: <LongCompanyName>

Key passphrase: ••••••••••••••

Confirm passphrase: ••••••••••••••

Generate a public/private key pair

Load an existing private key file

Save the generated key

Type of key to generate:
● RSA ○ DSA ○ ECDSA ○ EdDSA ○ SSH-1 (RSA)

Number of bits in a generated key: 2048

SSH Key Pair creation – PuTTY Key Generator

3.4. Using an SSH passphrase storage agent: ssh-agent, pagaent

Authentication is required to access the IPND sftp/scp service using the ssh private key generated in previous sections of this document.

To authenticate, the user is required to enter the passphrase associated with the ssh private key. Automated / unattended batch systems are required to perform authentication for each session. It is recommended that automated / unattended batch transfer solutions utilise an ssh-agent component to load the private key for authentication.

An ssh-agent is a trusted repository into which the private key can be loaded.

3.4.1. CLI: Linux, WSL, PowerShell, CommandPrompt: Setting up ssh-agent

For CLI environments, it is recommended that an ssh-agent is utilised to manage SSH keys for authentication. The ssh-agent securely stores the passphrase protected private key for each session, eliminating the need for the user to enter the passphrase for each SSH connection. The ssh-agent temporarily stores the passphrase protected private key in memory, providing the user a seamless and secure way to manage SSH connections without compromising the security provided by the passphrase. To use ssh-agent, follow these steps:

As a standard user <user>: Linux, WSL, Windows – PowerShell or CommandPrompt

```
## Start ssh-agent run the following:
# For Linux/WSL only

eval "$(ssh-agent -s)"

# For PowerShell/CommandPrompt only

ssh-agent
```

```
## Load a private key into the agent, You will be prompted for the key’s passphrase
# For Linux/WSL or PowerShell/CommandPrompt

ssh-add -t <lifetime> <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519
```

Note:
<lifetime> e.g.
t 3600s for 3600 seconds,
t 60m for 60 minutes,
t 2h for 2 hours,
t 1d for 1 day.

3.4.2. CLI: Linux, WSL, PowerShell, CommandPrompt Using ssh-agent

The ssh-agent is designed to be used with SSH and its suite of programs. SSH programs will use ssh-agent if it is running. If ssh-agent is not running, the user will be prompted for their SSH key’s passphrase.

3.4.3. GUI: Windows Setting up Pageant

In the Windows environment, **Pageant** serves a similar purpose as the **ssh-agent** in CLI (Linux/WSL, Windows-PowerShell or CommandPrompt). Pageant is part of the PuTTY suite of tools and acts as an SSH authentication agent. Pageant allows users to load their private SSH keys into memory, and other PuTTY-related tools (eg: PuTTY itself or Plink) for authentication without prompting users for the passphrase each time.
The below details the process for loading and accessing the keys in Pageant:

1. Start Pageant:

   Start Pageant by running the pageant.exe executable.
   It will run in the background and appear as an icon in the system tray.

2. Load Keys into Pageant:

   Right-click on the Pageant icon in the system tray.
   Choose "Add Key" and select your private SSH key file.
   Enter the passphrase for the key if it's protected by one.

3. Agent Process:

   Pageant is now running as an SSH agent in the background.
   It holds the private keys in memory and provides them to applications upon request.

4. Key Access:

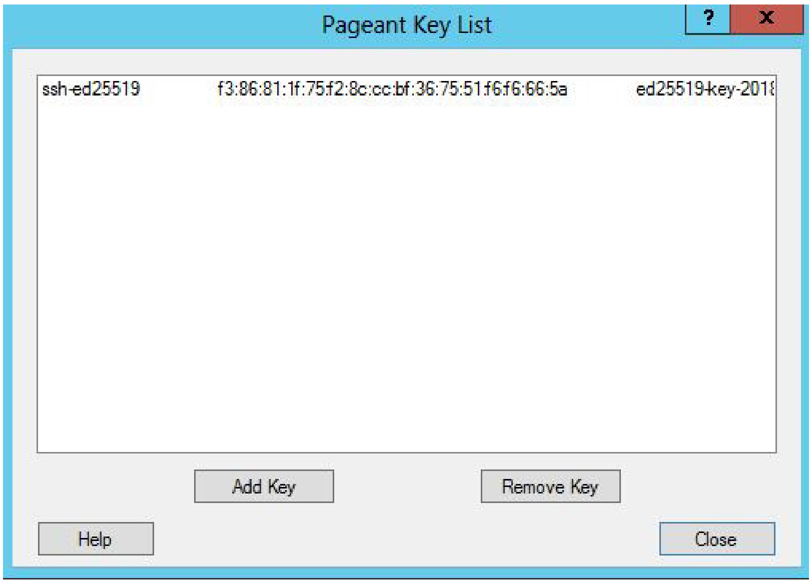
   The use of **PuTTY**, **Plink**, or other PuTTY-related tools to connect to an SSH server, enables these tools to communicate with Pageant to access the private keys loaded into it.

   Users will not be prompted to enter the passphrase as long as Pageant is running, and the keys are loaded.

5. To view loaded keys:

   Locate the Pageant Icon: Pageant will run in the background and can be found in the system tray of the Windows taskbar.

   Right-Click on Pageant Icon: Select "View Keys": A window like the one below will open, displaying the list of currently loaded keys.



```
ssh-ed25519          f3:86:81:1f:75:f2:8c:cc:bf:36:75:51:f6:f6:66:5a          ed25519-key-2018
```

Puttygen - SSH Agent

3.4.4. CLI: Windows Using Pageant with PowerShell or CommandPrompt

Pageant is designed to be used with PuTTY and its suite of programs. The use of Pageant with CLI: PowerShell/CommandPrompt (Windows) OpenSSH is not covered in this document.
Pageant does not work with Linux/WSL.

3.4.5. GUI: Windows Using Pageant with WinSCP or FileZilla

WinSCP will use Pageant if it is running. If Pageant is not running, users will be prompted for their SSH key passphrase.

FileZilla will use Pageant if it is running. If Pageant is not running, users will be prompted for their SSH key passphrase, where FileZilla will by default remember the passphrase until it is closed.

3.5. SSH Access Configuration

3.5.1. CLI: Linux, WSL, PowerShell, CommandPrompt

To ensure that users' connection to the IPND services is as seamless as possible, the users configuration details must be specified in the same directory location as the SSH Key-Pair files: `<TheCurrentDirectory>/.ssh/`**config** file associated with the account from which users transfer files to and from the IPND. The format of the config file is as follows:

#Production Service Example

```
host pfts
hostname 10.10.110.8
port 22
IdentityFile ~/.ssh/<prod_user_priv_key>
user <prod-user>
```

#User Test Service Example

```
host ufts
hostname 10.11.110.8
port 22
IdentityFile ~/.ssh/<test_user_priv_key>
user <test-user>
```

3.5.2. GUI: Windows WinSCP or FileZilla

Not applicable as this is internally managed by the application.

4. GPG KEY PAIRS

4.1. Overview

All files that are provided to and from the IPND via the IIS FTS will be encrypted using GnuPG.

This section provides an overview on how to use the programs and utilities associated with this software.

4.2. GnuPG Key Pairs

GnuPG uses public-key cryptography so that users may communicate securely. In a public-key system, each user has a pair of keys consisting of a private key and a public key. A user's private key is kept secret; it need never be revealed. The public key may be given to anyone with whom the user wants to communicate. GnuPG uses a somewhat more sophisticated scheme in which a user has a primary keypair and then zero or more additional subordinate keypairs. The primary and subordinate keypairs are bundled to facilitate key management and the bundle can often be considered simply as one keypair.

4.3. Creating a GPG key pair, Finger Printing, Exporting

This section describes how to generate a GPG key pair so that IPND files can be encrypted and decrypted.

> Note:
> GPG key pairs should be created in the same environment in which IPND files are going to be sent/received from the IPND

The GPG Public Key must be provided to the IPND Support team once generated via email to: IPND-support@logicaltech.com.au. The generated GPG Public key will be used to encrypt files transferred / downloaded from the IPND.

4.3.1. CLI: Linux, WSL, PowerShell, CommandPrompt

Users will be provided with the information to be added to the Comment field (optional).

Users will be prompted to provide a passphrase to protect their GPG key. It is imperative that a strong password or passphrase is specified. After the passphrase is entered the GPG keys will be created and stored in the key chain.

To generate a GPG key pair run the following:

As a standard user <user>: Linux, WSL, Windows – PowerShell, CommandPrompt

```
## GENERATING your gpg key pair
gpg --expert --full-generate-key
        gpg (GnuPG) 2.4.3; Copyright (C) 2023 g10 Code GmbH
        This is free software: you are free to change and redistribute it.
        There is NO WARRANTY, to the extent permitted by law.
        Please select what kind of key you want:
           (1) RSA and RSA
           (2) DSA and Elgamal
           (3) DSA (sign only)
           (4) RSA (sign only)
           (7) DSA (set your own capabilities)
           (8) RSA (set your own capabilities)
           (9) ECC (sign and encrypt) *default*
          (10) ECC (sign only)
          (11) ECC (set your own capabilities)
          (13) Existing key
          (14) Existing key from card
        Your selection? 9
        Please select which elliptic curve you want:
           (1) Curve 25519 *default*
           (2) Curve 448
           (3) NIST P-256
           (4) NIST P-384
           (5) NIST P-521
           (6) Brainpool P-256
           (7) Brainpool P-384
           (8) Brainpool P-512
           (9) secp256k1
        Your selection? 1
        Please specify how long the key should be valid.
                 0 = key does not expire ## Recommended by LogicalTech ##
              <n>  = key expires in n days
              <n>w = key expires in n weeks
              <n>m = key expires in n months
              <n>y = key expires in n years
        Key is valid for? (0) 0
        Key does not expire at all
        Is this correct? (y/N) y
        GnuPG needs to construct a user ID to identify your key.
        Real name: YourCompanyName
        Email address: CompanyEmailAddress@xxx.yyy.zzz
        Comment: Company
        You selected this USER-ID:
            "YourCompanyName (Company) <CompanyEmailAddress@xxx.yyy.zzz>"

        Change (N)ame, (C)omment, (E)mail or (O)kay/(Q)uit? O
        We need to generate a lot of random bytes. It is a good idea to perform
        ..
        ..
        public and secret key created and signed.
        pub   ed25519 2024-01-24 [SC]
              0EE4B570D5894794B328D4E83143C8B76468C1C0
        uid                      YourCompanyName (Company) <CompanyEmailAddress@xxx.yyy.zzz>
        sub   cv25519 2024-01-24 [E]
```

## LIST the public key(s)

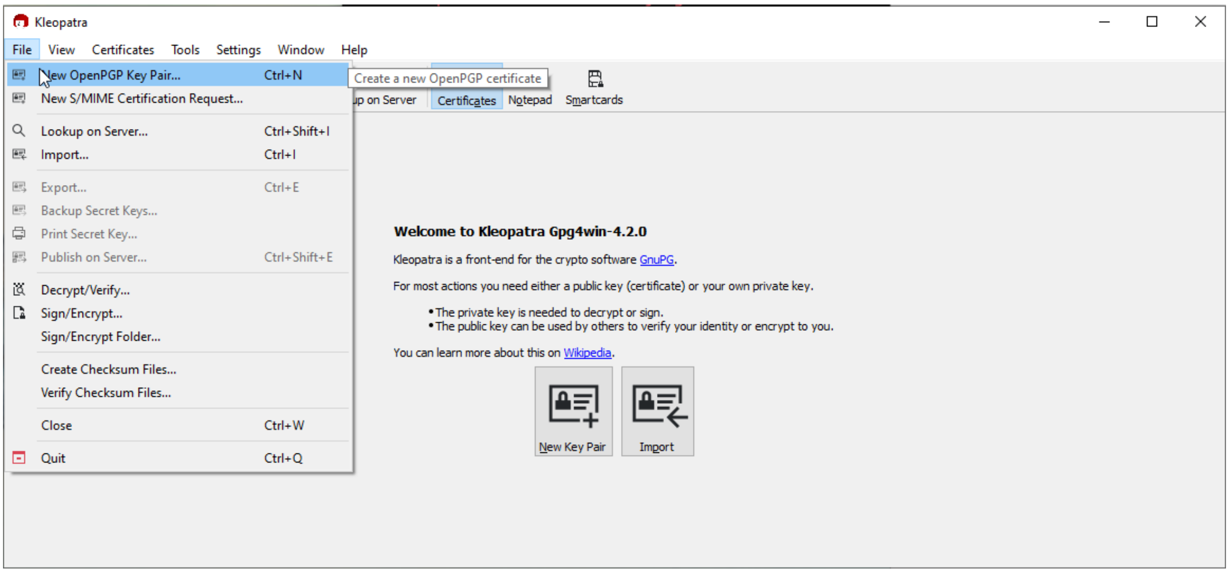
```
gpg -k   or   gpg --list-keys
        pub   ed25519 2024-01-24 [SC]
              0EE4B570D5894794B328D4E83143C8B76468C1C0
        uid           [ultimate] YourCompanyName (Company) <CompanyEmailAddress@xxx.yyy.zzz>
        sub   cv25519 2024-01-24 [E]
```

## FINGERPRINT (Shown in green) your key identified by CompanyEmailAddress@xxx.yyy.zzz

```
        gpg --fingerprint CompanyEmailAddress@xxx.yyy.zzz
        pub   ed25519 2024-01-24 [SC]
              0EE4 B570 D589 4794 B328  D4E8 3143 C8B7 6468 C1C0
        uid           [ultimate] YourCompanyName (Company) <CompanyEmailAddress@xxx.yyy.zzz>
                sub   cv25519 2024-01-24 [E]
```

4.3.2. GUI: Windows Kleopatra

- Launch Kleopatra and click ‘New Key Pair’.
- If there are no (0) keys (created or imported) users will be presented with the screen below when Kleopatra is launched.
- If keys are present, upon launching Kleopatra users will be presented with the Certificates page containing previously created/imported keys.
- To create a new keypair click on the ‘New Key Pair’ icon in the centre of the screen or select ‘New OpenPGP Key Pair’ from the ‘File menu’



Welcome to Kleopatra Gpg4win-4.2.0

Kleopatra is a front-end for the crypto software GnuPG.

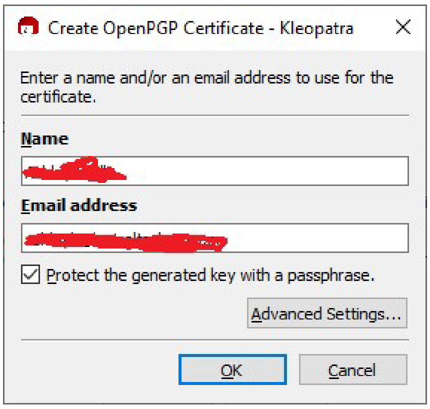
For most actions you need either a public key (certificate) or your own private key.

- The private key is needed to decrypt or sign.
- The public key can be used by others to verify your identity or encrypt to you.

You can learn more about this on Wikipedia.

Kleopatra – 0 GPG keys present

- Users will be prompted to provide their Name and email address. Users must tick the ‘Protect the generated key with a passphrase’ box and click on the ‘Advanced Settings...’ button.
- On the Advanced Settings page select ECDSA/EdDSA with the value ed25519.
- Tick the +ECDH box and select cv25519.
- Unselect the ‘Valid until:’ checkbox.
- Click OK to return the Create OpenPGP Page, after which hitting OK users will be prompted to provide a passphrase.



Enter a name and/or an email address to use for the certificate.

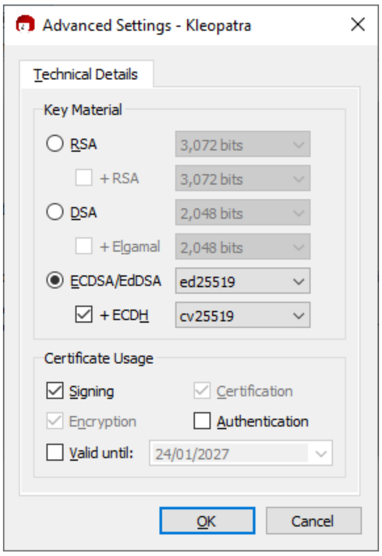
Name

[redacted]

Email address

[redacted]

☑ Protect the generated key with a passphrase.

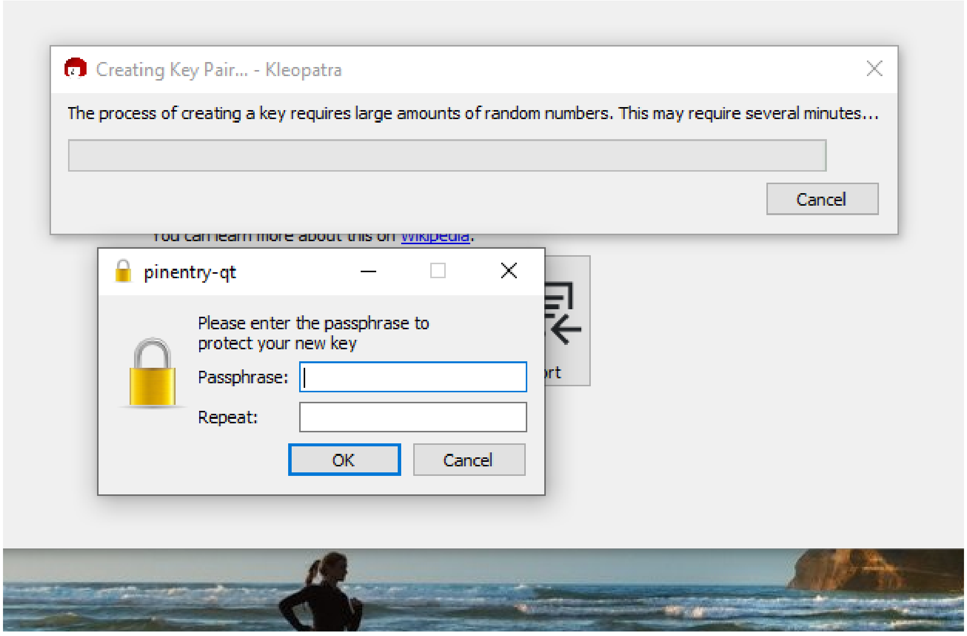


Key Material

○ RSA 3,072 bits
□ + RSA 3,072 bits
○ DSA 2,048 bits
□ + Elgamal 2,048 bits
● ECDSA/EdDSA ed25519
☑ + ECDH cv25519

Certificate Usage

☑ Signing ☑ Certification
☑ Encryption □ Authentication
□ Valid until: 24/01/2027



Creating Key Pair... - Kleopatra

The process of creating a key requires large amounts of random numbers. This may require several minutes...

