



HKSCC Report Access Platform (RAP)

Technical Guide

Version: 7.1

Date: January 2023

Modification History

Version	Date	Modified By	Synopsis
1.0	Oct 2019	HKSCC	First issue
2.0	Jan 2020	HKSCC	Updated SDNet ip addresses subnet under section 6
3.0	Aug 2020	HKSCC	Updated the following <ul style="list-style-type: none">• section 2.3 add verification of HKSCC SFTP facility• section 3 only one RAP User ID per Clearing Participant• section 4.2 add daily subfolders to both INBOX and COMMON folders, with handling of report retrieval from subfolders remove OUTBOX folder• section 4.4 new section on sign-on session• section 7 add notes on performance with shared SDNet line
4.0	Jan 2021	HKSCC	Added tips on concurrent setting under section 7
5.0	Jul 2021	HKSCC	Updated the following <ul style="list-style-type: none">• section 4.2 add new RPF folder• section 7 add convert csv files to pdf format add performance of RPF file download
6.0	Oct 2021	HKSCC	Updated the following <ul style="list-style-type: none">• section 4.2 (d) updated the handling of reports/files made available via RAP beyond mid-night (00:00)
7.0	Apr 2022	HKSCC	Updated the following <ul style="list-style-type: none">• section 5.2 add procedure for public key renewal
7.1	Jan 2023	HKSCC	Updated the following <ul style="list-style-type: none">section 5.2 add procedure for public key renewal

Latest updates are highlighted in orange

TABLE OF CONTENTS

TABLE OF CONTENTS	3
1 OVERVIEW.....	4
1.1 BACKGROUND.....	4
2 TECHNICAL INFRASTRUCTURE	5
2.1 SFTP STANDARDA.....	5
2.2 PRIMARY AND BACKUP SFTP FACILITIES.....	5
2.3 AUTHENTICITY OF RAP.....	5
3 ACCESS TO RAP VIA SFTP FACILITY	6
3.1 USER ID.....	6
3.2 SECURE SHELL (SSH) KEY.....	6
3.3 PUBLIC KEY	6
3.4 PUBLIC KEY FINGERPRINT	7
4 OPERATION OF RAP	8
4.1 OPERATION HOURS AND TIME SCHEDULE.....	8
4.2 FOLDER STRUCTURE.....	8
4.3 FREQUENT SIGN-ON CONTROL	9
4.4 SIGN-ON SESSION.....	9
5 REGISTRATION OF RAP USER ID.....	10
5.1 INITIAL REGISTRATION	10
5.2 SELF-SERVICE RENEWAL OF PUBLIC KEY	10
5.3 RE-REGISTRATION OF PUBLIC KEY (ONLY WHEN PRIVATE KEY IS BEING COMPROMISED)	11
6 NETWORK CONFIGURATION	12
6.1 CONNECTIVITY OF RAP	13
7 IMPORTANT NOTES.....	14
7.1 USAGE GUIDELINES.....	14

1 OVERVIEW

1.1 Background

This document serves as a technical reference guide for HKSCC's Clearing Participants to retrieve reports/files through HKSCC Report Access Platform (RAP) via a secure file transfer protocol (SFTP) facility provided by HKSCC.

It covers the following areas of the RAP:

- Technical Infrastructure
- Access to RAP via SFTP Facility
- Operation of RAP
- Registration of RAP User ID
- Network Configuration
- Important Notes

2 TECHNICAL INFRASTRUCTURE

2.1 SFTP Standard

The SFTP facility uses industry standard SFTP and the following protocols are supported:

Protocol	RFC	Remarks
SFTP	RFC 4251-4254	Secure Shell File Transfer Protocol
SSH Public Key File Format	RFC4716	SSH2 Public Key File Format Fingerprint: MD5 message-digest

All Clearing Participants are required to ensure that the SFTP client (in house development or third party software) is installed in their RAP client workstations for report/file retrieval and it must adhere to the above standard.

