

Requirements for Mobility and Interconnection of Virtual Machines (VMs) and Virtual Network Elements (VNEs)

<http://tools.ietf.org/id/draft-khasnabish-vmmi-problems-02.txt>

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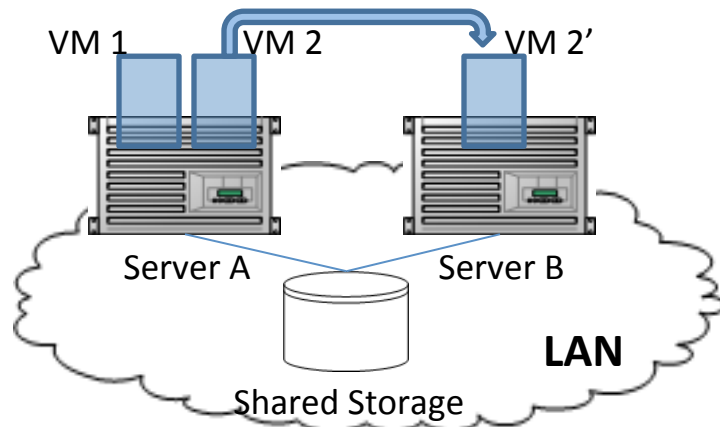
Outline

- VM Migration (VMM) across IP Subnets / WAN
- Virtual Network Model and Processing Flow
- Service Related VMM Requirements
- Answers to the Questions from the WG chairs
- Next Steps, and Discussion

VM Migration Across IP Subnets/WAN

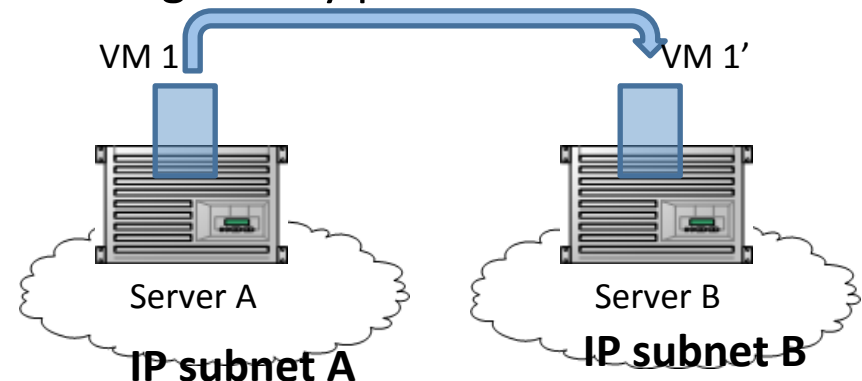
- **Migrating VMs in a LAN**

- IP address of VM is not changed
- A single LAN limits the scalability of the VM computing environment, because of the limited network scale
- STP/MSTP leads to VLAN isolation, and cannot support uninterrupted operation in storage network



- **Migrating VMs across IP subnets**

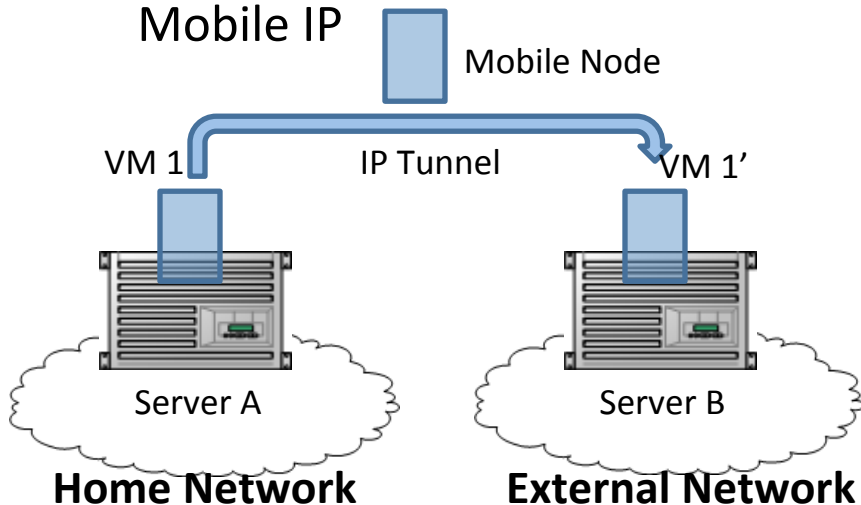
- IP tunnel problem
- IP allocation strategy problem
- Routing synchronization strategy problem
- VM migration protocol state machine problem
- Resource gateway problem
- Optimized location of default gateway problem



