Research On GameSpy Protocol

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Part I

Research On GameSpy SDK

Chapter 1

GameSpy General Construction

In GameSpy SDK there are 9 modules, which constructed the GameSpy main functions.

1.1 GameSpy SDK Module

- GameSpy Presence Connection Manager
- GameSpy Presence Search Player
- Nat Negotiation
- Query Report 2
- Server Browser
- Game Patching
- Master Server Patching
- Game Stats and Tracking
- Chat

1.1.1 Basic Descriptions of Protocol

In this part, we show the basic descriptions of protocol in GameSpy Presence SDK.

1.1.1.1 The String Pattern

We first introduce the pattern of the string, which is using to make up a request. This kind of string is represent a value in a request sends by the client as Table 1.1.

String	Description
$\backslash\langle content\rangle\backslash\backslash$	The value is $\langle content\rangle$

Table 1.1: Value string

This kind of string is represent a command in a request sends by the client as Table 1.2. The command will end with \\ or \ depends on whether run at the server-side or client-side.

String	Description
$\backslash command\backslash\backslash$	This is a command
$\backslash error\backslash\backslash$	Error command
$\backslash lc\backslash$	Login command

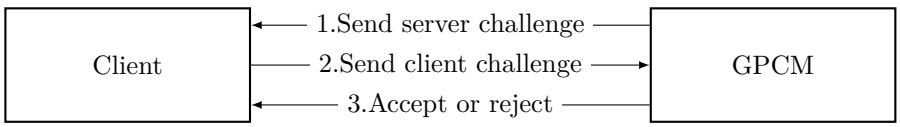
Table 1.2: Command string

Chapter 2

The Detail of GameSpy Presence SDK

2.1 GameSpy Presence Connection Manager

GameSpy Presence SDK contain two server, GameSpy Presence Connection Manager (GPCM) and GameSpy Presence Search Player (GPSP). GPCM is a server that handle login request and response with corresponding user information stored on GameSpy. GPSP is a server that handle search request for user.



2.1.1 Server IP and Ports

Table **??** are the GPCM and GPSP IP and Ports that client/game connect to.

IP	Port
gpcm.gamespy.com	29900

Table 2.1: IP and Ports for GameSpy Presence Servers

2.1.2 Request For GameSpy Presence Connection Manager

Table 2.2 lists the request(already known by us) that clients send to GameSpy Presence Connection Manager server (GPSP).

Commands	Description
$\backslash inviteto\backslash\backslash$	Invite friends
$\backslash login\backslash\backslash$	Login to GPCM
$\backslash getprofile\backslash\backslash$	Get profile of some player
$\backslash addbuddy\backslash\backslash$	Add player to my friend list
$\backslash delbuddy\backslash\backslash$	Delete player from my friend list
$\backslash updateui\backslash\backslash$	?
$\backslash updatepro\backslash\backslash$	Update player's profile such as first name, last name, gender etc.
$\backslash logout\backslash\backslash$	Logout manually by user
$\backslash status\backslash\backslash$	Update status of a user
$\backslash ka\backslash\backslash$	Keep client alive(do not disconnect)

Table 2.2: Request For GameSpy Presence Connection Manager

Error response string for (GPCM, GPSP):

$$\backslash error\backslash\backslash err\backslash\langle errorcode\rangle\backslash\backslash fatal\backslash\backslash errmsg\backslash\langle errormessage\rangle\backslash id\backslash 1\backslash final\backslash \quad (2.1)$$

2.1.2.1 Login Phase

Client Login Request
There are three ways of login:

- AuthToken: Logging using an alphanumeric string that rapresents an user
- UniqueNick: Logging using a nickname that is unique from all the players
- User: Logging with the nickname and the password

The full login request string:

$$\begin{aligned}&\backslash login\backslash challenge\backslash\langle challenge\rangle\backslash authtoken\backslash\langle authtoken\rangle\\&\backslash uniquenick\backslash\langle uniquenick\rangle\backslash user\backslash\langle user\rangle\backslash userid\backslash\langle userid\rangle\\&\backslash profileid\backslash\langle profileid\rangle\backslash partnerid\backslash\langle partnerid\rangle\backslash response\backslash\langle response\rangle\\&\backslash firewall\backslash 1\backslash port\backslash\langle port\rangle\backslash productid\backslash\langle productid\rangle\\&\backslash gamename\backslash\langle gamename\rangle\backslash namespaceid\backslash\langle namespaceid\rangle\\&\backslash sdkrevision\backslash\langle sdkrevision\rangle\backslash quiet\backslash\langle quiet\rangle\backslash id\backslash 1\backslash final\backslash\end{aligned} \quad (2.2)$$

The value $\langle challenge\rangle$ for $\backslash challenge\backslash$ in 2.2 is a 10 byte alphanumeric string.

The following Table 2.3 is a description of string used in login request, GameSpy can use these string to find value in database.

