IBM MQ 9.0.5

Managed File Transfer - Performance Report for Protocol Bridge Agent

Configuration and Measurements for the following products:

IBM MQ MFT 9.0.5

IBM Corporation
IBM MQ MFT Performance Team
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First Edition, July 2018.
This edition applies to the Managed File Transfer component of IBM MQ V9.0.5.0 (and to all subsequent releases and modifications until otherwise indicated in new editions).

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Contents

Tables & Figures

1 Overview

The Managed File Transfer (MFT) component of IBM MQ is a reliable, secure, robust, recoverable, automated file transfer product that uses IBM MQ as its transport layer. This is the performance report related to the agent type ***Protocol Bridge Agent***. The protocol bridge enables the MFT network to transfer files to a file server outside the network, either in the local domain or a remote location. MFT can connect to a file server which uses FTP, FTPS or SFTP network protocols. Each file server needs at least one dedicated agent. The dedicated agent is known as the protocol bridge agent. More information can be found in the below link,

https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_9.0.0/com.ibm.wmqfte.doc/protocol_bridge.html

This performance report details IBM MQ MFT in a range of scenarios, giving the reader information on transfer times. The report is based on measurements taken from Intel hardware, running Windows 7 operating systems.

At the end of each block of results is a summary of the findings. It should be noted that results obtained and the inferences made depend on the test infrastructure hardware and any change could alter the results significantly. The reader is urged to use the findings in this report only as guidelines – this is particularly true for results where all of the values are very close.

2 Performance Outlook

The measurements for the performance headlines are based on the behaviour of the protocol bridge agent in different locations. The number of files & size of files are the two main criteria followed.

The number of files considered was 100, 50 & 1. Below were the files sizes considered for a multi-file testing:

- 1 KB
- 100 KB
- 500 KB
- 1 MB

For a single file testing, a file whose size is equal to the total size of all the files considered in the multi scenarios would be considered. For example, if 100 10 KB files were considered for a multi file testing, a 1 MB file was considered for a single file testing. The result of interest is the transfer time in each case.

The performance headlines demonstrate the effect of altering the agent's Chunk Size property(see https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_9.0.0/com.ibm.wmqfte.doc/properties.htm "Managed File Transfer─► MFT Reference ─► MFT configuration reference ─►The agent.properties file" for more details on setting this property). The Chunk Size defines the size of the MQ message that the agent will use to transfer the files. The following Chunk Sizes (defined in bytes) have been used:

- 256 KB
- 1 MB
- 4 MB

In case of a cross geo testing, another criterion for comparison was used, which was to consider a standard MQ MFT Agent in the place of a Protocol Bridge agent and capturing the result. Hence same set of tests were run for,

