SONG: Quake 3 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 Quake 3 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 Quake 3 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

Quake 3 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 QUAKE3 CONFIG PARAMETERS	seta sv_maxclients 12
	seta g_quadfactor 4
	seta g_gametype 0
	seta g_weaponrespawn 3
	seta g_inactivity 200
	seta g_forcerespawn 1
	seta g_callvote 0
	seta g_allowvote 0
	seta bot_nochat 1

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 Quake3 configuration is described in each table

The last three entries in the table describe the Quake 3 configuration used by the client. This differed between clients. However, the following Quake 3 configuration was common to all clients

Table 2. Quake 3 common configuration

Setup->System->Network->Data rate	LAN
Setup->System->Graphics->GL Driver	Default
Setup->System->Graphics->GL Extensions	On
Setup->System->Graphics->Colour Depth	32 bit
Setup->System->Graphics->Fullscreen	On
Setup->System->Graphics->Lighting	Lightmap
Setup->System->Graphics->Geometric Detail	High
Setup->System->Graphics->Texture quality	32 bit
Setup->Game Options->Simple items	Off
Setup->Game Options->Marks on walls	On
Setup->Game Options->Ejecting brass	On
Setup->Game Options->Dynamic lights	On
Setup->Game Options->High quality sky	On
Setup->Game Options->Sync every frame	Off
Setup->Game Options->Force player models	Off
Setup->Game Options->Draw Team Overlay	Off

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 Mode	800x600
Texture Detail	¾
Texture Filter	Bilinear

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 mode	1024 x 768
Texture Detail	4 / 4
Texture Filter	Trilinear

Table 5. Client 3 configuration

IP address	136.186.229.72
Specs same as 136.186.229.71	
Video mode	1024x768
Texture Detail	¾
Texture Filter	Bilinear

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 mode	640x480
Texture Detail	¾
Texture Filter	Bilinear

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 mode	1024x768
Texture Detail	¾
Texture Filter	Trilinear

Table 8. Client 6 configuration

IP address	136.186.229.75
Specs same as 136.186.229.71	
Video mode	800x600
Texture Detail	¾
Texture Filter	Bilinear

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 mode	1280x1024
Texture Detail	4/4
Texture Filter	Trilinear

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 mode	1024 x 768
Texture Detail	¾
Texture Filter	Bilinear

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	FreeBSD 5.4 Release
Other	NVIDIA DRIVER: 1.0-7174 (from sysctl hw.nvidia.version) "sysctl kern.clockrate" = "kern.clockrate: { hz = 100, tick = 10000, profhz = 1024, stathz = 128 }"
Video mode	800x600
Texture Detail	¾
Texture Filter	Trilinear

All Windows Quake3 client software was patched to v1.32. All FreeBSD Quake3 client software was patched to the equivalent v1.32b.

D. Network configuration

The Quake 3 clients were attached to the central server via the CAIA LAN running at 100 Mbps. The traffic capturing was done on the machine running the Quake 3 dedicated server. 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 Quake 3 traffic traces that are available on the SONG databse. All traces can be found under the hierarchy **SONG – traffic traces – Quake3.** The naming convention used for the tcpdump files described in this report is as follows:

`quake3_<trialdate>_<run#>_<mapname>_<numplayers>.dmp`
`quake3_<trialdate>_<run#>_<mapname>_<numplayers>_fragment.dmp.`

The naming convention used for the Quake 3 log files described in this report is as follows: `<configfilename>-<date>_<time>_<pid>_<udpport>.log`.

Traffic was captured 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 `quake3_100106_1_caialab3_9.dmp` full trace is named `quake3_100106_1_caialab3_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

Table 12. Trial 1

Number of clients	9
Full Tcpdump file	quake3_100106_1_caialab3_9.dmp
Full Tcpdump MD5	619b87c75babb07b1a2334dadb56349e
Sample Tcpdump file	quake3_100106_1_caialab3_9_fragment.dmp
Sample Tcpdump MD5	dff76bb000aca0655d655e2cd84c5c98
Log file	jukebox-100106_1754_23761_27960.log

Table 13. Trial 2

Number of clients	8
Full Tcpdump file	quake3_100106_1_caialab3_8.dmp
Full Tcpdump MD5	e0d145e7c773599e9c6c01401b3169fa
Sample Tcpdump file	quake3_100106_1_caialab3_8_fragment.dmp
Sample Tcpdump MD5	848994eafc7e89a47ff1a0361551e53f
Log file	jukebox-100106_1820_23886_27960.log

