Challenges in Enterprise Networking and How SDN Can Help.

Presented by Eric Murray

Kindred Healthcare

- US top 150 private employer (77,000)

- Annual revenues of $6 billion

- Provide healthcare services in over 2000 locations spanning 46 states

- Ranked one of Fortune magazines Most Admired Healthcare Companies 3 years in a row

Typical Requirements for Facilities

Hospital	6Mb MPLS	Video Conf	Public Wifi Broadband	Central Billing Office	QoS for Video Radiology
Nursing Center	1.5Mb MPLS	Video Conf	Public Wifi Broadband	Full Coverage Wireless	Qos for Video VoIP
Rehab	3G/DSL VPN	Corp Wireless AP	Tablet Handheld Apps		

Operational Challenges

- Limited network staff to support a large number of sites.

- Vast configuration differences make it difficult for NOC to handle first level support.

- Different lines of business have different requirements. This complicates standardization.

- Hardware refresh cycles also complicate standardization for remote facilities.

Operational Challenges

- Wireless connectivity growth is out pacing our support capabilities.

- Reliable hotspot connectivity for our customers is expected, however it is difficult to manage.

- Broadband for hotspot, site back up, or small site connectivity is cheap but unreliable and very difficult to support.

Operational Challenges

- Implementing newer technologies on existing platforms is expensive, time consuming, and disruptive to users.

- Requirements are constantly evolving due to new applications or other business needs.

- Many legacy applications or processes must be supported for long periods of time due to the specialized nature of our business.

Case Study Acquisition Example

- Acquisitions are kept very quiet in our environment and are executed very quickly once announced.

- Technical teams are typically not involved until the announcement due to the sensitive nature of the activities.

- Creative engineering solutions are needed many times to provide solutions with little time to execute.
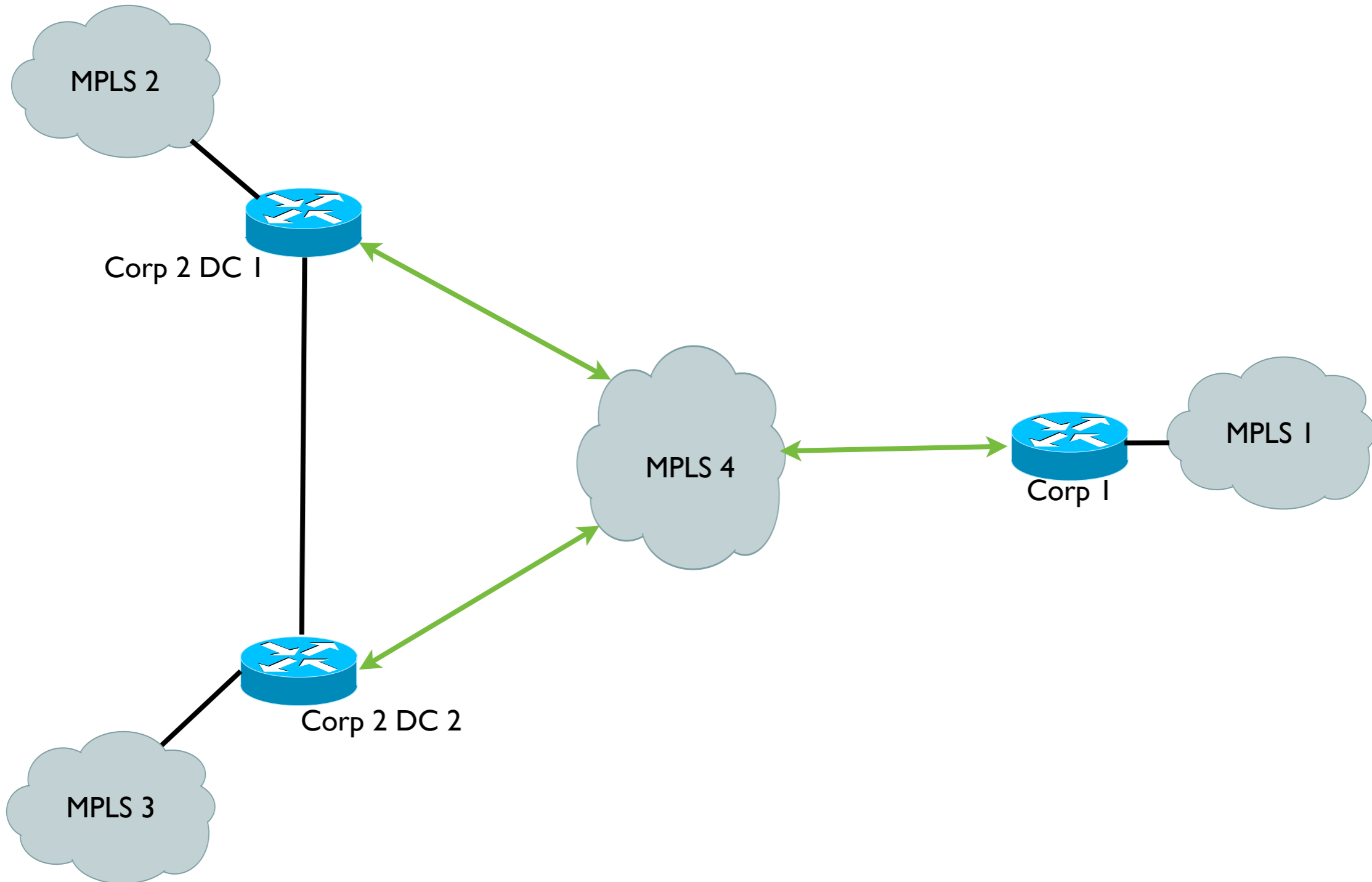
Technical Challenges for Acquisition

- Corp 1 has one large data center with 800 locations and uses a variety of platforms.

