

Ministry of Finance

Datacenter Site Survey and Recommendations

(In Support of the Iraqi Financial Management Information System Deployment)

April 20, 2009

Summary

This document is composed of two sections, the site survey and site recommendations. The site survey describes our observations during two visits to the Ministry of Finance datacenter. The site recommendation section contains our suggestions for changes to the datacenter in support of IFMIS. The intended audience for this document is personnel within the Ministry of Finance (MoF) Information Technology group who are currently familiar with the environment and requirements of the system.

Site Survey

Report Structure

This report contains the following sections:

1. Facilities: description of the MoF datacenter, security, power, flooring, air-conditioning, and fire protection
2. Network: number of users, software licensing, physical and logical structures, and ISP information
3. Datacenter / UPS Suggested Rooms: description of suggested server rooms, requirements, and diagrams
4. UPS Movement: planning for how to move the 3 ton UPS into the facility

Facilities

Building Description

The MoF datacenter was originally used as a server room. It contained several mainframes about a decade ago. The basement was used to house the UPS and was temperature controlled. The mainframes were housed on the first floor and it was temperature controlled by a central cooling system. All that is left of the cooling system is the ceiling of the rooms. The MoF is currently planning to put both the IFMIS servers and the UPS in first floor. The Technicians will still be located next to the room and managers will move to the second floor because of space requirements. An approximate diagram of the first floor is found in the section titled "UPS Movement".

Security

Security within the MoF datacenter building includes the following:

1. Security Guards - their job is to perform a body check and inquire into the destination of visitor.
2. Reception Desk – inside the building a receptionist requires signature, time in, time out, and destination for all visitors before they will be allowed to enter the building.
3. Mobile phones and cameras are not allowed without a signed permission.

Power (Cabling, Outlets)

All rooms are supplied with power cables with are either underground or inside walls. Most of the cables are placed underground because aluminum sheet barriers separate a majority of the offices inside the building. These barriers are not embedded inside the ground – as a result most of the space under the building is connected. Additionally, these barriers are too thin to handle cables and power outlets and the power cables are not embedded in compliance to building codes. (Note: The MoF is planning to fix these items by contracting them out to a local firm).

Flooring

The flooring in the datacenter is comprised of 8" raised flooring. Previously, it supported mainframes, large printers, and other heavy equipment.

Air-Conditioning

Air conditioning (AC) units differ from room to room that each having independent temperature controls. Additional AC units can be added when requested, and required changes in walls and ceiling are implemented before a new unit is added. The MoF are planning to add AC units to the datacenter and UPS rooms. (Note: Air conditioning is to be a part of the contract with the selected local company mentioned earlier.)

Fire Protection

A complete fire protection system will be a part of the contract with the local company.

Network

Number of Users

There are two types of users:

1. *Internal* - Internal users have access to the Internet. Currently there are approximately 50 users, where 20 users have access to the IFMIS system. The MoF anticipates that 25 more trainees will need access to IFMIS within that location. The MoF facility has training rooms.
2. *External* - The MoF anticipates that support for 750 external users will be required to access the IFMIS system.

Software Licensing

The MoF is planning to engage a local vendor to provide the following:

1. An Open License for Windows XP.
2. License for Antivirus server software with 50-70 client licenses. Additionally, 150 separate Antivirus licenses will be provided. This will enable the MoF to provide other organizations with licensed Antivirus software.
3. License for Microsoft Office.
4. License for Adobe Reader Professional.

Physical and Logical Structures

The internal network has the following specifications:

1. Standalone Windows XP PCs
2. No Active Directory Domain
3. Two routers connect to the Internet and perform NATing. This is due to the physical distance between the two private networks and the inability of each router to support the number of users.
 - o One powerful router in addition to a firewall can replace these two routers. The updated equipment should support up to 100 internal users and up to 750 external users simultaneously.
4. The switching technology utilized does not provide layer 2 management and advanced security.
5. Underground UTP CAT 5 cables are used, however no standard cable protection is used.

