Asymmetric Extended Route Optimization (AERO)

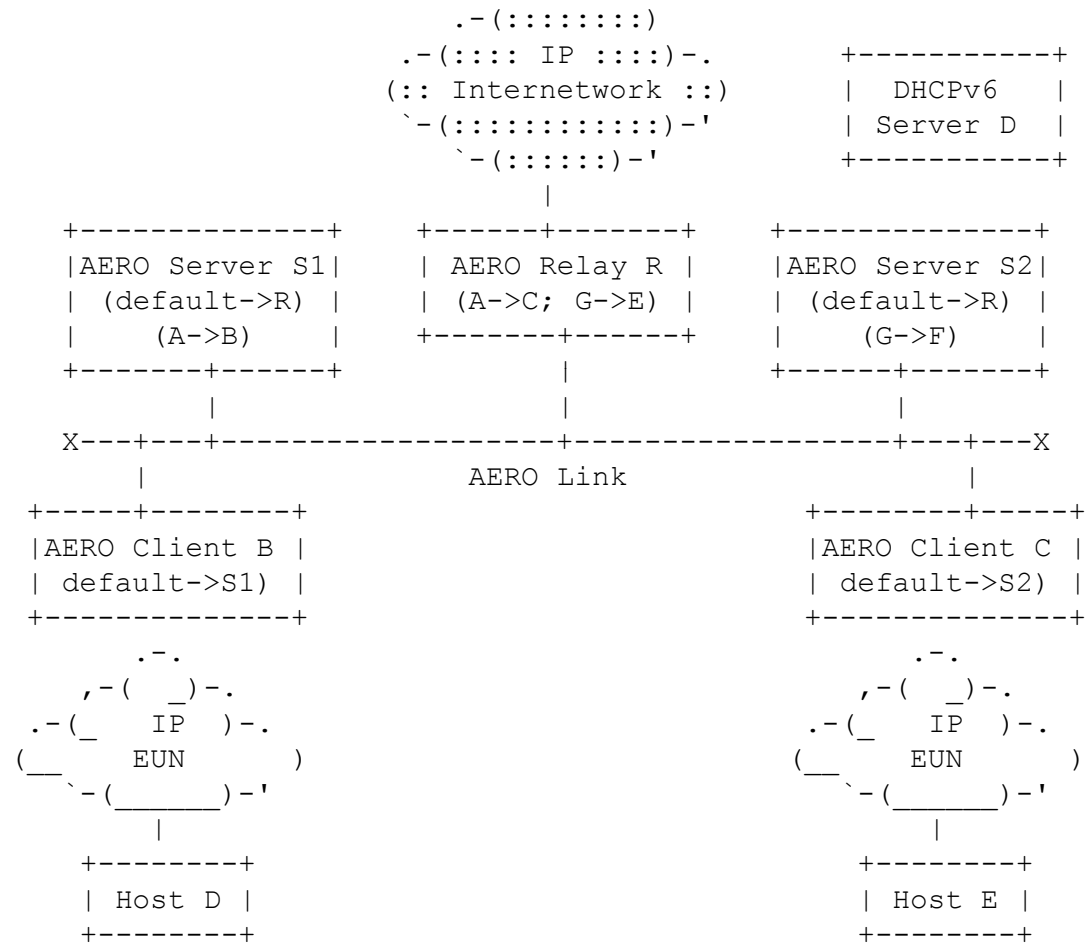
IETF90 Distributed Mobility Management (DMM) Working Group

Fred L .Templin
fred.l.templin@boeing.com

AERO History

- Developed in the 2008 – 2014 timeframe
- First Edition published as IETF RFC 6706
- Second Edition now an Internet draft (draft-templin-aerolink)

