



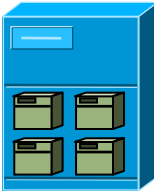
## Available Virtual Desktops Through Replication and Mobility

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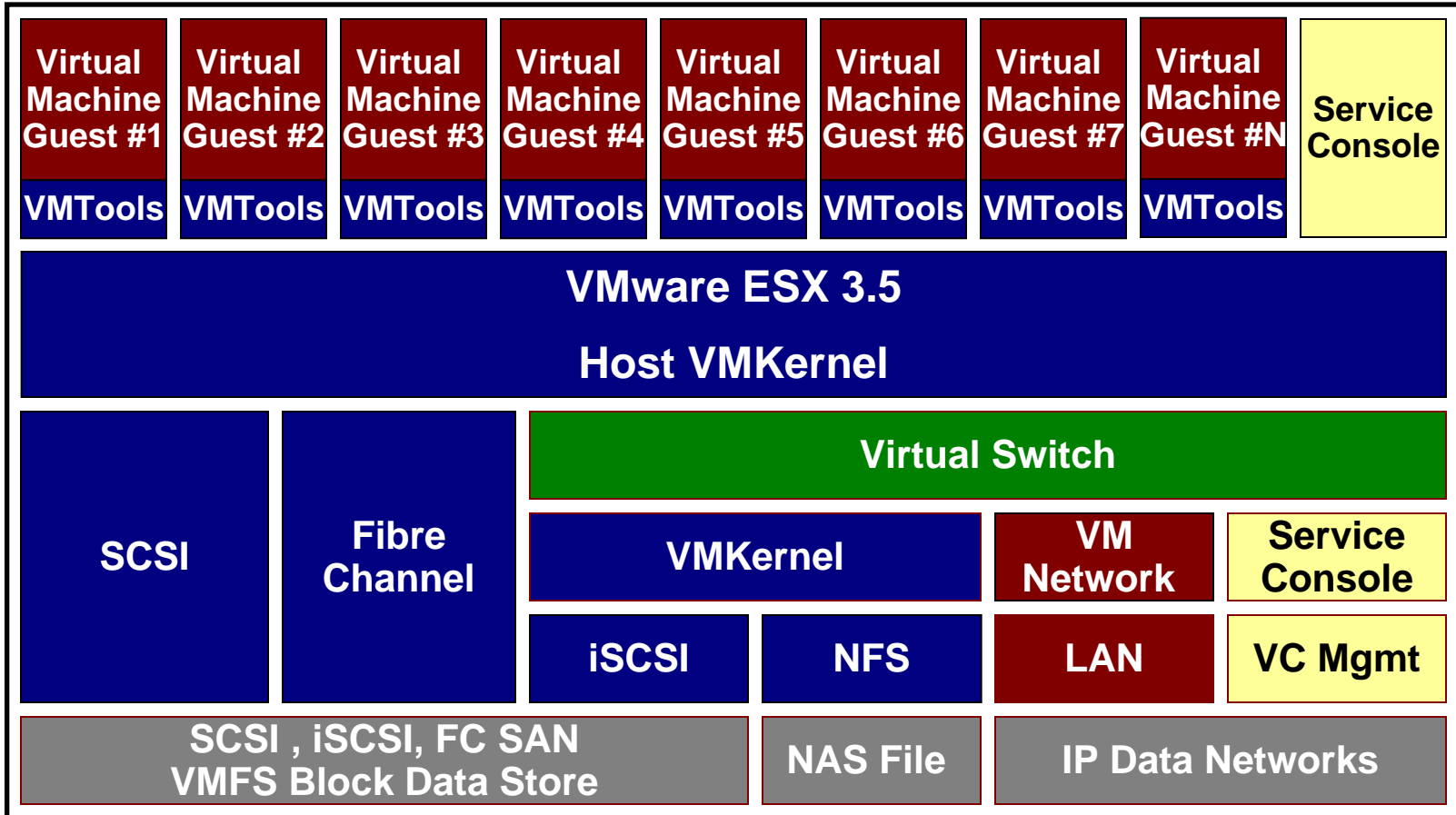
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# Highly Available Desktop Virtualization

