

Technical Guide – Network Impact of SIMS

Module	Technical Guide - Network Impact of SIMS
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Revision Number	1.0
Last Edited	Wednesday, 06 April 2005

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Glossary

Definition	Size	Comment	Why Might I copy the file over the network
Average File	For our purposes, we will assume that an average file is 0.1MB.	This is a reasonable size for a word document of a few pages.	Any time you use a shared document.
Example Executable File	5MB - This is representative of our SIMS Attendance module attendw.exe	This excludes any other files that it may use.	Every time you run the Attendance / Assessment, .. Modules until the Autumn 2004 release.
SIMS Installer	80MB (SimsApplicationSetup.exe)	From the Autumn 04 release	Every time you upgrade to the latest copy of SIMS on a workstation.
Example Database File	1024MB (1GB). This is a large data file.	This might be a typical size for a school of 1000 pupils.	Copying Backups to DVD from a workstation.

Introduction

SIMS .net will run quite happily over a basic ISDN link for most purposes. It is therefore of concern that a number of customers have reported to the Help Desk and mentioned on Talkback that SIMS is slow to load on their equipment, or that SIMS is much slower than it used to be.

Internet use has a few simple caveats:

1. Ensure it is a secure connection (VPN). This is not technically a requirement of SIMS, but it is the simplest way of ensuring the data is protected in transmission over the internet.
2. Don't attempt to upgrade on a very slow connection.
3. Avoid launching other modules on a 64Kb connection. Not true on a 1Mb connection, although initial launch may be a little slow until the Autumn 04 CD is released.

Given that SIMS will work fine over the internet, it is confusing to us that some customers are reporting major speed problems, nevertheless the problems are real and we need to obviously need to address their issues.

Purpose

The aim of this document is to explain what actually happens when you run SIMS and point to some of the pitfalls that may make it run slowly. The outcome we hope is that customers should be able to assist themselves in ascertaining what needs to be done to make SIMS (or other systems for that matter) run at an optimal speed.

Local Area Networks

Glossary

Definition	Size	Comment
Slow Hardwired LAN	10Mb/sec (1.25MB Sec)	Some 10Mb/sec installations are in use – consideration should be given to upgrading a LAN of this speed.
Standard Hardwired LAN	100Mb/sec (12.5 MB/Sec)	100Mb/sec would be expected.
Fast Hardwired LAN	1Gb/sec (128MB/Sec)	Usually only used between servers, but newer networks may use 1Gb/sec
Slow Wireless LAN	11Mb/Sec (0.75MB/Sec*)	* Wireless LAN's due to their very nature require security to be applied. Typically you have 6Mb/Sec available to the user.
Standard Wireless LAN	54Mb/Sec	Assume 55% is available to users
Fast Wireless LAN	108Mb/Sec	Assume 55% is available to users

What is deemed to be an acceptable speed?

Industry anecdote suggests that delays of more than 8 seconds for an application to start or a web page to appear are viewed as unacceptable. Certain Processes such as copying backup to CD or upgrading may reasonably take longer.

How much of the network bandwidth can I have?

Like a motorway at night, you may in the best of circumstances have the road to yourself. At 3am one might be able to cruise around the M25 at 70MPH, at rush hour collisions occur, jams and hold-ups may reduce our effective speed to 30MPH (if we are lucky!). This is also true of networks, if you are the only user, then you could use the whole width of the road. As traffic builds up (and possibly collisions occur), the actual average speed of all traffic is reduced until potentially everything stops. Networks manage traffic too, some networks are better than others; in all circumstances the most traffic you can get through is 100% of the bandwidth

Example networks and file transmissions

One User

		Hardwired			Wireless		
		Fast	Standard	Slow	Fast	Standard	Slow
Nominal Bandwidth		1024	100	10	108	54	11
Effective bandwidth Mb/sec		1024	100	10	59.4	29.7	6.05

File Size MB							
Average File	0.1	0	0	0	0	0	0
Example Executable File	5	0	0	4	1	1	7
SIMS Installer	80	1	6	64	11	22	106
Example Database File	1024	8	82	819	138	276	1354

Two Users

Nominal Bandwidth		1024	100	10	108	54	11
Effective bandwidth Mb/sec			50	5	29.7	14.85	3.025