- Corp 2 has undergone 3 acquisitions and has two different data centers that were never completely migrated. Significant loss of knowledge.

- The business requirements dictate that we must migrate both data centers from Corp 2, to Corp 1 within 90 days.
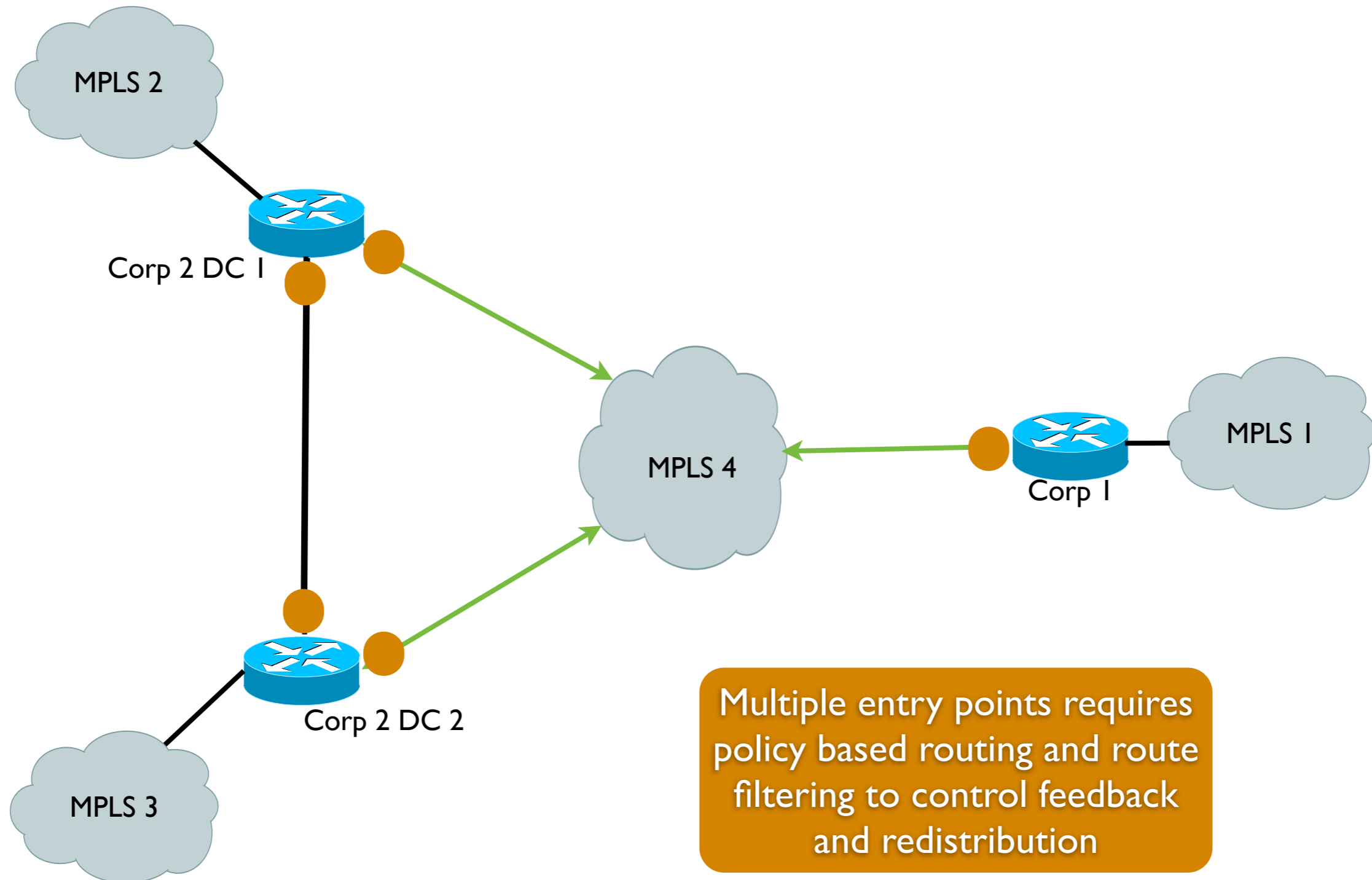
Two Companies, Three MPLS networks