- VMware ESX I/O Architecture
- Virtual Desktop I/O
- Wide Area Applications Services (WAAS) Overview
- VMware View Desktop Delivery Infrastructure
- Desktop Availability through Replication and Mobility
  - NFS Based Virtual Desktop Storage
  - Accelerated Vmotion
  - Offline Desktop
- Cloud



# VMware ESX Architecture



- Virtual Machine (VM)
- Small Computer System Interface (SCSI)
- Storage Area Network (SAN)
- Virtual Machine File System (VMFS)
- Fibre Channel (FC)
- Network File System (NFS)
- Network Attached Storage (NAS)
- Virtual Center (VC)

# Virtual Desktop Data and Storage I/O

- Display Protocols

Remote Desktop Protocol (RDP) – Microsoft

ICA – Citrix

ALP - Sun/Oracle

PCoIP – Teradici

Many other RDP variants

- Storage

VMware Virtual Machine File System (VMFS)

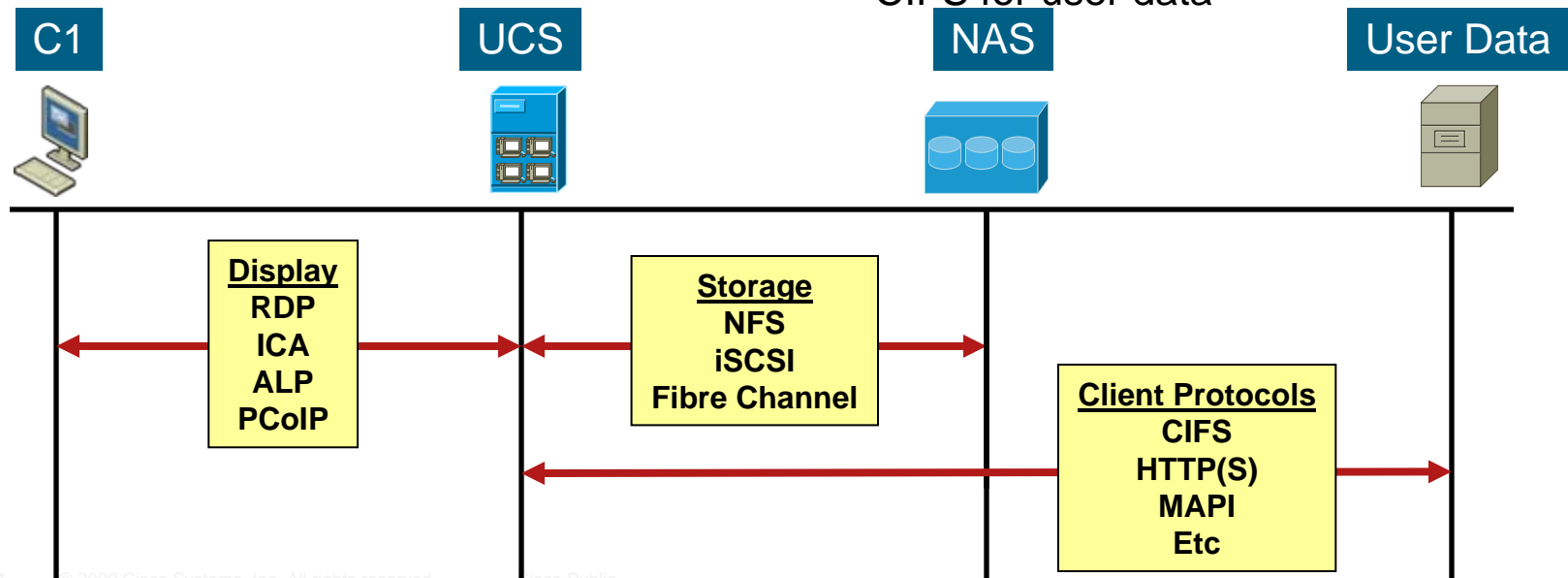
SCSI local datastore

iSCSI remote datastore (TCP)

