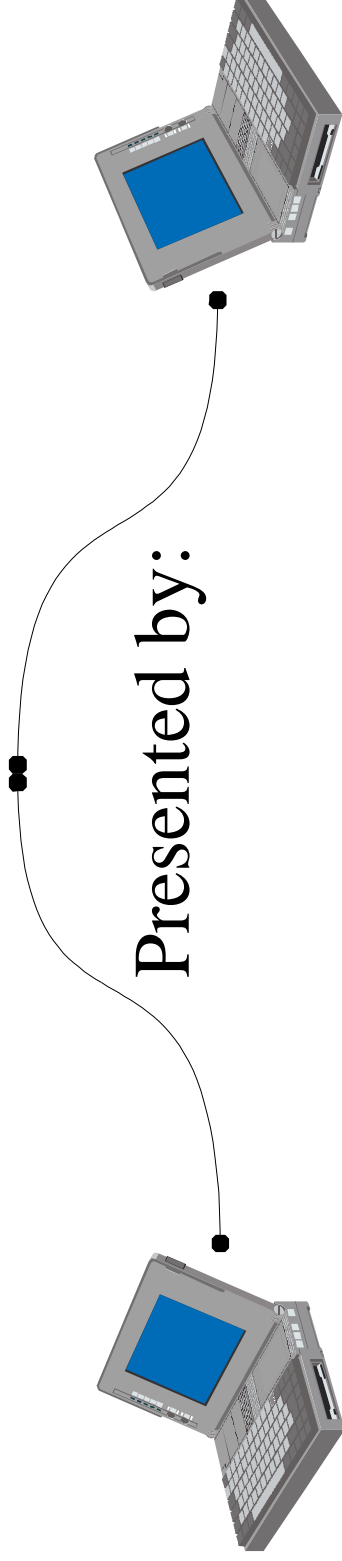


# PLIP

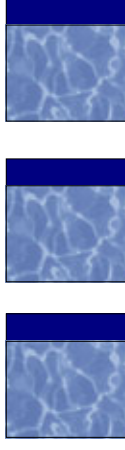
## Parallel Line Internet Protocol



Presented by:

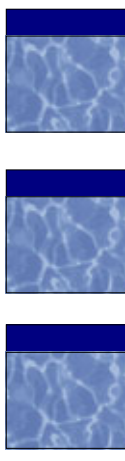
Andy Stewart  
Worcester Linux Users' Group  
Worcester, MA USA

May 15th, 2002



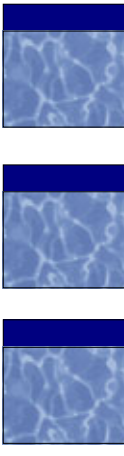
# What is PLIP?

- ❑ PLIP = Parallel Line Internet Protocol
- ❑ A way to build a network between two computers
- ❑ Transportation of IP packets over a parallel port
- ❑ Uses standard LapLink cable (null printer)
- ❑ Can also use a custom PLIP cable



# Advantages

- ❑ Very inexpensive –cable = \$7.00
- ❑ Virtually all computers have a parallel port
- ❑ Its easy!



# Disadvantages

- ❑ Limited range – cable < 15 meters
- ❑ Connects only two computers to each other
- ❑ Totally non –standard
- ❑ Performance – slow but useable for some applications



# Cable Information

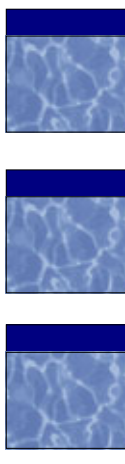
- ❑ Use the correct cable!
- ❑ LapLink Cable Pinout:

2–15, 15–2	5–10, 10–5
3–13, 13–3	6–11, 11–6
4–12, 12–4	17–17
25–25	
- ❑ Unconnected pins:  
1, 7, 8, 9, 14, 16, 18–24 inclusive
- ❑ I physically removed pins 1, 14, 16 as they were connected on my cable.



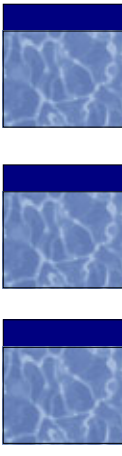
# Hardware Setup

- ❑ Parallel Port info required:
  - ❑ What is its I/O address?
    - ❑ Typically 0x378 for first LPT
  - ❑ Which IRQ does it use?
    - ❑ Typically IRQ 7
  - ❑ PLIP works:
    - ❑ in polled mode without interrupts (good for initial debug)
    - ❑ with interrupts
- ❑ If motherboard has parallel port hardware, be sure to enable it in the BIOS.
- ❑ Connect the cable!