AERO LINK Reference Model



AERO Overview

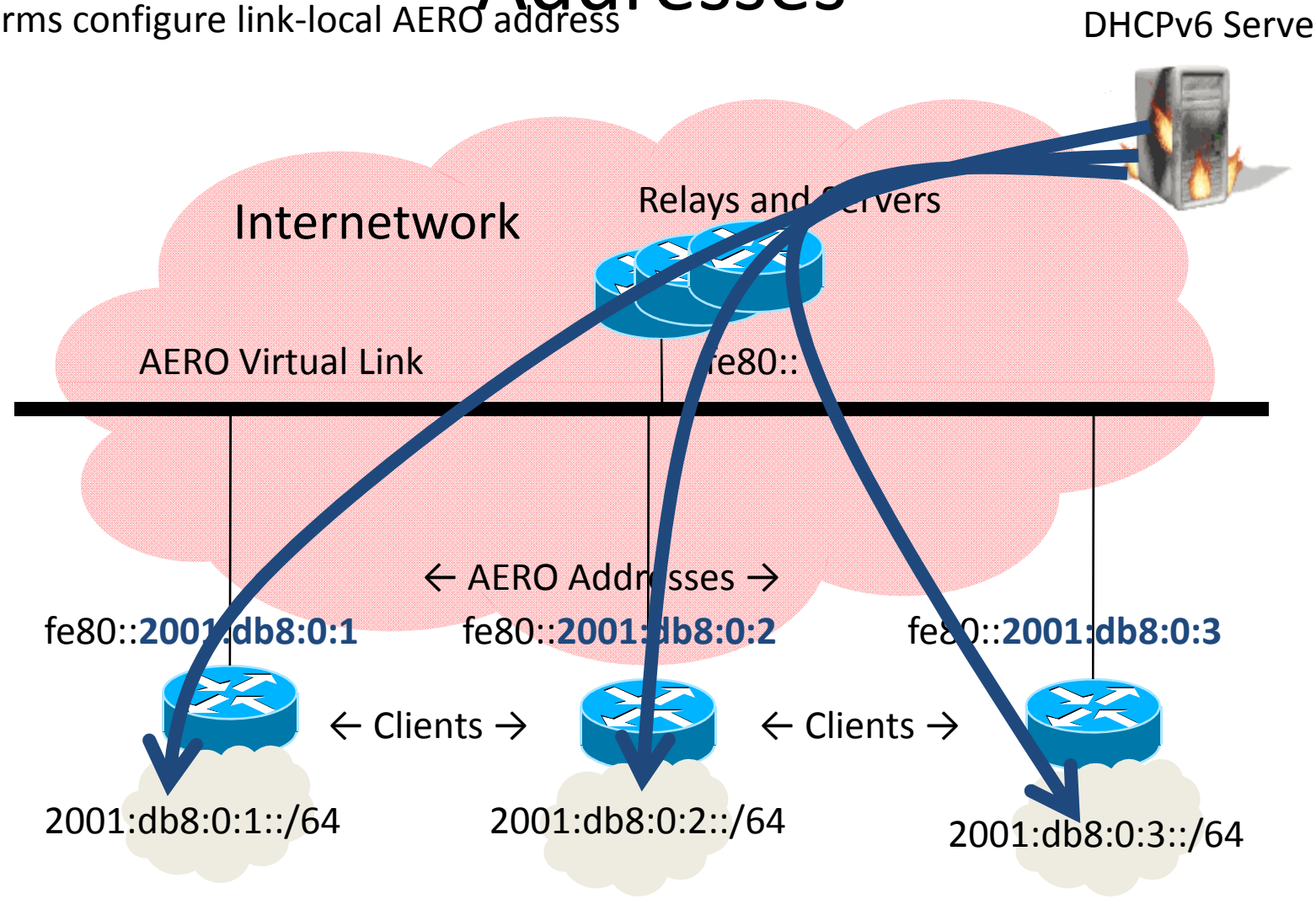
- Tunneling of any Internet Protocol (IP) version over any IP network (e.g., IPv6 over IPv6, IPv6 over IPv4, etc)
- IPv6 Neighbor Discovery (ND) messaging (control plane)
- Mobile Clients; stable Servers/Relays, DHCPv6 server
- Clients, Servers and Relays are “neighbors” on a virtual IP link configured over a carrier IP network
- Clients are delegated IP prefixes for mobile networking
- Clients send initial communications through a Server
- Client-initiated redirection to discover optimal routes
- Relays keep track of Client/Server assignments and serve as gateways to the rest of the Internetwork

