네트워크 지능화를 위한

SDN의 진화

NAIM

http://www.naimnetworks.com

I SDN 제품군 – Controller

벤더	특징	비고
Big Switch	OpenFlow 주도적 역할	BVS / Big Tap
VMWare	Cloud 환경에 초점 / 물리적 스위치 관여 안 함.	NSX
HP	SDN 전체 Portfolio 수립	자사 솔루션과 결합 (Sentinel, UC&C etc.)
NEC	SDN 전체 Portfolio 수립	OF 1.3 지원
Plexxi	WDM을 이용한 독자 기술 이용	OF 지원 안함

I SDN 제품군 – Controller

벤더	특징	비고
IBM	NEC Controller와 호환	자체 Controller 개발 중
Alcatel Lucent	BGP / MPLS에 특화된 솔루션	Nuage Network에 투자
Vello	가상네트워크에 특화된 솔루션	
NTT	SDN을 SI 전략으로 진행	

I SDN 제품군 - Switch

벤더	특징	비고
HP	5개 모델에서 29개 종에서 OpenFlow 지원	HP 3500 / 3500yl / 3800 / 5400 / 8200
IBM	2개 모델 3개 종에서 OpenFlow 지원	G8264 / 8264T / 8052
NEC	2개 모델 4개 종에서 OpenFlow 지원	PF 5820 / 5240
Arista	1개 모델 5개 종에서 OpenFlow 지원	Arista 7050 Series
Brocade	3개 모델 8개 종에서 OpenFlow 지원	MLX Series / CES 2000 / CES 2000
Extreme	ExtremeXOS 15.1 (1.0 지원)	Stackable Switch

I SDN 제품군 - Switch

벤더	특징	비고
Dell	4개 모델에서 4개 종에서 OpenFlow 지원	S4810 / Z9000 / MXL / S4820T
Juniper	1개 모델 1개 종에서 OpenFlow 지원	EX 9200
PICA8	4개 모델 4개 종에서 OpenFlow 1.2 지원	P-3290 / P-3295 / P-3780 / P-3920
Plexxi	OpenFlow 지원 안함	독자 장비
Vello	2개 모델 2개 종에서 OpenFlow 지원	CX (Optical) / VX (Ethernet)

I SDN 제품군 - Switch

벤더	특징	비고
HP	올해 중 OpenFlow 1.3 지원 예정	전 기종
Cisco	올해 중 OpenFlow 1.0 지원 예정	Nexus / Catalyst 일부
Juniper	JunOS SDK (1.0 / 1.3지원) 예정	일부 기종
Arista	올해 중 OpenFlow 1.2 지원 예정	7050 제품

I SDN 제품군 – Chip

Utilizes 40nm technology
Wire speed 960G/1280G
64K MAC Addresses
8K IPv4 Routes
4K VRF
8 Queues per port
H-VPLS | Mac-in-Mac
FCOE Forwarding, Classification and Prioritization
Full MPLS support
IP-in-IP | GRE | MPLS Tunneling
Hierarchical shaping and scheduling

Openflow 1.0 Compliant

Intel's Flexpipe™ Technology

Programmable Processing Pipeline
Programmable for SDN
Openflow "12 Tuple" Lookup
Network Virtualization Support
Network Overlays | VXLAN, NVGRE

OpenFlow v1.0, v1.2, v1.3

180 Million Packets Per Second Throughput
50G (Full Duplex) wire speed packet processor
Integrated 40G MAC (i.e. provides support for single 40G Interface)
Up to 4G Frame memory

Weighted Fair Queuing (WFQ) Shaping | WRED Congestion Management
Shaping | Single Color | Dual Color
Hardware Flow Control | Per Class Flow Control

Openflow 1.1 Support

28nm 1G/10G/40G ASIC

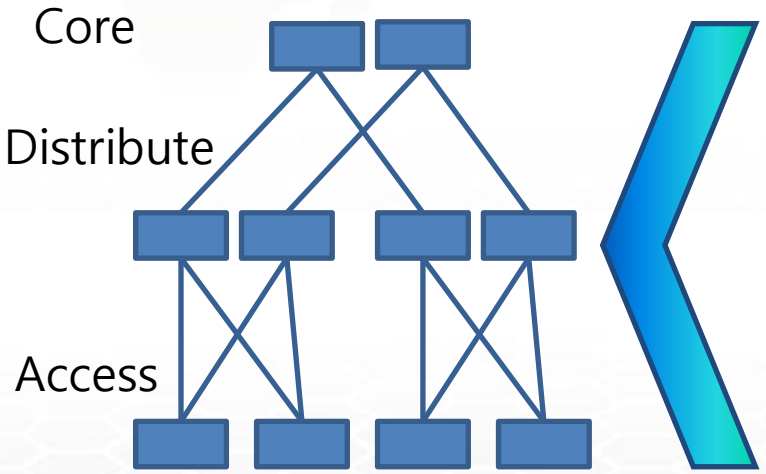
960Gbps – 1280Gbps Switch Capacity
Low Latency < 480ns
Enhanced Hashing/Load Balancing
Flexible Shared Forwarding Tables

DC Overlay Support
VXLAN, NVGRE encap/decap

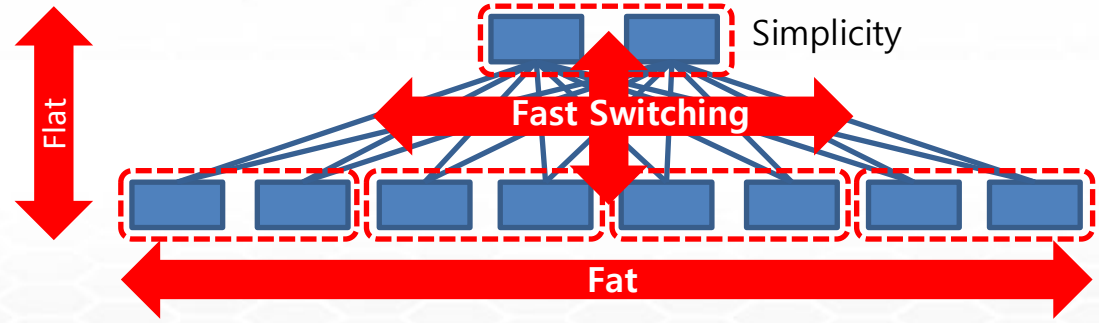
I 현재 우리의 네트워크

IDC에 따르면
데이터센터의 Traffic이 2014년 이후로 East – West Traffic이 80% 이상이 됩니다.

과거의 데이터 센터와 다른 네트워크 구조
- Flat network 네트워크 홉 최소화
- Fat Tree 대규모 서버 환경 및 최적 경로
- Fast Switching 낮은 네트워크 대기 시간을 보장
- Simplicity 구성, 운영 및 관리 용이성



