SONG: Quake 4 Network Traffic Trace Files

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CAIA Technical Report 060814A
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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 4 game running on a central server with between two and seven 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 captured. 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 4 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 4 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 QUAKE4 CONFIG PARAMETERS	net_LANServer 1
	si_maxPlayers 8
	si_countdown 10
	si_fragLimit 0
	si_timeLimit 20
	seta g_log "1"
	seta g_gamelog "1"
	seta logFile "2"
	seta com_logMPStats "1"
	seta com_logDemos "1"

C. Client configuration

There were seven different client machines involved in the trials. Each trial used between two and seven clients. The IP addresses of the clients and the client machine configuration (hardware and operating system) and Quake4 configuration is described in each table

The last two entries in the table describe the Quake 4 configuration used by the client. This differed between clients. However, the following Quake 4 configuration was common to all clients

Table 2. Quake 4 common configuration

Setup->Game Options->Auto Weapon Reload	Yes
Setup->Game Options->Show Decals	Yes
Setup->Game Options->Show Gun Model	Yes
Setup->Game Options->Crossair	Weapon Default
Setup->Game Options->Crossair Size	Default
Setup->System->Video Quality	Low Quality
Setup->System->Fullscreen	Yes
Setup->System->Advanced Settings->High Quality Special Effects	No
Setup->System->Advanced Settings->Enable Shadows	Yes
Setup->System->Advanced Settings->Enable Specular	Yes
Setup->System->Advanced Settings->Enable Bump Maps	Yes
Setup->System->Advanced Settings->Vertical Sync	No
Setup->System->Advanced Settings->Antialiasing	Off
Multiplayer->Settings->Data Rate	T1/LAN
Multiplayer->Settings->Punkbuster	Enabled

Table 3. Client 1 configuration

IP address	136.186.229.76
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	Gainward Nvidia GeForce 6600 256MB AGP 8x graphics card (BIOS revision 5.43.02.80.00)
HDD	Western Digital WD400JB 40GB PATA UDMA100
OS	MS Windows XP Professional SP2 + all critical security patches as at 20/07/2006
Other	NVIDIA DRIVER: 9.1.3.1
Screen Size	640x480
Aspect Ratio	Standard (4:3)

Table 4. Client 2 configuration

IP address	136.186.229.74
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 20/07/2006
Other	NVIDIA DRIVER: 7.1.8.9
Screen Size	640x480
Aspect Ratio	Standard (4:3)

Table 5. Client 3 configuration

IP address	136.186.229.73
Specs same as 136.186.229.74 except runs FreeBSD 5.4-RELEASE with nVidia driver version 1.0-7676	
Screen Size	640x480
Aspect Ratio	Standard (4:3)

Table 6. Client 4 configuration

IP address	136.186.229.75
Specs same as 136.186.229.74 except runs nVidia driver version 8.1.9.8	
Screen Size	800x600
Aspect Ratio	Standard (4:3)

Table 7. Client 5 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 20/07/2006
Other	NVIDIA DRIVER: 7.7.7.7
Screen Size	1024x768
Aspect Ratio	Standard (4:3)

Table 8. Client 6 configuration

IP address	136.186.229.101
CPU	Intel T2300 1.66GHz Duo
RAM	1.00 GB DDRII RAM
Motherboard	ASUS A6000 series notebook
Onboard NIC	Realtek RTL 8168/8111 PCI-E Gigabit Ethernet
Onboard Video	ATI Radeon x1600
HDD	Hitachi 80GB 5400RPM PATA UDMA100
OS	MS Windows XP Professional SP2 + all critical security patches as at 20/07/2006
Other	ATI DRIVER: 8.241.0.0 (from device manager -> display adapter -> driver tab)
Screen Size	1280x768
Aspect Ratio	Widescreen (16:9)

Table 9. Client 7 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 }"
Screen Size	640x480
Aspect Ratio	Standard (4:3)

All Windows and FreeBSD Quake4 client software was patched to v1.2.

