SONG: Half Life 2 Counter-Strike Network Traffic Trace Files

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Abstract-**This technical report describes the conditions under which network traffic was generated and captured for a range of traffic traces available on the SONG database. In this case the traffic traces concern network traffic generated by the Half Life 2 Counter-Strike game running on a central server with between two and nine players and two different maps. This dataset is made publicly available as part of the SONG database project of the Smart Internet CRC (http://caia.swin.edu.au/sitcrc/song) to assist researchers in accessing databases of network game traffic generated under known conditions. This report and the SONG website should be referenced in any work which uses any of the corresponding dump files.**

Keywords- **Traffic trace, Smart Internet CRC**

I.   INTRODUCTION

SONG (Simulating Online Network Games) is a sub-project of the Smart Networks Stream 4, itself a project of the Smart Internet CRC. More information the CRC and the Smart Networks Projects can be found here [1, 2]. The goal of this project is to develop a publicly available library of network traffic traces and simulation models that can be used to augment existing IP network engineering tools and to demonstrate any new models developed to assist in the design of networks to carry game traffic.

This document describes the conditions under which the corresponding network traces were both generated and captures. This information should be considered when analysing any statistical results generated from the trace file as well as when comparing the properties of data from two different trace files.

II.   TRAFFIC CAPTURE SCENARIO

This report deals with traffic captured during networked sessions of the Half Life 2 Counter-Strike game [3]. The report is relevant to numerous trace files

available on the SONG website and describes the game scenarios, number of players and network configuration under which the trace files were captured.

A.   Game Details

Half Life 2 Counter-Strike is a client-server based game with client software running on standard PCs. Player actions are transmitted from the client to the server. The server constructs a game state for distribution to all players based on these actions. The game state is then distributed to all players. The game state may be different for players to limit the possibility of cheating, particularly wall-hacks.

For all trace files described in this report the game was played across a switched Ethernet LAN.

B.   Server configuration

The server configuration for this series of trials is described in the following table.

Table 1. Server configuration

IP address	136.186.229.146
CPU	Intel Celeron 2.8GHz (8kb L1 cache, 128kb L2 cache)
RAM	1GB PC3200 DDR RAM (2 x 512MB in dual channel configuration)
Motherboard	ASUS P4-P800VM
Onboard NIC	Intel 82801BA (D865) Pro/100 VE
Onboard Video	Intel 82865G (865G GMCH) SVGA controller (reported by FreeBSD dmesg)
HDD	Seagate ST380011A/8.01 80GB PATA UDMA100
OS	FreeBSD 5.4-RELEASE

OS KERNEL CONFIG	Kernel config file: GENERIC+ALTQ
	Commented the line: cpu I486_CPU
	Commented the line: cpu I586_CPU
	Added the line: options ALTQ
	Added the line: options ALTQ_CBQ
	Added the line: options ALTQ_PRIQ
	Added the line: options ALTQ_HFSC
OS CONFIG PARAMETERS	Relevant sysctl variable/value pairs:
	kern.clockrate = { hz = 1000, tick = 1000, profhz = 1024, stathz = 128 }
RELEVANT HALF LIFE 2 COUNTER-STRIKE CONFIG PARAMETERS	'Counter-Strike Source Shared Content' version 46
	'Base Source Shared Models' version 3
	'Base Source Shared Sounds' version 3
	'Base Source Shared Materials' version 7
	'Source Dedicated Server Linux' version 51
	sv_minrate 3000
	sv_maxrate 20000
	decalfrequency 60
	sv_maxupdaterate 100
	sv_minupdaterate 30
	sv_lan 1

Main->Options->Keyboard->Advanced->Console (~)	On
Main->Options->Audio->Speaker Config	2 speakers
Main->Options->Audio->Sound Quality	High
Main->Options->Audio->Captioning	No captions
Main->Options->Video->Aspect Ratio	4:3
Main->Options->Video->Display Mode	Fullscreen
Main->Options->Video->Advanced->Model Details	Low
Main->Options->Video->Advanced->Texture Detail	Low
Main->Options->Video->Advanced->Shader Detail	Low
Main->Options->Video->Advanced->Water Detail	Simple reflections
Main->Options->Video->Advanced->Shadow Detail	Low
Main->Options->Video->Advanced->Antialiasing Mode	None
Main->Options->Video->Advanced->Filtering Mode	Bilinear
Main->Options->Video->Advanced->Wait For Vertical Sync	Disabled
Main->Options->Video->Advanced->High Dynamic Range	None
Main->Options->Voice->Enable Voice In The Game	Off

C. Client configuration

There were nine different client machines involved in the trials. Each trial used between two and nine clients. The IP addresses of the clients and the client machine configuration (hardware and operating system) and Half Life 2 Counter-Strike configuration is described in each table

The last two entries in the table describe the Half Life 2 Counter-Strike configuration used by the client. This differed between clients. However, the following Half Life 2 Counter-Strike configuration was common to all clients.

