IBM Network Station Family of Thin clients

Network Station Manager Version 2 Release 1

Memory Footprint and Simultaneous Boot Performance

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Contents

Overview

This document addresses basic main memory and flash memory footprint sizing, and uses 'worst case' simultaneous booting scenarios (vs real world staggered booting) for NT and AS/400 boot servers to identify boot time and performance bottlenecks to help you plan for increase boot performance and set performance expectations.

V2R1 delivers significant enhancements to terminal emulators and ICA capabilities, delivers the 'Netscape Communicator 4.5 experience', and provides additional Network Station Manager capabilities, including flash management. These improvements, and a move to a virtual memory system, require additional code to be transferred between the boot server and the Network Station. This boot load can be reduced by using staggered boot times, leaving the Network Stations powered on when not in use, or consider using flash boot with peer / buddy boot for additional Network Stations.

This information is provided for planning purposes only. Your memory requirements may vary based on selected function, applications, and languages selected, and your simultaneous boot times will vary based on network speed and loading, and processor speed.

Main Memory and Flash Memory Footprints

Main memory and flash memory will have different 'footprint' sizes for the same functions. Main memory is used to load _working sets_ of the base operating system and applications (portions necessary for execution) and to allocate data areas during execution. Flash memory is used to the store the entire (vs working set) base operating system and file system in addition to the complete application programs, so the client will be self-sufficient and not need to retrieve code pages from the boot server.

Minimum Main Memory Requirements

Detailed main memory requirements by component (<u>in megabytes</u>) based on a prerelease version of V2R1

	V2R1 (MB) SBCS non-extended fonts **(S/2800 and S/2200)**	**V2R1 (MB)** SBCS non-extended fonts **(S/1000 and S/300)**
Base: **REQUIRED BY ALL APPLICATION LOADS**	S/2800 = 17.0 S/2200 = 20.0	S/1000 = 20.0
If windows app via ICA is used	7.5	9.0
If Java applet/application invoked		
- Add JVM size	5	5
- Minimum buffer size specified	5	5
- Recommended buffer size specified	7	7
5250 emulator		
- First session	4.0	4.5
- Each additional session	1.0	1.0
3270 emulator		
- First session	3.5	4.0
- Each additional session	1.0	1.0
VTxxx emulator (US English Only)		
- First session	3.0	3.5
- Each additional session	0.5	0.5
X-Terminal Client		
- Advanced Diagnostics: First session	1.5	2.0
- Each additional session	1.0	1.0
Navigator 4.5 Browser Includes 1MB memory cache	17.0	17.0
Printing	2.0	2.0
- If print monitor is used	3.0	3.0
Extras and Tool Kit - See notes for memory needs on specific applications	See note below	See note below

Main Memory Notes:

1) The previous table is meant to be a guide for the minimum amount of memory a Network Station should have with a given application load. Your results may vary based on application use, and use of extension functions.

2) An application load consists of all applications currently open including any that may be in a minimized window on the Network Station work space.

3) The scenario below for V2R1 and Series 2800 with two 3270 emulation sessions, browser and Java illustrates how to determine memory requirements:

17.0	Base
3.5	3270 emulation
1.0	Second 3270 emulation
17.0	Browser
5.0	JVM
<u>5.0</u>	Buffer size
48.5	**MB minimum memory recommended**

4) V2R1 additional Memory recommendation for Extras and Tool Kit Productivity applications:

3.0	Print monitor
2.5	File manager
2.2	Calculator
5.0	Calendar
4.0	Text editor
3.5	Paint
3.5	Video player
2.5	Audio player
<u>2.5</u>	Real player
28.7	Total

Minimum Flash Memory Requirements

Detailed flash memory requirements by component (<u>in megabytes</u>) based on a prerelease version of V2R1

	V2R1 US English Compact Flash (S/2800 and S/2200)	V2R1 US English Linear Flash (S/1000 and S/300)
Base Operating System + File System (REQUIRED BY ALL APPLICATION)	34.0	TBD
If windows app via ICA client or Remote Application Manager is used, add	3	TBD
If Java applet/application invoked, add JVM size	14.0	TBD
If any 5250/3270/VTxxx Emulator used, add one time (see notes below)	6.0	TBD
If Netscape is used, add	20.0	TBD
If NFS peer boot is used, add	AS/400 NSM PTF1 = 4.0 NT NSM PTF1 = 4.0 AIX NSM PTF1 = 6.0 AIX NSM PTF2 = 4.0	TBD
Possible Quick-on Flashcard Sizes for V2R1		
Base OS + ICA client	48 MB Quick-on Flashcard	Max Linear flash 40 MB
Base OS + ICA client + Emulators	64 MB Quick-on Flashcard	Max Linear flash 40 MB
Base OS + ICA client + Netscape	64 MB Quick-on Flashcard	Max Linear flash 40 MB

Flash Memory Notes:

1) The previous table is meant to be a guide as a recommendation for the minimum amount of flashcard space a Network Station should have with a given software stack. Your results may vary based on software stack.