File Size MB							
Average File	0.1	0	0	0	0	0	0
Example Executable File	5	0	1	8	1	3	13
SIMS Installer	80	1	13	128	22	43	212
Example Database File	1024	16	164	1638	276	552	2708

5Users

Nominal Bandwidth		1024	100	10	108	54	11
Effective bandwidth Mb/sec		512	20	2	11.88	5.94	1.21

File Size MB							
Average File	0.1	0	0	0	0	0	1
Example Executable File	5	0	2	20	3	7	33
SIMS Installer	80	1	32	320	54	108	529
Example Database File	1024	16	410	4096	690	1379	6770

10 Users

Nominal Bandwidth		1024	100	10	108	54	11
Effective bandwidth Mb/sec		102.4	10	1	5.94	2.97	0.605

File Size MB							
Average File	0.1	0	0	1	0	0	1
Example Executable File	5	0	4	40	7	13	66
SIMS Installer	80	6	64	640	108	215	1058
Example Database File	1024	80	819	8192	1379	2758	13540

Red suggests that the speed would be unacceptable.

It is easy to see that on the lower bandwidth networks, the need to get executable files over the network can cause problems. This supports the SIMS architectural approach of moving often used files (such as application executables) from a fileserver to the workstation, and the adoption of low bandwidth client-server architecture

What Happens when you run a SIMS Application

Pre – Login

Example

SIMS .net

Command

C:\Program Files\SIMS\SIMS .net\simsload.exe C:\Program Files\SIMS\SIMS .net\Pulsar.exe

What Happens

SIMSLOAD will attempt to:

Open C:\Program Files\SIMS\SIMS .net\simsload.ini	Small local file
Read the latest installed version of: • SIMS Application Setup.exe • SIMS Manual Setup.exe Usually hosted in X:\SIMS\SETUPS	SIMS Application Setup is in the order of 53-80MB. SIMS Manual Setup is 15-20MB. Version number reads + miscellaneous network traffic to about 30Kb (minimal) for both files. If a new version were available, it would kick of an upgrade and effectively a network transfer in the order of 100MB.
SIMS .Net Login dialog appears	

What could make this slow?

Anti Virus Software

Our AV Software (McAfee) does not 'check' files on access. It is however conceivable that an aggressive AV tool that checks all files on access, may force a download of any file that you wish to access to your machine, in this case causing 100MB to be passed over the network. If this were the case, then launching SIMS .net from SIMS Load would never work at an acceptable speed on wireless LAN. 108Mb/sec WLAN would take (single user) 13 seconds to download the file. 11Mb/sec (single user) would take 2 minutes, or >20 minutes for 10 concurrent users and assuming that sharing has no cost associated with it.

If our AV Software downloads the whole file what can we do?

1. Run Pulsar directly: Start | Run

c:\Program Files\SIMS\SIMS .net\Pulsar.exe

This should not require access to the file server at this point.

If this makes the system run much more quickly then SIMS Load is to be suspected.

2. It would also make sense to turn off your AV software and run SIMS .net through it's Start Menu short cut, i.e. via SIMSLOAD. If this makes also works quickly then your AV is in the frame.

Be warned that if you have AV policy orchestrators, then you may get AV turned back on every 5 minutes or so

Gap between Login and the Application being usable – SIMS .net

User Logs in	
SIMS .net loads dlls and gets info from the database. SIMS .net looks for Icons of SIMS Applications such as attendance, Profiles, ...	Traffic is expected to the SQL Server Dlls are local Until Autumn 04, SIMS .net was looking on the file server for applications and reading Icons from the applications.

What could make this slow?

Anti Virus Software

This is again a possible problem, although it does not happen with CES AV configuration. The icons are read from the applications. These are perhaps 5MB a time. 10 applications would involve potentially a long wait. This will be addressed by the Autumn 2004 release where applications are now hosted on the workstation.