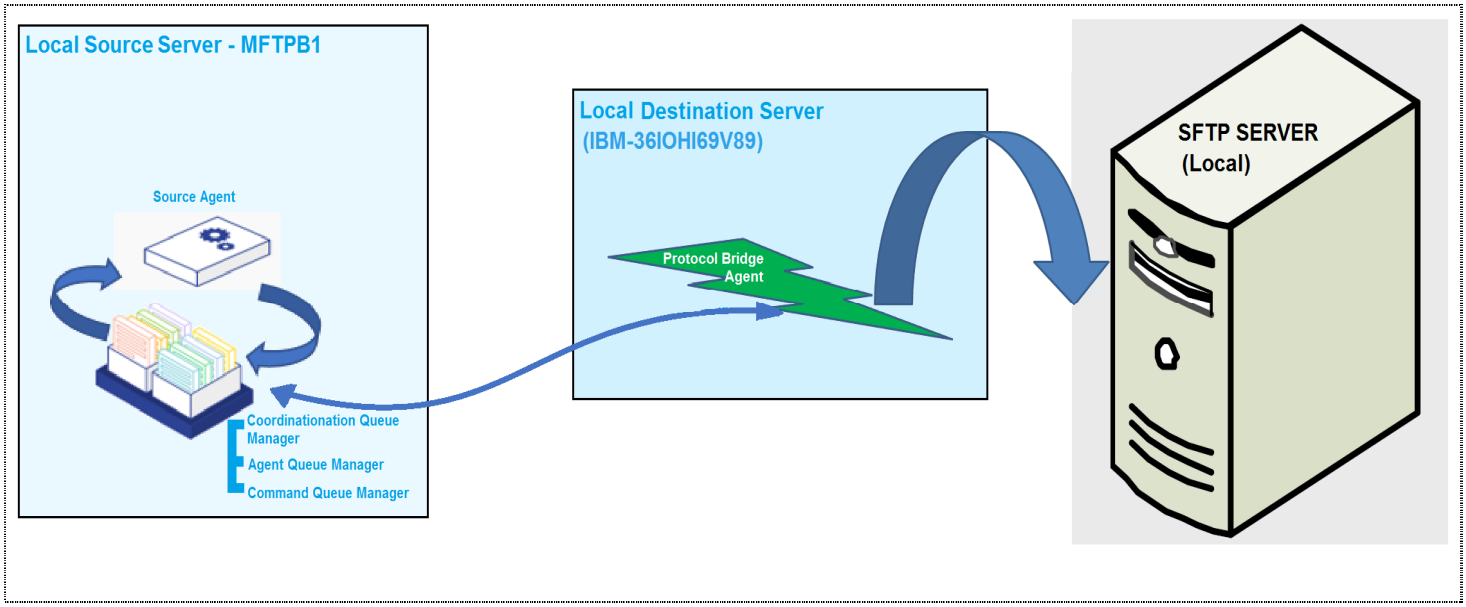
- Protocol Bridge agent (PB Agent)
- Standard MFT Agent

All files were transferred using default binary mode. Each file transferred was the same size for a given performance run but contained random data.

The results are laid out in the chapters 4.1 and 4.2. Each test case has its own results table and associated graph. The first set of tables and figures show the reader the results for each chunk size (agentChunkSize) property has on the transfer time for a particular file size. At the end of the chapter is a summary that highlights the best combinations of chunk size and file size for single and multiple threaded tests. The tests were broadly classified based on the location of the destination servers. Below they are briefed.