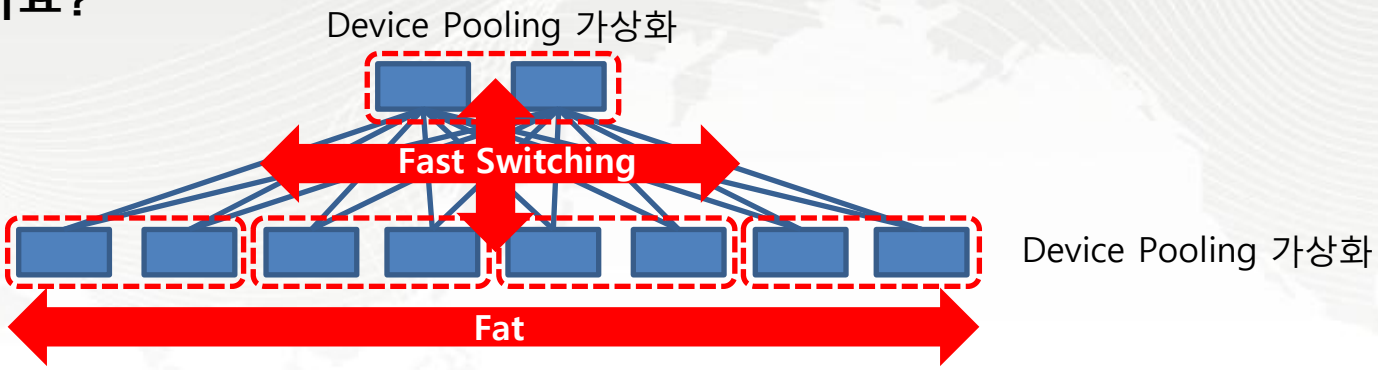
기존 네트워크 중심의 구조

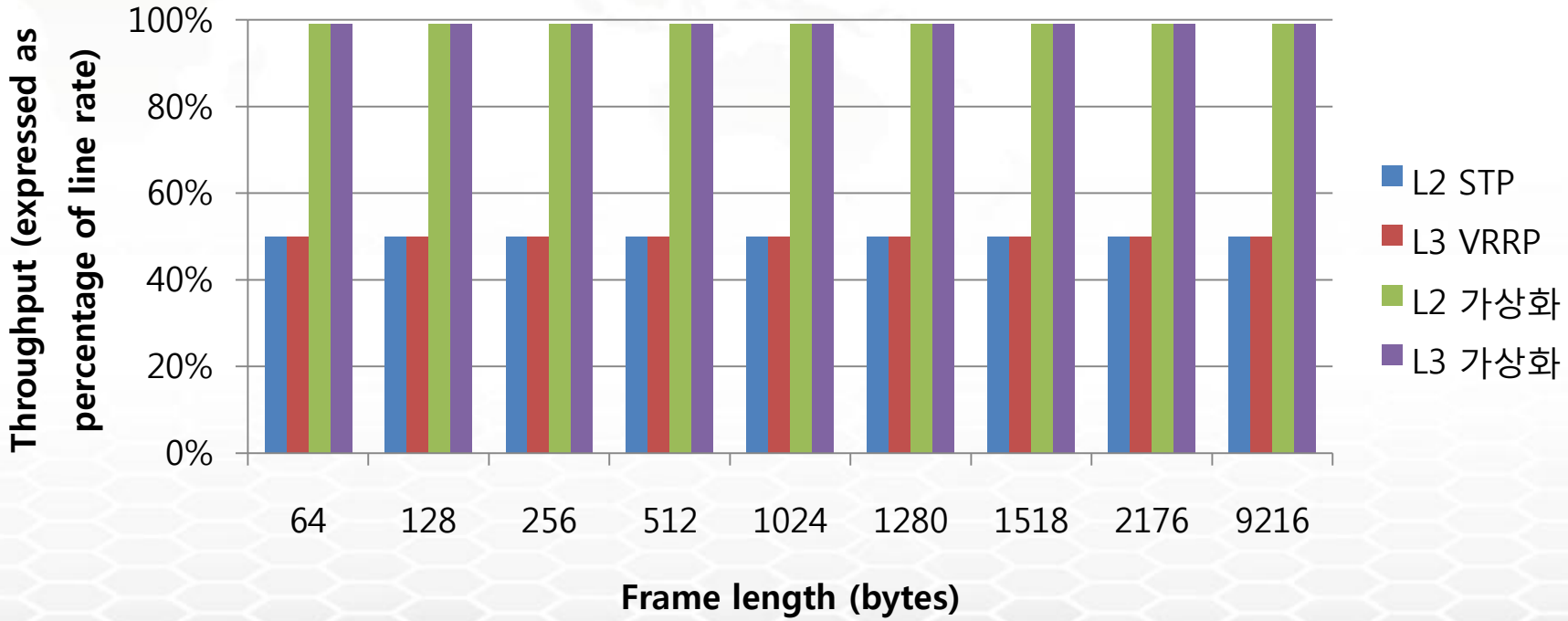


향후, 어플리케이션 중심의 구조

I 현재 우리의 네트워크

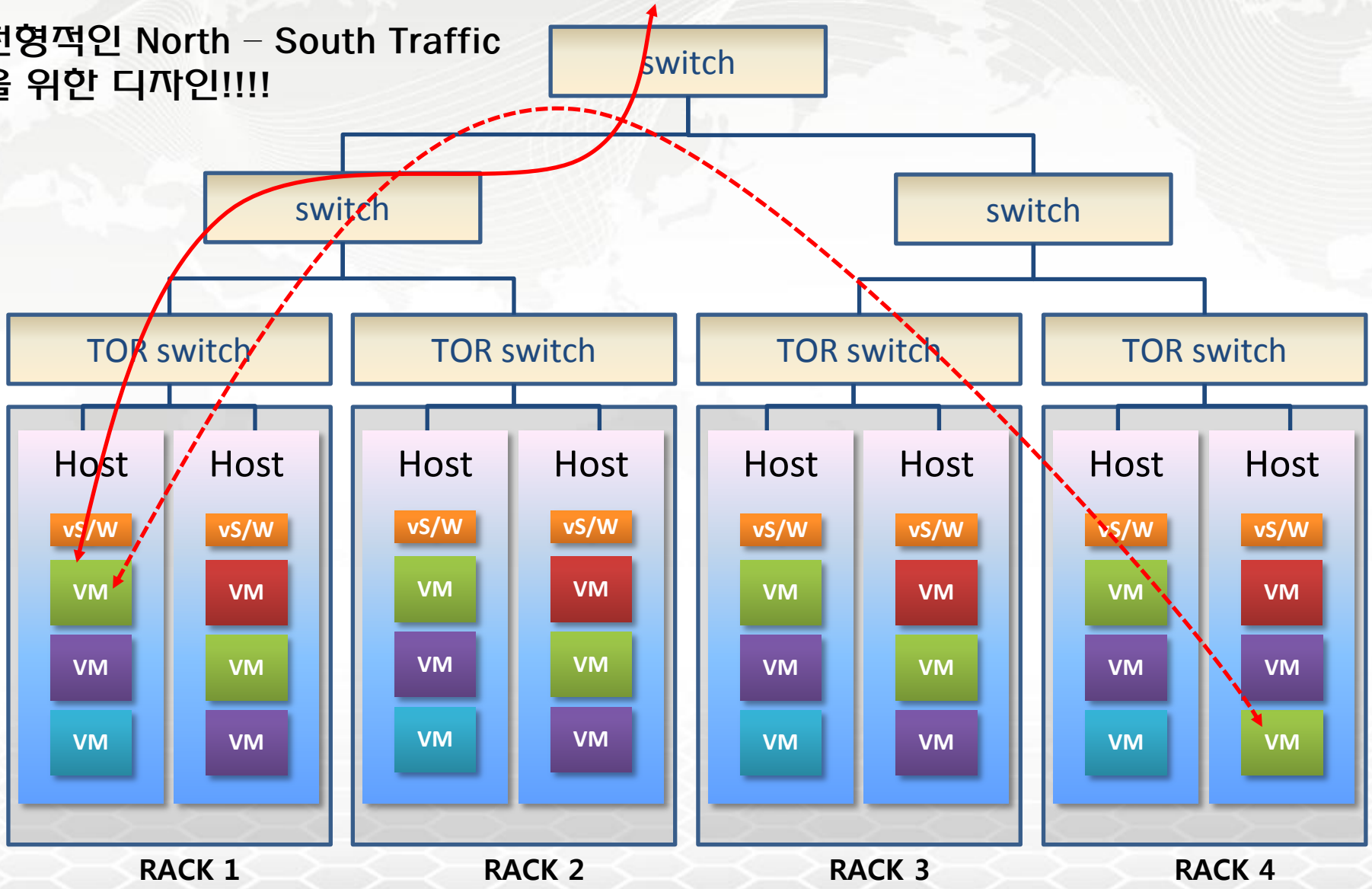
이것으로 충분한가요?