2.2 Primary and Backup SFTP Facilities

There are two sets of SFTP facility setup at HKSCC's primary and secondary data centres respectively. Under normal situation, Clearing Participants should only connect to the primary SFTP facility. Under contingency situation where the primary SFTP facility becomes unavailable, HKSCC will then activate and switch the RAP connection to the secondary SFTP facility.

2.3 Authenticity of RAP

Clearing Participants can verify the validity of HKSCC's SFTP facility by checking the server SSH host key fingerprint. The fingerprint should match the following value according to the fingerprint algorithm and format supported by their SFTP client.

Algorithm (Format)	Fingerprint
SHA-256 (Hex)	2c:96:a4:f0:85:fd:f6:2e:c4:ea:d6:a2:62:b5:af:3e: 36:72:2e:2b:f8:d6:f5:90:f6:bc:8a:bf:c9:26:e2:b2
SHA-265 (Base64)	LJak8IX99i7E6taiYrWvPjZyLiv41vWQ9ryKv8km4rI=
MD5 (Hex)	35:ce:89:49:73:80:2d:2d:af:6d:de:66:e5:a5:d5:83

3 ACCESS TO RAP VIA SFTP FACILITY

3.1 User ID

To retrieve reports/files, each Clearing Participant will be issued with one RAP User ID by HKSCC for access to the RAP, in the following format:

- *Xnnnnn001*

where Xnnnnn is the Participant ID. For example, RAP User ID B00001001 would be assigned to Clearing Participant with Participant ID B00001.

For Clearing Participant, who would like to develop their own tools to conduct margin and stress test calculation/simulation, can subscribe to access the optional “RPF folder” for retrieval of Risk Parameter Files (RPF). *Please note that due to large file size, retrieval of RPF would require a larger bandwidth, please refer to section 7.1 for the projected download time under different bandwidths.*

After registration (Note: Please refer to section 5 for registration information), Clearing Participant may use its assigned RAP User ID together with the SSH private key to login to the RAP for retrieval of NG reports/files. Clearing Participant is recommended to verify and ensure its assigned User ID can access the RAP.

3.2 Secure Shell (SSH) Key

SFTP facility adopts Secure Shell (SSH) public-key authentication. For **each RAP User ID**, Clearing Participant should generate a pair of SSH private and public keys, as well as a public key fingerprint, and register the public key together with the public key fingerprint with HKSCC.

3.3 Public Key

HKSCC accepts RSA 2048-bit public key in SSH2 format.

For example:

```

---- BEGIN SSH2 PUBLIC KEY ----
Comment: SSH KEY
AAAAB3NzaC1kc3MAAACBAPY8ZOHY2yFSJA6XYC9HRwNHxaehvx5wOJ0rzZdzoSOXxbET
W6ToHv8D1UJ/z+zHo9Fiko5XybZnDIaBDHtblQ+Yp7StxyltHnXF1YLfKD1G4T6JYrdH
YI14Omleg9e4NnCRleaQoZPF3UGfZia6bXrGTQf3gJq2e7Yisk/gF+1VAAAAFQDb8D5c
vwHWTZDPfX0D2s9Rd7NBvQAAAIEAlN92+Bb7D4KLYk3IwRbXblwXdkPggA4pfdtW9vGf
J0/Rhd+NjB4eo1D+0dix6tXwYGN7PKS5R/FXPNwxHPapcj9uL1Jn2AWQ2dsknf+i/FAA
vioUPkmdMc0zuWoSOEsSNhVdtX3WdvVcGcBq9cetzrtOKWOocJmJ80qadxTRhtUAAACB
AN7CY+KKv1gHpRzFwdQm7HK9bb1LAo2KwaoXnadFgeptNBQeSXG1vO+JsvphVMBJc9HS
n24VYtYtsMu74qXviYjziVucWKjjKEb11juqnF0GD1B3VVmxHLmxnAz643WK42Z7dLM5
sY29ouezv4Xz2PuMch5VGPP+CDqzCM4loWgV
---- END SSH2 PUBLIC KEY ----

```

Each public key should be saved in a separate file with the following naming

convention and send to HKSCC via email for registration:

- *Xnnnnn001.pub* (public key for RAP User ID *Xnnnnn001*)

where *Xnnnnn* is the Participant ID of Clearing Participant.