Table 2. Half Life 2 Counter-Strike common configuration

Steam Setting->Internet	LAN/T1 >1M
Multiplayer Decal Limit	200
Main->Options->Multiplayer->Advanced->Automatically Switch To Picked Up Weapon If More Powerful	Yes
Main->Options->Multiplayer->Advanced->Centre Player Names	Yes
Main->Options->Multiplayer->Advanced->Auto Health	Yes
Main->Options->Multiplayer->Advanced->Show A Progress Bar When Diffusing C4	Yes
Main->Options->Keyboard->Advanced->Fast Weapon Switch	On

Table 3. Client 1 configuration

IP address	136.186.229.70
CPU	Intel Celeron 2.4GHz (8kb L1 cache, 128kb L2 cache)
RAM	512MB DDR RAM (2 x 256MB in dual channel configuration)
Motherboard	ASUS P4-P800VM
Onboard NIC	Intel 82801BA (D865) Pro/100 VE
Onboard Video	Sparkle Nvidia GeForce 6600 256MB AGP 8x graphics card (BIOS revision 5.43.02.46T5DH)
HDD	Western Digital WD400JB 40GB PATA UDMA100
OS	MS Windows XP Professional SP2 + all critical security patches as at 09/01/2006
Other	NVIDIA DRIVER: 81.98_forceware_winxp2k_english_whql.exe
Video Rendering Mode	DirectX
Resolution	800x600

Table 4. Client 2 configuration

IP address	136.186.229.71
CPU	Intel Celeron 2.8GHz (8kb L1 cache, 128kb L2 cache)
RAM	1GB DDR RAM (2 x 512MB in dual channel configuration)
Motherboard	ASUS P4-P800VM
Onboard NIC	Intel 82801BA (D865) Pro/100 VE
Onboard Video	Sparkle Nvidia GeForce 6600 256MB AGP 8x graphics card (BIOS revision 5.43.02.46T5DH)
HDD	Seagate ST380011A/8.01 80GB PATA UDMA100
OS	MS Windows XP Professional SP2 + all critical security patches as at 09/01/2006
Other	NVIDIA DRIVER: 81.98_forceware_winxp2k_english_whql.exe
Video Rendering Mode	DirectX
Resolution	640x480

Table 5. Client 3 configuration

IP address	136.186.229.72
Specs same as 136.186.229.71	
Video Rendering Mode	DirectX
Resolution	800x600

Table 6. Client 4 configuration

IP address	136.186.229.73
Specs same as 136.186.229.71 except for NVIDIA driver version. 78.01_winxp2k_english_whql.exe	
Video Rendering Mode	DirectX
Resolution	800x600

Table 7. Client 5 configuration

IP address	136.186.229.74
Specs same as 136.186.229.71 except for NVIDIA driver version. 7.1.8.9 (from device manager -> display adapter -> driver tab)	
Video Rendering Mode	DirectX
Resolution	800x600

Table 8. Client 6 configuration

IP address	136.186.229.75
Specs same as 136.186.229.71	
Video Rendering Mode	DirectX
Resolution	800x600

Table 9. Client 7 configuration

IP address	136.186.229.92
CPU	Intel P4 3.0GHz
RAM	512MB DDR RAM (1x512MB)
Motherboard	Gigabyte GA81865 GM-775
Onboard NIC	Marvel Yukon Gigabit Ethernet 10/100/1000
Onboard Video	Sparkle Nvidia GeForce 6600 256MB AGP 8x graphics card (BIOS revision 5.43.02.46T5DH)
HDD	Seagate ST380817AS 80GB SATA150
OS	MS Windows XP Professional SP2 + all critical security patches as at 09/01/2006
Other	NVIDIA DRIVER: 7.7.7.7
Video Rendering Mode	DirectX
Resolution	1024x768

Table 10. Client 8 configuration

IP address	136.186.229.126
CPU	Intel Celeron 2.4GHz (8kb L1 cache, 128kb L2 cache)
RAM	1.25 GB DDR RAM
Motherboard	ASUS P4-P800VM
Onboard NIC	Intel 82801BA (D865) Pro/100 VE
Onboard Video	Sparkle Nvidia GeForce 6600 256MB AGP 8x graphics card (BIOS revision 5.43.02.46T5DH)
HDD	Western Digital WD400JB 40GB PATA UDMA100
OS	MS Windows XP Professional SP2 + all critical security patches as at 22/06/2005
Other	NVIDIA DRIVER: 7.1.8.4 (from device manager -> display adapter -> driver tab)
Video Rendering Mode	DirectX
Resolution	800x600

