Photo Across the Ocean

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Sections follow the student handout. Delete a section here when you delete it from the handout. The handout uses the short (quick) version of the reading.

Vocabulary: Fill in the Blank

1. mundane
2. intercept
3. gibberish
4. backbone
5. congested
6. decentralized / decentralised
7. resilient
8. come ashore
9. slender
10. fraction
11. boosts
12. jumbled
13. reassembles
14. latency

Word Partners

Part A. 1 h 2 d 3 e 4 a 5 f 6 g 7 c 8 b

Phrases: mundane chores; intercept a message; talk complete gibberish; form the backbone of the internet; heavily congested roads; remarkably resilient; in a fraction of a second; boost your confidence.

Part B. 1 boost 2 congestion 3 decentralization / decentralisation 4 resilience 5 jumble 6 interception

Comprehension Questions: Model Answers

1. *What does the messaging app do to a photo before it leaves the phone?*
It compresses the photo, often to about two megabytes, encrypts it, and chops it into packets of up to about 1,500 bytes.

2. *Why does encryption matter if someone intercepts the data?*
Encrypted data looks like gibberish, so a person who intercepts it cannot see the photo.

3. *What two pieces of information does each packet carry?*
Its destination and its place in the sequence.

4. *How do the packets get from the phone to the fiber-optic network?*
They travel as radio waves to a nearby cell tower or Wi-Fi router, where the signal becomes pulses of laser light in fiber-optic cable.

5. *Explain how routers move packets without a central plan.*
Each router reads the destination address and passes the packet to a neighbor that is likely to bring it closer. No machine plans the whole route.

6. *Why is the network described as resilient?*
It is decentralized: if a link is congested or broken, routers send packets another way, and there is no central point that could fail.

7. *Why are satellites less important than many people think?*
Undersea cables carry around 99 percent of the data that crosses oceans; satellites carry only a small fraction.

8. *What problem does the receiving device have to solve, and how does it solve it?*
The packets arrive jumbled and some are lost. The device uses the sequence numbers to reassemble them in order and asks for the missing packets again.

9. *Why does the writer end with cable faults? What do they reveal about the internet?*
Open answer. A strong answer notes that the faults are ordinary (fishing gear and anchors), which

shows that the internet depends on physical cables on the seabed, and that the network can route around a break while it is repaired.

10. *True, False, or Not Given: "Satellites carry most of the data that crosses oceans." Explain your answer using the reading.*
    False. Undersea cables carry around 99 percent of the data that crosses oceans; satellites carry only a small fraction.

11. *Yes, No, or Not Given: "The writer suggests that one broken link can stop all internet traffic." Explain your answer using the reading.*
    No. The writer says that when a link is congested or broken, the router sends the packet another way, and that this makes the network resilient.

12. *Author's purpose: Why does the writer say the cables are "about as thick as a garden hose"? Is it (a) to help readers picture how surprisingly thin they are, (b) to explain how the cables are cleaned, or (c) to compare them with water pipes in cities?*
    (a) To help readers picture how surprisingly thin the cables are, given how much data they carry.

True or False

1. **T.** The messaging app usually compresses it first, often to around two megabytes.
2. **F.** It becomes well over a thousand packets.
3. **F.** It travels at roughly 200,000 kilometers per second.
4. **F.** No single machine plans the route; each router passes the packet to a neighbor.
5. **T.** Packets from the same photo can take different paths.
6. **T.** These cables are surprisingly slender: about as thick as a garden hose.
7. **F.** Satellites handle only a small fraction; cables carry around 99 percent.
8. **T.** A few have been lost, and the device asks for the missing pieces to be sent again.
9. **T.** A signal making a round trip typically takes around 180 milliseconds.
10. **F.** Most are caused by fishing gear and ship anchors.

Language Focus: Time Clauses (once, as soon as, until, by the time)

Model answers. Accept any answer that uses the form correctly and makes sense.

1. As soon as I get home today, I will cook dinner and call my sister.
2. Once I have saved enough money, I am going to buy a new laptop.
3. By the time I am forty, I will have lived in at least two countries.
4. I never check my messages until I have had breakfast.
5. When I travel abroad, I always buy a local SIM card as soon as I land.
6. As soon as I wake up, I check the weather on my phone.
7. As soon as this class ends, I will get a coffee.
8. I usually reply as soon as I see the message, unless I am busy.
9. By the time I graduate, I want to have spent a semester abroad.
10. I will feel confident once I have practiced a few times in front of friends.

Accept will or going to in the main clause; the time clause itself should stay in a present tense.

Notes on the Evidence

Source and corrections. The unit was inspired by a short social video that follows a photo from a phone to an undersea cable. Several details in that video were simplified or adjusted here. (1) It implies the photo travels directly from phone to phone; on most messaging services the photo is uploaded to the service's servers, which store it and notify the recipient, so total delivery time is usually longer than the network delay alone. (2) It says the whole trip takes 200 milliseconds. Measured round-trip latency between Seoul and the US East Coast is about 180 ms (Economize Cloud, AWS ap-northeast-2 to us-east-1: 181 ms); one-way propagation over 12,000+ km of fiber at about 200,000 km/s is about 60 ms or more. (3) It says about

600 cables carry 99 percent of intercontinental data. TeleGeography’s FAQ (2026) says it tracks "more than 600 active and planned" cables; the 99 percent figure is widely cited (Wikipedia, Submarine communications cable) but is an estimate. (4) The video sends the photo to Los Angeles; the reading avoids naming a landing city. The New Cross Pacific (NCP) cable, for example, lands at Busan and in Oregon.

Cables and repeaters: TeleGeography describes deep-sea cables as "as wide as a garden hose" with fibers about the diameter of a human hair; Wikipedia gives about 25 mm. Repeaters use erbium-doped fiber amplifiers, which boost the light optically, powered by a DC current carried along the cable. Spacing varies by system (commonly cited as roughly 50 to 100 km; Wikipedia notes spans of more than 100 km), so the reading says "every few dozen kilometers or more". Satellites: the FCC figure quoted by TeleGeography is 0.37 percent of US international capacity.

Packets: a standard Ethernet MTU is 1,500 bytes, so "up to about 1,500 bytes" is a typical maximum, not a fixed size. A 2 MB file at roughly 1,400 to 1,460 bytes of payload per packet gives well over a thousand packets; the video’s "1,500 packets" is a rough figure. Encryption: many popular apps (for example WhatsApp, per its security whitepaper) use end-to-end encryption, with media encrypted before upload; others encrypt only between the phone and the server. Lost packets are resent by transport protocols such as TCP (or QUIC) between the two ends of each connection.

Faults: the International Cable Protection Committee cites about 150 to 200 cable faults a year worldwide, with about 70 to 80 percent caused by accidental human activity, mainly fishing and anchoring (ICPC media page; ITU comments reported by AFP, February 2025). Latency figures vary by route and time and may change as new cables open. All figures checked on 11 October 2026.