3.4 Public Key Fingerprint

Public key fingerprint is MD5 hash digests of public key in the format of 16 octets printed as hexadecimal with lowercase letters and separated by colons.

For example:

```
"c1:b1:30:29:d7:b8:de:6c:97:77:10:d7:46:41:63:87"
```

Each public key fingerprint² should be saved in a separate (text) file with the following naming convention and send to HKSCC via email for registration:

- *Xnnnnn001.fpt* (fingerprint of public key for RAP User ID *Xnnnnn001*)

SSH public key and public key fingerprint together with the IP address(es) of its RAP client workstation(s) used for accessing RAP should be submitted to HKSCC through email for registration. See Section 5 for details.

Clearing Participant SHOULD NOT submit its private key to HKSCC for registration.

4 OPERATION OF RAP

4.1 Operation Hours and Time Schedule

Operation hours of RAP are from 07:00 - 24:00 on each business day.

All reports/files will be available via RAP for retrieval for 10 calendar days after generation. Clearing Participant should retrieve and save their reports/files in a timely manner.

Please note that there are quite a number of reports, while some reports are generated multiple times daily, available for retrieval each day. In order to avoid heavily load network traffic due to unnecessary frequent report retrieval action, you should review your report retrieval mechanism through SFTP facility to ensure reports are being retrieved Once Daily Only.

Further information including the estimated time schedule with regards to reports/files available via RAP will be provided to Clearing Participant in due course.

4.2 Folder Structure

Each RAP User ID can access the following folders via RAP:

Folder	Description
COMMON/yyyymmdd	<ul style="list-style-type: none"> For retrieval of common reports/files applicable to all Clearing Participants yyyymmdd is the system-generated subfolder for each calendar day Clearing Participants should retrieve common reports/files generated and available on specific day from the corresponding date subfolder
INBOX/yyyymmdd	<ul style="list-style-type: none"> For retrieval of reports/files applicable to specific Clearing Participant <Xnnnnn only> yyyymmdd is the system-generated subfolder for each calendar day Clearing Participants should retrieve Participant specific reports/files generated and available on specific day from the corresponding date subfolder
RPF/yyyymmdd	<p><i>[Only available to RAP User with folder subscription]</i></p> <ul style="list-style-type: none"> For retrieval of Risk Parameter Files (RPF) only yyyymmdd is the system-generated subfolder for each calendar day Clearing Participants should retrieve the RPF generated and available on specific day from the corresponding date subfolder
KEY_MANAGEMENT	<ul style="list-style-type: none"> For submission of public keys for renewal by Clearing

	Participants
--	--------------

- a. Each assigned RAP User ID can access the INBOX and COMMON folders. Reports/files available in the INBOX folder are Clearing Participant specific; while reports/files applicable to all Clearing Participants will be available in the COMMON folder.
- b. Access to RPF folder is on subscription basis. Only Clearing Participant subscribed for the RPF folder can access for retrieval of RPF. Please refer to section 7.1 for the project download time under different SDNet bandwidths.
- c. The KEY_MANAGEMENT folder is for submitting public keys for renewal, each RAP User ID will be assigned with an individual KEY_MANAGEMENT folder and it cannot be shared with other RAP User ID.
- d. Usually reports/files generated on a specific calendar day will be available in the corresponding date (T) subfolder. However, in case any of the reports/files could only be made available via RAP beyond mid-night (00:00), then Clearing Participants should retrieve such reports/files from (T+1) subfolders. For example, reports/files generated for business date: “11 Jun 2021” and received by RAP after midnight will be available in next calendar day’s subfolder, i.e. “20210612” subfolder.

4.3 Frequent Sign-on Control

Each RAP User ID will be restricted to a maximum of 5 times sign-on within 5 minutes. The User ID will be locked (unable to sign on) once it reaches 5 times within 5 minutes and automatically be unlocked at every 5 minute interval.

