Architecture

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Architecture

- How we organize and think about networks
- Including the key abstractions we use

E.g., Layering

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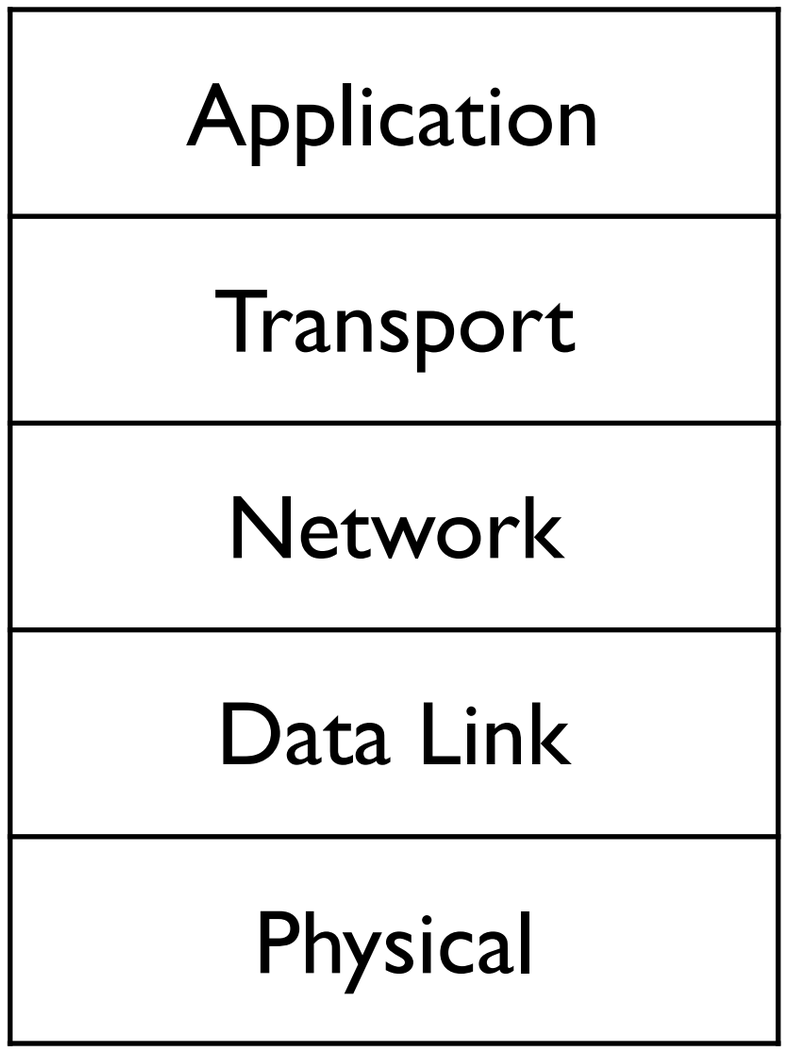
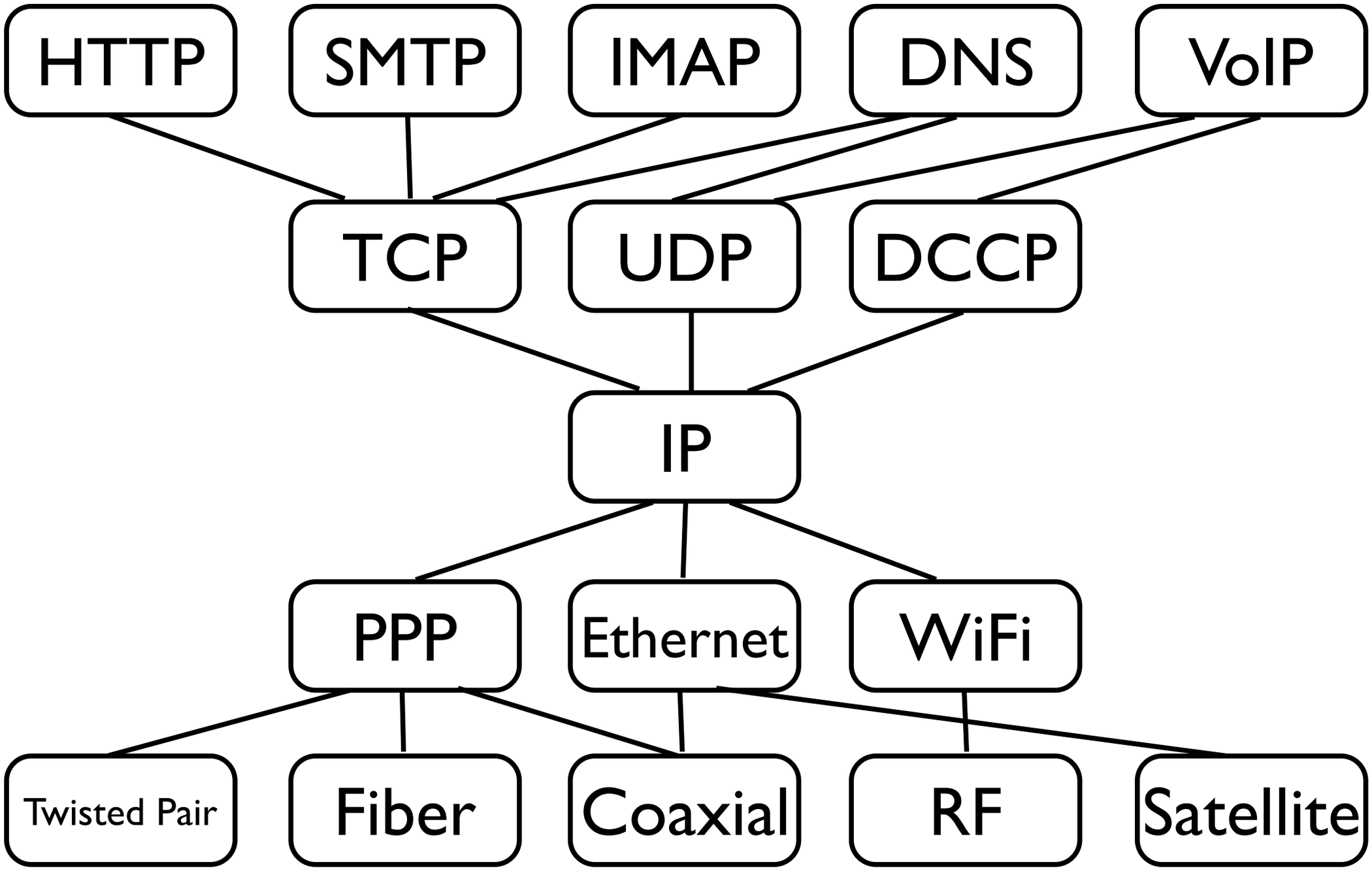