AERO Innovations

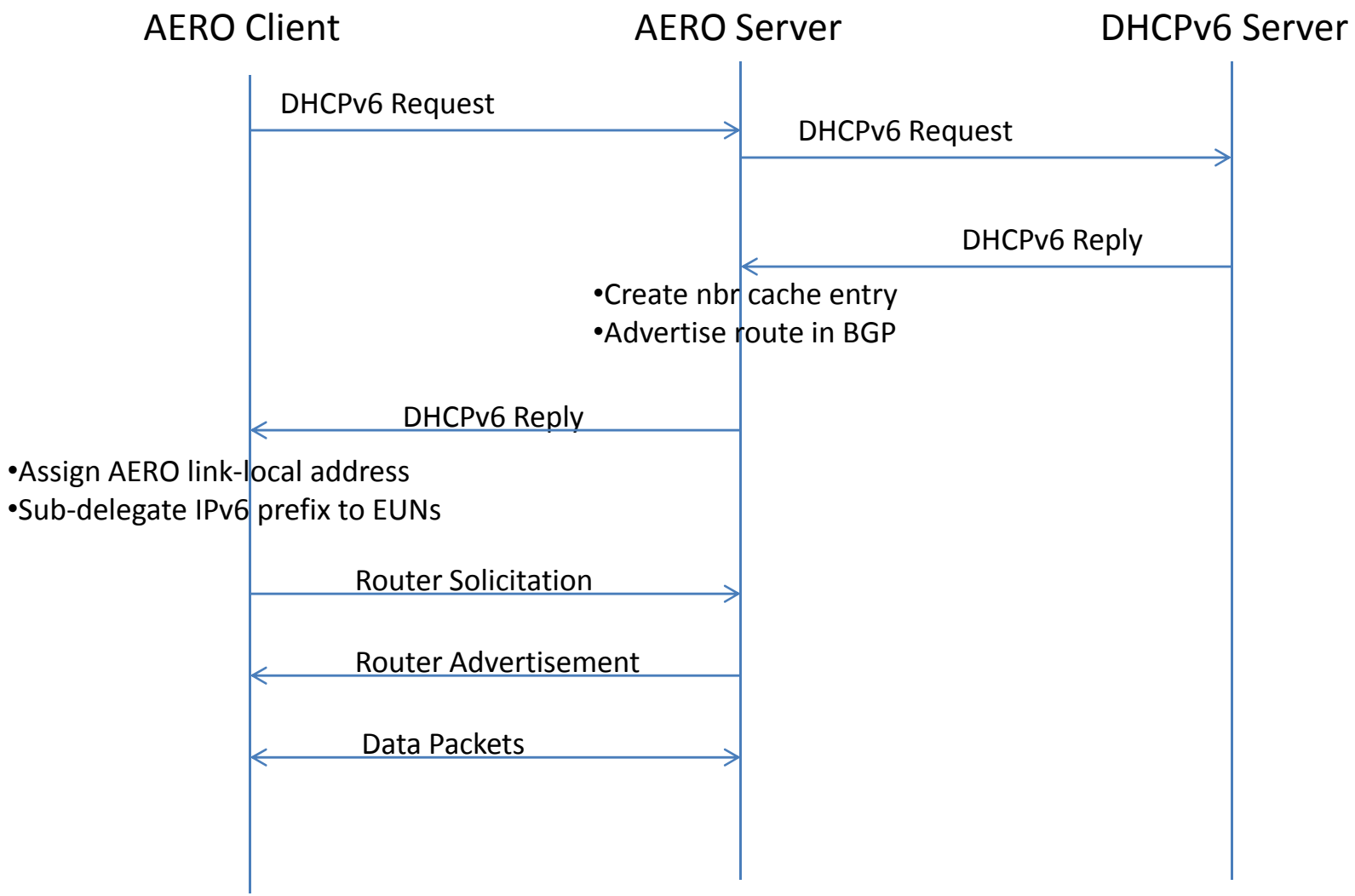
- New IPv6 link-local Address Format (the AERO Address)
  - IPv6 delegated prefix is 2001:db8:1:2
  - AERO link-local address is fe80::2001:db8:1:2
  - Address and prefix do not change as node moves
- AERO route optimization
  - Uses network trust anchors as intermediaries
  - Fully supports mobility (mobile networks and routers)
  - Works over any IPv4 or IPv6 access technologies (e.g., Ethernet, 3G/4G, WiFi, aeronautical links, MANET links, etc.)
- AERO Routing System
  - Servers manage collections of mobile Clients
  - BGP routing between Servers and Relays
  - Relays connect AERO link to rest of Internetwork