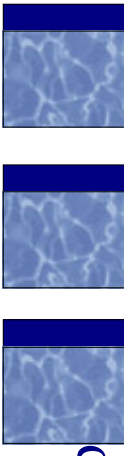
# Kernel Modules

- ❑ Generic parallel port support – parport
  - ❑ insmod parport
- ❑ Hardware specific parallel port support
  - parport\_pc – PC specific
  - parport\_sunbpp – Sun specific
  - etc.
  - ❑ insmod parport\_pc io=0x378 irq=none (or irq=7)
- ❑ plip module
  - ❑ insmod plip
- ❑ Explicitly remove module lp



# Software Configuration 1

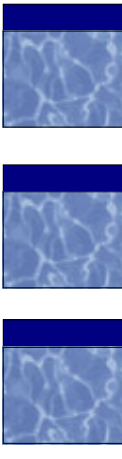
- ❑ Log in as root
- ❑ Create entries in `/etc/hosts` on both computers, for example:
  - ❑ `src_plip 192.168.10.1`  
`dst_plip 192.168.10.2`
  - ❑ Insure "hosts" line in `/etc/nsswitch.conf` has "files" before "dns"
- ❑ On `src_plip`:
  - ❑ `ifconfig plip0 src_plip pointopoint dst_plip up`
- ❑ On `dst_plip`:
  - ❑ `Ifconfig plip0 dst_plip pointopoint src_plip up`





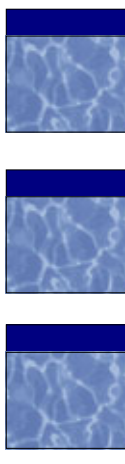
# Testing 1

- ❑ tail /var/log/messages
  - ❑ Look for messages about parport and plip
- ❑ ifconfig plip0 (from src\_plip):
  - ❑ plip0 Link encap:Ethernet HWaddr FC:FC:C0:A8:01:01  
inet addr:192.168.10.1 P-t-P:192.168.10.2 Mask:255.255.255.255  
inet6 addr: fe80::fecf:c0ff:fea8:101/10 Scope:Link  
UP POINTOPOINT RUNNING NOARP MTU:1500 Metric:1  
RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
TX packets:2 errors:1 dropped:0 overruns:0 carrier:1  
collisions:0 txqueuelen:10  
RX bytes:0 (0.0 b) TX bytes:140 (140.0 b)  
Interrupt:255 Base address:0x378
- ❑ route -n (from src\_plip)
- ❑ Look for route to dst\_plip



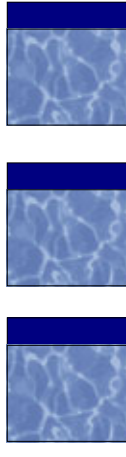
# Testing 2

- ❑ ping dst\_plip
- ❑ If this works, GREAT!
- ❑ If not, insure dst\_plip has PLIP up (see testing 1)
- ❑ Might need to run plipconfig to adjust timing
- ❑ Once ping works, try some stuff, for example:
  - ❑ ssh user@dst\_plip
  - ❑ mount dst\_plip:/media/dvd /media/dvd
  - ❑ ncftp -u user dst\_plip
    - ❑ Copy a big file and measure the bandwidth
- ❑ If this works, try enabling interrupts



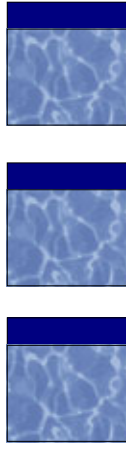
# Tweaking PLIP

- ❑ If ping does not work or drops lots of packets:
  - ❑ Check interrupts – most common cause
  - ❑ Show settings: `plipconfig plip0`
  - ❑ Default: `plipconfig plip0 nibble 3000 trigger 500`
  - ❑ Proper values highly dependent upon:
    - ❑ Parallel port hardware
    - ❑ Cable length and quality
    - ❑ Speed of CPU (especially in polled mode)
- ❑ Andy: `plipconfig plip0 nibble 4000 trigger 7000`



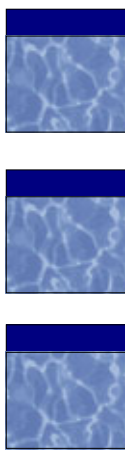
# Test Environment

- ❑ src\_plip: 2xPIII@450 Mhz
  - ❑ Motherboard contains parallel port hardware
- ❑ dst\_plip: Pentium@90 Mhz
  - ❑ Fossilized ISA parallel port card (with jumpers!)
- ❑ Both computers:
  - ❑ plipconfig plip0 nibble 4000 trigger 7000
  - ❑ Polled mode (interrupts disabled)
- ❑ 10 ft cable
- ❑ Linux kernel 2.4.18



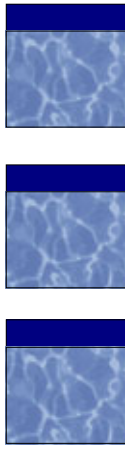
# Performance

- ❑ ping 11.8 mS average with rare loss
- ❑ ncftp some very big file one way:
  - ❑ ncftp reports: 32 kbytes / sec after 15 minutes
  - ❑ iptraf: 230 kbits/sec sustained, 300 kbits/sec peak  
(faster than a cheap DSL line?)
- ❑ ifconfig reports
  - ❑ Receive error rate 1–2%
  - ❑ Transfer error rate 0.7%
- ❑ Pentium@90 Mhz using nearly 100% CPU
- ❑ PIII@450 Mhz busy but not bad

