

# The GlobalTalk Network

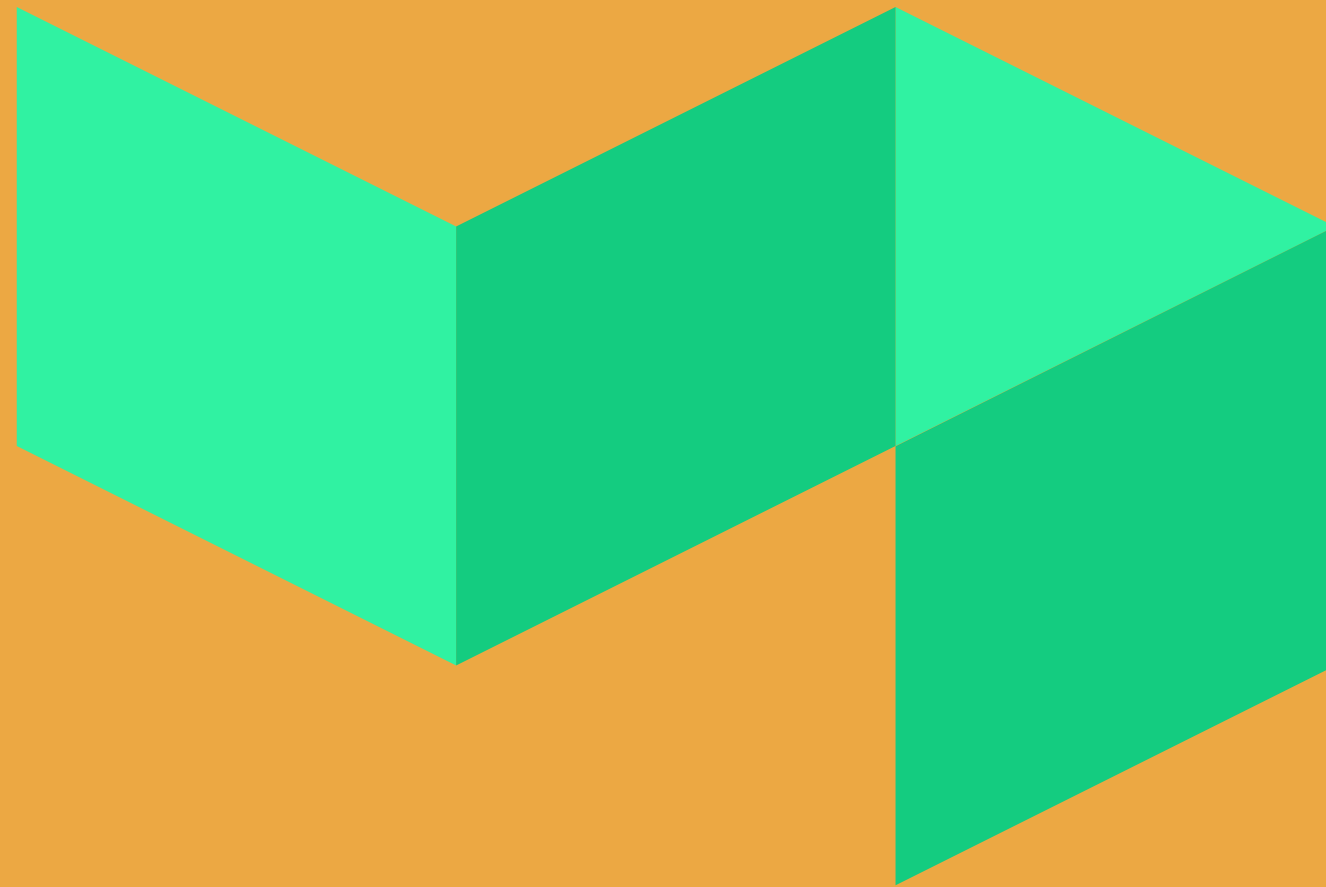
***/dev/world/2024, Melbourne***

**Josh Deprez**

# Who am I?

- **Josh**
- **they/them**
- **Retro Mac nerd**
- **/dev/world fixture?**

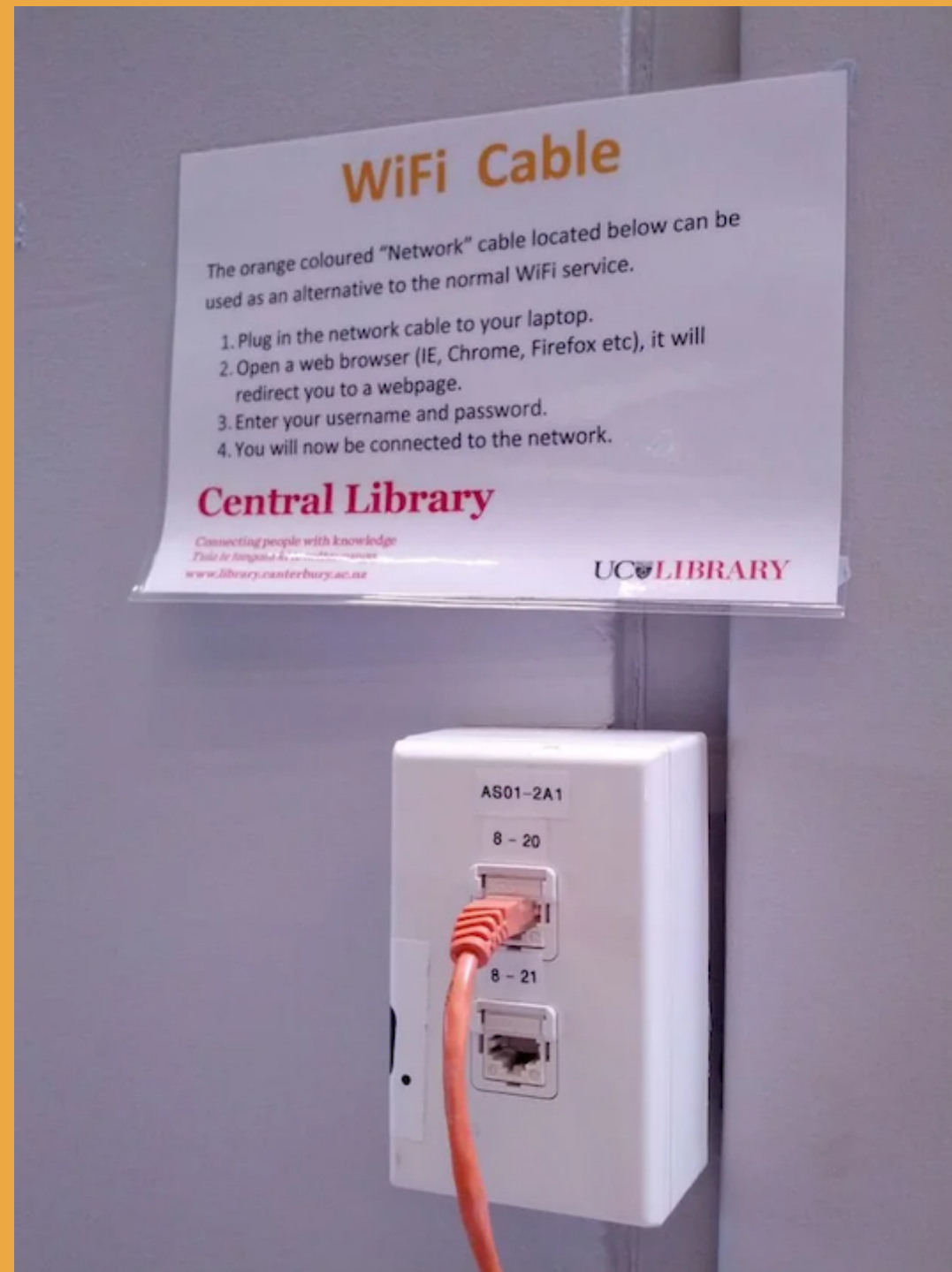
**A word from my sponsors**



**Buildkite**

**This is a talk about...**

**Wi-Fi Cables**



[https://www.reddit.com/r/networkingmemes/comments/12203r5/introducing\\_the\\_wifi\\_cable/](https://www.reddit.com/r/networkingmemes/comments/12203r5/introducing_the_wifi_cable/)

**This is a talk about...**

~~**Wi-Fi Cables Ethernet**~~

**This is a talk about...**

~~**Wi-Fi Cables Ethernet**~~ *and*  
**AppleTalk**

**This is a talk about...**

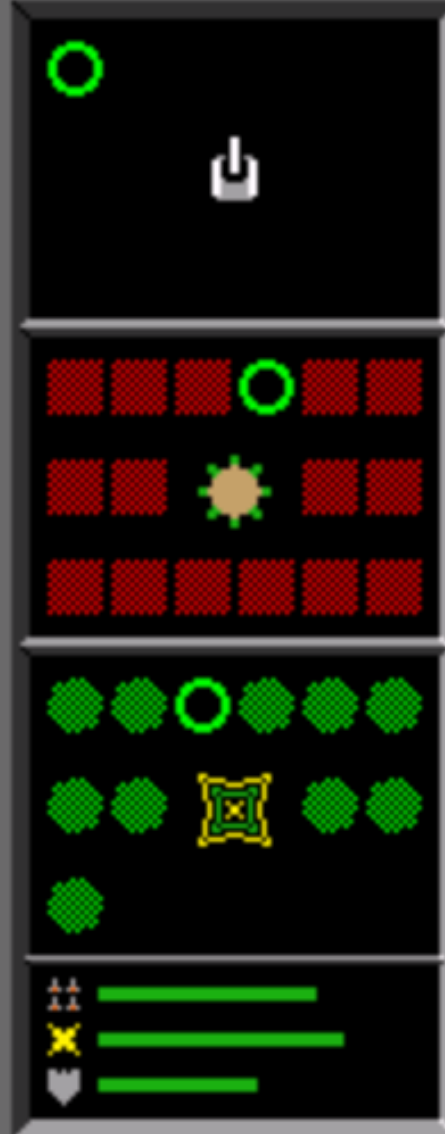
**Precise language**



Networks

Protocol

# Bolo



tosh captured a refuelling base Me@This Macintosh captured a neutral pillbox

Lives: 3

Score: 00

Damage: 

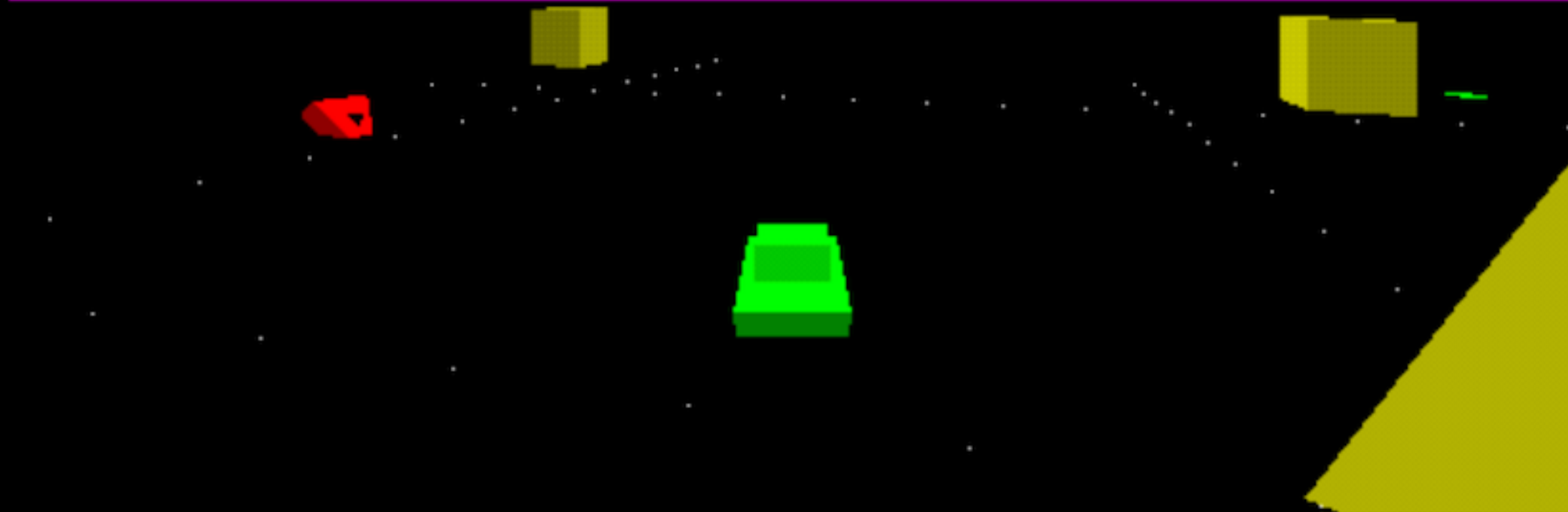
Level: 01

Ammo:  40

Bonus: 176



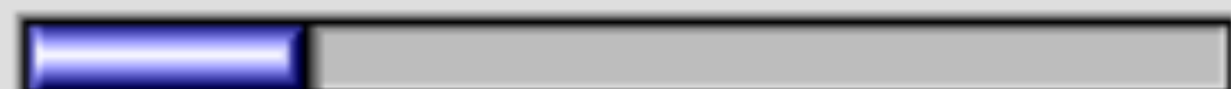
H



## Copy to the Desktop

Items remaining to be copied:

1



Stop

▼ Time remaining: About a minute

Copying: Apple AUX 3.0 Poster A1.pdf

From: AUX 3.0 Poster

To: Desktop

Bytes Copied: 304 K of 1.3 MB



# GlobalTalk

**A globe-spanning network of retro Macs**

Logo from <http://marchintosh.com/globaltalk.html>

# GlobalTalk

- **Started in early March 2024 (#MARCHintosh)**
- **Loose collection of retro Mac nerds over social media**
- **A Google spreadsheet**

1983

# State of computer networking in 1983

- **June: Ethernet standardised (IEEE 802.3)!**
- **Token Ring (IBM) in development**
- **Various proprietary systems**
- **Acoustic couplers and modems (300 bit/s)**
- **"Wireless network"? On what frequency?**



---

## **Why did we design it?**

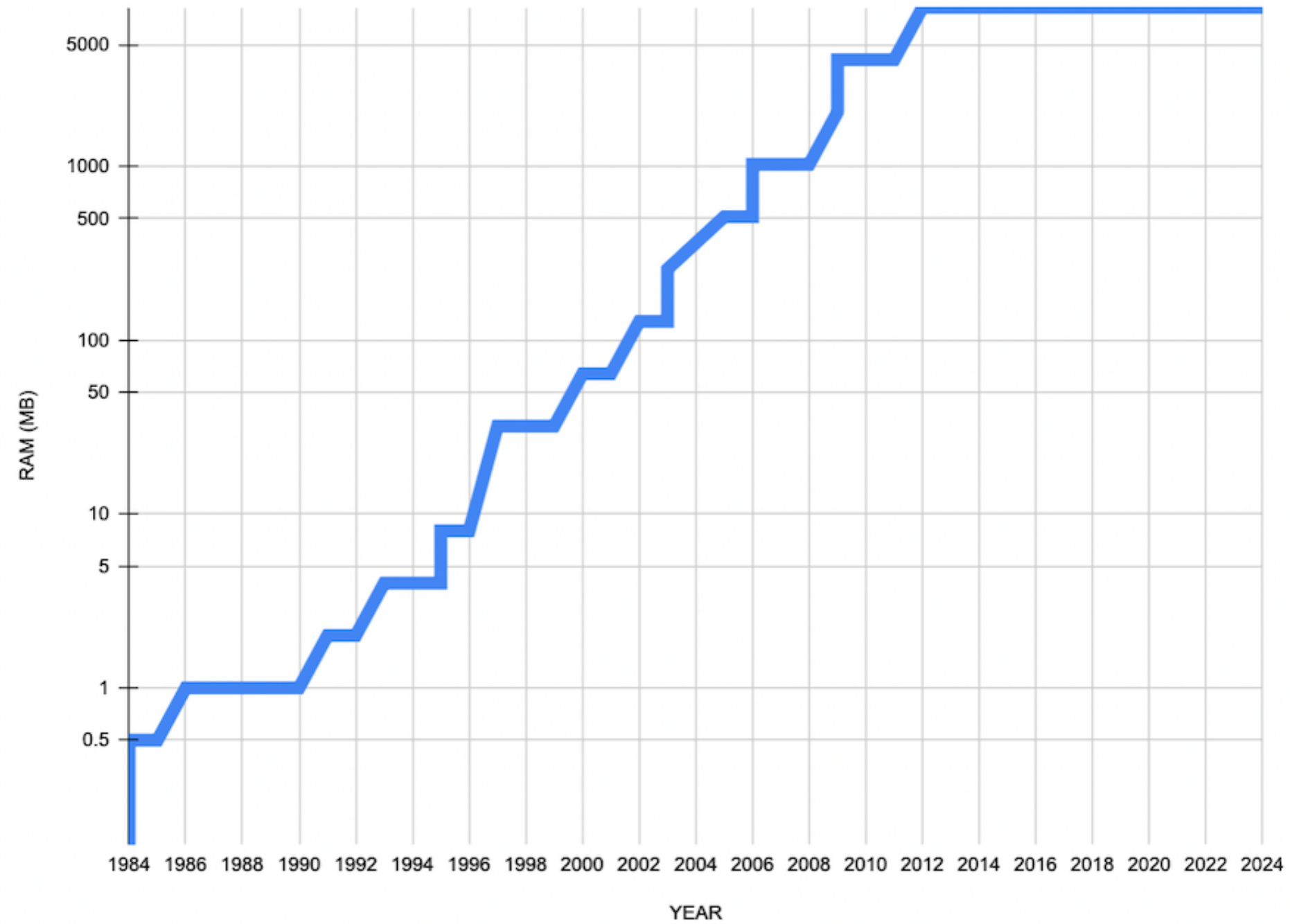
When this design activity was initiated in late 1983, many barriers prevented the widespread adoption of network technology. No one doubted networking's vast promise; yet its acceptance was proving slower than anticipated.

It was expensive (approximately \$1000 for each computer) to connect a computer to network systems. This high cost, acceptable for minicomputers and mainframes, seemed prohibitive for the personal computer (itself priced around \$1000). Furthermore, the services received by users who decided to pay the high initial price were limited.

More importantly, network systems were foreign appendages, conceived independently of computers and then only as an afterthought. Networks appeared to be celebrations of technology designed with more attention to such issues as data transmission speed than to user convenience. Users of network services had to learn the idiosyncrasies of each particular network. Access to resources through the network had to be obtained in a manner different from that used for local resources resident on the user's computer. The network constituted a hindrance when it should have extended the user's reach.

We could not use existing network protocol architectures to achieve our goal of seamlessly extending the user's computing experience. We chose instead to develop our own architecture in which we would utilize standard technology where appropriate and innovate freely where necessary.