Table 11. Client 9 configuration

IP address	136.186.229.138
CPU	Intel Celeron 2.4GHz (8kb L1 cache, 128kb L2 cache)
RAM	512 MB DDR RAM (2 x 256MB in dual channel)
Motherboard	ASUS P4-P800VM
Onboard NIC	Intel 82801BA (D865) Pro/100 VE
Onboard Video	Sparkle Nvidia GeForce 6600 256MB AGP 8x graphics card (BIOS revision 5.43.02.46T5DH)
HDD	Western Digital WD400JB 40GB PATA UDMA100
OS	MS Windows XP Professional SP2 + all critical security patches as at 09/01/2006
Other	NVIDIA DRIVER: 7.7.7.2
Video Rendering Mode	DirectX
Resolution	800x600

All Half Life 2 Counter-Strike client software was patched to the latest version as at January 31st, 2006.

Teams never differed in numbers of players by more than one i.e. even numbers of players were equally divided between both teams, odd numbers of players were split such that one team had one extra player.

D. Network configuration

The Half Life 2 Counter-Strike clients were attached to the central server via the CAIA LAN running at 100 Mbps. The traffic capturing was done on a bridge machine sitting between the Half Life 2 Counter-Strike dedicated server and the CAIA LAN. The traffic was captured using **tcpdump** [4] to obtain a raw packet trace of all LAN traffic during each experiment.

The accuracy of the timestamps generated by tcpdump on the traffic capturing machine is documented in [5].

III. NETWORK TRACES

This section describes the different Half Life 2 Counter-Strike traffic traces that are available on the SONG databse. All traces can be found under the hierarchy **SONG – traffic traces Half Life 2 Counter-Strike.** The naming convention used for the tcpdump files described in this report is as follows: `hl2cs_<trialdate>_<run#>_<mapname>_<numplayers>.dmp` `l2cs_<trialdate>_<run#>_<mapname>_<numplayers>_fragment.dmp` or `hl2cs_<trialdate>_<run#>_<mapname>_dx80_<numplayers>.dmp` `hl2cs_<trialdate>_<run#>_<mapname>_dx80_<numplayers>_fragment.dmp`, depending on the version of DirectX used.

The naming convention used for the Half Life 2 Counter-Strike log files described in this report is as follows: `<date>_<mapname>_<numplayers>.log` or `<date>_<mapname>_dx80_<numplayers>.log`, depending on the version of DirectX used.

Traffic was captured on the game server machine using the following configuration:

- **tcpdump** has been configured to capture the first 100 bytes of each packet. This 100 bytes is made up of:
    - 14 bytes – Ethernet frame header
    - 20 bytes – IP header
    - 8 bytes – UDP header
    - 58 bytes – first part of the UDP payload

The data collected has not been anonymised.

The tcpdump files that end in extension "_fragment.dmp" are for general consumption and are provided as a cut down sample of the full tcpdump files. The fragment files contain only packet header information for 5000*number_of_participating_clients packets. The packets are obtained from an offset of 10000 packets into the original full trace to ensure only active game traffic makes up the sample.

For example, the sample file for the `hl2cs_150206_1_dedust_9.dmp` full trace is named `hl2cs_150206_1_dedust_9_fragment.dmp` and contains 9*5000 = 45000 packet headers, for the packets numbered 10000 to 54999 (inclusive) in the full trace file.

A. Game Trials Using DirectX 9

Table 12. Trial 1

Number of clients	2
Game length	10 mins
Full Tcpdump file	hl2cs_070206_1_dedust_2.dmp
Full Tcpdump MD5	1aacffe1b425709aa9cee62477e80fd9
Sample Tcpdump file	hl2cs_070206_1_dedust_2_fragment.dmp
Sample Tcpdump MD5	9153b94a5ae8ad9b2bb290b2d1808dc5
Log file	070206_dedust_2.log

Table 13. Trial 2

Number of clients	3
Game length	20 mins
Full Tcpdump file	hl2cs_070206_1_dedust_3.dmp
Full Tcpdump MD5	97e814843c0ed5b95f1e98764386e11f
Sample Tcpdump file	hl2cs_070206_1_dedust_3_fragment.dmp
Sample Tcpdump MD5	af15ef6fa6f9a16e4c29e66c75f24b72
Log file	070206_dedust_3.log

Table 14. Trial 3

Number of clients	6
Game length	20 mins
Full Tcpdump file	hl2cs_080206_1_dedust_6.dmp
Full Tcpdump MD5	7a0754bed03f39f2e54d244fc59403ab
Sample Tcpdump file	hl2cs_080206_1_dedust_6_fragment.dmp
Sample Tcpdump MD5	7346d2b2c2c80b2fea711a6716c449f1
Log file	080206_dedust_6.log