Fibre Channel remote datastore

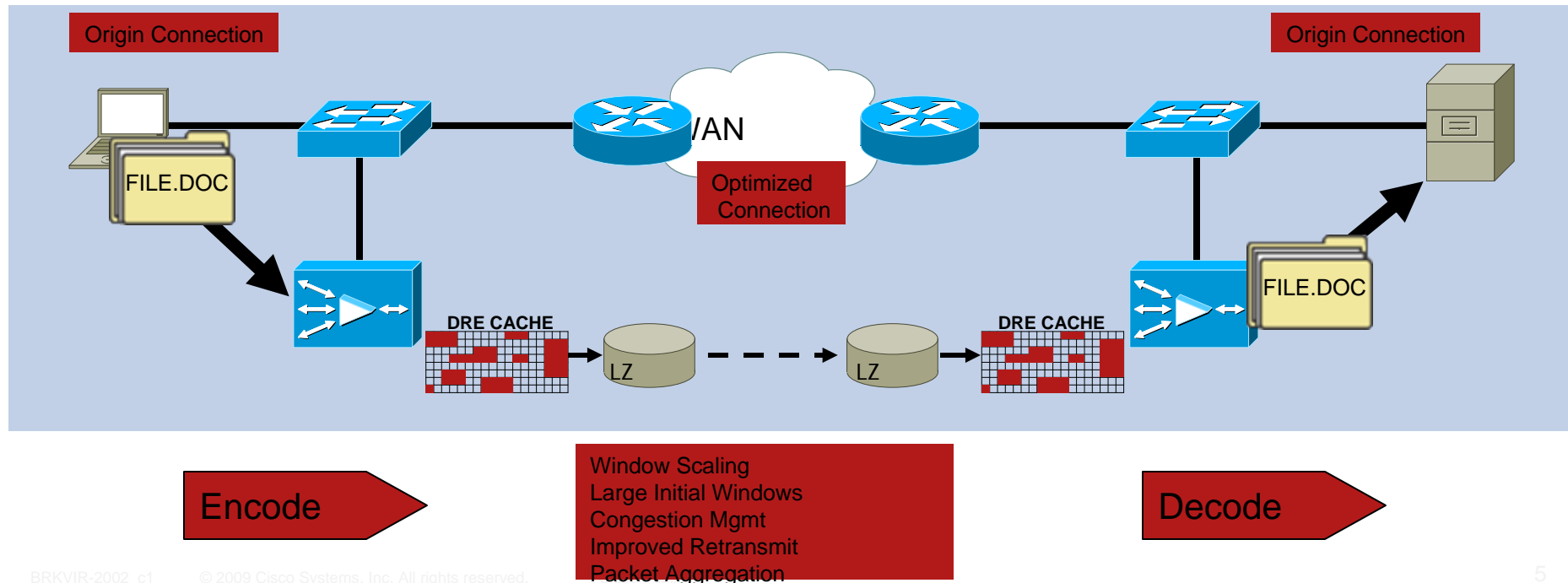
Network File System (NFS) - TCP or UDP

CIFS for user data



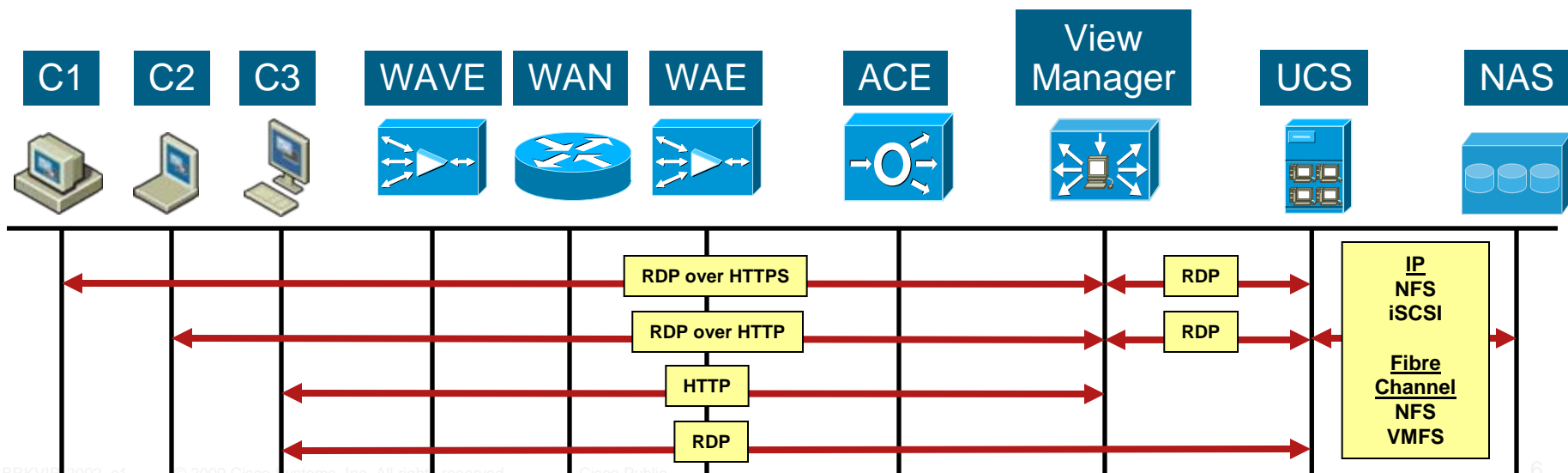
# WAAS Overview

- Data Redundancy Elimination (DRE) provides advanced compression to eliminate redundancy from network flows regardless of application
- LZ compression provides generic compression for all traffic



# VDI Display Protocol Acceleration

- Client Devices (C1-C3)
