

Seminar in Distributed Systems

# Separating Location and Identity

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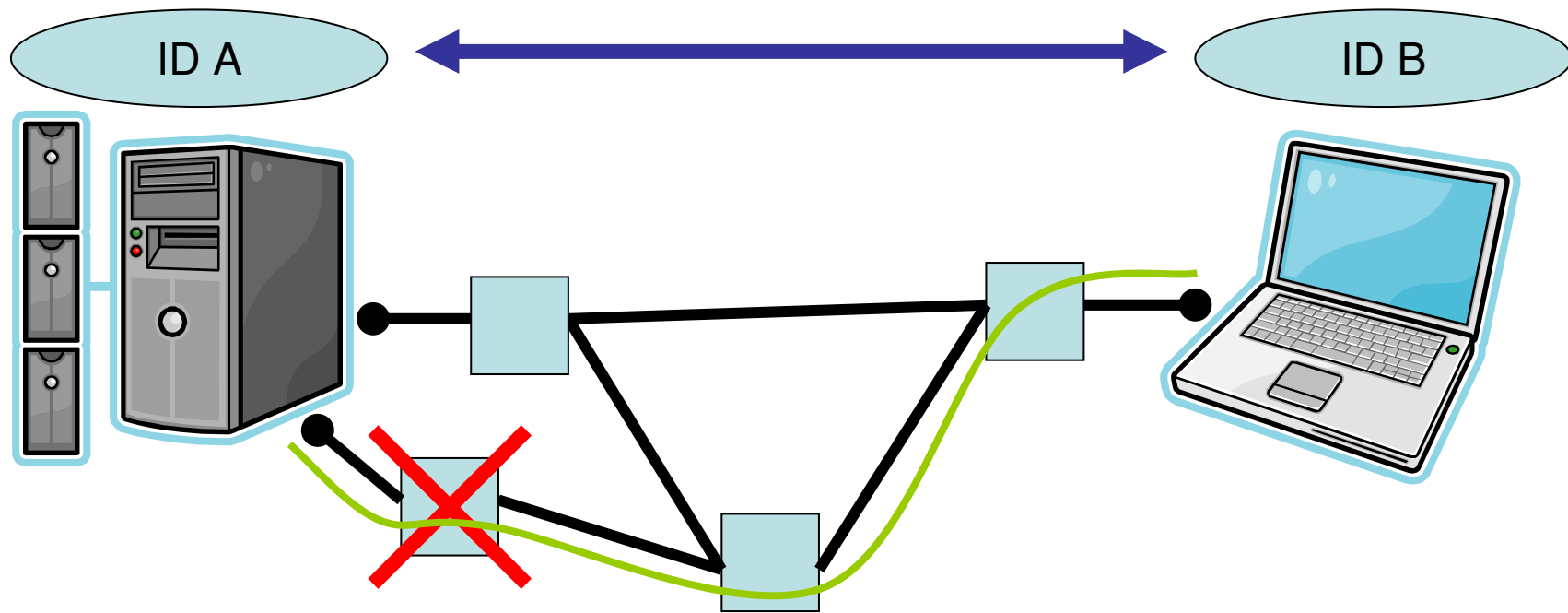
# Why?

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- IP addresses are overloaded, they indicate both network locations and node identities
- Overloading provides minimal security
- But: what happens if you switch from WLAN to LAN on your notebook?

# Why?

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# The papers

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- FARA: Reorganizing the addressing architecture
  - focused on mobility
- The Split Naming/Forwarding Network Architecture (SNF)
  - focused on flexibility of routing
- Both papers published in 2003

# FARA

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- “**F**orwarding directive, **A**ssociation and **R**endezvous **A**rchitecture”
- Part of the NewArch project
- A work in process
- Abstract model for network architectures
- A top-down reasoning

# 3-Step Approach

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Abstract architectural model



Instantiation of the model



Prototype of the Instantiation

# Basic Components

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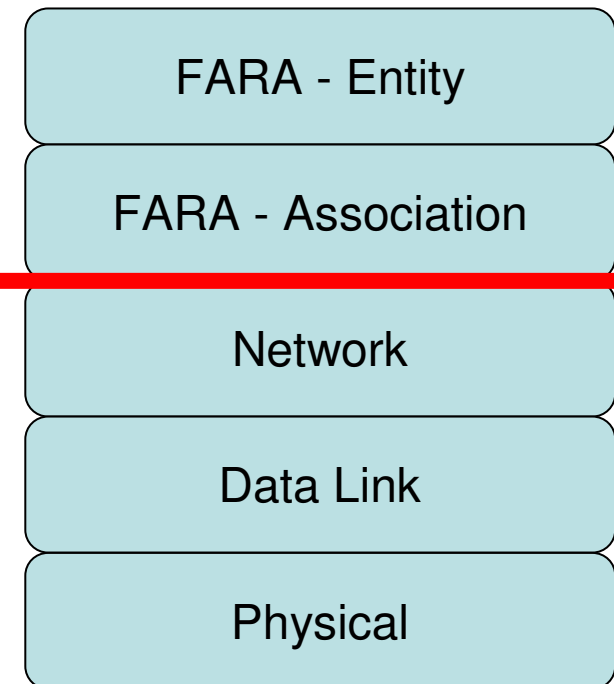
- Entity
  - Generalization of an end-point
  - Smallest mobile unit
  - i.e. a process, a thread, an entire computer, a cluster
- Association
  - Logical communication link between entities
  - Roughly analogous to a transport layer