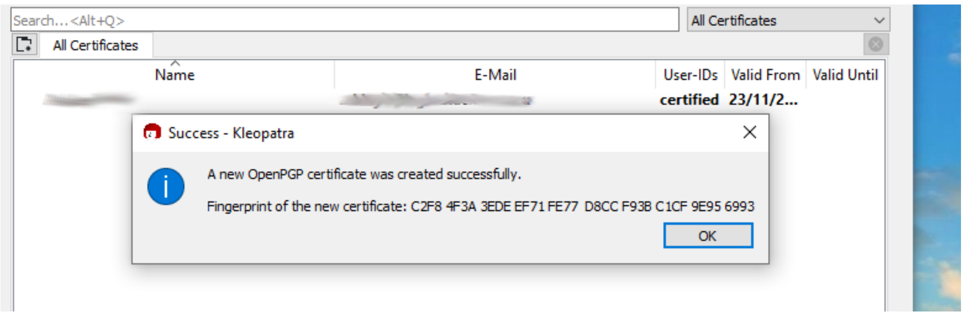
You can learn more about this on Wikipedia.

pinentry-qt

Please enter the passphrase to protect your new key

Passphrase:

Repeat:



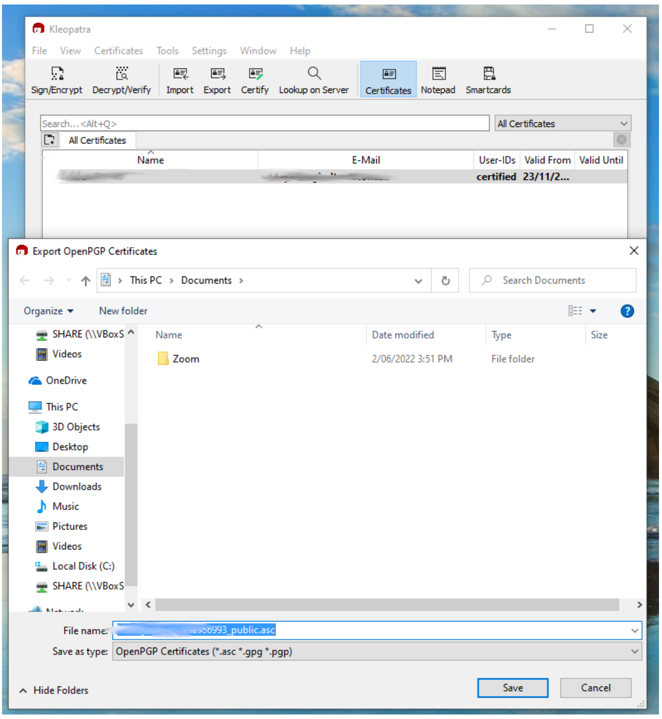
Name	E-Mail	User-IDs	Valid From	Valid Until
[redacted]	[redacted]	certified	23/11/2...	

Success - Kleopatra

A new OpenPGP certificate was created successfully.

Fingerprint of the new certificate: C2F8 4F3A 3EDE EF71 FE77 D8CC F93B C1CF 9E95 6993

- Take note of the fingerprint for verbal validation by the IPND Support team.
- To export the public key, highlight the GPG key on the Certificates page and right click.
- Select Export and Save the Public GPG key and send the key via email to the IPND Support team to: IPND-support@logicaltech.com.au, for verbal validation.



Name	E-Mail	User-IDs	Valid From	Valid Until
[redacted]	[redacted]	certified	23/11/2...	

Export OpenPGP Certificates

Name	Date modified	Type	Size
Zoom	2/06/2022 3:51 PM	File folder	

File name: [redacted]56993_public.asc

Save as type: OpenPGP Certificates (*.asc *.gpg *.pgp)

4.4. Import, Fingerprint and trust the IPND Public GPG key

The following instructions assume the user has already created their GPG key.

The instructions on importing the IPND public GPG key also assumes that the IPND Public key has been saved/named IPND-IIS-publickey.gpg

The IPND Public GPG key file will have been provided to you by the IPND Support Team.

This key is a simple text file that looks like:

IPND-IIS public gpg key (ASCII-armored format)

```
-----BEGIN PGP PUBLIC KEY BLOCK-----

mQENBFpny9QBCADb1u+tXTD2VwrFdPfX3eJlmnnz9MGD8i0oGCQEZT2KJ/yf42qM
f/dR38JCCcbbnE1/N5TkaxeSrk9WqataVEY6r75himzhJP5IHBcl1JtSu67hz2WU
P+2K6tzBV+NntuTGyVsqZiNgGr3O8gC2mYBZ+hcBVID0y29kQgHD952N4jmpsq65
/l4KV/Uto7p6blYd3WLjl6Uk6PaCypuxDrqy2ftPeQ5BmZv1qLytt3zx8MeSkadL
+y4qmL+8dVB0jtzP7n1drZzHovCa7BE1KqrnKEFjvIw95UiBY7jCmT8LxsxVUBhh
5q98kdfjgx/wF/YQlcI3NYaAe2in1pJzIl5VABEBAAG0SGlwbmQtaWlzIChJUE5E
IElJUyBmaWxlIHRyYW5zZmVyIGVuY3J5cHRpb24ga2V5LikgPGlwbmQtaWlzQGlw
bmQuY29tLmF1PokBOQQTAQgAIwUCWmfL1AIbAwcLCQgHAwIBBhUIAgkKCwQWAgMB
Ah4BAheAAAoJEEYPjXxbxZg1oKwH/2iJlx4Y/LYRfdFRwY27YT1yxAPRUL5hg019
ByZHjJh7dyajHKbq4bNL++5jiRCbbOAXk1SGouAZkGBStkmXUoxPjuohJeuJIOUx
n8rxLmjMi01nma/y8Tyav/bGnjzGa0U0f9yfG/FhJozCinEtbtmhlLlGSkLTaYhk
8mzREEzd5s4+LZ+P8ClSmrXYGNGP8+uLwem3Y+sgkA8IeKhGE26So+llOld687sE
DklpQJMHfpmAhW7jJW1gyLQl/iULW6oF1SqxNEN/4aLk2K9OmoPwQpO4eHsSmQfE
q8aY9YPpGUEUb8zzFjcb2nbgZpS9pgnLygYrQN7dLrL7Qye+f365AQ0EWmfL1AEI
ANO+L4kW1WLJBGiuorlkTCGYyCf2j8i83nJCYoJWBzg7+csv6VefG7bIaLgNPs5k
7dszG7Ztfr/bLf5M8pigvHcfcJhx68tYzD6hW5PONr5rdy2rH8k/H6ZNkkGZKkJq
puT02uDtQg0ONQ1o0AOo6kRvm2uO2UCG0n3nb+detfsOuHtVGSKo/g2nM3a9mLhK
mjd1QMeBI8cpqw/R4KERTNNbTwYxQnZsVXOyzuJHQBynCyAtvDMhO5Ch4y4WQp2A
PdiXLYN7pqFudjsuTm02uRBjDrjzRndQQWNbVWS1SPepz86hd6/Euj2atxnVsWU/
/gWHqvyX3+PxBOhIQNfMCGsAEQEAAYkBHwQYAQgACQUCWmfL1AIbDAAKCRBGD418
W8WYNVmAB/9H+Tgx5wWcXW7GkvlNXR2vqOwlBG4RE5EWjj7qTP2+JUZslEDve8GD
z00bmEfon+XwQVHU9U6xvXdpPYQfL+hHYtT+UusBhKwm7Ov/RHNO+6JlfoEvjo2I
t522sed0XnLSWpF9xogqaRAXN+4W03Vmlswbw24aQUgfLCNa5qA2tnusHk8wjgrm
8aVUCoaCbQGE18K57S2o2xTCNTLt8J7ysGiTSLwJMoEtHqzqUwCtyEzAYHY9cpVZ
/HcjKb6KkV5djqzmOjH0df69tZu+newoF6HNRCgbVtsKK5CexabG+ggAVl71SQkk
tDdhSb6UPVV7cozE/nqBCpBfkr8NCVUC
=fixq
-----END PGP PUBLIC KEY BLOCK-----
```

Save the IPND public key and check its md5sum

As a standard user <user>: Linux, WSL

## Use the cd command to change to the directory where you saved the IPND public key file

```
cd <Directory Where File was saved>


md5sum IPND-IIS-publicley.gpg
        afe982d3fc99e636efb0d7ed4d6b6e8a  IPND-IIS-publicley.gpg
```

As a standard user <user>: Windows – PowerShell or CommandPrompt

## Use the cd command to change to the directory where you saved the IPND public key file

```
cd <Directory Where File was saved>


Get-FileHash -Algorithm MD5 -Path ".\IPND-IIS-publicley.gpg"


        Algorithm      Hash                                Path

        ---------      ----                                ----

                MD5    AFE982D3FC99E636EFB0D7ED4D6B6E8A        C:\Users\UserName\IPND-IIS-pub...
```

4.4.1. CLI: Linux, WSL, PowerShell, CommandPrompt

Users MUST import, fingerprint and trust the IPND-IIS public key.

As a standard user <user>: Linux, WSL, Windows – PowerShell or CommandPrompt

## Use the cd command to change to the directory where you saved the key file

```
cd <Directory Where File was saved>
```

## IMPORT the public gpg key

```
gpg --import IPND-IIS-publickey.gpg

        gpg: keybox '/home/<user>/.gnupg/pubring.kbx' created ##Extra Line shown in Linux/WSL

        gpg: /home/<user>/.gnupg/trustdb.gpg: trustdb created ##Extra Line shown in Linux/WSL

        gpg: key 460F8D7C5BC59835: public key "ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-
        iis@ipnd.com.au>" imported

        gpg:                 imported: 1
```

## LIST the public key(s). You should see the key you created earlier and the imported IPND key

```
gpg -k

        ---------

        pub    ed25519 2024-01-24 [SC]

               0EE4B570D5894794B328D4E83143C8B76468C1C0

        uid            [ultimate] YourCompanyName (Company) <CompanyEmailAddress@xxx.yyy.zzz>

        sub    cv25519 2024-01-24 [E]


        pub    rsa2048 2018-01-23 [SC]

               CD4C04C9630DAD81B192A1BC460F8D7C5BC59835

        uid            [ unknown] ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au>

        sub    rsa2048 2018-01-23 [E]
```

## FINGERPRINT (Shown in orange) the ipnd-iis key identified by ipnd-iis@ipnd.com.au

```
gpg --fingerprint ipnd-iis@ipnd.com.au

        pub    rsa2048 2018-01-23 [SC]

               CD4C 04C9 630D AD81 B192  A1BC 460F 8D7C 5BC5 9835

        uid            [ unknown] ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au>

        sub    rsa2048 2018-01-23 [E]
```

## TRUST the ipnd-iis public key (Trust Level Must be >= 4)

```
gpg --edit-key ipnd-iis@ipnd.com.au

        gpg (GnuPG) 2.4.3; Copyright (C) 2023 g10 Code GmbH

        This is free software: you are free to change and redistribute it.
        There is NO WARRANTY, to the extent permitted by law.
        pub  rsa2048/460F8D7C5BC59835
             created: 2018-01-23  expires: never       usage: SC
             trust: unknown       validity: unknown
        sub  rsa2048/B239EE64FBFA9B6E
             created: 2018-01-23  expires: never       usage: E
        [ unknown] (1). ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au>
        gpg> trust
        pub  rsa2048/460F8D7C5BC59835
             created: 2018-01-23  expires: never       usage: SC
             trust: unknown       validity: unknown
        sub  rsa2048/B239EE64FBFA9B6E
             created: 2018-01-23  expires: never       usage: E
        [ unknown] (1). ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au>
        Please decide how far you trust this user to correctly verify other users' keys
        (by looking at passports, checking fingerprints from different sources, etc.)
          1 = I don't know or won't say
          2 = I do NOT trust
          3 = I trust marginally
          4 = I trust fully
          5 = I trust ultimately
          m = back to the main menu
        Your decision? 5
        Do you really want to set this key to ultimate trust? (y/N) y
        pub  rsa2048/460F8D7C5BC59835
             created: 2018-01-23  expires: never       usage: SC
             trust: ultimate      validity: unknown
        sub  rsa2048/B239EE64FBFA9B6E
             created: 2018-01-23  expires: never       usage: E
        [ unknown] (1). ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au>
        Please note that the shown key validity is not necessarily correct
        unless you restart the program.
        gpg> quit

## Confirm TRUST Level (shown in orange) as ultimate
gpg --fingerprint ipnd-iis@ipnd.com.au
        pub   rsa2048 2018-01-23 [SC]
              CD4C 04C9 630D AD81 B192  A1BC 460F 8D7C 5BC5 9835
        uid           [ultimate] ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au>
        sub   rsa2048 2018-01-23 [E]
```

The IPND Support team will validate verbally that the fingerprint is correct.

Note:
DO NOT send key fingerprints via email. They must be verified verbally by the IPND Support team.

4.4.2. GUI: Windows Kleopatra

Users are required to import the IPND Public Key provided to them by the IPND Support team using the Kleopatra application.
By default, keys created/imported by Windows - PowerShell or CommandPrompt will be visible to Kleopatra (if it is installed).

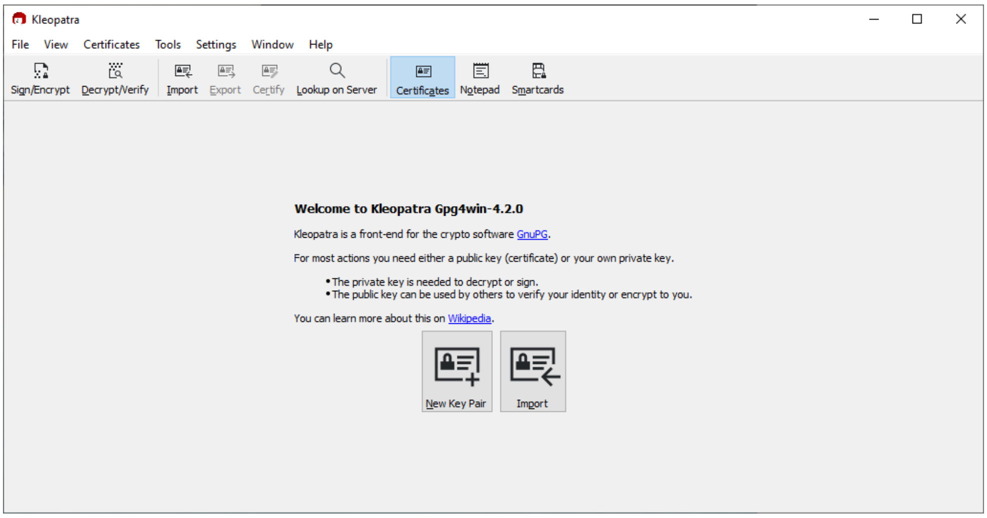
> Note:
> A different process applies for Linux/WSL.

4.4.2.1. GUI: Windows Importing the IPND GPG key

Launch Kleopatra.

If there are no (0) keys (created or imported) users will be presented with the screen below when Kleopatra is launched. If this is the case, the user must repeat the steps in Section 4.3 Creating a GPG key pair, Finger Printing, Exporting.

If keys are present, upon launching Kleopatra users will be presented with the Certificates page containing previously created/imported keys.



Welcome to Kleopatra Gpg4win-4.2.0

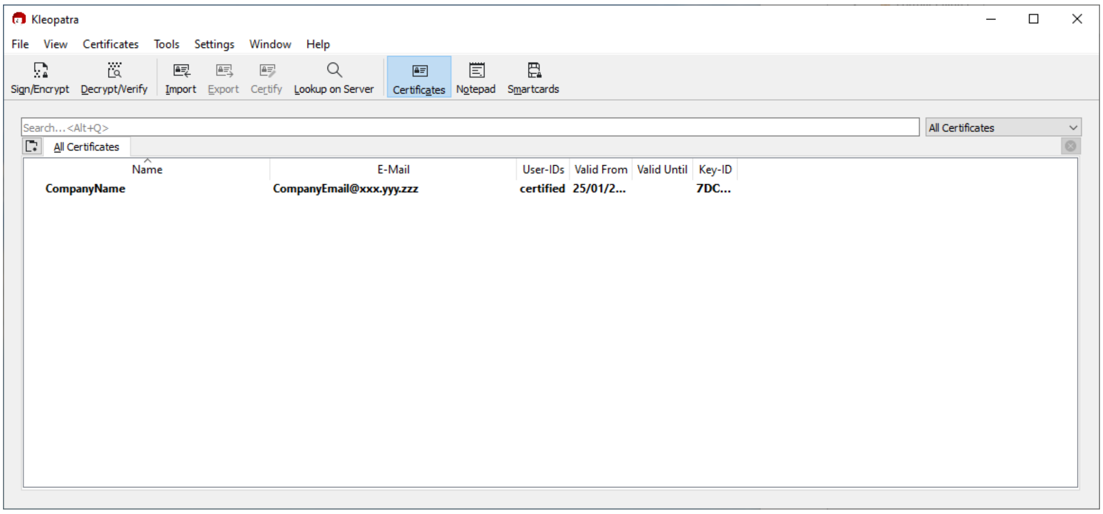
Kleopatra is a front-end for the crypto software GnuPG.