- WAN Acceleration (WAE)
- WAN
- Load Balancing (ACE)
- Connection and Security Broker (VMware View)
- Virtual Desktops (UCS)
- Storage (Netapp Filer)

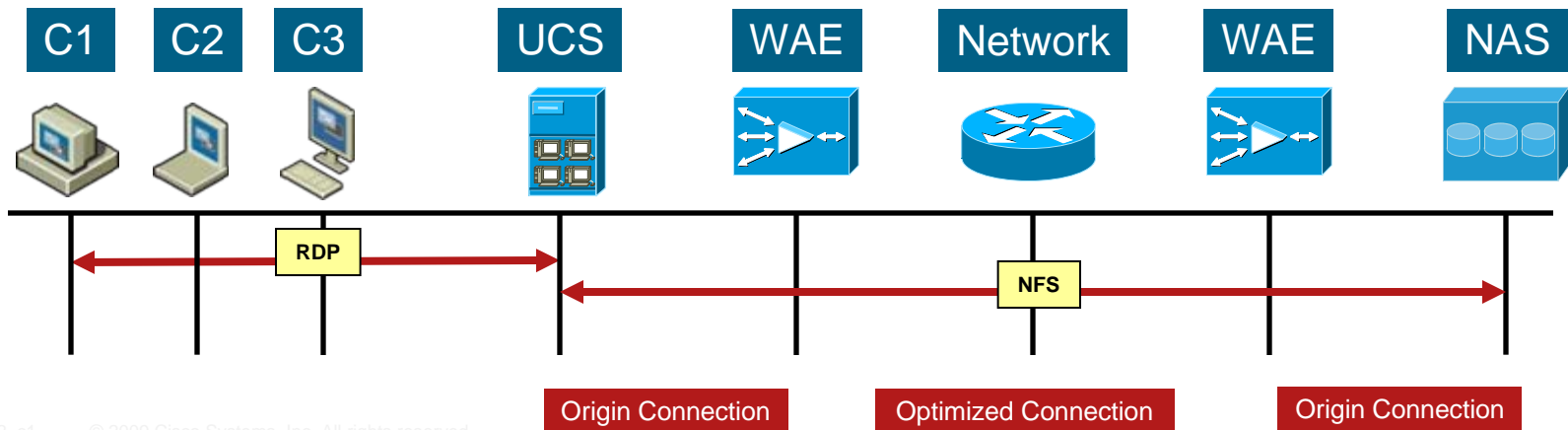


# VDI NFS Storage Acceleration

- Client LAN attached terminal
- Native protocols over WAN
- Centralized VMDK and user data

- Storage
  - NFS from ESX to NAS
  - WAAS between ESX and NAS
  - 99.6% compression (10 GB reduced to <100 MB)