Keys	Description	Type
login	The login command which use to identify the login request of client	
challenge	The user challenge used to verify the authenticity of the client	
authtoken	The token used to login (represent of an user)	
uniquenick	The unique nickname used to login	
user	The users account (format is NICKNAME@EMAIL)	
userid	Send the userid (for example when you disconnect you will keep this)	
profileid	Send the profileid (for example when you disconnect you will keep this)	
partnerid	This ID is used to identify a backend service logged with gamespy.(Nintendo WIFI Connection will identify his partner as 11, which means that for gamespy, you are logging from a third party connection)	
response	The client challenge used to verify the authenticity of the client	
firewall	If this option is set to 1, then you are connecting under a firewall/limited connection	
port	The peer port (used for p2p stuff)	
productid	An ID that identify the game you're using	
gamename	A string that rapresents the game that you're using, used also for several activities like peerchat server identification	
namespaceid	?	
sdkrevision	The version of the SDK you're using	
quiet	? Maybe indicate invisible login which can not been seen at friends list	
id	The value is 1	
final	Message end	

Table 2.3: Login parameter string

Login Response From Server

This response string 2.3, 2.4 is send by the server when a connection is accepted, and followed by a challenge2.2, which verifies the server that client connect to.

There are two kinds of login response string:

$$\begin{aligned}&\backslash lc\backslash 1\backslash challenge\backslash\langle challenge\rangle\backslash nur\\&\backslash userid\backslash\langle userid\rangle\backslash profileid\backslash\langle profileid\rangle\backslash final\backslash\end{aligned} \tag{2.3}$$

Keys	Description	Type
challenge	The challenge string sended by GameSpy Presence server	
nur	?	
userid	The userID of the profile	
profileid	The profileID	
final		

Table 2.4: The first type login response

$$\backslash lc\backslash 2\backslash sesskey\backslash\langle sesskey\rangle\backslash userid\backslash\langle userid\rangle\backslash profileid\backslash\langle profileid\rangle \\ \backslash uniquenick\backslash\langle uniquenick\rangle\backslash lt\backslash\langle lt\rangle\backslash proof\backslash\langle proof\rangle\backslash final\backslash \tag{2.4}$$

Keys	Description	Type
sesskey	The session key, which is a integer rapresentating the client connection	
userid	The userID of the profile	
profileid	The profileID	
uniquenick	The logged in unique nick	
lt	The login ticket, unknown usage	
proof	The proof is something similar to the response but it vary	
final		

Table 2.5: The second type login response

Proof in 2.5 generation: $md5(password)||48spaces$ The user could be AuthToken or the User/UniqueNick (with the extra PartnerID). server challenge that we received before. the client challenge that was generated before.

2.1.2.2 User Creation

This commmand 2.5 is used to create a user in GameSpy.

$$\backslash newuser\backslash email\backslash\langle email\rangle\backslash nick\backslash\langle nick\rangle \\ \backslash passwordenc\backslash\langle passwordenc\rangle\backslash productid\backslash\langle productid\rangle \\ \backslash gamename\backslash\langle gamename\rangle\backslash uniquenick\backslash\langle uniquenick\rangle \\ \backslash cdkeyenc\backslash\langle cdkeyenc\rangle\backslash partnerid\backslash\langle partnerid\rangle\backslash id\backslash 1\backslash final\backslash \tag{2.5}$$

The description of each parameter string is shown in Table 2.6.

String	Description	Type
email	The email used to create	
nick	The nickname that will be created	
passwordenc	The encoded password (password XOR with Gamespy seed and the Base64 encoded)	
productid	An ID that identify the game you're using	
gamename	A string that rapresents the game that you're using, used also for several	
namespaceid	?Unknown	
uniquenick	Uniquenick that will be created	
cdkeyenc	The encrypted CDkey, encrypted method is the same as the passwordenc	
partnerid	This ID is used to identify a backend service logged with gamespy	
id	The value of id is 1	
final	Message end	

Table 2.6: User creation string

2.2 GameSpy Presence Search Player

Table **??** are the GPSP IP and Ports that client/game connect to.

IP	Port
gpsp.gamespy.com	29901

Table 2.7: IP and Ports for GameSpy Presence Search Player

2.2.1 Search User

This is the request that client sends to server:

$$\begin{aligned} &\backslash search\backslash\backslash sesskey\backslash < sesskey > \backslash profileid\backslash < profileid > \\ &\backslash namespaceid\backslash < namespaceid > \backslash partnerid\backslash < partnerid > \\ &\backslash nick\backslash < nick > \backslash uniquenick\backslash < uniquenick > \\ &\backslash email\backslash < email > \backslash gamename\backslash < gamename > \backslash final\backslash \end{aligned} \tag{2.6}$$

This is the response that server sends to client:

$$\begin{aligned} &\backslash bsr\backslash < profileid > \backslash nick\backslash < nick > \backslash uniquenick\backslash < uniquenick > \\ &\backslash namespaceid\backslash < namespaceid > \backslash firstname\backslash < firstname > \\ &\backslash lastname\backslash < lastname > \backslash email\backslash < email > \\ &\backslash bsrdone\backslash < gamespyencdeterminator > \backslash final\backslash \end{aligned} \tag{2.7}$$