For most actions you need either a public key (certificate) or your own private key.

- The private key is needed to decrypt or sign.
- The public key can be used by others to verify your identity or encrypt to you.

You can learn more about this on Wikipedia.

Kleopatra: 0 GPG keys present



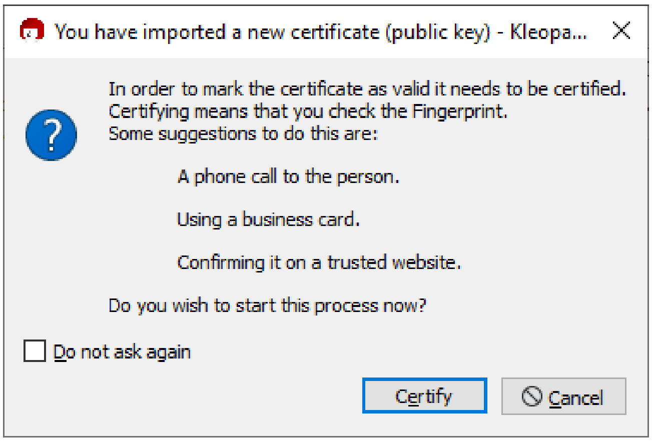
Name	E-Mail	User-IDs	Valid From	Valid Until	Key-ID
CompanyName	**CompanyEmail@xxx.yyy.zzz**	**certified**	**25/01/2...**		**7DC...**

Kleopatra: 1 GPG key present

- Click on ‘File’ and select ‘Import’.
- If the IPND public key was not saved with the recommended name, select ‘Any files (*)’ and then browse to the location of the saved IPND-IIS-publickey.gpg file
- Select the file and click the Open icon.

Users should be presented with the below screen to indicate a successful import

Note:
Before exiting the screen, the user must set the ‘Trust’ for the IPND-IIS-publickey.gpg key by clicking on the ‘Certify’ button.



You have imported a new certificate (public key) - Kleopa...

In order to mark the certificate as valid it needs to be certified.
Certifying means that you check the Fingerprint.
Some suggestions to do this are:

A phone call to the person.

Using a business card.

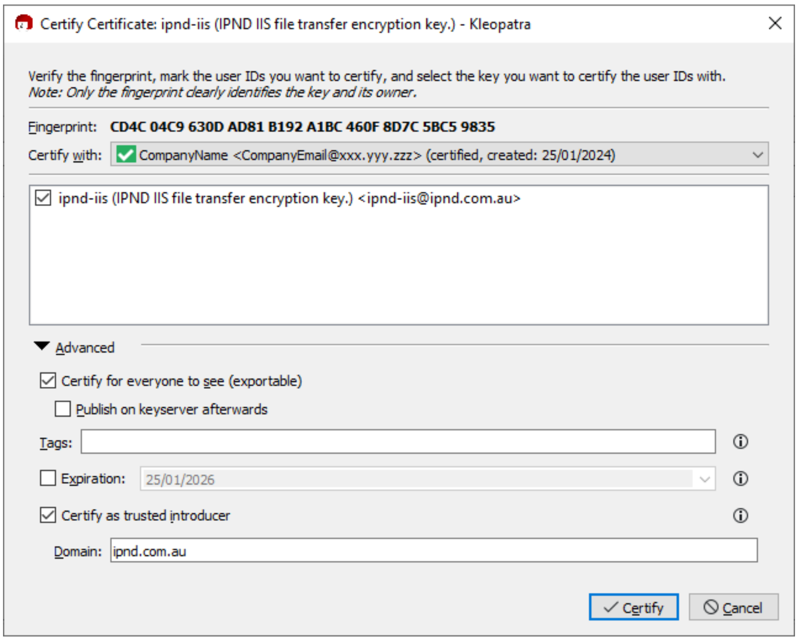
Confirming it on a trusted website.

Do you wish to start this process now?

□ Do not ask again

Kleopatra: Certify the IPND Public key

- Click the ▶ on the lefthand side of Advanced to expand.
- In the expanded section ensure that ‘Certify for everyone..’ and ‘Certify as trusted introducer’ are ticked
- Click on the ‘Certify’ button on the bottom right hand side of the page.
- Enter the GPG key passphrase when prompted.
- When successful the IPND Public key will be ‘**Fully**’ Trusted:



Certify Certificate: ipnd-iis (IPND IIS file transfer encryption key.) - Kleopatra

Verify the fingerprint, mark the user IDs you want to certify, and select the key you want to certify the user IDs with.
Note: Only the fingerprint clearly identifies the key and its owner.

Fingerprint: **CD4C 04C9 630D AD81 B192 A1BC 460F 8D7C 5BC5 9835**

Certify with: CompanyName <CompanyEmail@xxx.yyy.zzz> (certified, created: 25/01/2024)

☑ ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au>

▼ Advanced

☑ Certify for everyone to see (exportable)

□ Publish on keyserver afterwards

Tags:

□ Expiration: 25/01/2026

☑ Certify as trusted introducer

Domain: ipnd.com.au

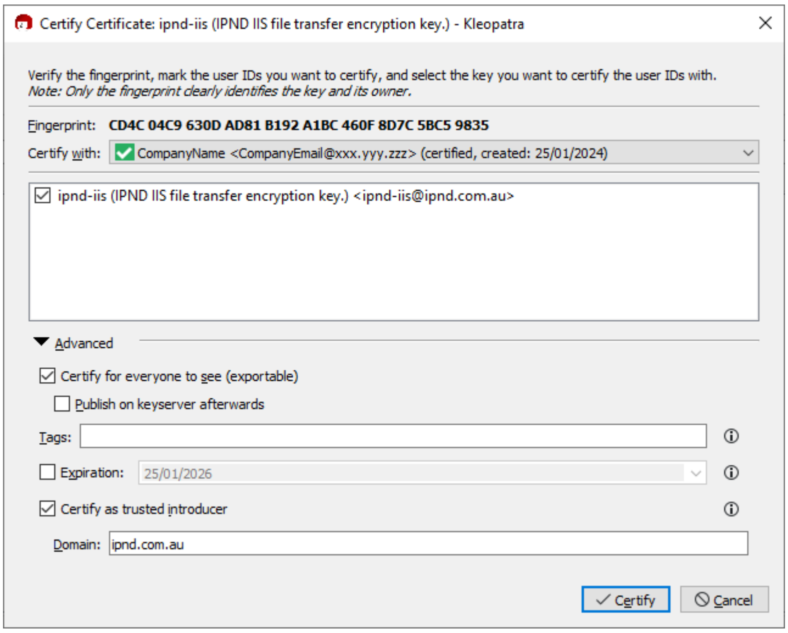
Kleopatra: Certify the IPND Public key

4.4.2.2. GUI: Windows Trusting a GPG key

Users can modify the trust (certification) level for an imported key only when the uses previously generated Public/Private GPG key pair are present.

If the trust of the IPND public key is not set when importing, the trust level can be modified at a later date using the below process:

- Launch Kleopatra and select the IPND-IIS-publickey.gpg file
- Right click and select 'certify'
- Click the ▶ on the lefthand side of Advanced to expand.
- In the expanded section ensure that 'Certify for everyone…' and 'Certify as trusted introducer' are ticked
- Click on the 'Certify' button on the bottom right hand side of the page.
- Enter the GPG key passphrase when prompted.
- If successful the IPND Public key will be '**Fully**' Trusted:



Certify Certificate: ipnd-iis (IPND IIS file transfer encryption key.) - Kleopatra

Verify the fingerprint, mark the user IDs you want to certify, and select the key you want to certify the user IDs with.
Note: Only the fingerprint clearly identifies the key and its owner.

Fingerprint: **CD4C 04C9 630D AD81 B192 A1BC 460F 8D7C 5BC5 9835**

Certify with: ✓ CompanyName <CompanyEmail@xxx.yyy.zzz> (certified, created: 25/01/2024)

☑ ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au>

▼ Advanced

☑ Certify for everyone to see (exportable)

□ Publish on keyserver afterwards

Tags:

□ Expiration: 25/01/2026

☑ Certify as trusted introducer

Domain: ipnd.com.au

Kleopatra: Certify the IPND Public key

5. CONNECTING

5.1. Overview

This section describes how to connect to the IPND - IIS FTS. The basic steps are:

Uploading files from the users' server to the FTS

- Encrypt the file with the IPND Public key
- Establish a VPN tunnel
- Transfer the file to the users home directory using scp/sftp protocol and disconnect
- Terminate the VPN tunnel

Downloading files from the FTS to the users' server

- Establish a VPN tunnel
- Transfer the file to the users' home directory using scp/sftp protocol and disconnect
- Terminate the VPN tunnel
- Decrypt the file with using the Private GPG key

5.2. Establish a VPN tunnel

Once the user has successfully established a VPN connection as described in Section 2.VPN the user can then establish an SSH connection. The tunnel needs to be maintained for the duration of the SSH (SCP/SFTP) session.

5.3. Environments

The IIS provides FTS access to the core IPND Production and User Test environments.

Refer to Appendix 1 for details of IP addresses etc.

5.4. Connection Management Guidelines

To facilitate file transfer between the users' server and the IPND, the user must establish an authorized VPN connection. The IPND exclusively supports secure file transfer protocols such as SFTP (Secure File Transfer Protocol) and SCP (Secure Copy Protocol) over SSH.

Direct (SSH) tty access is restricted, allowing only limited file system commands like ls and cd over SSH.

5.4.1. VPN Session Management

Idle VPN sessions are automatically terminated after 15 minutes of inactivity.

VPN sessions have a maximum duration of 24 hours and will be automatically terminated, even if actively in use.

It is highly recommended that users' terminate both SSH and VPN sessions after completing file transfers to release resources and enhance security.

Wait at least 10-15 minutes before reconnecting to verify that uploaded file(s) have been processed and to download subsequent .err files.

5.4.2. Security Considerations

Retaining open VPN and SSH connections post file transfer poses security risks by extending the exposure window for unauthorized access. Extended session durations increase the likelihood of security vulnerabilities being exploited, providing malicious actors with a larger timeframe to compromise internal systems.

Promptly closing connections mitigates these risks by minimizing the opportunity for unauthorized access and reducing the overall surface area susceptible to potential security threats.

5.4.3. Server Access and Testing Protocol

All users are provided access to the IPND UserTest/Onboarding File Transfer Server environment, where they are required to pass testing criteria before access to IPND Production environment is granted.

Notes:
ALL testing should only be performed on the IPND UserTest/Onboarding environment.
NEVER transfer REAL user data to IPND UserTest/Onboarding environment.
NEVER perform testing on the IPND Production environment.

FTS Server Environment	URI*	IP	UserID
UserTest/Onboarding	ufts.ipnd.com.au	10.11.110.8	t_<user>
Production	pfts.ipnd.com.au	10.10.110.8	p_<user>

* It is recommended that users connect using the URI for greater flexibility and resilience compared to relying solely on the IP address. This approach also guarantees a robust solution that can seamlessly adapt to any potential future modifications.

Users should confirm that their DNS resolves the URI to the IP shown in the table above. If it doesn't, users should update their server's hosts file or contact their network team for assistance.

5.5. Connection Testing

5.5.1. CLI: Linux, WSL, PowerShell, CommandPrompt

5.5.1.1. SCP

Ensure the user is in the directory where the created the ssh keys are located. This is typically the user's home directory.

As a standard user <user>: Linux, WSL, Windows – PowerShell or CommandPrompt

```
## Ensure your VPN tunnel is running. Ref 2.5 - Checking the Tunnel


## Testing ssh connectivity to the UserTest/Onboarding FTS

## If you are in the directory where you generated your ssh key-pair:

        ssh -i .ssh/<ShortCompanyName>_ed25519 <Your_IPND_UserAccountName>@ufts.ipnd.com.au ls

                archived

                download

                received

                rejected


## If you know the full path to your private ssh key file

## eg: <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519

        ssh -i <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519 <Your_IPND_UserAccountName>@ufts.ipnd.com.au ls

                archived

                download

                received

                rejected
```

Note:
SCP is a better option to use in conjunction with automated batch process.

5.5.1.2. SFTP

When the user invokes sftp they will have a similar interface to standard ftp, such as put, get etc.

As a standard user <user>: Linux, WSL, Windows – PowerShell or CommandPrompt

```
## Ensure your VPN tunnel is running. Ref 2.5 - Checking the Tunnel


## Testing ssh connectivity to the UserTEst/Onboarding FTS
## If you are in the directory where you generated your ssh key-pair:
        sftp -i .ssh/<ShortCompanyName>_ed25519 <Your_IPND_UserAccountName>@ufts.ipnd.com.au
                Connected to 10.11.110.8.
                sftp> ls
                archived  download  received  rejected
                sftp> quit

## If you know the full path to your private ssh key file
## eg: <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519
        sftp -i <TheCurrentDirectory>/.ssh/<ShortCompanyName>_ed25519 <Your_IPND_UserAccountName>@ufts.ipnd.com.au
                Connected to 10.11.110.8.
                sftp> ls
                archived  download  received  rejected
                sftp> quit
```

Note:
SFTP is a better option to use when testing or connecting to the FTS interactively.

5.5.1.3. SCP FILE TRANSFER EXAMPLE

The examples below use GENTE as the example filesource. This must be replaced with the filesource relevant to the users' organisation. Refer to 12. Appendix 3 – Advanced Batch SCP/SFTP Techniques for additional CLI guidance.

SCP provides an alternative mechanism to sftp to send and retrieve files from the IPND FTS services.

This example also assumes that the **.ssh/config** file has been set up as per section 3.5 SSH Access Configuration, then the syntax for uploading a file using SCP as follows:

```
scp IPNDUPGENTE.0000001.asc pfts:
```

Where a file is uploaded to the FTS production environment and the SSH configuration has been setup as described in the SSH Configuration section of this document.

The syntax for downloading a file using scp would be:

```
scp  pfts:download/IPNDUPGENTE.0000001.nnn.err.asc
```

Where *nnn* represents a retry number. The retry number is used to differentiate each version of the upload file loaded by the Data Provider so that an audit trail is maintained.

To download all .err files for a particular upload:

```
scp  pfts:download/IPNDUPGENTE.0000001.*.err.asc
```

If the .ssh/config file has not been specified then the syntax would be as follows:

```
scp -i ~/.ssh/<user_priv_key>  IPNDUPGENTE.0000001.asc gentelco@pfts.ipnd.com.au:
```

And for downloading a file would be:

```
scp -i ~/.ssh/<user_priv_key>  gentelco@pfts.ipnd.com.au:download/IPNDUPGENTE.0000001.nnn.err.asc
```

Where *nnn* represents a retry number. The retry number is used to differentiate each version of the upload file loaded by the Data Provider so that an audit trail is maintained.

To download all .err files for a particular upload:

```
scp -i ~/.ssh/<user_priv_key>  gentelco@pfts.ipnd.com.au:download/IPNDUPGENTE.0000001.*.err.asc
```

For more details and examples Ref to section 12 Appendix 3 – Advanced Batch SCP/SFTP Techniques.

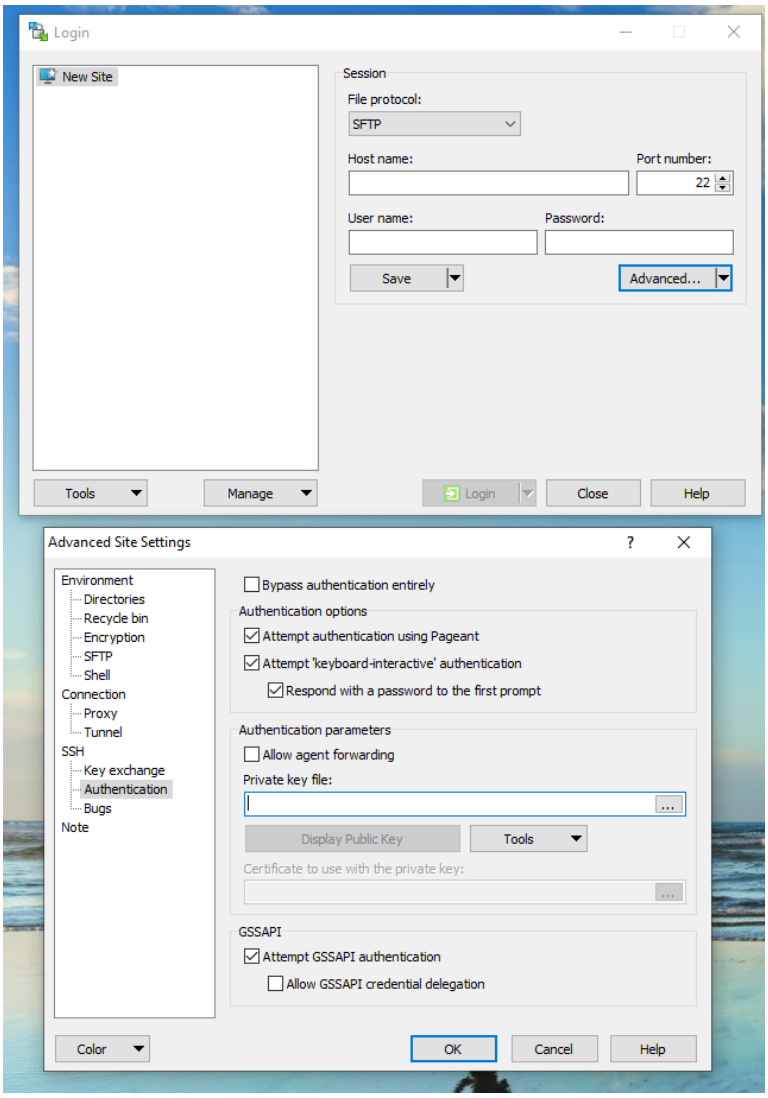
5.5.2. GUI: Windows WinSCP, FileZilla

The 2 most popular SSH based file transfer programs for Windows are WinSCP and FileZilla.
The configuration files for Windows' GUIs are stored as part of the Site details in the GUI setup.