MPLS 2

Corp 2 DC 1
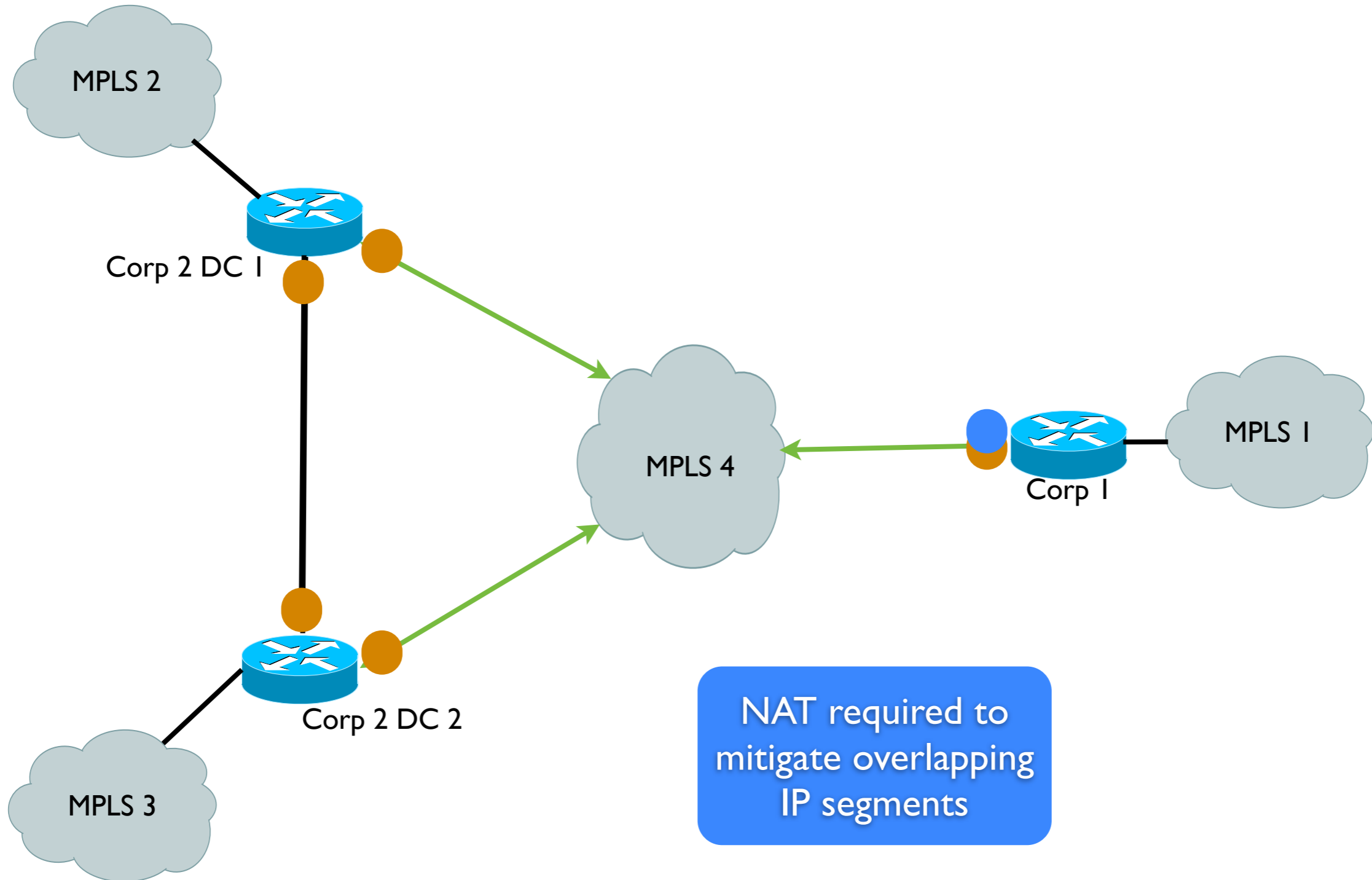
MPLS 1

Corp 1

Corp 2 DC 2

MPLS 3

Establish basic connectivity with interim network for day 1 activities (go live)

Complex route maps and filtering schemes must be used to control routing loops.
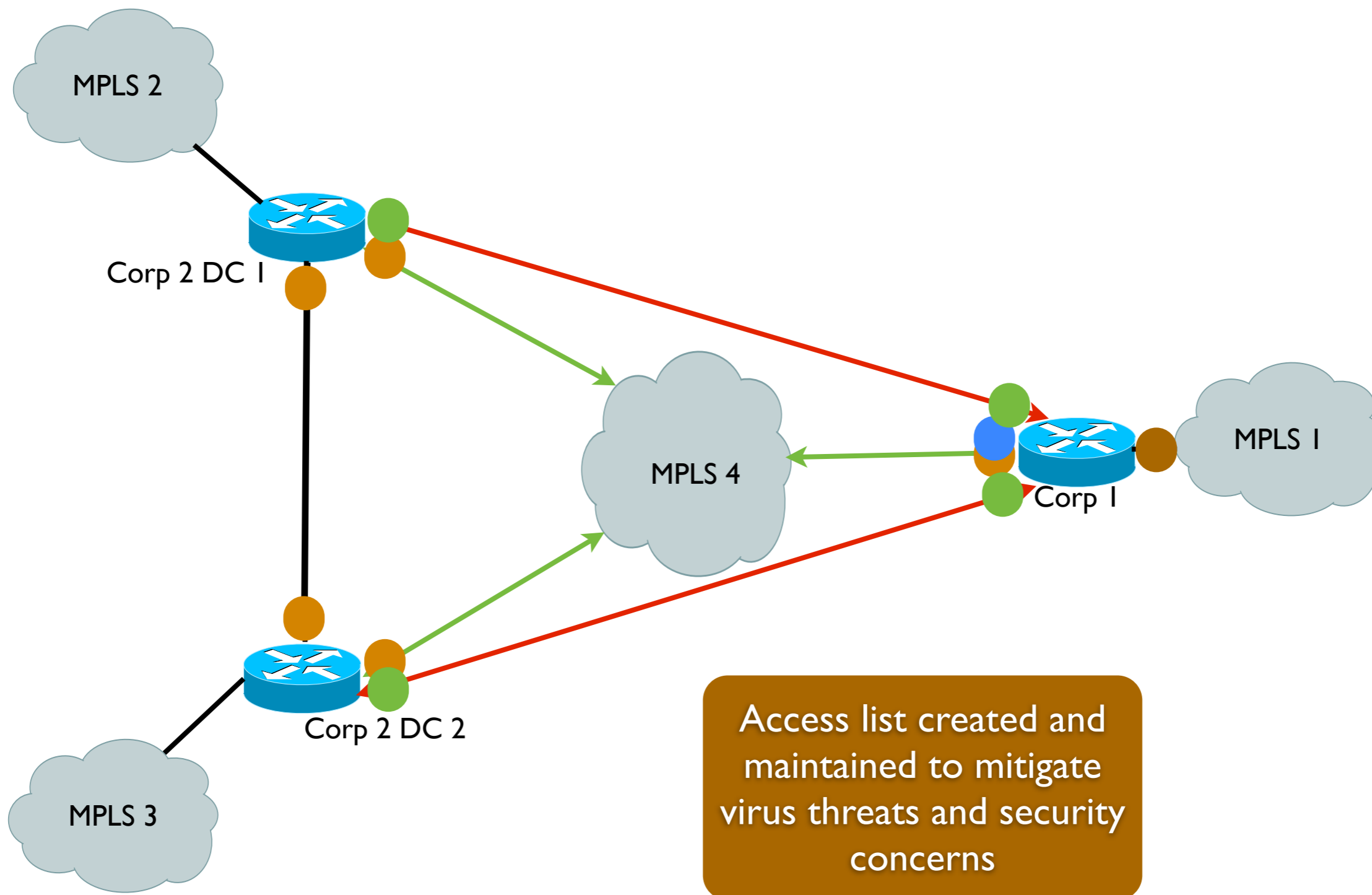