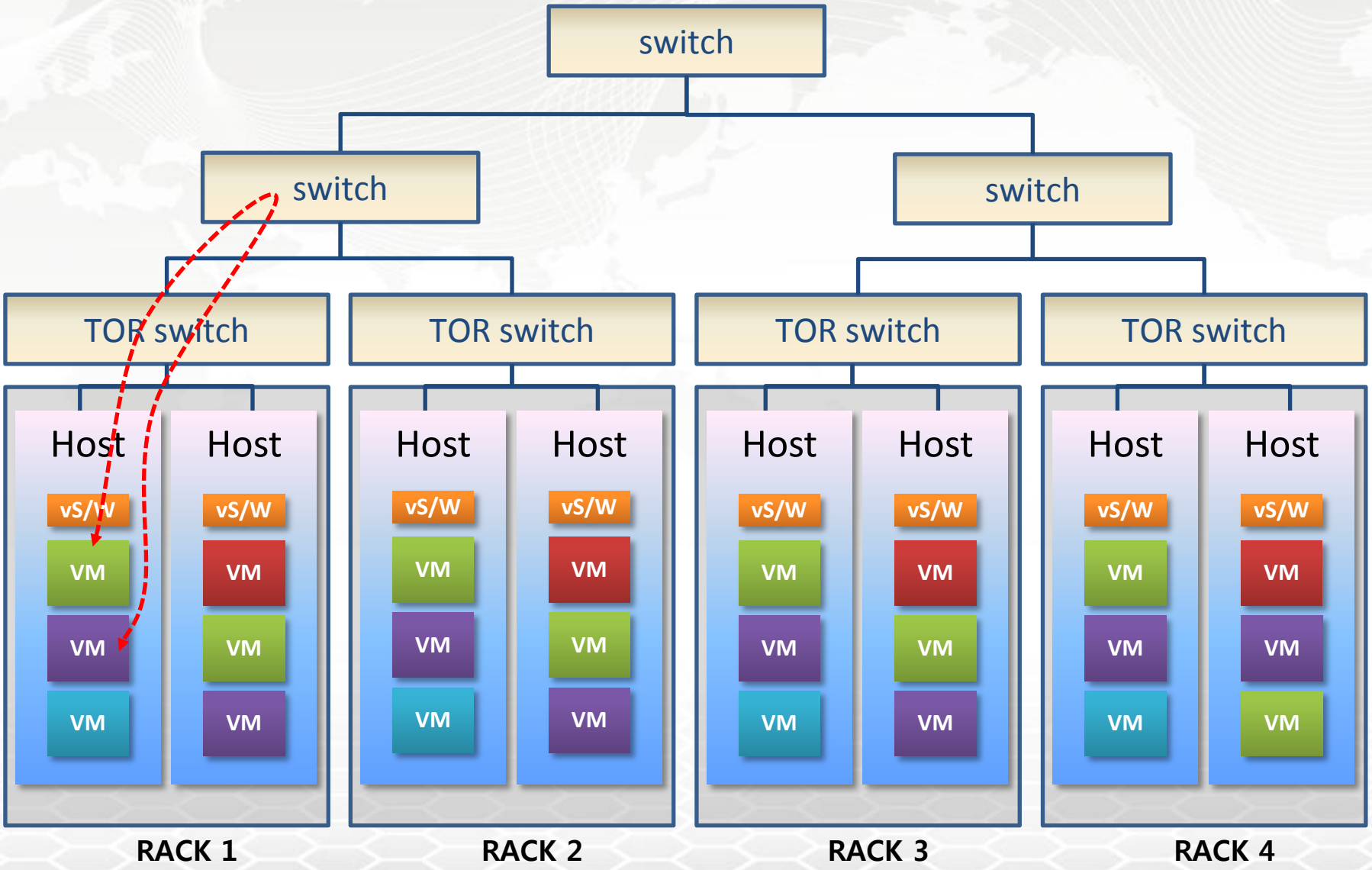


I 현재 우리의 네트워크

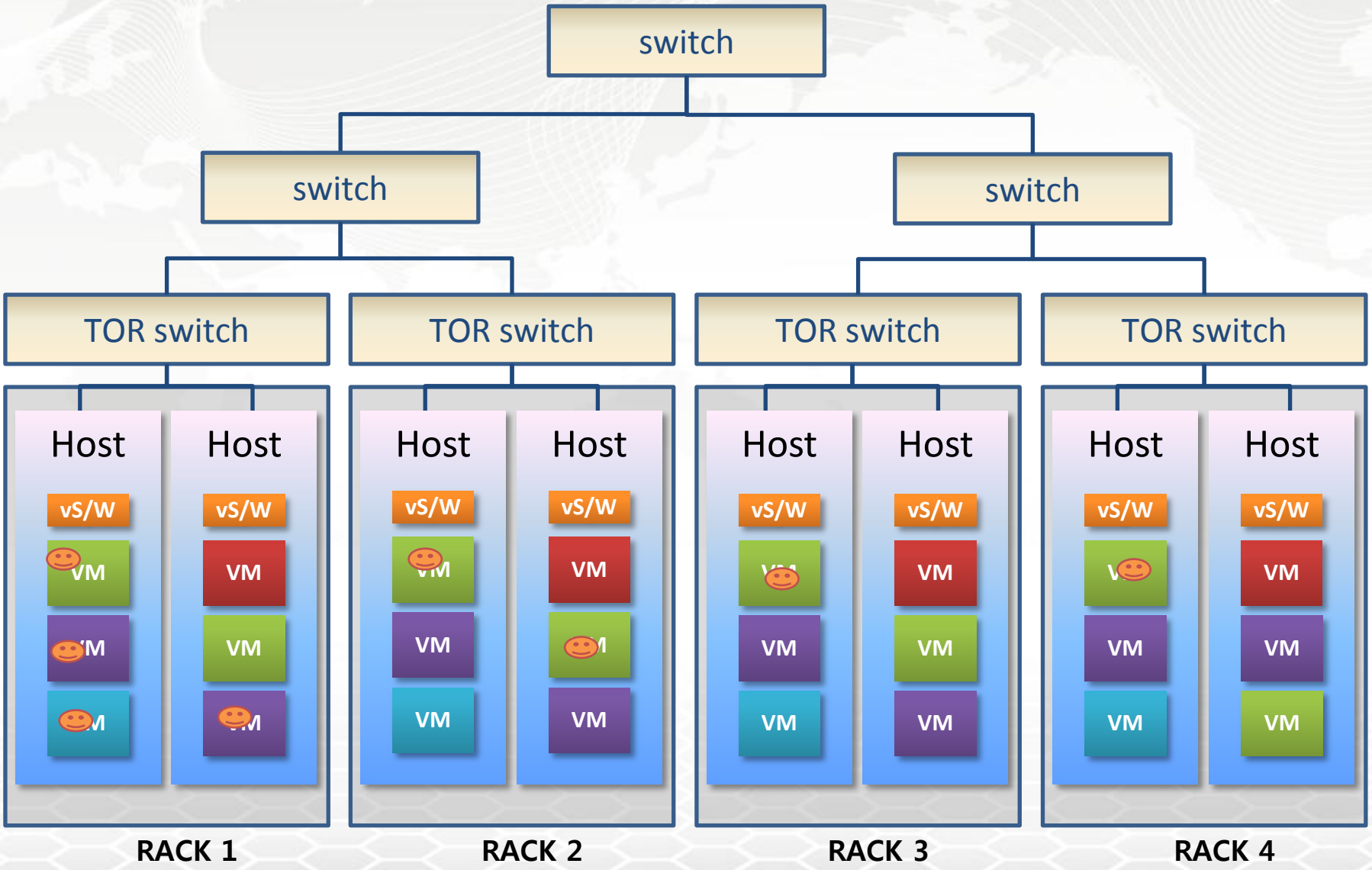
전형적인 North – South Traffic
을 위한 디자인!!!!