AERO Virtual Link With AERO Addresses

- DHCPv6 server delegates prefixes
- Platforms configure link-local AERO address

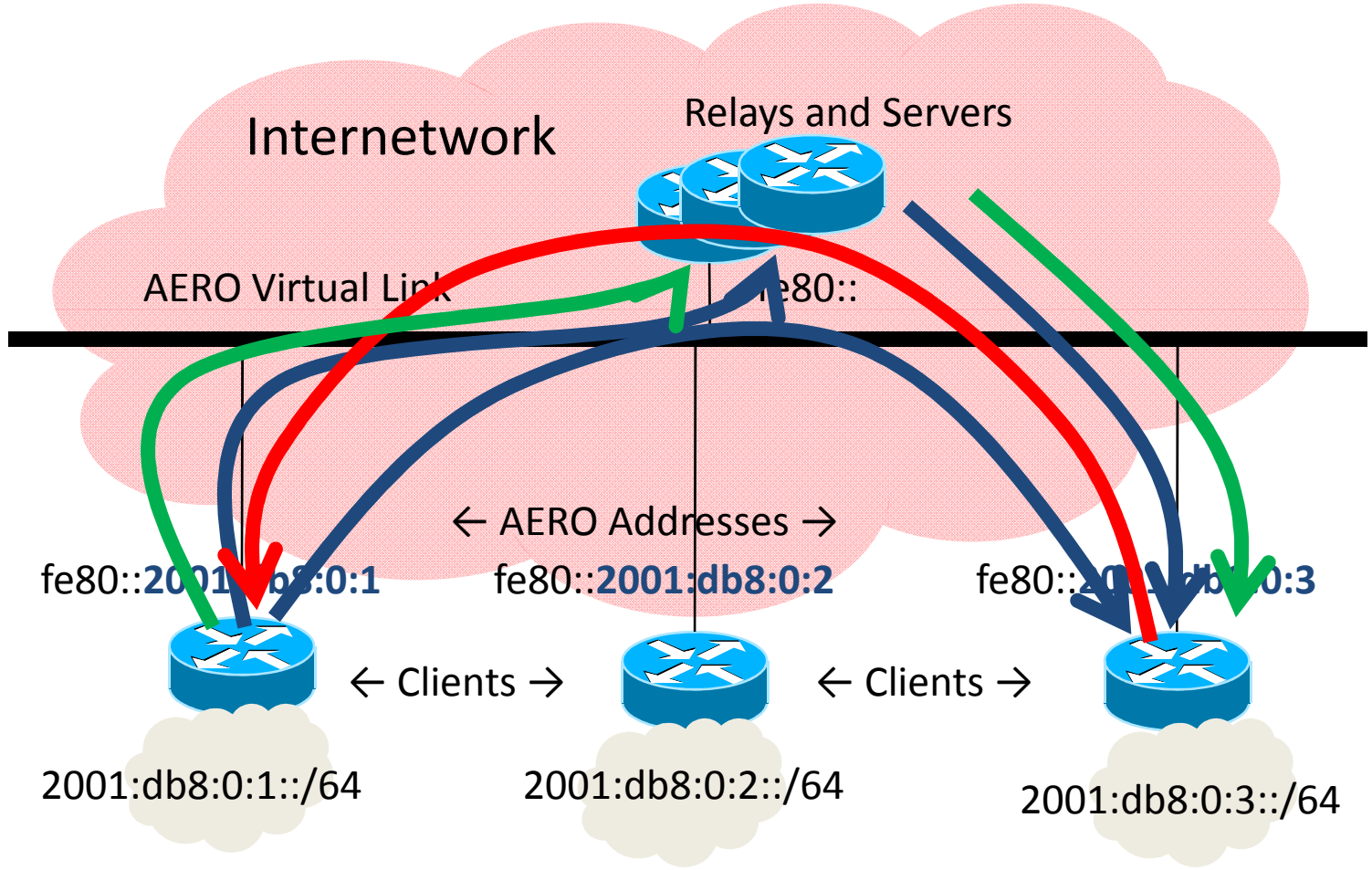


AERO Detailed Message Exchange (1)