VM Migration Across IP Subnets/WAN (../

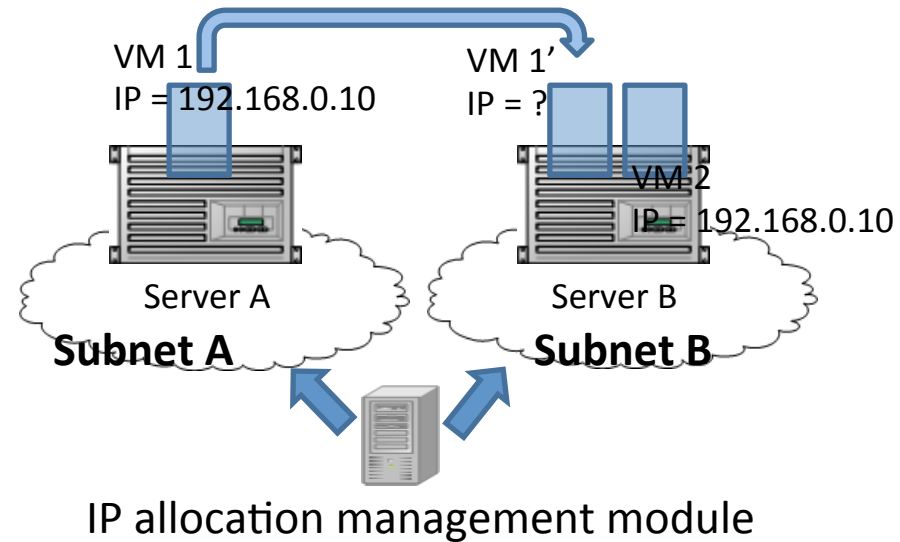
2) IP tunnel problem

- IP-in-IP tunnel: make sure that the user/application have no perception of migration
 - Network configuration of VM needs to be changed after the migration
- Network connection redirection needs to be considered: Proxy



• IP allocation strategy problem

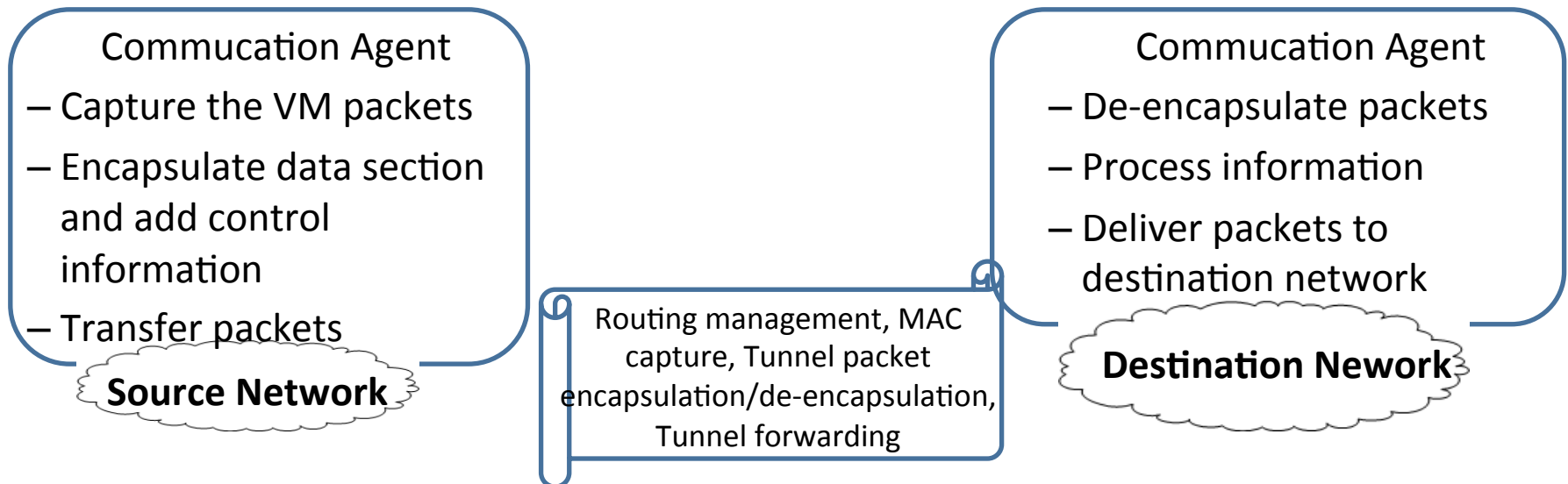
- IP address of migrated VM may conflict in destination network