For example, if a RAP User ID has signed on more than 5 times between 12:45:10 and 12:47:30, the User ID will be locked at 12:47:31 then unlocked at 12:50:00 automatically.

4.4 Sign-on Session

Each RAP User ID should only be sign-on to one of the designated RAP client workstation at a time. Clearing Participant should sign-out from the current session before signing onto another workstation with the same RAP User ID.

Note : When configuring the SFTP program connectivity, if there are parameter settings like “Number of simultaneous connections” or “Limit for concurrent download” , please set it to “1” to prevent concurrent login.

5 REGISTRATION OF RAP USER ID

5.1 Initial Registration

To register for RAP User ID, Clearing Participant should generate a pair of SSH public & private keys per User ID; then upload its public key and input public key fingerprint and IP addresses of its designated RAP client workstations to the RAP Registration and Maintenance Form (eService: TechS 8) which is available from 9 Aug 2021 onwards via [Client Connect](#).

The file name of the public key should follow the naming convention below:

- Xnnnnn001.pub

where *Xnnnnn* is the Participant ID of Clearing Participant

DO NOT UPLOAD private keys to [Client Connect](#). Clearing Participants shall keep their private keys confidential to prevent unauthorized usage.

5.2 Self-Service Renewal of Public Key

Clearing Participants are required and recommended to renew their public keys at least every two years. After generation of the new public keys (refer to Section 3.3 for the required format), Clearing Participants should re-register their new public keys with HKSCC by submitting them to the KEY_MANAGEMENT folder. **There is no restriction on the filename of the public key to be uploaded.** After submission, a result file will be generated and available for retrieval in the KEY_MANAGEMENT folder. **The renewal status can be found in the result file, and the new key will be effective after successful submission (i.e. a file containing the finger print of the key with file name of “Result.YYYYMMDD.HHMMSS.success.txt” will be generated.**

File name: Result.YYYYMMDD.Sequence_number.success.txt

File example of a successful upload

```
=====
= File name:  Xnnnnn001.pub           =
= Import date: 2023.01.12            =
= File size:  477                     =
=====
Result: Success
Fingerprint: MD5:a1:c4:ed:ae:22:fd:45:68:4f:a2:3b:3d:02:a2:28:75
SSH key expiry date: 2025.01.11
```

The system allows a third key to be uploaded. However, after a third key is uploaded successfully, the life time of the first key will be shortened to 14 calendar days.

If number of uploaded keys exceeds the maximum (3 including the existing key) or the uploaded key is not valid, a file with name of

“Result.YYYYMMDD.HHMMSS.failed.txt will be generated).

File name: Result.YYYYMMDD.Sequence_number.failed.txt

File example of a failed upload

```

=====
= File name:  Xnnnnn001.pub           =
= Import date: 2023.01.12           =
= File size:  477                    =
=====
Result: Failed
Number of maximum keys 3 reached.
    
```

Clearing Participants should also re-register their keys immediately if the corresponding private keys are become compromised. See Section 5.2.

Clearing Participants cannot upload more than 5 keys (no matter the results are successful or failed) within 1 hour. Clearing Participants can do subsequent upload after 1 hour and all upload attempts in this hour will be denied.

To remind Clearing Participant to renew the public key, a warning file with name of “SSHKeyExpireWarning_YYYYMMDD.txt” is generated in the KEY_MANAGEMENT folder when the public key will be expired in 14 calendar days.

File name: SSHKeyExpireWarning_YYYYMMDD.txt

File example:

```

SSH Fingerprint: MD5:34:83:cf:1d:e6:48:e1:5e:90:ed:61:a9:1e:27:97:9a  Key Expiry Date: 2023-01-21
    
```

5.3 Re-registration of Public Key (Only when private key is being compromised)

In case any of the private key is lost or damaged, Clearing Participant should generate a new set of keys, register and submit the new public key, public key fingerprint in the RAP Registration and Maintenance Form (eService: TechS 8) which is available from 9 Aug 2021 onwards via [Client Connect](#) for re-registration.

