

# Exchange 2000 MAPI Messaging Benchmark (MMB2) Performance Result

**Hardware:** IBM@server xSeries 220 Server  
**Software:** Exchange 2000 Enterprise Server  
**Test Profile:** MAPI Messaging Benchmark

The new MAPI Messaging Benchmark (MMB2) measures throughput in terms of a specific profile of user actions executed over an 8-hour working day.

This benchmark is different from the “Medium User” setting that was used with Exchange 5.5 in that the rate of client requests is significantly greater for this MMB2 profile.

**Results should be interpreted as a benchmark for messaging throughput and should *not* be confused with deployment recommendations.** Factors such as backup/restore, topology and other issues should be considered when planning a deployment. For information on how MMB2 results differ from deployment and configuration information, see the note on Benchmark vs. Production Configuration below.

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## ***Summary of Results***

The xSeries 220 configured with one 933MHz Intel Pentium III processor and 2GB of memory. The Microsoft loadSim MMB2 profile was used, which represents the tasks typically performed by a corporate e-mail user. During the 4-hour steady state, the xSeries 220 provided a weighted 95th percentile response time of 155 ms for 2000 MMB2, with average send queue size of 11.2 and average CPU utilization of 75%.

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## ***Benchmark vs. Production Configuration Disclosure Note***

This test measures the messaging throughput of a single-server, single-site topology. Its purpose is to measure the maximum throughput of a Microsoft Exchange Server on this hardware configuration. This can provide a benchmark for comparing hardware and/or software products, **but cannot be used as a deployment guide for production environments.** For deployment-specific information, contact a Microsoft or IBM representative.

The MMB2 benchmark does not account for:

- Usage profiles not matching that of the Load Simulator MAPI Medium profile
- Per-user storage and per-server backup requirements
- Fault tolerance requirements
- Workloads other than MAPI private folder access, which includes Public Folder, NNTP, POP3 and other e-mail interfaces
- Multiple Exchange Server deployments, where additional resources are required to forward mail intra-site
- Connectors, links and replication to remote Exchange sites

## Test Results

<b>Summary</b>	
Supported Benchmark Load	2000 MMB2s
Benchmark Profile	MAPI Messaging Benchmark 2 (MMB2)
Protocol	Exchange MAPI
Length of Steady State	4 Hours
Length of Test	8 Hours
<i>Unless otherwise noted, values listed below are averages over entire 4-hour stead-state period.</i>	
<b>Transactions in total</b>	
Total Messages Submitted	50119
Total Message Recipients Delivered	182000
Total Messages Sent	50118
Ratio Message Recipients Delivered / Messages Submitted	3.63
<b>Transaction Load (per hour)</b>	
Messages Submitted/Hour	12530
Message Recipients Delivered/Hour	45500
Messages Sent/Hour	12530
<b>Transaction Load (per Second)</b>	
Message Opens/Sec	19.13
Folder Opens/Sec	9.85
RPC Read Bytes/Sec	45775
RPC Write Bytes/Sec	332389
<b>Transaction Queues</b>	
IS Send Queue Average Length	11.2
<b>Processor Utilization</b>	
System Processor Utilization (%)	75
System Processor Queue Length	11.1
System Context Switches/Sec	1952
Process % CPU Time - Store	62.2
Process % CPU Time - Inetinfo	2.5
Exchange 2000 server is also domain controller? (Yes/No)	Yes
Process % CPU Time – LSASS (on domain controller)	4.5
<b>Memory Utilization</b>	
Available Bytes	672MB
Pages/Sec	1.66
Process Working Set Bytes - Store	1.04GB
Process Virtual Bytes - Store	1.84GB
<b>Logical Drive Utilization</b>	
IS Database Disk Reads/Sec	208 (52.9,52.5,50.5,52.0)
IS Database Disk Writes/Sec	179 (45.6,45.3,43.4,44.2)
IS Database Average Disk Queue Length	1.5
IS Log Disk Reads/Sec	0
IS Log Disk Writes/Sec	260
IS Log Average Disk Queue Length	0.13

## ***Descriptive Terms***

### **Messages Submitted**

Submit calls made by clients. This equates to total messages sent by users.

### **Messages Sent**

Messages that the Store sends to the categorizer in Inetinfo (SMTP Service in particular).<sup>1</sup>

### **Message Recipients Delivered**

Separate mailboxes that messages have been delivered to.

### **Message Opens/Sec**

Messages accessed for reading per second.

### **Folder Opens/Sec**

Folders opened for browsing per second.

### **RPC Read Bytes/Sec**

Bytes read from clients, sent via RPCs.

### **RPC Write Bytes/Sec**

Bytes written to clients, sent via RPCs.

### **IS Send Queue Average Length**

Send Queue Size is the number of messages in the private information store's send queue.

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## ***Response Times (Latencies)***

<b>Client Actions</b>	<b>95th Percentile Response Time (in Milliseconds)</b>
Read	110
Send	281
Delete	60
Move	140
Submit	90
<b>Weighted Total</b>	<b>155</b>

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## ***Message Throughput***

Summary of the MMB2 profile for an 8-hour day:

	<b>Expected</b>	<b>Measured</b>
Messages Submitted/MMB2/Day	51	50.12
Messages Delivered/MMB2/Day	185	182
Average Recipients per Message	3.6	3.63

- The standard MMB2 profile was used for testing
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<sup>1</sup> All messages – even MAPI messages – are sent to the categorizer, as this replaces the MTA for all but communication via X.400, with an Exchange 5.5 server.

## Server Configuration

Hardware	Exchange Server	Domain Controller (if remote)
Vendor	International Business Machines Corporation	N/a
Model	IBM @server xSeries 220	N/a
Processor	933MHz Pentium III	N/a
# of Processors	1	N/a
Primary Cache	256KB	N/a
Secondary Cache	None	N/a
Other Cache	None	N/a
Memory	2 GB SDRAM DIMMs	N/a
Disk Subsystem	28x18.2GB and 14x9.1GB disk drives connecting to 3 EXP300 Storage Expansion Units	N/a
Disk Controllers	5 Netfinity ServeRAID-3L Adapters	N/a
Other Hardware	1 Netfinity 10/100 Ethernet Adapter	N/a
Hardware Tunings	1 disk for OS/ExchangeDS/MDT/public folder, 41 disk for Exchange mail databases..	N/a
Comments		N/a
		N/a
<b>Mail Software</b>		N/a
Vendor	Microsoft Corporation	N/a
Mail Server	Exchange Server 2000	N/a
Build\Release Version	Windows 2000 Advanced Server – Build 2195. Exchange2000 Server – Enterprise Edition RTM Release.	N/a
Additional Software Tuning	None	N/a
		N/a
		N/a
<b>OS Software</b>		N/a
Operating System\Version	Microsoft Windows 2000 Advanced Server, Build 2195	N/a
Service Pack\Patch Info	SP1	N/a
File System Type	NTFS	N/a
Other Software		N/a
		N/a
<b>Network</b>		N/a
Type of Network	Ethernet	N/a
Network Speed	100 Mbps Full Duplex	N/a
MSL (sec)	120	N/a
Time-Wait (sec)	60	N/a

## Load Generator Configuration

# of Load Generators (LG)	10
Total # of LG processes	10
Simulated Users/Process	200
Model	IBM PC 300GL
Processor	233MHz Pentium II
# of Processors	1
Memory	128MB
Network Controller	Integrated 10/100 Ethernet Controller
Operating System	Microsoft Windows 2000 Professional