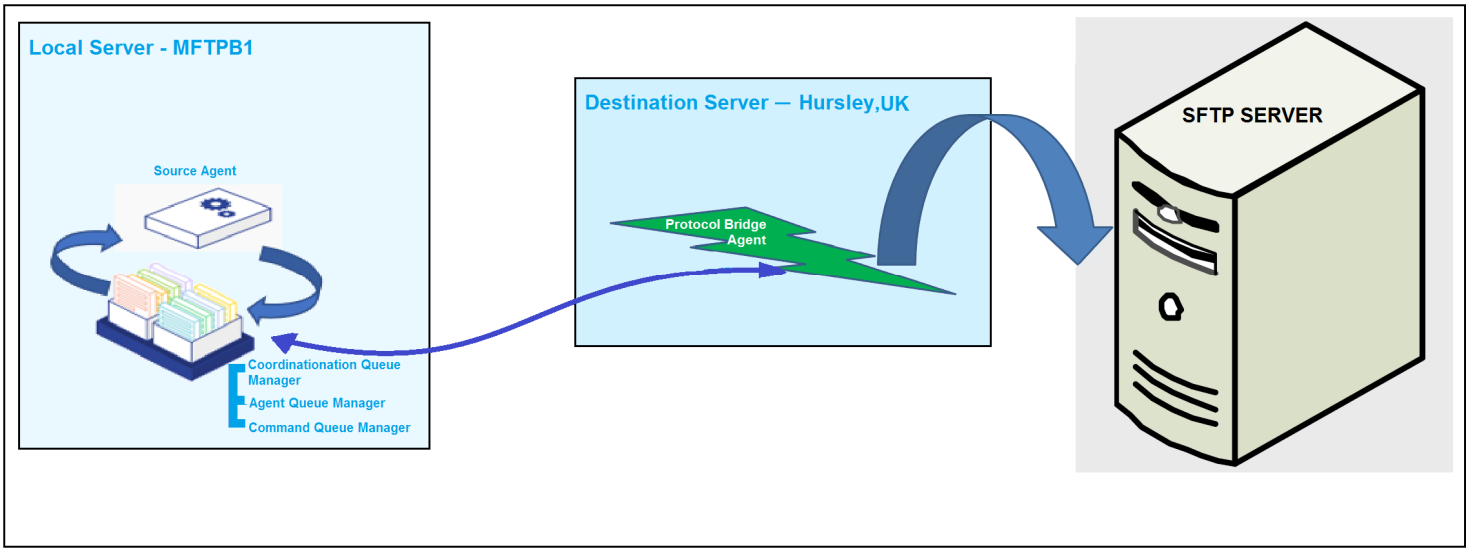
2.1 Local PB Agent Server

In this scenario both the source and the destination servers are in the same city in India. The queue manager MFTQM01 present in the source server acts both as coordination queue manager and agent queue manager. The protocol bridge agent running on the destination server is connected to MFTQM01 in clients mode. The SFTP server sits at a place nearby within a distance of ***10 miles*** and is accessible over the local network which acts as protocol bridge's destination point here. The following diagram details the exact scenario:



