DESIGNING DATA CENTERS & SERVER ROOMS

Compton's Designing Data Center Services are an enterprise-wide, consultative approach to help you manage mission critical environments. The services encompass the entire lifecycle, from assessment, strategy and design, to implementation and operational services. We give the client a Data Center that is state-of-the art and capable of meeting the most stringent demands.

Our Designing Data Center services include-

- Understanding the application, database and content
- Space designing i.e. optimized use of real estate
- Cooling system analysis as per BTU calculations
- Communication and data cabling
- Selection of equipments-Number and types of racks, Number of servers and their configuration, switches, storage devices, backup equipments.
- Physical security
- Fire detection and suppression
- Designing IT policy
- Testing and follow up
- Documentation

COMPTON Data Center Solutions is a data center and computer room consulting services firm and turnkey solutions provider.
We offer a broad range of project expertise. We specialize in planning, designing, engineering, constructing, monitoring and maintaining data centers, computer rooms and server rooms that integrate, 'best-of-breed', critical infrastructure technologies. The result is an always available, scalable, redundant, fault-tolerant, manageable, and maintainable data center environment.
COMPTON is uniquely qualified to help businesses assess their data center or computer room and support infrastructure risks, provide recommendations for improvement and offer accurate project cost estimating and guidance throughout implementation.
In today's hyper-competitive markets, where you measure network downtime in lost profits, COMPTON designs solutions that protect against some of the leading causes of downtime, hardware damage, data loss, and decreased productivity. COMPTON sets the standard for 'always' available solutions for data centers, computer rooms, server rooms, network closets, telecommunications rooms, network operations centers, and other mission critical facilities.

A small case study for reference

Creating Data Center at Crown Plaza hotel at New Delhi

When we started making this data centre we had a challenge in front of us that we had to house about 80 servers securely in a not very conducive environment of a five star hotel where fire water leakage rodents are a major threat to the IT operations. Irregular state power supply was another source of disruption from the IT services from time to time. As five star hotels have very small area for it's maintenance and within the same area all services like large laundry unit, HVAC units, Chiller plants, multiple and large kitchens and a small place for keeping the servers safe, up and running 24*7*365 days without any failure. To achieve this we were given about 3000 sq.ft. space for the data centre, about 1000 sq.ft for UPS room and 2000sq.ft. for the IT Executive and separate cabin for the IT Manager.

We divided this 3000sq.ft. of data centre into three parts
1. 450mm space below the raised floor.
2. 2438mm space below false ceiling and raised flooring.
3. 400mm space above false ceiling.

Entry to Data Centre (Access Control): The data centre entrance was given a wooden ramp with one step on one side. The ramp is a convenient way of moving the equipment in or out of data centre. Steps provide a non slippery and easy way for people to walk in and out of data centre. The data centre entrance which is guarded by an eSSL biometric machine from Germany. This machine supports finger print read. FBAC F7A (F7A) is a standalone fingerprint T&A + Access Control system System, IN and OUT status, also low price with good performance, designed specially in the purpose of popularizing the fingerprint products. It could store 1500 fingerprint templates and 50000 transaction records. To come out of data centre there was another eSSL FBAC F7A (F7A), both these machines were connected to LAN for with access control software loaded on one central machine manning the entry into UPS room/ IT executive room as well as IT Manager room besides the data centre. In other areas except data centre have a bell switch to come out of the room. These machines are connected to EM Locks on the doors.

False Flooring: We maintained the data center raised flooring at 450mm so that a proper air flow for PAC is maintained. All the services which are to be delivered under the floor are at different heights. The ground zero is painted with two hour fire resistant paint from viper and then covered with insulation of grade 0(fire resistant) so that we get adequate coverage against accidental fire due substantial amount of power and data cables. All the cable trays guiding the flow of electrical cables are rested directly on insulation of ground zero. The raceways are put on the stand at the height of

300mm so that adequate distance between the data and power cables is maintained. The water leakage detection wire is stick on this insulation so that any kind of water seepage or leakage at ground zero can be detected. VESDA pipe and capillary are put on the height of 250mm at proper distance to each other and other services to detect any smoke or fire. Gas flooding nozzles are placed at the height of 200mm from ground zero at proper distance from each other.
After all the desired services provisioned the aluminum pegs and cross beams are fastened and nailed to the ground zero and covered by the 600mm by 600mm tiles, these are fire resistant tiles made up of aluminum cover and cement filled inside. As these are quite heavy having very high load bearing capacity, two number tile pullers are provided to life any tile and work under the raise floor. The entrance has a ramp for smooth moment of materials in and out of data center. The ramp can be divided into two parts 60% ramp for material moment and balance 40% as one step for the easy moment of persons maintaining and operating data center.