MPLS 2

Corp 2 DC 1

MPLS 4

Corp 1

MPLS 1

Corp 2 DC 2

MPLS 3

Multiple entry points requires policy based routing and route filtering to control feedback and redistribution

Configuration applied to address overlapping networks

MPLS 2

Corp 2 DC 1

MPLS 4

Corp 1

MPLS 1

Corp 2 DC 2

MPLS 3

NAT required to mitigate overlapping IP segments

Establish secondary WAN connectivity for large data moves for migration (SAN replication)

MPLS 2

Corp 2 DC 1

MPLS 4

MPLS 1

Corp 1

Corp 2 DC 2

MPLS 3

Source based routing applied to control routing of DC migration traffic
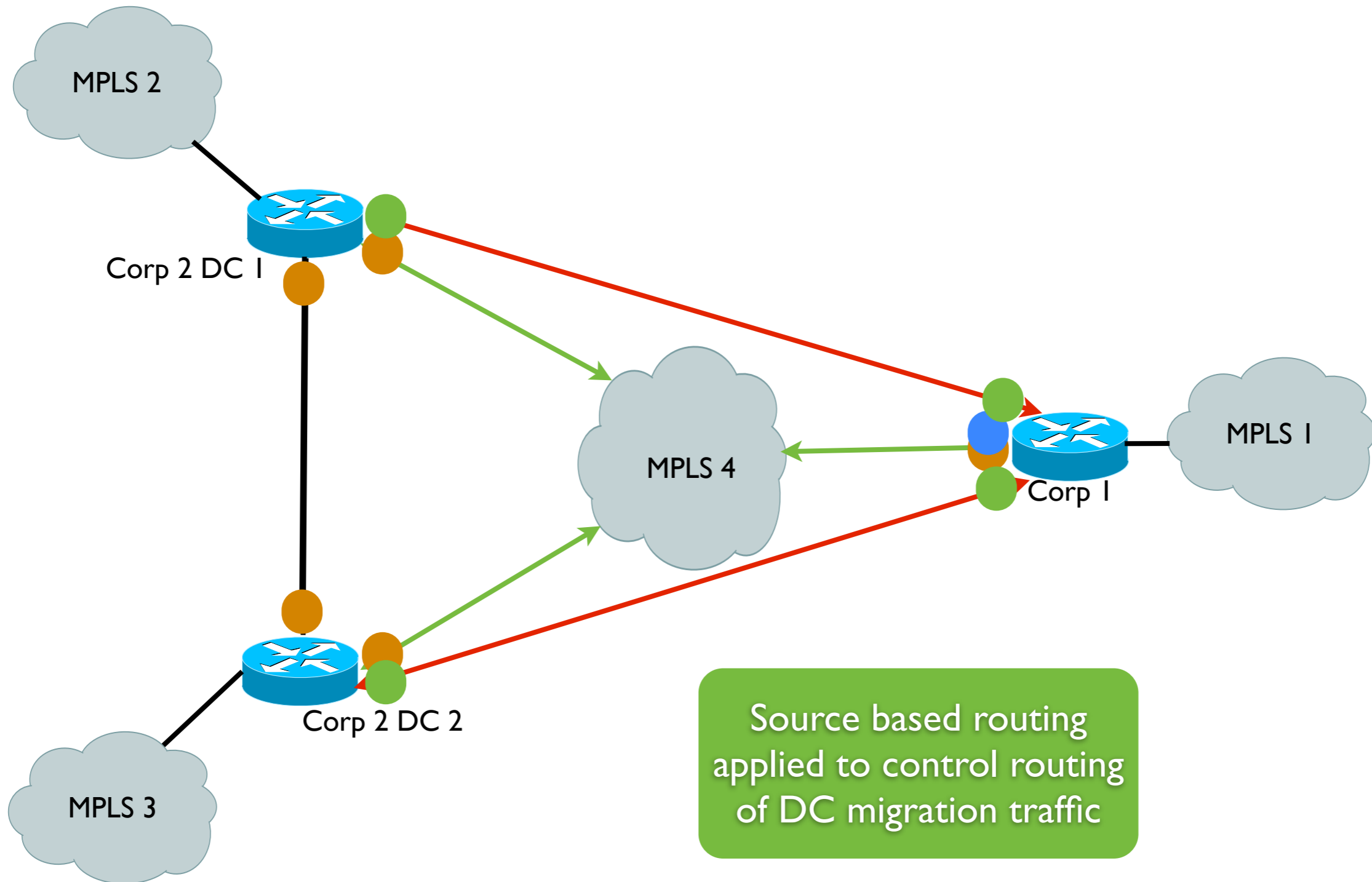
Corp 2 has significant virus infections. Internet is uncontrolled. Access list are deployed.