# Basic Components

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- Communication Substrate

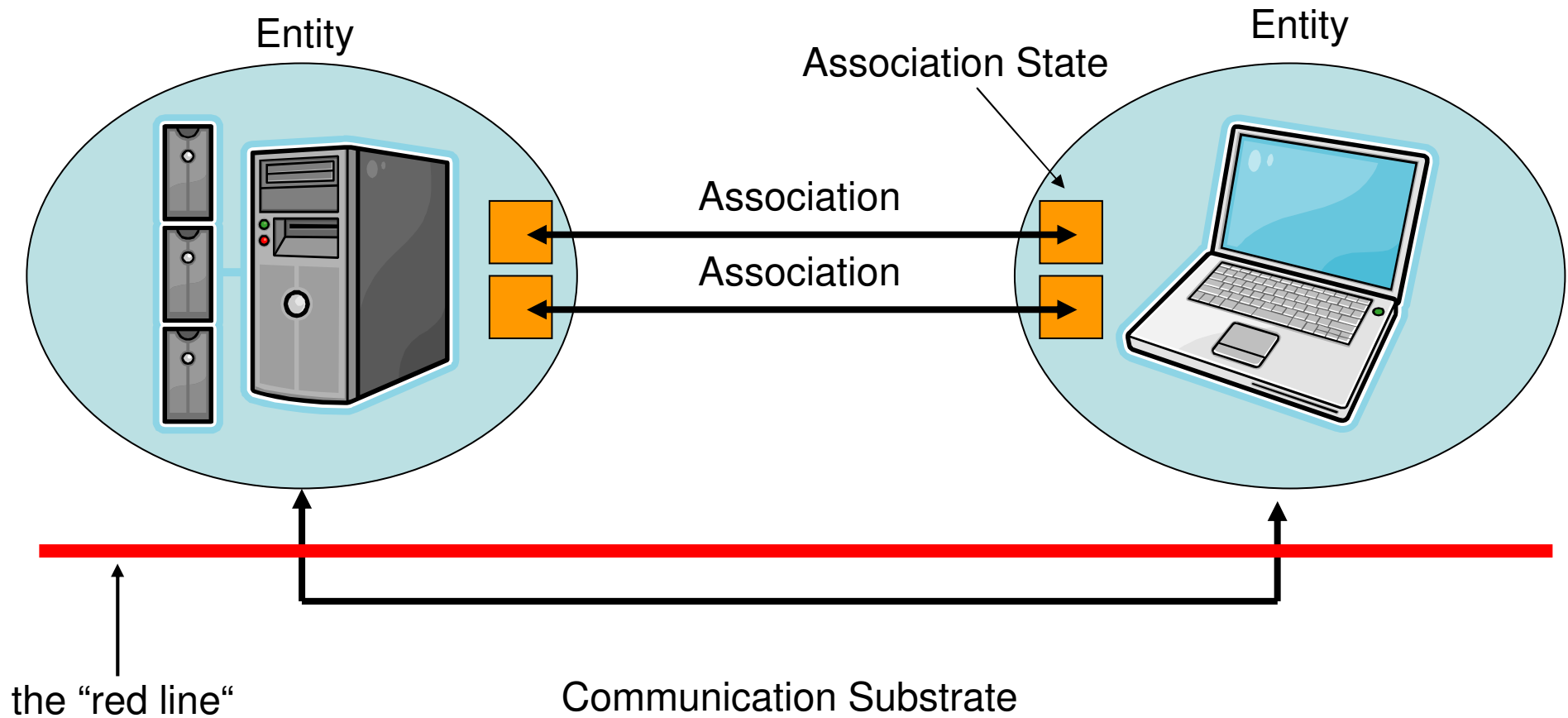
- Roughly a network layer
- FARA assumes connectionless packet delivery with appropriate addressing and routing
- But no restrictions on particular choices of mechanisms
- A couple of functions have to be provided





# Basic Components

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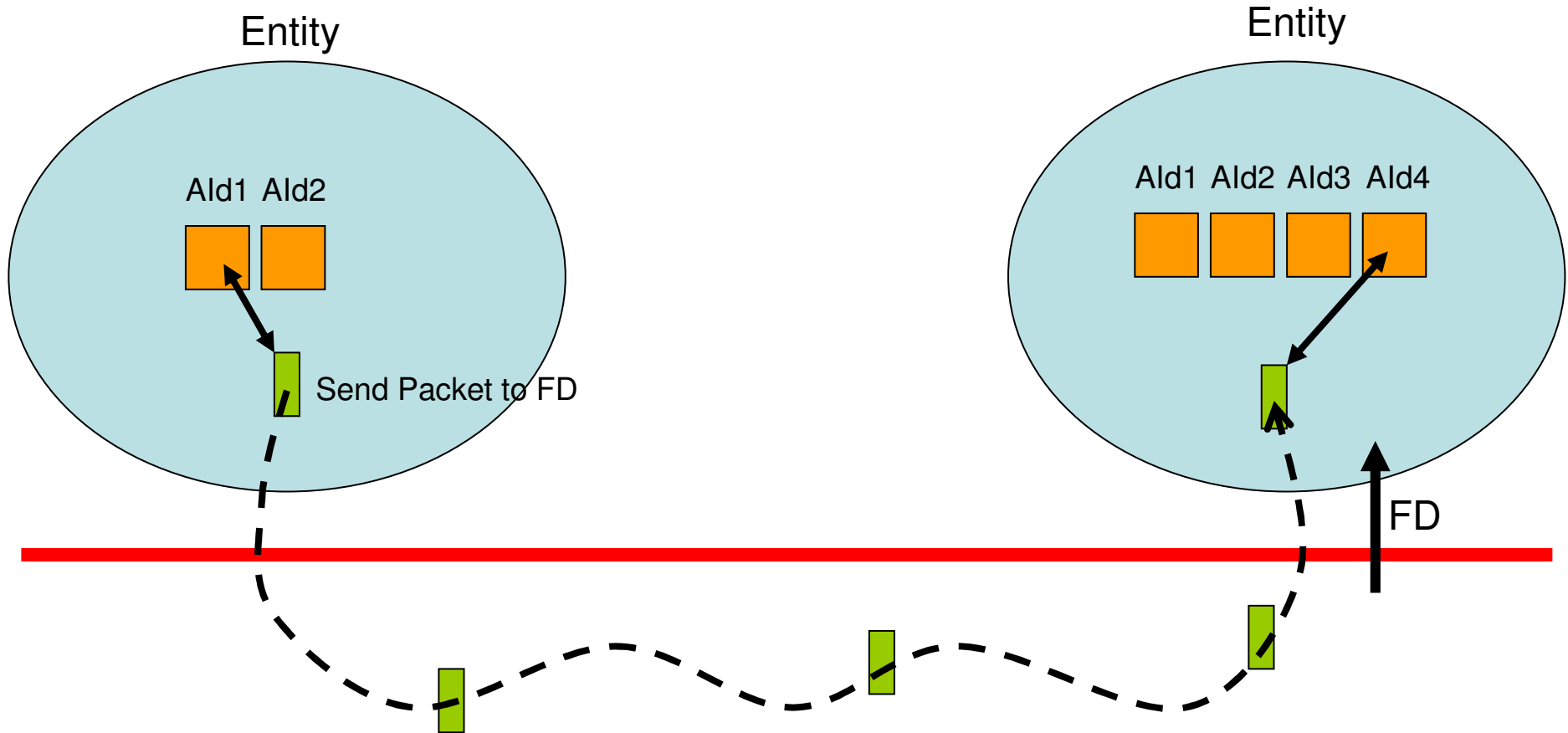
# Packet delivery