Apple Consumer All-In-One Base RAM (MB, logarithmic) vs. Year



By @dschaub@mstdn.social



CC BY-SA 4.0 Mister rf  
<https://commons.wikimedia.org/wiki/File:ZILOGZ0803006SCC.jpg>

**Burrell [Smith]'s third Macintosh design was done in June 1981. The main reason was that he fell in love with a communications chip called the SCC. The SCC could support a built-in local area network, making AppleTalk possible with no additional hardware, as well as providing nice buffered serial ports with interrupts and other hardware features.**

**— Andy Hertzfeld (undated), *Five Different Macintoshes*, [https://folklore.org/Five\\_Different\\_Macs.html](https://folklore.org/Five_Different_Macs.html)**

19884

# 1984: The Macintosh launches

- It included networking capability *built in*
- (mostly)
- (sort of)
- You needed some cables

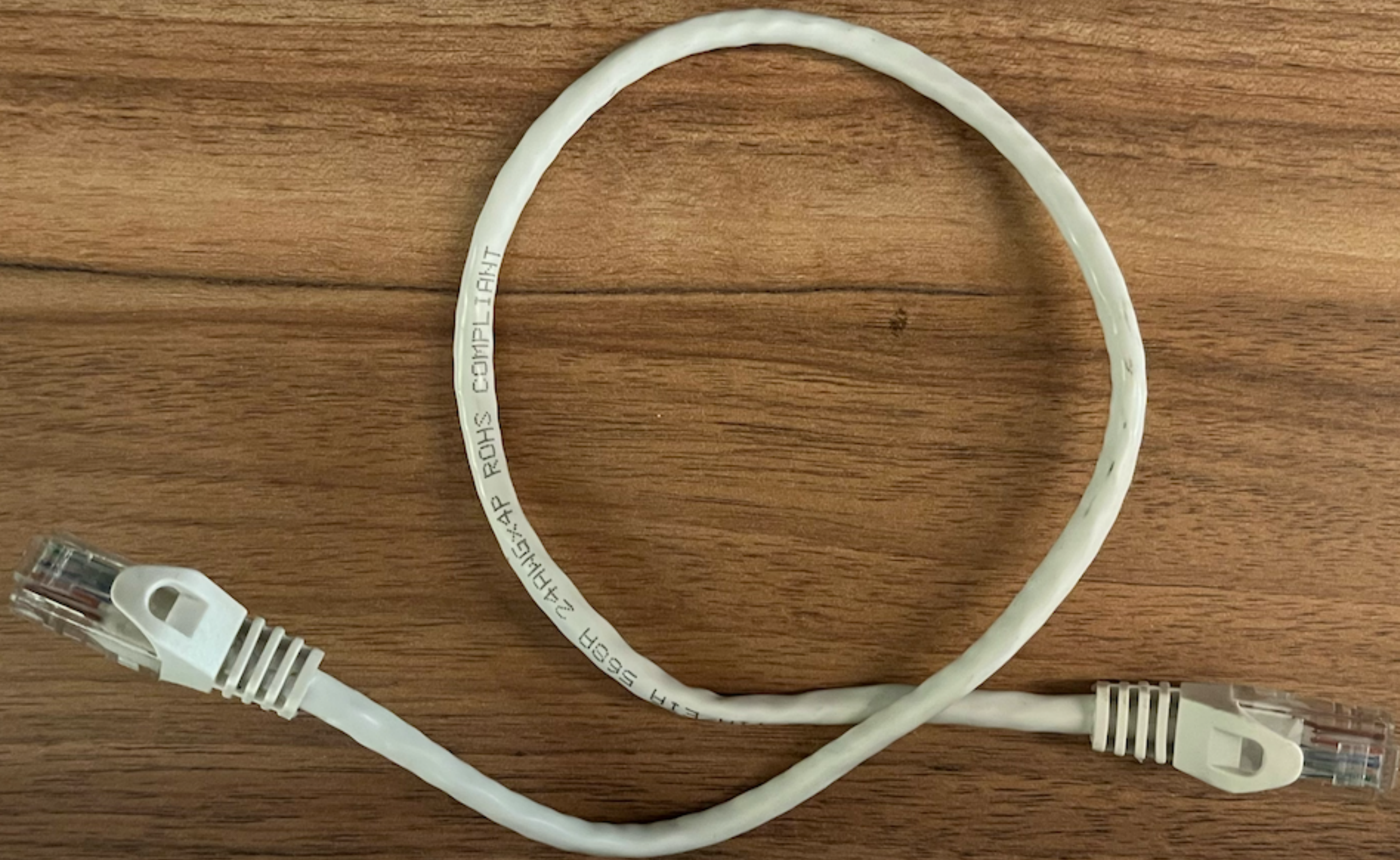




The background of the slide is a halftone pattern in shades of yellow and orange. It features a laptop computer in the upper right and several Ethernet cables with RJ45 connectors in the lower left and center. The overall aesthetic is technical and digital.

Hey!

**Those aren't ~~Wi-Fi~~  
Ethernet cables!**



ROHS COMPLIANT  
24P/HGX4P  
568B

**Older Macs don't have  
Ethernet**

**Many new Macs don't  
have Ethernet either**



Public domain - Aerialvendetta <https://commons.wikimedia.org/wiki/File:AnOriginalMacintoshBackCaseUNALTEREDMACINTOSH.jpg>



Public domain - Aerialvendetta <https://commons.wikimedia.org/wiki/File:AnOriginalMacintoshBackCaseUNALTEREDMACINTOSH.jpg>

Apple Macintosh™ Plus 1Mb

Apple Computer, Inc.  
Cupertino, California 95014  
Made in U.S.A.  
Model Number: M0001AP

Certified to comply  
with IEC 380 by  
TUV Rheinland



220-240V ~  
50-60 Hz  
0.5A  
60W

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Apple and the Apple logo are registered trademarks  
of Apple Computer, Inc. Macintosh is a trademark  
of Apple Computer, Inc.

Y





# Macintosh™ Classic™

Apple Computer, Inc.  
Cupertino, California

Made in Singapore  
Model Number: M1420

**FCC ID: BCGM0420**

*Om apparaten kopplas till ett utbrett ledningsnät,  
skall den anslutas till jordat näfuttag.*

*Laite on liitettävä suojakosketinpistorasiaan,  
jos se on liitetty laajaan johdinverkkoon.*

*Die in diesem Gerät entstehende Röntgen-  
strahlung ist nach ROV §5 (2) ausreichend  
abgeschirmt. Beschleunigungsspannung  
maximal 12,6 kV.*

*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two  
conditions: (1) this device may not cause harmful interference, and (2) this device must accept  
any interference received, including interference that may cause undesired operation.*

*This product complies with DHS Rules 21 CFR Subchapter J applicable at date of manufacture.*

*© 1990 Apple Computer, Inc. Apple, the Apple logo, and Macintosh are trademarks  
of Apple Computer, Inc. Classic is a trademark licensed to Apple Computer, Inc.*

825-2665-A



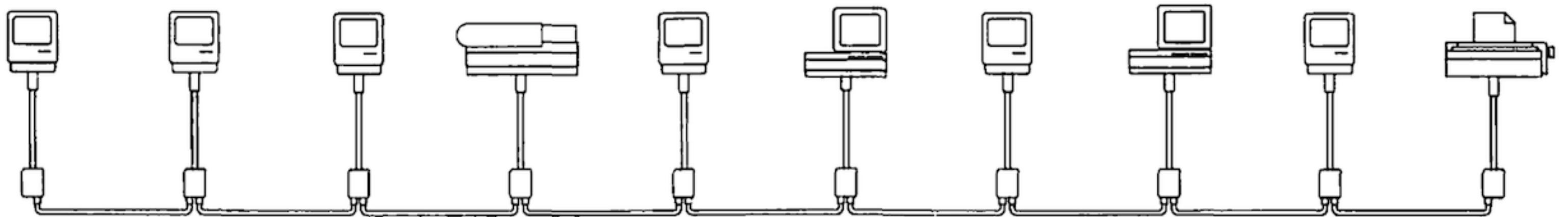
220-240V~  
50-60 Hz  
0.5A



EN 60 950: 1988



■ **Figure I-2** LocalTalk network





**The daisy-chain requires  
extra hardware**

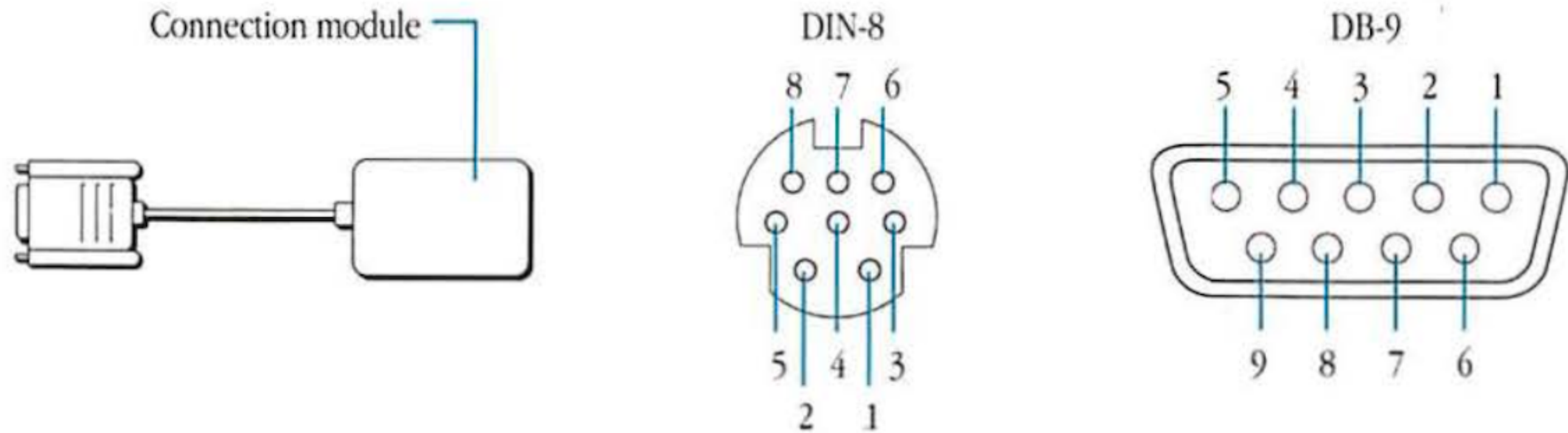
**You can't make 1 single  
network by chaining  
through both ports**



**CC BY-SA 4.0 Bill Woodcock**

**<https://commons.wikimedia.org/wiki/File:PhoneNET-LocalTalk.jpg>**

■ **Figure A-2** LocalTalk connection module





NeitherNet

# NeitherNet

- Sold by Joe's Computer Museum ([jcm-1.com](http://jcm-1.com))
- Like Farallon PhoneNET, but...
- Uses commodity ~~Wi-Fi~~ Ethernet cables instead of rare "phone" cables

**Some Macs had Ethernet**



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[https://commons.wikimedia.org/wiki/File:Quadra\\_650\\_rear.jpg](https://commons.wikimedia.org/wiki/File:Quadra_650_rear.jpg)



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[https://commons.wikimedia.org/wiki/File:Quadra\\_650\\_rear.jpg](https://commons.wikimedia.org/wiki/File:Quadra_650_rear.jpg)





Apple Ethernet  
Twisted-Pair Transceiver  
Apple Computer, Inc.

Model No: M0437

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation.

MADE IN USA



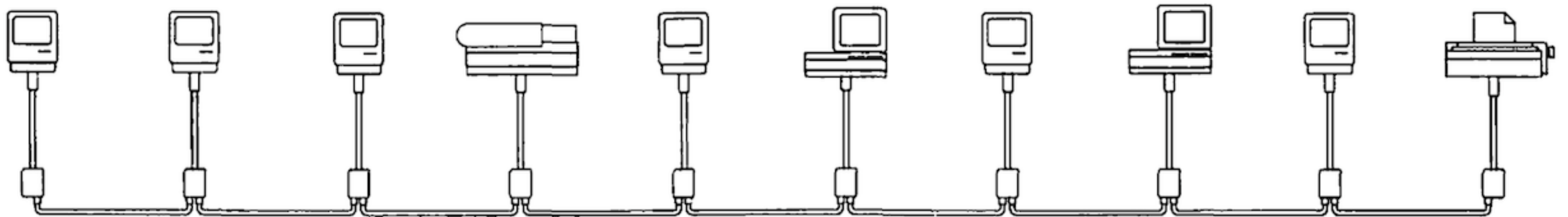
Still from *The Matrix* (1999), Warner Bros.

# The Blue Pill

## A single LocalTalk network

- 230.4 Kbps
- Up to 254 nodes, up to 300m total length
- No routing, no routers!
- One anonymous zone
- One topology (bus)

■ **Figure I-2** LocalTalk network

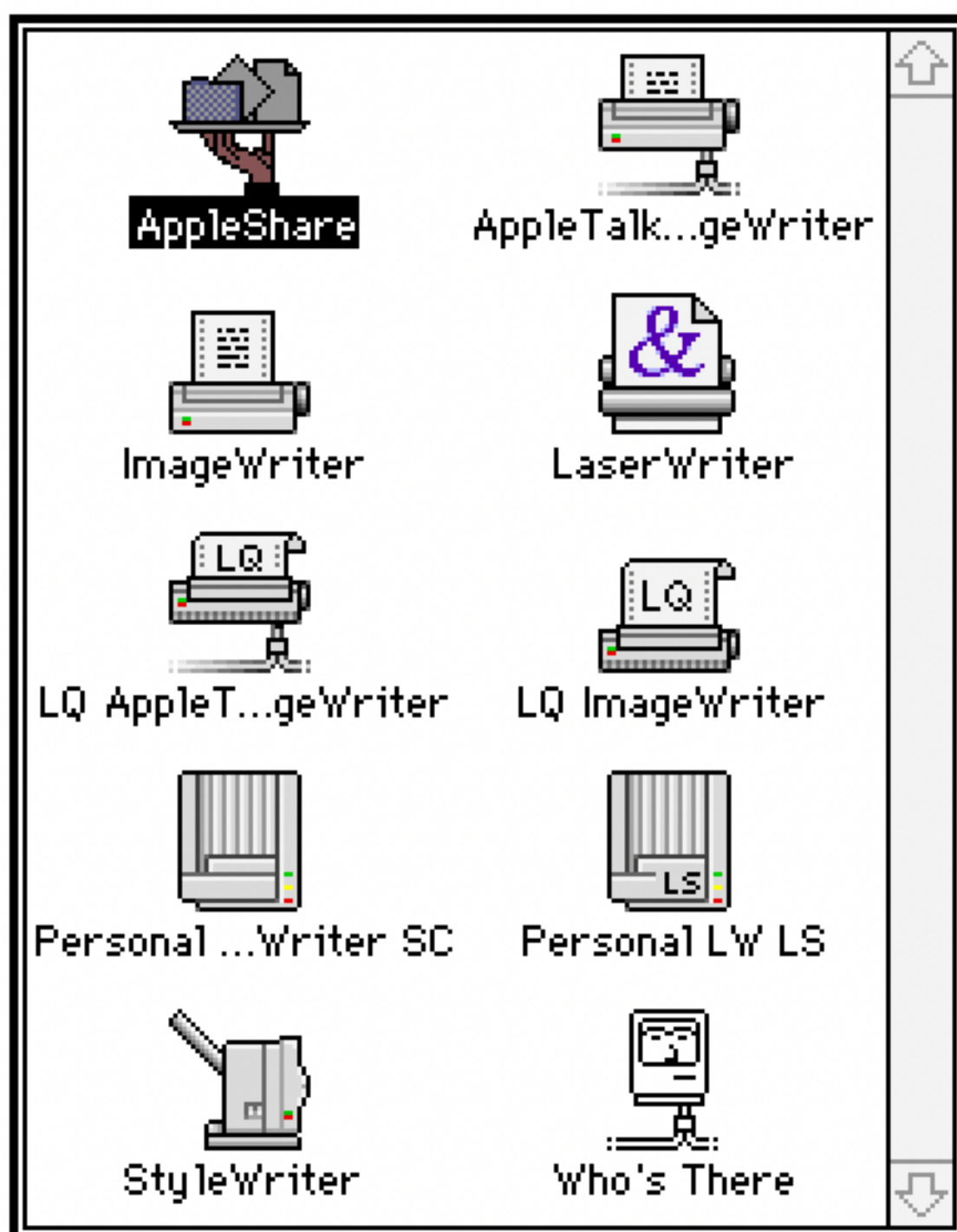


# EtherTalk

**Same thing, just with Ethernet**

- Up to 10 Mbps!**
- Supports more nodes**
- More topologies**

# Chooser



A grid of ten icons representing various printers and servers. The icons are arranged in two columns and five rows. The first row contains 'AppleShare' (a hand holding a folder) and 'AppleTalk...geWriter' (a printer with a document). The second row contains 'ImageWriter' (a printer) and 'LaserWriter' (a printer with a purple ampersand). The third row contains 'LQ AppleT...geWriter' (a printer with 'LQ' on the paper) and 'LQ ImageWriter' (a printer with 'LQ' on the paper). The fourth row contains 'Personal ...Writer SC' (a printer) and 'Personal LW LS' (a printer with 'LS' on the paper). The fifth row contains 'StyleWriter' (a printer) and 'Who's There' (a computer monitor). A vertical scrollbar is on the right side of the grid.

AppleShare

AppleTalk...geWriter

ImageWriter

LaserWriter

LQ AppleT...geWriter

LQ ImageWriter

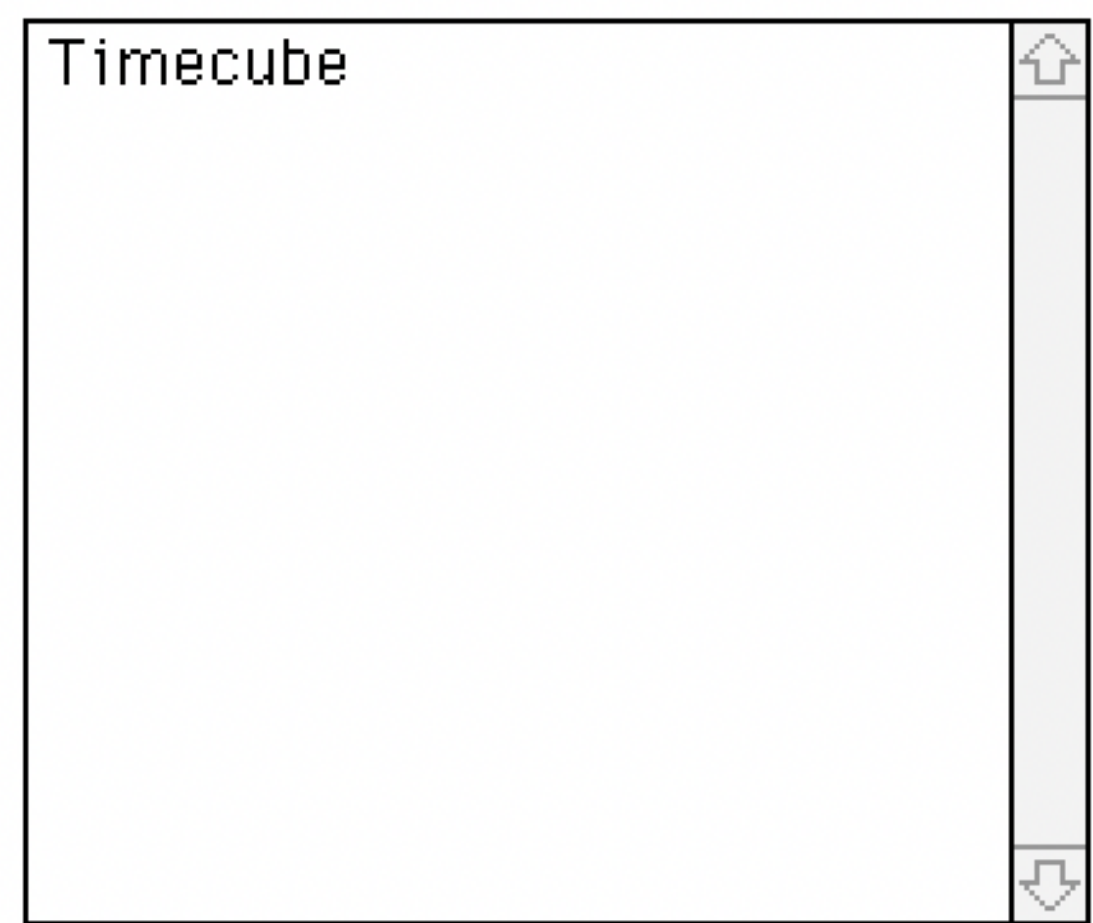
Personal ...Writer SC

Personal LW LS

StyleWriter

Who's There

Select a file server:



A list box containing the name 'Timecube'. The list box has a vertical scrollbar on the right side.