E.g., The Thin Waist



E.g., End-to-End Principle

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- We can only ever really trust the endpoints
  - e.g., for reliability
  - e.g., for security

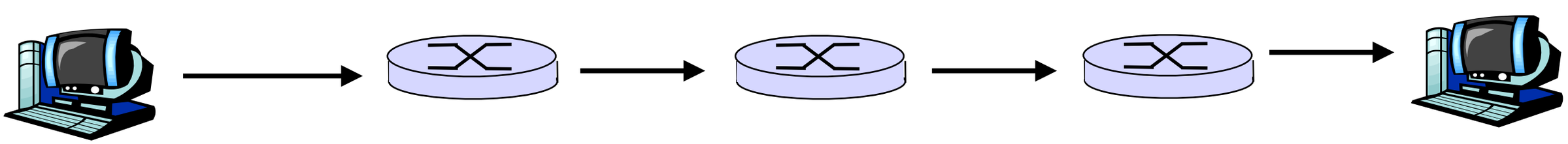
E.g., End-to-End Principle

- We can only ever really trust the endpoints
  - e.g., for reliability
  - e.g., for security

- Nodes in the middle—switches, routers, caches, firewalls, etc.—can help …
- … but do not obviate the need for end points to do these jobs

E2E Reliability

Goal: reliable transmission



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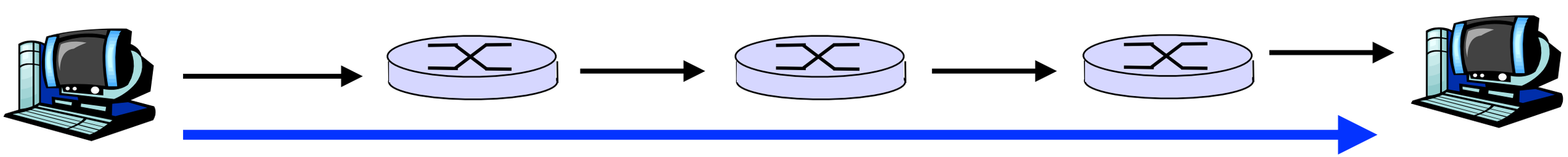