Finding the Database Server

The application has to be able to translate the name of your SQL server to an IP address. It will use DNS lookups to achieve this. It has been know for this translation to take some while. To test this, although it may not work if network security is very high, drop to a command prompt and type:

```
ping <Server Name>
```

```

C:\>ping CHOPPER

Pinging Chopper.sims.co.uk [10.128.0.91] with 32 bytes of data:

Reply from 10.128.0.91: bytes=32 time<1ms TTL=128
Reply from 10.128.0.91: bytes=32 time<1ms TTL=128
Reply from 10.128.0.91: bytes=32 time<1ms TTL=128
Reply from 10.128.0.91: bytes=32 time<1ms TTL=128

Ping statistics for 10.128.0.91:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

```

Typically on a LAN, connection time should be negligible; any other answer needs to be investigated.

Your SQL Server name can be replaced in connect.ini with the IP address and this may resolve any mapping problems for SIMS. There would still be a problem to resolve on your network if this were the case.

Gap between Login and the Application being usable – Lesson Monitor

User Logs in 'On line'	
	Traffic is expected to the SQL Server This process typically downloads 30MB

What could make this slow?

Wireless LAN

Clearly downloading 30MB at the same time on a number of machines will lead to delay. Even on a 54Mb system, a single user would expect this to take some 8 seconds to download. Multiply this by 10 users and the system would appear to border on the unusable. On a slow wireless LAN, a single user might take 40 seconds. Multiply that up to 10 users and the delay will be in excess of 400 seconds (approaching 7 minutes)

Overloaded Network

It is possible that a hardwired network can have bottlenecks. If you seem to have issues at particularly busy times of years, it may be possible that your network has a configuration problem. If you suspect that this may be an issue then you will need to call in some network hardware specialist. Simple advice, obvious perhaps with hindsight, such as avoid synchronized activities could save a small

fortune! Schools have bells that keep everyone to school time, if every member of staff waits for a bell before starting a computer task, then just to keep everyone working at a reasonable speed could drastically increase your hardware costs. For if everyone in the school (prior to Autumn 04) tries to run Attendance (5MB), assume a 100Mb LAN, 150 workstations, at the same time then the best average time to run is about 60 seconds. If that application run is spread out over a 5 minute period, then the 0.4 seconds that each copy might take to load over the network would go un-noticed and without cost.

NB: This advice is even more important for Wireless LAN users who have less precious bandwidth to start with...

Hardware Advice

Workstations

There are 2 reasons for giving a minimum hardware advice:

1. Ensure that hardware running SIMS is appropriate
2. Avoid un-necessary cost to schools.

Our aim is to make our workstation minimum specification the same as that of the operating system. SIMS, like Microsoft Office, will work on minimum specification equipment. However, the times taken to load applications from hard disk, times for the application to process data (SIMS hard work is done on the SQL server and not the workstation), times for writing a letter to the hard disk and such like will be slower than ideal. As usual, it becomes a trade off between cost of hardware update and cost of staff time. This equation is heavily skewed by the frequency of use of old hardware, the more use it gets the more staff would benefit from further investment in hardware.

The absolute minimum kit, a P400 with 128MB RAM, would be OK for less frequent use. If used to perform all of the school management tasks then performance may be unacceptably low. Very often the oldest kit has slow network cards (10Mb) and this can add to the perception that applications are slow, although we are doing all that we can to reduce network traffic as stated above.

Unfortunately, minimum hardware specifications are set to rise as we cease support for Windows 98. Realistically Windows 2000 and Windows XP we would recommend a minimum of 256MB.

- Windows XP requires a 300MHz processor and 128MB RAM or higher recommended.
- Office XP recommends a Pentium III processor.

This should be adequate to run Microsoft Word and SIMS.

Minimum workstation specifications would not be expected to run multiple applications well. For example running SIMS .net, SIMS Attendance, SIMS Lesson Monitor, Word, Excel, Outlook and Internet Explorer on a minimum specification machine would be an unfulfilling experience.

