

Introduction

Telnet is a network protocol that allows for the exchange of text and other data between two computers. Telnet is most commonly used to provide remote access to another machine's command-line interface. It was originally designed as a standardized way for a wide range of machines to access remote terminals. Previously Embedded Xinu was accessed only by using specialized software run in the MSCS Systems Lab. Our work allows a wider range of devices to access Xinu.

Challenges

- Xinu's TTY device didn't provide enough control over I/O so Telnet needed it's own pseudo-TTY.
- Xinu lacks a paradigm for servers, so the Telnet server had to be developed as a Xinu "device".
- This is the first time the Xinu shell has been used for something other than it's original purpose, so it has some biases towards the mips-console interface.
- The Telnet client has options that require sensitive modifications to the TTY's settings.
- Many servers with authentication use the telnet "echo" option, so it's important that the client supports it.
- The Xinu TCP/IP network stack was being developed at the same time this Telnet implementation was, so any substantial changes to Xinu networking affected Xinu Telnet, as well.

Telnet on Embedded Xinu

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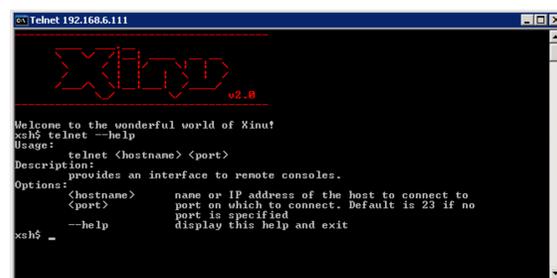


Server

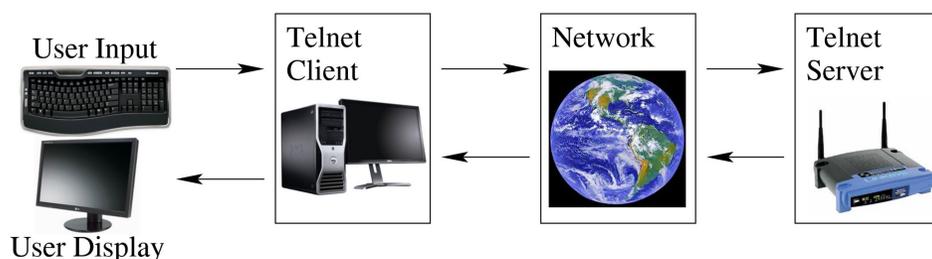
The Xinu Telnet server allows nearly any machine to connect to and interact with a device running Embedded Xinu. First, the Telnet server waits for a Telnet client program to connect to it. Once a client connects to that server, the user is greeted with the Xinu banner and the shell prompt:



The user may then issue shell commands. The Xinu router then executes a given command, and the server sends the router's output to the client's machine:

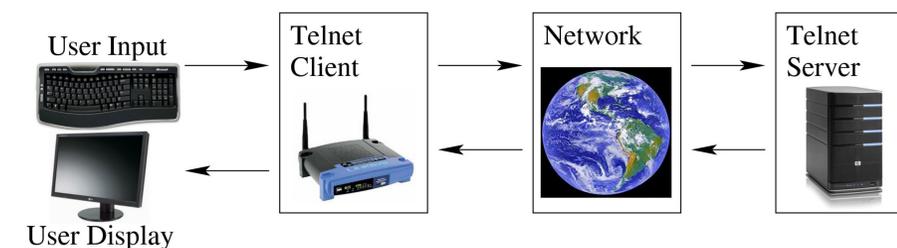


The server is configured to listen for up to three connections at a time, allowing three machines to use the same Xinu router simultaneously.



Client

The Xinu Telnet client allows a user to connect to and run commands on another computer over a network. When used, the telnet client tries connecting to the specified computer. After connecting and negotiating options, the remote computer displays it's command line to the user. The user can then type commands which will be sent to and processed on the remote computer.



Future Work

- Server:
 - Add options to improve user experience
 - Require username/password
- Client:
 - Implement more options
 - Give user finer control over connection
 - Add a Telnet command shell

Conclusion

This project makes the Embedded Xinu shell accessible to a wider range of devices than ever before. It also exemplifies how Xinu can take full advantage of the router's network hardware.

References

- [1] Xinu: <http://xinu.mscs.mu.edu/>
- [2] Telnet Protocol Specification. RFC 854: <http://www.ietf.org/rfc/rfc0854.txt>