Timecube

OK

AppleTalk  Active  
 Inactive

**The Red Pill**

**AppleTalk internet**

**An internet ≠ The Internet**

**"Internet" is short for  
"internetwork"**

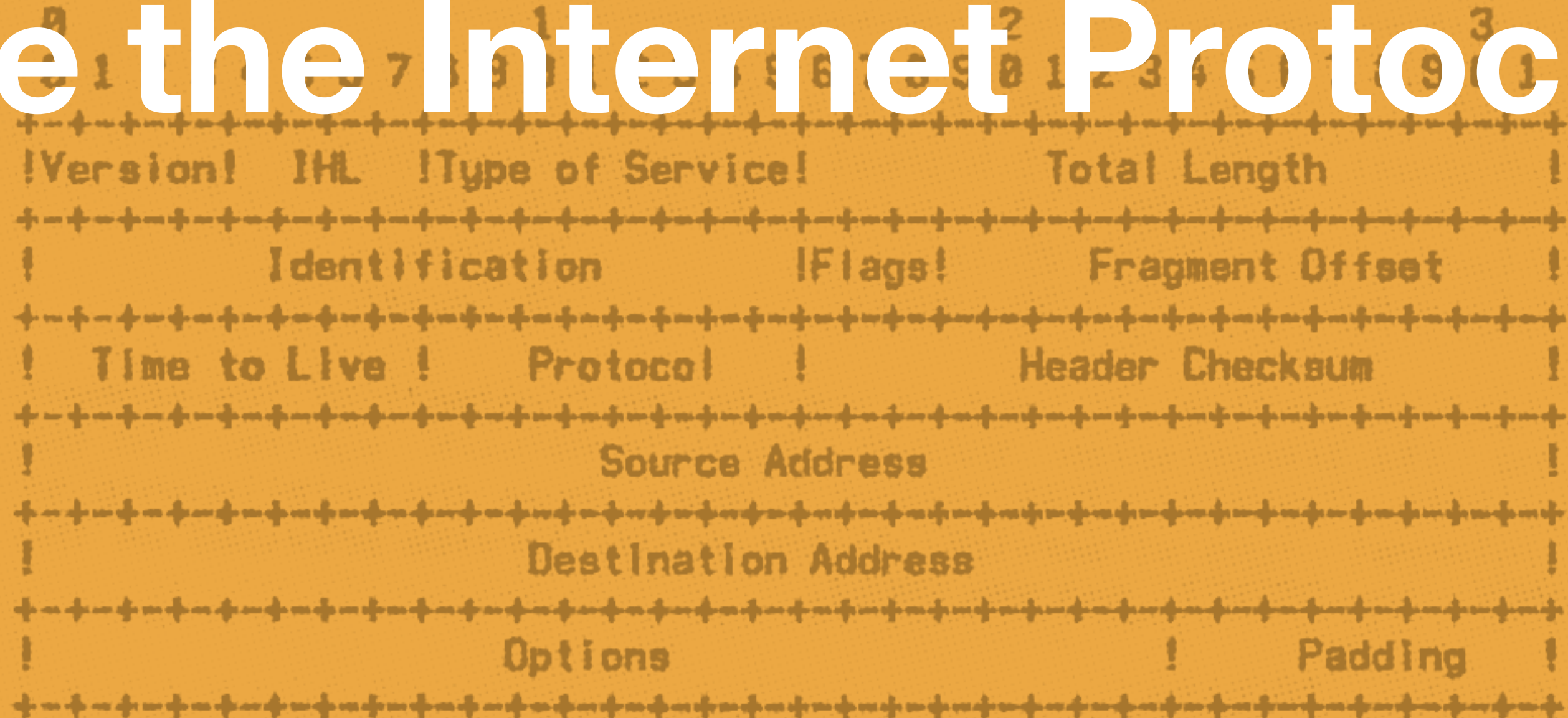


# INTERNETWORK PROTOCOL SPECIFICATION

Version 4

Jonathan B. Postel

# AppleTalk internets don't use the Internet Protocol



Postel, J.B. (1978) *Internetwork Protocol Specification Version 4*, IEN 54, ISI USC, California

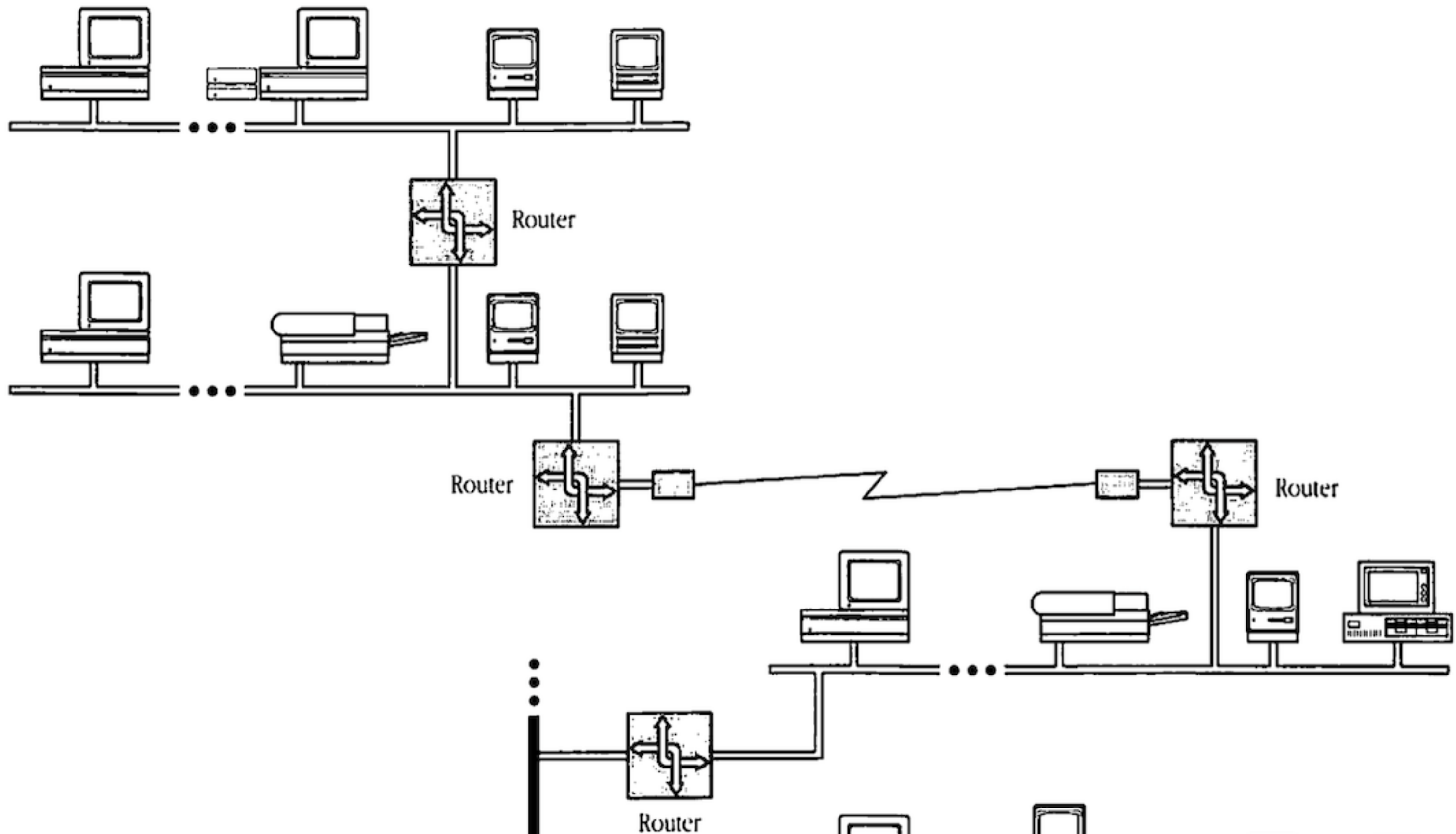
Figure 2.

# The Red Pill

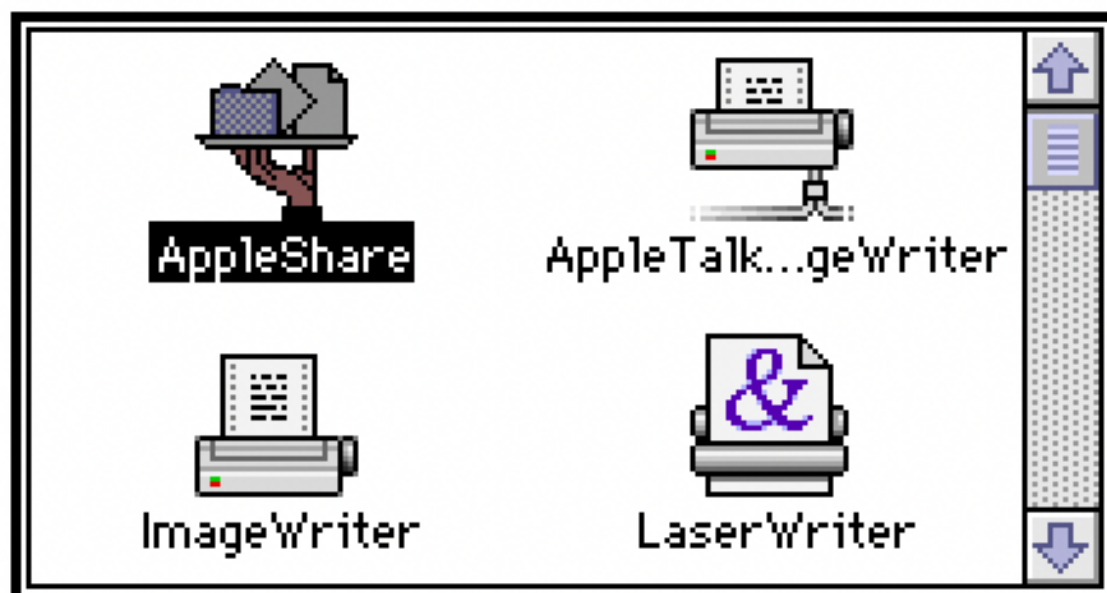
## AppleTalk internet

- Up to ~16 million nodes
- AppleTalk *internet routers*
- 254 zones per (local) network

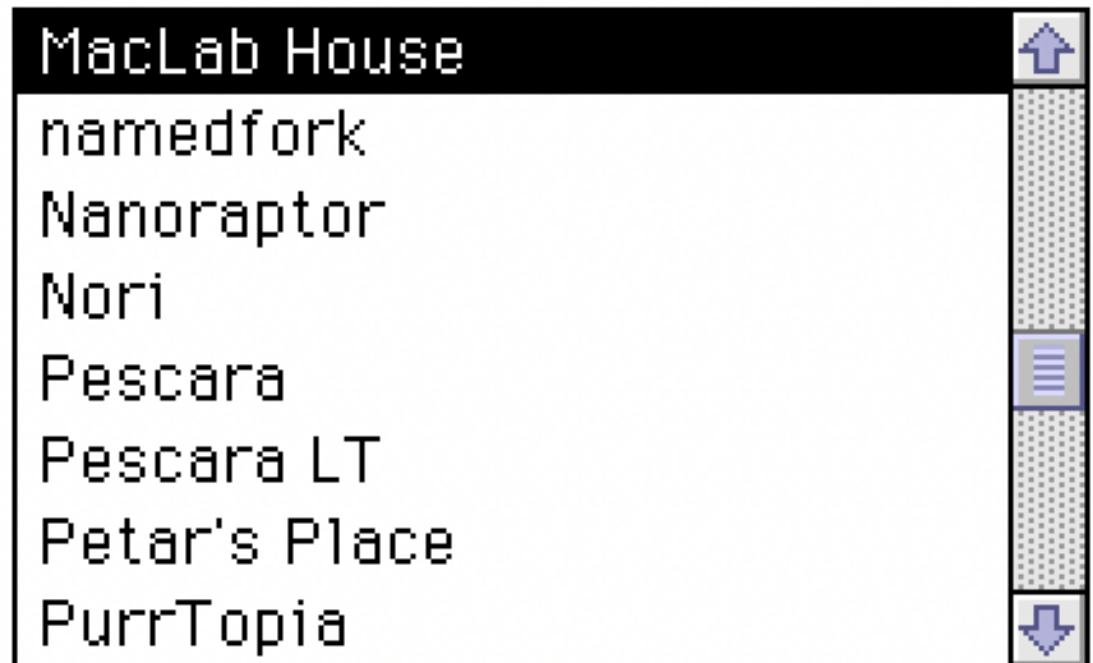
■ **Figure I-3** AppleTalk internet



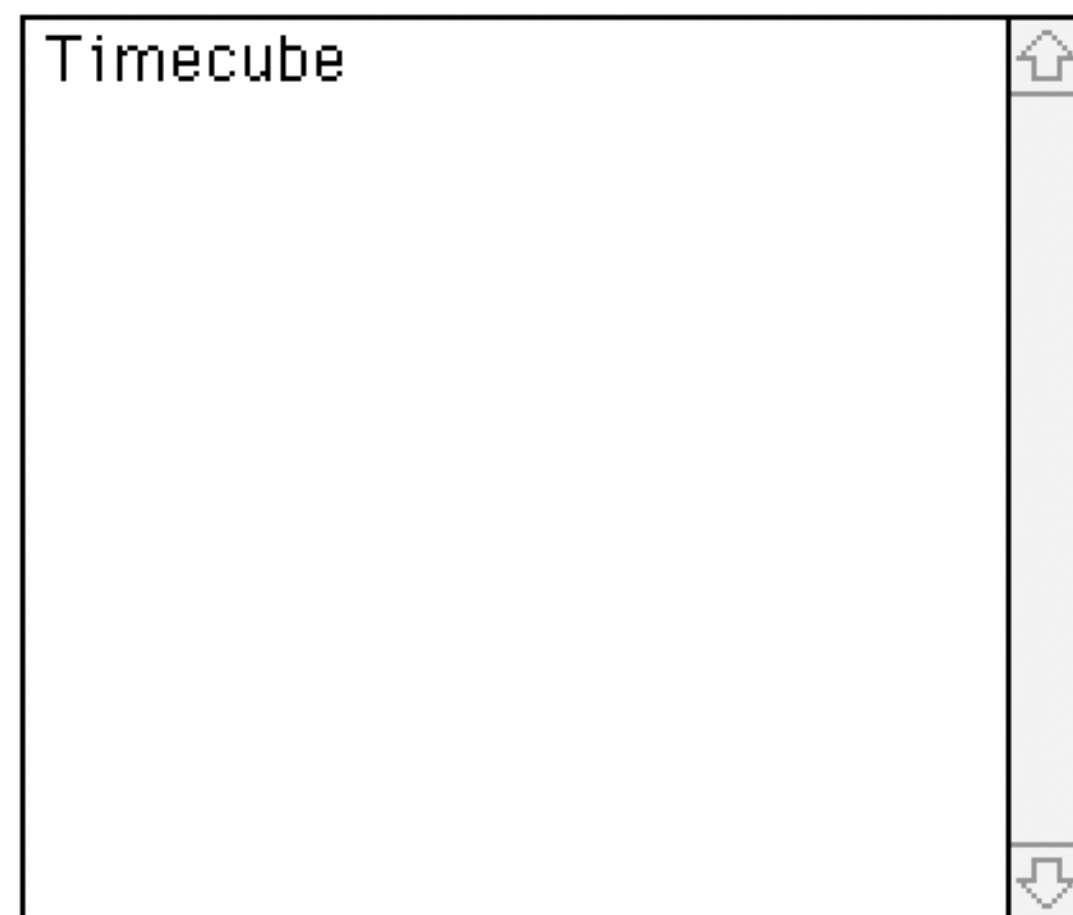
# Chooser



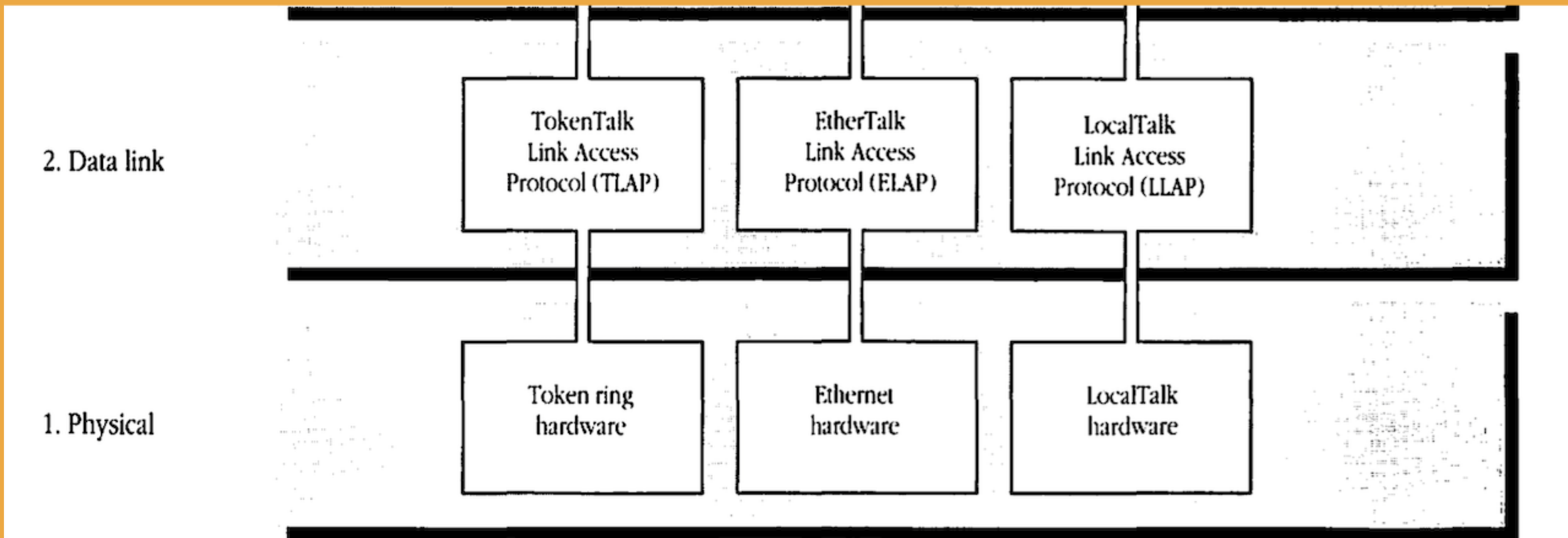
AppleTalk Zones:



Select a file server:



AppleTalk  Active  
 Inactive



# AppleTalk

**Originally the name for both the physical cabling  
(now LocalTalk)  
*and* the protocol stack, but later on it referred to the  
protocol stack only.**

# AppleTalk

- **LocalTalk: AppleTalk using Modem/Printer ports**
- **EtherTalk: AppleTalk over Ethernet**
- **TokenTalk: AppleTalk over Token Ring**



4. Transport

Routing Table  
Maintenance  
Protocol (RTMP)

AppleTalk  
Echo  
Protocol (AEP)

AppleTalk  
Transaction  
Protocol (ATP)

Name  
Binding  
Protocol (NBP)

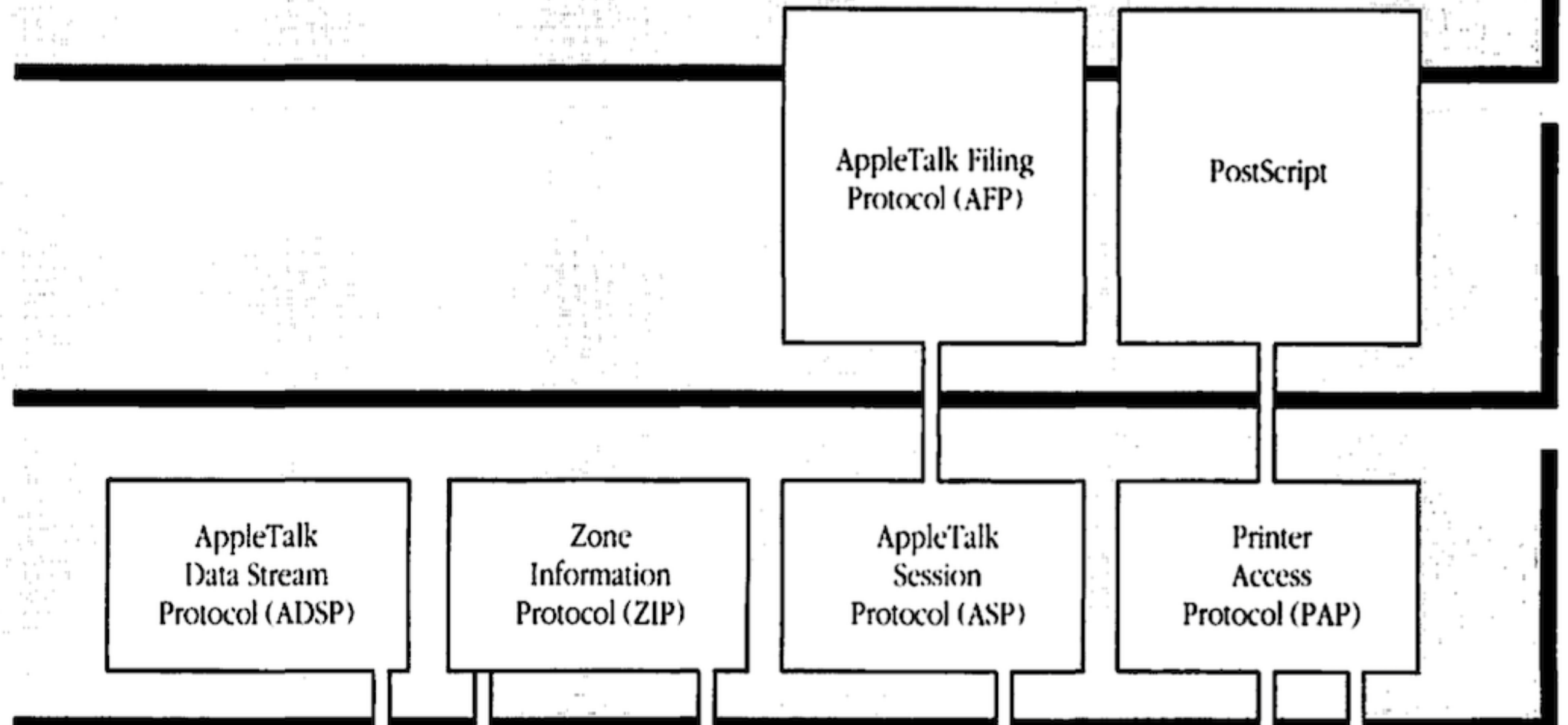
3. Network

Datagram Delivery Protocol (DDP)

7. Application

6. Presentation

5. Session

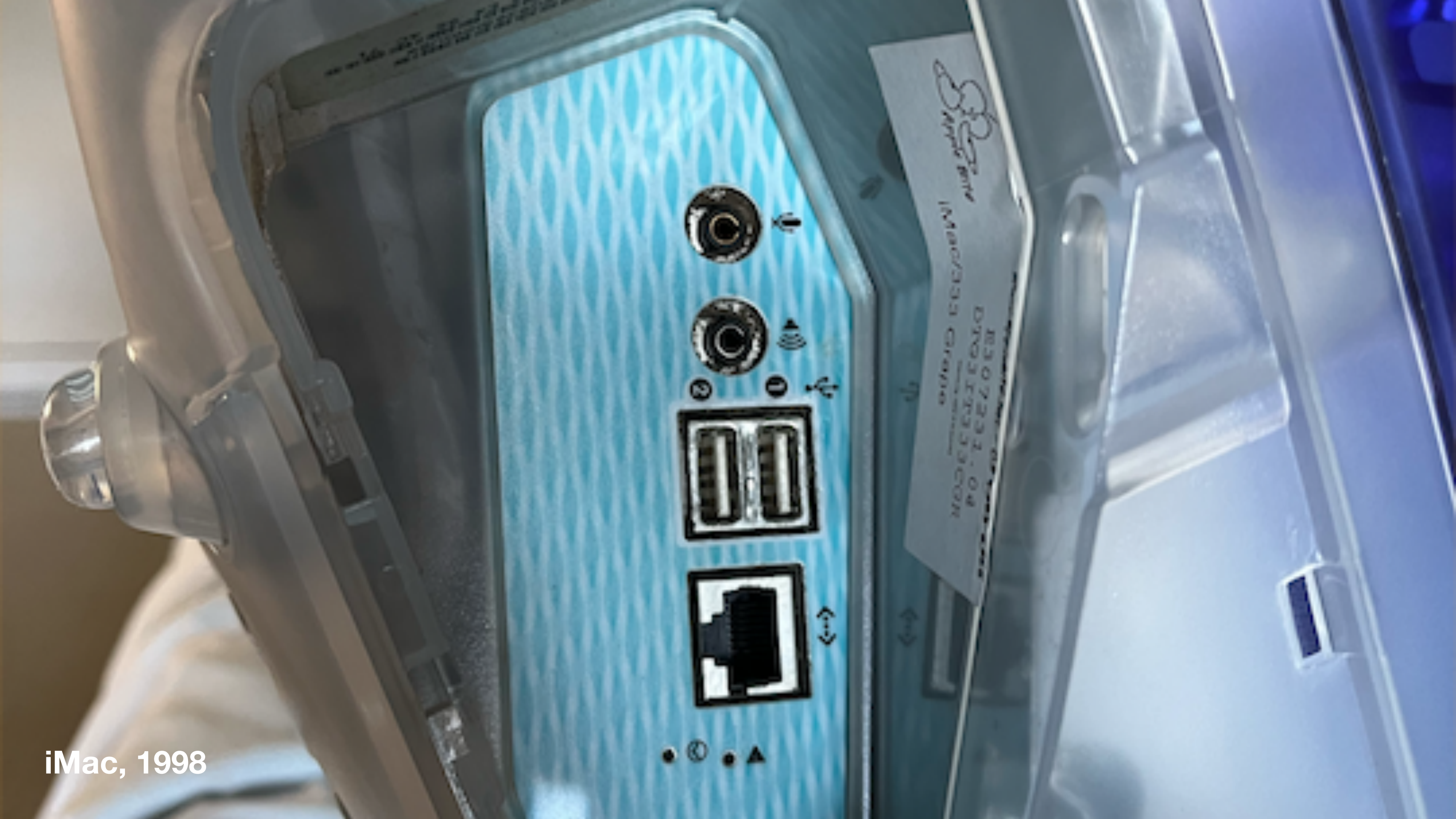


# What happened to AppleTalk?



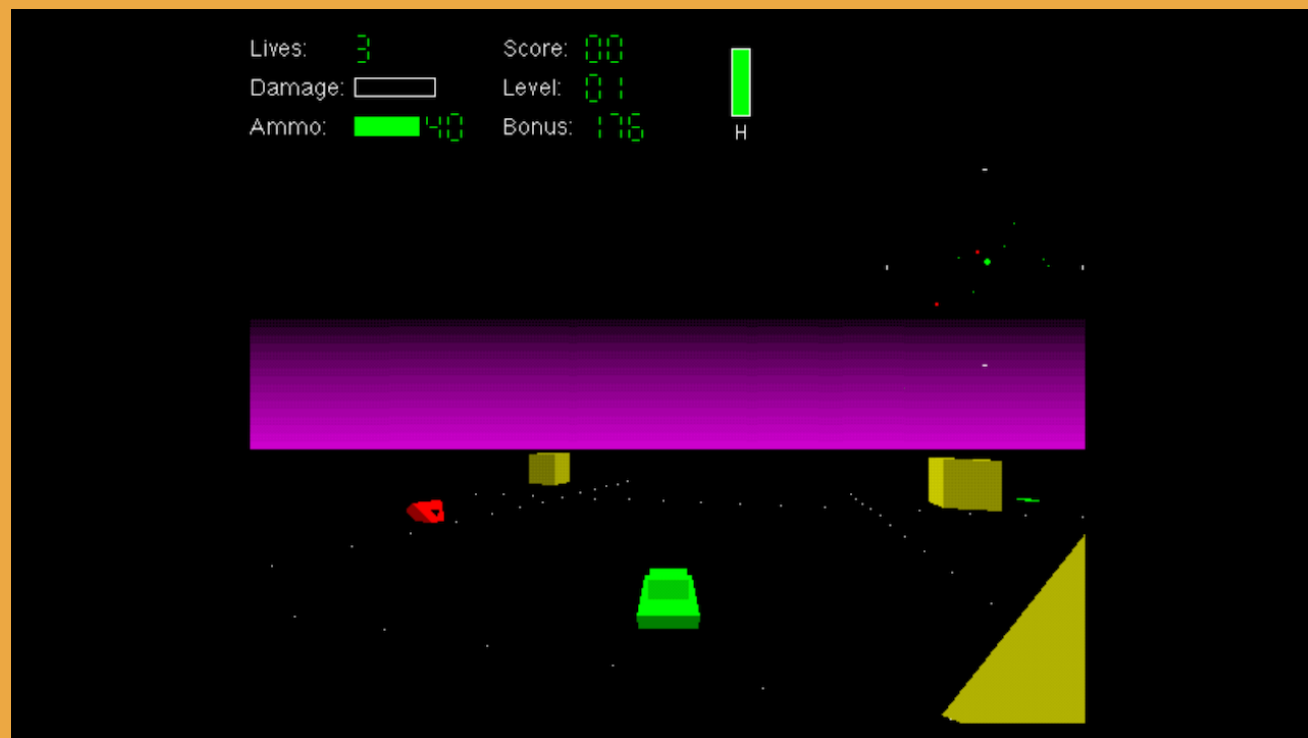
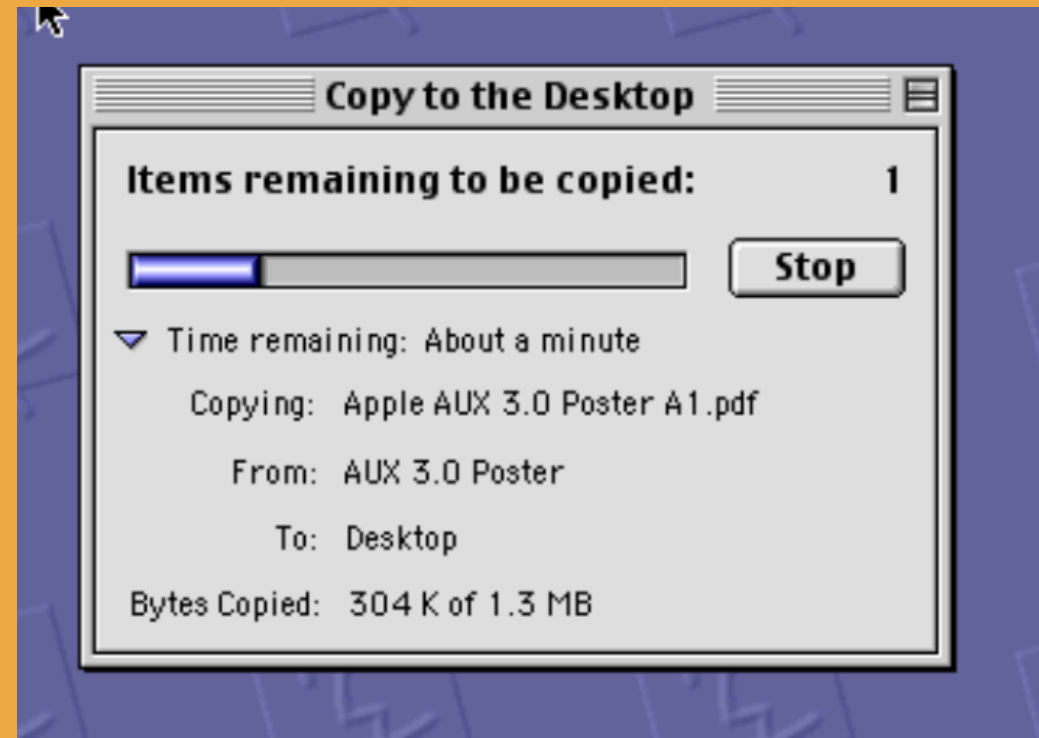
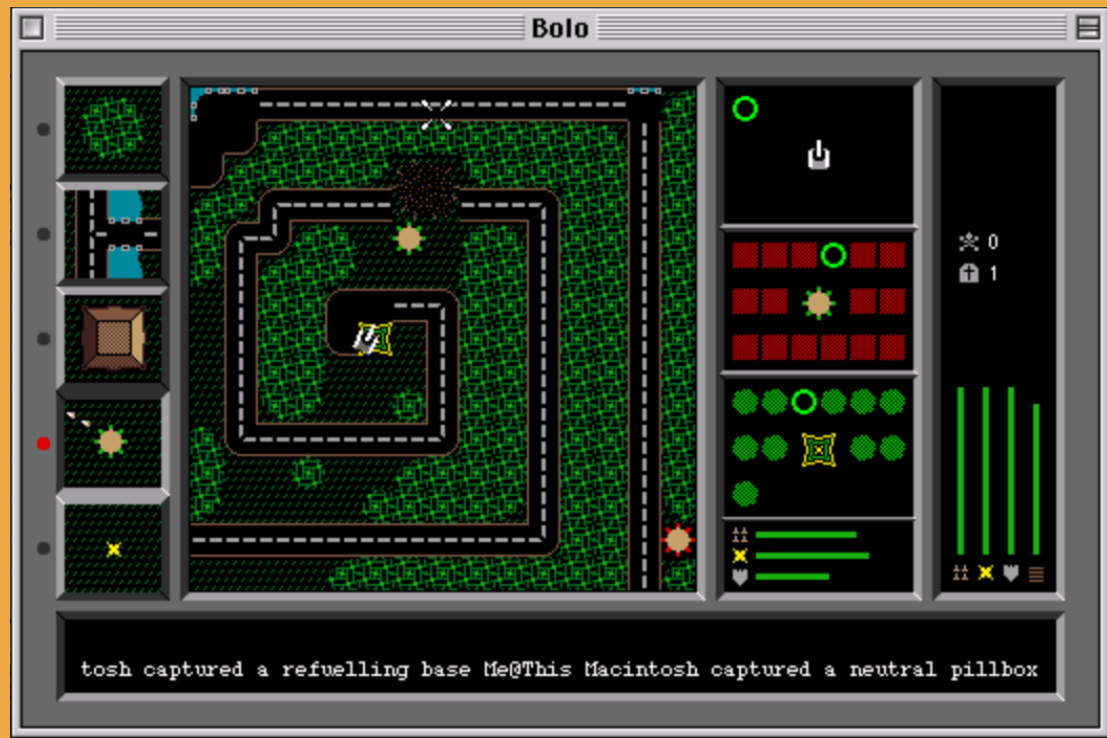
Macintosh PowerBook G3, 1998

iMac, 1998



# What happened to AppleTalk?

- Apple added a TCP/IP stack to the Mac
- Apple made AFP sharing function over TCP/IP
- iMac (1998) and onwards had no mini-DIN ports
- AppleTalk removed in Mac OS X 10.6 Snow Leopard
- AFP sharing removed in macOS 11 Big Sur, incompatible with APFS