5.5.2.1. WINSCP

Note:
WinSCP only uses PuTTY format keys.
If the user generated OpenSSH type keys and select one of these **private** keys for authentication, then WinSCP will provide the user the option to convert and save it to PuTTY format (*.ppk).

Visit the official site, download and install WinSCP.
When the user first launches WinSCP a login dialog will appear. On subsequent launch of the WinSCP application the login dialog screen is available via 'Tabs/Sites/Site Manager'



Login

Session

File protocol: SFTP

Host name:

Port number: 22

User name:

Password:

Advanced Site Settings

□ Bypass authentication entirely

Authentication options

☑ Attempt authentication using Pageant

☑ Attempt 'keyboard-interactive' authentication

☑ Respond with a password to the first prompt

Authentication parameters

□ Allow agent forwarding

Private key file:

Certificate to use with the private key:

GSSAPI

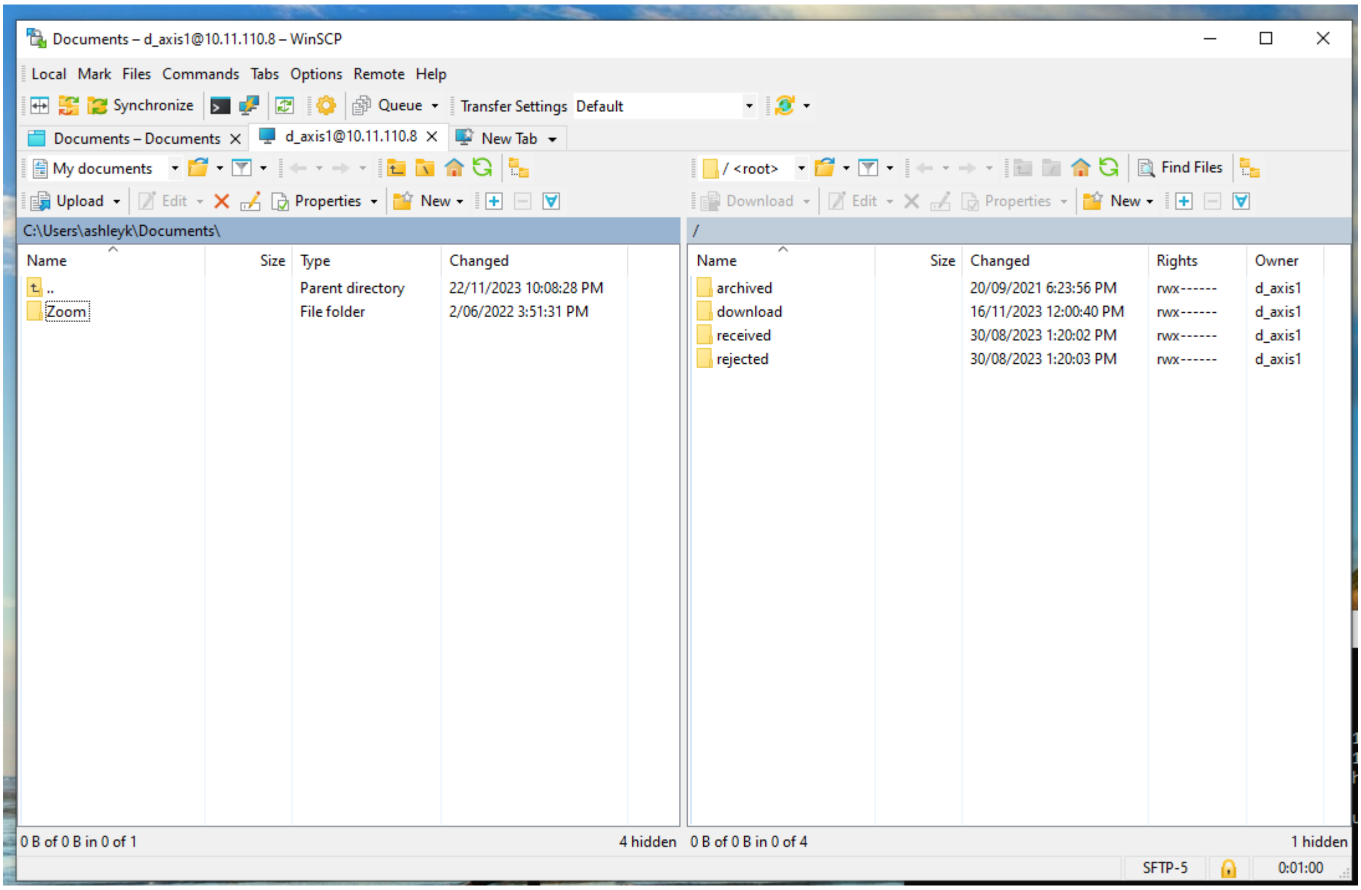
☑ Attempt GSSAPI authentication

□ Allow GSSAPI credential delegation

WinSCP: Configuration – initial setup

On the dialog:

- Make sure New site node is selected.
- On New site node and make sure the SFTP protocol is selected.
- For UserTest/Onboard Enter the URI ufts.ipnd.com.au (10.11.110.8) into the Host field.
- When accessing Production enter pfts.ipnd.com.au (10.10.110.8) into the Host field.
- Enter the users fts account name to the User name field: t_username for ufts, p_username for pfts
- Leave the Password field empty
- Click on the Advanced button to open the 2nd screen On the Advanced Site Settings
  - Go to SSH > Authentication page.
  - In Private key file box select the users private SSH key file.
  - Save and close the Advanced site settings dialog with the OK button.
- Save the site settings using the Save button on the login page. The user will be prompted to name the login session.
- Highlight the new site in the left panel and press the Login using Login button.
- Verify the host key by comparing fingerprints with those collected before (see above).
- If Login is successful the Right-hand panel will show 4 folders known as directories (archived, download, received, rejected)



Documents – d_axis1@10.11.110.8 – WinSCP

C:\Users\ashleyk\Documents\

Name	Size	Type	Changed
..		Parent directory	22/11/2023 10:08:28 PM
Zoom		File folder	2/06/2022 3:51:31 PM

0 B of 0 B in 0 of 1 4 hidden

/

Name	Size	Changed	Rights	Owner
archived		20/09/2021 6:23:56 PM	rwx------	d_axis1
download		16/11/2023 12:00:40 PM	rwx------	d_axis1
received		30/08/2023 1:20:02 PM	rwx------	d_axis1
rejected		30/08/2023 1:20:03 PM	rwx------	d_axis1

0 B of 0 B in 0 of 4 1 hidden

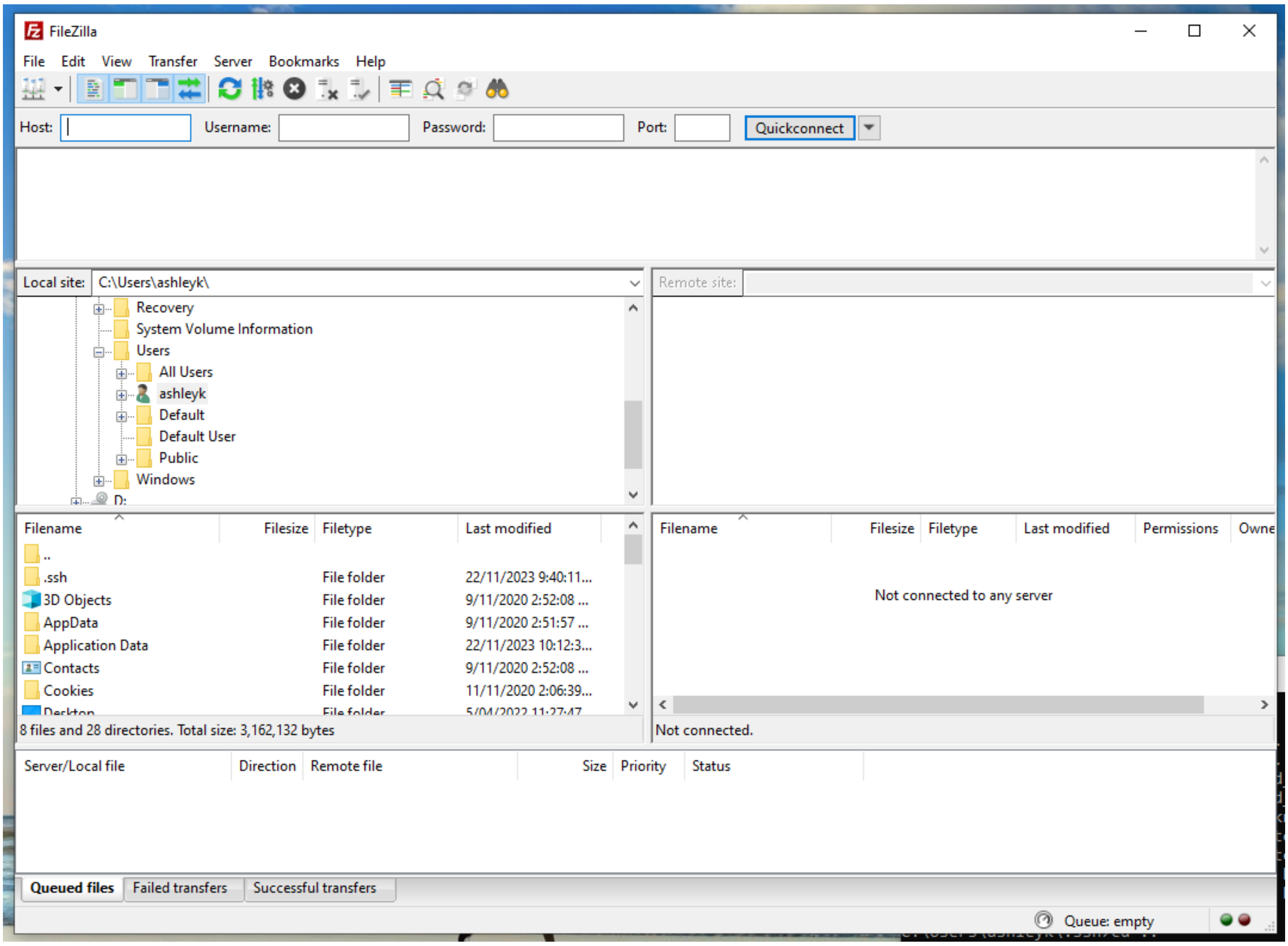
SFTP-5 0:01:00

WinSCP: Connected Session

5.5.2.2. FileZilla

Visit the official site to download and install FileZilla.

- Open the **FileZilla** software. Press the Start button, search for **FileZilla**, and press **Enter**. This will open the **connect panel**.
- For UserTest/Onboard Enter the URI ufts.ipnd.com.au (10.11.110.8 into the Host field.
- When accessing Production enter pfts.ipnd.com.au (10.10.110.8) into the Host field.
- Enter the users' fts account name to the Username field: t_username for ufts, p_username for pfts
- Leave the Password field blank and enter 22 in the Port field


FileZilla
File Edit View Transfer Server Bookmarks Help
Host: Username: Password: Port:
Quickconnect
Remote site:
Queued files Failed transfers Successful transfers

Local site: C:\Users\ashleyk\

Recovery
System Volume Information
Users
All Users
ashleyk
Default
Default User
Public
Windows
D:

Filename	Filesize	Filetype	Last modified
..			
.ssh		File folder	22/11/2023 9:40:11...
3D Objects		File folder	9/11/2020 2:52:08 ...
AppData		File folder	9/11/2020 2:51:57 ...
Application Data		File folder	22/11/2023 10:12:3...
Contacts		File folder	9/11/2020 2:52:08 ...
Cookies		File folder	11/11/2020 2:06:39...
Desktop		File folder	5/04/2022 11:27:47

8 files and 28 directories. Total size: 3,162,132 bytes

Filename	Filesize	Filetype	Last modified	Permissions	Owne

Not connected to any server

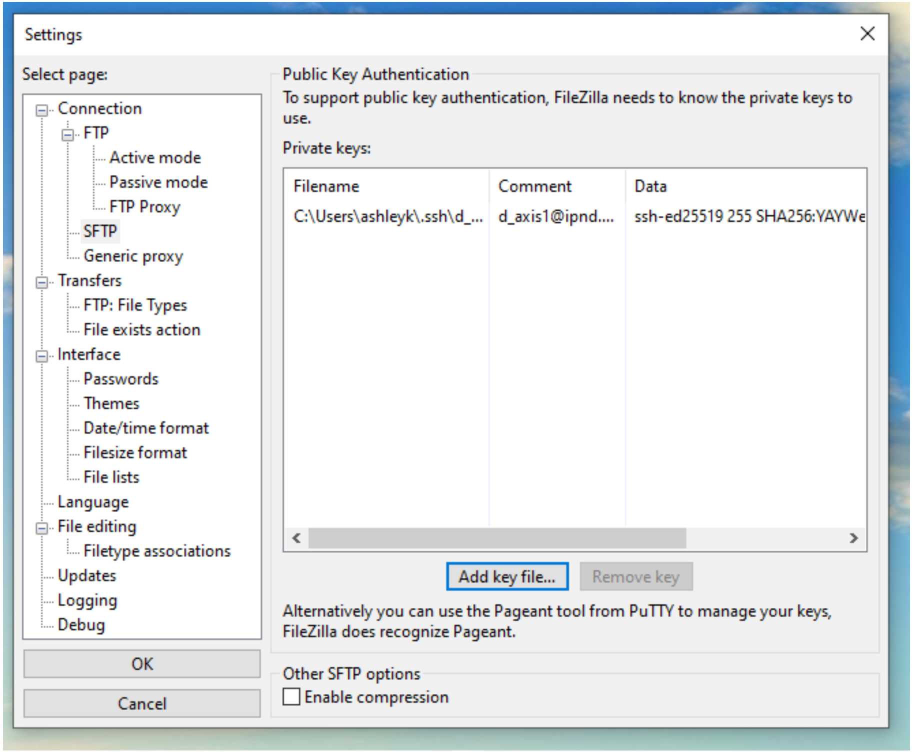
Not connected.

Server/Local file	Direction	Remote file	Size	Priority	Status

Queue: empty

FileZilla: Configuration – initial setup

- Click on Edit and select Settings to open the settings page. On this page select SFTP, click add key and browse and load the users' **private** key (PuTTY or OpenSSH), click OK to save.



Public Key Authentication

To support public key authentication, FileZilla needs to know the private keys to use.

Private keys:

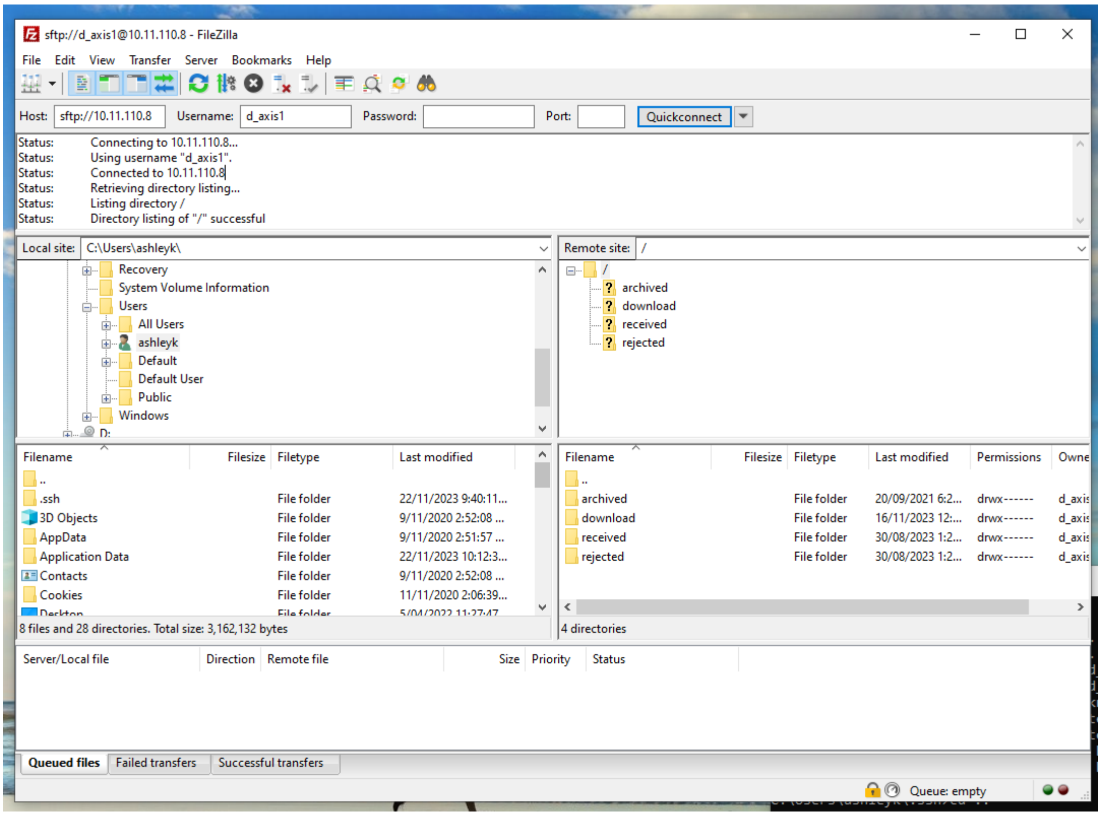
Filename	Comment	Data
C:\Users\ashleyk\.ssh\d_...	d_axis1@ipnd....	ssh-ed25519 255 SHA256:YAYWe

Alternatively you can use the Pageant tool from PuTTY to manage your keys, FileZilla does recognize Pageant.

