**Overview**

As you know, because of the purchasing policy currently in use at the District where individual departments purchase most of the servers for single application use, the vast majority of servers in the L7/Computer Room as well as in the 2 satellite computer rooms in the ATC/MLC and the Foothill/1900 computer rooms are very similar in size and utilization. Thus, the sample size of the 50 servers that were reachable by the VMware collection process represents easily 80-85+% of the server population.

Using the assessment data, VMWare makes a recommendation that for a virtualization “**Starter Set**”, FHDA should deploy 4 high powered Dell PowerEdge 710 servers. However, VMWare makes no recommendations on how much disk space is required, thus what size SANS needs to be ordered, nor do they provide any guidance on network requirements – this is an FHDA responsibility.

**Network**

For the network, Lisa has developed the following approach:

* Cisco has Data Center devices that offer better management capabilities than the standard operating system
* Work with Cisco to discuss how to manage the network connections, routing and security between the Layer 2 devices and the virtual VLAN's that the servers will reside on
* The connection and management of the virtual network interfaces can be provisioned through a number of different products -- Cisco and VMWARE -- and the Network Team will look more closely at their solutions
* This analysis in support of the Server Virtualization Project will also be used as an opportunity to automate IP and DNS management processes.

***(Continued)***

**Disk**

For the SANS, the following is recommended:

* Dell Equalogic PS 6610x & EqualLogic PS6110E

**Note**: PS6110E has bigger 3.5” drives for services that need large amounts of disk space but not very fast disk access

* Has an excellent reputation in the industry for reliability and performance and is scalable
* Uses the same disk management tools that ETS has developed extensive experience with over the past 10 years with Dell PowerVault SANS and disk arrays
* Configured using RAID technology with a combination of fast and slow drives based on data and system requirements
* Initial size of the array:
* 24 x 900GB Drives
* Total: 21.6 Terabytes
* Usable: 18.9 Terabytes
* iSCSI Switches for Server-to-SANs communications (two for each SANs platform for redundancy purposes)

**Servers**

For the servers, using the VMWare vendor Assessment Report, the following is recommended for the Primary Server Platform:

* Dell R710 PowerEdge Servers
* Six-Core CPU
* 192 GB Ram
* 146GB Hard Drives
* Quantity: 4

(**Note**: Licensing cost maybe affected by which VM software is implemented)

***(Continued)***

**Physical Redundancy Platforms**

Server virtualization presents a tremendous opportunity to reduce the number of physical servers and disk units. However, it also creates a significant availability problem.

Lisa, Ryan and I share a concern that virtualization creates single points of failure in the server platform and the disk array for these reasons:

1. Before virtualization, if a server failed for any reason, only the applications on that server were affected; and for most servers that means just a single application. With VM, if we have 15 applications running on server, and the server fails, we have 15 applications out of service until we can redirect them to another server in the VM cluster if one exists
2. Where we have 100 applications using the same SANS, and the SANS fails, all 100 applications are down and there is no failover – the applications are out of service until the SANS is repaired.

While hardware reliability is said to have improved, the equipment still has moving parts that can break or wear out, and electrical circuitry that over time can and will fail. In September 2011 and April 2012, we had two hardware failures with the LSI SANS that supports the EIS platform. The September 2011 outage took 4 days to troubleshoot and resolve and crippled the District’s ability to use the EIS platform. The May 2012 outage cost most of one business day to resolve and recover from.

***(Continued)***

Because the Server Virtualization Project is impacting the ability of the District to conduct its business, the following is proposed:

**L7/Computer Room: Intra Center Backup Configuration**

* Two identical, but physically separate VM platforms
* One Designated the **Primary Platform**; the other the **Secondary Platform**
* Each with 4 Dell R710 servers and their own Equalogic PS 6610x/ PS6110E SANs disk array

ETS/Systems & Networks would setup the VM platforms to keep systems in sync and be able to transfer applications to the other platform in the event of a hardware failure.

**Remote Location: Disaster Recovery Configuration**

* 4 Dell R710 servers and its own Equalogic PS 6610x/ PS6110E SANs disk array
* Could be located at any of the following locations: FH/Admin 1900, Abtech (if the network connection speed can be improved), NTT/America (Verio), or some other colocation vendor
* Use virtualization-specific software tools and procedures to move the applications to this site from the primary one

**Facilities Requirements**

The new virtual platforms will require a number of changes in both the L7/Computer Room and wherever the site is for the Disaster Recovery Configuration:

**Electrical Power**

* New electrical power outlets will have to be installed in the south end of the L7/Computer Room by Plan Services from whatever power source has the required capacity
* These new electrical power outlets need to be connected a UPS Battery Backup Unit

**UPS**

* A new UPS Battery Backup Unit needs to be installed to provide battery backup for the server, disk and network equipment in the L7/Computer Room
* The existing Leibert & APC/Symmetra UPS units are already exceeding their vendor rated capacity and cannot be used for the server virtualization project
* The new UPS Battery Backup Unit will need to then be connected to one of the existing Transfer Switches which connects to diesel generator electrical hookups

**Equipment Racks for Servers and SANS Disk Array**

* Server Racks will be required for each virtualized platform to house the following equipment:
* Servers
* SANS Disk Arrays
* KVM Switches
* Keyboard/Mouse/Monitor
* Each server rack will need to be seismically anchored into the floor for racks located in the L7/Computer and the FH/Admin 1900 computer room if that room is used for the Disaster Recovery Configuration