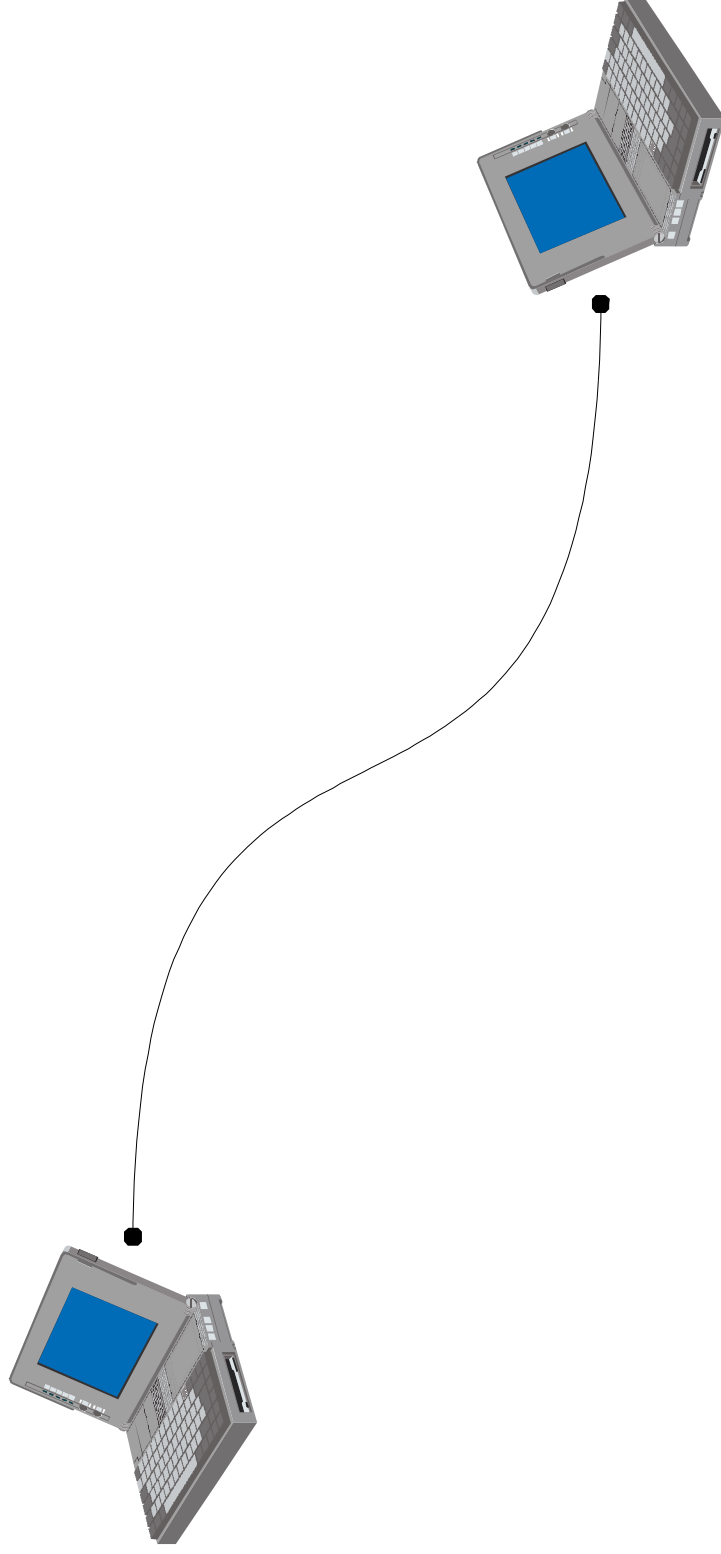


# Notes

- ❑ SuSE Linux 8.0 supports PLIP installs(!)
  - ❑ Does not let you run plipconfig, thus this did not work for me.
- ❑ LapLink cable has 4 bits in each direction
  - ❑ CPU spends lots of time (dis)assembling bytes
- ❑ Docs describe an 8 bit custom made cable for use only with two bi-directional parallel ports



# Live Demo



# References

- ❑ PLIP:
  - ❑ [/usr/src/linux/Documentation/networking/PLIP.txt](#)
  - ❑ PLIP mini HOWTO
  - ❑ PLIP–Install–HOWTO
  - ❑ `man plipconfig`
- ❑ Kernel modules:
  - ❑ [/usr/src/linux/Documentation/modules.txt](#)
  - ❑ `man` pages: `insmod`, `ifconfig`, `route`