Table 14. Trial 3

Number of clients	2
Full Tcpdump file	quake3_100106_1_caialab3_2.dmp
Full Tcpdump MD5	d983d0c3e71b76bfaa6c042081216704
Sample Tcpdump file	quake3_100106_1_caialab3_2_fragment.dmp
Sample Tcpdump MD5	eb4031fc2c1efb0df0bf7c3e91c45818
Log file	jukebox-100106_1857_24026_27960.log

Table 15. Trial 4

Number of clients	7
Full Tcpdump file	quake3_110106_1_caialab3_7.dmp
Full Tcpdump MD5	5225dc04016e3a9b3ab44e3586685da9
Sample Tcpdump file	quake3_110106_1_caialab3_7_fragment.dmp
Sample Tcpdump MD5	2e4f2ba3077f43741b18155ada77cab9
Log file	jukebox-110106_1707_27067_27960.log

Table 16. Trial 5

Number of clients	6
Full Tcpdump file	quake3_110106_1_caialab3_6.dmp
Full Tcpdump MD5	c9234f4ccfa17ebbdff12aa72605dcc3
Sample Tcpdump file	quake3_110106_1_caialab3_6_fragment.dmp
Sample Tcpdump MD5	5ffb4504af51c8103d3ddea609d5a5e7
Log file	jukebox-110106_1731_27141_27960.log

Table 17. Trial 6

Number of clients	5
Full Tcpdump file	quake3_110106_1_caialab3_5.dmp
Full Tcpdump MD5	068bf35ee6f086a8719d4b2e4682605a
Sample Tcpdump file	quake3_110106_1_caialab3_5_fragment.dmp
Sample Tcpdump MD5	384c8db44e42a69e70954592f6c0e93a
Log file	jukebox-110106_1756_27234_27960.log

Table 18. Trial 7

Number of clients	4
Full Tcpdump file	quake3_110106_1_caialab3_4.dmp
Full Tcpdump MD5	6c74d4ab0e499fe0479740b5e5dc6077
Sample Tcpdump file	quake3_110106_1_caialab3_4_fragment.dmp
Sample Tcpdump MD5	100cf4f06dd62b353a595d879aaac007
Log file	jukebox-110106_1819_27307_27960.log

Table 19. Trial 8

Number of clients	3
Full Tcpdump file	quake3_110106_1_caialab3_3.dmp
Full Tcpdump MD5	14f29f70deb4a6f5a3da686c1afdccb8
Sample Tcpdump file	quake3_110106_1_caialab3_3_fragment.dmp
Sample Tcpdump MD5	7f102c04c19a89c131300ec3ee26a6cb
Log file	jukebox-110106_1843_27382_27960.log

Table 20. Trial 9

Number of clients	5
Full Tcpdump file	quake3_020206_1_pigskin_5.dmp
Full Tcpdump MD5	86eba542aa9838b2cb8c2ca8c9595b7a
Sample Tcpdump file	quake3_020206_1_pigskin_5_fragment.dmp
Sample Tcpdump MD5	761dfa2e656b7656a44dc3e3693c7a49
Log file	jukebox-020206_1528_43764_27960.log

Table 21. Trial 10

Number of clients	6
Full Tcpdump file	quake3_020206_1_pigskin_6.dmp
Full Tcpdump MD5	43d787d3612292b099369c1c7ca17e1c
Sample Tcpdump file	quake3_020206_1_pigskin_6_fragment.dmp
Sample Tcpdump MD5	bed933aa13f07981ebf9a1a1a11b0927
Log file	jukebox-020206_1556_43874_27960.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.

L. Stewart, P. Branch, "HLCS, Map: dedust, 5 players, 13Jan2006", Centre for Advanced Internet Architectures SONG Database, http://caia.swin.edu.au/sitcrc, hlcs_130106_1_dedust_5_fragment.tar.gz, April 4th, 2006.

L. Stewart, P. Branch, "Quake3, Map: caialab3, 8 players, 10Jan2006", Centre for Advanced Internet Architectures SONG Database, http://caia.swin.edu.au/sitcrc, quake3_100106_1_caialab3_8_fragment.tar.gz, April 4th, 2006.

L. Stewart, P. Branch, "HL2DM, Map: overwatch, 3 players, 3Feb2006", Centre for Advanced Internet Architectures SONG Database, http://caia.swin.edu.au/sitcrc, hl2dm_030206_1_overwatch_3_fragment.tar.gz, April 4th, 2006.

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[3] "id Software", 2005, http://www.idsoftware.com

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