I 여전히 복잡한 트래픽 경로

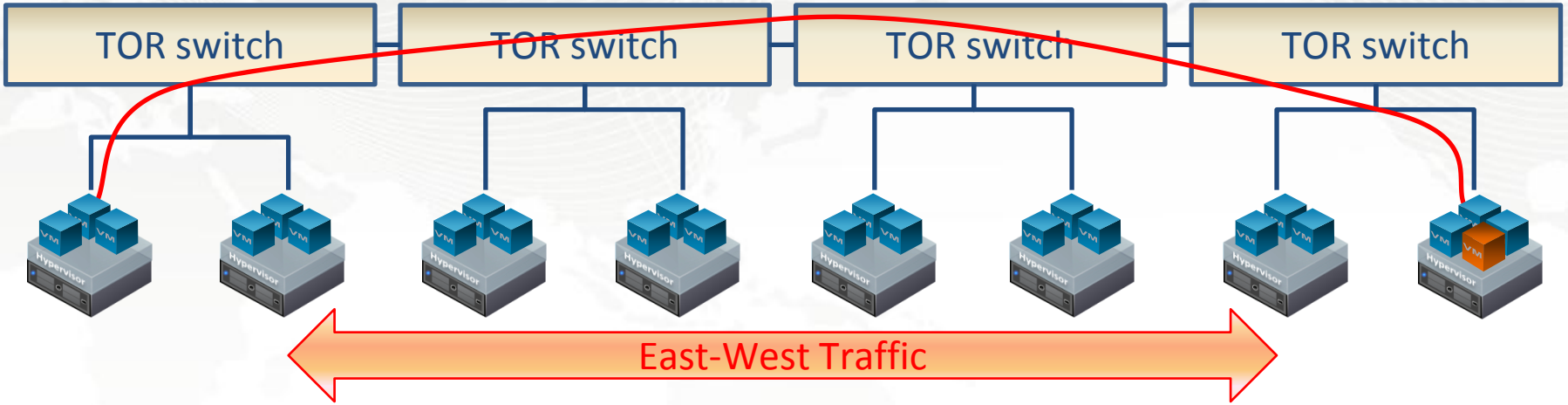


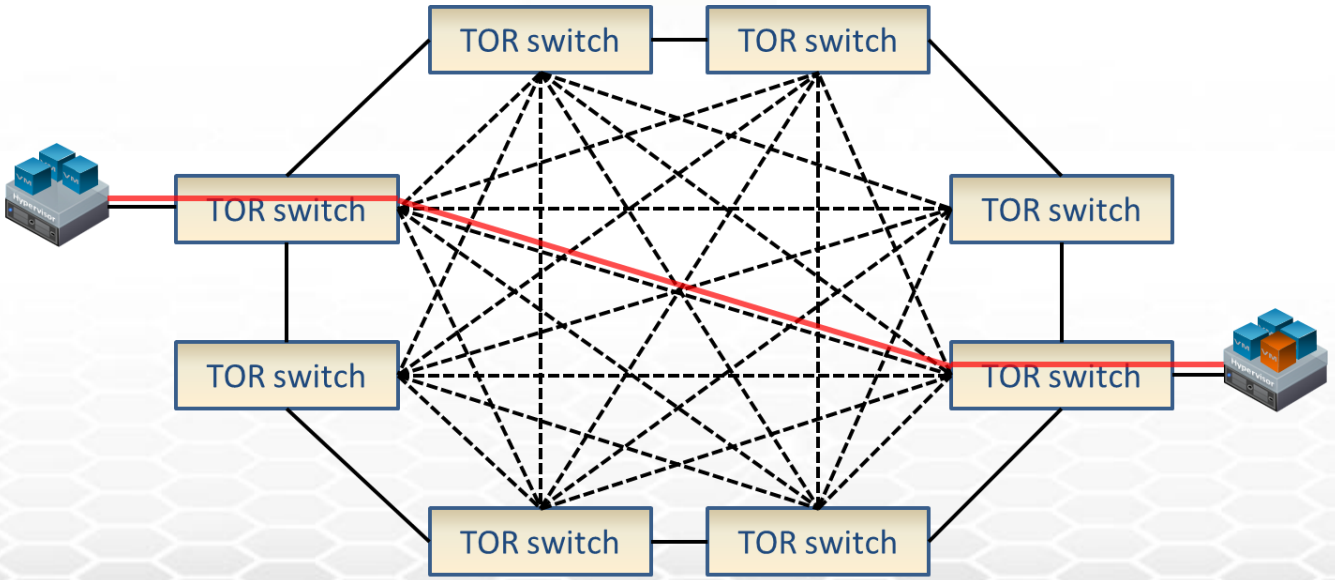
여전히 복잡한 트래픽 경로



I PLEXXI 제안 방식

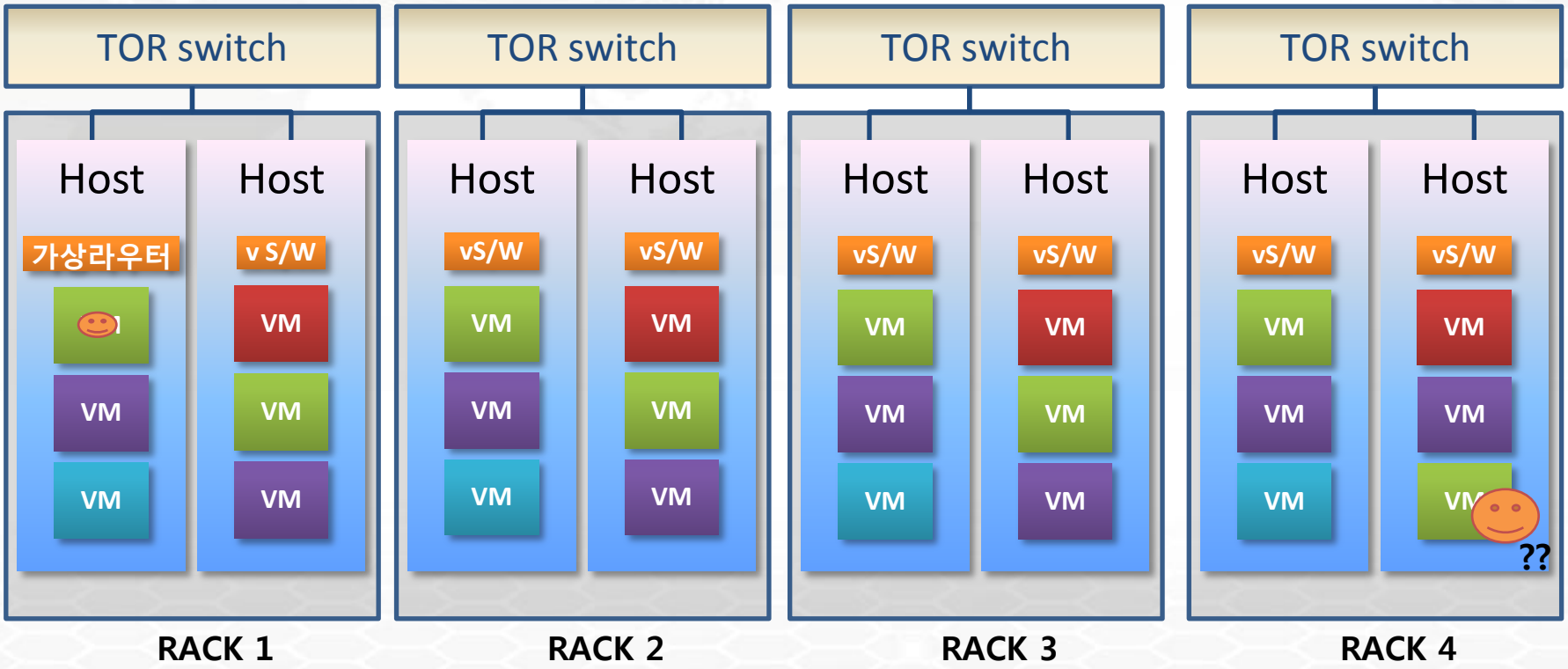
1Tier 구성 (WDM 구성을 통한 논리적 Full Mesh)





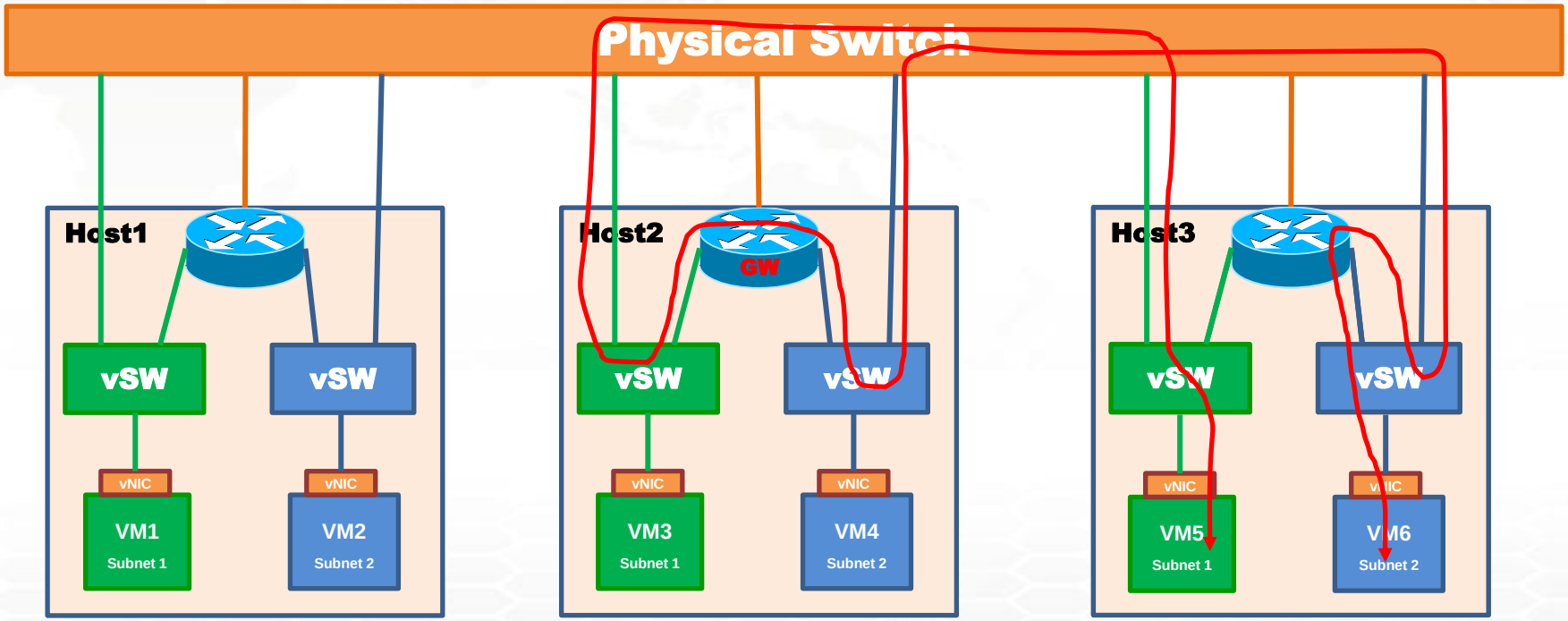
I 가상 라우터의 한계

- 가상 라우터는 매우 좋은 솔루션입니다.
- 하지만 네트워크가 확장될 때도 유용한가요?