Other SFTP options

□ Enable compression

- Connect and the user should see a screen like the one below, where the Right-hand panel will show 4 folders known as directories (archived, download, received, rejected)



Host: sftp://10.11.110.8 Username: d_axis1 Password: Port:

```
Status:     Connecting to 10.11.110.8...
Status:     Using username "d_axis1".
Status:     Connected to 10.11.110.8
Status:     Retrieving directory listing...
Status:     Listing directory /
Status:     Directory listing of "/" successful
```

Local site: C:\Users\ashleyk\

```
Recovery
System Volume Information
Users
    All Users
    ashleyk
    Default
    Default User
    Public
Windows
D:
```

Remote site: /

```
/
    archived
    download
    received
    rejected
```

Filename	Filesize	Filetype	Last modified
..			
.ssh		File folder	22/11/2023 9:40:11...
3D Objects		File folder	9/11/2020 2:52:08 ...
AppData		File folder	9/11/2020 2:51:57 ...
Application Data		File folder	22/11/2023 10:12:3...
Contacts		File folder	9/11/2020 2:52:08 ...
Cookies		File folder	11/11/2020 2:06:39...
Desktop		File folder	5/04/2022 11:27:47

8 files and 28 directories. Total size: 3,162,132 bytes

Filename	Filesize	Filetype	Last modified	Permissions	Owne
..					
archived		File folder	20/09/2021 6:2...	drwx------	d_axis
download		File folder	16/11/2023 12:...	drwx------	d_axis
received		File folder	30/08/2023 1:2...	drwx------	d_axis
rejected		File folder	30/08/2023 1:2...	drwx------	d_axis

4 directories

FileZilla: Connected session

5.6. IPND FTS Directories

Do NOT use absolute paths in your scripts.

e.g. /data/prod/home/p_<user>/download/ ✗

Always use relative path names.

e.g. download/ ✓ or ./download/ ✓

Each FTS environment consists of the user’s home directory and four subdirectories.

1. download
2. received
3. rejected
4. archived

File uploads are restricted to your home directory. Once a file is uploaded, it remains visible in the users home directory for approximately 5 seconds after which it undergoes initial validation.

All files are then given a timestamp prefix that denotes the time they were received and closed by the users transfer client. The Files then undergo initial validation. Validated files are moved to the "received" directory. Invalid files are given an error code as a suffix and moved to the "rejected" directory, where they're stored with a zero size.

The initial validation ensures that files adhere to the correct naming format and are GPG ASCII-armored (ASC) encrypted. Files meeting these criteria are forwarded to the primary IPND application server for decryption. Any files that cannot be decrypted are given an error code suffix and sent back to the users "rejected" folder.

Output files resulting from successful processing are encrypted using the users GPG key and sent back to their download directory.

1. download

This directory contains non-archived IPND files encrypted with the users GPG key that they may download.

2. received

This directory contains a copy of uploaded IPND files that pass initial validation. The file names are prefixed with a unique timestamp code. These are the files that are sent to the IPND system for processing.

3. rejected

This directory contains zero-byte (i.e. empty) versions of any uploaded IPND files that fail initial validation or are unable to be decrypted on the legacy system (i.e. fail secondary validation)

The files are prefixed with a unique timestamp code and a suffix indicating the reason for failure. Refer to section 8 Messages for a full list of the suffixes and failure reasons. Examples of failure reasons are:

a) the filename does not comply with the specified valid filename associated with the user account,
b) the file has not been encrypted.

4. archived

This directory contains further subdirectories for archived download, received and rejected IPND files. It contains files that are older than 6 months but still within the archive retention period.

6. File Encryption and Decryption

6.1. Overview

All files that are provided to and from the IPND via the IIS FTS will be encrypted using GnuPG

This section provides an overview on how to encrypt and decrypt files.

6.2. Encrypting Files

There are 3 critical components to encrypting files for the IPND.

1. Files must be ASCII armored
2. Encrypted files MUST be signed with the users private key
3. Files must be encrypted using the IPND public key

> Note:
> Encrypted Files that are not created with these attributes will be rejected and NOT processed by the IPND FTS.

6.2.1. CLI: Linux, WSL, PowerShell, CommandPrompt

As a standard user <user>: Linux, WSL, Windows – PowerShell or CommandPrompt

## Check that you have access to your public gpg key and the IPND public gpg key

```
        gpg -k
                ---------
                pub   ed25519 2024-01-25 [SC]
                      AC115A5CF00F1D5A252DBAAA7DCED07E90A15FE7
                uid           [ultimate] CompanyName <CompanyEmail@xxx.yyy.zzz>
                sub   cv25519 2024-01-25 [E]

                pub   rsa2048 2018-01-23 [SC]
                      CD4C04C9630DAD81B192A1BC460F8D7C5BC59835
                uid           [  full  ] ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au>
                sub   rsa2048 2018-01-23 [E]
```

## Check that you have access to your private key

```
        gpg -K
                ---------
                sec   ed25519 2024-01-25 [SC]
                      AC115A5CF00F1D5A252DBAAA7DCED07E90A15FE7
                uid           [ultimate] CompanyName <CompanyEmail@xxx.yyy.zzz>
                ssb   cv25519 2024-01-25 [E]
```

## To Encrypt `<UnencryptedFile>` as `<UnencryptedFile>.asc` in the same directory
## NB: Your Unencrypted file is affected.

```
        gpg -batch --encrypt --armor --sign --recipient ipnd-iis@ipnd.com.au <UnencryptedFile>
                ## You will be prompted to input your Private gpg key passphrase
```

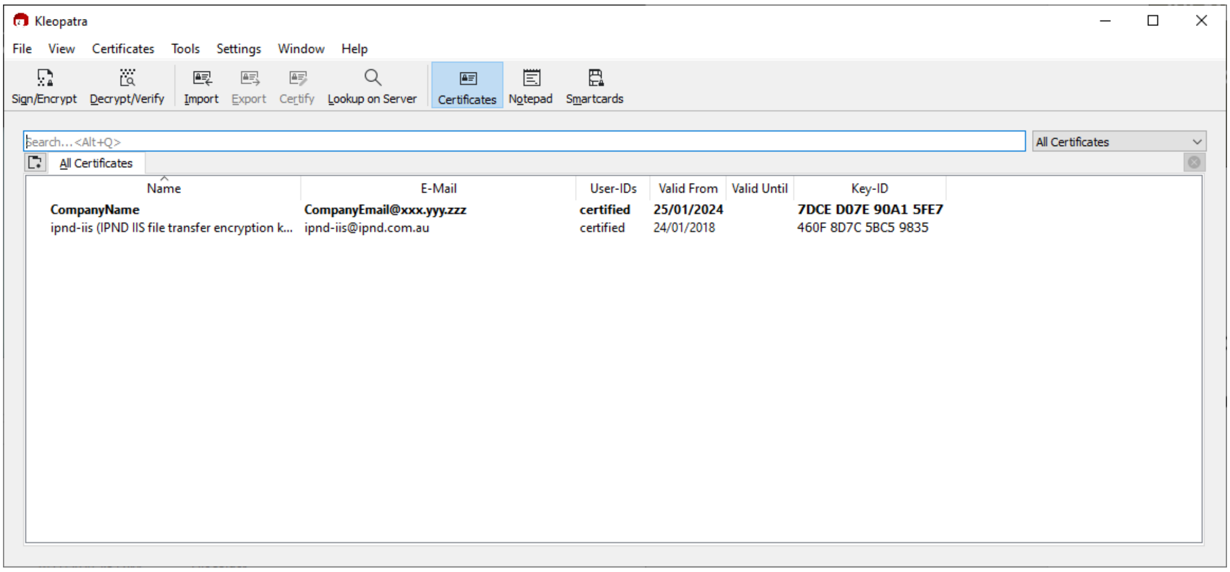
## To Encrypt `<Unencryptedfile>` as `<NewDirEncFile>.asc`

## NB: Your Unencrypted file is affected.

```
        gpg -batch --encrypt --armor --sign --recipient ipnd-iis@ipnd.com.au --output <NewDirEncFile>.asc <UnencryptedFile>
                ## You will be prompted to input your Private gpg key passphrase
```

6.2.2. GUI: Windows Kleopatra

The Kleopatra start page.



Kleopatra
File View Certificates Tools Settings Window Help
Sign/Encrypt Decrypt/Verify Import Export Certify Lookup on Server Certificates Notepad Smartcards
Search...<Alt+Q>
All Certificates
All Certificates

Name	E-Mail	User-IDs	Valid From	Valid Until	Key-ID
CompanyName	**CompanyEmail@xxx.yyy.zzz**	**certified**	**25/01/2024**		**7DCE D07E 90A1 5FE7**
ipnd-iis (IPND IIS file transfer encryption k...	ipnd-iis@ipnd.com.au	certified	24/01/2018		460F 8D7C 5BC5 9835

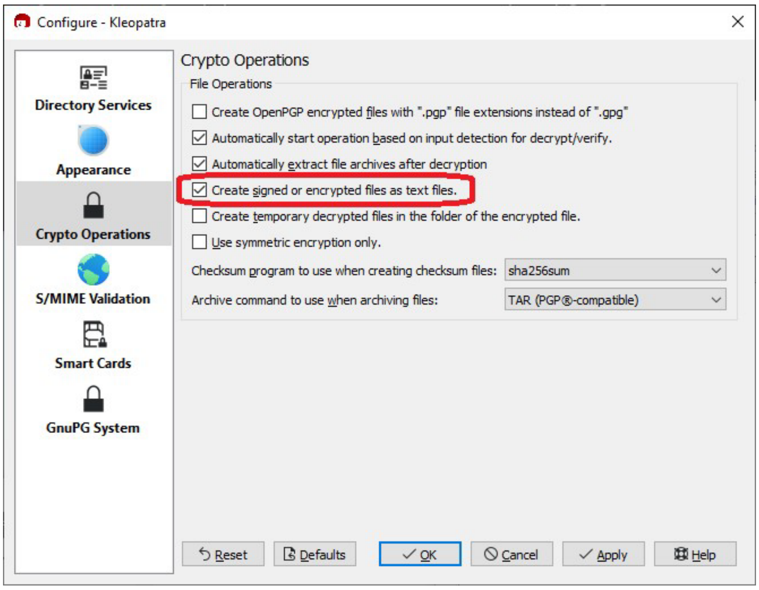
Kleopatra: Certificates screen

Kleopatra: Certify the IPND Public key

Configure ASC armor mode

1. Launch Kleopatra, then click on Settings and select "Configure Kleopatra..."
2. On the "Configure Kleopatra" window click "Crypto Operations"

Ensure that the "Create signed or encrypted files as text files" is ticked, then click "Apply" and then "OK"



Crypto Operations

File Operations

- ☐ Create OpenPGP encrypted files with ".pgp" file extensions instead of ".gpg"
- ☑ Automatically start operation based on input detection for decrypt/verify.
- ☑ Automatically extract file archives after decryption
- ☑ Create signed or encrypted files as text files.
- ☐ Create temporary decrypted files in the folder of the encrypted file.
- ☐ Use symmetric encryption only.

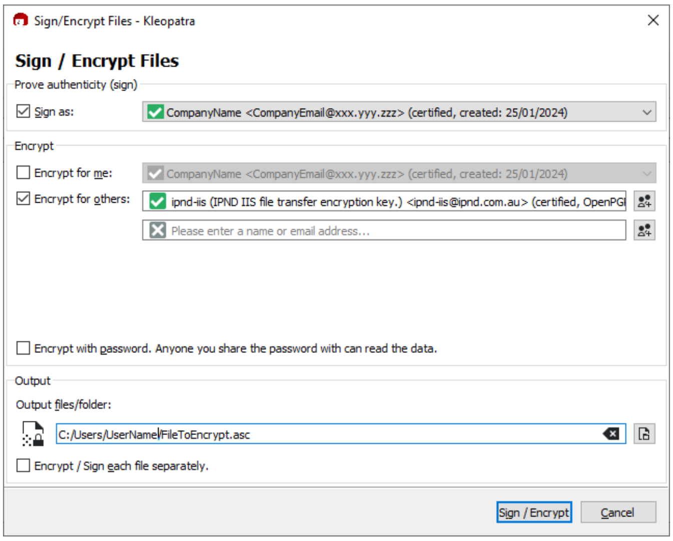
Checksum program to use when creating checksum files: sha256sum

Archive command to use when archiving files: TAR (PGP®-compatible)

Kleopatra: File encryption settings

Encrypting

1. Launch Kleopatra and click on “File” and select “Sign/Encrypt” or simply click the ‘Sign/Encrypt” icon
2. Users will be presented with a Files selection screen, browse and select the file to encrypt.
3. Select the file and click “Open”
4. On the next screen ensure the following is done
   a. “Sign as:” as is selected and your key details are selected,
   b. “Encrypt for me:” is unselected,
   c. “Encrypt for others:” is selected and then click on the “Show certificate list” icon at the end of this line
5. A “Certificate Selection” screen will open, on this page select the ‘ipnd-iis key’, then click “OK”
   Ensure “Encrypt with password..” is unchecked
   In the Output box the user must provide their output file a .asc extension
6. If users are encrypting all files in a directory, Ensure the “Encrypt/Sign each file separately” is checked.



Sign/Encrypt Files - Kleopatra

Sign / Encrypt Files

Prove authenticity (sign)

☑ Sign as: CompanyName <CompanyEmail@xxx.yyy.zzz> (certified, created: 25/01/2024)

Encrypt

☐ Encrypt for me: CompanyName <CompanyEmail@xxx.yyy.zzz> (certified, created: 25/01/2024)

☑ Encrypt for others: ipnd-iis (IPND IIS file transfer encryption key.) <ipnd-iis@ipnd.com.au> (certified, OpenPGI

Please enter a name or email address...

☐ Encrypt with password. Anyone you share the password with can read the data.

Output

Output files/folder:

C:/Users/UserName/FileToEncrypt.asc

☐ Encrypt / Sign each file separately.

Kleopatra: File Encryption screen

7. Click “Sign/Encrypt”
   Users may receive a popup warning- message that “None of the recipients you are encrypting seems to be your own..” Click “Do not ask again” and then click “Continue”
8. If the users GPG key passphrase is not cached, they will receive a popup window requesting their private key’s passphrase.
9. If successful, the user will be navigated to a results page with a message
   “<FileToEncrypt> → <FileToEncrypt>.asc: **Signing and encryption succeeded.**”
   Click on ”Finish”

6.3. Decrypting Files

6.3.1. CLI: Linux, WSL, PowerShell, CommandPrompt

As a standard user <user>: Linux, WSL, Windows – PowerShell or CommandPrompt

## Check that you have access to your private key

```
        gpg -K

                ---------

                sec   ed25519 2024-01-25 [SC]

                      AC115A5CF00F1D5A252DBAAA7DCED07E90A15FE7

                uid           [ultimate] CompanyName <CompanyEmail@xxx.yyy.zzz>

                ssb   cv25519 2024-01-25 [E]
```

When decrypting you must specify an output file, otherwise the output is to the screen
## NB: Your Encrypted file is unaffected.

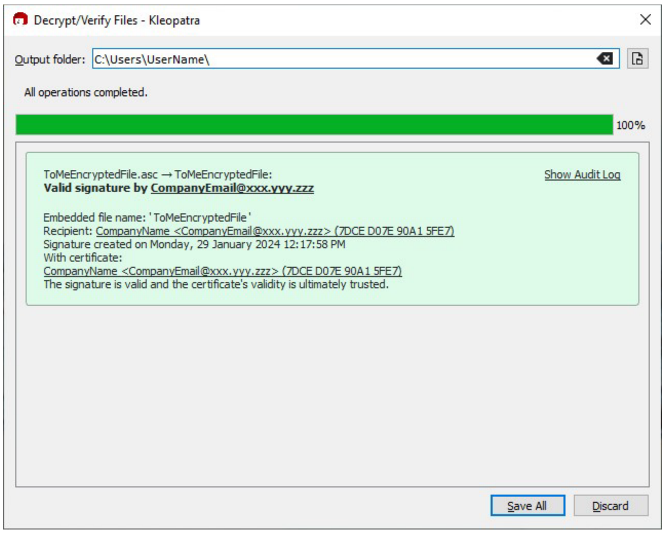
## To Decrypt `<Encryptedfile>` as `<UnEncryptedFile>`

```
        gpg --batch --decrypt --output <UnEncryptedFile> <EncryptedFile>
```

6.3.2. GUI: Windows Kleopatra

Decrypting

1. Launch Kleopatra and click on "File" and select "Decrypt/Verify" or simply click the 'Decrypt/Verify' icon
2. Users will be presented with a Files selection screen, browse and select the file to decrypt.
3. Select the file and click "Open"
4. If the users GPG key's passphrase is not cached they will receive a pop-up screen to provide it
5. If the file was verified/decrypted the user will be presented with a 'Save' screen



Output folder: C:\Users\UserName\

All operations completed.