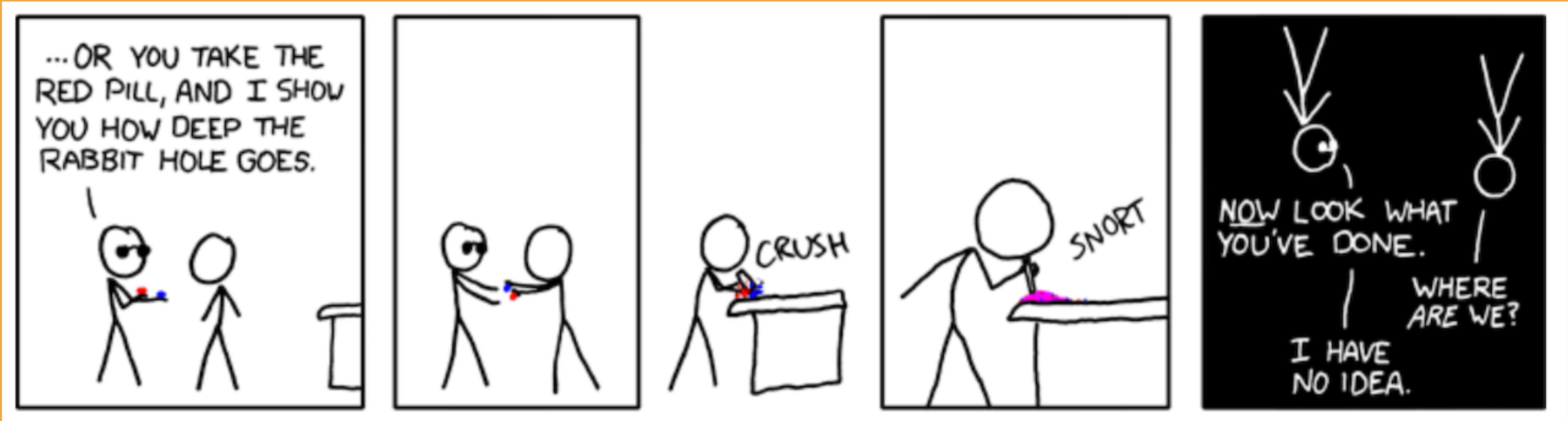


**How do we get AppleTalk  
over The Internet?**

**The Internet doesn't route  
AppleTalk packets**

**(to be fair AppleTalk doesn't route IP packets)**

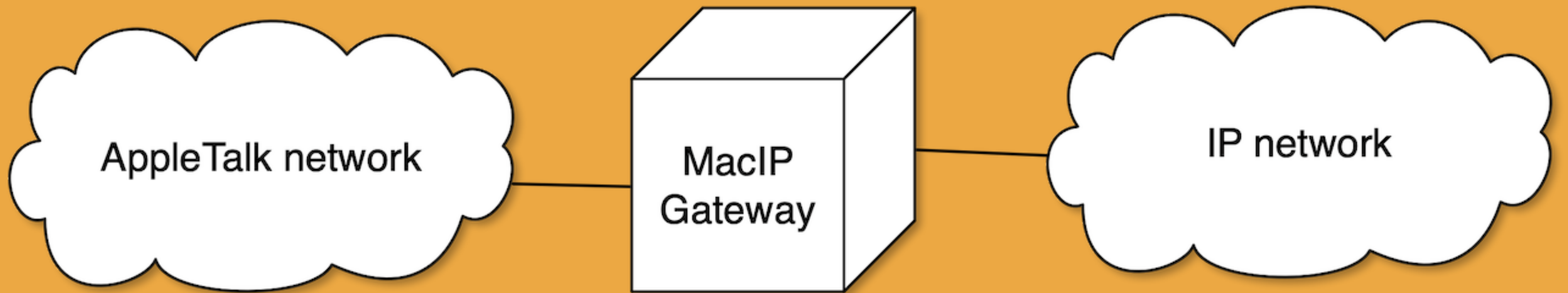




1985

**Stanford Ethernet  
AppleTalk Gateway  
(SEAGATE)**

**which later became  
MacIP**



Network translation

## DDP

Hop count: 4 bits

**Source network: 16 bits**

**Source node: 8 bits**

Source socket: 8 bits

**Destination network: 16 bits**

**Destination node: 8 bits**

Destination socket: 8 bits

Protocol type: 8 bits

## UDP and TCP

Source port: 16 bits

Destination port: 16 bits

## IPv4

Time-to-live: 8 bits

Protocol type: 8 bits

**Source address: 32 bits**

**Destination address 32 bits**

WPNN

# Tunneling

**also known as  
Encapsulation**

## *Tunneling*

**... is to *networking*, as**

**"Just add another layer  
of tunnelling/  
encapsulation!"**

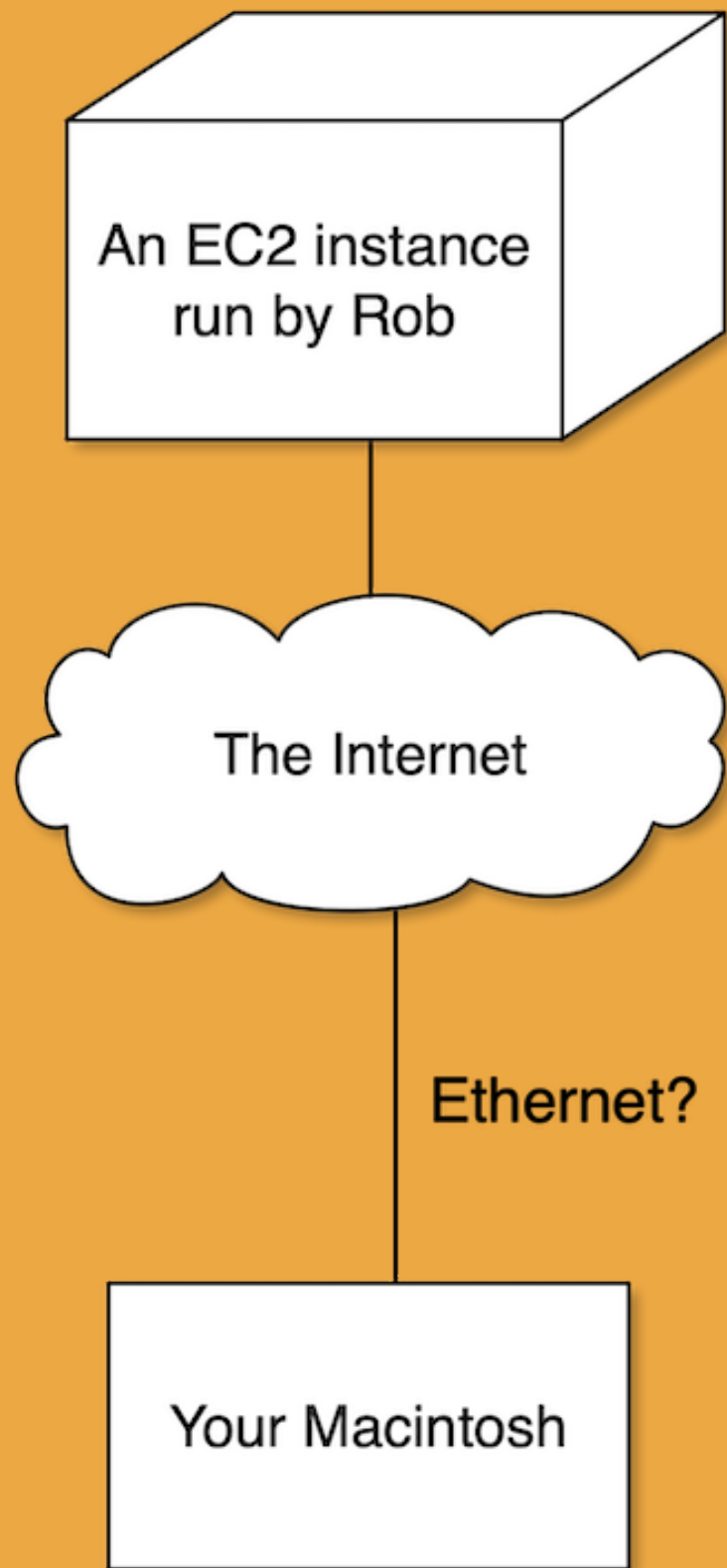
## *Indirection*

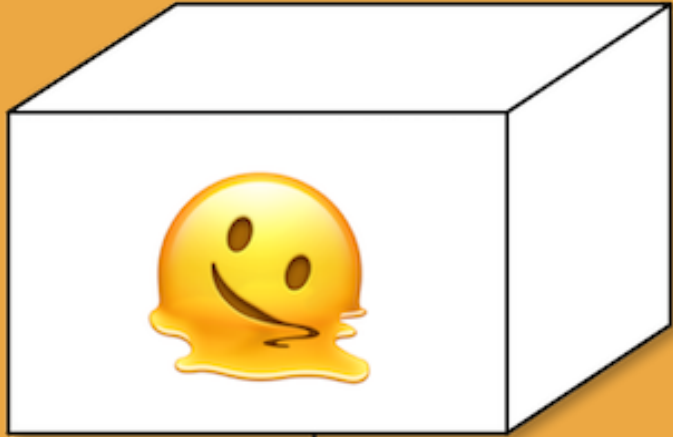
**... is to *programming***

**"Just add more lookup  
tables!"**

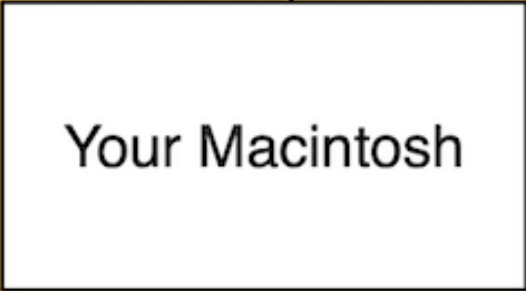








Ethernet?



Apple

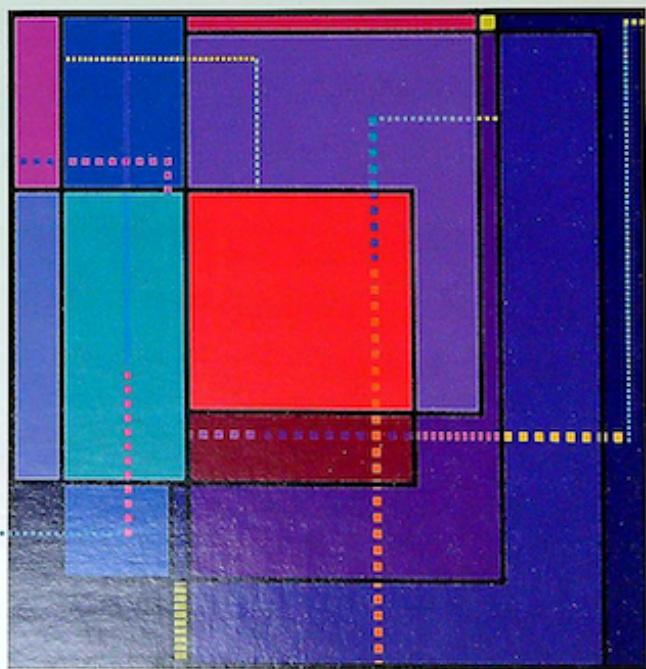
**Internet**

Router



## Apple Internet Router Basic Connectivity Package

*The easiest way to interconnect  
your local and remote workgroups*



## Apple Internet Router Basic Connectivity Package

Whether you have a small office and want to connect a few workgroups, or you're part of a multinational corporation with global internetworking needs, the Apple Internet Router provides the perfect networking solution. With the Apple Internet Router software, you can easily increase the size, enhance the performance, and improve the management of your organization's AppleTalk network.

### Local and wide area networking flexibility

The router enables you to connect local workgroups over industry-standard network types, including LocalTalk, Ethernet, and Token Ring. And, as your network grows larger and more global, the Apple Internet Router lets you choose among several internetworking options. You can link remote sites to your internetwork through a dial-up connection over a standard modem, or you can add one of the Apple Internet Router Wide Area Extensions (available separately) to link your AppleTalk networks using X.25 or TCP/IP.

### Powerful and efficient internetworking

The Apple Internet Router features the AppleTalk Update-based Routing Protocol (AURP), a powerful wide area networking standard. AURP ensures that wide area links function efficiently, substantially reducing the traffic over wide area networks. With AURP, you can be certain that you're maximizing the use of your network resources.

### Easy to use and manage

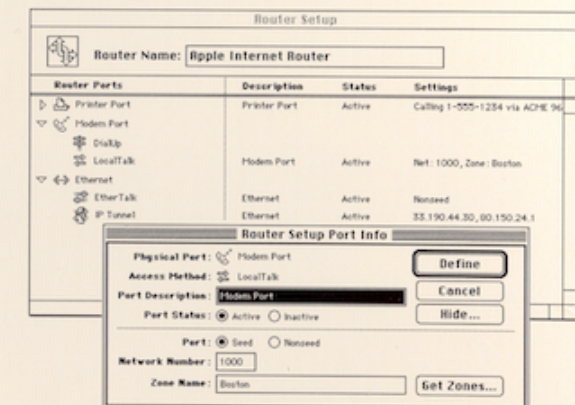
Because the Apple Internet Router software runs on a broad range of Apple Macintosh computers, you can tailor your router configurations to meet your cost/performance requirements. And, like other Macintosh-based software, the router is easy to configure, use, and support. Even a network novice can have the router up and running and can begin to make use of its powerful features within minutes. In addition, the router has built-in support for the Simple Network Management Protocol (SNMP), so it can be easily monitored by any SNMP-based management station.

### Package Contents

- Apple Internet Router software and installer
  - *Apple Internet Router Administrator's Guide*
  - DialUp Wide Area Extension
  - SNMP Router Agent
- (AppleTalk/IP and AppleTalk/X.25 Wide Area Extensions sold separately)

### System Requirements

- A Macintosh Plus computer or later model with at least 4 megabytes of memory (PowerBook computers not recommended)
- System software version 7.0 or later
- Dial-up connections require a V.32/9600-bps or higher-speed modem
- Works on AppleTalk Phase 2 networks only

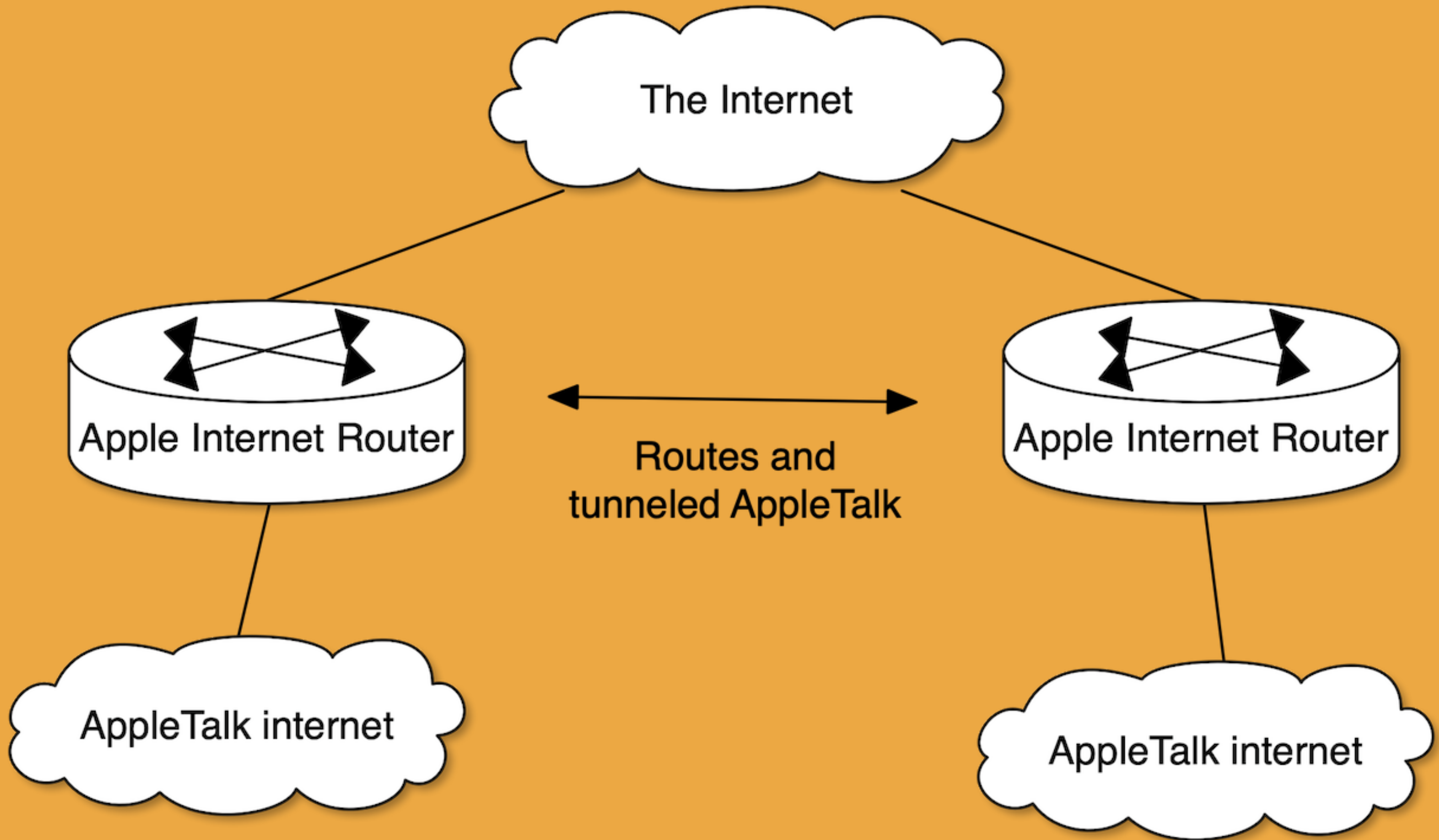


© 1993 Apple Computer, Inc. Apple, the Apple logo, AppleTalk, LocalTalk, and Macintosh are trademarks of Apple Computer, Inc., registered in the U.S.A. and other countries. PowerBook is a trademark of Apple Computer, Inc.

**Apple Computer (1993), Apple Internet Router**

Apple Internet Router  
*does use* Internet  
Protocol (and AppleTalk)

Apple Internet Router  
*does not* let Macs access  
The Internet



## Prepare your Mac

Here's the steps we used to create a working AIR installation. We are using LC form factor machines with Ethernet cards installed in the PDS slot. Other machines may also work but have not been tried. H/t to Dan **????** for figuring out the order of operations!

1. Start with a fresh install of **System 7.1**.
2. Install **System Update 3.0**.
3. Install **Apple Internet Router 3.0**.
4. Install **Router IP extension**.
5. Install **Network Software Installer 1.4.5**.