MPLS 2

Corp 2 DC 1

MPLS 4

Corp 1

MPLS 1

Corp 2 DC 2

MPLS 3

Access list created and maintained to mitigate virus threats and security concerns

Servers in Corp 2 data centers must be migrated to Corp 1. Virtualization is the methodology used.

MPLS 2

10.1.1.0

Corp 2 DC 1

MPLS 4

MPLS 1

Corp 1

Corp 2 DC 2

MPLS 3

10.2.1.0

Corp 2 servers are virtualized and storage replicated to Corp 1.

Servers in Corp 2 data centers must be migrated to Corp 1.Virtualization is the methodology used.

MPLS 2

Corp 2 DC 1

10.1.1.0
10.2.1.0

MPLS 4

MPLS 1

Corp 1

Corp 2 DC 2

MPLS 3

VM's are shutdown and entire subnet of servers migrated in one downtime

Remote facilities migrate from Corp 2 WAN infrastructure to Corp 1 MPLS

MPLS 2

Corp 2 DC 1

MPLS 4

MPLS 1

Corp 1

10.1.1.0
10.2.1.0

Corp 2 DC 2

MPLS 3

Facility IP subnets remain the same during the move.
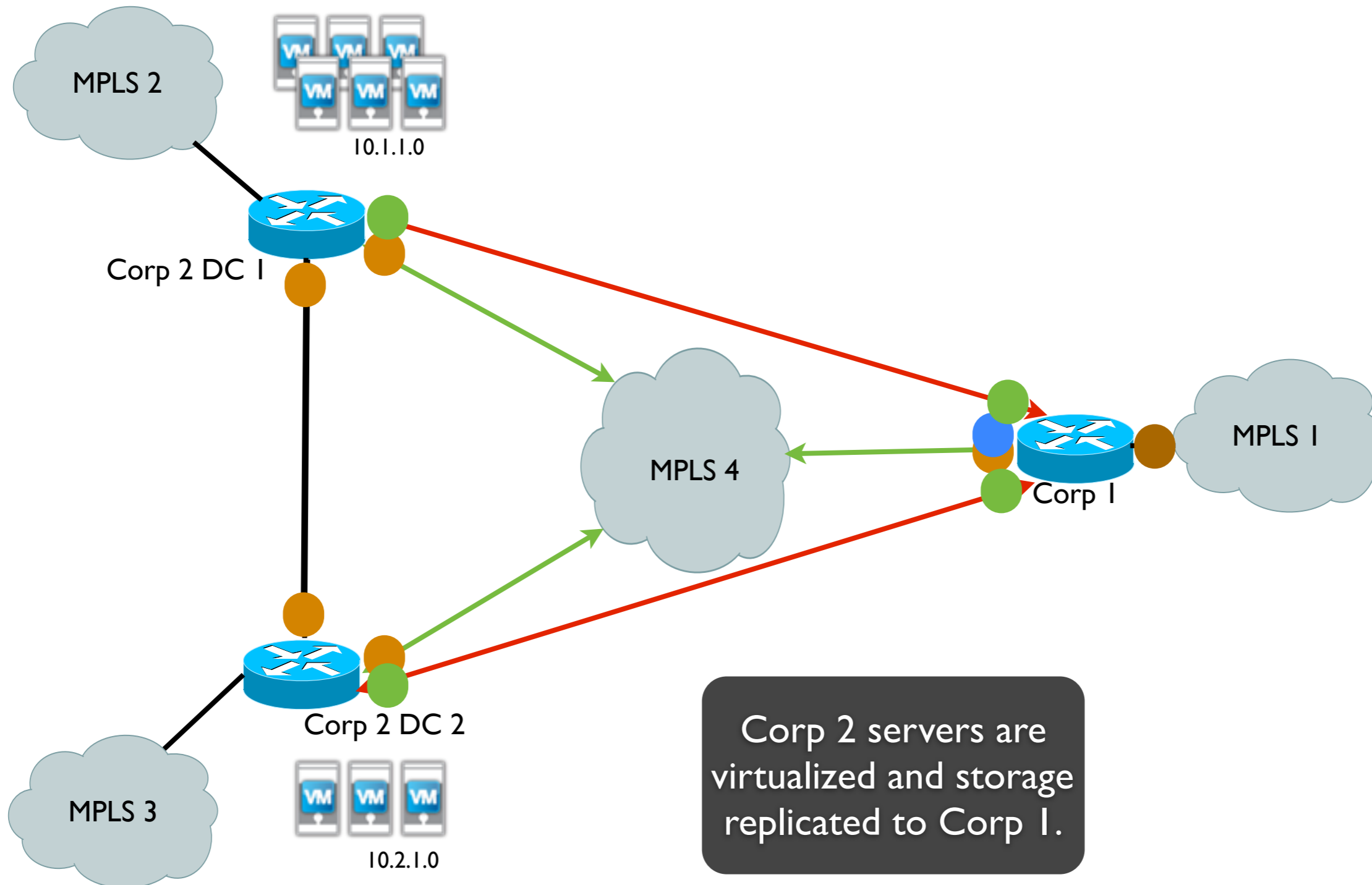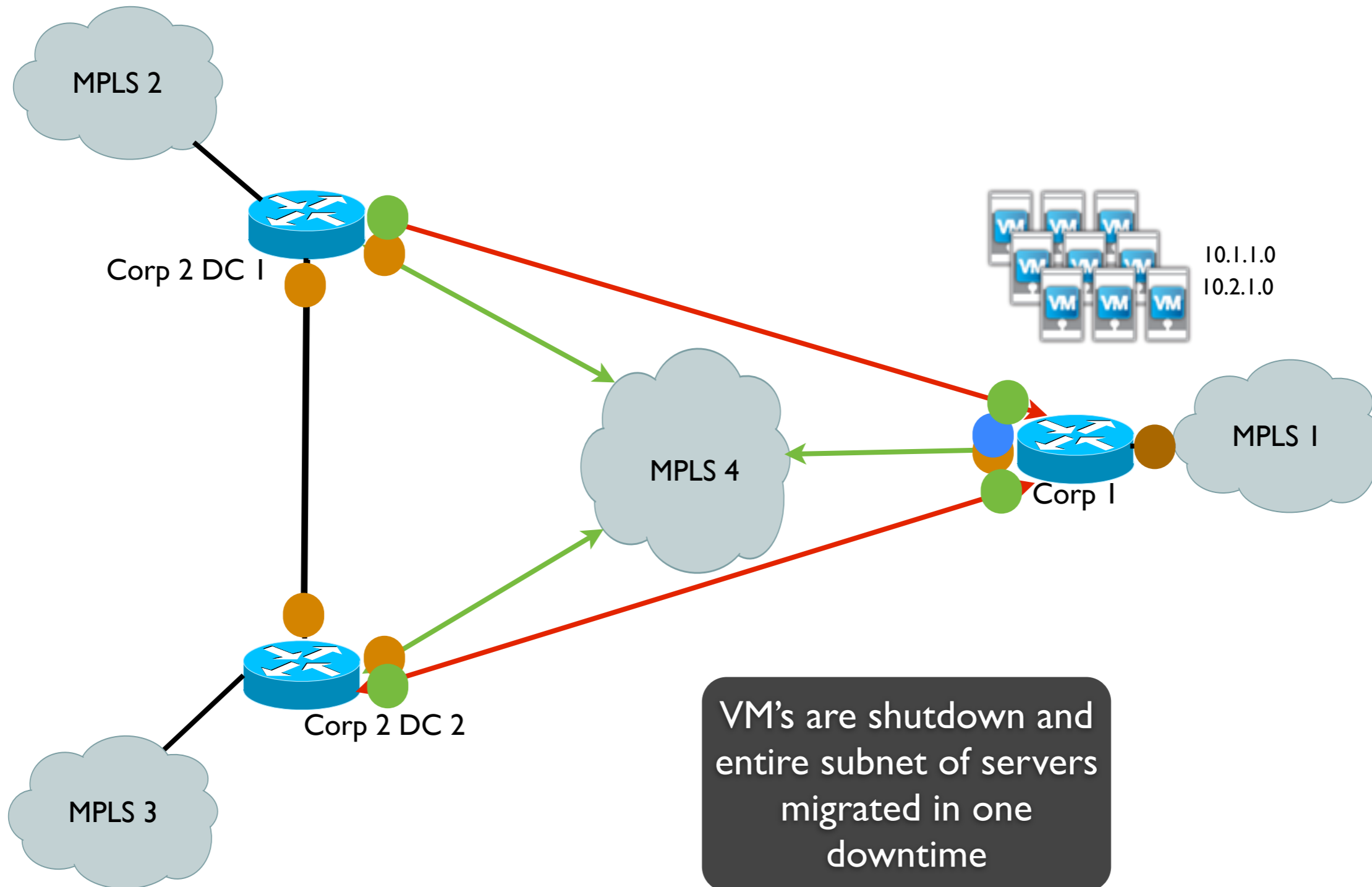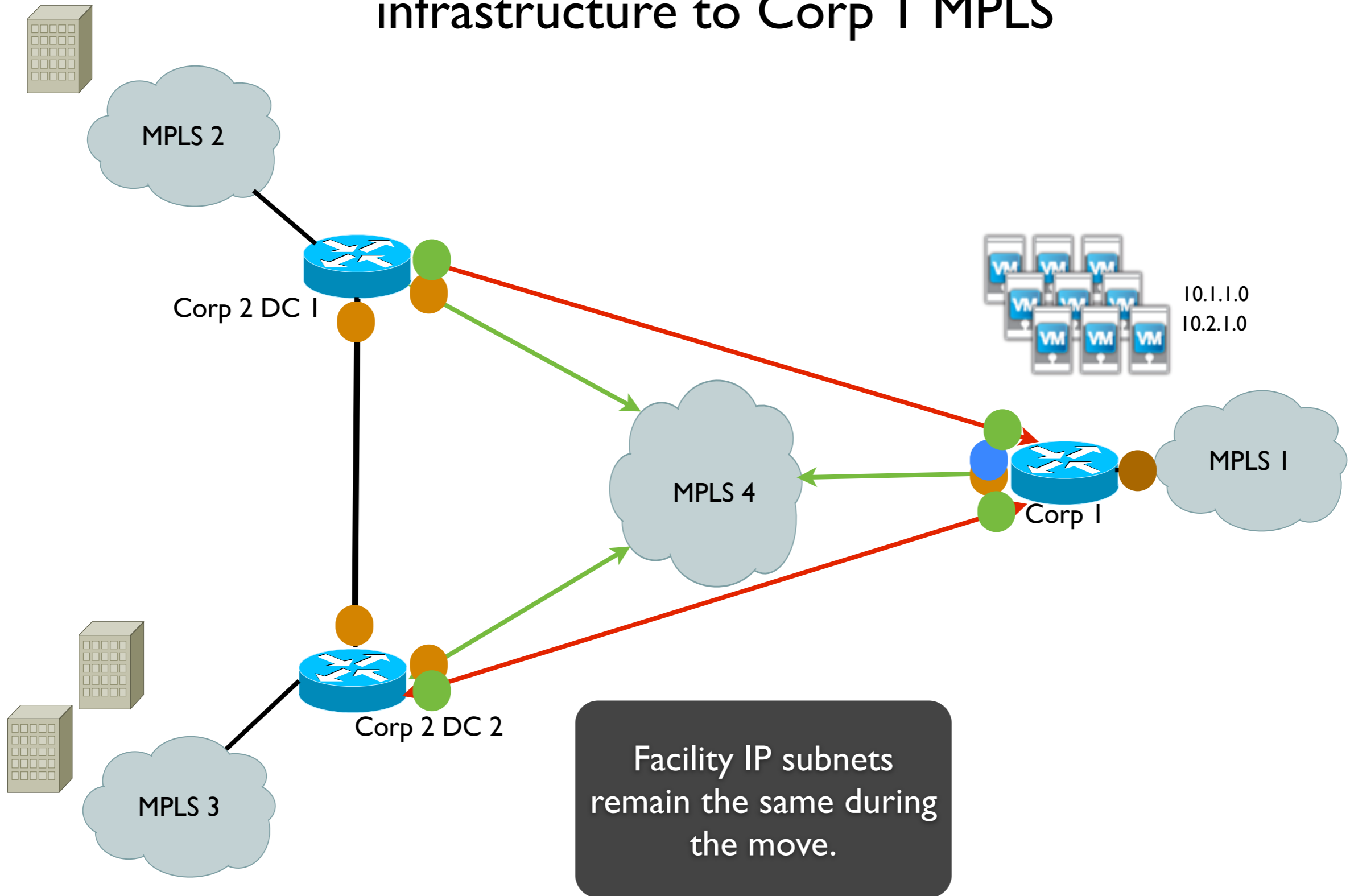
Remote facilities migrate from Corp 2 WAN infrastructure to Corp 1 MPLS
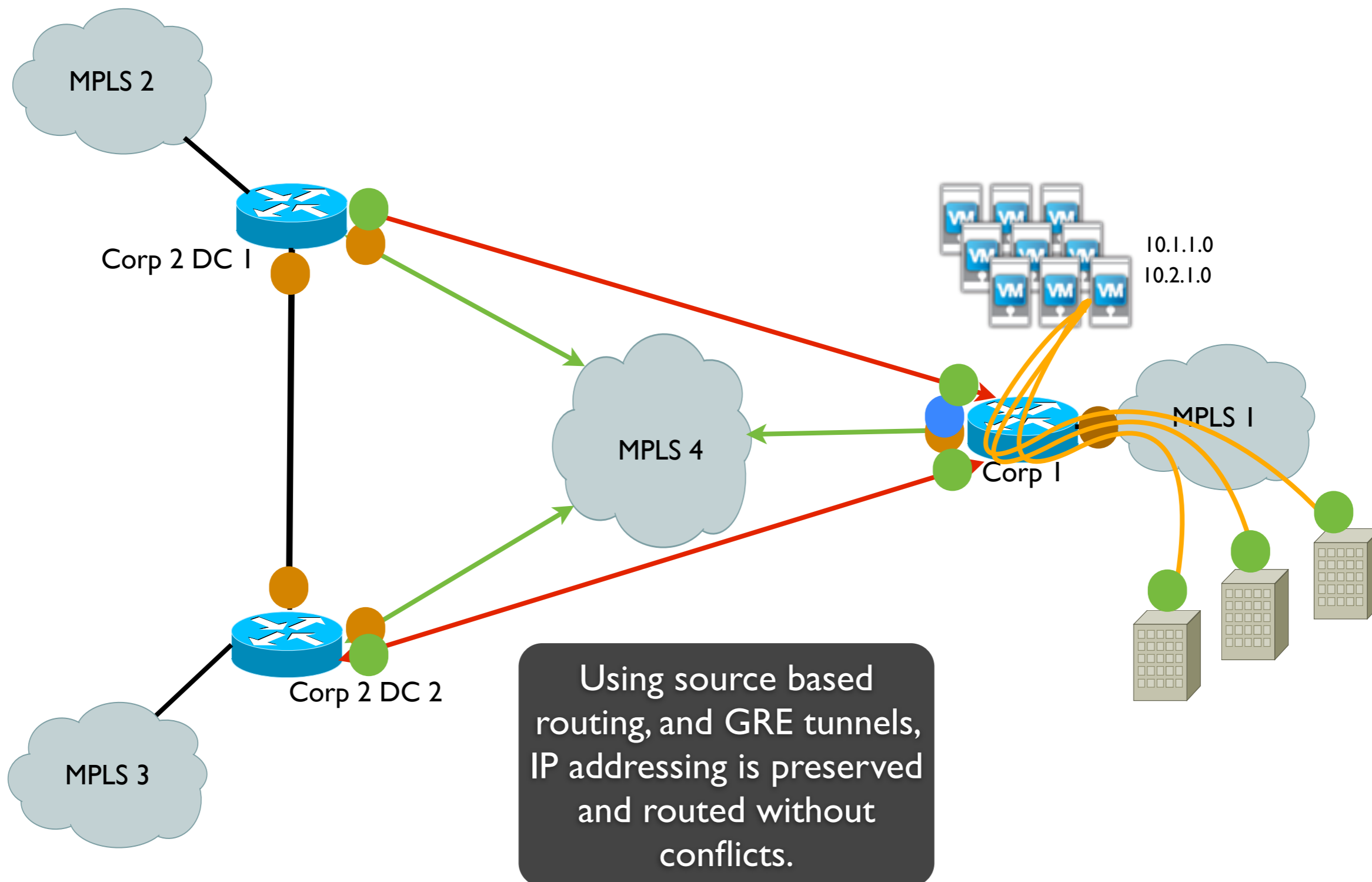
Detail of complexity maintaining legacy environment in an "as is" state.

