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Power Delivery Recommendations: Plush Packet Incorporated (PPI)

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The power requirements for PPI’s server room will need to be 10 Amps from the utility company, and the Generator will need to be able to supply at least 9 Amps as backup (these are estimates based on an APC calculator which can be found in Table 1). The power for each rack will be routed through a UPS (in the PDU) to a circuit panel on the end of each server row, delivered above ceiling, which will be further routed to each server through the racks. Backup power supply requirements will be ten UPS’s which supply a minimum of 12kVA.

Utility power supply is of great concern to PPI as a whole. This is due to general costs of power and being able to budget future expenses based on estimated power consumption. The amperage supplied by the power company, while being at 10 Amps will not be used in whole for a few years. This is based on PPI’s 200% growth into the future. However, the infrastructure must be able to supply 10 Amps if this growth is to ever be achieved.

It is assumed that PPI’s current data requirements for day 1 are 40 servers, 5 CRACs, 10 Switches, 3 gateways, 4 connections for Fire Suppression, and 2 connections for the security system. The voltage used in the system is at 220 volts (PPI have decided to build in Australia), with an average of 2.39 Amps. Each of these pieces of hardware is considered priority and must remain operational under a blackout for at least 30 minutes. In this fashion, network administrators can shut-off servers or swap to generator power.

The uninterruptable power supplies will need to each provide, at least, 12kVA for 30 minutes. As such, PPI are recommended to use APCs Smart UPS VT 15kVA (model SUVTP15KH3B4S) which will provide 31 minutes of uptime under full load. Note that this is a recommendation and an equivalent form factor can be used. A primary concern to keep in mind with this, is that all servers should have two power supplies installed, that way they can run off two different UPS’s (in case of a fault in one).

On day 1, PPI will need to have four UPS units on hand to support operational capacity. As hardware comes in, UPSs can be ordered and installed. This will save PPI money in both the short and long term as having more UPSs on hand will only cause power drainage where not required. Since PPI will only be using approximately 37 kVA on day 1, 4 UPSs will cover this all the way to N+1.

Power requirements, backup power requirements, and the number of UPSs to support required uptime are all key points to consider. However, on top of this is the way in which power is routed to each piece of hardware. PPI is recommended to route all power through the ceiling rather than through the ground. This ensures that cables are not damaged due to spills or being crushed.

Routing should also be done so as to keep all cables as separate as possible. That is, power cables to server circuit boards should be routed separately to those going to the CRACs or the networking cabinets. Additionally, power cables should be color coded to easily identify where they are coming/going from/to. Both of these methods are shown in figure 1 – Power Distribution Map.

Further to this, separating cable routes ensures that any future maintenance to the data center’s power infrastructure does not cause damage due to confusion over what power cable goes where. Also, cables should be routed in easy to access areas. This is for the same reason as cable route separation. Keeping cables in the middle of walk ways and away from hardware also ensures that electromagnetic interference does not occur from so much electricity running past networking cables.

Electromagnetic interference should also be a key factor when determining the location of PDUs. PPI are recommended to keep these cabinets at least four feet from server cabinets and networking equipment. Additionally, they should be located near a wall, for easy utility connection, and on separate sides of the room, for security (if one cable is cut for some reason all electricity is not lost).

Figure 1 - Power Distribution Map



Table 1 – Power Requirements



Table 2 – Day 1 Equipment



Table 3 – Future Equipment



Table 4 – UPS Requirements



Reference

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