Reference

Gnutella

Requests and Responses

Header

Ping 0x00

Pong 0x01

Query 0x80

QueryHit (0x81)

Push (0x40)

Some Routing

File Downloads

Reference


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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 servants

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 servant with

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

Where `<protocol version string>` is 0.4

If the remote servant accepts the connection it must respond with

```
GNUTELLA OK
```

Both servants 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**

<table>
<thead>
<tr>
<th>Byte offset</th>
<th>Descriptor ID</th>
<th>Payload Descriptor</th>
<th>TTL</th>
<th>Hops</th>
<th>Payload Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
</tr>
</tbody>
</table>

**Descriptor ID**

16 byte string
Uniquely identifies Request/Response

**Payload Descriptor**

<table>
<thead>
<tr>
<th>Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00</td>
<td>Ping</td>
</tr>
<tr>
<td>0x01</td>
<td>Pong</td>
</tr>
<tr>
<td>0x40</td>
<td>Push</td>
</tr>
<tr>
<td>0x80</td>
<td>Query</td>
</tr>
<tr>
<td>0x81</td>
<td>QueryHit</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Port</th>
<th>IP Address</th>
<th>Number of files shared</th>
<th>Number of kilobytes shared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12</td>
<td>56</td>
<td>910</td>
</tr>
</tbody>
</table>

**Port**

Port that responding servent can accept incoming connections

**IP Address**

IP Address of responding servent

This field uses big-endian format
Query 0x80

<table>
<thead>
<tr>
<th>Byte offset</th>
<th>Minimum Speed</th>
<th>Search Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12</td>
<td>...</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Number of hits</th>
<th>Port</th>
<th>IP Address</th>
<th>Speed</th>
<th>Result Set</th>
<th>Servent Identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte offset</td>
<td>0</td>
<td>1</td>
<td>23</td>
<td>67</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
<td>…</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n</td>
<td>n+16</td>
</tr>
</tbody>
</table>

**Number of hits**

Number of hits in the result set

**Port**

Port number on which responding servant can accept incoming connections

**IP Address**

IP Address of responding servant

This field uses big-endian format

**Speed**

Speed of responding host’s connection in kb/second
Result Set

<table>
<thead>
<tr>
<th>File Index</th>
<th>File Size</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>34</td>
<td>78</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Number of hits</th>
<th>Port</th>
<th>IP Address</th>
<th>Speed</th>
<th>Result Set</th>
<th>Trailer</th>
<th>Servent Identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte offset</td>
<td>0</td>
<td>1</td>
<td>23</td>
<td>67</td>
<td>10</td>
<td>11... n</td>
</tr>
<tr>
<td></td>
<td>m</td>
<td>m+1</td>
<td>m+2</td>
<td>n</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Trailer

<table>
<thead>
<tr>
<th>Vender Code</th>
<th>Open Data Size</th>
<th>Open Data</th>
<th>Private data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte offset</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

How do we know if the trailer exists?

How do we know the length of the private data?
Push (0x40)

<table>
<thead>
<tr>
<th>Servent Identifier</th>
<th>File Index</th>
<th>IP Address</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte offset</td>
<td>0</td>
<td>1516</td>
<td>1920</td>
</tr>
</tbody>
</table>

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:

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

Remote server responses with:

```plaintext
HTTP 200 OK
Server: Gnutella
Content-type: application/binary
Content-length: fileSize
```