

How to Maximize SCP and SFTP PUT or GET Throughput

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1. How to Maximize SCP and SFTP PUT or GET Throughput

Applies to: OpenVMS V8.3 and later, TCP/IP Services for OpenVMS V5.6 and later.

An SCP/SFTP file transfer is only as fast as its slowest link, i.e., the network or disk speed.

Note

Whether a system is the SCP/SFTP client or server is determined by which system initiates the connection by running the scp or sftp command. It is not determined by the direction of data transfer (PUT or GET).

Example:

```
$ SCP source-name destination-name
$ SFTP [user@host]
```

SCP/SFTP throughput can be affected by network and TCP/IP performance, SCP/SFTP processing performance, UAF quotas, and RMS or disk performance.

2. Procedure

2.1 Check Network and TCP/IP Performance

1. Measure SCP throughput without writing to disk.

```
$ SCP 192.168.20.131:"test/linux.bck" NL:

linux.bck          |    60MB | 7716.7 kB/s | TOC: 00:00:08 | 100%
```

Uses a null device (NL) as the destination rather than a disk, allowing network/TCP/IP throughput to be measured independently of disk performance.

2. Compare performance with FTP.

If OpenVMS is the FTP server

```
FTP> PUT [filename] NL:
```

If OpenVMS is the FTP client

```
FTP> GET [filename] NL:
```

If these tests are significantly faster than disk writes, the bottleneck is unlikely to be the network/TCP/IP layer. Proceed to [SCP and SFTP Tuning](#).

3. Check for duplex mismatches.

```
$ MCR LANCP SHOW DEVICE/INTERNAL_COUNTERS
```

If "possible duplex mismatch" is reported, adjust the NIC duplex settings.

4. Disable PMTU.

Caution

Changing the PMTU setting affects all TCP/IP traffic and may cause connection loss. Use only as a last resort.

```
TCPIP> SYSCONFIG -R INET PMTU_ENABLED=0
```

PMTU affects WAN performance only.

5. Increase TCP send and receive buffers.

 Caution

SB_MAX setting affects all of TCP/IP and may result in increased memory load on a system. TCP_SENDSIZE and TCP_RECVSPACE setting affects all TCP connections and may result in increased memory load on a system. Use only as a last resort.

Check current values:

```
TCPIP> SYSCONFIG -Q SOCKET  
  
TCPIP> SYSCONFIG -Q INET TCP_SENDSIZE TCP_RECVSPACE
```

Increase the buffer sizes:

```
TCPIP> SYSCONFIG -R INET TCP_SENDSIZE=1000000 TCP_RECVSPACE=1000000
```

If OpenSSH is the SCP/SFTP server, restart SSH:

```
$ @SYS$MANAGER:TCPIP$SSH_SHUTDOWN.COM  
$ @SYS$MANAGER:TCPIP$SSH_STARTUP.COM
```

If OpenVMS is the FTP client, start a new FTP session.

2.2 SCP and SFTP Tuning

Enable the NoDelay option for SCP and SFTP transfers to improve throughput. Performance improvements of up to 20% have been observed.

```
$ SCP "-o NoDelay Yes" source-name destination-name  
$ SFTP "-o NoDelay Yes" [user@host]
```

Note

- The NoDelay option is supported only with TCP/IP V5.7 SSH.COM.
- For OpenSSH, NoDelay is enabled by default.

2.3 Check UAF Quotas

Review and increase quotas if necessary. For OpenVMS SCP/SFTP servers, check the TCPIP\$SSH account.

Recommended minimum values are as follows:

- BYTLM: 300000
- PGFLQUO: 300000

TQELM should be approximately 1.5 times the SSH service limit.

To determine the SSH service limit, use the appropriate command for your SSH implementation:

For SSH.COM:

```
$ TCPIP SHOW SERVICE SSH/FULL
```

For OpenSSH:

```
$ TCPIP SHOW SERVICE SSHD22/FULL
```

Alternatively, to display all SSH related services:

```
$ TCPIP SHOW SERVICE SSH*/FULL
```

2.4 Improve RMS and Disk Performance

1. Set RMS defaults for the account or process:

```
$ SET RMS_DEFAULT/BLOCK=127/BUFF=255/NET=127/EXT=5000
```

Throughput increases of 300% or more have been observed.

Example:

```
$ SCP 192.168.20.131:"test/linux.bck" []

linux.bck          |   60MB | 1210.5 kB/s | TOC: 00:00:51 | 100%

$ SET RMS/BLOCK=127/BUFF=255/NET=127/EXT=5000
$ SCP 192.168.20.131:"test/linux.bck" []

linux.bck          |   60MB | 3858.3 kB/s | TOC: 00:00:16 | 100%
```

- If OpenVMS is the SCP/SFTP client, issue the **RMS** command before establishing the connection.
- If OpenVMS is the SFTP server, place the command in the TCPIP\$SSH account LOGIN.COM in the TCPIP\$SSH_HOME directory.

2. Measure disk copy performance:

Time a disk-to-disk copy of a large file (preferably 100 MB or larger).

The TIME_COPY.COM procedure below is provided to assist when measuring the copy time.

Disk fragmentation can significantly reduce performance. To minimize its impact:

- Copy the file to a disk with little or no fragmentation (for example, a newly initialized disk).
- Defragment the target disk by performing an image backup and restore or by using a utility such as Disk File Optimizer for OpenVMS (DFO).

```
$! TIME_COPY.COM
$ SET NOON
$ SET PROC/PRIV=(ALL,NOBYPASS)
$ CL == "TYPE/PAGE NL:"
$ CL
$ SAY == "WRITE SYS$OUTPUT"
$
$ T1 = F$TIME()
$ SAY "STARTING TIME: 'T1'"
$ SET PROC/UNIT=BYTES
$ COPY/LOG 'P1' 'P2'
$ T2 = F$TIME()
$ H1 = F$EXTRACT(12,2,T1)*60*60
$ M1 = F$EXTRACT(15,2,T1)*60
$ S1 = F$EXTRACT(18,2,T1)
$ SS1 = F$EXTRACT(21,2,T1)
$ TS1 = H1+M1+S1
```

```

$ H2 = F$EXTRACT(12,2,T2)*60*60
$ M2 = F$EXTRACT(15,2,T2)*60
$ S2 = F$EXTRACT(18,2,T2)
$ SS2 = F$EXTRACT(21,2,T2)
$ TS2 = H2+M2+S2
$ TS3 = TS2-TS1
$ SAY "ENDING TIME: ''T2'"
$ SAY "TOTAL ELAPSED TIME:"
$ SAY "'TS3' SECONDS."
$ EXIT

```

Example:

```

$ @TIME_COPY.COM -
_ $ DISK10:[KITS.VMS.V84]TEST.FILE -
_ $ DKA0:[KITS]
STARTING TIME: 13-DEC-2011 12:44:32.38
%COPY-S-COPIED, DISK10:[KITS.VMS.V84]TEST.FILE;1
copied to DKA0:[KITS]TEST.FILE;1
(133.56MB)
ENDING TIME: 13-DEC-2011 12:44:46.89
TOTAL ELAPSED TIME:
14 SECONDS.

```

133.56 MB in 14 seconds equals approximately 9.54 MB/s (9540 KB/s).