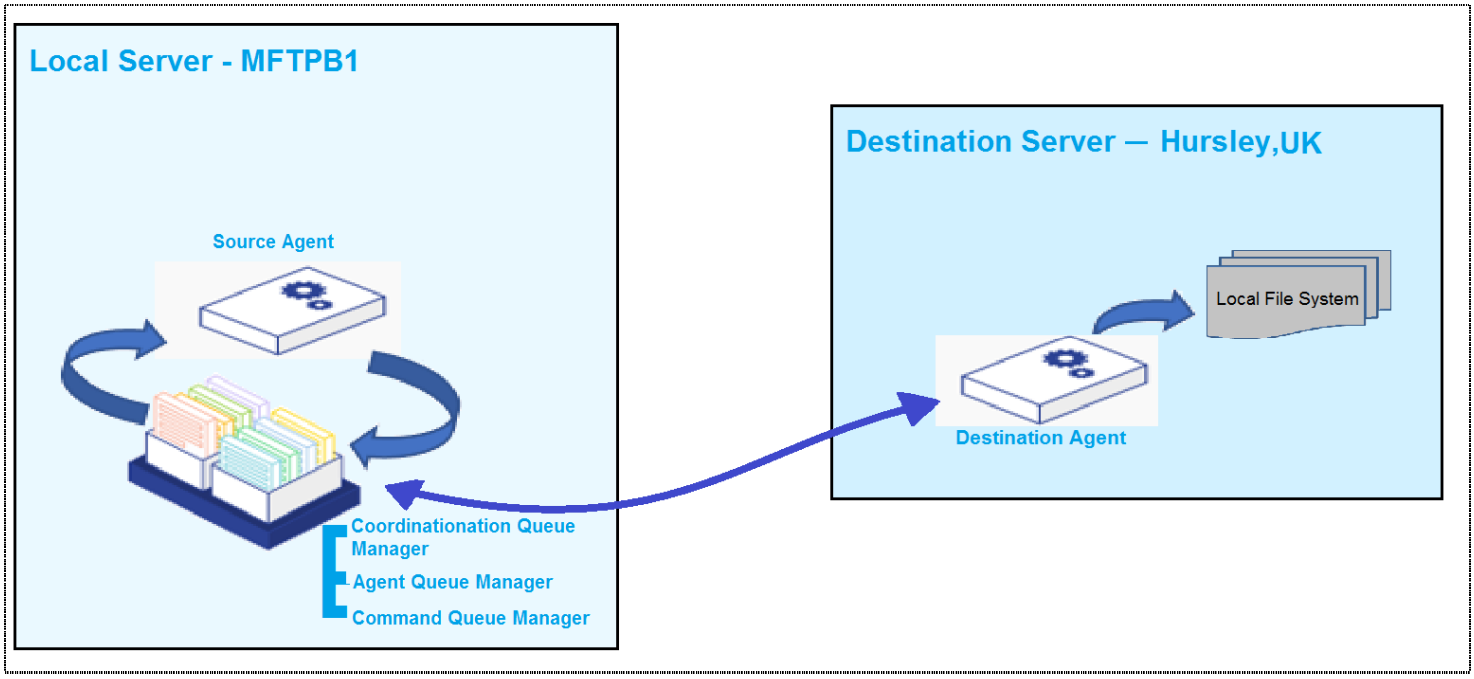
2.2 Cross-Geo PB Agent Server

This is a cross geo scenario wherein the destination is located at a far off place(approx ***5000 miles***) and is accessible over the global network. A protocol bridge agent resides in the destination server located at Hursley, UK. The source local queue manager MFTQM01 acts both as coordination queue manager and agent queue manager. The protocol birdge agent connects to this queue manager in clients mode. The SFTP server is at a shorter distance to the destination server which acts as Protocol Bridge's destination point here. The following diagram details the exact scenario:



2.3 Cross-Geo Standard Agent Server

This is also a cross geo scenario wherein the destination is located at a far off place(approx ***5000 miles***) and is accessible over the global network. But here, a standard MFT agent is used in the place of a protocol bridge agent. The source local queue manager MFTQM01 acts both as coordination queue manager and agent queue manager. The destination agent connects to this queue manager in clients mode. In this case there is no SFTP server since the standard agent writes to the local file system of the destination server (This case is tested only in case of a cross geo scenario and not considered in case of local destinations). The following diagram details the exact scenario:



3 Testing and test results

3.1 Agent connecting to local server

This testing is carried out only for the protocol bridge agent for default chunk size (256 KB). The table and chart below display the relevant times for single file and multi-file transfer with different file sizes.

	Test id	Number of files	File size	Time taken for transfer (default chunk size)
Local Server	1	100	1KB	7.5 s
	2		100 KB	8 s
	3		500 KB	14 s
	4		1 MB	20 s
	5	50	1 KB	4 s
	6		100 KB	5 s
	7		500 KB	7 s
	8		1 MB	10 s
	9	1	100 KB	2 s
	10		10 MB	3 s
	11		50 MB	10 s
	12		100 MB	20 s

