CS 580 Client-Server Programming
Spring Semester, 2005
Doc 15 Gnutella
Contents

Reference

The Gnutella Protocol Specification v0.4, Document Revision 1.2, http://www9.limewire.com/developer/gnutella_protocol_0.4.pdf

Gnutella

- Peer-to-peer

- Gnutella program is both a server and a client: servent

- No central server

- Protocol does not discuss how one knows about other servents

Basic Idea

Servent connects to 1 or more remote servents

Can
* Ping the network

* Send a request for a file to see who has it

To get a file from a servent

* Connect to the servent directly with http request

Basic Protocol

Connect to another servent with

GNUTELLA CONNECT/<protocol version string>\n\n

Where <protocol version string> is 0.4

If the remote servent accepts the connection it must respond with

GNUTELLA OK\n\n

Both servents then can then send messages

Requests and Responses

Ping – who is on the network

Pong – response to a ping

Query – search the network for data

QueryHit – response to query

Push – Used to allow servents work behind firewall

Each Request/Response starts with a header

Header

Desciptor ID	Payload Descriptor	TTL	Hops	Payload Length

Byte offset   0   15   16   17   18   19   22

Descriptor ID

16 byte string
Uniquely identifies Request/Response

Payload Descriptor

Value	Meaning
0x00	Ping
0x01	Pong
0x40	Push
0x80	Query
0x81	QueryHit

TTL

Time to live

Number of times message will be forwarded by servents

Many servents will set TTL to 5 if is it larger

Each servent that gets the message reduces TTL by one before forwarding the message

Hops

Number of times message has been forwarded

Each servent that gets the message increase Hop by one before forwarding

Payload Length

Length of rest of message

Ping 0x00

No more content other then header

Pong 0x01

Sent only in response to a ping

Servent can cache pongs of other servents

Port	IP Address	Number of files shared	Number of kilobytes shared

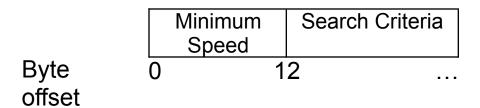Byte offset   0   12   56   910   13

Port

Port that responding servent can accept incoming connections

IP Address

IP Address of responding servent

This field uses big-endian format

Query 0x80

Minimum Speed	Search Criteria

Byte offset   0   12   …

Minimum Speed

Minimum speed (of connection) in kb/second of servents that should respond to this message

Search Criteria

Nul (0x00) terminated search string

Length of string must be included in the payload length field

QueryHit (0x81)

Sent in response to a Query

Descriptor ID in header should contain same value as the Query

Number of hits	Port	IP Address	Speed	Result Set	Servent Identifier

Byte offset   0   1   23   67   10   11   …   n   n+16

Number of hits

Number of hits in the result set

Port

Port number on which responding servent can accept incoming connections

IP Address

IP Address of responding servent

This field uses big-endian format

Speed

Speed of responding host's connection in kb/second

Result Set

File Index	File Size	File Name

Byte   0   34   78   …
offset

File Index

A number used by host to identify the file

File Size

Size in bytes of the file

File Name

Double-nul (0x0000) terminated name of the file

Servent Identifier

A 16-byte string uniquely identifying the responding servent on the network.

"This is typically some function of the servent's network address"

Extended Query Hit

Number of hits	Port	IP Address	Speed	Result Set	Trailer	Servent Identifier

Byte
offset   0   1   23   67   10 11   …   n   m m+1   m+17

Trailer

Vender Code	Open Data Size	Open Data	Private data

Byte   0   3   4   5   6   n
offset

How do we know if the trailer exists?

How do we know the length of the private data?

Push (0x40)

Servent Identifier	File Index	IP Address	Port

Byte   0   1516   1920   2324   25
offset

Servent Identifier

A 16-byte string uniquely identifying the servent on the network that should push the file

File Index

Index of the file to push

IP Address

IP Address of to which the file should be pushed

This field uses big-endian format

Port

Port to which the file should be pushed

Some Routing

Pong messages

Can only be send along path the carried the Ping

Servents should not forward a pong if they did not see the ping

QueryHit

Can only be send along path the carried the Query

Servents should not forward a query hit if they did not see the query

Push

Can only be send along path the carried the QueryHit

Servents should not forward a push if they did not see the query hit

Fowarding

Forward all Ping and Querys to all directly connected servents except to the one that sent it

Decrement TTL and increment Hops field

Don't forward messages that you have seen before

File Downloads

In response to a QueryHit download the file by using http.

Request the file uses following format:

```
GET /get/<File Index>/<File Name>/ HTTP/1.0\r\n
Connection: Keep-Alive\r\n
Range: bytes=0-\r\n
User-Agent: Gnutella\r\n 3  \r\n
```

Remote servent responses with:

HTTP 200 OK\r\n
Server: Gnutella\r\n
Content-type: application/binary\r\n
Content-length: fileSize\r\n
\r\n