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- Forwarding Directive (FD)
  - “Address” for packet delivery by the communication substrate
  - Not specified in FARA
  - A FD can change, but an Association ID never changes if an entity moves

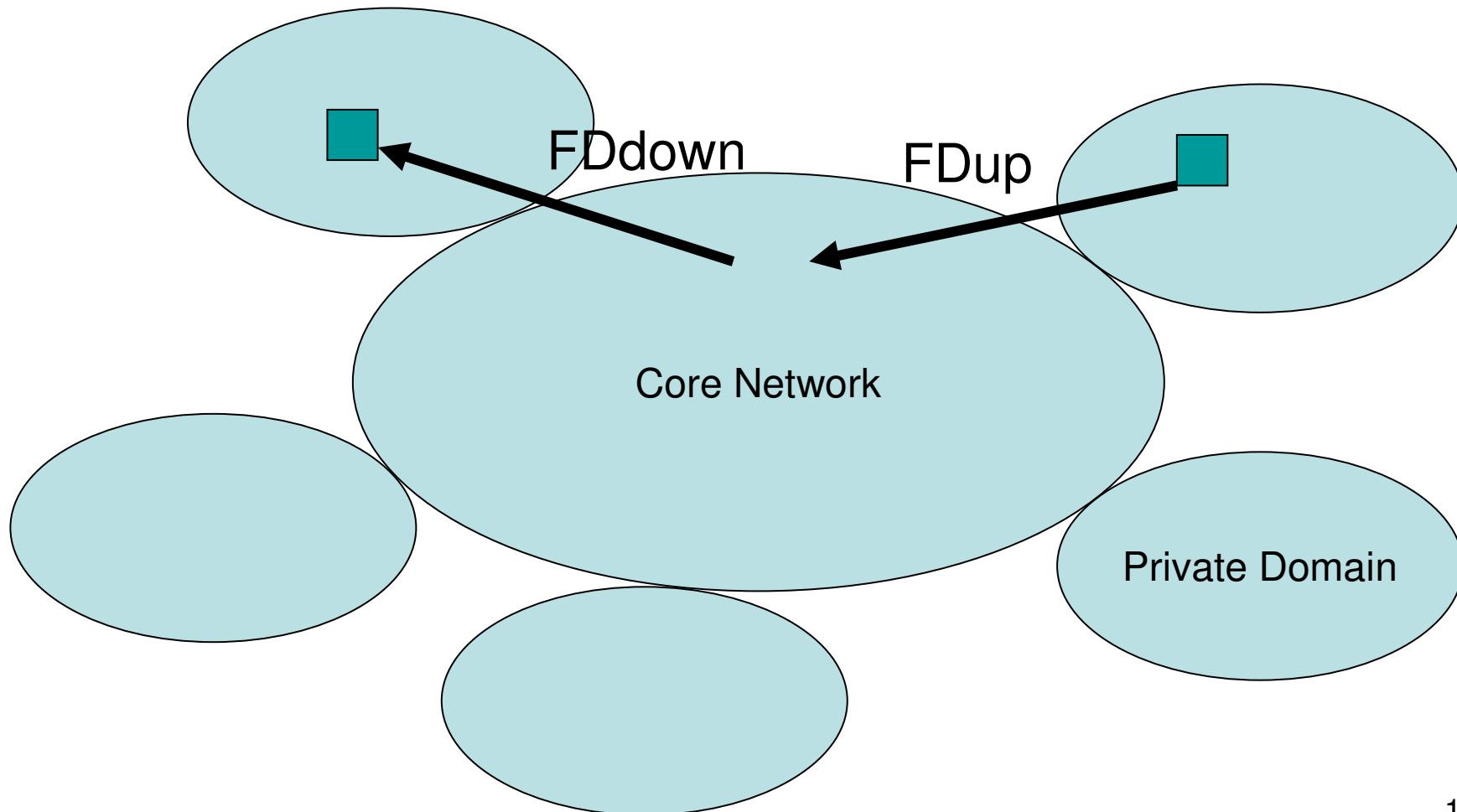
# Packet delivery

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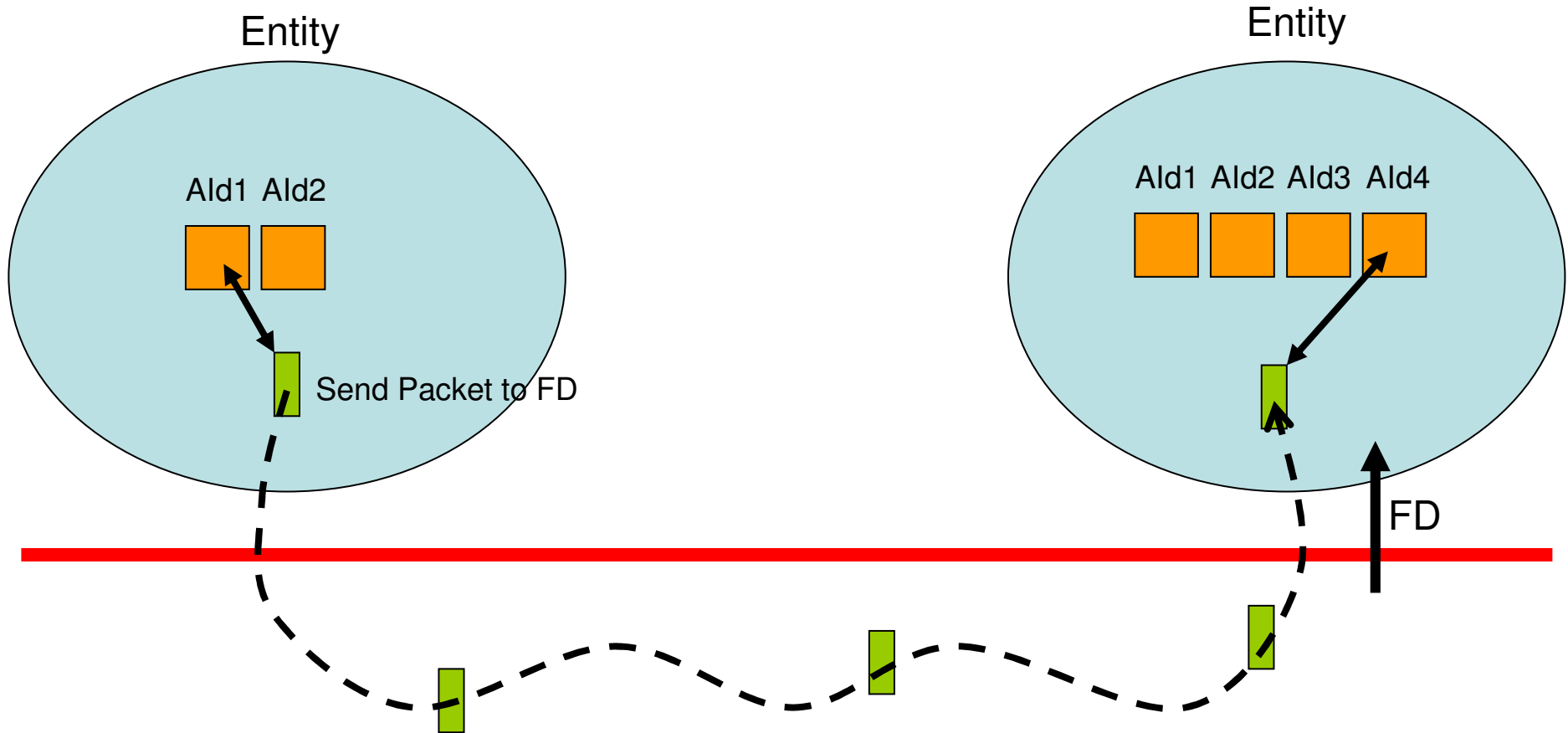
# M-FARA

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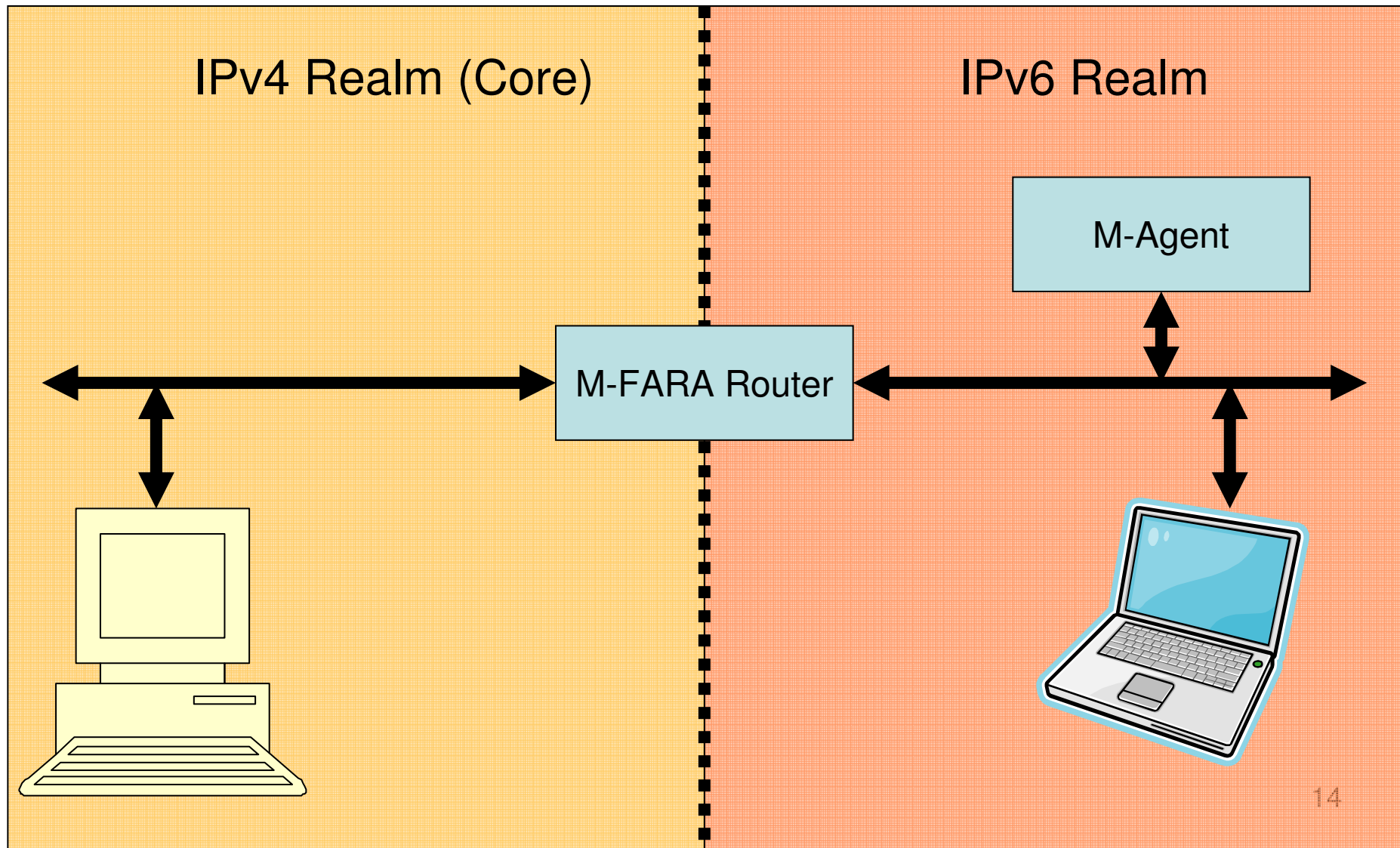