Table 1 Values for Single and Multiple file transfers – local destination server

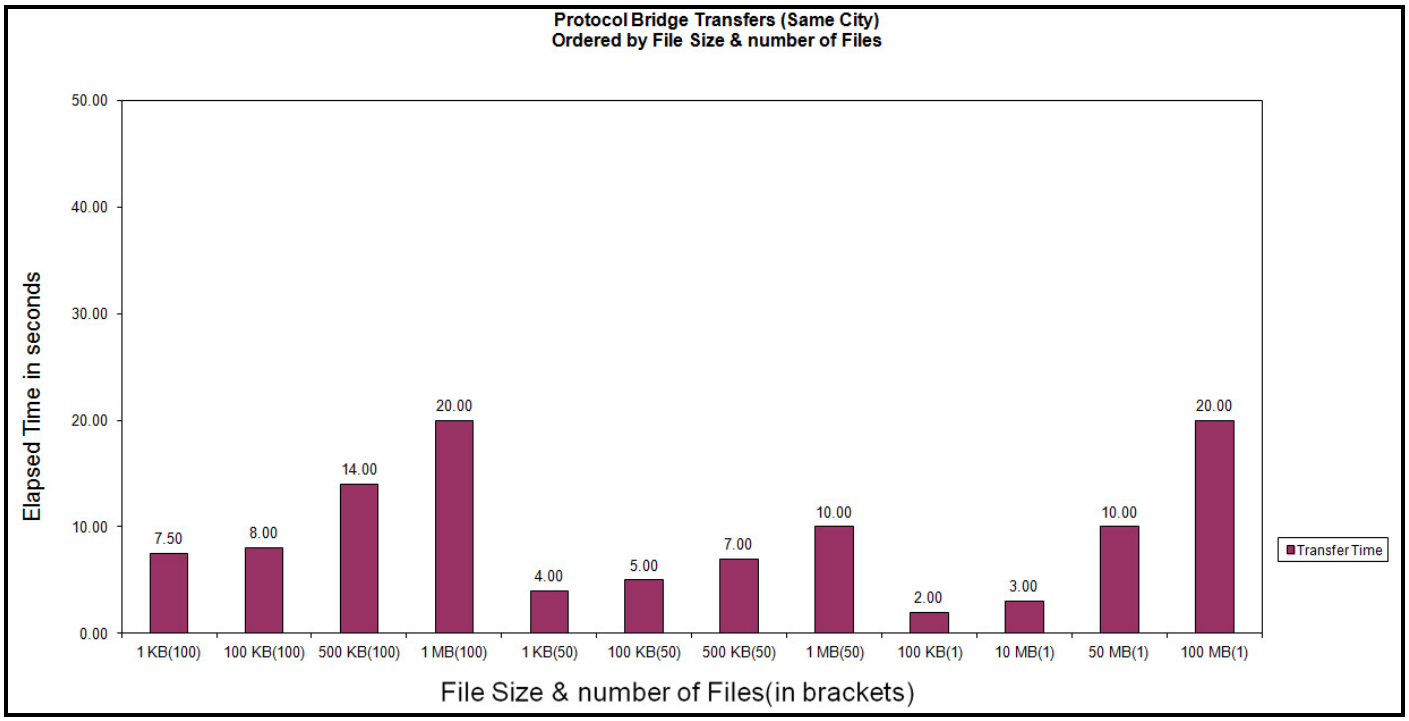


Figure 1 Graph for Single and Multiple file transfers – local destination server

3.2 Destination agent at a far off place

3.2.1 256 KB ChunkSize

3.2.1.1 PB Agent

The table and chart below show the relevant times for single file and multi-file transfer with different file sizes.

Test Si No.	Number of files	File size	Time taken for transfer PB Agent (default chunk size)
1	100	1KB	11 s
2		100 KB	58 s
3		500 KB	284 s
4		1 MB	662 s
5	50	1 KB	8 s
6		100 KB	30 s
7		500 KB	156 s
8		1 MB	335 s
9	1	100 KB	10 s
10		10 MB	61 s
11		50 MB	271 s
12		100 MB	540 s

Table 2 256 KB Chunk - Values for Single and Multiple file transfers through PB Agent – remote destination server

3.2.1.2 Standard Agent

Test Si No.	Number of files	File size	Time taken for transfer Standard Agent (default chunk size)
1	100	1KB	9.00
2		100 KB	79.00
3		500 KB	301.00
4		1 MB	720.00
5	50	1 KB	8.00
6		100 KB	41.00
7		500 KB	148.00
8		1 MB	349.00
9	1	100 KB	8.00
10		10 MB	78.00
11		50 MB	289.00
12		100 MB	551.00