6 NETWORK CONFIGURATION

The RAP is only accessible from the Securities and Derivatives Network (SDNet) which is designated for connection to Central Clearing and Settlement System (CCASS). Clearing Participants should refer to the [CCASS/ VaR Online/ RAP Technical Guide](#) for the network configuration requirement.

Clearing Participants can register at most two designated client workstations for RAP. Follow Section 5 above, Clearing Participants should submit the IP addresses of their designated RAP client workstations to HKSCC for registration.

Upon registration of public keys and IP addresses, Clearing Participants can access RAP with their assigned RAP User ID via either one of their designated RAP client workstations.

IP addresses of RAP client workstations must fall within the same subnet of SDNet for HKSCC, which is listed below table for reference.

SDNet IP addresses subnet	
10.135.0.0/16	10.176.0.0/16
10.136.0.0/16	10.177.0.0/16
10.137.0.0/16	10.178.0.0/16
	10.179.0.0/16

6.1 Connectivity of RAP

a. By Domain Name System (DNS)

Clearing Participants are recommended to connect RAP through hostname and resolve the IP address by Domain Name System provided by HKSCC. RAP connection will be interrupted when there is a contingency that HKSCC needs to activate its secondary data centre. Once RAP service is resumed, Clearing Participants could resume connection to RAP using the same hostname.

RAP Hostname and Port Number

HKSCC data centre
rapcc.hkexposttrade.com.hk Port 10022

To enable workstation with DNS service, the following DNS server IP are required to be set up in Windows.

Domain Name System (DNS) Server Settings on Windows

Preferred DNS Server	Alternate DNS Server
10.243.1.1 (UDP Port 53)	10.243.65.1 (UDP Port 53)

b. By IP Address

Alternatively, Clearing Participants can connect RAP using the following IP addresses directly. Subject to Clearing Participants' own setup, when there is a contingency that HKSCC needs to activate its secondary data centre; RAP connection will be interrupted. Once RAP service is resumed, Clearing Participants would need to change the IP address for RAP connection via the secondary data centre.

IP addresses of RAP

Primary data centre	Secondary data centre
10.243.2.51 Port 10022	10.243.66.51 Port 10022

7 IMPORTANT NOTES

7.1 Usage Guidelines

1. Clearing Participants are recommended to poll and retrieve reports/files from RAP ONLY when needed e.g. around the time when the reports/files being available. In addition, any intensive polling should be avoided.

2. Usage management

Clearing Participants are recommended to retrieve the reports/files that have not been downloaded before. For example, they can use command “mget –r /INBOX/YYYYMMDD/” or “get –r /INBOX/YYYYMMDD/” to download the files/reports from the current date folder. (where YYYYMMDD being the current date)

For efficient use of network bandwidth and shorten download time, Clearing Participants are advised NOT to use wild card command such as “mget –r * “ or “get –r *” when downloading files, otherwise all files retained in the folder/subfolders (i.e. all reports/files for past 10 calendar days), will be downloaded.

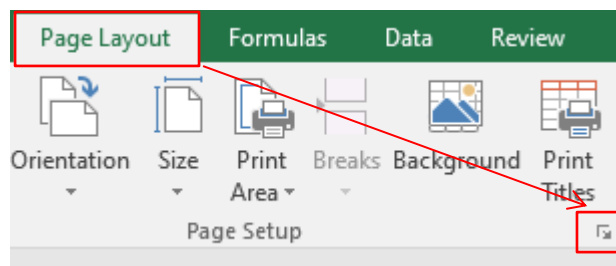
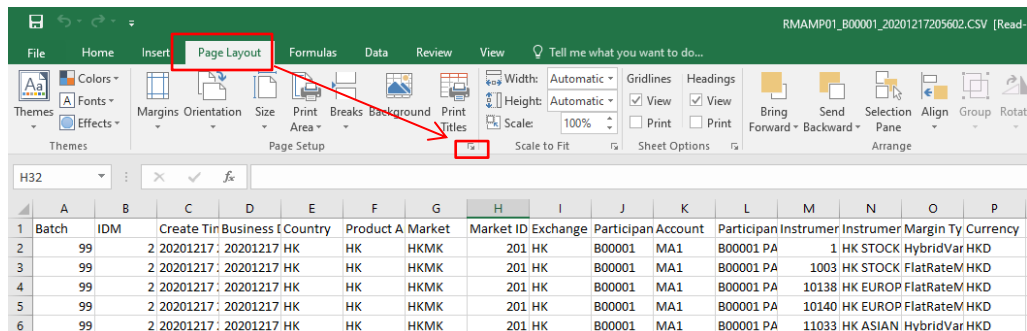
3. CSV file format