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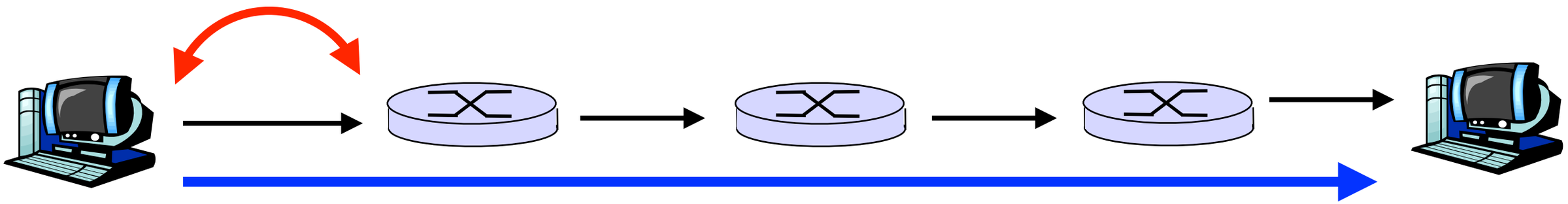

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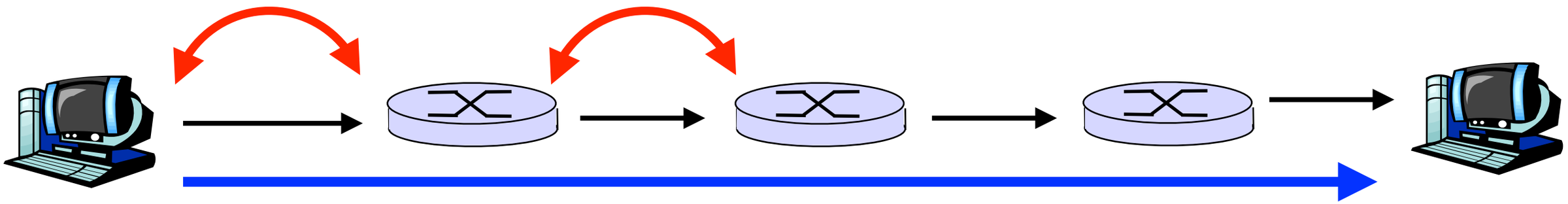

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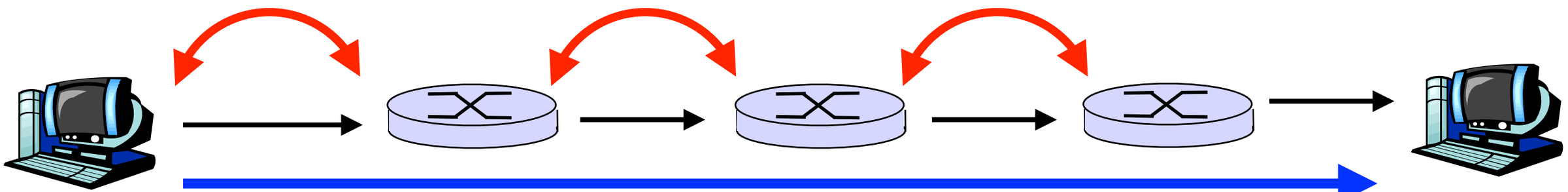

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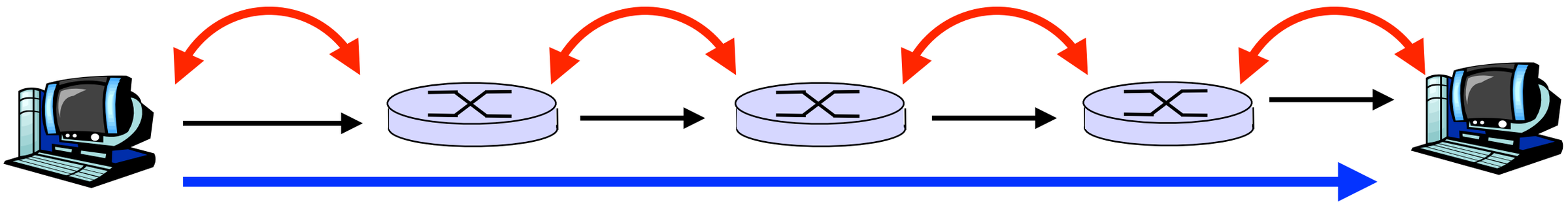

