A previous expedition three years before had ended in failure when technicians lost contact with the undersea drone and it was not recovered.

This time the expedition had two newer drones, a primary and a backup, that were flat torpedo-like pieces of equipment about 13 feet long and 5 feet wide with thrusters that enabled them to move in all directions.

Like those on the previous expedition, these drones could operate independently, programmed in advance with coordinates and a search pattern. But unlike the earlier equipment, these were tethered to the ship by a thin, miles-long fiber optic cable that could be unspooled as the drone traveled to the seafloor. The cable transmitted images to the ship in real time, but could also be used to send new instructions to the drone to alter its course if necessary.

what even is it
1978: flexibility and layering

Transport

TCP, UDP
OSPF, EGP, DNS

Congestion collapse
Policy routing
CIDR

1970s: ARPAnet
1980s: growth → change
late 80s: growth → problems
1993: commercialization

hosts.txt
distance-vector routing
TCP, UDP
OSPF, EGP, DNS


Today: turning our attention away from the Internet to datacenter networks. What’s different in this environment, and why does it matter?

Application

The things that actually generate traffic

Examples: TCP, UDP

Transport

Sharing the network, reliability (or not)

Examples: TCP, UDP

Network

Naming, addressing, routing

Examples: IP

Link

Communication between two directly-connected nodes

Examples: ethernet, bluetooth, 802.11 (wifi)
datacenter networks back many of the services you use every day
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Multiple physical machines on a single **rack**.
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we need a way to communicate across racks. we control this network, so we can design its topology

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Certain topologies can add a lot of redundancy. This is an example of a Clos topology.
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multipath routing can do this, but we need to be careful about how we divide traffic across the paths.

e.g., dividing a single TCP flow across multiple paths will make congestion control more difficult.
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Each physical machine can host multiple virtual machines, which sometimes need to be moved around in the network. Datacenters need to decouple a VM’s name from its physical location in order to make this work.
because datacenter networks are under the control of a single administrative entity, we have a level of control over the network that we simply don't have on the Internet.
application  the things that actually generate traffic

transport sharing the network, reliability (or not)
examples: TCP, UDP

network naming, addressing, routing
examples: IP

link communication between two directly-connected nodes
examples: ethernet, bluetooth, 802.11 (wifi)

different networking environments give us different opportunities and impact applications in different ways