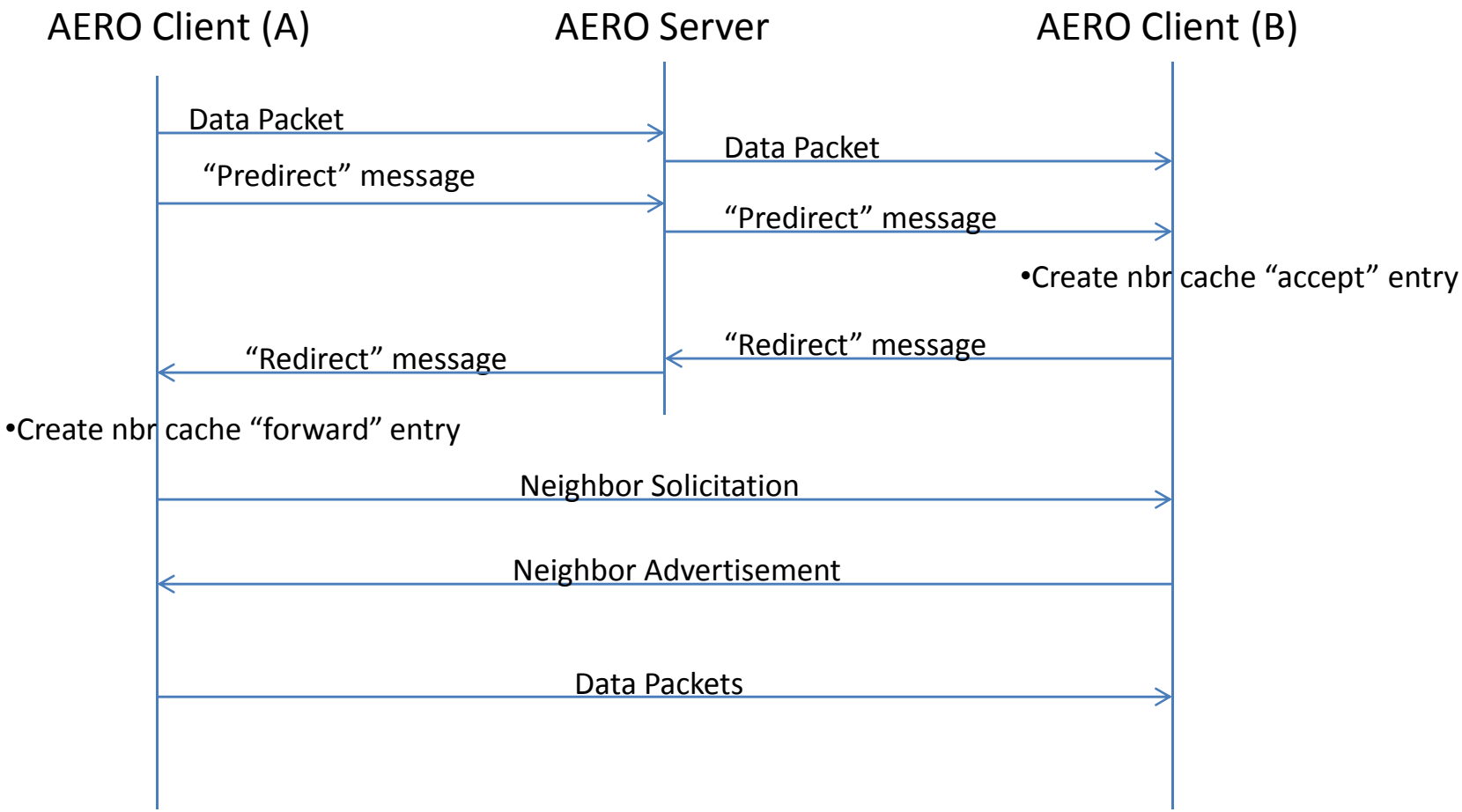


AERO Route Optimization

- First packet and “Predirect” to Server
- “Predirect” triggers “Redirect”
- Subsequent packets direct to target