ISP Information

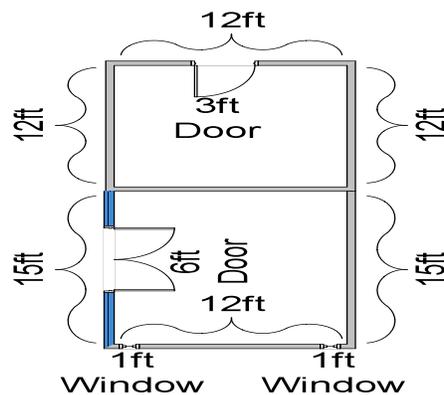
LunaSAT is the Internet Service Provider. Currently the MoF utilize 1Mbps download and 512 Kbps upload. According to the MoF, the Internet service is not reliable – the bandwidth has decreased several times.

Datacenter / UPS Suggested Rooms

The MoF has two possible server rooms

- 1- Room #1
 - Advantages
 1. Two adjacent physically secure rooms.
 2. First room can be used for servers and second room can be used for UPS
 3. Access to these rooms is easily monitored.
 4. The size of the room (12x12 ft) provides for easy cooling and would allow for free movement even after the servers are placed
 - Disadvantages
 1. Needs power and network cabling.
 2. Needs replacing of front wood door with armed one.
 3. Needs air-conditioning and ventilation.
 4. Needs (opening) door between the two rooms

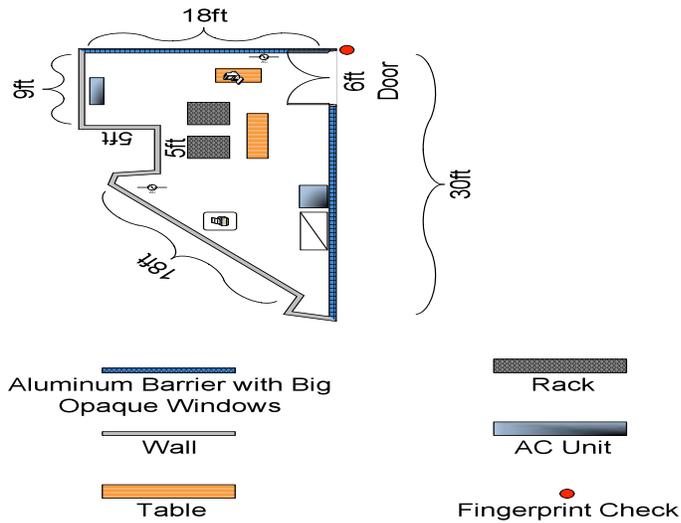
5. If the UPS was placed in the adjacent room, it would not be on the ground level.
- Notes
 1. There is neither power cabling nor network cabling in the suggested datacenter room.
 2. The ground space under the suggested server room is separated from the entire building by embedded walls.
 3. The ceiling of the room is connected to the ceiling of the entire floor.
 4. The UPS room is an option, however, neither this room nor any room with raised floor is recommended to hold the UPS. A room with a solid floor that can handle the three ton UPS is recommended.



2- Server Room #2

- Advantages
 1. Requires finger print check to access
 2. Well air-conditioned room
 3. Wider room that gives more free space
 4. Access to this room is easily monitored
- Disadvantages
 1. Walls are no more than barriers of aluminum and opaque glass
 2. The adjacent room where the UPS may be placed is not secure
 3. Irregular shape (triangle like room) where anything can be put at any angle without being noticed by anyone
 4. UPS will be in the same room
- Notes
 1. The power cabling is either underground or embedded in the walls. The power feeding to the racks comes from underground place.
 2. The network cabling in the room is underground.

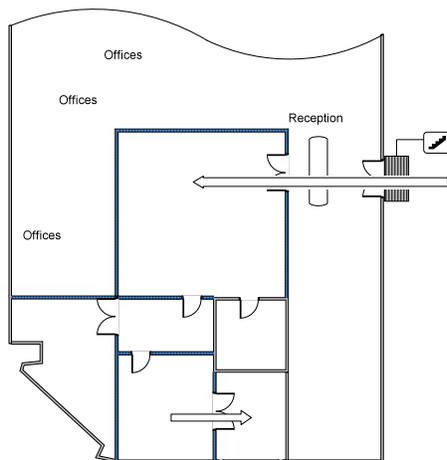
3. The underground space under the suggested datacenter room is connected to the entire building underground space.
4. The ceiling of the room is connected to the ceiling of the entire floor.
5. The diagram below shows the server room #2



UPS Movement

The plan of taking the UPS into the UPS room is difficult, as suggested by MoF managers. The proposed plan will consist of the following steps:

1. Lift the UPS using a small crane.
2. The path of moving to the UPS room passes through four small doors. These doors are located in aluminum sheet barriers where the barriers are easily removed. Removing the barriers is the only way to take the UPS to its destination.