# Packet delivery

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# M-FARA



# FARA Assumptions

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- Associations are not names for entities; there is no global name space for associations
- There doesn't have to be a global namespace for entities names
  - No need to know the name of an entity to communicate with it; just need to know how to reach its unique location
- No global address space required

# Security

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- We have to deal directly with the end-to-end security issue
- In FARA this is a private matter between the consenting entities
- No restrictions on the protocols and mechanisms



# Security

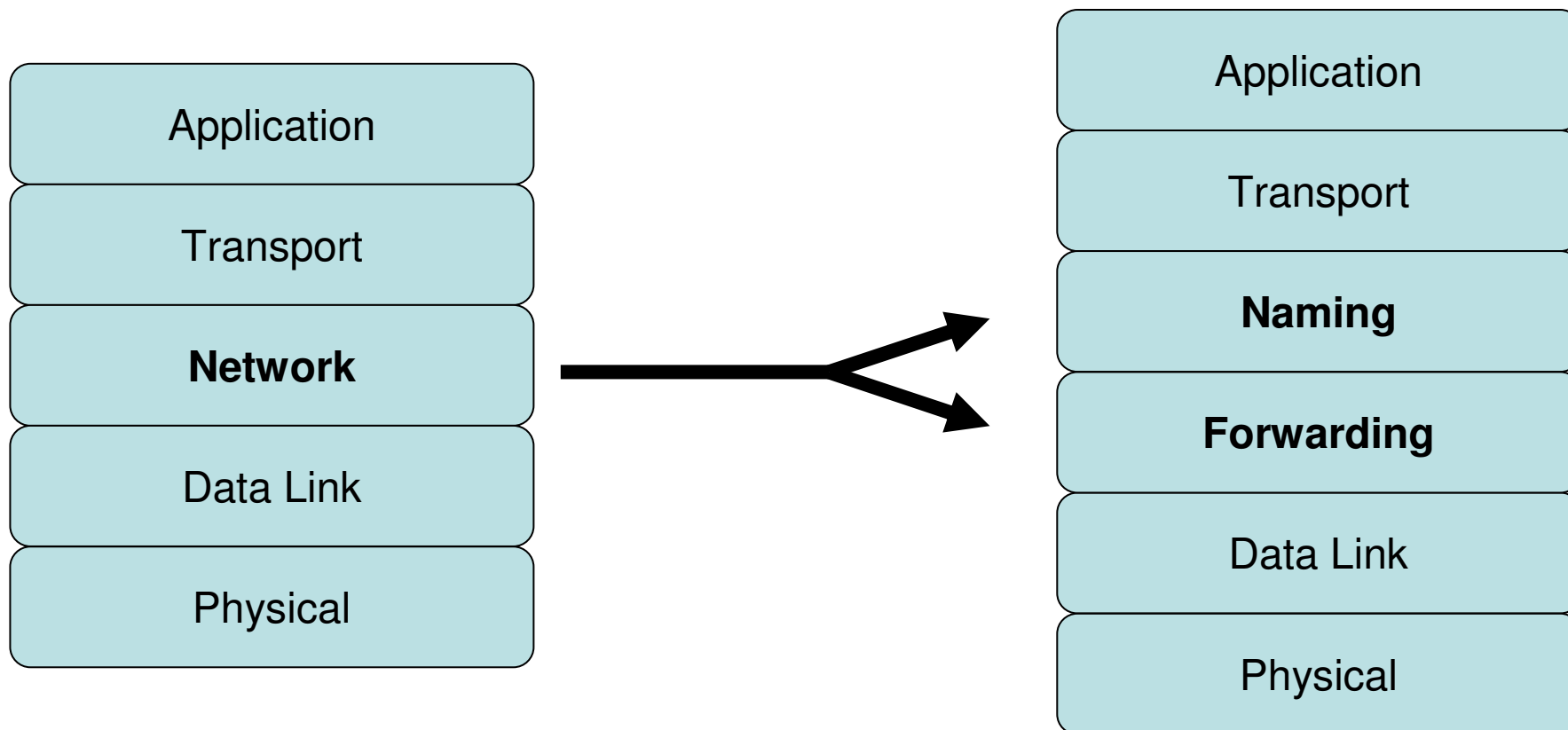
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- Goal is to support different security mechanisms and levels
  - No authentication
  - Authentication during handshake
  - Authentication after each move
  - Authentication of each packet

# Split Naming/Forwarding Network Architecture (SNF)

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- Divides the network layer into naming and forwarding layers