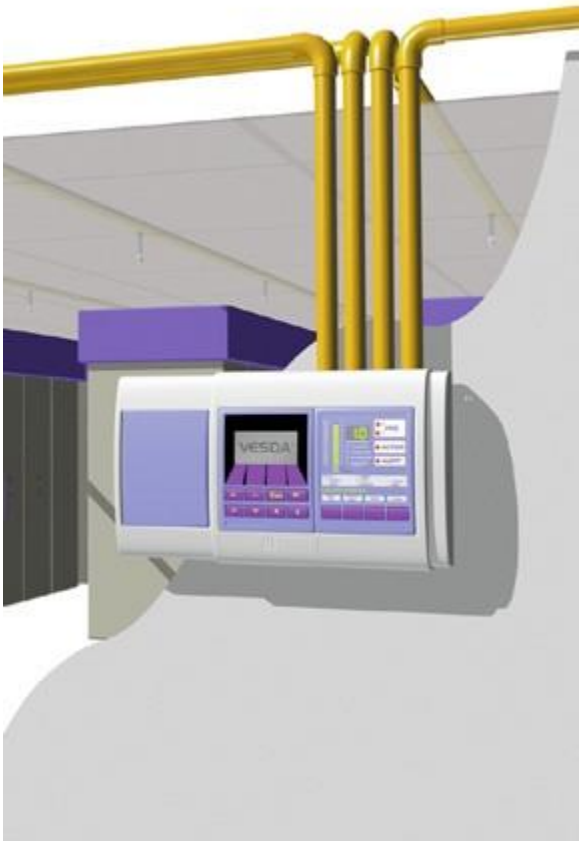
Electrical system of data Centre: It is a type III data centre so there is not complete redundancy of resources. One of the major lacking is the redundancy of stable power source only one source of state power supply. The generator power source is a stop gap arrangement for the state run power source. We maintained less than 2 Ω resistance in the earth. We got 8 earth strips out of which four were directly from the earth pit in one of the shafts of hotel, these are called pure earths. The balance four earths were being shared other equipments in the hotel i.e expensive items in hotel kitchen called regular earths.
The three phase raw power goes directly to the two panels MCCB 63Amp Adlec panels for two UPS and Precision Air conditioners from Emerson network power system. From

the bus bar of these panels a 8sq.mm copper wire(Finolex/ RR Cables/ no havells) will take the out put to four DB Box which will further reduce the load to individual racks. From four DB box the RYB for different racks is taken out on 6Sq.mm Copper wire(Finolex/ RR Cables/ no havells) for dividing the load equally on all racks. We used 300mm cable trays to move all the electrical cables and hard armored optical cables.
As cable trays are open from top they are perfect for guiding the flow of cables near or above the sealing as well under the raised floors. For guiding the flow of voice cables as well as RJ45 or RJ11 cables we used 75mm raceways. 45mm raceways are used for flow of cables on the walls as there is no concealed wiring in the data center. For connection of panels like water leakage, Fire alarm, VESDA, gas flooding system we used raceways as they are covered and give a neat look on the wall. Four Distribution box (DB) were used to receive the input power from the 40KVA * 2No. Emerson UPS. These DB housed multiple TPN and MCB in adequate numbers to properly distribute the desired R,Y,G to every rack so that proper redundancy of power is maintained on every rack and servers located on these racks keep on non-working even if there is a partial/ complete power failure or any one UPS is down. Servers will be off only in a condition when both the UPS go faulty and even main power is not available. Every rack has designed to take on 35Amp anything above that will automatically shut down all the servers located in that rack. Every rack has two PDU which are connected to two separate 16AMP industrial socket (Clypsal brand). There are two 16AMP industrial power sockets per rack and there are seven such racks in the data center.
All the lights we used in data center are clean room fittings from wipro. These were connected to UPS and one Emergency light is also provided on raw power within the data center. We provided only two electrical sockets for 16AMP so that they can be used for laptop charging or mobile charging in case someone has to work within the data center for long.
Raw power Input treatment: We were receiving the raw power on the two separate Adlec Panels which were regulating this raw power with 65AMP MCCB. By putting two separate panels for the raw power input we generated two redundant power inputs for our data centre. The raw input power source is hybrid and common for Diesel operated generator set and state power. Output bus bar of these panels becomes the input for PAC and UPS. We used two grounding earths direct from the earth pit(It was a chemically prepared earth pit and not in our scope of work for this project).

UPS: We used 2 numbers of Emerson 40KVA UPS in parallel with half an hour of battery backup. The ideal situation would be to have UPS working parallel in N+1 mode that means if for example you have a 70KVA load you should use two numbers of forty KVA

UPS running in parallel mode and one 40KVA in standby which will become active only if there is a fault in one of the main UPS. In some mission critical situation it would be better to have UPS working parallel in N+N mode that means if for example you have a 70KVA load you should use two numbers of forty KVA UPS running in parallel mode and two 40KVA in standby which will become active only if there is a fault in one or both of the main UPS. This allows you to have a complete backup of your power infrastructure. We were receiving the power from Adlec Panels which were regulating our raw power with 65AMP MCCB. We used two separate pure earths to ground these UPS. Output of these UPS feed the four DB in the data centre which feed power to each rack.