ToMeEncryptedFile.asc → ToMeEncryptedFile:
Valid signature by CompanyEmail@xxx.yyy.zzz

Embedded file name: 'ToMeEncryptedFile'
Recipient: CompanyName <CompanyEmail@xxx.yyy.zzz> (7DCE D07E 90A1 5FE7)
Signature created on Monday, 29 January 2024 12:17:58 PM
With certificate:
CompanyName <CompanyEmail@xxx.yyy.zzz> (7DCE D07E 90A1 5FE7)
The signature is valid and the certificate's validity is ultimately trusted.

Kleopatra: File Decryption screen

6. Select/Enter an Output directory and click "Save All" and follow the prompts to save the decrypted file.

7. File Names

7.1. Data Providers

7.1.1. Upload File

7.1.1.1. Customer Record System Extract IPND Upload File

Data provider upload file formats are defined in section 6.1.2 of the Data Users and Data Providers Technical Requirement for the IPND document.

Data Provider upload files must be encrypted (refer 6.2 Encrypting Files) with the IPND public key and the filename must be in the format:

IPNDUP<XXXXX>.<NNNNNN>.asc

Where

<XXXXX> is a valid File Source for the Data Provider,

<NNNNNNN> is the file sequence number with a leading 0

“asc” indicates that the file has been encrypted using the documented method.

Notes:
The “.asc” extension is created by the gnupg tools that will encrypt the data for transmission.
Refer to the File Encryption section for the data encryption process.
Files that have not been encrypted will not be accepted by the FTS.

Filenames that do not match the expected format will be rejected. The Filesource <XXXXX> must be one associated with the SSH account. This will have been configured when the account is set up.

Example:

An IPND Data Provider with an (ssh) account of p_gentelco has been assigned a filesource of GENTE.

Using this ssh account, tt will only be possible to upload a file in the following format:

IPNDUPGENTE.NNNNNNN.asc

An invalid pattern will result in an empty file in the rejected directory. This empty file will have the same invalid filename, be prefixed with a timestamp, and suffixed with R001.

7.1.2. Download Files

Download files will be encrypted with the Public GPG key provided by the individual organisation. Refer to Section 6.2 Encrypting Files.

7.1.2.1. IPND error file Report to Data Providers

For each upload file received from a data provider that passes initial reject processing, there will be a corresponding error file. The error file format is described in section 6.1.3 of the Data Users and Data Providers Technical Requirement for the IPND document.

The error file name will be based on the name of the upload file for which it is generated. Each upload file is given a retry number when it is received by the IPND. This retry number is used to differentiate each version of the upload file loaded by an IPND Data Provider for audit trail purposes.

The filename format of the error file in the IIS is described below:

IPNDUP<XXXXX>.<NNNNNN>.<MMM>.err.asc

Where

<XXXXX> is the File Source for the Data Provider

<NNNNNNN> is the sequence number of the associated upload file

<MMM> is the retry number i.e indicates the number of times sequence <NNNNNNN> has been uploaded

"err" indicates an error file associated with sequence <NNNNNNN> and retry <MMM>

"asc" is the suffix indicating that the file is encrypted using the gpg public key associated with the Data Provider

> Note:
> All error files include a retry suffix in the IIS environment.
> There is no symbolic link to the latest .err file as in the IPND Legacy environment.

7.1.2.2. Data Provider Snapshot File

These reports are produced on request from a Data Provider. The output format for these files once decrypted will be as described in Section 6.1.20 of the Data Users and Data Providers Technical Requirement for the IPND document.

The filename format of these reports in the IIS is as follows:

IPNDRU.<XXXXX>.<MMMMMMM>.<NNNNNNN>.<PPP(P)>.asc

Where

<XXXXX> Is the File Source code for the Data Provider

<MMMMMMM> is the run number identifying the output file. It indicates that the file was part of the

MMMMMMMth run of an extract for this filesource.

<NNNNNNN> is the file sequence number of the last upload file from the Data Provider with this File Source.

<PPPP> or <PPP> - Span number. All Output On Request (OOR) download files are limited to 100,000 rows of data. The first 100,000 rows are written to span 001. Requests that generate > 100,000 rows are written to additional spanned files. If the number of output files exceeds 999, the spanned number will increment to 1000 onwards.

If the number of output files exceeds 999, the spanned number will increment to 1000 onwards.

"asc" is the suffix indicating that the file is encrypted using the gpg public key associated with the Data Provider.

7.1.2.3. Changed Data Provider Report

The Changed Data Provider Report runs monthly on 1st of the month and documents all Data Provider changes from the previous month. The format of the file once decrypted is described in Section 6.1.19 of the Data Users and Data Providers Technical Requirement for the IPND document.

The filename format in the IIS is described below:

IPNDDP<XXXXX>.<NNNNNNN>.asc

Where

<XXXXX> is the File Source code for the Data Provider

<NNNNNNN> is the File sequence number with leading 0

"asc" is the suffix indicating that the file is encrypted using the gpg public key associated with the Data Provider

7.1.2.4. Data Provider Query File

The DPQF is produced as part of the processing from the Data User Query File Sub-system. This file is described in detail in section 5.2.5.3.1 of the Data Users and Data Providers Technical Requirements for the IPND.

The format of this file once decrypted is described in Section 6.1.17 of the same document.

The filename format in the IIS is described below:

IPNDQP.<XXXXX>.<NNNNNNN>.asc

Where

<XXXXX>	is the File Source for the Data Provider
<NNNNNNN>	is a file sequence number with leading 0
"asc"	suffix indicating that the file is encrypted using the gpg public key associated with the Data Provider.

7.2. Data Users

7.2.1. Upload File

7.2.1.1. IPND Data User Query File DUQF

Data Users can upload a Data User Query File. The DUQF Sub-system is described in Section 5.2.5 of the Data Users and Data Providers Technical Requirements for the IPND.

The format of this file is described in Section 6.1.13 of the same document.

The filename format in the IIS is described below:

IPNDQU<XXXXX>.<yyyymmddhhmmss>.asc

Where

<XXXXX>	is a valid File Source for the Data User,
<yyyymmddhhmmss>	is a date stamp indicating when the file was created.
"asc"	indicates that the file has been encrypted using the documented method.

Notes:
The ".asc" extension is created by the gnupg tools that will encrypt the data for transmission.
Refer to the File Encryption section for the data encryption process.
Files that have not been encrypted will not be accepted by the FTS.

Filenames that do not match the expected format will be rejected. The Filesource <XXXXX> must be one associated with the ssh account. This will have been configured when the account is set up.

Example:

An IPND Data User with an (ssh) account of p_genuser has been assigned a filesource of GUSER.

Using this ssh account, it will only be possible to upload a file in the following format:

IPNDQUGUSER.yyyymmddhhmiss.asc

An invalid pattern will result in an empty file in the rejected directory. This empty file will have the same invalid filename, be prefixed with a timestamp and suffixed with R001.

7.2.2. Download Files

7.2.2.1. IPND Download Files to Data Users

The IPND will produce a distinct Download File for each Data User. There are 6 types of Data Users who receive Download Files. For more information refer to Section 5.2.2.7.2 of the Data Users and Data Providers Technical Requirements for the IPND. File formats for these files are described in Section 6.1.5 to 6.1.11 of the Data Users and Data Providers Technical Requirements for the IPND.

The filename format for these files in the IIS is described below:

IPND<TT>.<XXXXX>.<NNNNNNN>. asc

where

<TT> refers to the file type and may be one of

"ES" for Emergency Services
"LA" for Law Enforcement Agencies
"DI" for Directory Publishers and Directory Assistance
“LD” for Location Dependent Carriage Service
“RS” for Researcher
“EW” for Early Warning System

<XXXXX> refers to the individual DU File source code
<NNNNNNN> refers to a sequence number uniquely enumerating the output file

“asc” is the suffix indicating that the file is encrypted using the gpg associated with the data user

7.2.2.2. Output on Request Extract Files

Data User output on request files are generated on a request basis. Refer section 5.2.6 to of the Data Users and Data Providers Technical Requirements for the IPND document for more detail. The file format of these files is described in Section 6.1.5 to 6.1.11 of the Data Users and Data Providers Technical Requirements for the IPND.

The filename format of output on request files for data users in the IIS is described below;

IPND<TT>.<XXXXX>.<MMMMMMM>.<NNNNNNN>.<PPP(P)>

Where

“IPND” literal Identifier String

<TT> file Type – may be one of the following:

“RE" for Emergency Services
“RL" for Law Enforcement Agencies
"RI" for Directory Publishers
“RD” for Location Dependent Carriage Service providers

”RR” for Researchers

“PR” for Health and Public Policy Researchers

<XXXXX> refers to the DU file source code

<MMMMMMM> run number uniquely identifying the output file. It indicates that a file was part of the MMMMMMMth run for that download file type <TT>

<NNNNNNN> file sequence number with leading 0

<PPPP> or <PPP> - Span number. All Output On Request download files are limited to 100,000 rows of data. The first 100,000 rows are written to span 001. Requests that generate > 100,000 rows are written to additional spanned files. If the number of output files exceeds 999, the spanned number will increment to 1000 onwards.

“asc” suffix indicating the file is encrypted with the gpg public key associated with the data user.

7.2.2.3. IPND DUQF Error File

The DUQF Error file is produced as part of the DUQF sub-system described in 5.2.5 of Data Users and Data Providers Technical Requirements for the IPND. The format of these files is described in Section 6.1.14 of the same document.

DUQF err files are produced for every DUQF upload.

The filename format in the IIS is as follows:

IPNDQU<XXXXX>.<yyyymmddhhmmss>.<MMM>.err.asc

Where

<XXXXX> is the DU file source code

<yyyymmddhhmmss> is a date time stamp indicating when the file was created

<MMM> is an optional retry number (in case a duplicate DUQF filename was received)

“err” indicates an error (status) file

“asc” suffix indicating that the file is encrypted using the gpg public key associated with the data user

7.2.2.4. Amalgamated Query File Process (DAQF)

The DAQF file is produced monthly as part of the DUQF sub-system. Refer to section 5.2.5.4 of the of Data Users and Data Providers Technical Requirements for the IPND for details and Section 6.1.18 of the same document for the format.

The filename format of the DAQF in the IIS is as follows:

IPND<TT>.<XXXXX>.<NNNNNNN>.asc

Where

<TT> refers to the file type and may be one of

"QE" for a Emergency Services DAQF

"QL" for a Law Enforcement Agencies DAQF

“QW” for a Early Warning System DAQF

"QI" for a Directory Publishers DAQF

“QD” for a Location Dependent Carriage Service DAQF

“QS” for a Researcher DAQF

<XXXXX> is the DU file source

<NNNNNNN> is a file sequence number with leading 0

“asc” suffix indicating that the file is encrypted using the gpg public key associated with the

Data User

8. Messages

Error Files will report success or failure of uploads as documented in Section 6.1.4 of the Data Users and Data Providers Technical Requirements for the IPND document.

Note:
All error files include a retry suffix in the IIS environment. There is no symbolic link to the latest .err file as in the IPND Legacy environment.

Files that are immediately rejected i.e. not sent to the legacy IPND system will be moved to the “rejected” directory as an empty file with an error suffix. The error suffix will represent the first reason found for rejecting the file.

Files that are not able to be decrypted will result in:

- an empty file in the “rejected” directory with a R020 suffix
- a copy of the original file in the “received” directory for auditing purposes

The table below documents rejected file errors:

Error	Reason
R001	File does not match valid file pattern
R002	File not valid for user type
R003	For IPNDUP/QU files, the FILESOURCE muse be valid for user
R010	File must be encrypted
R020	File decryption failed
R100	Empty File
R200	File too large. This is an upper extreme limit applied to the encrypted file. It is separate to the row count applied by the legacy system.

9. References

9.1. Glossary

Term	Description
CLI	Command Line Interface
FTS	File Transfer Service
GPG	GNU Privacy Guard
IIS	Internet Interface Service
IPND	Integrated Public Number database
PKI	Public Key Infrastructure
SSH	Secure Shell
TLS	Transport Layer Security
VPN	Virtual Private Network

10. Appendix 1 – Fingerprints

10.1. SSH KEY FINGERPRINTS

The following section describes how to obtain fingerprints for SSH and GPG keys.

Note:
Never send key fingerprints via email.
The IPND Support team will contact users to verify key fingerprints verbally.

10.1.1. CLI: Linux, WSL, PowerShell, CommandPrompt

```
ssh-keygen -lf /path/to/ssh/key
```

or to see an MD5 hash of it if generated using putty

```
ssh-keygen -E md5 -l -f ./t_genba.pub
```

Converting Windows Key to Unix

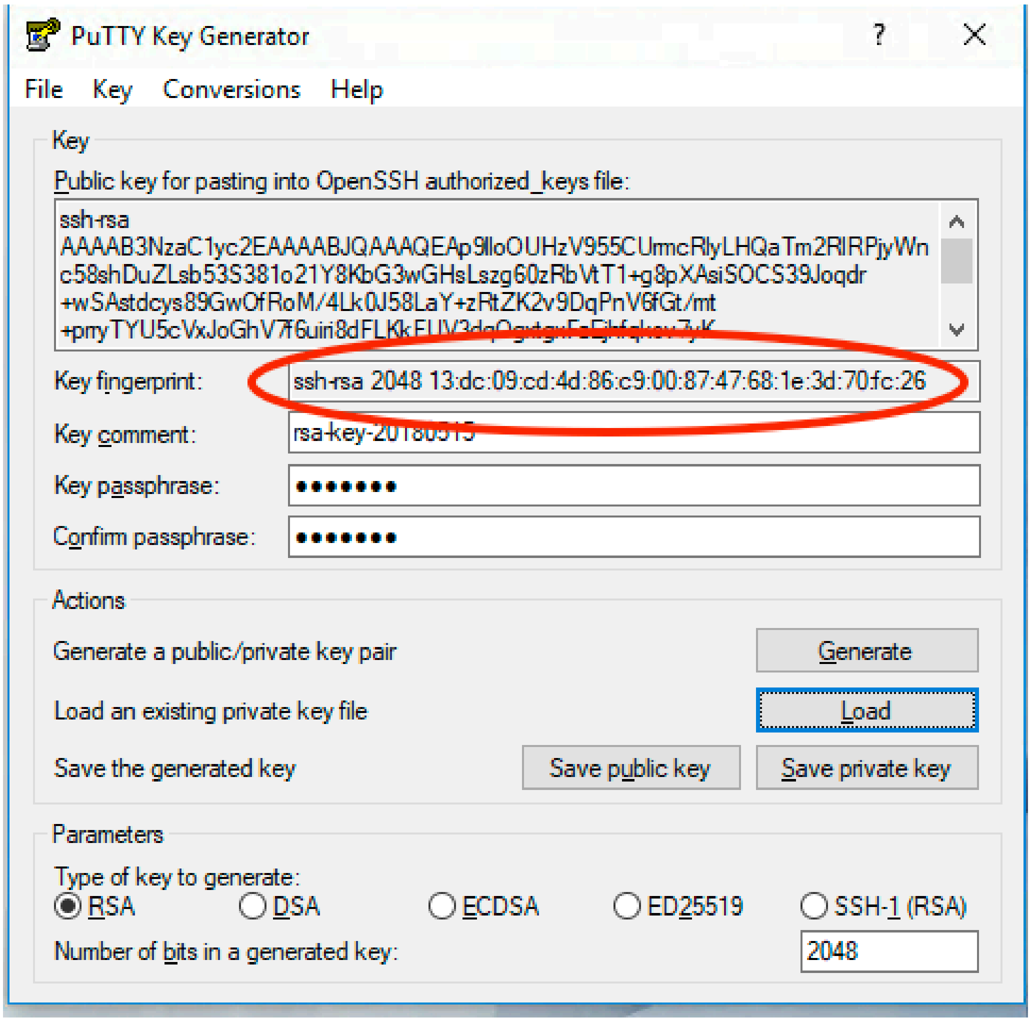
```
ssh-keygen -i -f keyfile.pub > newkeyfile.pub
```

WINDOWS

When generating using putty key gen look in the Key fingerprint: field

```
ssh-rsa 2048 13:dc:09:cd:4d:86:c9:00:87:47:68:1e:3d:70:fc:26
```

Alternatively load the key and read the fingerprint (you will need to provide the pass phrase to load the key.