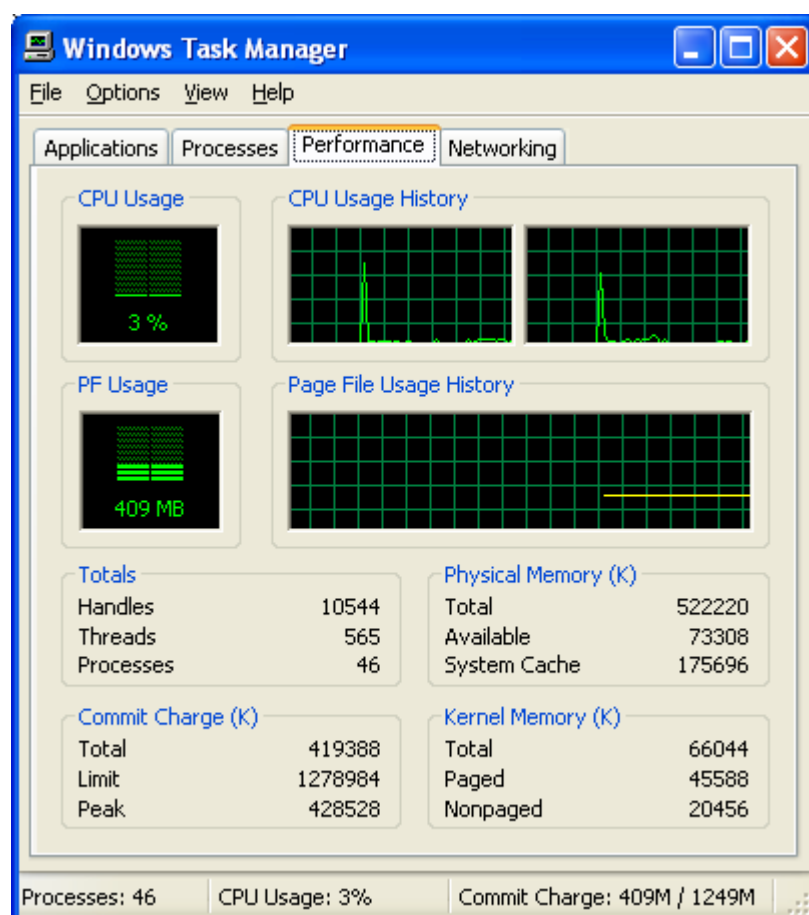
We also recommend that schools budget to replace hardware every 3 years. Whilst SIMS .net on the workstation is not particularly demanding, all software moves onwards to meet the new demands of users and equipment in excess of 3 years old may be unable to support new software. Perhaps more important than this, the expectation that hardware will fail increases over time and the warranty usually expires at the 3 year point; therefore budget contingency, at least, needs to be made for the

equipment failing and requiring repair or replacement. A new PC starts from about £300¹ w/o monitor and a PC world health check costs in the order of £60² + parts³.

If SIMS appears to be slow, we would recommend that you try it on your best hardware before looking further.

Servers

If good workstation hardware appear to be running SIMS slowly then servers may be to blame. Log on to the SQL Server Box. Look at Task Manager. (Right click on the Task Bar and select Task Manager). Click on performance and see what CPU usage and memory are like.



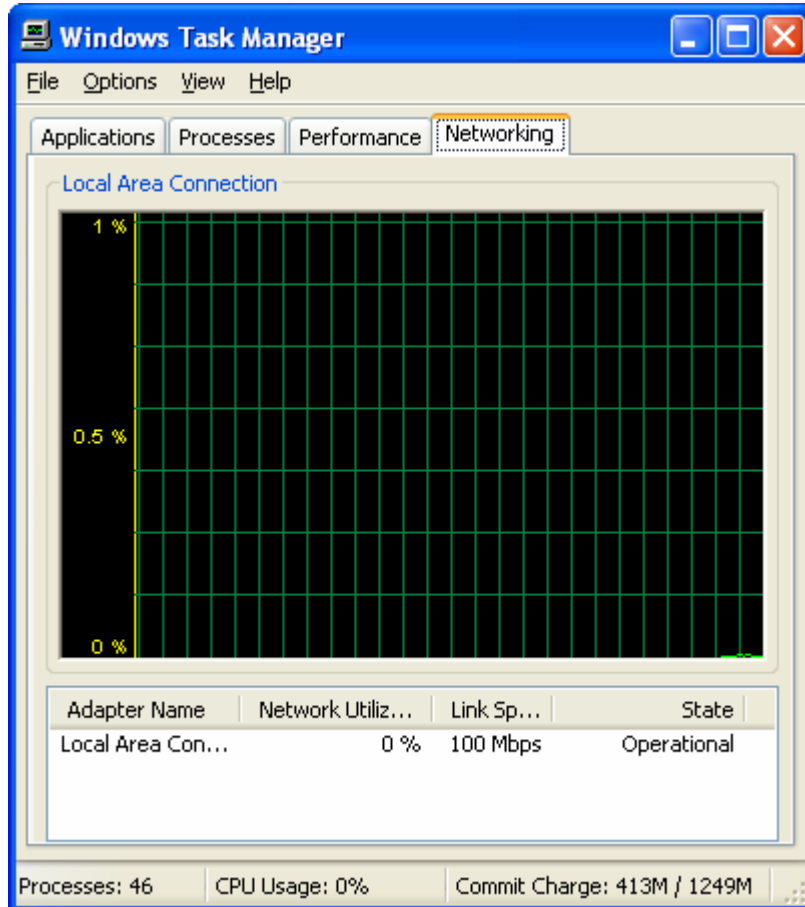
¹ I have asked one of the tier 1 manufacturers (Dell, IBM or HP) to confirm that schools could buy a PC with a P4 processor, 512MB RAM, 160GB HDD, DVD RW & Network (no monitor) for the price given.