Source IP:Port	Dest IP:Port	Peer Id	Applied Policy	Open Duration	Org Bytes	Opt Bytes	% Comp	Clas
192.168.203.200:693	192.168.101.100:2049	dc1-wae2		0:45:48	10.0108 GB	67.5429 MB	99%	
192.168.203.200:694	192.168.101.100:2049	dc1-wae2		0:27:48	166.7422 KB	26.8691 KB	84%	
192.168.203.201:807	192.168.101.100:2049	dc1-wae2		796:9:51	19.9475 GB	1.5759 GB	92%	
192.168.203.201:808	192.168.101.100:2049	dc1-wae2		796:9:51	930.2551 MB	131.4365 MB	86%	



# VDI Display Protocol v NFS Storage

- Display protocol challenged by rich media
- Mitigate display protocol challenges by placing compute close to user
- Maintain centralized data and storage

Action MB / Compress	RDP WAAS Origin	RDP WAAS Optimized	NFS Origin	NFS Optimized
Boot			204	2.922 / 98.61%
Login	0.670	0.132 / 80.28%	91.781	1.938 / 97.89%
Office	10.817	2.395 / 77.86%	201	3.584 / 98.26%
Web 5X	30-50 MB	27-45 MB / 5-10%	21.5 15.914	0.433 / 98% 2.019 / 87%
On demand Flash	1172	790 / 32.55%	3.333	0.062 / 98.18%

