



# **MULTI-HOMING**

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# AGENDA

- What is multi-homing
- Multi-homing Types
- Why multi-homing?
- Different multi-homing solutions for IPv4 and IPv6
- Problems and possible solutions for mobile multi-homing



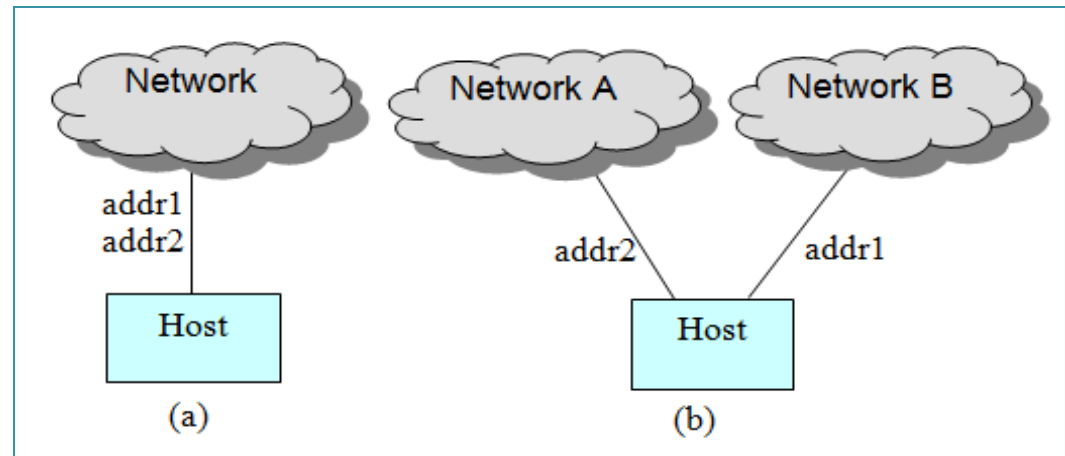
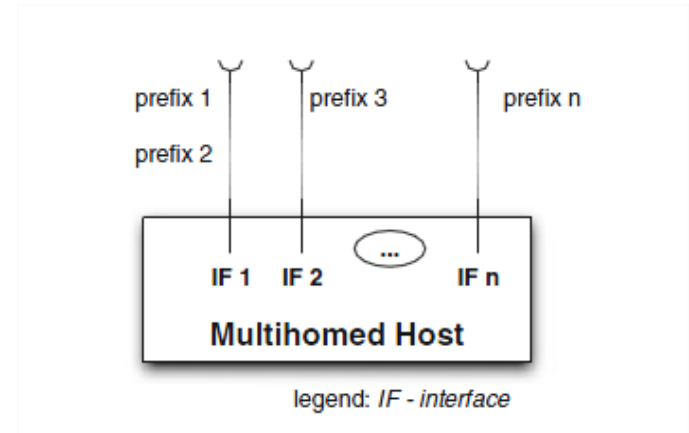
# WHAT IS MULTI-HOMING?

- Multi-homing is when a end-node or an end-site has multiple first-hop connections to the network.
- Connections to at least two providers (Transit Autonomous Systems) to the internet to enhance reliability and increase network performance
- Transit Autonomous Systems (ASes) are Ases that provides transit services to other Ases, such as Internet Service Providers
- Traditional approach is to use BGP



