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01/10

# A Rule Tested Between Hawaiian Islands Changed How Shared Networks Speak

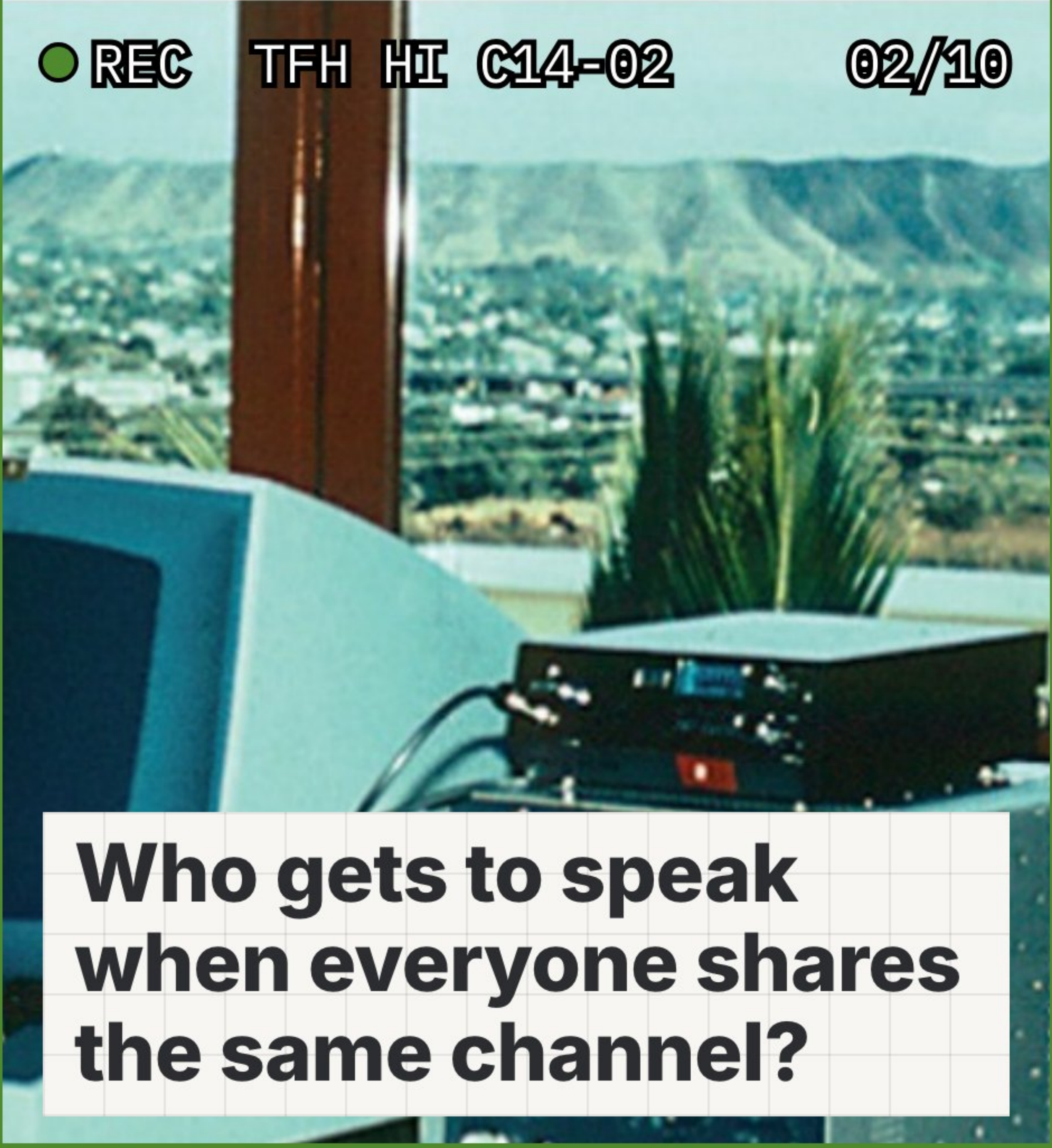
Before Wi-Fi, ALOHAnet taught  
shared networks what to do  
when devices talked at once.

Photo: Norm Abramson/UH Mānoa

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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# Who gets to speak when everyone shares the same channel?

Source: Abramson, IEEE ComMag 2009

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A satellite photograph of the Hawaiian Islands, showing the main islands and surrounding waters, with a green border around the image.

**In 1971, ALOHAnet  
operated a UHF  
packet-radio network  
across Hawai'i.**

Photo: NASA

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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**Transmit. Listen for  
acknowledgment. If  
none arrives, wait a  
random interval, and  
try again.**

Photo: Marcin Wichary, cropped

Frame: Steve Jurvetson, CC BY 2.0, cropped

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**Random delay kept  
unsuccessful  
terminals from  
colliding again in  
lockstep.**

Photo: ES0, cropped

Frame: Steve Jurvetson, CC BY 2.0, cropped

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**Under its idealized model,  
Pure ALOHA peaks near  
18.4% of channel capacity.**

## The ALOHA System, in figures

Developed

1970 through 1976

Pure ALOHA peak

About 18.4 percent of  
channel capacity, under  
the idealized traffic model

D J. HOLMES

COLLEGE OF ENGINEERING

Source: ETHW (IEEE History Center)

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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A black and white portrait of Franklin Kuo, a man with dark hair, looking slightly to the right. The image is framed by a green border.

Franklin Kuo's 1981 National Bureau of Standards survey describes the network as an experimental radio computer-communication system developed from 1970 through 1976.

ARPA satellite  
node

December 1972

Photo: Masao Miyamoto, UH Archives

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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+5  
RUN  
HALT



GATEWAY



PACKET RADIO MINISTATION

**ALOHA influenced  
later shared-medium  
protocols.**

Photo: Marcin Wichary

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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PWR

SC

**It is a lineage, not a  
claim that ALOHAnet  
simply invented Wi-Fi.**

Photo: Fernost

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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**When it extended  
packet networking  
through satellite  
facilities,**

**the technical path ran into a  
pricing system still organized  
around voice service.**

Photo: courtesy Ram Chandran

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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## ● WHAT WE ACTUALLY KNOW 09/10

Demonstration of the ALOHA Packet Radio Data Network, 1971

In June 1971, the ALOHA packet radio data network began providing inter-island access to computing facilities at the University of Hawaii. ALOHAnet was the first to demonstrate that communication channels could be effectively and efficiently shared on a large scale using simple random access protocols. It led directly to the development of Ethernet and personal wireless communication technologies.

June 2021

# What We Actually Know

What we know

**A working random-access packet-radio system.**

What we don't

**That every later wireless standard is the same protocol.**

Source: ETHW (IEEE History Center)

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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# Every Wi-Fi icon hides a shared-channel question Hawai'i helped make computable.

Read the full record.

- ☐ Does a sender wait for permission, or just transmit?



Photo: Herzi Pinki

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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**HiMAX** 5-Port Fast Ethernet Hub  
Mbps  
POWER LNK/ACT COL 1 2 3 4

☐ What happens when two transmissions collide?

Photo: George Shuklin

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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☐ Is the throughput figure measured, or theoretical?

Photo: heimnetzwerke.net

Frame: Steve Jurvetson, CC BY 2.0, cropped  
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