Clearing Participants should note that the CSV files downloaded from RAP are in UNIX format in which the end of line is signified by only Line Feed (n).

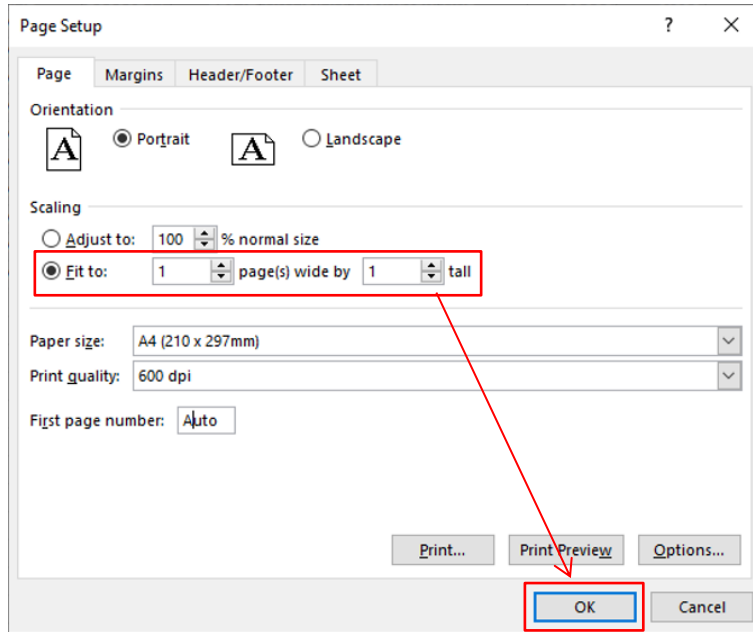
4. Convert csv file to PDF format via Excel

Clearing Participants can also convert the CSV files to PDF format following the below steps:

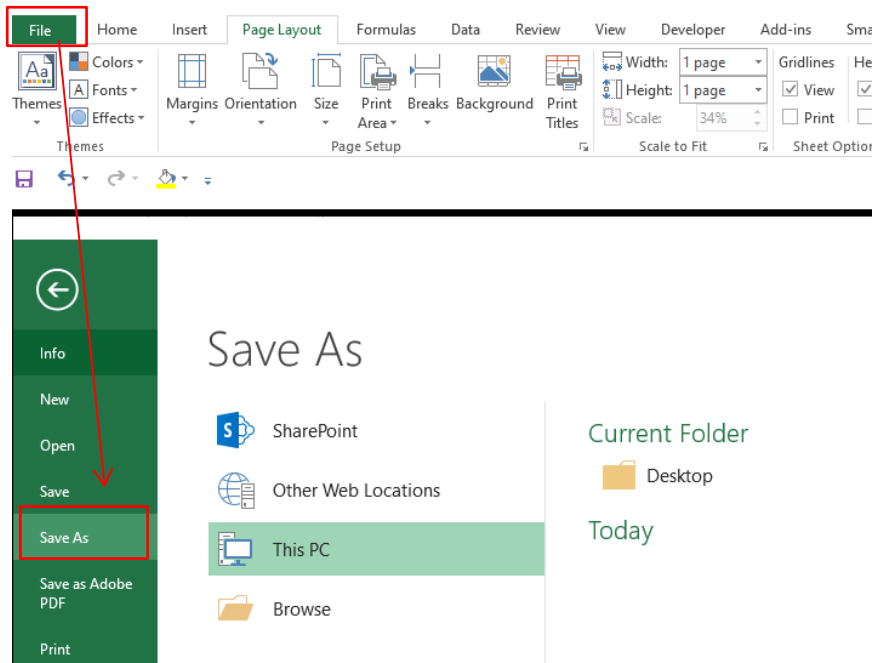
- (i) Open the CSV file in “Excel”
- (ii) Go to **Page Layout** tab, and click the **Page Setup launcher** at the bottom right corner