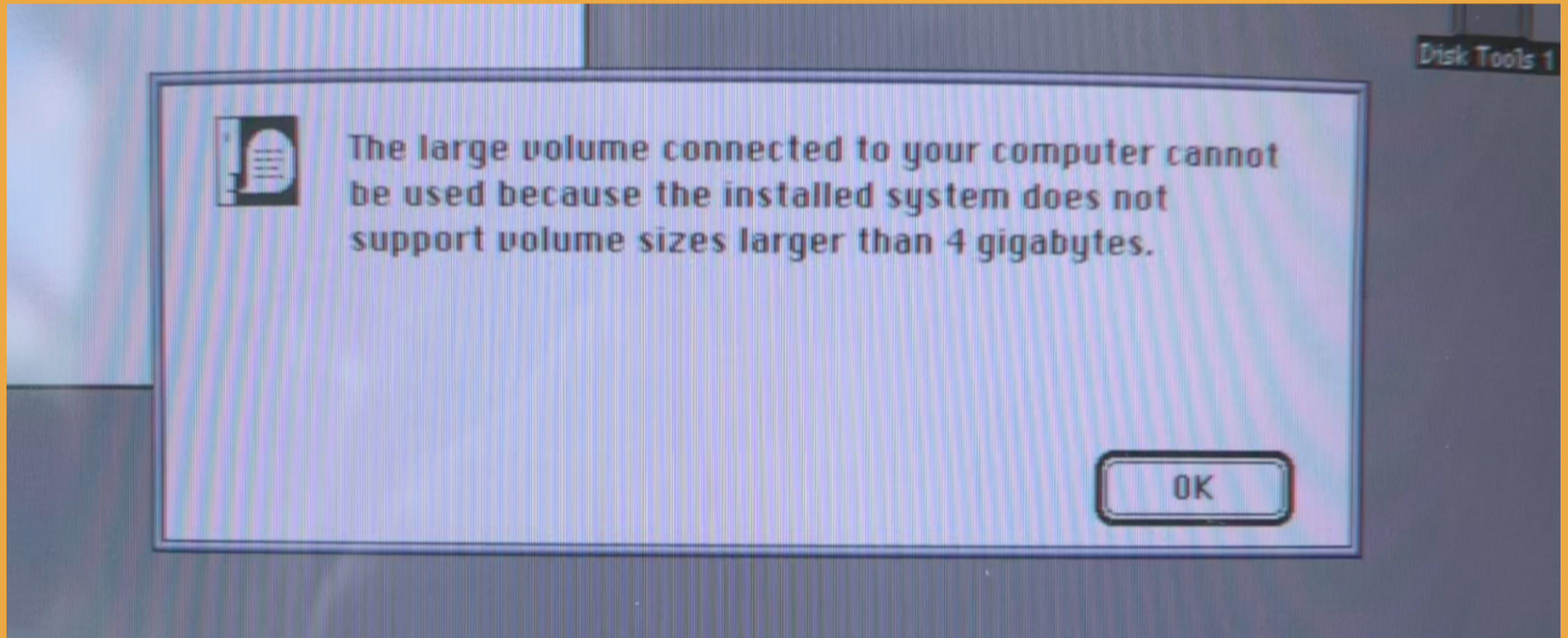


# Which Mac supports System 7.1?





- Mac Plus: no Ethernet
- Mac Classic: no Ethernet
- "Mystic" Colour Classic: Ethernet and 68040 CPU!
- PowerBook G3: has Ethernet, but too new
- Power Mac G4 Cube: has Ethernet, but too new



I promptly bricked it



# No System 7.1 for Mystic

- Was running Mac OS 8.1
-  680x0 Macs can only boot from HFS format
-  Internal hard disk is 140 GB
-  Earlier Mac OS only supported disks up to 4 GB
-  This includes Disk Tools disks

QUEMMU

**I guess!?**

QEMU

File Edit View Control Windows

DrJosh9000 router

The router is currently using this setup document.

Router Name:

Router Ports	Description	Status	Settings
Printer Port			
Modem Port			
Ethernet			
EtherTalk	Ethernet	Active	Net: 450-459, Zone: MacLab House
IP Tunnel	Ethernet	Active	Host IDs

Router Statistics

Statistics last reset at: 3/17/24 9:19 PM

Graphs show data for the past:

**Packets Routed:** 61

**Network Activity:**

**Network Reliability:** 98.4%

**Network Errors:**

Port Statistics

Statistics last reset at: 3/17/24 9:19 PM

Statistics	Total	Ethernet	Ethernet
Packets In	48	29	19
Packets Out	48	32	16
Name Requests In	13	13	0
Name LookUps Out	13	13	0
Data Link Errors	0	0	0
Packet Buffer Overflow	0	0	0
Unknown Network	0	0	0
Hop Count Exceeded	0	0	0
Routing Table Overflow	0	0	0
Local Net Setup Conflicts	0	0	0
Remote Net Range Conflicts	1	0	1
Router Version Mismatch	0	0	0

Network Information


49 Networks, 38 Zones

Sort by:






Network Range	Zone Name	Distance	Forwarding Port	Next Hop
70-79	BlueSCSI Int HQ	1	Ethernet	
701-709	btb Ether Zone	1	Ethernet	
700	btb Local Zone	1	Ethernet	
120-129	Captain's Quarters II BBS	1	Ethernet	
1447-1457	Charles'World	1	Ethernet	
918-918	Diller Zone	1	Ethernet	
919-919	Diller Zone	1	Ethernet	
920-920	Diller Zone	1	Ethernet	
200-220	Eric's Edge	1	Ethernet	
550-560	Gemedet	1	Ethernet	
8096-8096	GlobalSwim	1	Ethernet	
6565-6575	gutbomb	1	Ethernet	
742	OutBomb LT	1	Ethernet	
2460	IntoTheEther	1	Ethernet	
2461-2469	IntoTheEther	1	Ethernet	
6502-6512	JCM Zone	1	Ethernet	
8080	Joe's Computer Museum	1	Ethernet	
930-939	Jonny0	1	Ethernet	
5	Jonny0Local	1	Ethernet	
909	JUPAK	2	Ethernet	
990-999	JUPAK	1	Ethernet	
42	KennyLoginsDangerZone	1	Ethernet	
4260-4269	KennyLoginsDangerZone	1	Ethernet	
130-139	Kingdom of Sealand	1	Ethernet	
110-118	Likes0181acs	1	Ethernet	
119	Likes0181acs	1	Ethernet	
450-459	MacLab House	0	Ethernet	
10	Petar's Place	1	Ethernet	
1000-1009	Petar's Place	1	Ethernet	
420-429	PurrTopia	1	Ethernet	
54	RCV2	1	Ethernet	
5320-5330	RCV2	1	Ethernet	
710	RT0D LC	1	Ethernet	
711-721	RT0D LC	1	Ethernet	
12300-12309	ScrapHeap	1	Ethernet	
600-609	the polpo zone	1	Ethernet	
3100-3120	VCG Ethernet	1	Ethernet	
300	Vaffenet	1	Ethernet	
33330-33340	Welcome to Windows?	1	Ethernet	
2400-2409	Woodland Digital Studios	1	Ethernet	
190-199	VOzFest HQ	1	Ethernet	

## DrJosh9000 router



 The router is currently using this setup document.

**Router Name:**

Router Ports	Description	Status	Settings
<ul style="list-style-type: none"><li> Printer Port</li><li> Modem Port</li><li> Ethernet<ul style="list-style-type: none"><li> EtherTalk</li><li> IP Tunnel</li></ul></li></ul>			

## Network Information



49 Networks, 38 Zones

Pause

Sort by: **Zone Name**



Network Range	Zone Name	Distance	Forwarding Port	Next P
70 79	BlueSCSI Int HQ	1	Ethernet	
701 709	btb Ether Zone	1	Ethernet	
	700 btb Local Zone	1	Ethernet	
120 129	Captain's Quarters II BBS	1	Ethernet	
1447 1457	CharkesWorld	1	Ethernet	
918 918	Diller Zone	1	Ethernet	
	919 Diller Zone	1	Ethernet	
	920 Diller Zone	1	Ethernet	
200 220	Eric's Edge	1	Ethernet	
550 560	Gemedet	1	Ethernet	
8086 8096	GlobalSwim	1	Ethernet	
6565 6575	gutbomb	1	Ethernet	



## Port Statistics



Statistics last reset at: 3/17/24 9:19 PM

<b>Statistics</b>	<b>Total</b>	 <b>Ethernet</b>	 <b>Ethernet</b>
Packets In	48	29	19
Packets Out	48	32	16
Name Requests In	13	13	0
Name LookUps Out	13	13	0
Data Link Errors	0	0	0
Packet Buffer Overflow	0	0	0
Unknown Network	0	0	0
Hop Count Exceeded	0	0	0
Routing Table Overflow	0	0	0
Local Net Setup Conflicts	0	0	0
Remote Net Range Conflicts	1	0	1
Router Version Mismatch	0	0	0

## Router Statistics

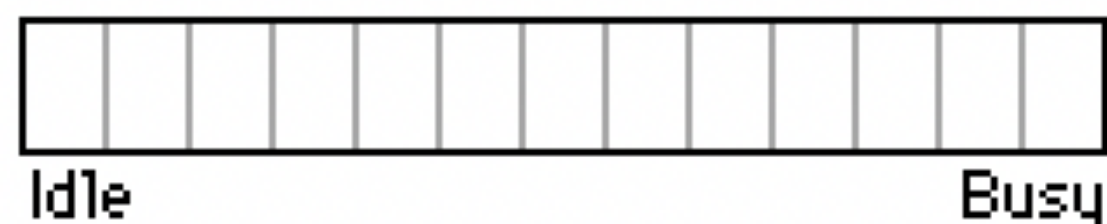


Statistics last reset at: 3/17/24 9:19 PM

Graphs show data for the past: **5 minutes** ▼

**Packets Routed:** 61

**Network Activity:**



**Network Reliability:** 98.4%

**Network Errors:**



# Recommendation for devs

**Software should be *observable***

**Find a way to diagram the internal state of your app!**

**Is it 100% safe and secure??**

Actually, **NO** - probably not! ಀ\_(ツ)\_/ The only way to participate in this is to share your IP address on a spreadsheet and open a port for your router to allow these connections.

You'll also need a Google account so you can request access to the spreadsheet that contains the other networks to connect to. We can't change this, it is what it is. Sorry!

Is Apple Internet Router  
secure?

**Probably not**

Why am I not totally pwnd  
right now?

**(Obscurity)**

So I decided to write my  
own "AIR" in Go

**jrouter**



✨ **Josh** ✨  
@DrJosh9000

10d

Better write some talk slides, hey [#DevWorld](#) [#GlobalTalk](#)

**The GlobalTalk Network**

**/dev/world/2024, Melbourne**

**Josh Deprez**





**europlus**

@europlus@europlus.zone

MUTUAL



@DrJosh9000 @ctb31





**Tashtari**  
Tinkerer

Mar 20, 2024

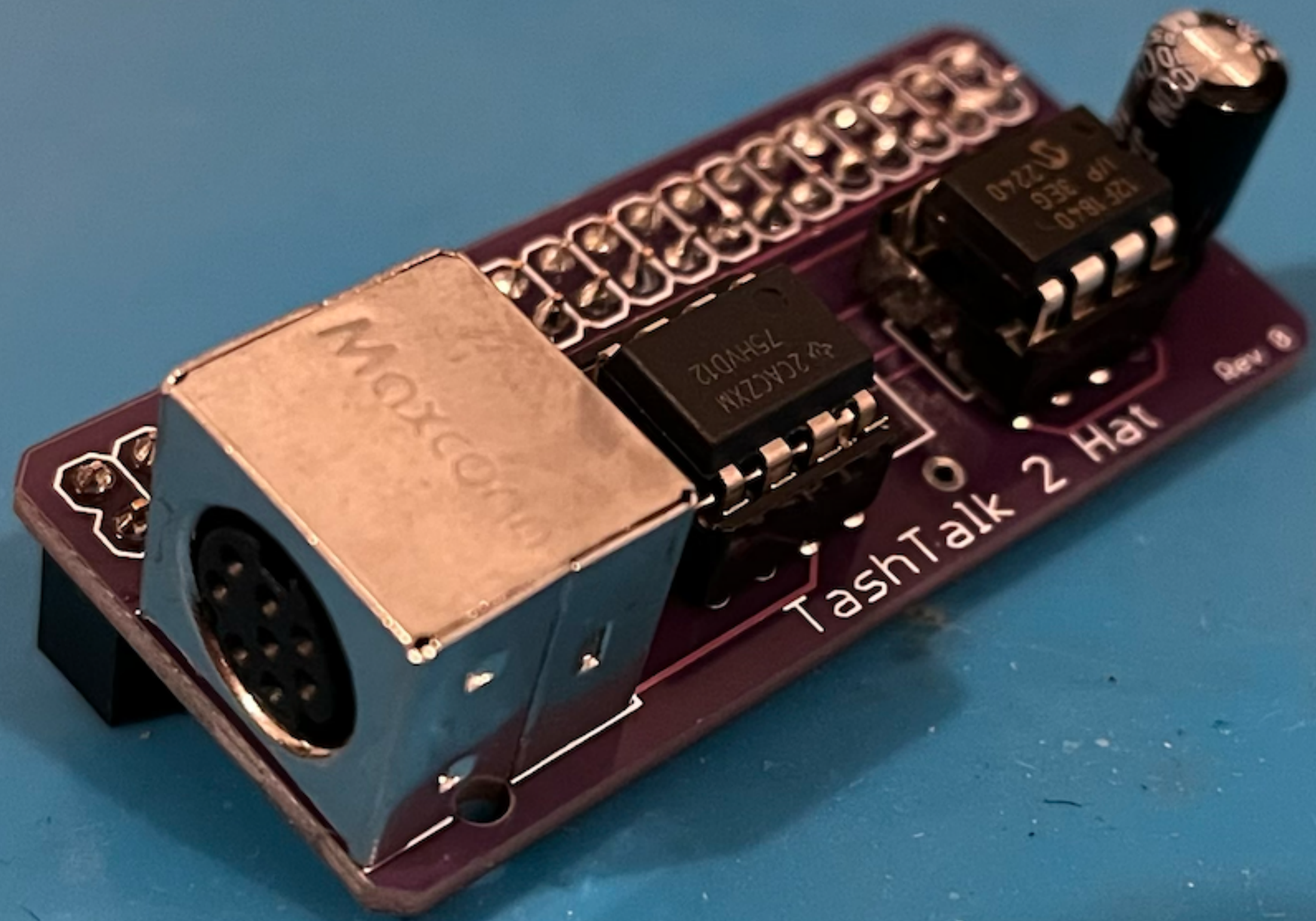
 #24

NJRoadfan said: ↩

Someone is writing a AURP gateway in go: <https://gitea.drjosh.dev/josh/jrouter>

Hm. I've done too much wheel-reinvention in my time to cast stones, but I certainly wish they were writing it in Python... =)

<https://tinkerdifferent.com/threads/globaltalk-global-appletalk-network-for-marchintosh-2024-and-beyond.3392/page-2#post-29150>



# jrouter

- **Uses libpcap for raw Ethernet access**
- **Acts like an AppleTalk router**
- **Connects to Apple Internet Routers**
- **Works! (barely)**

# Where's the diagram? 😡

foreign network system. The headers required by a foreign-network protocol always precede an AppleTalk data packet sent across a multipoint tunnel. A domain header generally immediately precedes the AppleTalk data packet. Figure 2-9 shows the format of an AppleTalk data packet preceded by a domain header.

<<Figure 2-9 AppleTalk data-packet format with a domain header>>

A domain header consists of the following fields:

Destination DI: The length of the destination DI field in bytes depends on the type of DI.

**Oppenheimer, A.B. (1993) *Appletalk Update-Based Routing Protocol: Enhanced Appletalk Routing* <https://datatracker.ietf.org/doc/html/rfc1504>**

**Sigh** 🙄

## Format of This RFC Document

The text of this document has been quickly prepared for RFC format. However, the art is more complex and is not yet ready in this format. We plan to incorporate the art in the future. Consult the official APDA document, as indicated below, for the actual art.

**Oppenheimer, A.B. (1993) *Appletalk Update-Based Routing Protocol: Enhanced Appletalk Routing* <https://datatracker.ietf.org/doc/html/rfc1504>**



✨ Josh ✨

@DrJosh9000

🗨️ ✎️ 58d

Edit: found by @boredzo  
! [wiki.preterhuman.net/AppleTalk...](https://wiki.preterhuman.net/AppleTalk...)

Hey anyone know where I can get the missing diagrams from RFC 1504\*? Or Apple's original spec document that it is based on?

(\*this one: [datatracker.ietf.org/doc/html/...](https://datatracker.ietf.org/doc/html/...) )

#GlobalTalk #VintageApple #MarchIntosh



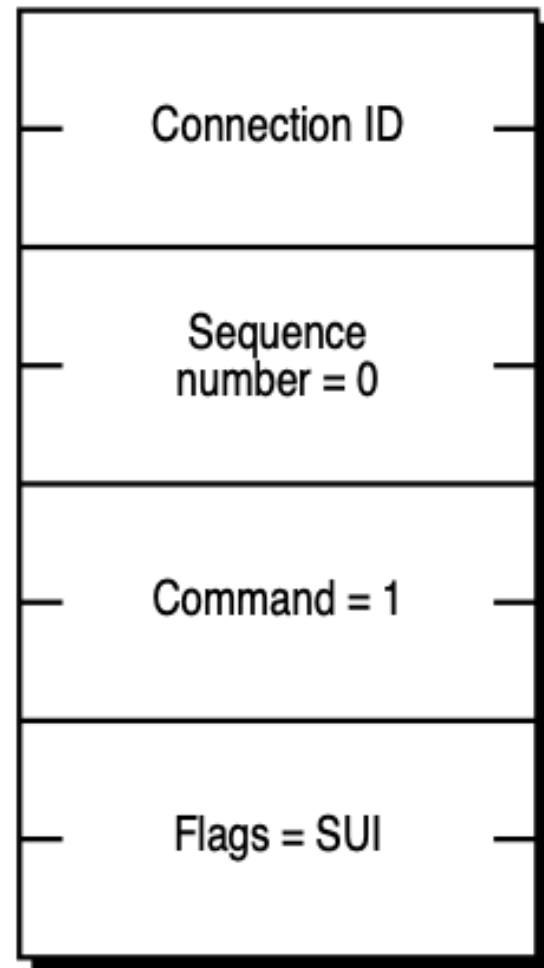
**AppleTalk Update-Based Routing Protocol: Enhanced AppleTalk Routing - Higher Intellect Vintage Wiki**  
[wiki.preterhuman.net](https://wiki.preterhuman.net)