Public key for pasting into OpenSSH authorized_keys file:

```
ssh-rsa
AAAAB3NzaC1yc2EAAAABJQAAAQEAp9lloOUHzV955CUmcRlyLHQaTm2RIRPjyWn
c58shDuZLsb53S381o21Y8KbG3wGHsLszg60zRbVtT1+g8pXAsiSOCS39Joqdr
+wSAstdcys89GwOfRoM/4Lk0J58LaY+zRtZK2v9DqPnV6fGt/mt
+pmyTYU5cVxJoGhV7f6uiri8dFLKkFUV3dqOgvtguFcEjhfqkov7yK
```

Key fingerprint: ssh-rsa 2048 13:dc:09:cd:4d:86:c9:00:87:47:68:1e:3d:70:fc:26

Key comment: rsa-key-20180515

Key passphrase: •••••••

Confirm passphrase: •••••••

Generate a public/private key pair

Load an existing private key file

Save the generated key

Type of key to generate:
● RSA ○ DSA ○ ECDSA ○ ED25519 ○ SSH-1 (RSA)

Number of bits in a generated key: 2048

Fingerprint Identification

10.2. GPG FINGERPRINTS

10.2.1. CLI: Linux, WSL, PowerShell, CommandPrompt

Once key has been loaded into keychain:

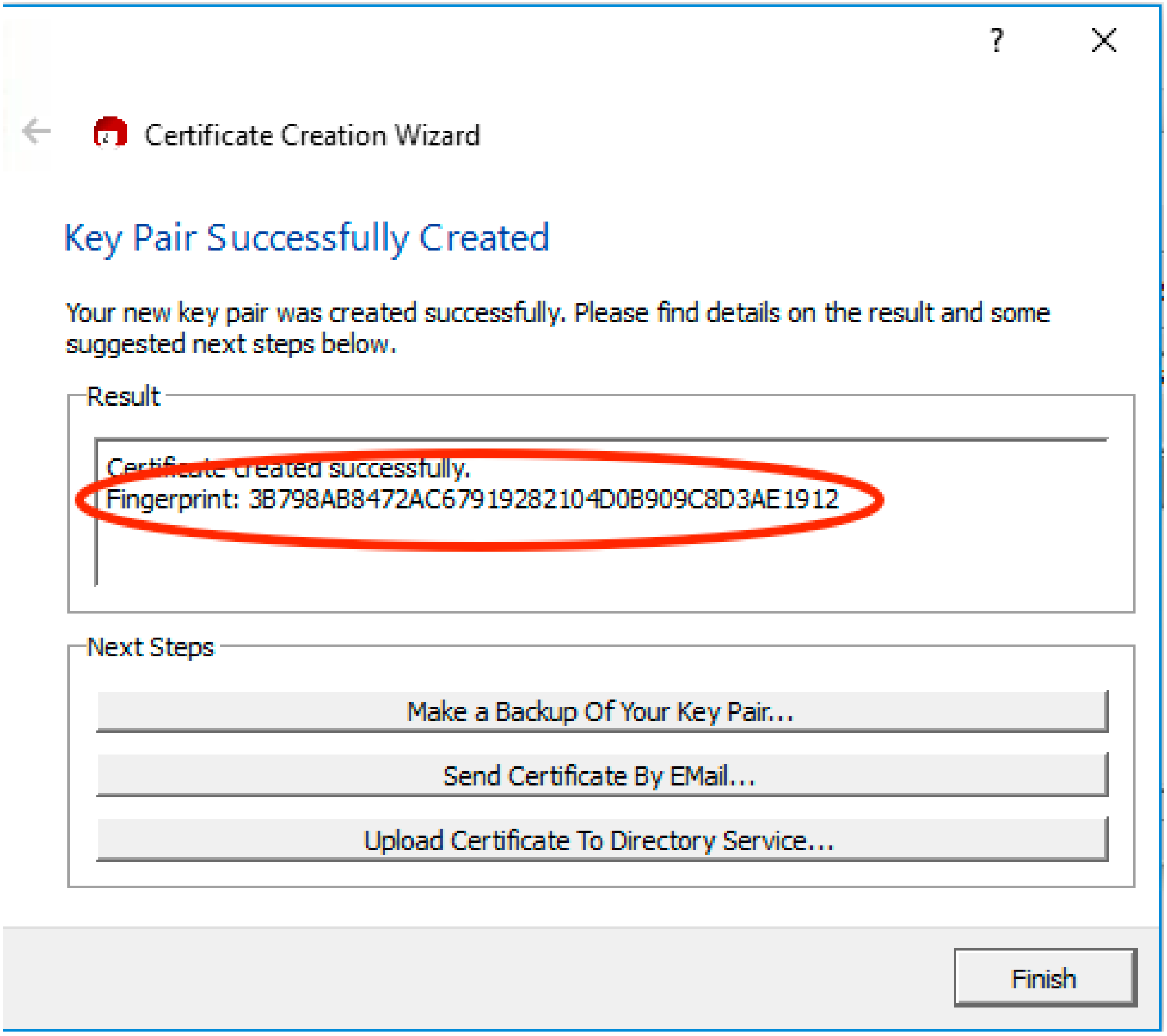
```
gpg --fingerprint <user>
pub   rsa2048 2013-06-11 [SC]
      3777 04C9 34DD 3DAB DBED  D500 8947 60EF 77FD D883
uid           [  full  ] User Name <user@email.com>
sub   rsa2048 2013-06-11 [E]
```

Checking file if not loaded:

```
gpg <key>.asc
gpg: WARNING: no command supplied.  Trying to guess what you mean ...
pub   rsa2048 2013-06-11 [SC]
      377704C934DD3DABDBEDD500894760EF77FDD883
uid           User Name <user@email.com>
sub   rsa2048 2013-06-11 [E]
```

10.2.2. GUI: Windows - Kleopatra

When GPG key pair is created.



?
Certificate Creation Wizard

Key Pair Successfully Created

Your new key pair was created successfully. Please find details on the result and some suggested next steps below.

Result

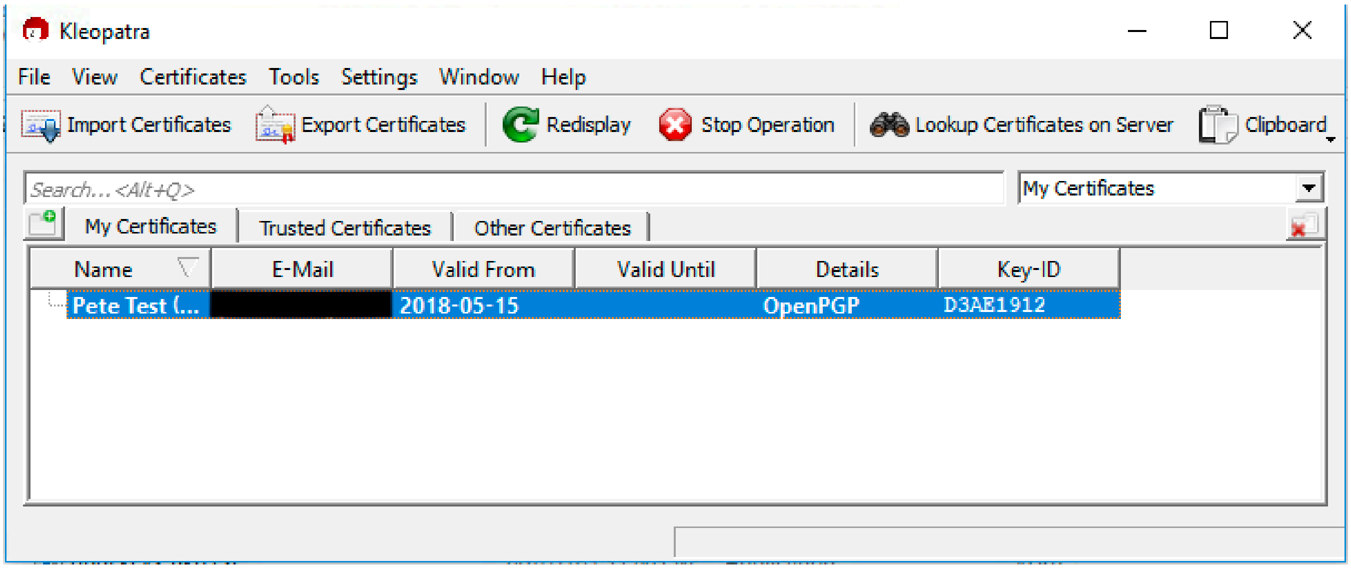
```
Certificate created successfully.
Fingerprint: 3B798AB8472AC67919282104D0B909C8D3AE1912
```

Next Steps
Make a Backup Of Your Key Pair...
Send Certificate By EMail...
Upload Certificate To Directory Service...
Finish

GPG Fingerprint - Kleopatra

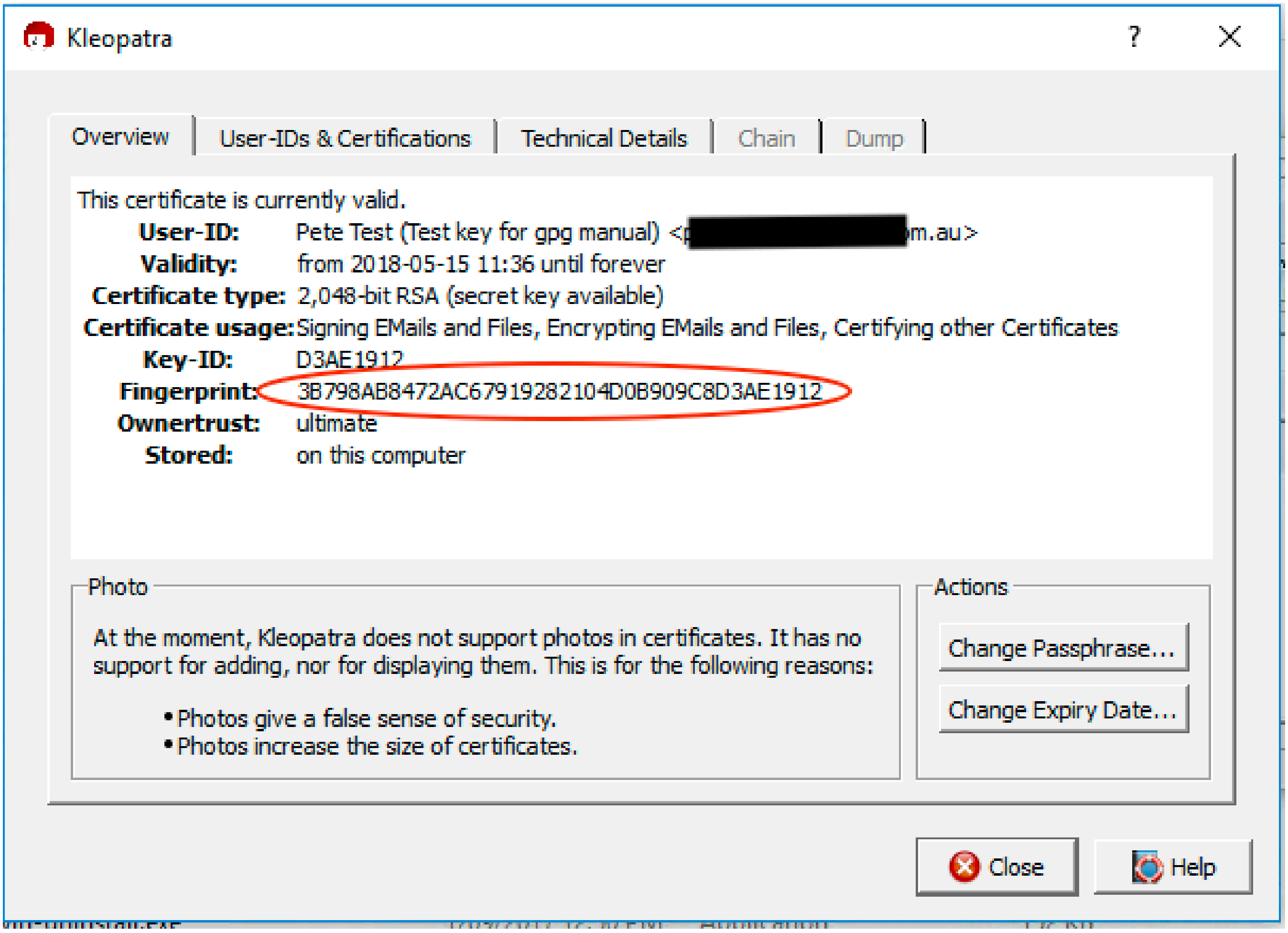
After key pair has been generated:

Double click on the key pair.



Name	E-Mail	Valid From	Valid Until	Details	Key-ID
Pete Test (...	[redacted]	2018-05-15		OpenPGP	D3AE1912

GPG Fingerprint - Kleopatra - post create



This certificate is currently valid.

User-ID:	Pete Test (Test key for gpg manual) <p[redacted]m.au>
Validity:	from 2018-05-15 11:36 until forever
Certificate type:	2,048-bit RSA (secret key available)
Certificate usage:	Signing EMails and Files, Encrypting EMails and Files, Certifying other Certificates
Key-ID:	D3AE1912
Fingerprint:	3B798AB8472AC67919282104D0B909C8D3AE1912
Ownertrust:	ultimate
Stored:	on this computer

Photo

At the moment, Kleopatra does not support photos in certificates. It has no support for adding, nor for displaying them. This is for the following reasons:

- Photos give a false sense of security.
- Photos increase the size of certificates.

GPG Fingerprint - Kleopatra - post create 2

11. Appendix 2 – OpenVPN configuration file example

The VPN configuration file that users download (Ref: 2.3-Downloading VPN Client and Configuration) should look similar to the one shown below. If it doesn't try downloading again.

```
# Automatically generated OpenVPN client config file
# Generated on Thu May  3 09:30:38 2018 by pvpn01
# Note: this config file contains inline private keys
#       and therefore should be kept confidential!
# Note: this configuration is user-locked to the username below
# OVPN_ACCESS_SERVER_USERNAME=<user>
# Define the profile name of this particular configuration file
# OVPN_ACCESS_SERVER_PROFILE=<user>@gw1.ipnd.com.au/AUTOLOGIN
# OVPN_ACCESS_SERVER_AUTOLOGIN=1
# OVPN_ACCESS_SERVER_CLI_PREF_ALLOW_WEB_IMPORT=True
# OVPN_ACCESS_SERVER_CLI_PREF_BASIC_CLIENT=False
# OVPN_ACCESS_SERVER_CLI_PREF_ENABLE_CONNECT=True
# OVPN_ACCESS_SERVER_CLI_PREF_ENABLE_XD_PROXY=True
# OVPN_ACCESS_SERVER_WSHOST=gw1.ipnd.com.au:443
# OVPN_ACCESS_SERVER_WEB_CA_BUNDLE_START
<information removed>
# OVPN_ACCESS_SERVER_IS_OPENVPN_WEB_CA=0
# OVPN_ACCESS_SERVER_ORGANIZATION=Telstra IPND IIS
setenv FORWARD_COMPATIBLE 1
client
server-poll-timeout 4
nobind
remote gw1.ipnd.com.au 1194 udp
remote gw1.ipnd.com.au 443 tcp
dev tun
dev-type tun
ns-cert-type server
setenv opt tls-version-min 1.0 or-highest
reneg-sec 604800
sndbuf 100000
rcvbuf 100000
# NOTE: LZO commands are pushed by the Access Server at connect time.
# NOTE: The below line doesn't disable LZO.
comp-lzo no
verb 3
setenv PUSH_PEER_INFO
<ca>
<information removed>
</ca>
<cert>
<information removed>
</cert>
<key>
<information removed>
</key>
key-direction 1
<tls-auth>
<information removed>
</tls-auth>
<information removed>
```

12. Appendix 3 – Advanced Batch SCP/SFTP Techniques

12.1. Paths

Do NOT use absolute paths
e.g
/data/prod/home/p_<user>/download/ ✗

Always use Relative path names.
e.g.
download/ ✓
./download/ ✓

12.2. Directories

Each FTS environment consists of the user’s home directory and four subdirectories. Files must only be uploaded to the home directory. Processed files and files available for download can be found in the subdirectories which are:

1. download
2. received
3. rejected
4. archived

1. download

This directory contains non-archived IPND files that users may download.

2. received

This directory contains a copy of uploaded IPND files that pass initial validation. The file names are prefixed with a unique timestamp code. It is these files that are sent to the IPND system for processing.

Note: The files will appear in this directory ~ 5 seconds after being received.

Note:
Files must only be uploaded into the user’s home directory, not any other subdirectory.

3. rejected

This directory contains zero-byte (i.e. empty) versions of any uploaded IPND files that fail initial validation or are unable to be decrypted on the legacy system

The files are prefixed with a unique timestamp code and a suffix indicating the reason for failure. Refer to section 8 Messages for a full list of the suffixes and failure reasons. Examples of failure reasons are:

a) the filename does not comply with the specified valid filename associated with the user account,
b) the file has not been encrypted.

4. archived

This directory contains further subdirectories for archived download, received and rejected IPND files. It will contain files that are older than 6 months but still within the archive retention period.

12.3. Dangers of recursive downloading

For the following reasons we recommend that users do NOT recursively download their entire download directory.

i) It will be slow/time consuming, especially if the user requires just one file,

ii) Consume unnecessary bandwidth,

iii) Users could receive local file system permission errors*

*If users repeat a recursive download (without changing file permissions or setting umask), they WILL get permission errors, as they will not be able to overwrite the existing read only files.

> Note:
> Users must not use . as a filename when trying to recursively scp files.

They will receive the following error message: "error: unexpected filename: ."

eg:

```
$ scp -r -P 22  User@host:. <DestinationDir>

error: unexpected filename: .
```

12.4. Simple Directory Listing via ssh

Direct tty access is not allowed, however a user can pass limited file system commands over SSH, such as ls, cd.

Most of the standard command options for 'ls' are available.

In some instances, users may be required to encapsulate the command with in " " (especially if it contains a wildcard such as *), so that the local OS does not glob/expand.

> Note:
> Commands after the " " are interpreted by the local OS.

Various examples with dummy data shown below.