10.1.1.0
10.2.1.0 (NAT)

10.2.1.0 (NATIVE)

LAYER 2
ONLY

Corp 1
WAN Router

MPLS 1

Corp 1
NAT Migration Router
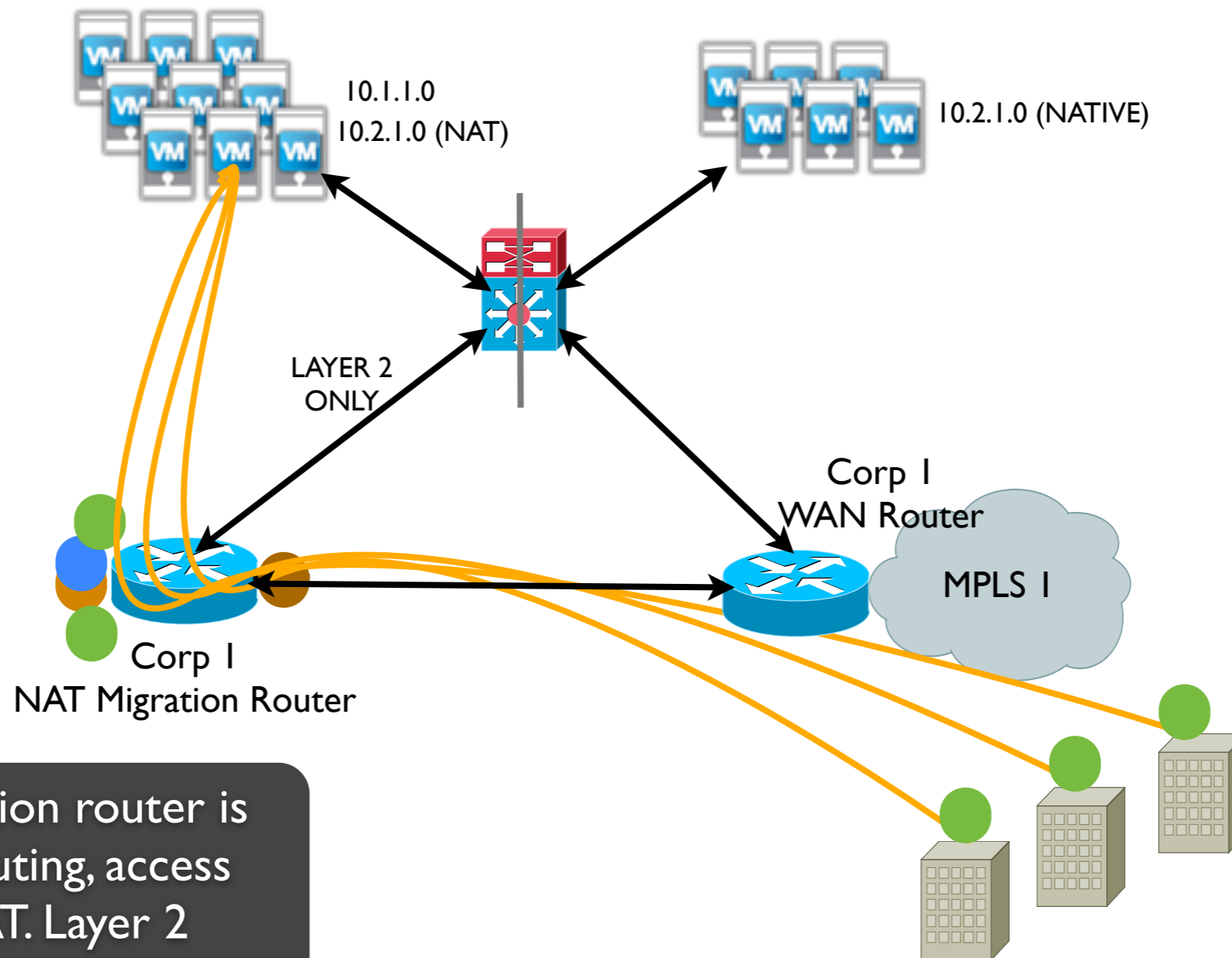
After move, migration router is maintained for routing, access control, and NAT. Layer 2 connection allows VM's on Corp 1's production VM environment

Summary of challenges using current methods

- Every hop on the network must have special configuration applied (NAT, redistribution, ACL's, etc.)

- Large number of locations must use specialized and different configurations for each site (PBR, SBR, ACL's, GRE tunnels)

- Limited support staff and complexity makes these solutions difficult to manage, troubleshoot, and understand.

How can SDN help ?

- Once the network is defined in software, it can be much easier to manage and scale

- Using SDN we can use policies, templates, or profiles to define traffic flows on the network

  - flows between partners, new entities etc more controlled/secure

- New features can be added through software.

- Hope SDN can provide increased consistency of user mobile experience

How can SDN help ?

- SDN to enable workload mobility, easier data center migrations and higher level of redundancy

- Conflicts are easier to deal with in an abstract environment.

- Network provisioning to become simpler & quicker.

- Lower opex

Can Network Resources Scale Without SDN ?