Water Leakage Panel: For this data center we used siemen's water leakage panel connected to about 100 mtrs of sonte water leakage detection wire which is spread out all across the length and breadth of the data center. This is a very fine cable with water detection sensors protruding out at regular intervals this wire is spread on the insulation of the data centre. This wire sense the presence of water on the data centre ground zero below the false flooring and sends it to the panel which hoots to send alarm it can be configured to send a mobile message of an email also. The panel can be divided into four zones to exactly know which part of the data centre is affected by the water leakage. The panel comes with minimum 2 Zones, 4 Zones, 16Zones and unlimited zones capacities depending upon the size of facility.



Panels and their Placement: We placed all the panel i.e Water leakage, VESDA, Fire alarm, Gas flooding outside the data centre in IT executive room as they become easy to access and maintain also in case of emergency within data centre it becomes very easy to operate them and control various services. These are all connected to the UPS power to allow 24*7*365 days operation. We wanted to place them outside the data center also because we don't want anybody entering the data center for maintenance jobs. The temperature within data center has to be maintained between 19 to 21 degree centigrade.

Fire safety and suppression system: Fire fighting is a very important service in a data center as it is a facility holding very important information and there is a big concentration of wires which are very prone to fire. For this purpose all the walls, windows and doors are made from fire resistant materials and covered with 2 hour fire resistant paint. Fire services in data center are divided into two separate parts of fire detection and gas flooding system.

• VESDA: We used a Very Early Smoke Detection Apparatus (VESDA) from x-tralis to detect the fire in its very early stage. The fire services in a data center are very specialized as there is a great danger of fire starting due to some short circuit or voltage fluctuation. To safeguard against such incidents of fire we installed VESDA VLS 505. This system has pipes fitted with capillaries at regular intervals connected to a device which is constantly sucking air from this pipe the moment it detect any smoke particle or ash it triggers an alarm and also actuate the Gas flooding system do that fire can be put of or brought under control.

• Gas Flooding Systems: We use FM200 based gas flooding systems. The gas based fire suppression systems are effective for electronics and computer items and also are environment friendly. We consider a gas flooding factor of 0.7% of the room volume for FM200 and 0.5% for NAF gas which is latest in the range of environment friendly fire suppressant gases available. Though expensive it is very effective even in low volumes. The gas cylinders come in the volume of 40Kg, 80Kg range and multiple numbers of cylinders are combined to give coverage to large data centers. In case of fire or smoke the flooding system is automatically actuated and the gas is released into the data

centre to put off the fire. As the gas is an expensive item we provide a manual release and abort buttons which will prevent the accidental release of the gas. The moment VESDA detects the smoke it send the signal to a hooter placed on the top of data center door and also actuate the gas flooding system to release the gas. There is a min. delay of 30sec. to 3 min. in release of the gas from the moment of detection of smoke, this is configured in Fire Panel.

Precision Air-Conditioning(PAC): The data centre has a very typical cooling requirement of 17 to 21 degree centigrade. This is difficult to achieve with traditional window/ split or cassette air conditioners. As there is a lot of heat being generated by various servers/ firewalls/ routers/ Video servers/ Voice Servers/ Storage systems and switches this need very special type of cooling from the Precision Air-Conditioners which throw the cool air under the raised flooring which is discharged through the discharge tiles in the raised floor using air dampers. These air-conditioners use two type of refrigerants i.e coolant or water from chillers. We strongly recommend the coolant type as in winters many companies turn off their chillers for about 20-30 days and use them for warm air circulation. These precession air-conditioners are taking input of the warm air which is discharged from the servers from the top of the air conditioners and cool them further and supply to racks and servers again from under the floor, as the input air in these ac's is much cooler than the outside temperature they are able to cool them to about 15 degrees and send out in the room back again where they reach at about 17 degrees so a desired temperature is maintained.
We use N+1 configuration in PAC so if we need two units we will have one backup unit which will be switched on alternatively for an eight hour shift after which the other unit is switched on. This way it is very easy to maintain the air conditioners and also we get optimum cooling from every unit without deranging it. PAC also helps to keep cool the electrical cables which are in the raceways and cable trays under the false flooring as the coldest air comes under the false floor first. Tonnage of the air conditioning is taken out by combining the British Thermal Unit(BTU) of all the devices being used in the data centre.

We would be eager to partner with you in your endeavor to success, please Contact Us so that our consulting team can engage with you to offer powerful business solution which form bases of your success.