

Gnutella and JXTA

Based on Ivkovic's paper "Improving Gnutella Protocol".

Also based on Docs and Tutorials at

<http://www.jxta.org/>

Gnutella

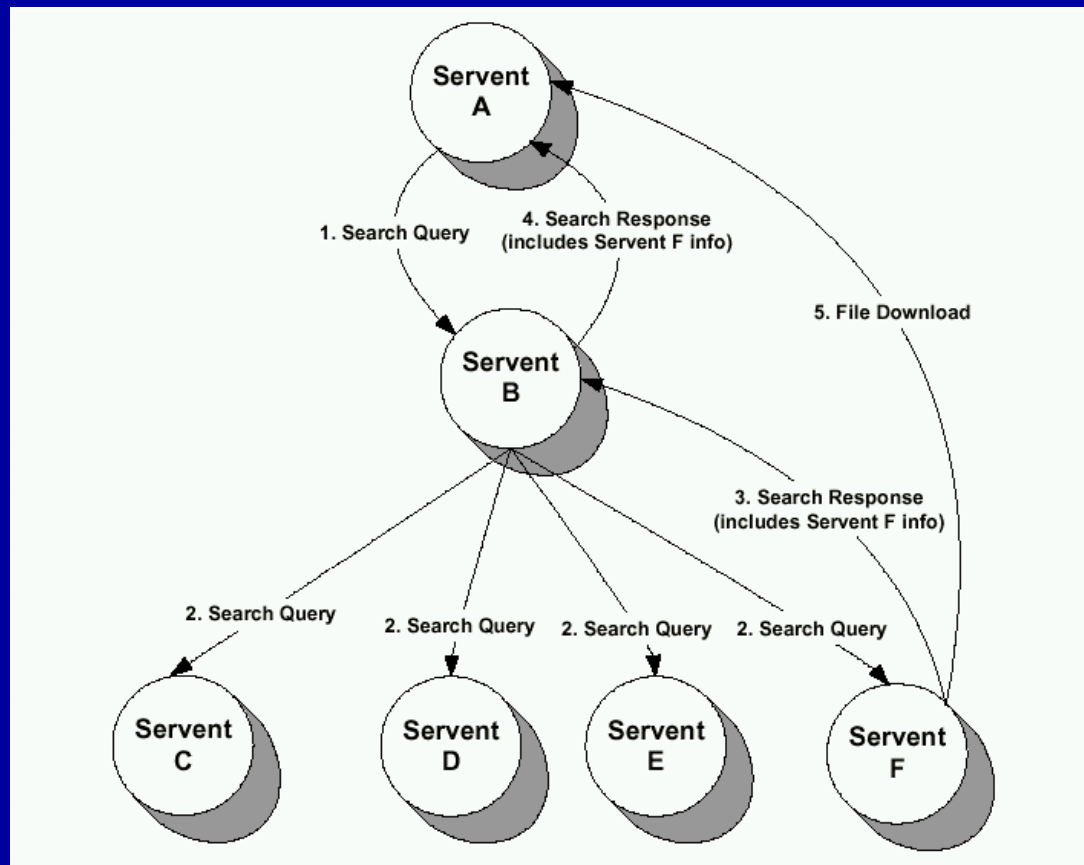
- Peer-to-peer indexing and searching service.
- Peer-to-peer point-to-point file downloading using HTTP.
- A gnutella node needs a server (or a set of servers) to “start-up”...
gnutellahosts.com provides a service with reliable initial connection points

But introduces a new single point of failure!

The Gnutella protocol (v0.4)

- PING – Notify a peer of your existence
- PONG – Reply to a PING request
- QUERY – Find a file in the network
- RESPONSE – Give the location of a file
- PUSHREQUEST – Request a server behind a firewall to push a file out to a client.