² I have seen health checks in PC world on or around £60. PC World may vary the price beyond our control and it should be considered indicative rather than factual.

³ A replacement hard disk would cost upwards of £40 plus fitting charges. This does not include the cost of re-installing Windows et al or restoring a backup if you have one. Other parts may be more or less expensive and availability of components may become an issue with old equipment. For example if the processor were to fail, a repair may entail replacing motherboard and memory if a like for like processor was not available.

The above example shows that my machine is not being worked hard enough!

If you choose the networking task then the performance of the network adapter can be reviewed



The example above shows that, once more, my machine's resources are underutilized.

For either of the above screens high usage suggests that this may benefit from upgrade, however, do be warned to average the effort over sensible time scales. The AV scanner might load your processor to 100% of its power, however since it runs once a week for 5 minutes, and would do the same (more quickly perhaps) on the fastest machine that you can buy; it would not be worth upgrading. Look at standard tasks and longer times before jumping to conclusions!

The same checks can be done on workstations, but it would be more unusual to be stressing the workstation after applications have loaded.

You could consider installing SIMS Workstation on the server and comparing performance with workstations. Performance theoretically may be slower than the workstation; this is because the machine is also working as the SQL server and hence should have significant resources committed to that. If it out performs the workstation then 3 things may be at issue:

1. Server hardware is significantly better than workstations
2. The network is slow (the bottleneck).

3. A combination of the above

It will never be our aim to minimize the load on the SQL server. Where programs run in the SQL server can be optimized, they will be, but fundamentally we want the SQL server to be perspiring due to hefty exertions. That keeps the load on the workstations down and effectively reduces costs.

Minimum hardware will work in small schools. Minimum hardware also assumes that the server is not doing other jobs such as also being the exchange server and domain controller. Moving to whole school networking, for example, would add to the load on the Domain Controller (DC) and might have a large effect on SQL if it is co-hosted of the DC. It is usually true that money spent on the servers would be of greater benefit to more people than the same money spent on one or more workstations.

Conclusion

There are many reasons why a computer system may perform less well than you would hope for. Some problems are directly attributable to the software and may be quite acceptable, for example the finance year end procedure may take some time to complete. Others may be directly attributable and unacceptable. There are however many grey areas that can give the user an unacceptable experience and yet are caused by external factors and yet be displayed when a user uses SIMS. We trust that the document will help you to investigate such problems and identify the cause. Where there are factors within our control, we will address them whenever possible; where factors are outside of our control we will try to assist, but would in any case be unable to advise in detail on matters such as Anti Virus configuration, because we may not have the competence⁴ to do so.

⁴ We may actually know how to configure firewalls, AV, proxy servers and alike. However we are unable to take responsibility or liability for errors made when customers implement changes to these policies; indeed such policies are often dictated by LEA or other body and are beyond the school's control. In these cases, we will advise on principle but must leave implementation to LEAs and alike.