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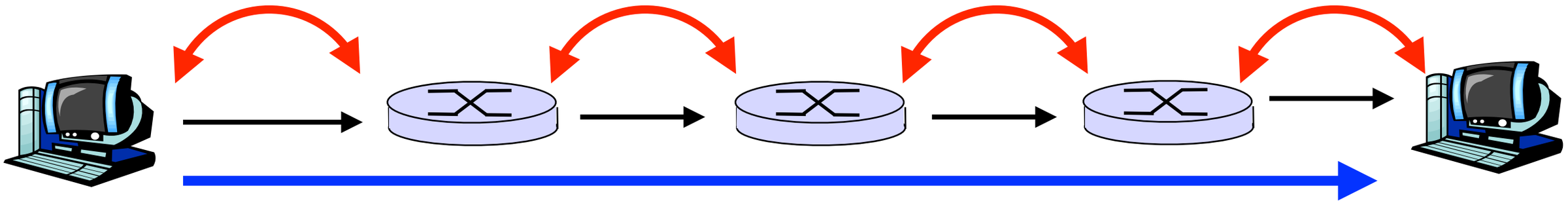


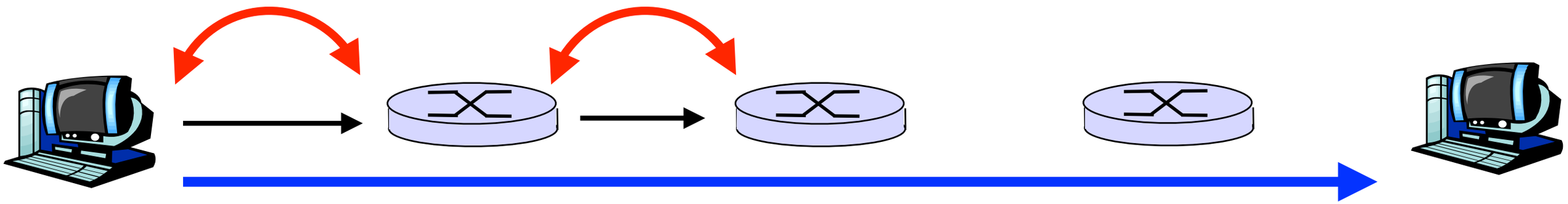
Hop-by-hop reliability

vs.

End-to-end reliability

E2E Reliability

Goal: reliable transmission



Hop-by-hop reliability

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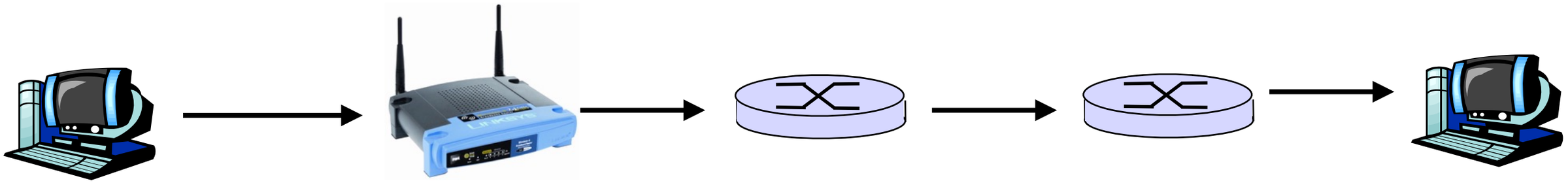
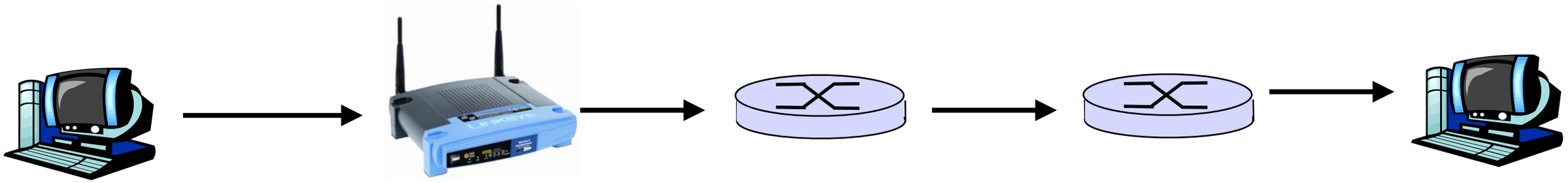
E2E Security