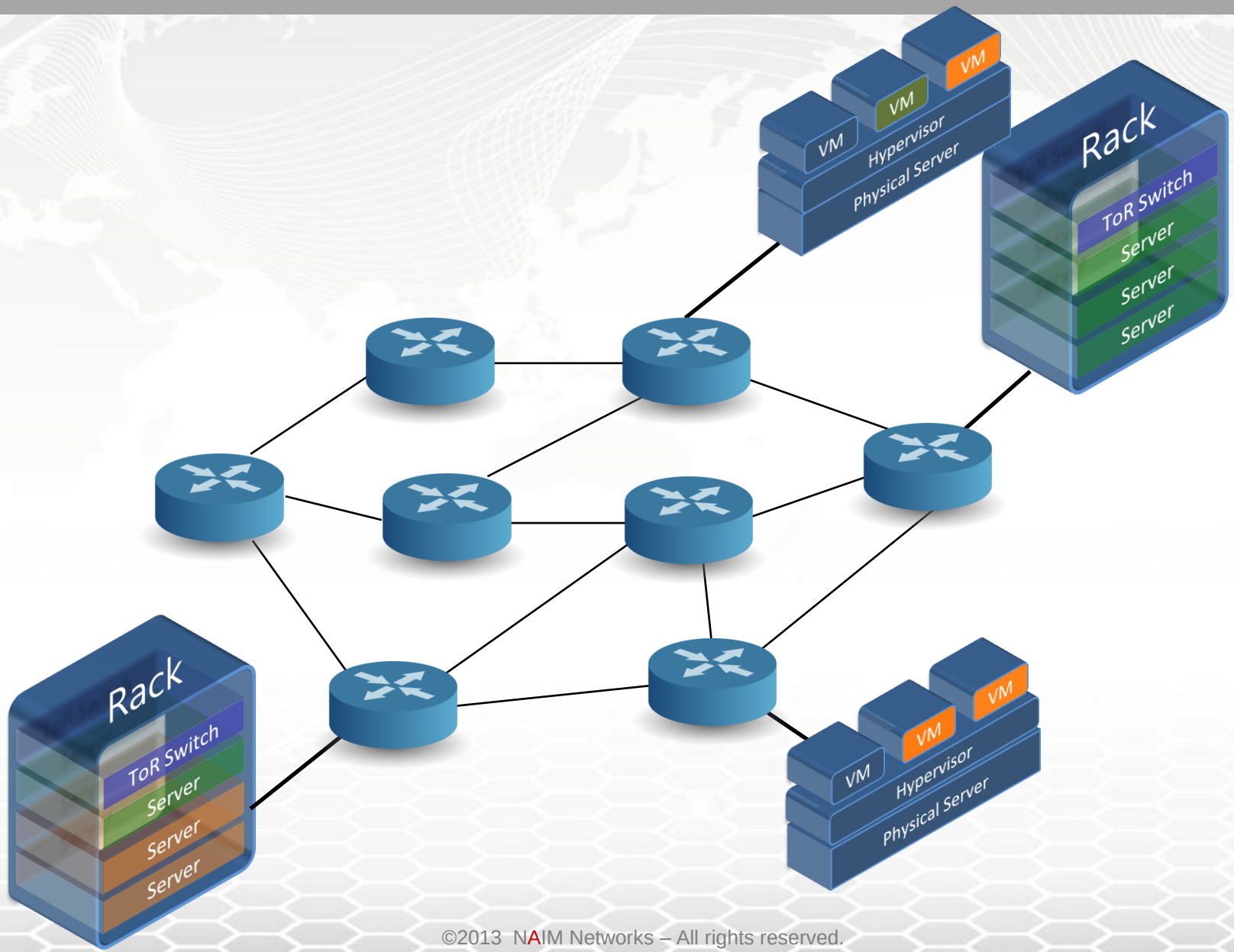


가상 라우터의 한계

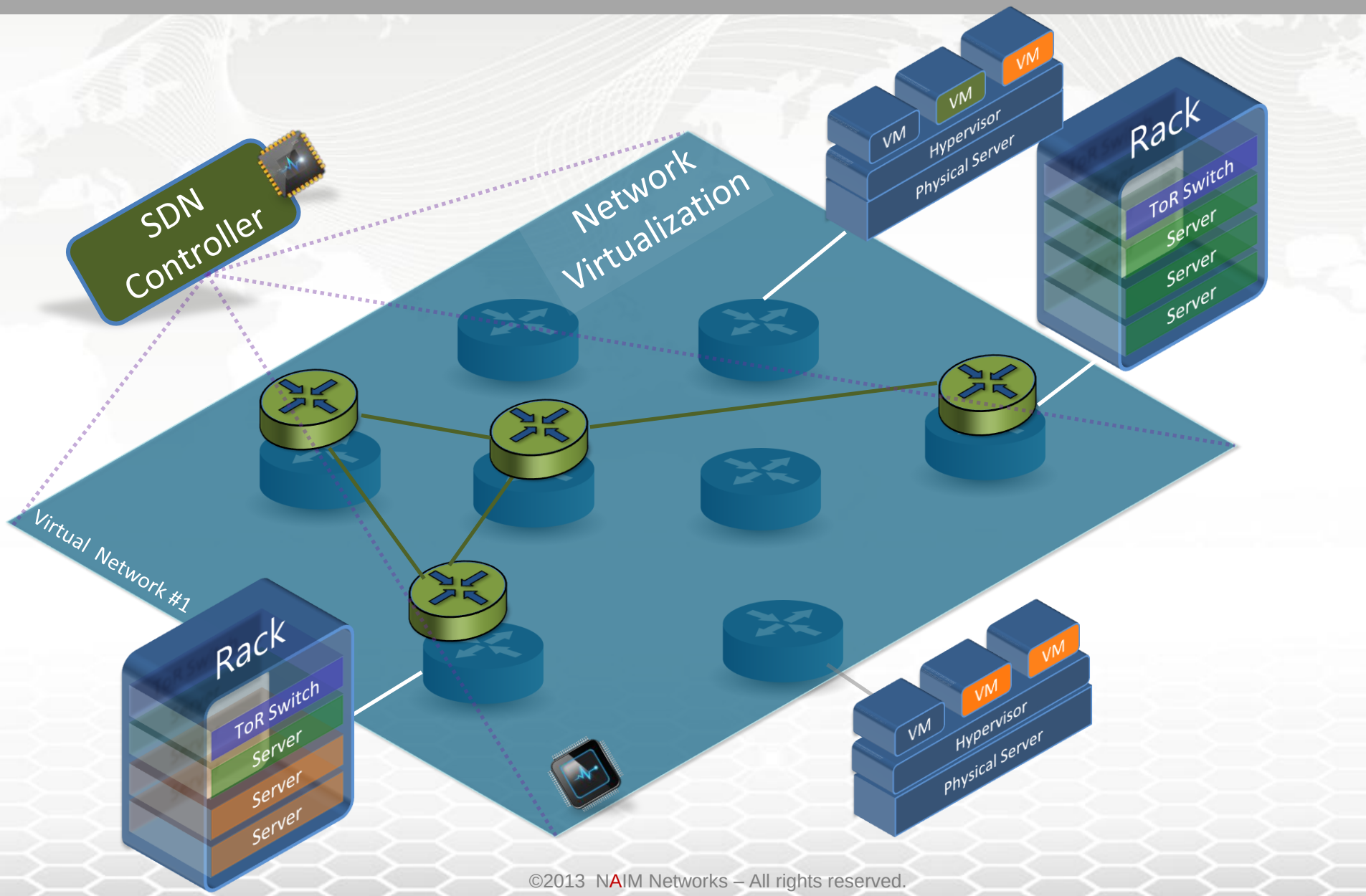
- 두 개의 **subnet**에 대한 **Default Gateway**는 **Host2**의 **vRouter**
- **Host3**에 생성된 **VM6 -> VM5**로 통신을 시도