D. Network configuration

The Quake 4 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 Quake 4 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 Quake 4 traffic traces that are available on the SONG databse. All traces can be found under the hierarchy **SONG – traffic traces – Quake4.** The naming convention used for the tcpdump files described in this report is as follows:
```
quake4_<trialdate>_<run#>_<mapname>_<numplayers>.dmp
quake4_<trialdate>_<run#>_<mapname>_<numplayers>_fragment.dmp.
```

The naming convention used for the Quake 4 log files described in this report is as follows:
```
<configfilename>_<date>_<mapname>_<numplayers>.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 `quake4_200706_1_q4dm1_5.dmp` full trace is named `quake4_200706_1_q4dm1_5_fragment.dmp` and contains 5*5000 = 25000 packet headers, for the packets numbered 10000 to 34999 (inclusive) in the full trace file.

A. Game Trials

Table 10. Trial 1

Number of clients	2
Full Tcpdump file	quake4_200706_1_q4dm1_2.dmp
Full Tcpdump MD5	9dac0ebebff6b8a96f8fe51834e08129
Sample Tcpdump file	quake4_200706_1_q4dm1_2_fragment.dmp
Sample Tcpdump MD5	c83f7bea12059fbe10fc4f8143964058
Log file	trials_200706_q4dm1_2.log

Table 11. Trial 2

Number of clients	3
Full Tcpdump file	quake4_200706_1_q4dm1_3.dmp
Full Tcpdump MD5	a30f6ae031dfd668a7c789a285ae0854
Sample Tcpdump file	quake4_200706_1_q4dm1_3_fragment.dmp
Sample Tcpdump MD5	f104242bdc4aa481561c10a4da16feb3
Log file	trials_200706_q4dm1_3.log

Table 12. Trial 3

Number of clients	4
Full Tcpdump file	quake4_200706_1_q4dm1_4.dmp
Full Tcpdump MD5	6776e7b95e628e5e169d434d9aaedd85
Sample Tcpdump file	quake4_200706_1_q4dm1_4_fragment.dmp
Sample Tcpdump MD5	393118947df5bf3769290a0559ffcb37
Log file	trials_200706_q4dm1_4.log

Table 13. Trial 4

Number of clients	5
Full Tcpdump file	quake4_200706_1_q4dm1_5.dmp
Full Tcpdump MD5	17c4d2ea98ee382038a659f714d8341f
Sample Tcpdump file	quake4_200706_1_q4dm1_5_fragment.dmp
Sample Tcpdump MD5	4d76e6a27acc1ed1780ca1e366f7c982
Log file	trials_200706_q4dm1_5.log

Table 14. Trial 5

Number of clients	5
Full Tcpdump file	quake4_200706_1_q4dm2_5.dmp
Full Tcpdump MD5	d2b020c68f9632eee2f4ef79469d2f89
Sample Tcpdump file	quake4_200706_1_q4dm2_5_fragment.dmp
Sample Tcpdump MD5	860ae63eea4935281fcfdb09a78257a6
Log file	trials_200706_q4dm2_5.log

Table 15. Trial 6

Number of clients	6
Full Tcpdump file	quake4_310706_1_q4dm1_6.dmp
Full Tcpdump MD5	f29650af53ff1dd9d50701f0bc5bd427
Sample Tcpdump file	quake4_310706_1_q4dm1_6_fragment.dmp
Sample Tcpdump MD5	a8f792c4593bb0f41655d72daffec44e
Log file	trials_310706_q4dm1_6.log

Table 16. Trial 7

Number of clients	7
Full Tcpdump file	quake4_310706_1_q4dm1_7.dmp
Full Tcpdump MD5	eb8f1cae3ded6f3b96f63d4a9f8ecf4f
Sample Tcpdump file	quake4_310706_1_q4dm1_7_fragment.dmp
Sample Tcpdump MD5	3d1e3e5158ca66e27dff6077166a5b5f
Log file	trials_310706_q4dm1_7.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.

REFERENCES

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[3] "id Software", 2006, http://www.idsoftware.com

[4] "TCPDump/libpcap", 2006, http://www.tcpdump.org

[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