# Forwarding layer

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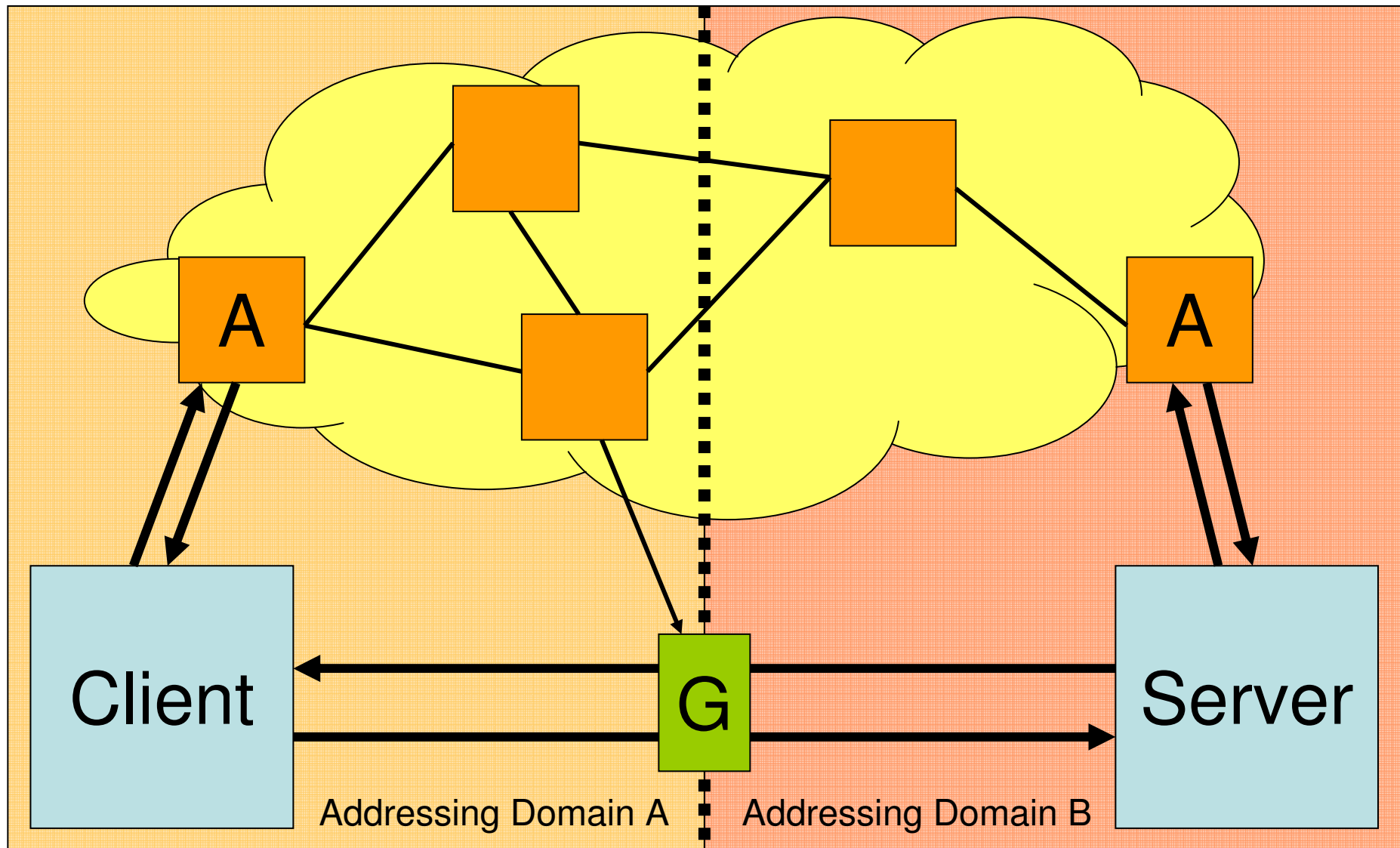
- Provides locators with which the network can deliver packets to a corresponding location
  - Locator can be an IP address
- Does not require globally uniform protocols or global address spaces
  - Translation gateways needed
  - i.e. IPv4 and IPv6 networks

# Naming Layer

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- Provides name to locator mappings
- Globally uniform, but multiple implementations are possible

# Naming Layer



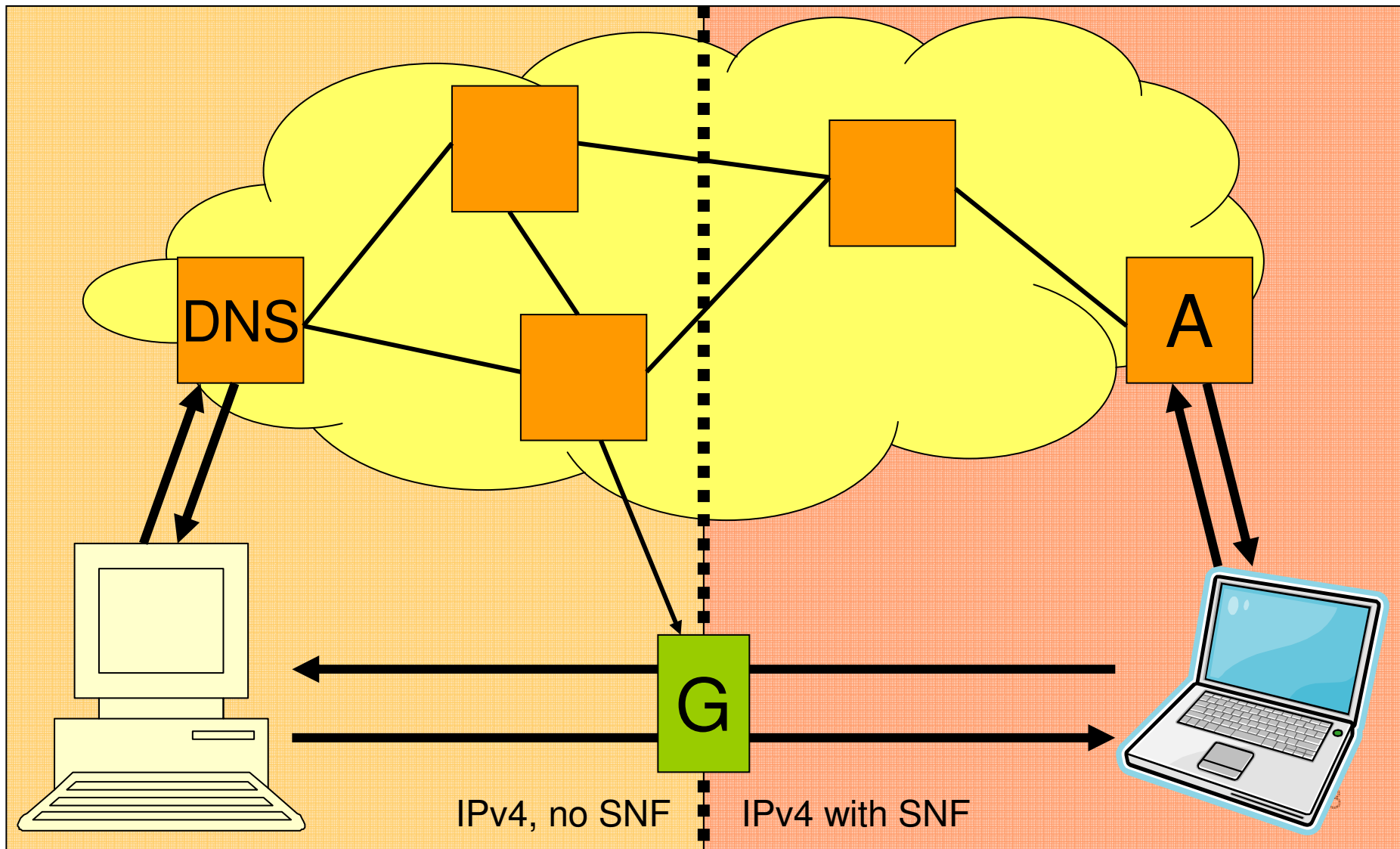
# Implementing SNF

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- On top of the current infrastructure
- Use of IP at the forwarding layer and DNS at the naming layer