- Synchronization of IP address allocation
 - DHCP related issues
 - Difference in network topologies
 - IP addressing & Routing strategy₄

Virtual Network Model and Processing Flow

- Virtual network model has two new requirements
 - Adjust routing information automatically according to the physical location of VM after the VM is migrated to a new subnet
 - Add “virtual network communications agent ” which is responsible for data routing, storage and forwarding in across-subnets commucations
- Processing flow
 - Migration messages trigger the topology updates of VM clusters in source network and destination network



Service Related VMM Requirements

Resource Allocation Gateway

Data Center Gateway

Provide access to the virtualized resources

Provide access to the data center for different outside users

Core Router/Switch

High-end core nodes/switch with routing capabilities located in the core layer

Aggregation Layer Switch

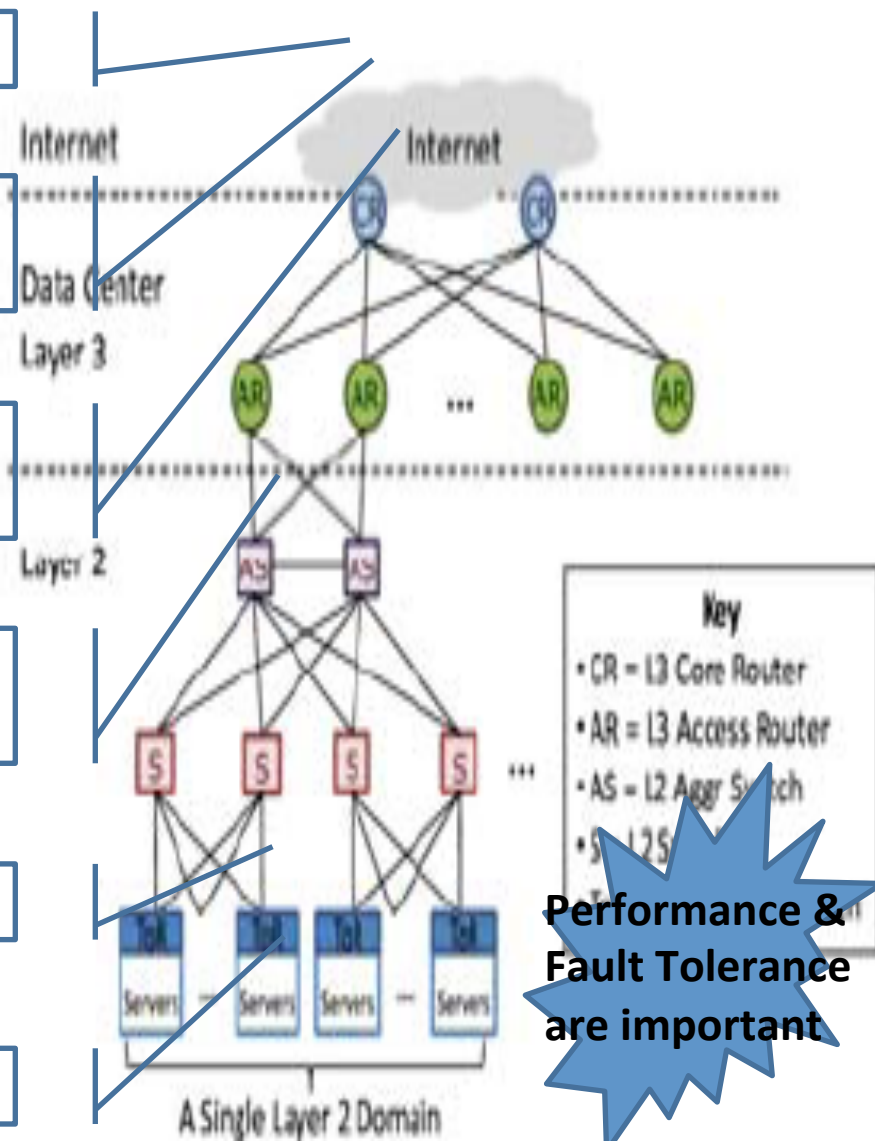
Aggregate traffic from the TORswitches and forwards the downstream traffic