Site Recommendations

Facilities

Power (Cabling, Outlets)

1. Power cables should be placed either underground or in the ceiling. Putting cables underground makes it easier to fix issues regarding cables and keep the ceiling from being damaged. This will allow re-use of the central cooling system in the future. Additionally, putting the cables underground can hide the visible piece of cable that will be connected to terminal devices (especially for servers located in center of the room).
2. Power cables should pass through pipes or some means of protection.
3. Power cables should be far from network cables with distance of 20" (50cm).
4. Power cables should be placed together with a label for each cable each 5ft (1.5m).
5. All electrical cabling should comply with local building codes.

Flooring

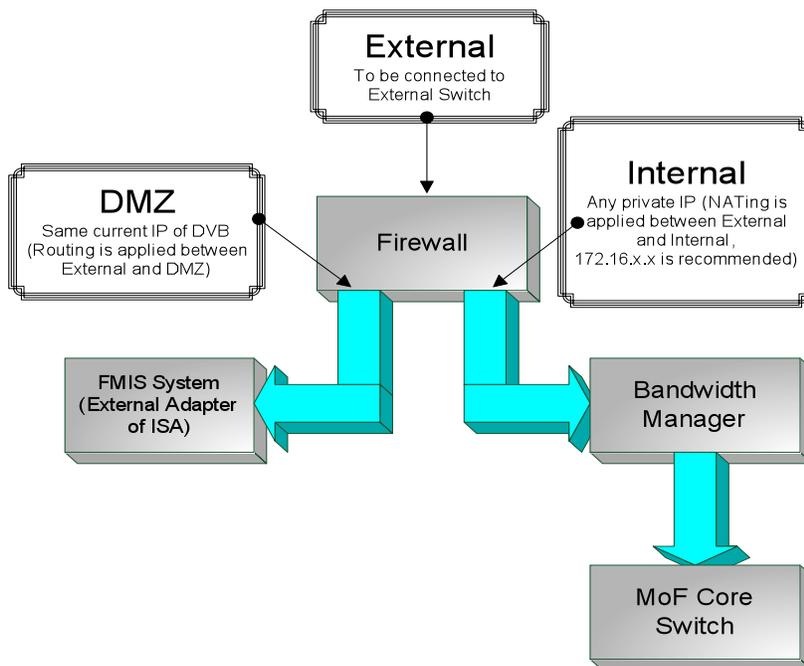
The raised floor needs maintenance in some areas inside the building.

Fire Protection

Continue with plans to have a local company install a complete fire protection system.

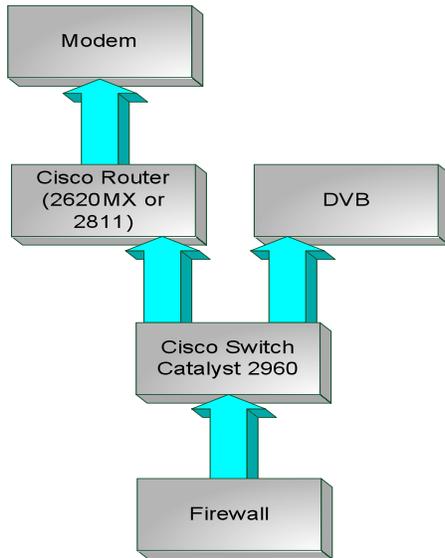
Network

Physical Structure



- **Firewall**
 - Watchguard X5500e (For more information check the following website <http://www.watchguard.com/products/peak-e.asp>)
- **Bandwidth Manager**
 - Planet Bandwidth Management Gateway BM-2101 (For more information check the following website http://www.planet.com.tw/en/product/product_spec.php?id=7570)