# VDI Delivery Virtual Desktop Architecture

- Normal Conditions

Desktops provisioned to use local NFS Filer

SnapMirror Replicates VMDK files through WAAS

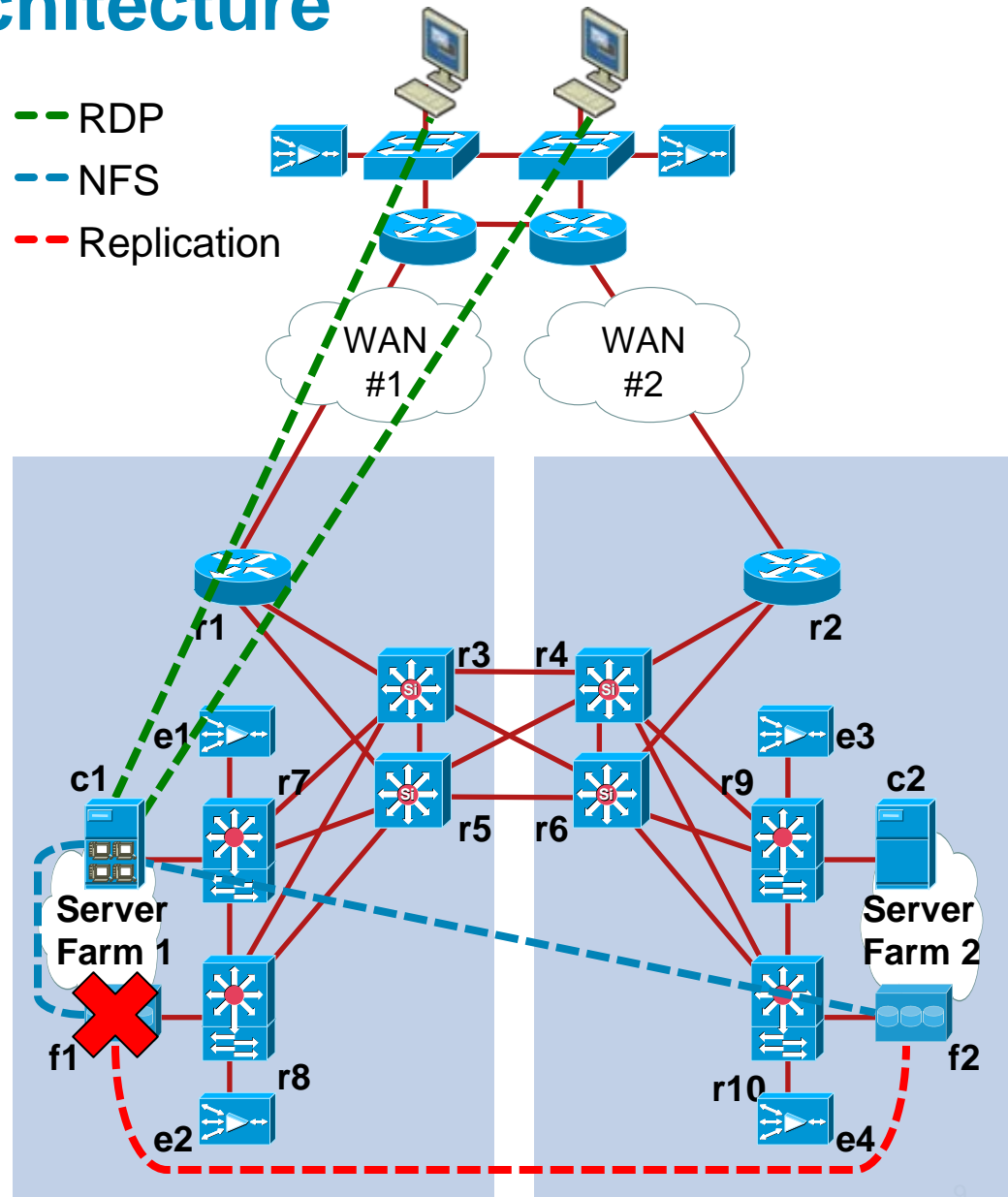
Netapp Flex Clones to reduce storage

- Event

NAS fails over to replicated NAS using L2 extension or Route Health Injection (RHI)

WAAS enables desktops to run from NAS in remote data center

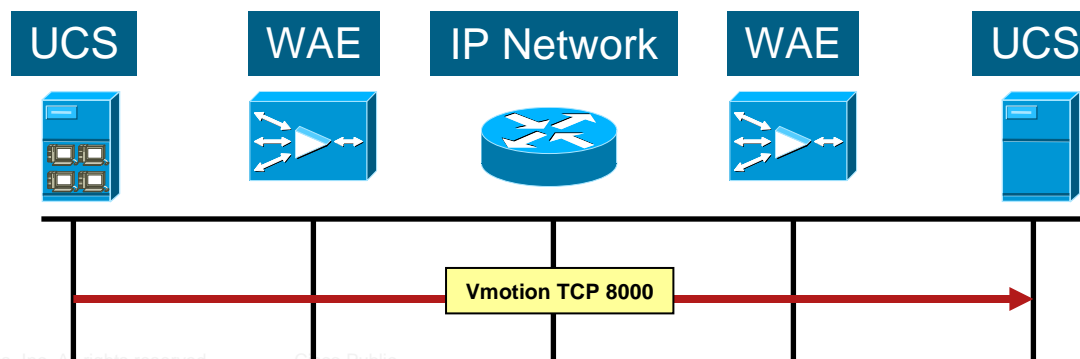
View Clients maintain display protocol connection with stationary compute VM



# VDI VMotion Acceleration

- VMotion uses TCP to reliably migrate the contents of memory from one compute to another
- Source host initiates a TCP 8000 connection to the destination host
- WAAS can be in the path using inline card or WCCP
- WAAS reduces 512 MB transfer to just 31 MB if warmed with similar WinXP desktop
- WAAS enables bulk VMotion between data centers in the event storage moves
- WAAS enables efficient VMotion from/to private to/from public clouds

Source IP:Port	Dest IP:Port	Peer Id	Applied Policy	Open Duration	Org Bytes	Opt Bytes	% Comp	Classifie Name
10.87.121.4:49157	192.168.203.201:8000	<a href="#">dcl-wae2</a>		0:1:24	513.254 MB	31.5101 MB	94%	HTTP
192.168.203.201:49157	10.87.121.4:8000	<a href="#">dcl-wae2</a>		0:1:24	136 Bytes	300 Bytes	-	HTTP