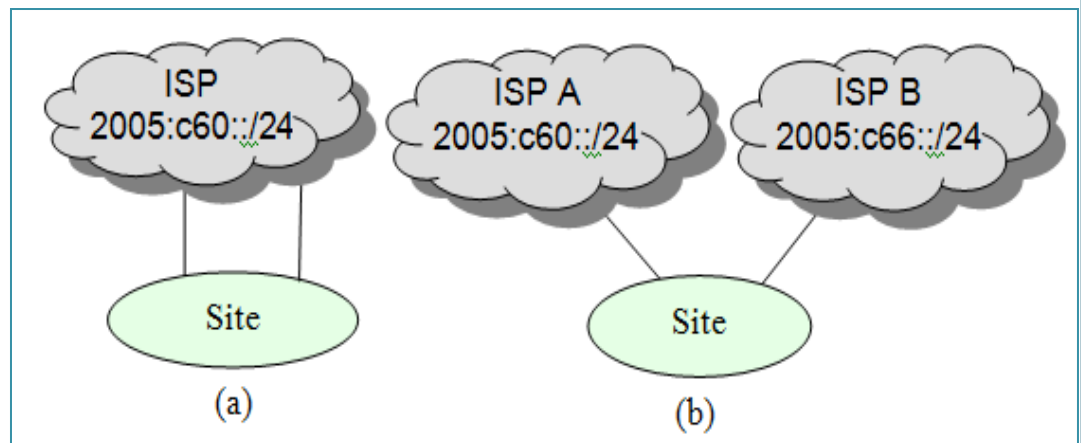
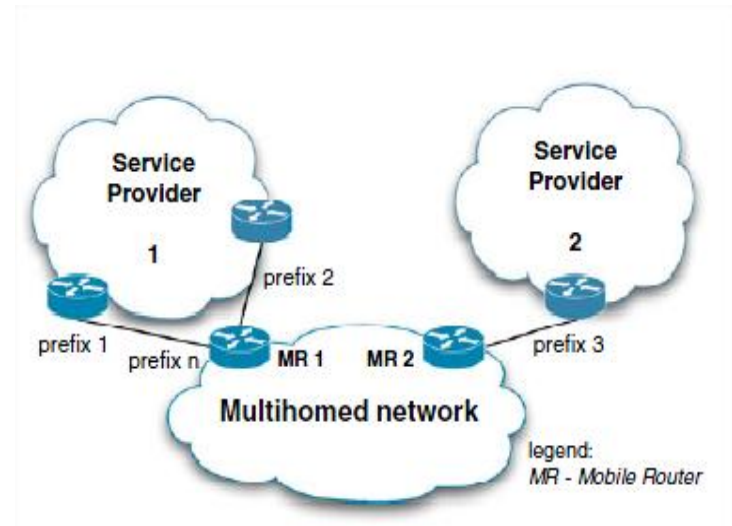
# MULTI-HOMING TYPES

## Host Level Multi-homing



# MULTI-HOMING TYPES

## Site Level Multi-homing



# WHY MULTI-HOMING?

- Goals of multi-homing is
  - Bandwidth aggregation
  - Increased Reliability
  - Load balancing
  - Less downtime