2.3 GameSpy Status and Tracking

when game connect to GSTATS server, server will send an message to game which contains the challenge, the total length of message must bigger than

38bytes, and the challenge must bigger than 20bytes. when game received the challenge it will compute a response, the response is formed as follows. response = CRC32(<server challenge>,<length of server challenge>)||<game secret key> then game will compute the MD5 hash as MD5value = MD5(<response>,<length of response>) then encoded with Enctype3 then construct the challenge-response message as $\backslash auth\backslash\backslash gamename\backslash < gamename > \backslash response\backslash < MD5value > \backslash port\backslash < port > \backslash id\backslash < id >$

session key length (unknown) connction id = transfer ascii of sessionkey to integer

the initialization phase is finished. server challenge message length (bigger than 38-byte) server challenge length (bigger than 20-byte) $\backslash final\backslash$ is encrypted using XOR Enctype1 at the end of the challenge that sends by the server.

Part II

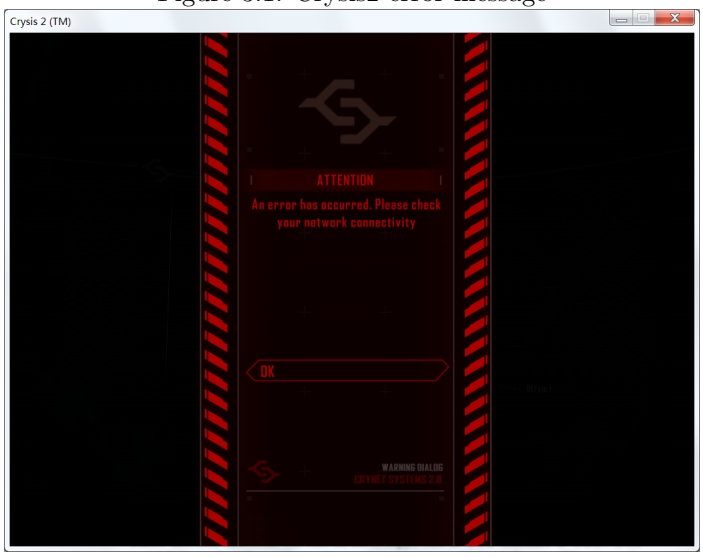
RetroSpy System Architecture

Chapter 3

Introduction

2014 is a year that thousands games are abandon by GameSpy. I still remember the day when GameSpy shutdown, no matter how hard i try to login into Crysis2 multiplayer, but the same error shows ”An error has occurred. Please check your network connectivity”3.1.

Figure 3.1: Crysis2 error message



Chapter 4

Database

This kind of string is represent a parameter in a request sends by the client 4.2. GameSpy uses the combination of the parameter to search the string with value, and sends the data back to client use this kind of parameter string.

4.0.1 Database Key Field

These keys is that GameSpy Presence SDK using to find a user in their database. Keys are shown in Table 4.1.

Keys	Description
user	An user contains the Email and the password, but contains multiple profiles
profileid	The profile contains the name, surname, birth date and all the rest user info, including an unique nickname used to identify the profile and a generic nickname used to show for example in games

Table 4.1: Key Field

String	Description
id\1\	This is a parameter string the value of *id* is 1
profileid\007\	This is a parameter string the value of *profileid* is 007

Table 4.2: Parameter string

Chapter 5

The Detail of RetroSpy Project

All projects in the RetroSpy visual studio solution is listed as follows.

- GameSpyLib: The library for all RetroSpy servers.
- CDKey: CD-Key server.
- NATNegotiation: NAT negotiation server.
- PresenceConnectionManager: GPCM server.
- PresenceSearchPlayer: GPSP server.
- QueryReport: Query report server.
- ServerBrowser: Server browser server.
- StatsAndTracking: Stats and tracking server.
- SAKEPersistentStorage: SAKE persistent storage server.

5.1 GameSpyLib

5.1.1 Common

5.1.2 Database

5.1.3 Extensions

5.1.4 Logging

5.1.5 Networks

There are two different servers in RetroSpy; one is TCP another is UDP. TCP and UDP work differently so the implementation will be different. We show the different implementing in 5.1.5.1 and 5.1.5.2.

5.1.5.1 Tcp

TcpServer class is only for making the connection and listening for connections. TcpStream is for receiving and sending the message.

5.1.5.2 Udp

UdpServer class does not need a server to handle connection and listen for connection, every client can be a server, and every server is a client. So this class has both receiving and sending functions.

5.2 CDKey

5.3 NATNegotiation

5.4 PresenceConnectionManager

5.4.1 LoginHandler

Different game will have different request. Some of request contain different combination of <key,value> pairs. The request we already known is shown in the Table 5.1.

Game name	request
armada2	firewall,port
gslive	uniquenick,productid,partnerid,gamename,sdkrevision
Crysis2	uniquenick,productid,partnerid,gamename,sdkrevision

Table 5.1: Game requests key

5.5 PresenceSearchPlayer

5.5.1 NewUserHandler

5.6 QueryReport

5.7 ServerBrowser

5.8 StatsAndTracking

5.9 SAKEPersistentStorage

Chapter 6

conclusion