

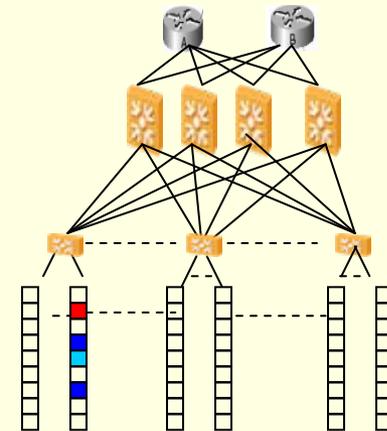
# Problem statement on address resolution in VM migration

draft-liyz-armd-vm-migration-ps-01.doc

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# Dimensions to be considered

- Network Topology
  - Layer 2 domain restricts VM movement
  - Where is the default gateway (router)?
- Protocols used at layer 2
  - STP based
  - Routing-like protocol, TRILL/SPB
  - Support different scale of network in nature, i.e. #of VMs

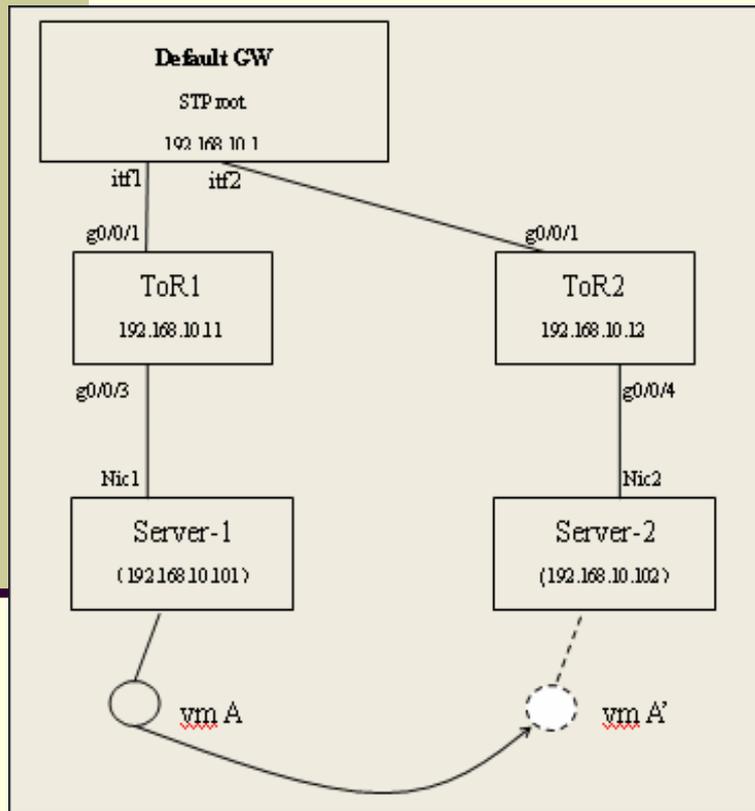


# ARP difficulty in VM migration (1)

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- No ARP “leave” message
  - Magnitude of seconds to complete the migration
  - Impact: black hole at transition time, depending on aging. ARP request storm as no response made at transition time
  - How to forget the address?
    - Keepalive?
    - De-registration?
    - Through management plane? vCenter knows vm is migrating.
  
- Variety of ARP message type after VM migration
  - ARP request/reply, reverse ARP. Experiments show different implementations on updating ARP table entry on receipt of ARP family message (next slide)
  - Impact: need to guarantee the correct updating on ARP table at gateways

# Examples for ARP entry updating in VM migration



#	packet sent aft VM migration	Is VM's interface updated to itf2 on GW?
1	std gratuitous ARP	Y
2	broadcast ARP reply	N
3	RARP	N
4	ARP request with GW as target IP	Y
5	ARP request with other host as target IP	N
6	unicast ARP reply with GW as destination	Y
7	unicast ARP reply with other host as destination	N

# ARP difficulty in VM migration

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- ARP message unreliable delivery
  - In case of congestion, consecutive ARP messages can be lost. Sending 3 ARP messages does not help much. Need to send more?
  - ARP table is not updated by data frame
  - Impact: delayed cache refreshment, worsen black hole issue, data frames are delivered to old location for traffic from gateway
- Duplicate address detection
  - Gratuitous ARP has function of DAD. No way to perform DAD at transition time
  - ND in IPv6 has a better way to differentiate DAD & address adv.
    - DAD: NS with unspecified address as src.
    - Address resolution: NS with unicast address as src
    - Address advertisement: unsolicited NA with all-nodes multicast address as dest
  - Impact: address occupation/contention

# Security concerns

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- Some existing mechanism may not be applicable
  - MAC locking: locking a MAC address to a specific physical port of the switch.
  - DHCP snooping: binding IP/MAC by snooping DHCP ACK to port of switch.
- ARP is a signal that a migrated VM starts to receive frame at the new location?

# Next step?

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- Be merged to general problem statement draft