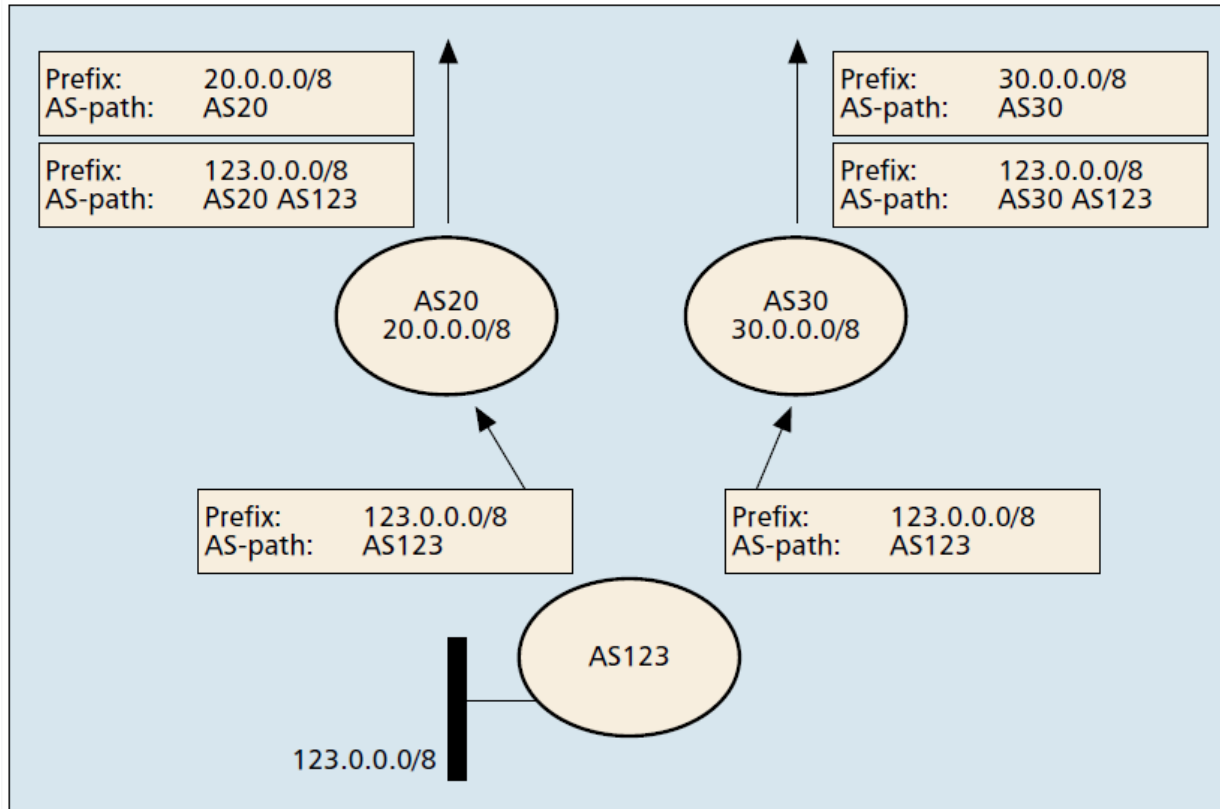


# DIFFERENT MULTIHOMING SOLUTIONS FOR IPv4 AND IPv6

- Routing approaches
  - *Multi-homing with BGP PI address space*
  - *Multi-homing with PA address space*
  - *Multi-homing at site exit router*
- Middle-box approaches
  - *Multi-homing with NAT*
  - *Multi-homing Translation Protocol (MHTP)*
  - *Multi-homing Aliasing Protocol (MHAP)*
- Host-centric approaches
  - SHIM6