<i>Unit</i>	<i>Implemented by</i>	<i>Purpose</i>
Name	FQDN	Identifies a node
Locator	IP number	Denotes the location of node
ECI	64-bit number	Identifies a packet flow

# Compatibility for SNF unaware Hosts



# Conclusion

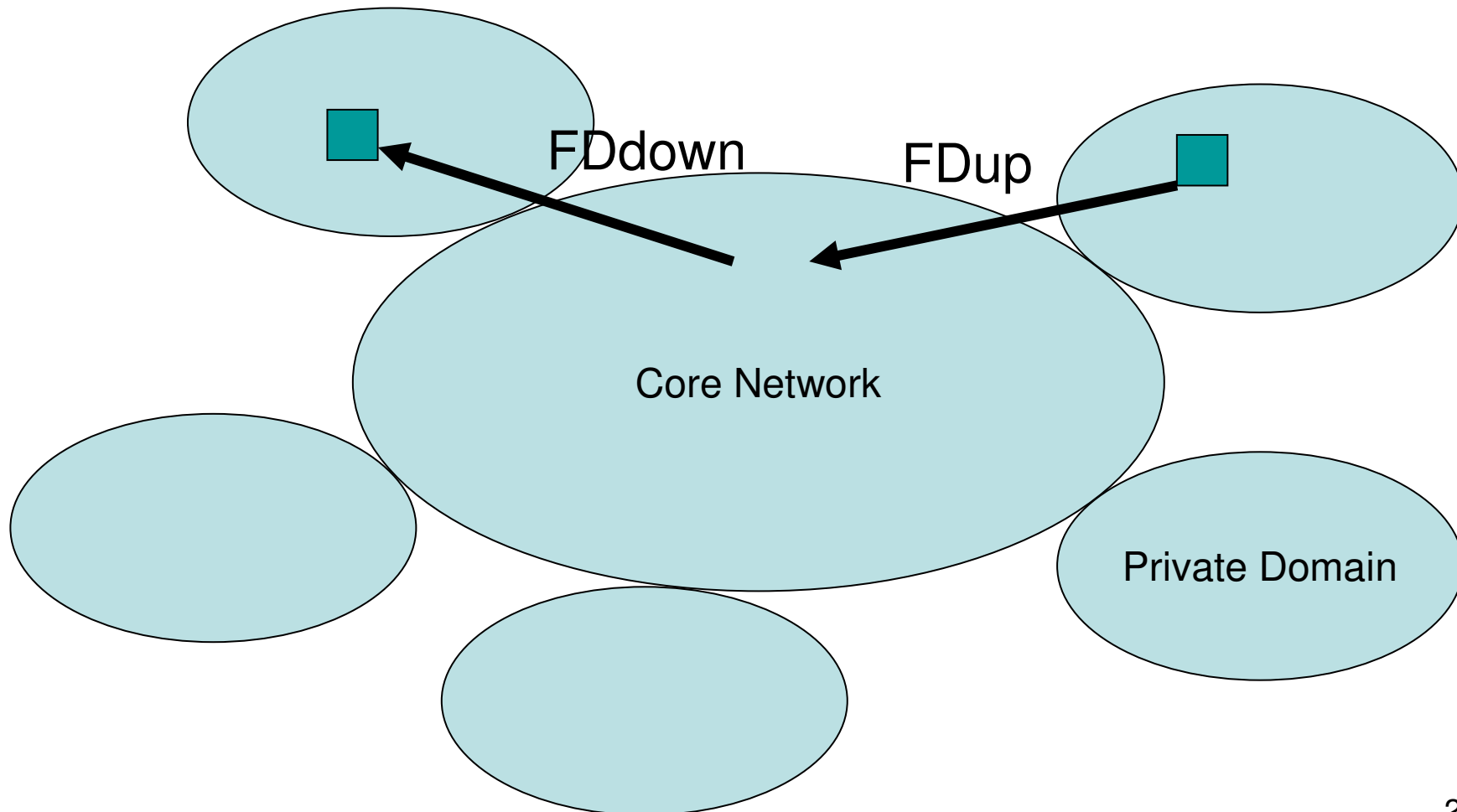
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- FARA:
  - IPNL and TRIAD uses a similar concept of FD



