Solutions

2.1

- Link (frames, neighbours); network (packets, strangers) ✓.

2.2

- Three headers – one per layer crossed ✓.

2.3

- The promised service, unchanged – whatever the layer does below ✓.

3.1

- Wire bytes: $14 + 20 + 20 + 200 = 254$ ✓.
- Header fraction: $54/254 \approx 21.3\%$ ✓.
- Strips: NIC strips the 14-byte Ethernet header; the IP layer strips 20; TCP strips its 20 – each layer sees only its own promise ✓.
- The link service interface (best-effort frames) held, so TCP never noticed – the principle of layer independence ✓.

3.2

- Violation: a leaky interface – the application reading a network layer header below it ✓.
- When the stack changes, that browser breaks: it was written against an implementation detail, not a service ✓.
- TTL belongs in the network layer (routers decrement it); anything needing it should sit at or below that layer's interface ✓.
- The hourglass: one narrow waist protocol (IP) lets every application above run over every link below – widening the waist multiplies the combinations nobody can maintain ✓.

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