2) A software stack consists of Base Operating System, File System and all application programs stored on the flashcard.

3) 5250, 3270, VTxxx emulators are always stored together in the flashcard.

4) The scenarios below for V2R1 and Series 2800 with 5250 Emulation, 3270 Emulation, Browser (with no Java applets), Windows application via ICA illustrates how to determine flashcard space requirements:

        34.0   Base OS + filesystems
         6.0   Emulator applications for 3270/5250/VTxxx
        20.0   Netscape application
         3.0   ICA application
        ===
        63.0   MB minimum flashcard space recommended

Performance comments:

- Once booted, 5250/3270 emulation performance is similar to V1R3, and ICA is faster due to the enhanced ICA version.

- There may be up to a 4-fold increase in the LAN traffic to boot a Network Station in NSM V2R1 vs. NSM V1R3.4.

- Migration from V1R3 to V2R1 may require moving the customer to 100 Mbps Ethernet since 100 Mbps Ethernet allows much faster booting for multiple simultaneous Network Stations.

- The boot time for a single Ethernet Network Station Series 2800 in an idle network from an idle server is about a minute. For more than a few Network Stations, boot time is a linear function of the number of Networks Stations, with the slope depending upon the LAN speed, server power, and TFTP block size.

- For simultaneous booting of a number of Network Stations:
  - The faster the Network Station, the quicker the boot/load
  - The faster the boot server, the quicker the boot/load.
  - The faster the LAN, quicker the boot/load.

- The LAN is the bottleneck on a 10 Mbps Ethernet while both the LAN and boot server may be bottlenecks on a 100 Mbps Ethernet.

- Subnet (TFTP) broadcast does not help.

Performance recommendations with all boot servers:

- Install 100 Mbps Ethernet, if possible.

- Customers should study the subnetting of their LANs before moving to V2R1.

- Use network switches, not hubs to isolate boot traffic

- If using TFTP, maximize TFTP block size to reduce boot time and server utilization. Configure in setup utility; it is also needed in the host.

- Use flash boot on a WAN. Booting over a WAN is possible, but not recommended.

- Isolate Network Stations on a subnet with their boot/file server.

- Train users to avoid rebooting: either logoff or lock but leave power on.

- For token ring, maximize frame size and MTU size. MTU configured in setup utility.

Windows NT specific comments:

- Increasing the boot server speed on a 100 Mbps Ethernet (Netfinity 5500 2x400 PII vs. PC 300GL 1x166 MMX Pentium) can reduce the boot time by half, but makes little difference on a 10 Mbps Ethernet.

- Boot times for 32 Network Station Series 2800s on a 10 Mbps Ethernet are about 6 minutes for a Netfinity 5500 with dual 400 MHz Pentiums or a PC 300GL with a 166 MHz MMX Pentium. When on a 100 Mbps Ethernet, boot times decrease to approximately 2 minutes and 4 minutes, respectively.

- Boot server utilization: simultaneously booting 32 Network Stations can temporarily monopolize the boot server. The server utilization averages 63% of a PC 300GL (166 MHz MMX Pentium) for 379 seconds, or 17% for *each* of the pair of 400 MHz Pentium II processors in a Netfinity 5500 for 376 seconds when booting over 10 Mbps Ethernet. While on a 100 Mbps Ethernet, the server utilizations are 91% for the PC 300GL for 252 seconds, or 47% for *each* of the 2 processor in the Netfinity 5500 for 120 seconds.

AS/400 specific comments:

- Make sure that the AS/400 server and Network Stations are configured in the AS/400's TCP host table

- Boot times for 30 Network Station Series 2800s on a 10 Mbps Ethernet using 8192 TFTP blocks are about 4 minutes for an AS/400 170-2386 V4R4 or 170-2291 V4R4. With the less efficient 1024 TFTP block size, boot times increase to just over 4 minutes and 8 minutes, respectively.

- CPU utilization on boot server: simultaneously booting 30 Network Station Series 2800s on a 10 Mbps Ethernet can temporarily monopolize the boot server, depending on the TFTP block size and server power. For an 8192 TFTP block size, utilization is 10% of an AS/400 170-2386 V4R4 for 237 seconds and 24% of an AS/400 170-2291 V4R4 for 242 seconds. For the less efficient 1024 TFTP block size, utilizations are 17% for 251 seconds and 42% for 493 seconds, respectively.

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