# M-FARA

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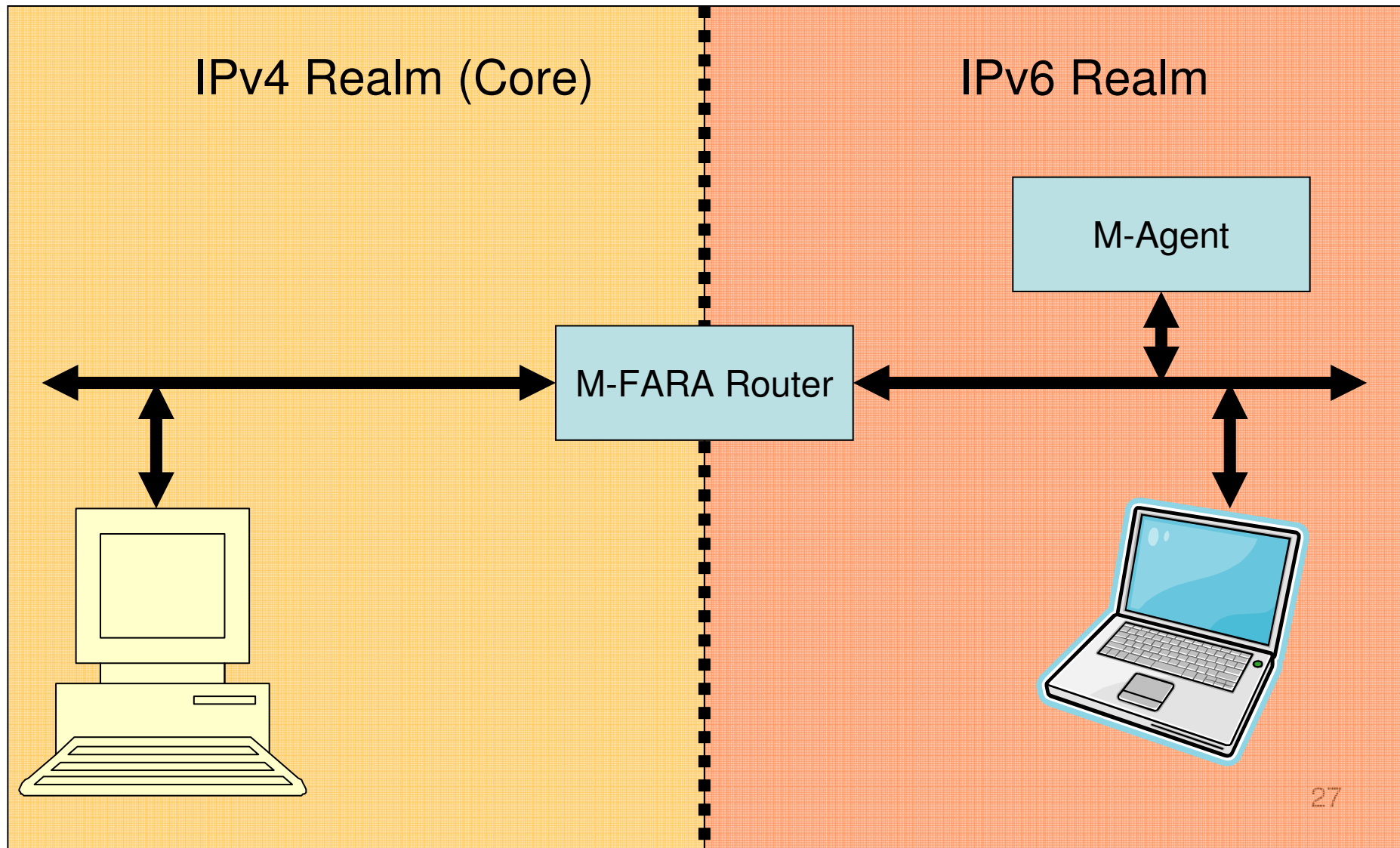


# Conclusion

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- FARA:
  - IPNL and TRIAD uses a similar concept of FD
  - Mobility features are very similar to Mobile IP

# M-FARA



# Conclusion

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- FARA:
  - IPNL and TRIAD uses a similar concept of FD
  - Mobility features are very similar to Mobile IP
  - Splitting into a end-to-end part and the communication substrate is not new

So, what's really new?

The assembly of the concepts

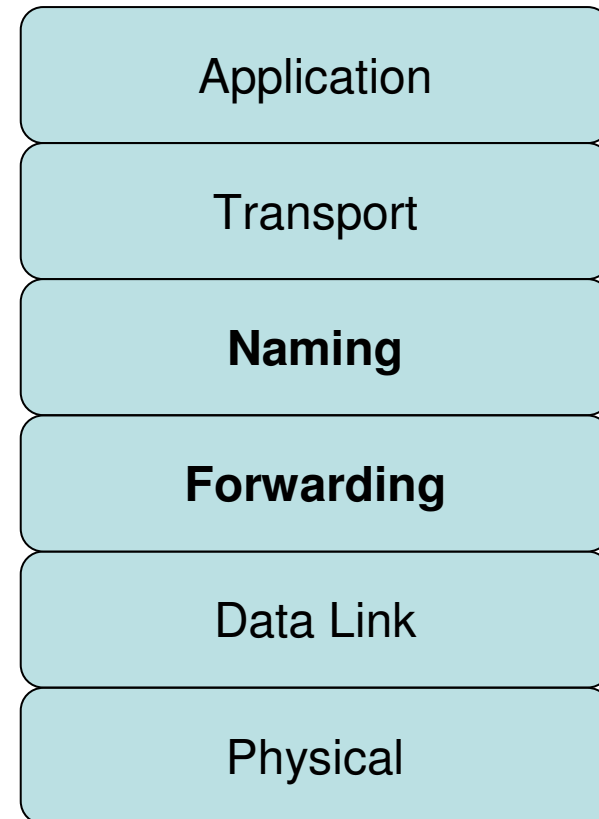
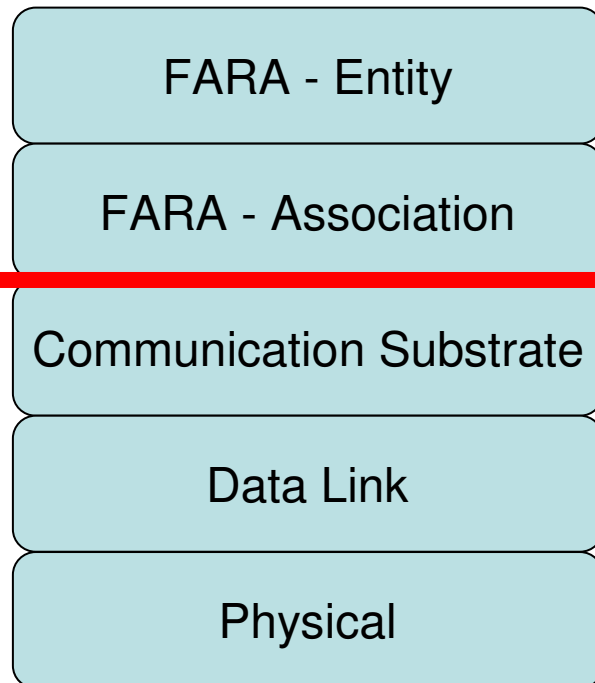
# Conclusion

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- SNF:
  - Splits network layer into a naming and a forwarding layer
    - Naming layer is an overlay network
  - Integration of DNS into the protocol stack
- After all nothing fundamentally different to TRIAD / IPNL

# Conclusion

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# **Thank you for your attention**

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