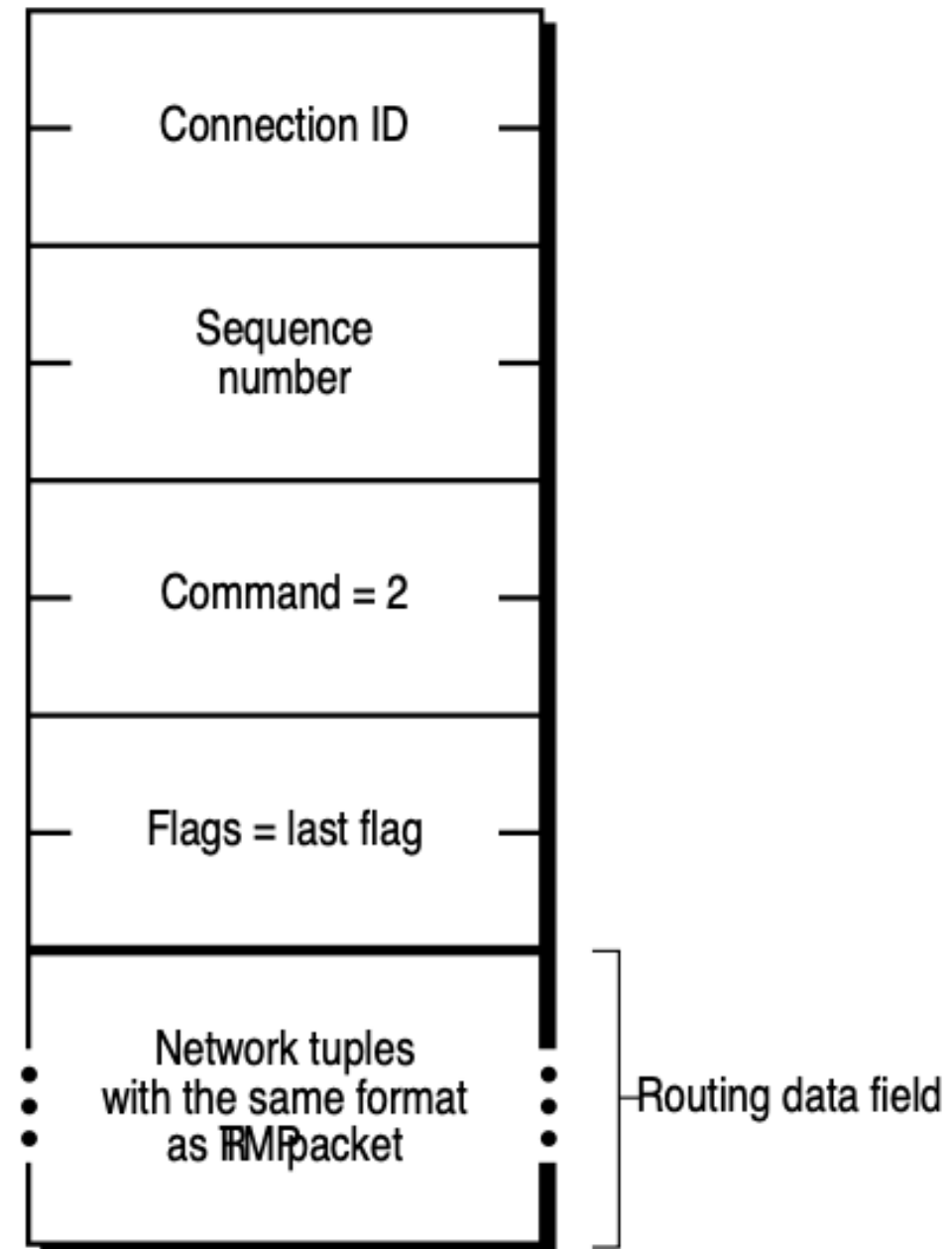
# AppleTalk Update-Based Routing Protocol

*Enhanced AppleTalk Routing*





**Figure 3-26** RI-Req packet format



**Figure 3-27** RI-Rsp packet format

**Apple Computer (1993) *AppleTalk Update-based Routing Protocol: Enhanced AppleTalk Routing***

# AURP

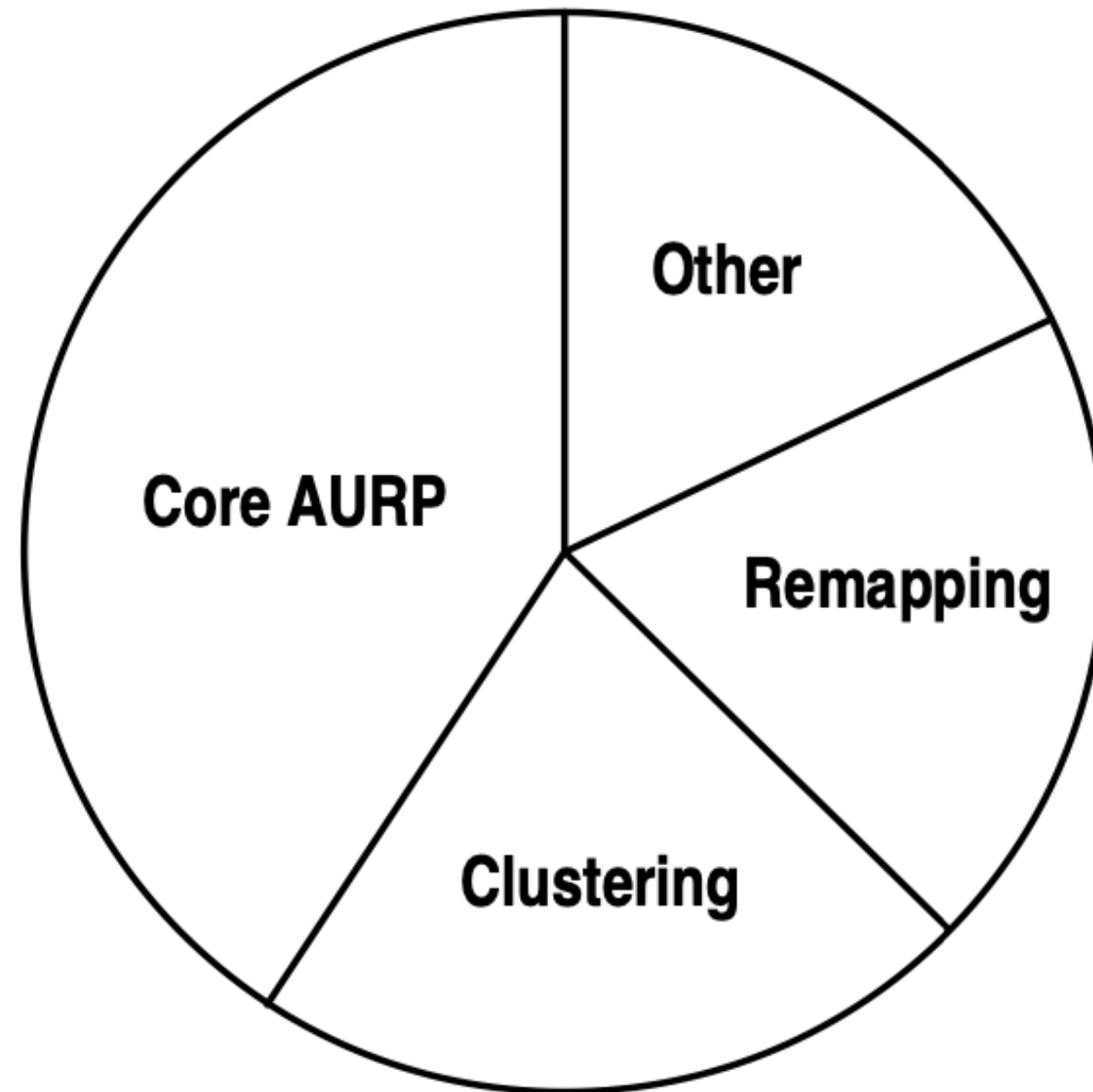
**It's like AppleTalk routing but with...**

- AppleTalk tunnelled over UDP/IP (port 387)**
- ...between Apple Internet Routers...**
- ...that share routing data...**
- ...using a new protocol that replaces RTMP and ZIP**

**Data sender  $\neq$  packet sender**

**Data receiver  $\neq$  packet receiver**

**AURP** *was the easy part*

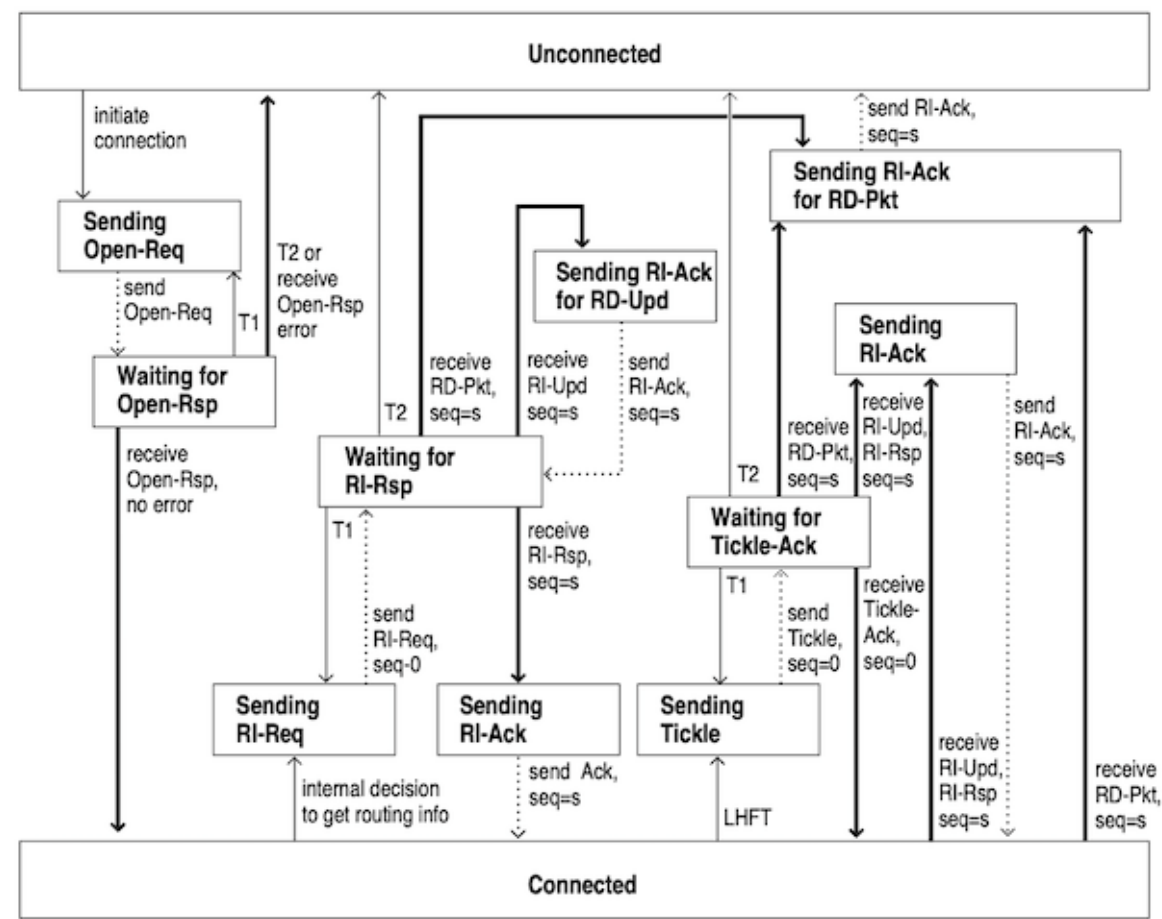


**Figure A-3** Implementation effort for AURP

**Apple Computer (1993) *AppleTalk Update-based Routing Protocol: Enhanced AppleTalk Routing***

## State diagrams

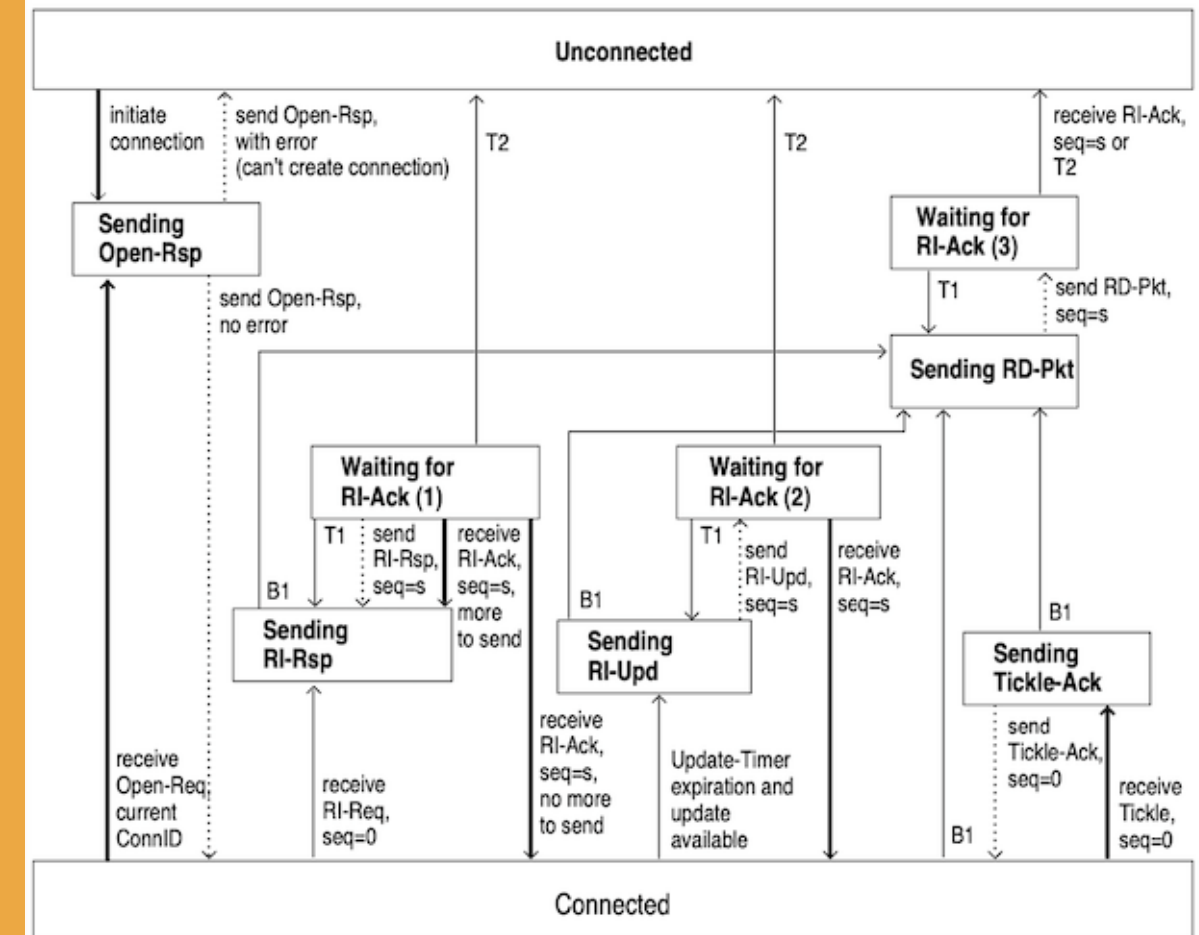
Figure A-1 shows the state diagram for the AURP data receiver.



- ← Internally generated event
- ← Receive packet event
- ←····· Send packet event
- T1 = Send-Retry-Timer expires, retries < max
- T2 = Send-Retry-Timer expires, retries = max
- LHFT = Last-Heard-From-Timer expires

Figure A-1 AURP data receiver state diagram

Figure A-2 shows the state diagram for the AURP data sender.



- ← Internally generated event
- ← Receive packet event
- ←····· Send packet event
- T1 = Send-Retry-Timer expires, retries < max
- T2 = Send-Retry-Timer expires, retries = max
- LHFT = Last-Heard-From-Timer expires

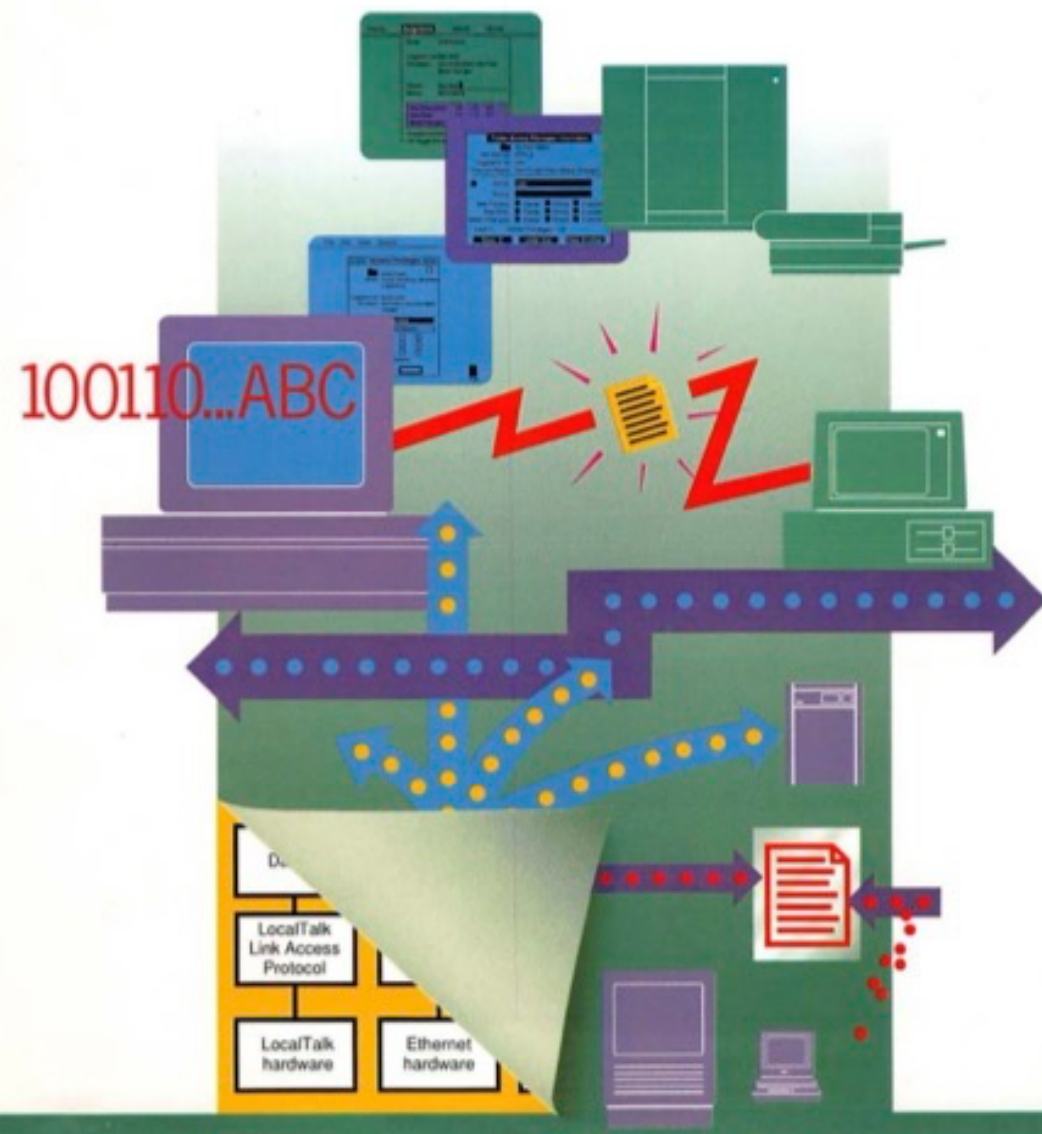
Figure A-2 AURP data sender state diagram