Table 3 256 KB Chunk – Standard Agent observations – remote destination server

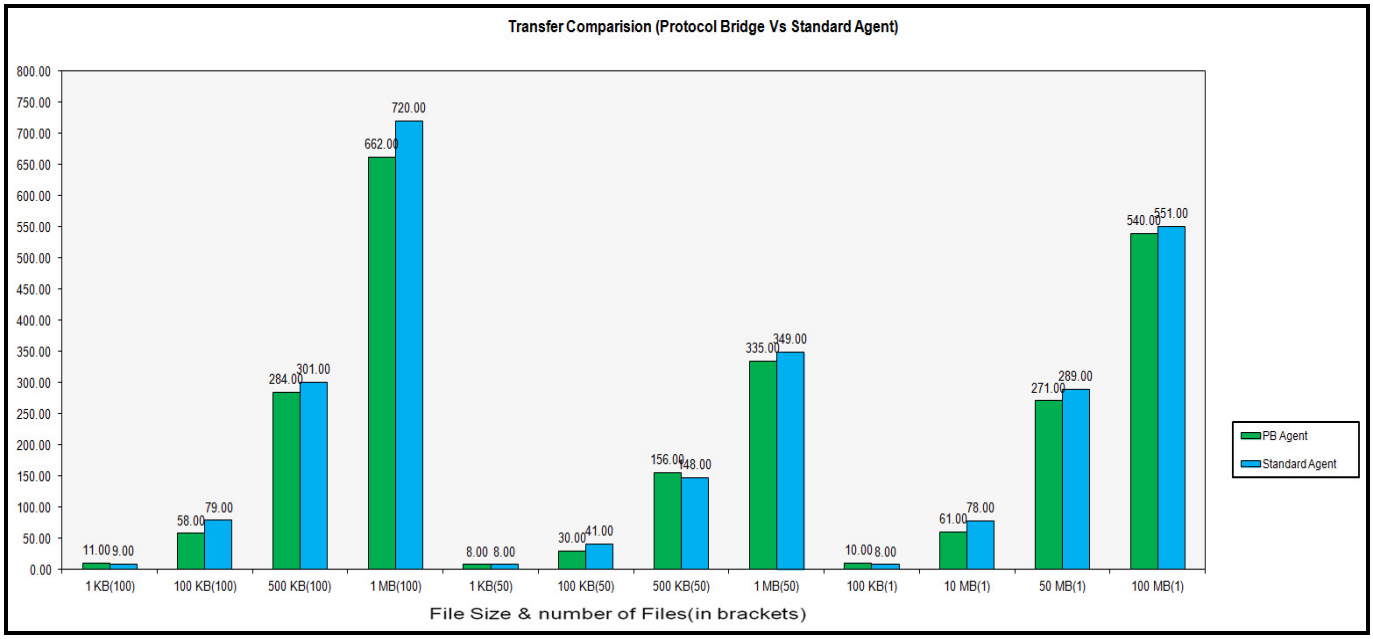


Figure 2 Graph for comparing pb agent and standard agent observations for 256 KB chunk size – remote destination server

3.2.2 1 MB Chunk Size

This testing has been carried out only for file count 100 & 1.

3.2.2.1 PB Agent

The table and chart below show the relevant times for single file and multi-file transfer with different file sizes.

Test Si No.	Number of files	File size	PBAgent 1MB Chunk size
1	100	1KB	12 s
2		100 KB	59 s
3		500 KB	295 s
4		1 MB	654 s
5	1	100 KB	40 s
6		10 MB	70 s
7		50 MB	286 s
8		100 MB	632 s

Table 4 1MB Chunk - Values for Single and Multiple file transfers through PB Agent – remote destination server

3.2.2.1 Standard Agent

The table and chart below show the relevant times for single file and multi-file transfer with different file sizes.

Test Si No.	Number of files	File size	Standard Agent 1MB Chunk size
1	100	1KB	15 s
2		100 KB	61 s
3		500 KB	272 s
4		1 MB	522 s
5	1	100 KB	25 s
6		10 MB	60 s
7		50 MB	289 s
8		100 MB	504 s

Table 5 1MB Chunk - Values for Single and Multiple file transfers through Standard Agent – remote destination server