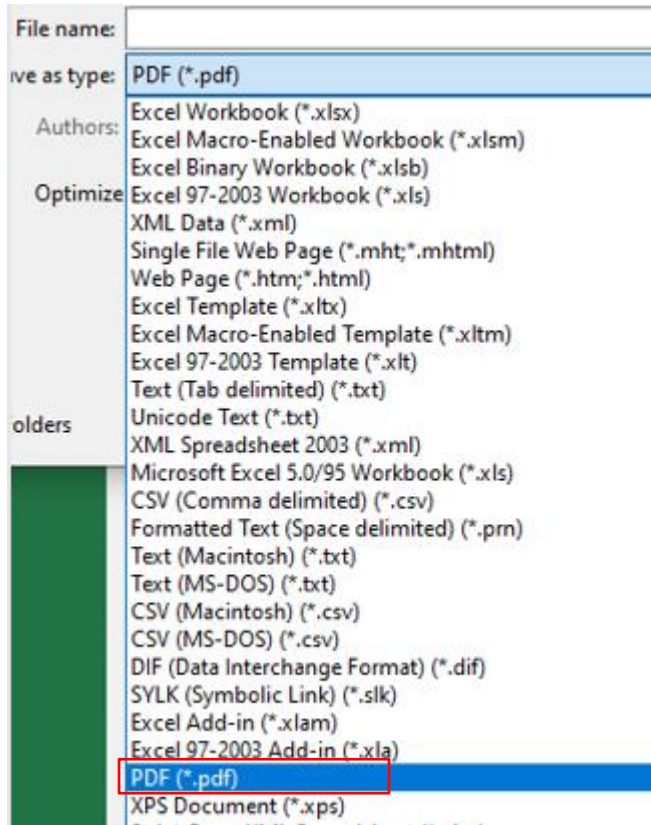
- (iii) In the pop-up window, select the Scaling option: **“Fit to: 1 page(s) wide by 1 tall”**, then click **“OK”**.



- (iv) Go to **“File”**, click **“Save As”**, then choose destination location to save the file



(v) Save file as type “PDF (*.pdf)”, and click “Save”.



5. Performance of file download

Subject to the size of reports/files being retrieved, the retrieval time could be long and it will occupy the SDNet line bandwidth. If the RAP setup is to share the same SDNet line with other operations, such as CCASS Terminal and VaR Online, performance of corresponding operations e.g. report download via CCASS Terminals or Participant Gateway, may be impacted.

6. Projected download time for RPF (only applicable to Clearing Participant who subscribed the RPF folder)

File sizes of Risk Parameter Files (RPF) is large, it would take a longer time to retrieve. The average total RPF size is approximately 1.3G Byte and is subject to increase along with the number of instruments, Clearing Participants should ensure adequate bandwidth for retrieving RPFs. Please assess and make reference to the following projected file retrieval time under different SDNet bandwidths.

Bandwidth	Project download time for 1.5G Byte files	Bandwidth	Project download time for 1.5G Byte files
1M	~4.2 hr	7M	~ 36 min
2M	~2.1 hr	8M	~ 32 min
3M	~1.4 hr	9M	~28 min
4M	~1.1 hr	10M	~ 26 min
5M	~51 min	20M	~ 13 min
6M	~ 42 min	30M	~ 9 min

7. Connectivity configuration of SFTP program

If there are parameter settings like “Number of simultaneous connections” or “Limit for concurrent download”, please set it to “1” to prevent concurrent login.