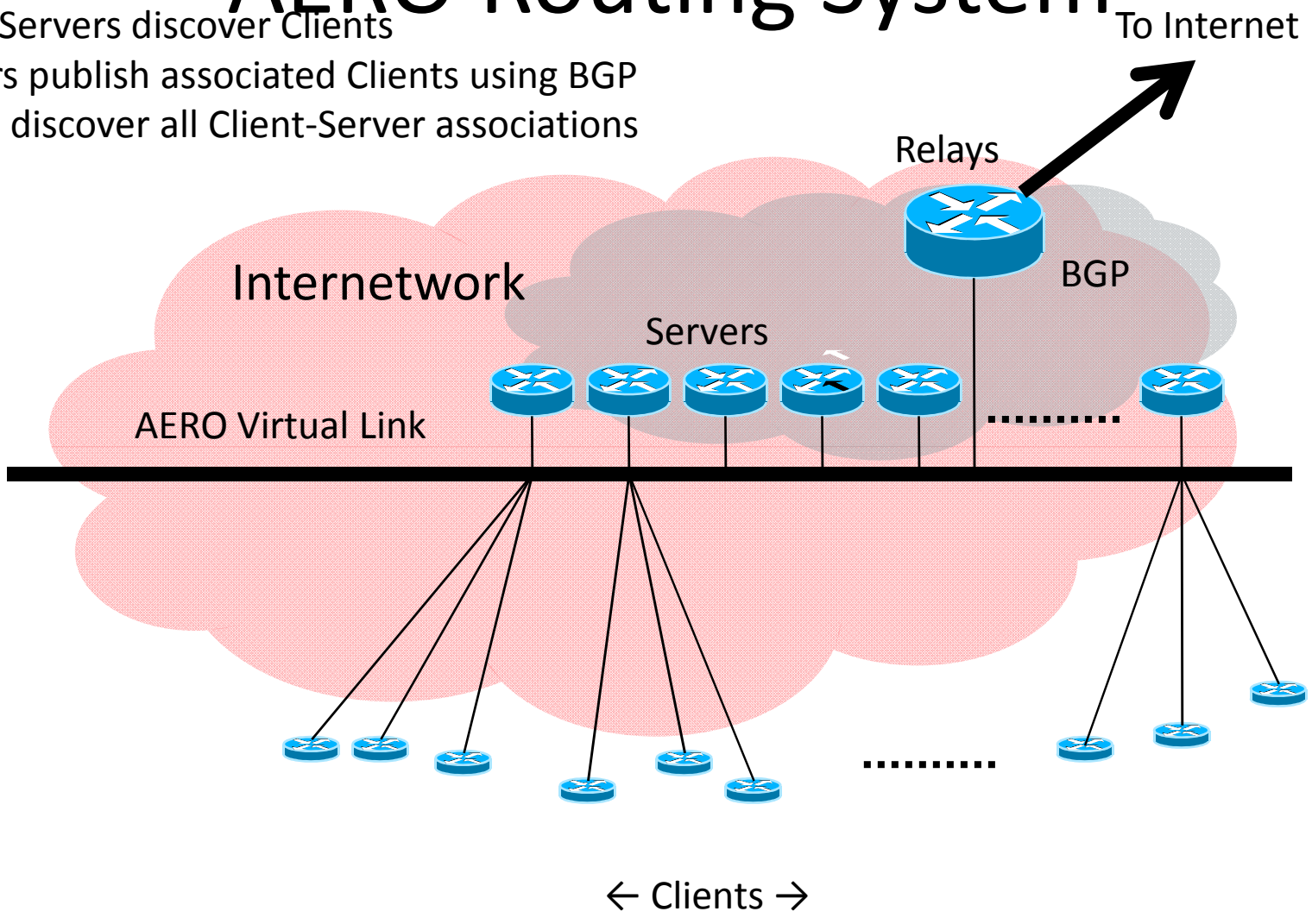


AERO Detailed Message Exchange (2)



AERO Routing System

- AERO Servers discover Clients
- Servers publish associated Clients using BGP
- Relays discover all Client-Server associations



AERO Use Cases

- AERO for enterprise mobile device users
  - iPad, iPhone, Android, Windows mobiles
  - Goal: place AERO handsets with corporate users
- AERO for civil aviation:
  - Airplane as mobile router for its attached networks
  - On-board device addresses remain stable as aircraft travels
  - Goal: support air traffic management
- AERO for other uses:
  - numerous other use cases under investigation