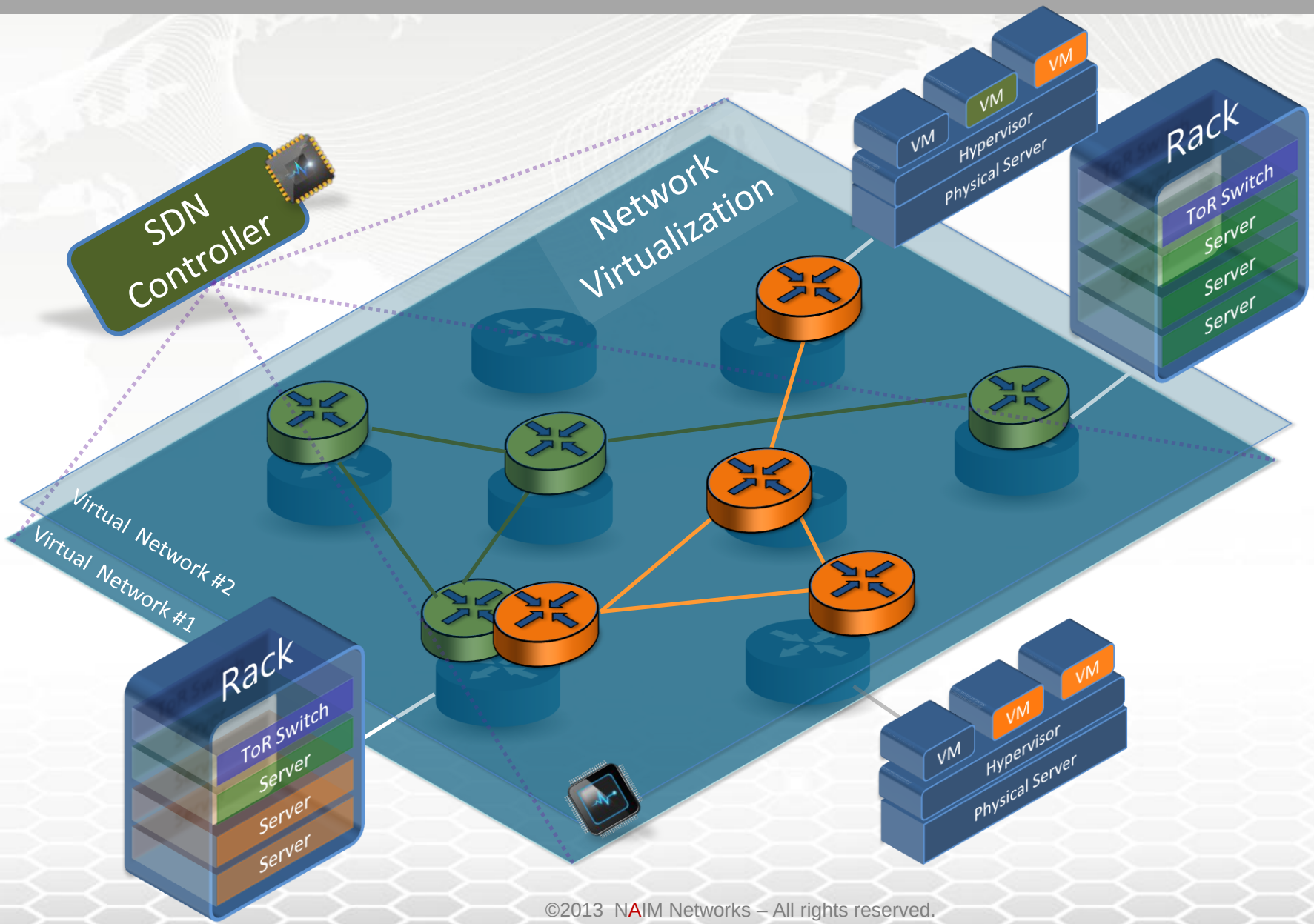
I Network Virtualization



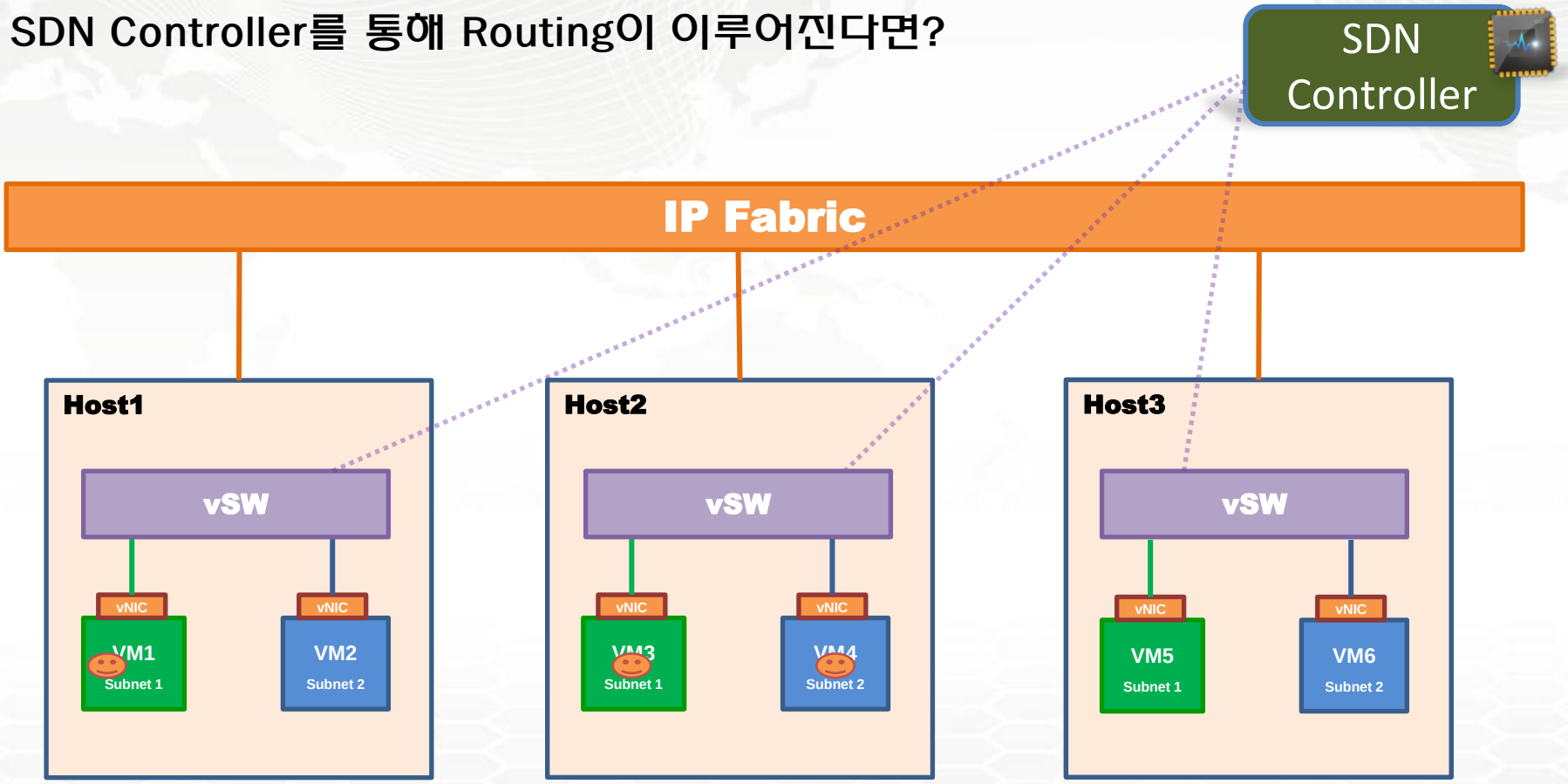
I Network Virtualization

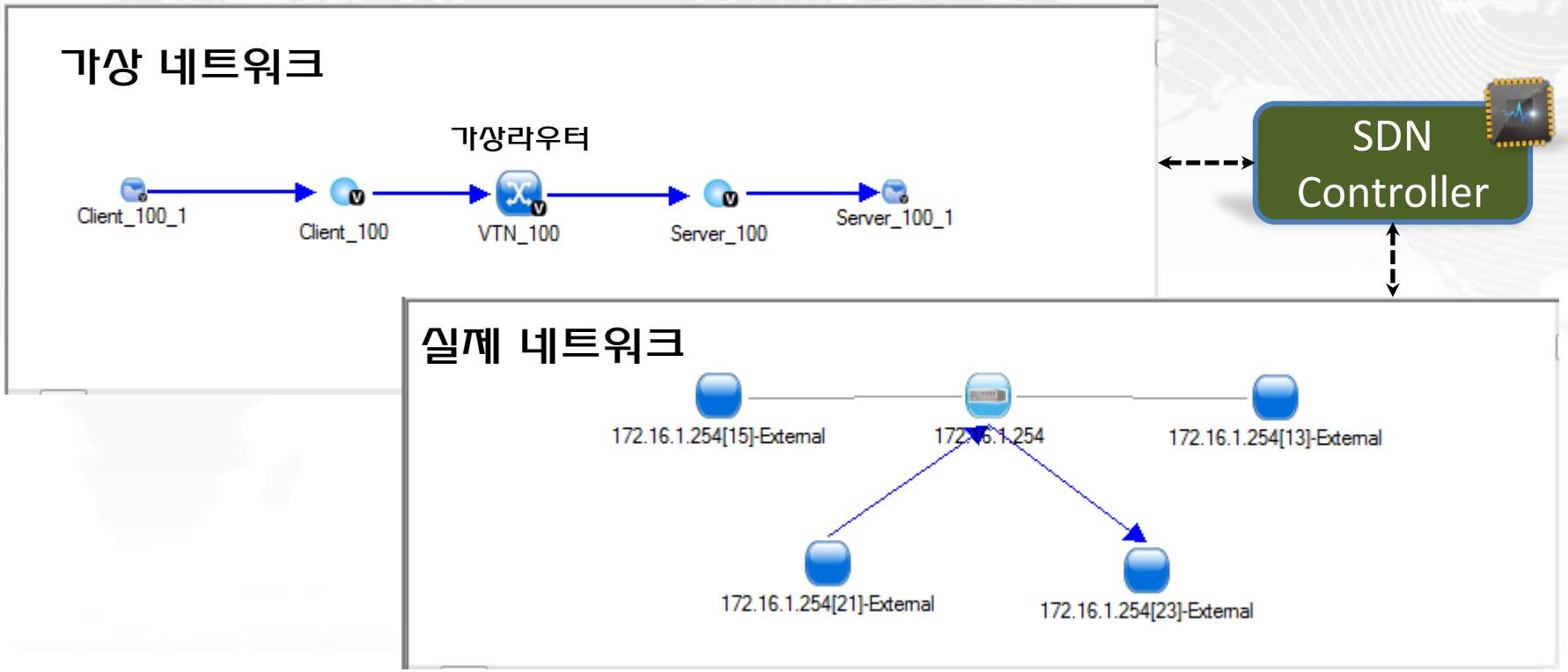


I Network Virtualization



SDN Controller를 통해 Routing이 이루어진다면?