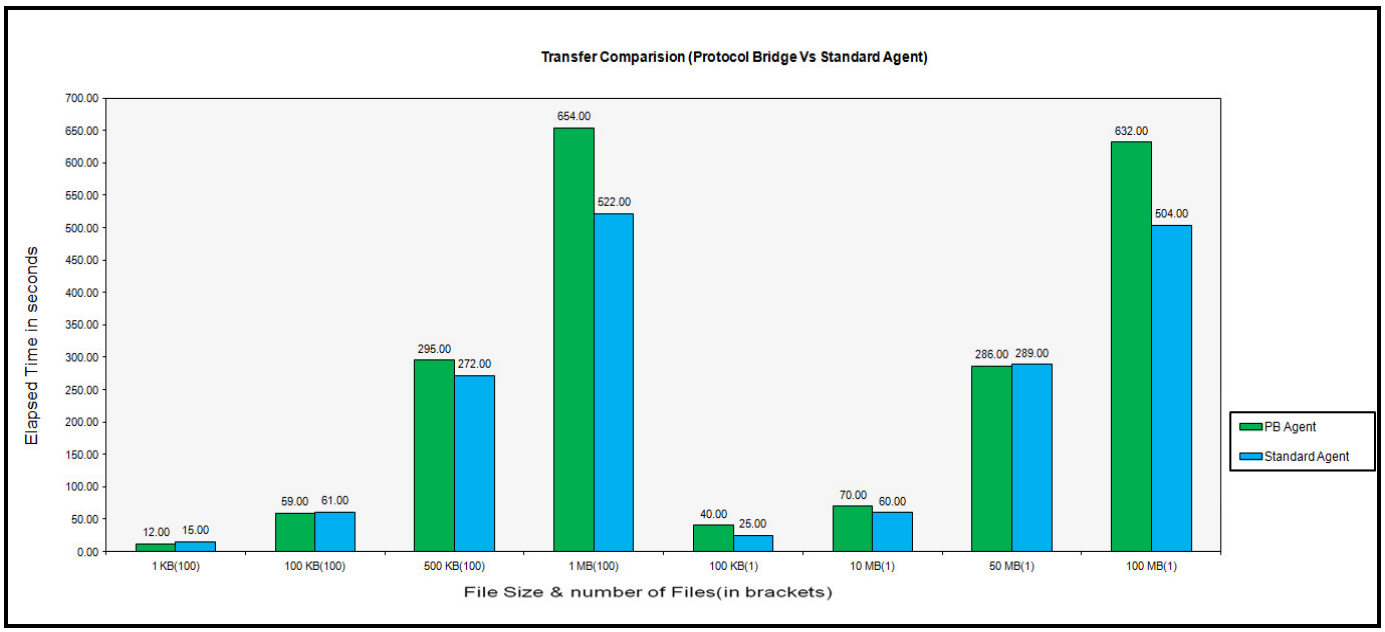


Figure 3 Graph for comparing pb agent and standard agent observations for 1 MB chunk size – remote destination server

3.2.3 4 MB Chunk Size

This testing has been carried out only for file count 100 & 1.

3.2.3.1 PB Agent

The table and chart below show the relevant times for single file and multi-file transfer with different file sizes.

Test Si No.	Number of files	File size	PBAgent 1MB Chunk size
1	100	1KB	11 s
2		100 KB	59 s
3		500 KB	191 s
4		1 MB	486s
5	1	100 KB	26 s
6		10 MB	58 s
7		50 MB	266 s
8		100 MB	482 s

Table 6 4MB Chunk - Values for Single and Multiple file transfers through PB Agent – remote destination server

3.2.3.2 Standard Agent

The table and chart below show the relevant times for single file and multi-file transfer with different file sizes.

Test Si No.	Number of files	File size	Standard Agent 1MB Chunk size
1	100	1KB	26 s
2		100 KB	63 s
3		500 KB	253 s
4		1 MB	546 s
5	1	100 KB	24 s
6		10 MB	66 s
7		50 MB	262 s
8		100 MB	470 s

Table 7 4MB Chunk - Values for Single and Multiple file transfers through Standard Agent – remote destination server