Access Layer TOR Switch

Dual-homed to the parent node switch

Virtual Switch

Software switch which runs on a server

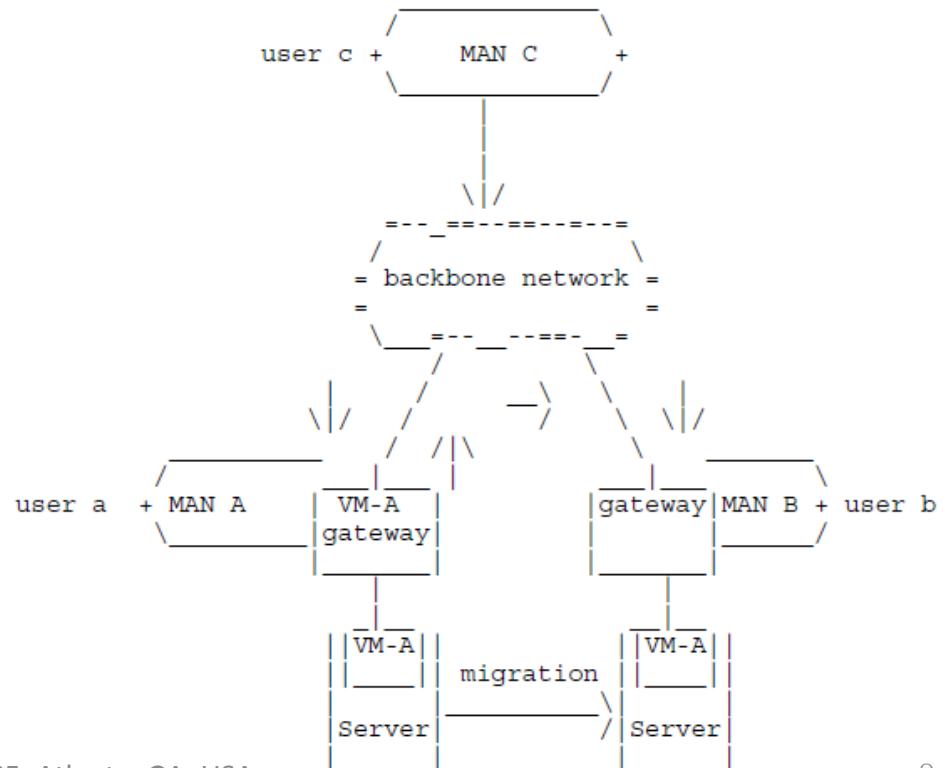


Service Related VMM Requirements (../2)

- VPN interconnection requirements
 - Applications of L2VPN in DCs
 - Applications of L3VPN in DCs
- VN requirements
 - VN = Virtual IDC Network + Virtual DC Internal Switching Network
- Packets encapsulation requirements
 - A method similar to overlay address is required: data packets travel to DC interconnection network through DC GW and are encapsulated for subsequent transmission
- Mixed (IPv4 and IPv6) network requirements
 - Availability of global network and storage resources
 - Global available network resource and requested network resource for matching with storage resources
 - Global requested network resource for matching with storage resources

Service Related VMM Requirements (../3)

- Selection of migration
 - Different network environments and protocol
 - Live migration of Virtual Machine: IPv4/IPv6 ↔ IPv4/IPv6
- Access and migration of VMs without users' perception
 - Avoid traffic roundabout while having traffic roundabout problem as a prerequisite
 - Portray the state of no migration in user's perception and no traffic roundabout with having no traffic roundabout problem as a target



Service Related VMM Requirements (../4)

- Review of VXLAN, NVGRE, and NVO3
 - Both VXLAN and NVGRE use encapsulation and tunneling to create VLAN subnets, which can be extended to Layer-2 and Layer-3 networks
- East-West traffic problem
 - Three potential solutions to the distributed horizontal flow of traffic
- Data center interconnection fabric related problems
- MAC, IP, and ARP explosion problems
- Suppressing flooding within VLAN
- Convergence and multipath support
- Routing control – multicast processing

Answers to the Questions

- **QUESTION-1:** Does your draft contain any material that should be incorporated into the Problem Statement or Framework document?
 - Yes, it contains some materials that can be incorporated into the Problem Statement and/or Framework document. our draft(draft-khasnabish-vmmi-problems-02.txt) is being discussed in the mail list now.
- **QUESTION-2:** Does your draft contain any material that should be incorporated into one of the Requirements drafts? If so please separate the requirements from the "companion" text so these two topics can be dealt with appropriately.
 - Yes, the VMMI draft contains texts/sections that can be included in both problem statement and requirements
- **QUESTION-3:** Does your draft contain similar information as one or more other drafts that have been contributed to NVO3? If so please consider merging and/or choosing one draft to be put forward for WG adoption.
 - Yes, Our draft don't contain similar information as other drafts that have been contributing to in NVO3. Yes, we can work with the authors of other similar drafts on merging the drafts.