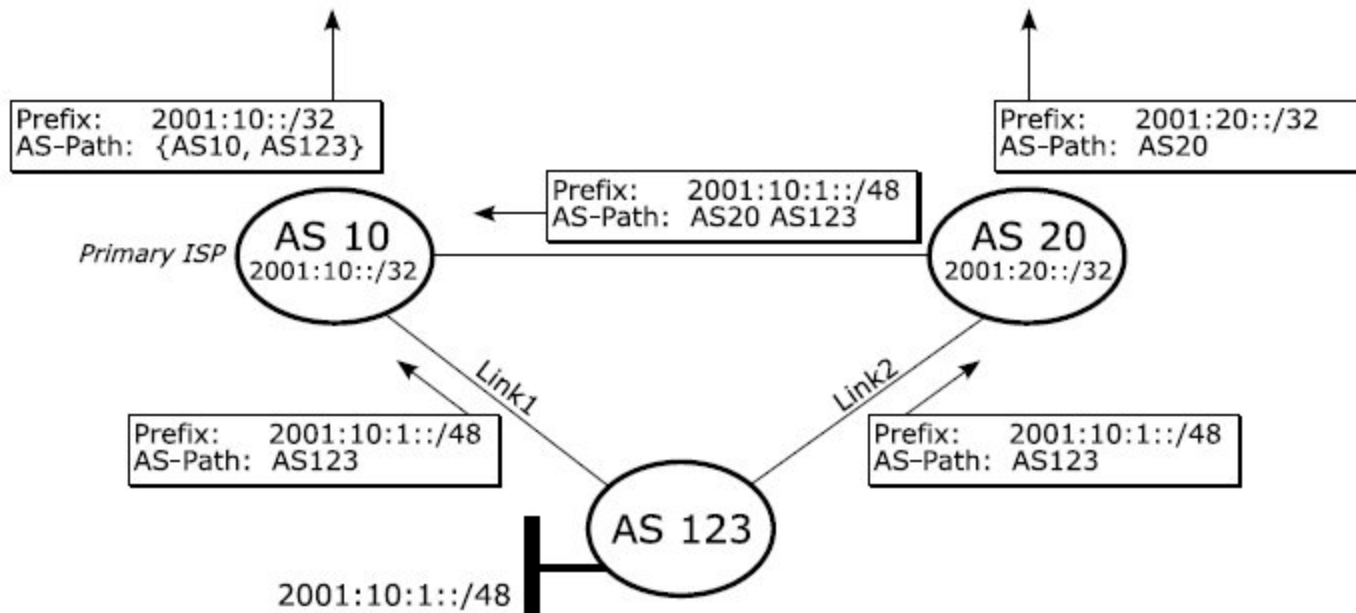


# MULTI-HOMING WITH PI ADRESSESS

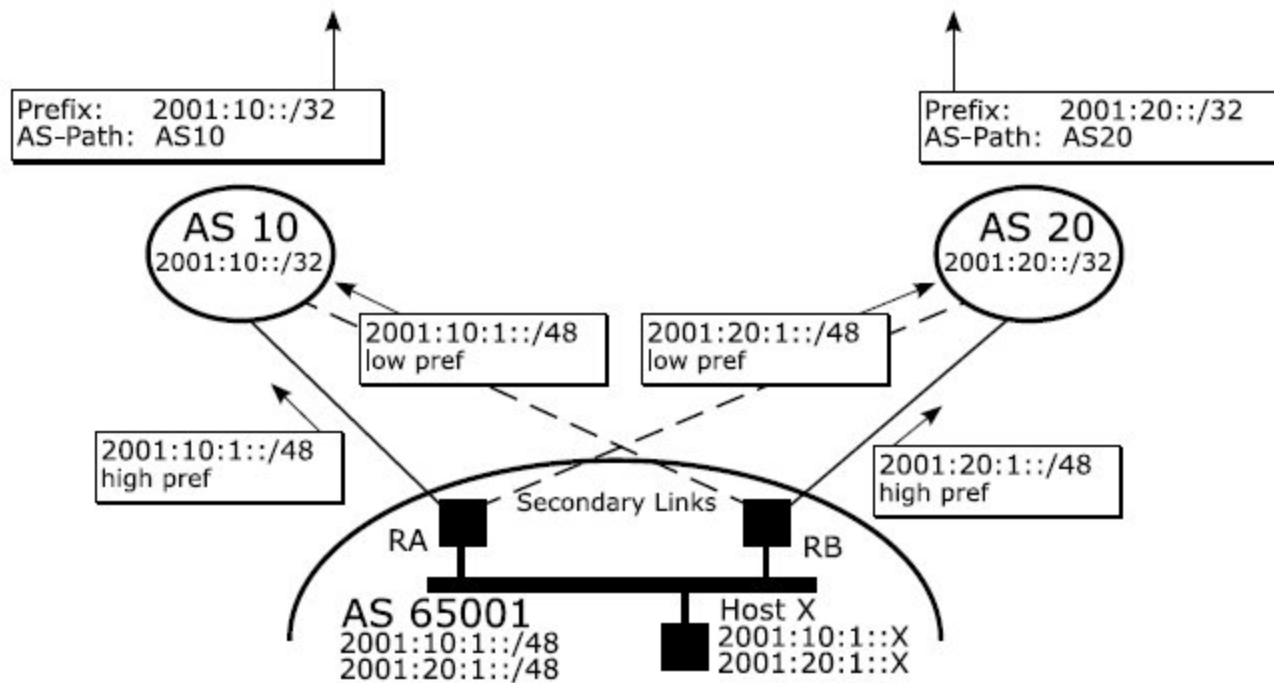




# MULTI-HOMING WITH PA ADDRESSES



# Multi-homing at site exit router



# SHIM6

- Using Provider Aggregatable addresses, removing the need to involve BGP or any other protocol.
- Default IPv6 address selection algorithm defines the selection of a address pair for a communication, and the address pair does not change for the duration of the session.
- Shim6 offers the ability to change the address pair used and uses routable IP addresses (locators) as the identifiers visible to the transport layer.
- When detecting that node communication fails → Reachability Protocol (REAP) can change the locator pair in use
- REAP searches for a working pair of locators and picks another available working pair



# PROBLEMS WITH MOBILE MULTI-HOMING

- Maintaining established communications while moving → similar to preserving established communications through outages
- Current MIPv6 does not fully support multi-homing



# SOLUTIONS FOR MOBILE MULTI-HOMING

- Proxy Mobile IPv6 (PMIPv6)
  - Local Mobility Anchor (LMA)
  - Mobile Access Gateway (MAG)
- The Multiple Care of Address (MCoA) and flow bindings
- Network Mobility (NEMO)
  - Extends the procedure with the addition of the mobile router (MR) entity



Questions?

