

**CS 580 Client-Server Programming**  
**Spring Semester, 2004**  
**Doc 20 Gnutella**  
**Contents**

Reference.....	1
Gnutella.....	2
Requests and Responses.....	5
Header.....	6
Ping 0x00.....	8
Pong 0x01.....	9
Query 0x80.....	10
QueryHit (0x81).....	11
Push (0x40).....	14
Some Routing.....	15
File Downloads.....	16

**Reference**

The Gnutella Protocol Specification v0.4, Document Revision 1.2,

[http://www9.limewire.com/developer/gnutella\\_protocol\\_0.4.pdf](http://www9.limewire.com/developer/gnutella_protocol_0.4.pdf)

**Copyright** ©, All rights reserved. 2004 SDSU & Roger Whitney, 5500 Campanile Drive, San Diego, CA 92182-7700 USA. OpenContent (<http://www.opencontent.org/opl.shtml>) license defines the copyright on this document.

## **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 server with

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

Where <protocol version string> is 0.4

If the remote server accepts the connection it must respond with

```
GNUTELLA OK\n\n
```

Both servers 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 servers work behind firewall

Each Request/Response starts with a header

## Header

	Descriptor 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 server that gets the message increase Hop by one before forwarding

## **Payload Length**

Length of rest of message

## **Ping 0x00**

No more content other than 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	1	2	5	6	9	10		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	1 2 ...

### Minimum Speed

Minimum speed (of connection) in kb/second of servers 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	2 3	6 7	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 offset	0	3 4	7 8 ...

### 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 2	3 6	7 10	11 ...	n m	m+1 m+17

### Trailer

	Vender Code	Open Data Size	Open Data	Private data
Byte offset	0 3	4	5 6	n

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 offset	0            15	16            19	20            23	24            25

### 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 server responses with:

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