Next Steps, and Discussion

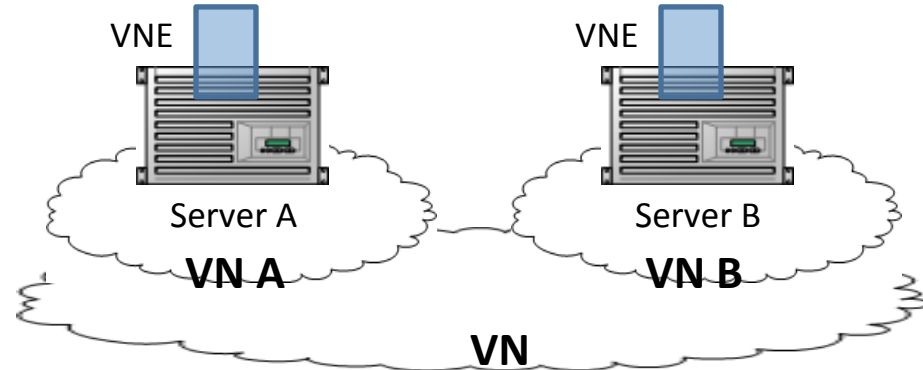
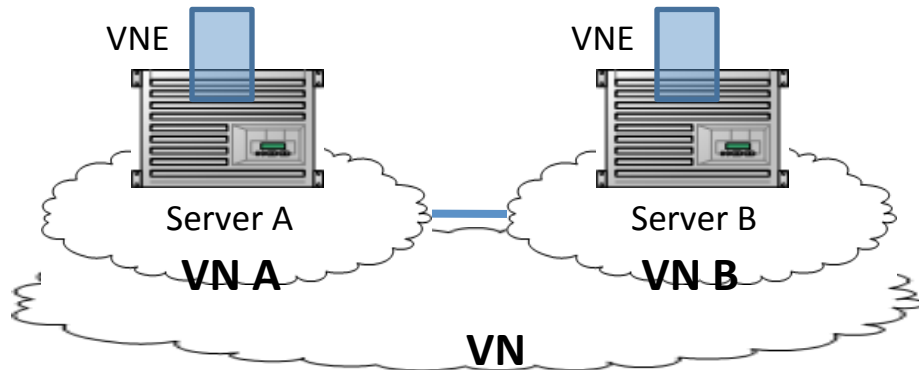
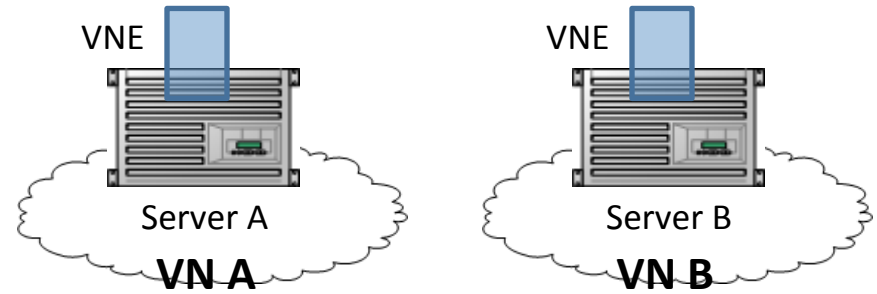
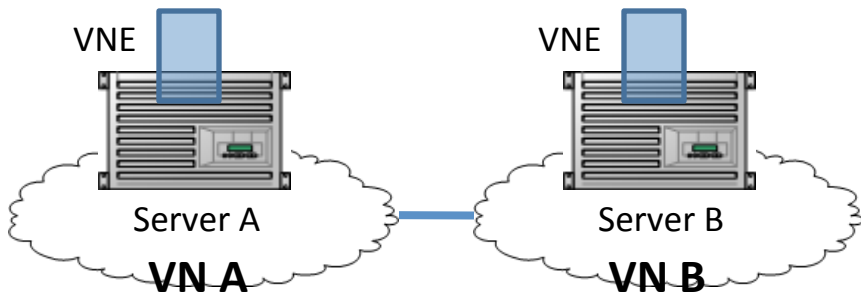
- Update the draft to address the comments/ suggestion received since publishing version 02
 - Publish version 03 ASAP
- Merge the overlapping sections with other relevant drafts
- Develop new draft(s) using the materials that are not discussed in other NV03 draft(s)
- Anything else ?

Additional Information

Impact of NVE/OBP Location on VMM

- NVE/OBP on the Server
 - Transparent to network topology and L2/L3 protocol

- NVE/OBP on the TOR
 - Need to develop new rules to deal with VM migration



Relationship with Logical Network Topology

- VMM has a close relationship with network topology