# Apple Computer (1993) AppleTalk Update-based Routing Protocol: Enhanced AppleTalk Routing

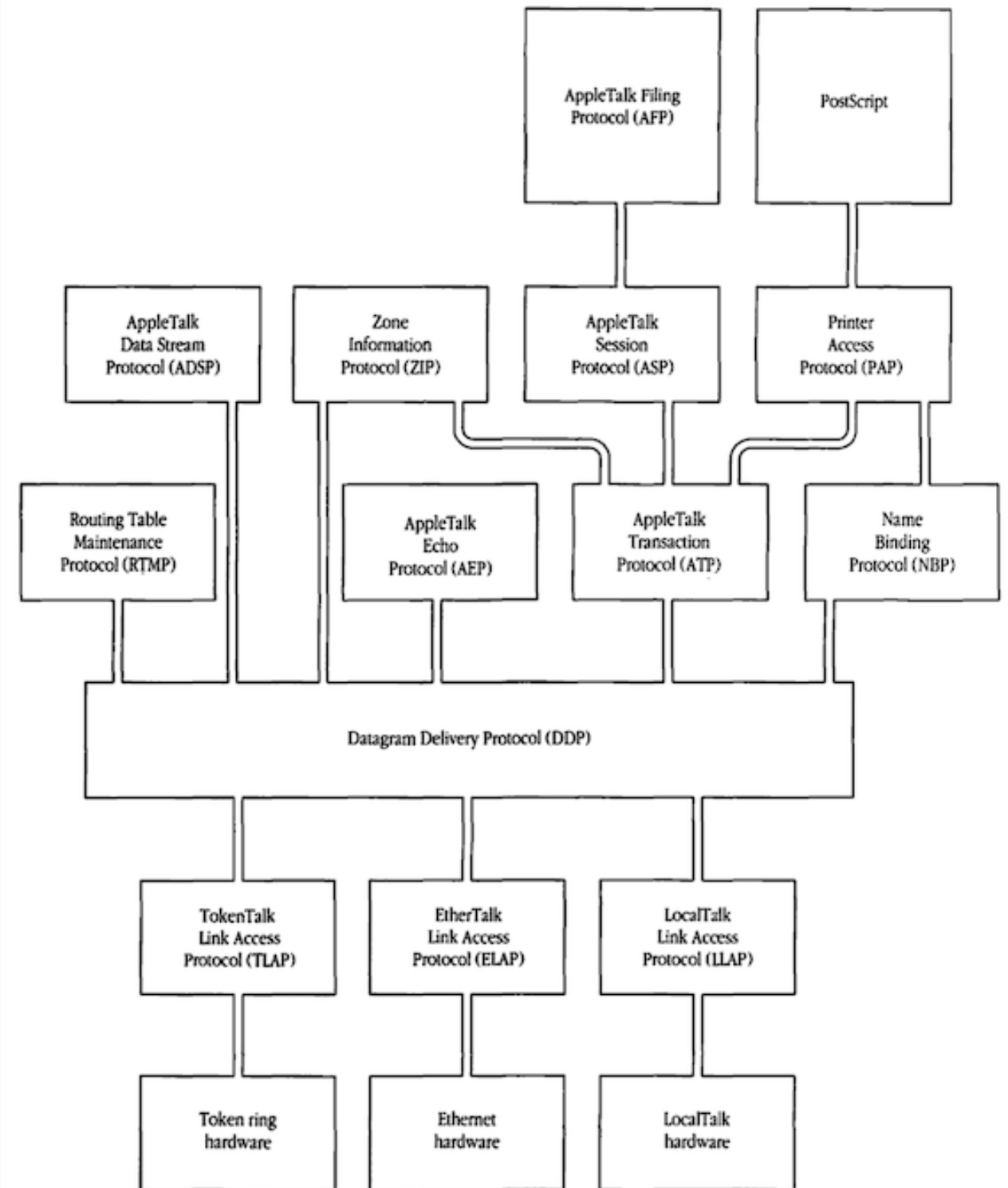


## Inside AppleTalk, Second Edition

by Gursharan S. Sidhu, Richard F. Andrews, Alan B. Oppenheimer  
Apple Computer, Inc.



■ Figure I-7 AppleTalk protocol architecture



```
CkSum := 0 ;
```

```
FOR each datagram byte starting with the byte immediately following the  
Checksum field
```

```
REPEAT the following algorithm:
```

```
    CkSum := CkSum + byte; (unsigned addition)
```

```
    Rotate CkSum left one bit, rotating the most significant bit into the  
        least significant bit;
```

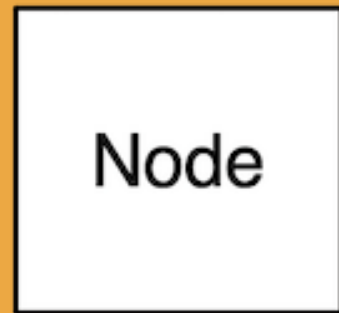
```
IF, at the end, CkSum = 0 THEN
```

```
    CkSum := $FFFF (all ones).
```

Reception of a datagram with CkSum equal to 0 implies that a checksum is not performed.

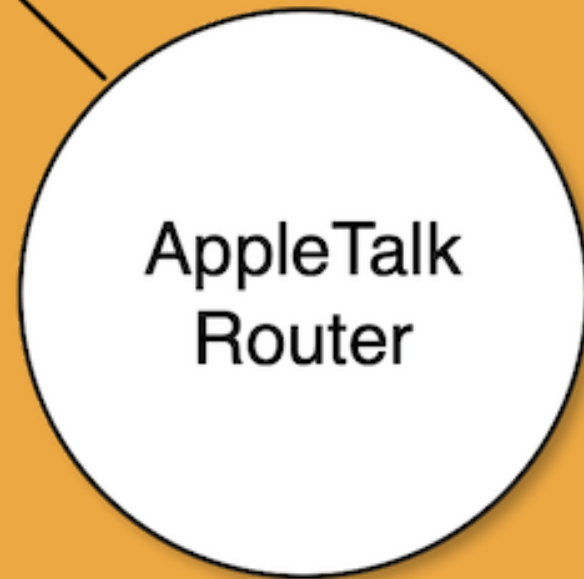


1. Send BrRq to router

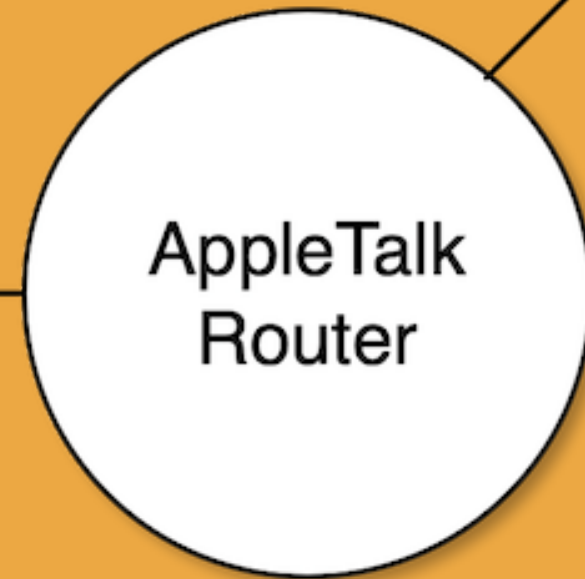


Node

2. Translate BrRq->FwdReq  
and send to next router

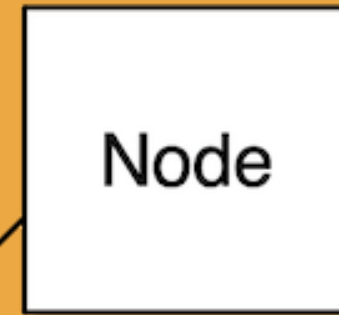


AppleTalk  
Router



AppleTalk  
Router

4. Respond with LkUp-Reply



Node

3. Translate FwdReq->LkUp  
and then broadcast on LAN

**Welcome to  
#GlobalTalk Chat**  
**Created for #MARCHintosh 2024**  
By @kalleboo@bitbang.social



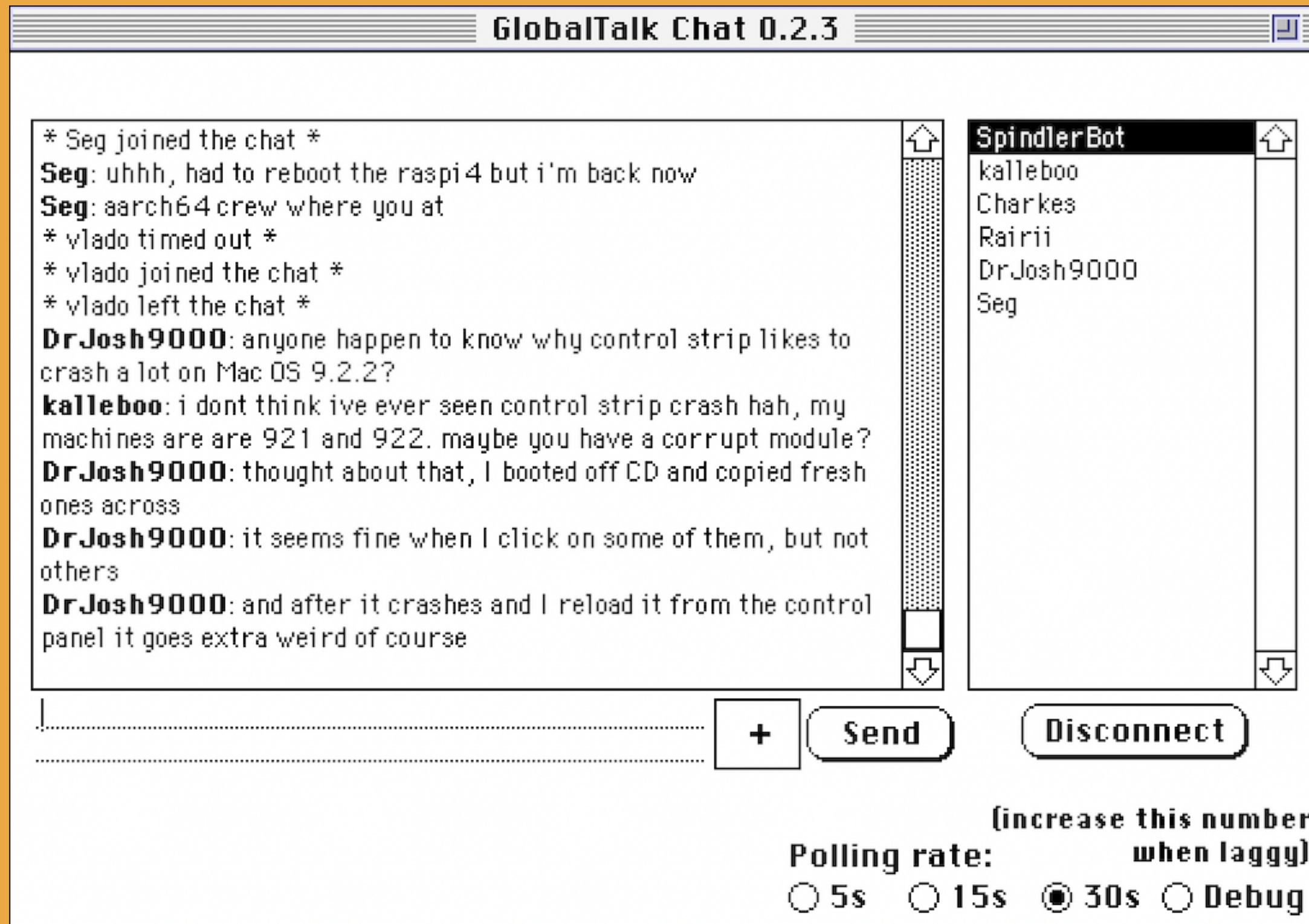
Nickname: DrJosh9000

Server: BaroNet:Lombard:GlobalTalk Chat Server

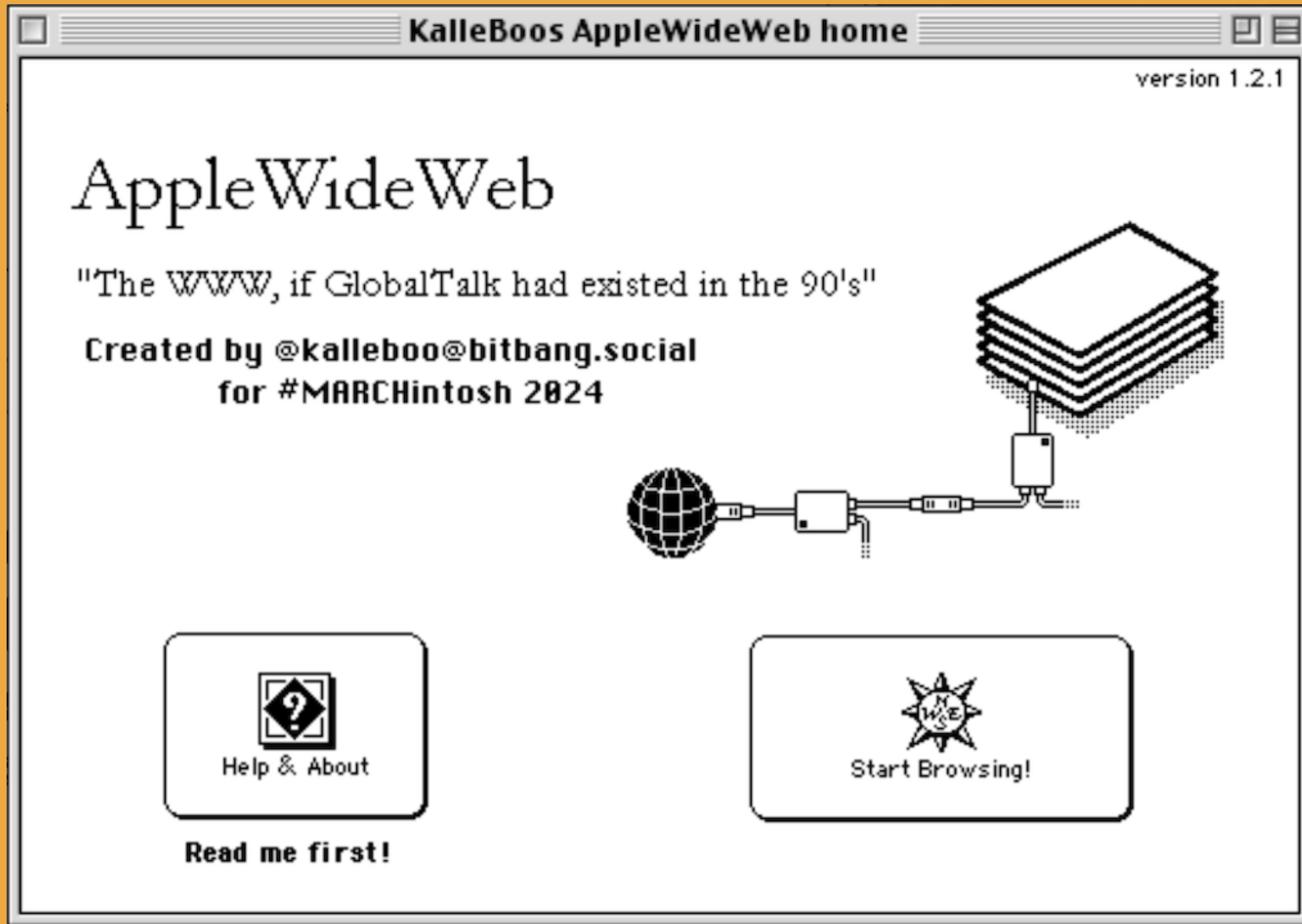
Choose

Default

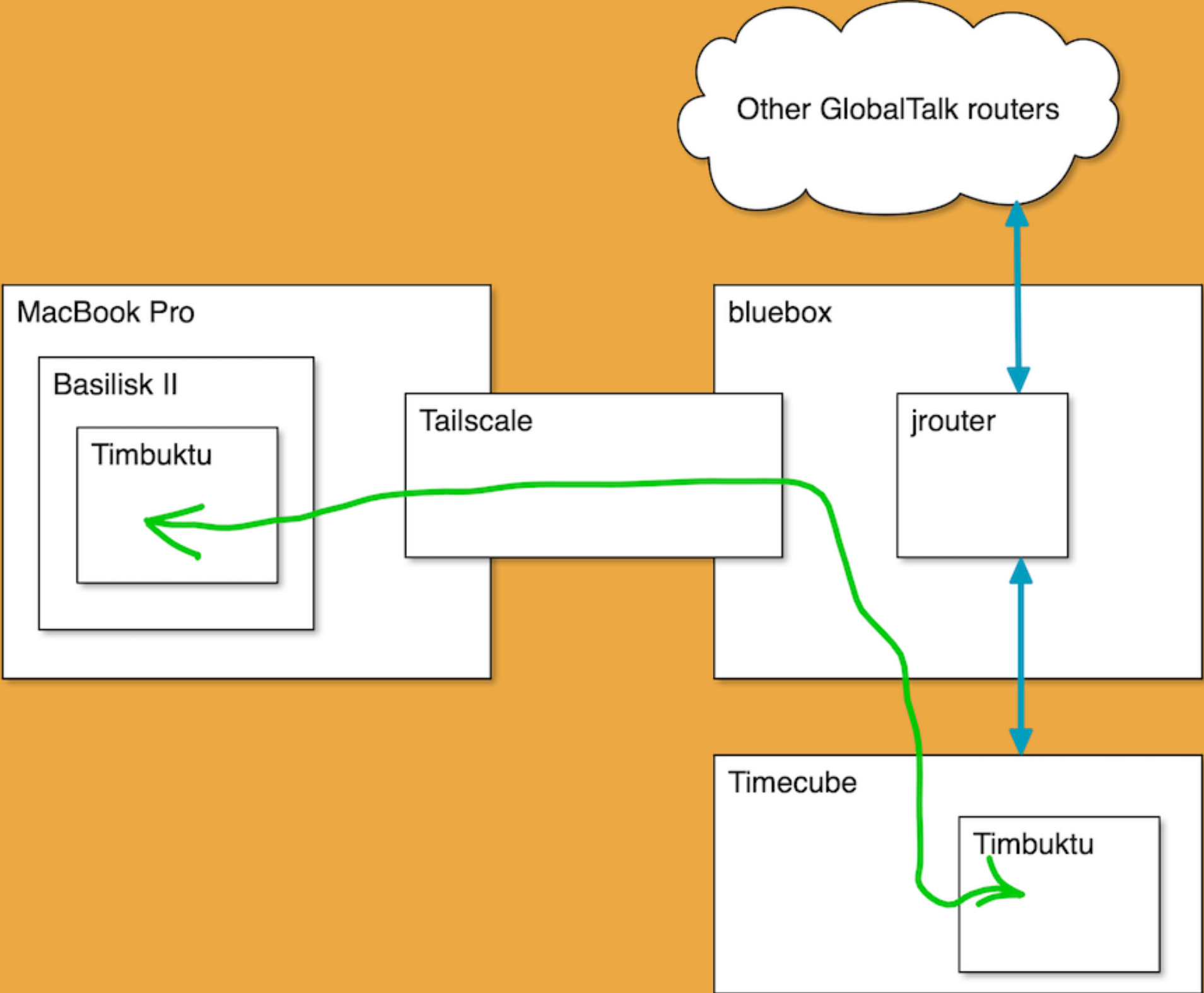




@kalleboo@bitbang.social (2024) #GlobalTalk Chat version 0.2.3 (alpha)



Demo time



# Thanks!

**Fediverse: @DrJosh9000@cloudisland.nz**

**jrouter: gitea.drjosh.dev/josh/jrouter**

**This talk: gitea.drjosh.dev/josh/devworld2024**



Mac84 🍏

@mac84tv@bitbang.social

My PC is crashing the #GlobalTalk party! 🤪

