We can't send emails farther than 500 miles.

The code example is a joke based on a true story from 1994.

a software configuration bug accidentally turned a physics constant into a networking problem. 😄

A network administrator at the University of Maryland received a strange complaint from the dean: "We can't send emails farther than 500 miles."

The administrator was convinced it was a joke, but after checking the data, he discovered the dean was right. What was going on?

The investigation showed that emails sent to nearby destinations (such as Georgia or North Carolina) were delivered without any issues, while emails sent to more distant locations (such as New York, about 580 miles away) consistently failed and bounced back.

The person who shared the story is a software developer and systems engineer, Trey Harris. In 2002, he posted the memory to the SAGE (System Administrators Guild) mailing list, and from there the story went viral.

After a deep investigation, it turned out that someone had upgraded the mail server's operating system, and the upgrade had overwritten a configuration file. As a result, the response timeout value was reset to 0.

Because of the way the code was written, the system fell back to a hardware default setting, which calculated signal propagation time at roughly 3 milliseconds.

An electrical signal travels through optical fiber at close to the speed of light. In 3 milliseconds, a signal can travel a maximum distance of... approximately 558 miles. Any server farther away simply could not respond before the timeout expired, causing the email delivery attempt to fail.

He concluded the story with these words:

"As network geeks, we tend to think of our problems as being in the routing tables, or the DNS, or the mailers. Sometimes, it's just the top speed of light."

Speed of light in fiber

Light in vacuum: 300,000 km/s

In optical fiber it slows down to roughly: 200,000 km/s

(about 2/3 of the speed of light)

Step: Timeout is 3 milliseconds

The timeout was: 3 ms in config

But if you do the physics literally:

Using fiber speed ≈ 200,000 km/s:

distance = speed × time

= 200,000 × 0.003
= 600 km <<<< so, you can’t send an email more than 600 km’s. 🙂

The important lesson

The story is **not really about the exact number 3 ms.**

The real lesson is:

Very small timeout

Very small timeout
+
Finite speed of light
=
Distance-dependent failures