# VDI VMotion Acceleration

## Compute Follows the Storage

- Normal Conditions

Desktops provisioned to use local NFS Filer

SnapMirror Replicates VMDK files through WAAS

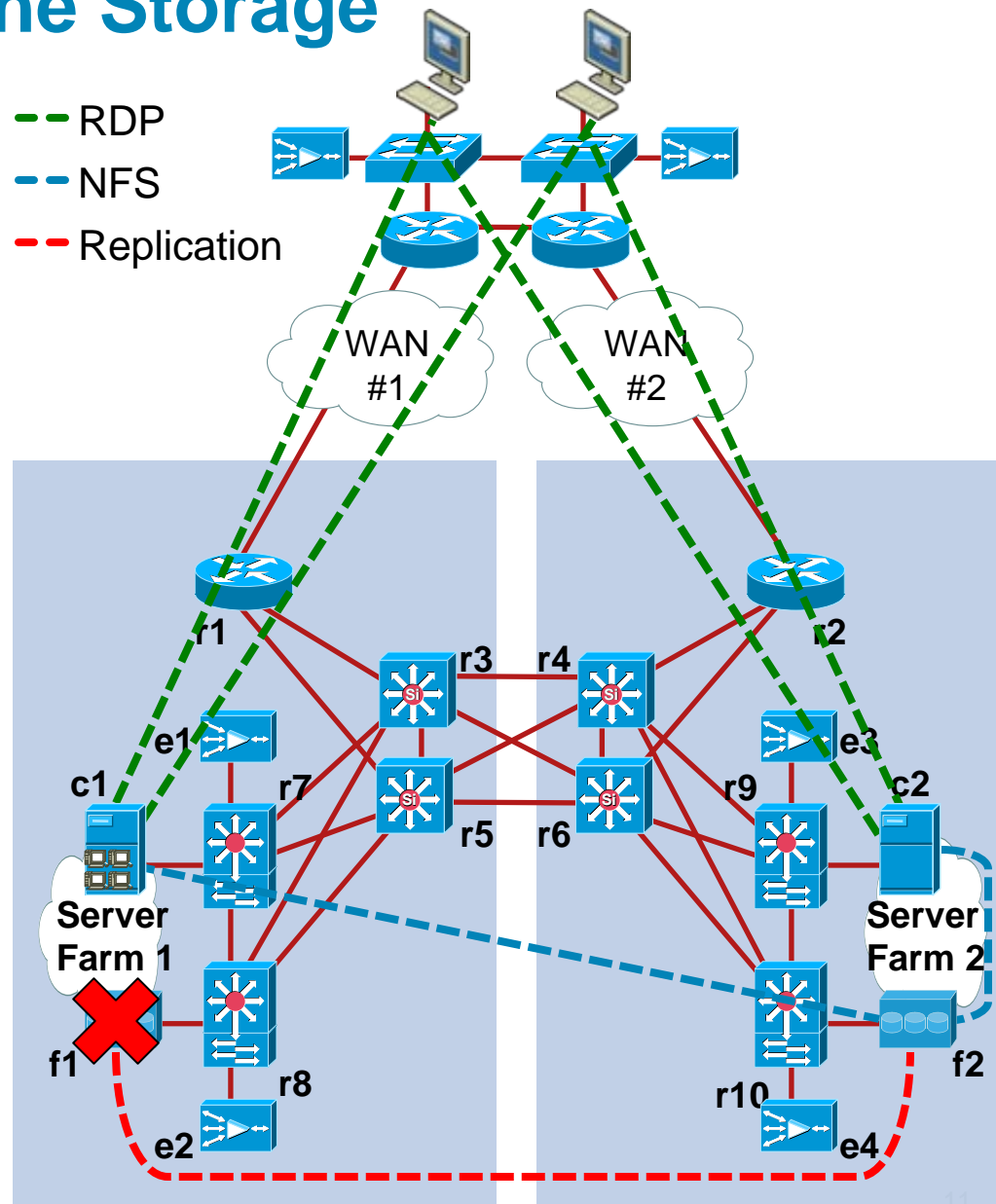
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- Event

NAS fails over to replicated NAS using L2 Extension or Route Health Injection (RHI)

WAAS efficiently migrates desktop VMs to backup compute following storage

Client VMs can preserve IP with RHI, L2MP, or request new IP through DDNS





# Virtual Machine Mobility and Replication

- NFS storage remote from compute
  - NFS is more compressible than RDP
  - NAS disaster recover
  - LAN attach compute and client
- VMotion
  - Gold – Preserve all incoming connection using L2 extension
  - Silver – Preserve incoming connections via anycast Route Health Injection (RHI)
  - Bronze – Preserve single incoming display protocol connection with Dynamic DNS/DHCP, RHI, or L2 extension
- Offline Desktop
  - Accelerate check out and check in
- Cloud Workload Mobility and Flexibility
  - Efficient VM mobility within the private enterprise cloud
  - Efficient workload mobility between private enterprise and public clouds
  - Compute execution in public cloud with workload in private cloud