E2E Security

WPA2 Enabled



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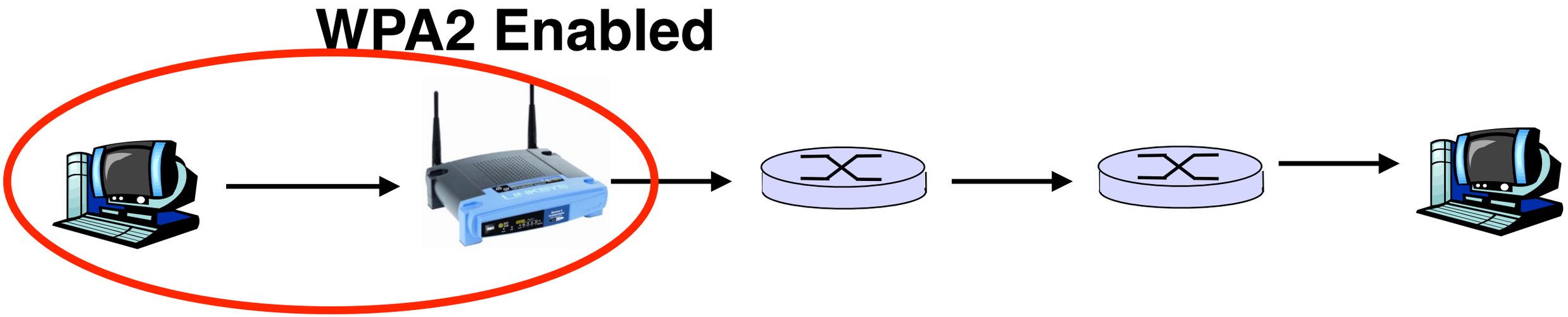

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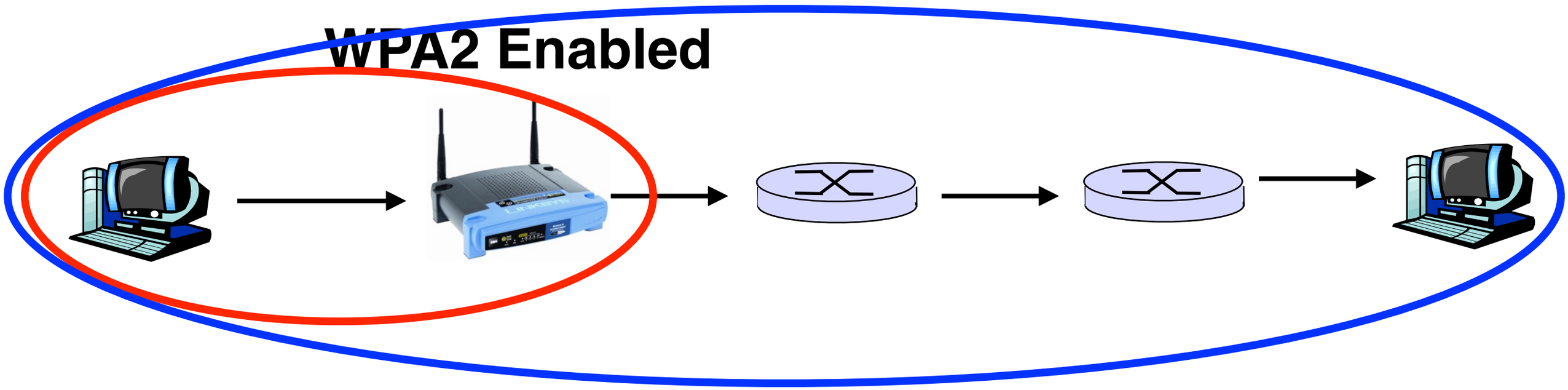

E.g., Soft State

- We prefer *soft state* to *hard state*
- To the extent possible we want the system to learn what it needs to operate on-the-fly rather than hard-code information into the system

Soft State: IP Addr. Assignment

- DHCP is built on soft state
  - we connect to a network and request an IP address (etc.)
  - we configure the end system's local state using information in the DHCP response
  - later, the state times out and is removed
    - (if not actively renewed)

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- We can nearly always "do better"—in some dimension—with point designs
  - but, then we add the complexity of a zillion designs for a zillion tasks