12.4.1. Short list the contents of your home directory

```
eg: $ ssh user@host ls

archived

download

received

rejected
```

12.4.2. Long list the contents of your home directory

```
$ ssh user@host ls  -l

total 16

dr-xr-x---+ 3 root root 4096 Feb 28  2018 archived

dr-xr-x---+ 2 root root 4096 Dec  3  2018 download

dr-xr-x---+ 2 root root 4096 Dec  3  2018 received

dr-xr-x---+ 2 root root 4096 Dec  3  2018 rejected
```

12.4.3. List the directories of your home directory

$ ssh user@host ls -d *   ##(<= this will most likely fail as the local OS will try to expand to match contents of dir from where command is being run)

$ ssh user@host ls -d *   ## Will work. Backslash to prevent local OS glob expansion

$ ssh user@host "ls -d *" ## Will also work, encapsulating in quotes to prevent local OS glob expansion

12.5. Advanced Directory Listing via ssh

12.5.1. Recursively list the directories of your home directory

```
## There is no easy way to use 'ls' to recursively list only directory names.
```

The next example is one way of doing it.

```
eg: $ ssh -p 22 user@host "ls -lR" | egrep '^\.\/.*:' | sed 's/:/\//'
./archived/
./archived/2018/
./archived/2018/02/
./archived/2018/03/
./download/
./received/
./rejected/
```

12.5.2. List rejected/directory contents, long format, sorted by time (oldest first).

```
$ ssh -p 22 user@host ls -t rejected
total 12884
-r--r----- 1 t_USERX t_USERX     1314 Dec  3  2018 1543796454445212:IPNDQP.USERX.0000003.asc.R001
-r--r----- 1 t_USERX t_USERX     1254 Oct 10  2018 1539142898825600:IPNDQP.USERX.0000001.asc.R001
-r--r----- 1 t_USERX t_USERX     1254 Oct 10  2018 1539142700250161:fred.R001
-r--r----- 1 t_USERX t_USERX     1254 Oct 10  2018 1539142420638527:IPNDQP.USERX.0000001.asc.R001
-r--r----- 1 t_USERX t_USERX     6342 Oct  3  2018 1538524413133162:IPNDUPXXXXX.0000001.R001
-r--r----- 1 t_USERX t_USERX     6342 Oct  3  2018 1538523863403865:IPNDUPFRED.0000001.R001
-r--r----- 1 t_USERX t_USERX        0 Aug 24  2018 1535091432766621:IPNDUPUSERX.0000099.asc.R100
-r--r----- 1 t_USERX t_USERX     1046 Jun 13  2018 1528853104696409:IPNDUPUSERX.0000001.001.err.asc.R001
-r--r----- 1 t_USERX t_USERX     1046 Jun  6  2018 1528263911552345:IPNDUPUSERX.0000001.001.err.asc.R001
-r--r----- 1 t_USERX t_USERX 13137906 May 16  2018 1526438243657110:IPNDUPUSERX.0012294.R001
-r--r----- 1 t_USERX t_USERX     1046 May  3  2018 1526962263877394:IPNDUPUSERX.0000001.001.err.asc.R001
-r--r----- 1 t_USERX t_USERX     1197 Mar 21  2018 1521607917145442:IPNDUPUSERX 0000006.asc.R010
-r--r----- 1 t_USERX t_USERX     1197 Mar 21  2018 1521607821216482:IPNDUPUSERX 0000006.asc.R010
```

12.5.3. Reclusively list contents of home directory and all subdirectories

```
$ ssh -p 22 user@host ls -lR
.:
total 16
dr-xr-x---+ 3 root root 4096 Feb 28  2018 archived
dr-xr-x---+ 2 root root 4096 Dec  3  2018 download
dr-xr-x---+ 2 root root 4096 Dec  3  2018 received
dr-xr-x---+ 2 root root 4096 Dec  3  2018 rejected
```

```
./archived:
total 4
drwxr-xr-x 4 root root 4096 Feb 28 11:05 2018

./archived/2018:
total 8
drwxr-xr-x 2 root root 4096 Feb 28  2018 02
drwxr-xr-x 2 root root 4096 Feb 28 11:05 03

./archived/2018/02:
total 0
-rw-r--r-- 1 USERX USERX 0 Feb 28  2018 BBB
-rw-r--r-- 1 USERX USERX 0 Feb 28  2018 BBBZZ

./archived/2018/03:
total 0

./download:
total 12
-r--r----- 1 USERX USERX 1254 Dec  3  2018 IPNDQP.USERX.0000001.asc
-r--r----- 1 USERX USERX 1046 Dec  3  2018 IPNDUPUSERX.0000001.001.err.asc
-r--r----- 1 USERX USERX 1396 Dec  3  2018 IPNDUPUSERX.0000002.001.err.asc

./received:
total 16
-r--r----- 1 USERX USERX 1197 Mar 21  2018 1521608249487122:IPNDUPUSERX.0000001.asc
-r--r----- 1 USERX USERX 1197 May 16  2018 1526438542795880:IPNDUPUSERX.0000002.asc
-r--r----- 1 USERX USERX 1197 Dec  3  2018 1543796520382690:IPNDUPUSERX.0000002.asc
-r--r----- 1 USERX USERX 1197 Dec  3  2018 1543796971141478:IPNDUPUSERX.0000002.asc
-r--r----- 1 USERX USERX 1197 Dec  3  2018 1543796949131203:IPNDUPUSERX.0000002.asc

./rejected:
total 12884
-r--r----- 1 USERX USERX     1197 Mar 21  2018 1521607821216482:IPNDUPUSERX 0000006.asc.R010
-r--r----- 1 USERX USERX     1197 Mar 21  2018 1521607917145442:IPNDUPUSERX 0000006.asc.R010
-r--r----- 1 USERX USERX 13137906 May 16  2018 1526438243657110:IPNDUPUSERX.0012294.R001
-r--r----- 1 USERX USERX     1046 May  3  2018 1526962263877394:IPNDUPUSERX.0000001.001.err.asc.R001
```

```
-r--r----- 1 USERX USERX    1046 Jun  6  2018 1528263911552345:IPNDUPUSERX.0000001.001.err.asc.R001
-r--r----- 1 USERX USERX    1046 Jun 13  2018 1528853104696409:IPNDUPUSERX.0000001.001.err.asc.R001
-r--r----- 1 USERX USERX       0 Aug 24  2018 1535091432766621:IPNDUPUSERX.0000099.asc.R100
-r--r----- 1 USERX USERX    6342 Oct  3  2018 1538523863403865:IPNDUPFRED.0000001.R001
-r--r----- 1 USERX USERX    6342 Oct  3  2018 1538524413133162:IPNDUPXXXXX.0000001.R001
-r--r----- 1 USERX USERX    1254 Oct 10  2018 1539142420638527:IPNDQP.USERX.0000001.asc.R001
-r--r----- 1 USERX USERX    1254 Oct 10  2018 1539142700250161:fred.R001
-r--r----- 1 USERX USERX    1254 Oct 10  2018 1539142898825600:IPNDQP.USERX.0000001.asc.R001
-r--r----- 1 USERX USERX    1314 Dec  3  2018 1543796454445212:IPNDQP.USERX.0000003.asc.R001
$
```

12.5.4. Verify IIS received file IPNDUPUSERX.0000002.asc (List ALL)

```
$ ssh -p 22 user@host "ls  received/*IPNDUPUSERX.0000002.* "
received/1526438542795880:IPNDUPUSERX.0000002.asc
received/1543796520382690:IPNDUPUSERX.0000002.asc
received/1543796971141478:IPNDUPUSERX.0000002.asc
received/1543796949131203:IPNDUPUSERX.0000002.asc
```

12.5.5. List ALL error files for IPNDUPUSERX.0000002

```
$ ssh -p 22 user@host "ls download/IPNDUPUSERX.0000002.???.err.asc"
download/IPNDUPUSERX.0000002.001.err.asc
download/IPNDUPUSERX.0000002.002.err.asc
download/IPNDUPUSERX.0000002.003.err.asc
download/IPNDUPUSERX.0000002.004.err.asc
```

12.5.6. List the latest error files for IPNDUPUSERX.0000002

```
$ ssh -p 22 user@host "ls download/IPNDUPUSERX.0000002.*.err.asc"|tail -1
 download/IPNDUPUSERX.0000002.004.err.asc
```

12.6. Downloading files

12.6.1. Download IPNDUPUSERX.0000002.004.err.asc

```
$ scp -p 22 user@host:download/IPNDUPUSERX.0000002.004.err.asc DestinationDir
```

12.6.2. Download the latest error file of uploaded file (using ssh, ls and scp)

```
# Set the filename
$ UPLOADFILE="IPNDUPUSERX.0000002.asc"


## Optional ls check
```

```
 $ ssh -p 22 user@host ls download/${UPLOADFILE%.asc}.\*$(ssh -p 22 user@host ls
"received/*${UPLOADFILE%.asc}.*"|wc -l).err.asc

 ## If the file hasn't been processed then you will get an error

 ls: cannot access download/IPNDUPUSERX.0000002.*4.err.asc: No such file or directory


 ## If the file has been processed then you will get the file name

 download/IPNDUPUSERX.0000002.004.err.asc


## Combine and download the latest error file

$ scp -P 22 user@host:`ssh -p 22 user@host ls  download/${UPLOADFILE%.asc}.\*$(ssh -p 22 user@host ls
"received/*${UPLOADFILE%.asc}.*"|wc -l).err.asc` <DestDir>

IPNDUPUSERX.0000002.004.err.asc                                                              100% 1396
253.5KB/s   00:00


## If the error file doesn’t yet exist you will get an error.

ls: cannot access download/IPNDUPUSERX.0000002.*4.err.asc: No such file or directory

scp: .: not a regular file
```

13. Appendix 4 – Trouble shooting VPN connection issues

13.1.1. Check application logs

In Windows click on paper scroll icon on the top right-hand side to view app logs.

In linux check systemd logs or application logs depending on how they have been configured in the user app to start.

13.1.2. Check DNS settings

Re-confirm the DNS settings and resolution of the gw1.ipnd.com.au URL. Ref 2.4.1-Pre VPN Client Installation check DNS resolution check

13.1.3. Check Firewall settings

Check that UDP 1194 and TCP 443 is not blocked by your Firewall.

13.1.4. MTU path issues

Always proceed cautiously with network changes. Users should document modifications for potential rollback. If issues persist, seek assistance from network administrators or support for further troubleshooting.

MTU path issues often cause packet fragmentation. Packet fragmentation in networking is problematic because it slows down data transmission, increases latency, wastes bandwidth, raises error probability, adds complexity, and poses security risks. Avoiding fragmentation is crucial for optimal network performance and efficiency. Fragmentation can cause connection issues with firewalls by leading to out-of-sequence packets, packet loss, reordering, security vulnerabilities, resource strain, and susceptibility to denial-of-service attacks.

13.1.4.1. Check IP Path MTU Discovery is enabled

Check IP Path MTU Discovery is enabled

13.1.4.2. CLI: Linux, WSL

A value of 0 means IP Path MTU Discovery is enabled, while a value of 1 means it's disabled.

```
# To Check run: sysctl net.ipv4.ip_no_pmtu_disc

# To Enable run: sudo sysctl -w net.ipv4.ip_no_pmtu_disc=0
```

13.1.4.3. GUI: Windows

Check that the following registry parameter is 0
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\IPEnableRouter

To enable:
netsh interface ipv4 set subinterface "Your Network Interface Name" mtu=1500 store=persistent

13.1.4.4. CLI: Linux, WSL – run mtusweep.sh

Run the mtusweep.sh script on any Linux/WSL instance in the same network. Ref 14 - Appendix 5 – Linux/WSL mtusweep script. OpenVPN uses a default (max) MTU of 1500. If mtusweep.sh identifies that the user has an MTU < 1500, then they must adjust the users VPN config file to use their lower non-fragmenting MTU value.

> Note:
> If users alter the MTU in their VPN config file, do NOT set the MTU in the VPN config to > 1500, as this is the Maximum that OpenVPN uses.

> As a standard user <user>: **Linux/WSL only**

```
./mtusweep.sh
Sending 32 bytes to www.ibm.com
----> Contiguous
Sending 750 bytes to www.ibm.com
----> Contiguous
Sending 1125 bytes to www.ibm.com
----> Contiguous
..
Sending 1272 bytes to www.ibm.com
----> Contiguous
Sending 1275 bytes to www.ibm.com
----> Fragmented
Sending 1273 bytes to www.ibm.com
----> Fragmented
Sending 1272 bytes to www.ibm.com
----> Contiguous

1272 bytes is the largest contiguous packet size (1300 includes 28 ICMP/IP Headers)
       Your MTU should be set to 1300
```

Try modifying the openvpn config file then add a line for the max mtu size that mtusweep.sh identifies eg: 1300

```
eg:
..
setenv PUSH_PEER_INFO
tun-mtu 1300
<ca>
..
```

Start the VPN client, and check the MTU.

As a standard user <user>: **Linux/WSL only**

```
ip a s|grep tun

3: tun0: <POINTOPOINT,MULTICAST,NOARP,UP,LOWER_UP> mtu 1300 qdisc pfifo_fast state UNKNOWN group default qlen 100
```

14. Appendix 5 – Linux/WSL mtusweep script

The `mtusweep.sh` is a script designed outbound testing to find the Maximum Transmission Unit (MTU) for a network where it's run. The MTU is the maximum packet size that can be sent over a network without fragmentation.

The script iteratively tests different packet sizes to determine the largest contiguous packet that can be successfully transmitted and received without fragmentation, ultimately suggesting an optimal MTU for the network.

mtusweep.sh

```
#!/bin/sh

# MTU Sweeping Script

# Test and determine the Maximum Transmission Unit (MTU) for network connectivity


export PATH=$PATH:"/usr/sbin:/bin:/usr/bin:/sbin"


MTU="32"

STEP="750"

MAX_ITERATION="999"

PACKETS_HEADER="28"

HOST_1="www.ibm.com"

HOST_2="www.google.com"

HOST_3="www.microsoft.com"

HOST_EXT="$1"


PrintHelp() {

  echo "MTU Sweeping Script"

  echo "Usage: $0 [external_host]"

  echo "Test and determine the Maximum Transmission Unit (MTU) for network connectivity."

  echo "If [external_host] is not provided, the script uses default internal hosts."

  echo

  echo "Options:"

  echo "  -h, --help    Show this help message."

  exit 0

}


PingHost() {

  # Ping the host with one ICMP-echo packet of variable size, and filter the output

  if [ "$HOST" != "" ]; then

    echo "Sending $1 bytes to $HOST"

    ping -c 1 -M do -s $1 $HOST > /dev/null 2>&1

    RESULT=$?

    # Recursive output message

    if [ "$RESULT" = "0" ]; then

      echo "----> Contiguous"

    else
```

```
            echo "----> Fragmented"
        fi
        echo
    fi
}

# Check for help option
if [ "$1" = "-h" ] || [ "$1" = "--help" ]; then
    PrintHelp
fi

# Identify the 1st host from the list that is pingable. Use the initial MTU value(32)
for HOST in "$HOST_EXT" "$HOST_1" "$HOST_2" "$HOST_3"; do
    PingHost $MTU
    if [ "$RESULT" = "0" ]; then
        # If the 1st host succeeds, break and use it
        HOSTGOOD="1"
        break
    else
        HOSTGOOD="0"
    fi
done

# No valid hosts found: exit...
if [ "$HOSTGOOD" != "1" ]; then
    echo "No reachable hosts (tried): $HOST_EXT $HOST_1 $HOST_2 $HOST_3"
    exit 1
fi

# The host is pingable, so let's go on with larger packets...
MTU="$STEP"
ITERATION="0"
while [ "$ITERATION" -lt "$MAX_ITERATION" ]; do
    STEP=`expr "$STEP" / 2 + "$STEP" % 2`
    PingHost $MTU
    if [ "$RESULT" = "0" ]; then
        if [ "$MTU" = "$MTU_LASTGOOD" ]; then
            break
        else
            MTU_LASTGOOD="$MTU"
            MTU=`expr "$MTU" + "$STEP"`
        fi
    else
        MTU=`expr "$MTU" - "$STEP"`
    fi
    ITERATION=`expr "$ITERATION" + 1`  # Limit the max loop retries in case of successive host failures
```

```
done

# Maximum retries value reached: exit...
if [ "$ITERATION" = "$MAX_ITERATION" ]; then
   echo
   echo "Test limit exceeded"
   exit 2
fi

# Add ICMP default header to the found value
MTU=$((MTU + PACKETS_HEADER))
echo
echo "$MTU_LASTGOOD bytes is the largest contiguous packet size ($MTU includes $PACKETS_HEADER ICMP/IP Headers)"
echo
echo "Your MTU should be set to $MTU"
echo
##################
```

```
./mtusweep.sh
Sending 32 bytes to www.ibm.com
----> Contiguous
Sending 750 bytes to www.ibm.com
----> Contiguous
Sending 1125 bytes to www.ibm.com
----> Contiguous
Sending 1313 bytes to www.ibm.com
----> Contiguous
Sending 1407 bytes to www.ibm.com
----> Contiguous
Sending 1454 bytes to www.ibm.com
----> Contiguous
Sending 1478 bytes to www.ibm.com
----> Fragmented
Sending 1466 bytes to www.ibm.com
----> Contiguous
Sending 1472 bytes to www.ibm.com
----> Contiguous
Sending 1475 bytes to www.ibm.com
----> Fragmented
Sending 1473 bytes to www.ibm.com
----> Fragmented
Sending 1472 bytes to www.ibm.com
----> Contiguous

1472 bytes is the largest contiguous packet size (1500 includes 28 ICMP/IP Headers)
Your MTU should be set to 1500
```

END OF DOCUMENT