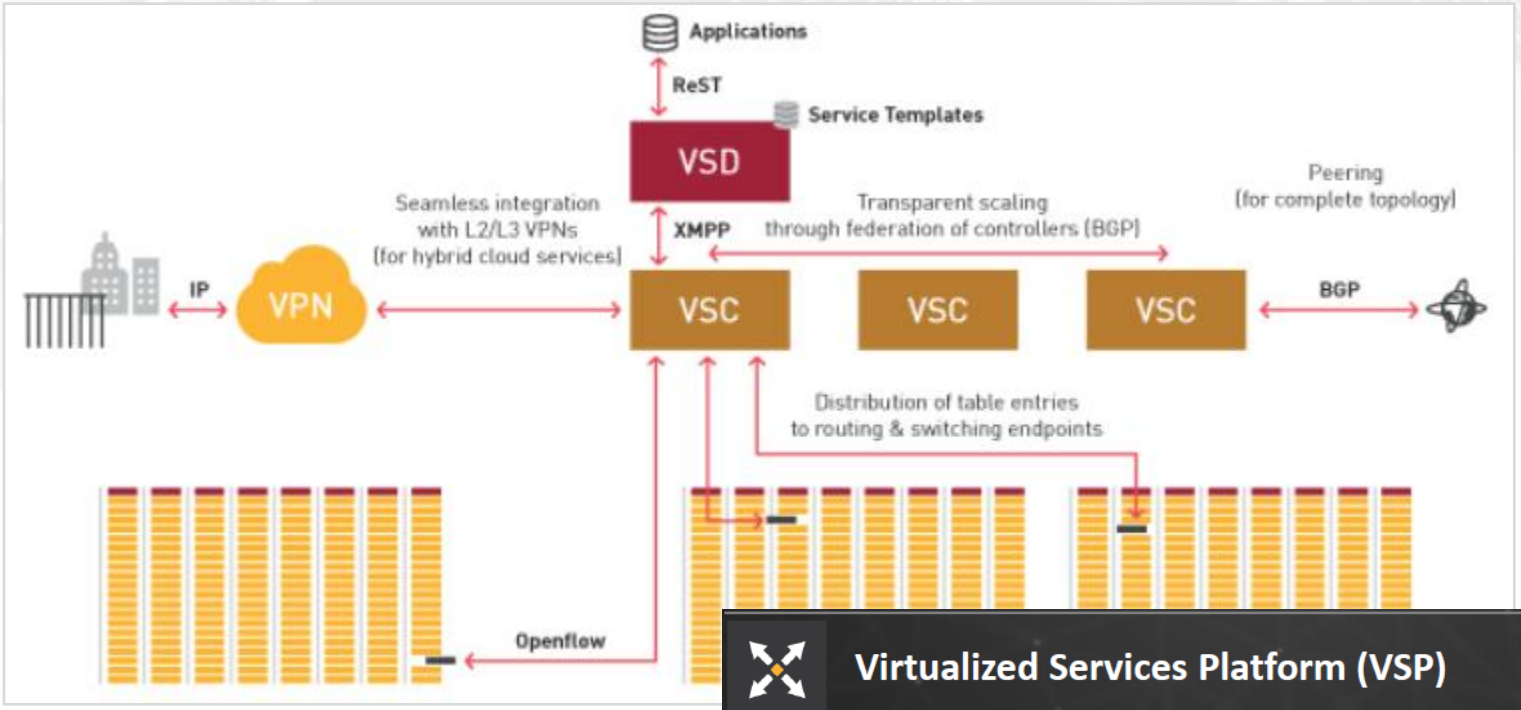




Controller에 등록된
Default Gateway의
Mac Address로 자동 변환

```
Flow 7
 Incoming Port : 23                    Ethernet Type     : IP
 Source MAC    : 00235a-d67dca         Destination MAC   : 02255c-cab7e6
 VLAN ID       : 0                     VLAN Priority     : 0
 Source IP     : 10.2.0.11             Destination IP    : 10.1.0.11
 IP Protocol   : 0x00                  IP ToS Bits       : 0
 Source Port   : 0                     Destination Port  : 0
 Priority      : 25000
 Duration      : 19 seconds
 Idle Timeout  : 300 seconds           Hard Timeout      : 0 seconds
 Packet Count  : 19                    Byte Count        : 1406
 Flow Location : Software
 Actions
   Modify Source MAC       : 02255c-ca1d8f
   Modify Destination MAC  : e8039a-0ad3dc
   Output                  : 21
```

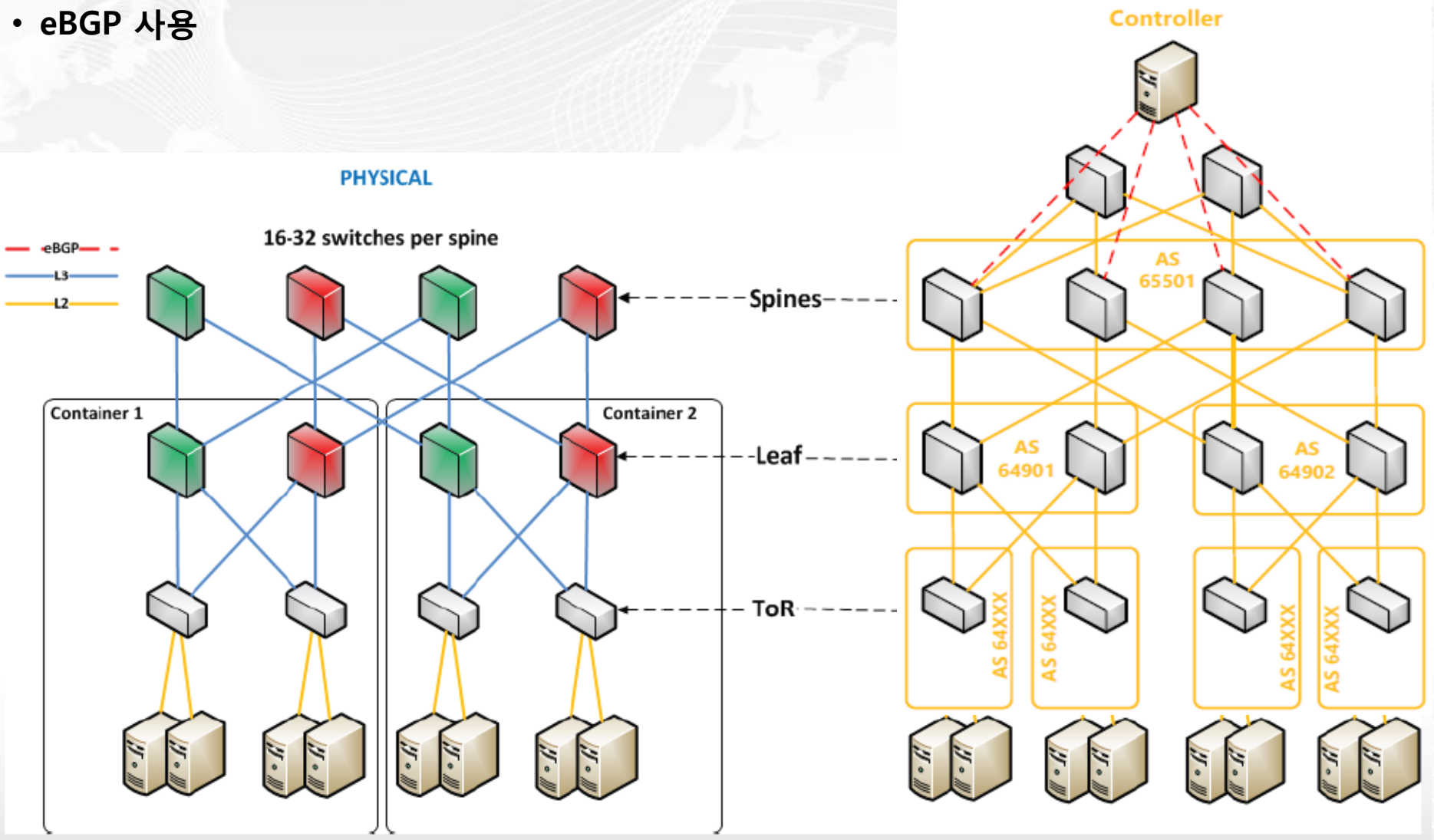
I SDN



Virtualized Services Platform (VSP)

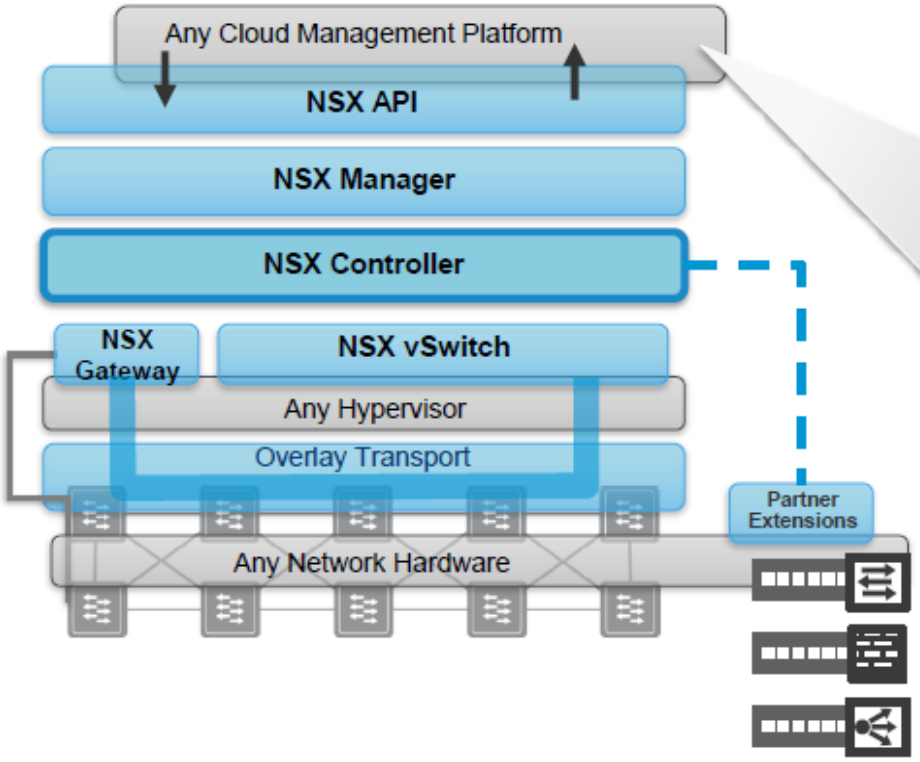
Virtualized Services Directory (VSD)	▪ Business/IT policy engine (definition of rules) ▪ Analytics & service templates
Virtualized Services Controller (VSC)	▪ SDN Controller ▪ Instantaneous programming of the network
Virtual Routing & Switching (VRS)	▪ Event-driven automation ▪ Integration of bare-metal assets

