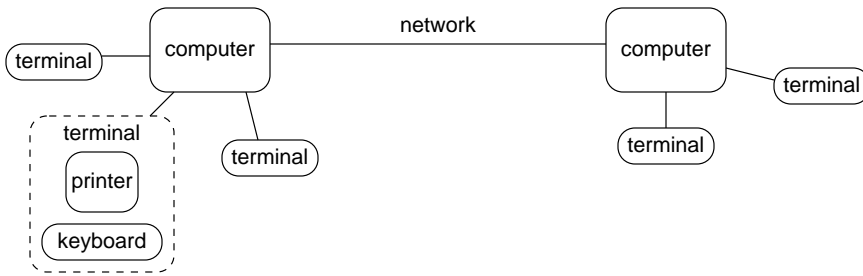


Telnet, FTP, News

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Telnet Goal: Use one computer's terminal to operate a remote computer.



Extensibility:

New language features can be added while preserving interoperability via option negotiation.

DO <option>
 DON'T <option>
 WILL <option>
 WON'T <option>

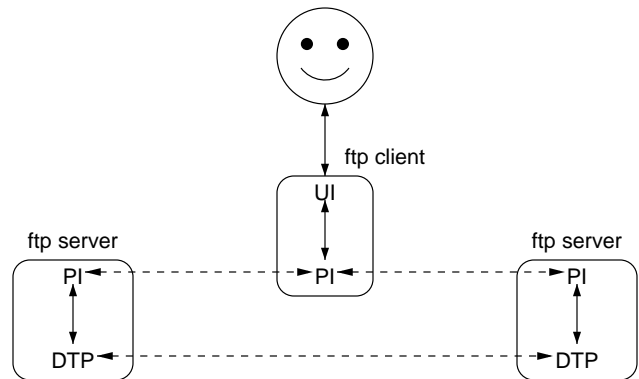
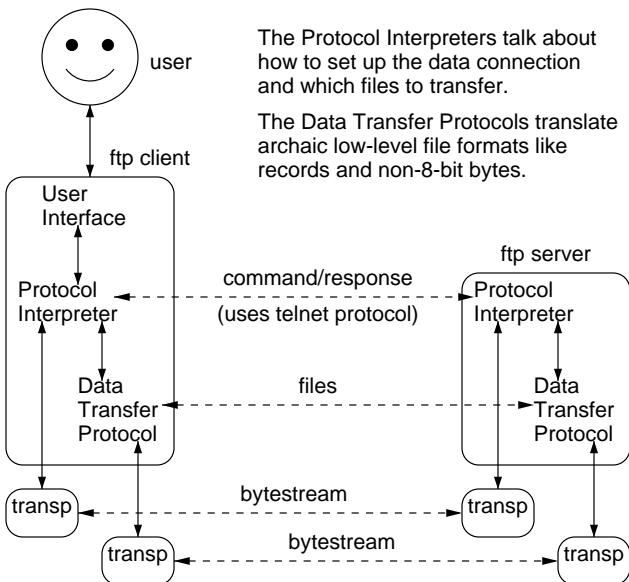
DO/DON'T serve as ACK/NAK for WILL, and WILL/WON'T server as ACK/NAK for DO, so concurrent DO & WILL ACK each other. Options are negotiated for each direction independently.

Challenge: Different computers and terminals speak different languages.
 Solution: Translate to/from the common language of the Network Virtual Terminal (NVT) (ASCII characters plus several extra functions like Interrupt Process).

See RFCs 854 & 855.

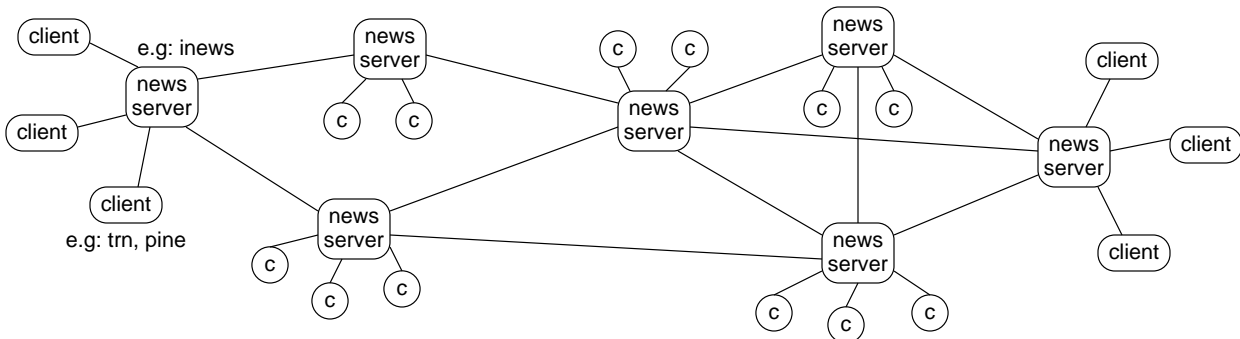
FTP File Transfer Protocol

The dual connections allow for transfers between two remote machines:



See RFC 959.

News Goal: Disseminate messages to a wide audience.



News articles are RFC 822 messages (like email) with some extra header fields, for example:

Path: *last host, previous host, ..., first host*
 Newsgroups: *forums where message appears*
 Followup-To: *appropriate forums for replies*
 Distribution: *optional: subset of Usenet*
 Organization: *author's organization*
 Lines: *number of lines in body*

See RFC 1036.

Generally every article is pushed to every server, then pulled by interested clients from their local server. Articles propagate by "flooding" (sending to every neighboring server) via various transports, like UUCP and email, but mostly the Network News Transfer Protocol (NNTP) (RFC 977), which is similar to SMTP. NNTP is interactive and avoids sending duplicate articles via different paths by comparing Message-ID header fields. For one-way transports the Path header field helps avoid some duplicates, but some arrive and are discarded. Servers "expire" (discard) all messages after some time limit (e.g. a week). Most clients use NNTP to fetch articles from servers.