Gnutella Decentralized Model



Gnutella Descriptor Header

	<i>Descriptor ID</i>	<i>Payload Descriptor</i>	<i>TTL</i>	<i>Hops</i>	<i>Payload Length</i>
<i>Offset</i>	0 15	16	17	18	19 22

- Descriptor ID uniquely identifies descriptor on the network
- Payload Descriptor is 0x00 = Ping, 0x01 = Pong, 0x40 = Push, 0x80 = Query, 0x81 = Response
- $TTL(0) = TTL(i) + Hops(i)$

Gnutella Ping

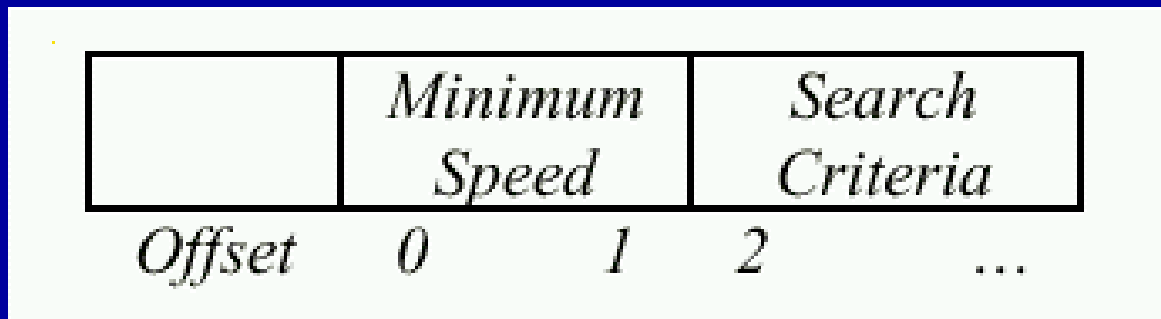
- No payload (i.e., payload length = 0)
- Used for probing the network and establishing connections after reception of “Pong”.

Gnutella Pong Descriptor Payload

	<i>Port</i>		<i>IP Address</i>			<i># Of Files To Share</i>			<i># Of KB Shared</i>		
<i>Offset</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>5</i>	<i>6</i>	<i>9</i>	<i>10</i>	<i>13</i>			

- Responding to “Ping” descriptors.
- Enough information to establish connection.
- File sharing meta-data.

Gnutella Query Descriptor Payload



- For querying the network for a particular file or files (usually substring of file name).
- Quality of Service parameter (minimum speed).

Gnutella Response Descriptor Payload

	<i># Of Hits</i>	<i>Port</i>	<i>IP Address</i>	<i>Speed</i>	<i>Result Set</i>	<i>Servent ID</i>
<i>Offset</i>	<i>0</i>	<i>1 2</i>	<i>3 6</i>	<i>7 10</i>	<i>11 n</i>	<i>n n+16</i>

- For positive “File Found” replies to a query.

	<i>File Index</i>	<i>File Size</i>	<i>File Name</i>
<i>Offset</i>	<i>0 3</i>	<i>4 7</i>	<i>8 ...</i>

Result Set field includes file index, size and name.

Gnutella Push Descriptor Payload

	<i>Servent ID</i>	<i>File Index</i>	<i>IP Address</i>	<i>Port</i>				
<i>Offset</i>	0	15	16	19	20	23	24	25

- For getting files from firewall-protected servents.
- Request pushing a file from an internal node to an outside servent.

Gnutella Research Directions

- Download failures
- Scalability
- Fragmented development
- Encouragement of content sharing
- Reducing browsing downtime
- Reducing unnecessary network traffic
- Creating and maintaining a healthy network structure –rebalancing, different TTL strategies, priorities
- Addressing security concerns.

JXTA

- For “juxtapose”, from Bill Joy at Sun.
- Connecting devices and applications by providing common P2P services to heterogeneous devices, operating systems, programming languages, and applications.

JXTA Overview

- Material from “Web Services Edge” XML Conference, San Jose, CA, October 2002, by Juan Carlos Soto, Sun Microsystems:

<http://www.jxta.org/community/>