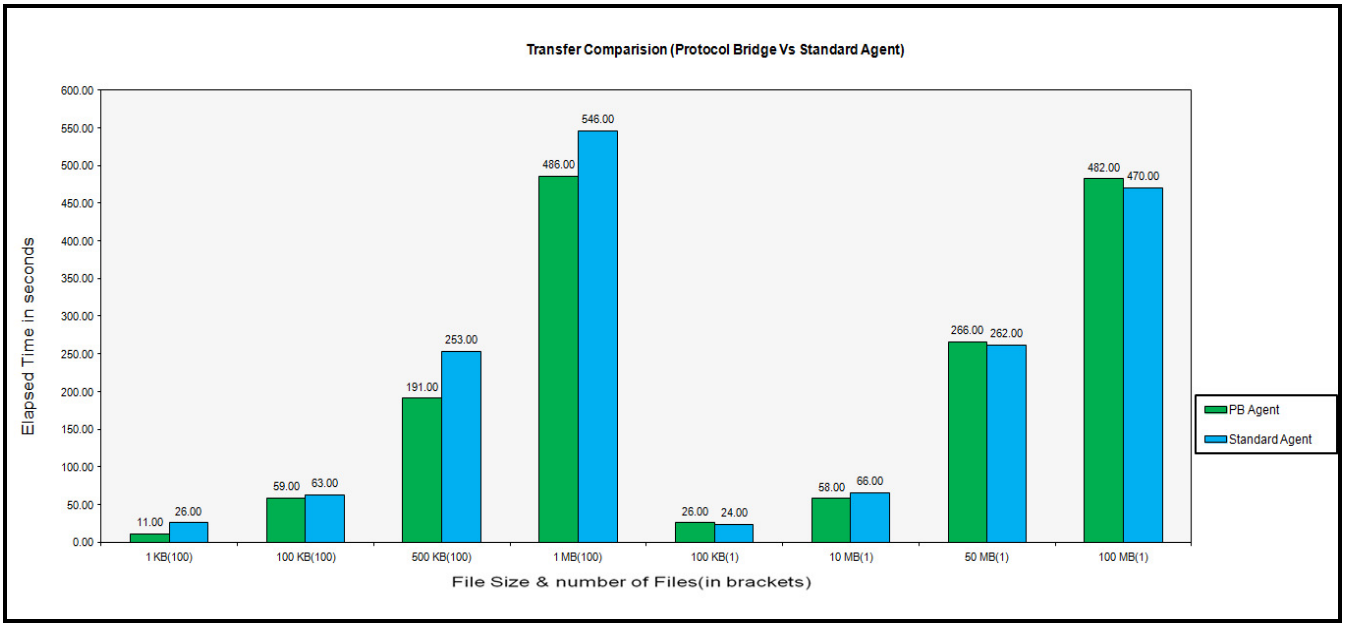


Figure 4 Graph for comparing pb agent and standard agent observations for 4 MB chunk size – remote destination server

4 Transfer Observations and Recommendations

The following are a list of bullet pointed observations and possible recommendations when planning for the above detailed scenario.

- The geographical location, i.e., the distance of the target machine from the MQ system plays a key role in the performance of a protocol bridge agent. This may be due to the number of network hops or multi network interoperability factors, bandwidth variations, network drops and so forth.

- Whilst multi file testing shows an enormous variance in between both the scenarios, single large file transfer brings the two situations to a comparable level

- Multiple smaller files place the agent under strain due to the operating system open/close costs associated with more files. Where possible configure your file creation processes to generate archives of smaller files, enabling IBM MQ MFT to use less open/close calls.

- Larger chunk sizes are effective in case of files of bigger size, as it can be seen that they perform relatively better

- Reading and writing to physical disk is often going to be the performance bottleneck. For agents that will see a large number of incoming and outgoing transfers it would be best if high performance disks were used to read data from and write data to.

- When configuring your MQ network, use the appropriate IBM MQ Performance Report to apply optimal settings for your platform.

- Ensure that you have sufficient RAM for your agents. The performance tests used 8 GB of RAM, it is recommended that you read your Operating System guide on memory usage and plan accordingly.

5 Measurement Environment

5.1 Agents

- IBM MQ Managed File Transfer Version 9.0.5 was used for this report.
- Default properties were used for agents.
- Agents were reading/writing files to the local file system, not the SAN.

5.2 IBM MQ

- IBM MQ Version 9.0.5 was used for all machines.
- Queue managers created in accordance with Performance report.

5.3 Operating System

- IBM-36IOHI69V89: Windows 7 Professional SP 1
- MFTPB1: Windows Server 2016 Standard 64bit
- Hursley Box: Windows 10 Enterprise

5.4 Hardware

System:	MFTPB1
Machine Type:	x64 based Processor, virtual
Processor:	Westmere E56xx/L56xx/X56xx (Nehalem-C) 2.39GHz
Architecture:	4 CPU
Memory (RAM):	8 GB
Disk:	Internal disk hosting OS – 250 GB

System:	IBM-36IOHI69V89 (Bangalore Box)
Machine Type:	x64 based Processor, physical
Processor:	Intel(R) Core(TM) i5 – 2540M CPU @ 2.60GHz
Architecture:	4 CPU
Memory (RAM):	8 GB
Disk:	Internal disk hosting OS – 460 GB

System:	Hursley Box
Machine Type:	x64 based Processor, virtual
Processor:	Intel(R) Xeon(R) CPU E5-4650 0 @ 2.70GHz
Architecture:	4 CPU
Memory (RAM):	4 GB
Disk:	Internal disk hosting OS – 100 GB