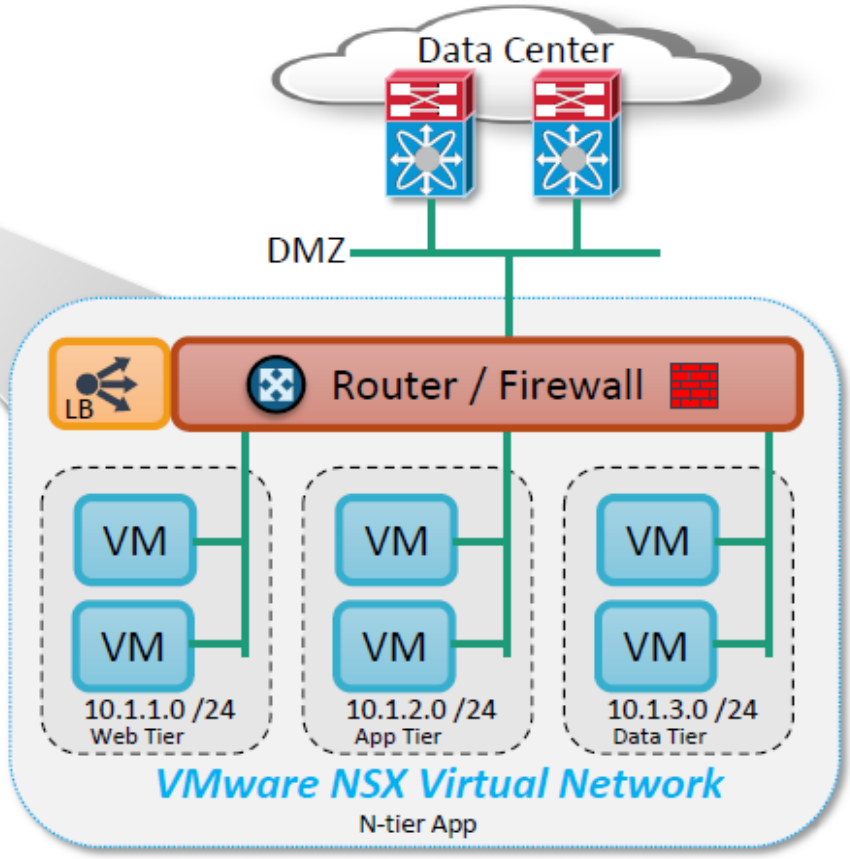
- eBGP 사용



I SDN

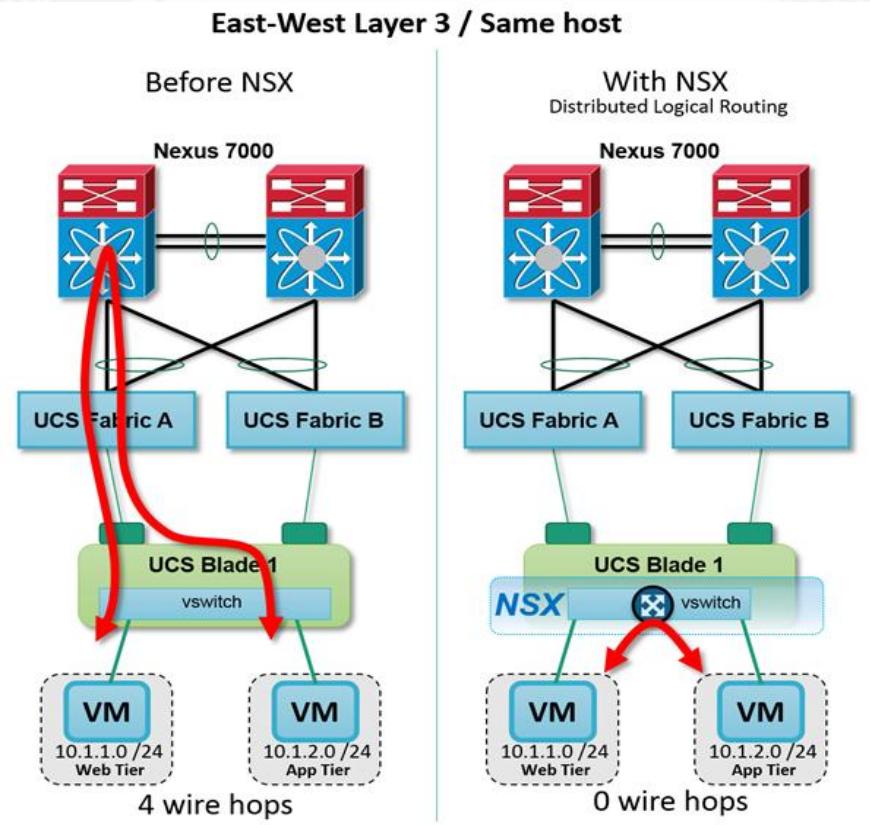
최근 SDN은 네트워크의 트래픽 경로를
단순화 하는 것에 초점을 두고 있습니다.



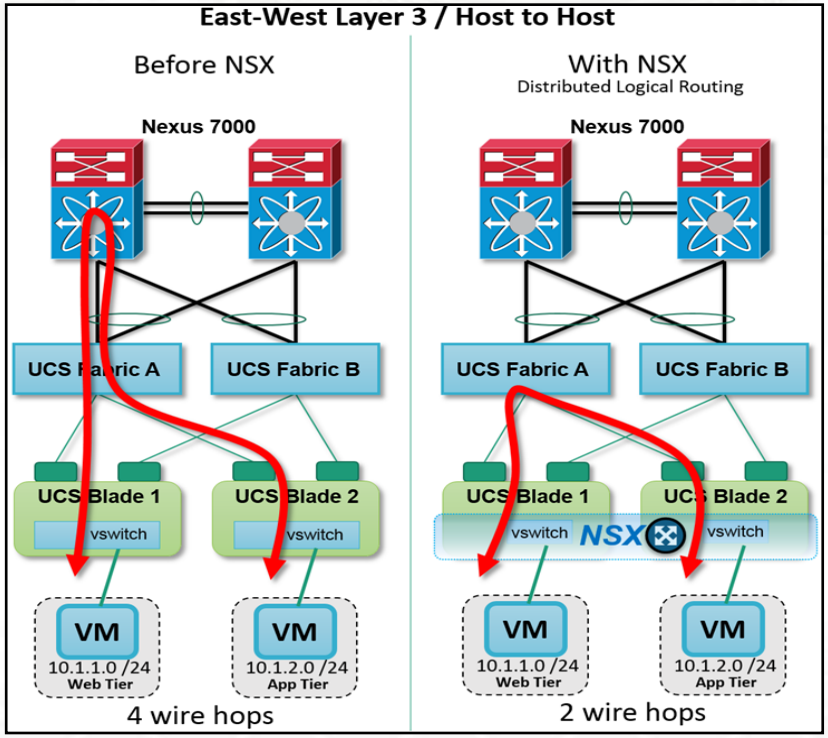


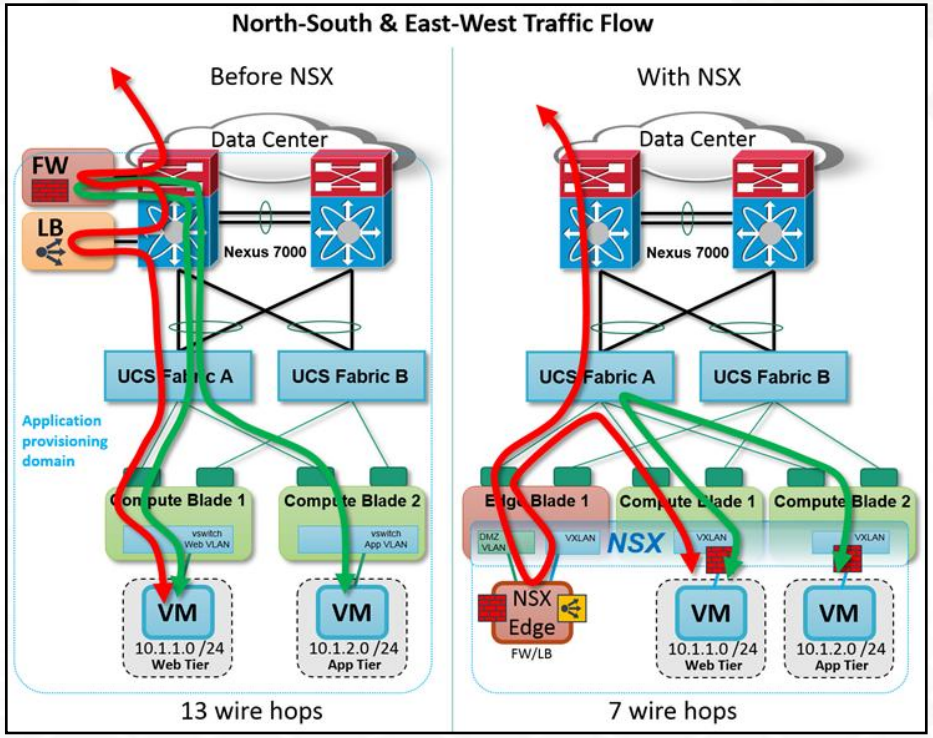
Paradox that good virtualization is bad networking ?

- More Scalability
- More Efficient
- Less STP
- No HSRP



Paradox that good virtualization is bad networking ?





THANK YOU

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