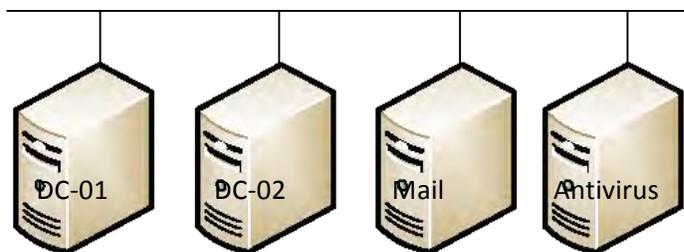
External Network



1. Connecting a PC in the internal network of MoF to the internal switch of the IFMIS system is not an option. *All connections to the IFMIS system should pass through the Firewall.*
2. All Switches should be Cisco Catalyst 2960 to obtain manageability and advanced security.
3. No hubs or unmanaged switches should be used.
4. Network cables should be placed together underground or in trays. No visible unprotected cables should be exposed.

Logical Structure

1. Implement a single Active Directory domain utilizing two DC servers.
2. Implement another application server that would serve as a Mail Exchange server.
3. All PCs should be provided with licensed Antivirus software managed by a centralized server. This server should be separate from the Mail Exchange server.



The figure above shows the needed servers only. These servers should be connected to the same internal network of MoF where this network will end with the mentioned bandwidth manager and firewall.

1. PCs should use a certain standard for naming such as (XP-01, XP-02, Vista-01...)
2. Information for each PC should be maintained. This list should include the name of the PC, MAC address, owner, location, and operating system information.

Bandwidth

Below we have recommended bandwidth allocation for the IFMIS environment. The mentioned rates of upload and download do not refer to the total bandwidth that should be used. They refer to the bandwidth rates needed in addition to the current bandwidth.

IFMIS Users	IFMIS Download	IFMIS Upload	Local Users Download	Local Users Upload	Total
250	2.5 Mbps	2.5 Mbps	512 Kbps	512 Kbps	3 Mbps down / 3 Mbps up
500	5 Mbps	5 Mbps	512 Kbps	512 Kbps	5.5 Mbps down / 5.5 Mbps up
750	7.5 Mbps	7.5 Mbps	512 Kbps	512 Kbps	8 Mbps down / 8 Mbps up

We derived these numbers based on actual monitoring the IFMIS traffic on our network. We monitored our IFMIS traffic at an ~50 user load and that consumed 400 Kbps up and 300 Kbps down. We also identified a lot of network traffic unrelated to IFMIS. Therefore, we have added 100Kbps to the upload and 200 Kbps to the download. This results in a final recommendation of ~500 Kbps up and ~500 Kbps down per 50 users for the datacenter housing the IFMIS servers. Please note that your networking team should keep a watch on network bandwidth utilization, as many, many factors can cause these metrics to go up or down. Also ensure that you have adequate satellite equipment that will allow you to change your bandwidth with the ISP without having to change out any hardware.

Datacenter / UPS Suggested Rooms

Security

The MoF should consider deploying some type of access control device (i.e. card reader) to restrict access to the server rooms.

Air-Conditioning

- The MoF should deploy enough cooling to keep the room at 21° or lower.
- A thermal sensor with Alarm system should be used in both datacenter room and UPS room.
- Access to turn off the AC units should be limited to a few individuals.

Flooring

If the UPS room is going to be the room beside the datacenter (which is not recommended by BearingPoint), the 8” space between the floor needs to be built out.

UPS Room

There are two options for placement of the UPS.

1. Build a room next to the MoF building, with the following recommendations taken into consideration; they are:
 - The room should be **big** enough to hold the UPS which has the following dimensions: width 87” (2.21m), depth 32” (0.81m), and height (1.42m).
 - The room should be **big** enough to allow free moving of persons inside it.
 - The room should be **big** enough to allow free moving of the used means of carrying the UPS to the inside (the means may be a crane or forklifts).
 - The room should be **small** enough to allow easy control of temperature.
2. Build a room inside the basement, with the recommendations mentioned above. Additionally, the height of basement should be enough to take the UPS to its destination with the help of a crane or forklift.

The MoF still has the option of using the room located next to the suggested server room (Server Room #1). This is not recommended by BearingPoint but is still an option. If the MoF decides to use this room then an architectural assessment should be completed to ensure the floor will support the weight.

UPS Movement

The following considerations should be taken before moving the UPS inside the building to its final destination:

1. The UPS should be installed and configured before the server rack is moved.
2. All required construction should be completed as soon as possible, including all required AC units.