Table 15. Trial 4

Number of clients	4
Game length	20 mins
Full Tcpdump file	hl2cs_080206_1_dedust_4.dmp
Full Tcpdump MD5	cd31df78431be85dcc660afcb5d3bb59
Sample Tcpdump file	hl2cs_080206_1_dedust_4_fragment.dmp
Sample Tcpdump MD5	2689e7635b53be3325817ae9c90a0f7f
Log file	080206_dedust_4.log

Table 16. Trial 5

Number of clients	7
Game length	20 mins
Full Tcpdump file	hl2cs_090206_1_dedust_7.dmp
Full Tcpdump MD5	9c877d090926dc18e35d1e206c385e4a
Sample Tcpdump file	hl2cs_090206_1_dedust_7.dmp
Sample Tcpdump MD5	e380d3309499ff310f1a3e3e244b2f8f
Log file	090206_dedust_7.log

Table 17. Trial 6

Number of clients	8
Game length	20 mins
Full Tcpdump file	hl2cs_090206_1_dedust_8.dmp
Full Tcpdump MD5	7e3a8e09ddf4d660784ba6570d49954e
Sample Tcpdump file	hl2cs_090206_1_dedust_8_fragment.dmp
Sample Tcpdump MD5	35b3fcabc4be4a49ba638e80ec41c902
Log file	090206_dedust_8.log

Table 18. Trial 7

Number of clients	5
Game length	20 mins
Full Tcpdump file	hl2cs_090206_1_dedust_5.dmp
Full Tcpdump MD5	89fc4def125f02d3ed0974b69832a7ab
Sample Tcpdump file	hl2cs_090206_1_dedust_5_fragment.dmp
Sample Tcpdump MD5	193a5cb1f5cb3b2e47dd9938c51555d3
Log file	090206_dedust_5.log

Table 19. Trial 8

Number of clients	5
Game length	20 mins
Full Tcpdump file	hl2cs_100206_1_csitaly_5.dmp
Full Tcpdump MD5	0e8d09230a53673b3948b170aaedaca0
Sample Tcpdump file	hl2cs_100206_1_csitaly_5_fragment.dmp
Sample Tcpdump MD5	9a245b4bebff4baf2e46909c41216b73
Log file	100206_csitaly_5.log

Table 20. Trial 9

Number of clients	6
Game length	20 mins
Full Tcpdump file	hl2cs_130206_1_csitaly_6.dmp
Full Tcpdump MD5	a00c73a837de0938654a250c240190f5
Sample Tcpdump file	hl2cs_130206_1_csitaly_6_fragment.dmp
Sample Tcpdump MD5	85b915334c3196861fe8417181049e1f
Log file	130206_csitaly_6.log

Table 21. Trial 10

Number of clients	9
Game length	20 mins
Full Tcpdump file	hl2cs_150206_1_dedust_9.dmp
Full Tcpdump MD5	c6d5f76226c43ff669c98c28dd4008ff
Sample Tcpdump file	hl2cs_150206_1_dedust_9_fragment.dmp
Sample Tcpdump MD5	3225ee19c305affaf840dd2de28cc6a7
Log file	150206_dedust_9.log

B. Game Trials Using DirectX 8

Table 22. Trial 11

Number of clients	5
Game length	20 mins
Full Tcpdump file	hl2cs_170206_1_dedust_dx80_5.dmp
Full Tcpdump MD5	c2ca09b1890d449a6ca357ee305526b2
Sample Tcpdump file	hl2cs_170206_1_dedust_dx80_5.dmp
Sample Tcpdump MD5	8b879e433ad1cbc00b3240f93f662f04
Log file	170206_dedust_dx80_5.log

Table 23. Trial 12

Number of clients	6
Game length	20 mins
Full Tcpdump file	hl2cs_170206_1_dedust_dx80_6.dmp
Full Tcpdump MD5	4021aa84bcbbee72de1fbdf4cb852567
Sample Tcpdump file	hl2cs_170206_1_dedust_dx80_6.dmp
Sample Tcpdump MD5	726481844fb59cb3456c18a030f2d5a5
Log file	170206_dedust_dx80_6.log

How To Cite

This section provides examples of how to cite any tracefiles or their related technical reports obtained from the online SONG database.

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[3] "Counter-Strike.net -- The Official Web Site", 2006, http://www.counter-strike.net/

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[5] L. Stewart, "Evaluation of the CAIA GENIUS Bridge's Timestamping Accuracy", CAIA Technical Report 060413A, April 2006, http://caia.swin.edu.au/reports/060413A/CAIA-TR-060413A.pdf