



Report on
Power failure to OLD MER room
At
Xxxx Group Centre
Mumbai

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1.0 Introduction

This report is prepared to understand the cause of power loss to some of the server racks in the Old MER room at Xxxx Group centre (xxx), Mumbai.

On 23rd Dec 2011, at around 19:00 hours, the facilities team at CGC had experienced a power fluctuation at the incoming power. The fluctuation was momentary and did not result in the tripping of any of the induction motors installed. It was reported that all is normal until it was learnt after some time that some of the racks in the MER room had rebooted.

IBSGD was invited to investigate the possible cause of this abnormality and report on the conclusions and mitigation plans.

A preliminary report was conducted by the facilities team as under;

1. The OEM vendor for UPS had made an incident report after verifying the log of events and the log concluded that there was no untoward event on the UPS output side. To reconfirm the UPS was shutdown and changeover of power to battery mode and also transfer of power to bypass mode was verified and found to be satisfactorily functioning. A report to this effect has been made by the UPS vendor.

2. A test of thermography was conducted on the upstream and downstream distribution of the UPS upto the DBs and there was no alarming loose connections / hot spots noticed. A report to that effect was also prepared by YYYYYY , the testing agency and submitted.

3. A physical checking of the power distribution system on the downstream of UPS upto the DBs was conducted by the facilities team and no loose connections were found.

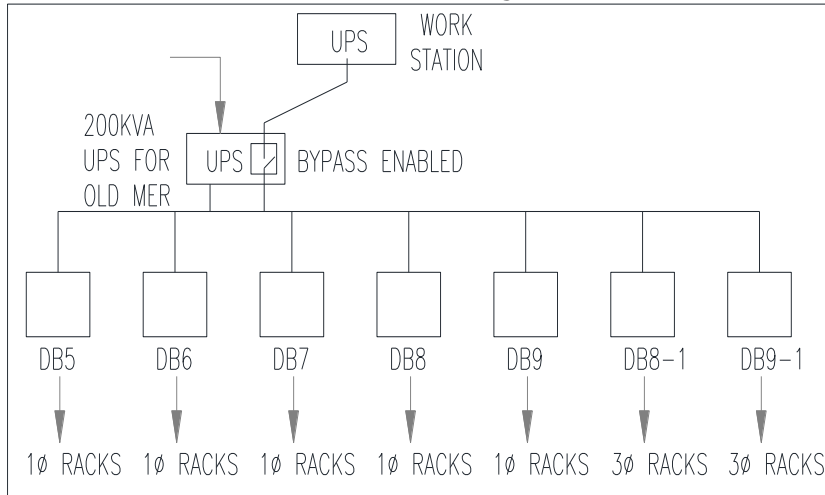
4. All of the above was vetted by M/s ZZZZZ, a Consultant based out of Mumbai and their report on root cause analysis was also submitted to the facilities team.

2.0 Observations:

The following were the preliminary observations:

- The premise has an Old MER room powered by 1 x 200 KVA UPS , A Lan room powered by 1x 100 KVA UPS and a New MER room powered by 2 x 120 KVA UPS on N+N.
- There are 2 x 200 KVA UPS powering the workstation loads. One of the outputs from these UPS is connected to the bypass of the Old MER room UPS for redundancy purpose.
- The incoming to the Old MER UPS is 3 wire /3 phase and the neutral of the downstream distribution is derived at the UPS output side.
- The UPS is in the basement level and the distribution panel and DBs are at the 3rd floor level.
- There is no isolation transformer in the upstream/ downstream of the UPS.
- There is a dedicated earthing system available with earth pits.
- The power distribution, neutral connection, earth connection inside the MER room run under the false floor. The wiring is haphazardly done and there is no way to ascertain the correctness of wiring .
- Each rack is powered through an ELCB.

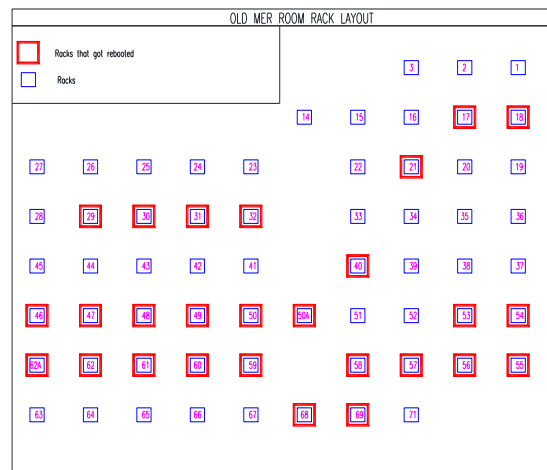
- Please refer to the schematic distribution arrangement for reference and understanding.



We had a meeting with the IT team and the facilities team to understand the details of the occurrence and the following observations were made.

- The power distribution arrangement of MER racks is as under:
 - Total no of racks : 63
 - No of 3 phase racks : 7
 - Out of the above 7
 - Racks supported by MER UPS : 5
 - Racks supported by workstation UPS : 2
 - Total no of single phase racks : 56
- All racks have 2 source of power generally from 2 DBs fed by the MER UPS.
- 4-5 racks have more than 2 sources fed by MER UPS DBs.
- Rack 28 and 50 have one source from Lan UPS DB
- Rack 21 has one source from Workstation UPS.

The attached sketch would explain the location of the racks with the details of racks that got rebooted.





It was observed that during the day of incidence that of the 63 racks, 27 racks got rebooted and the balance were unaffected.

There was no trip of any breaker at any level including the ELCB at the racks reported.

The AHUs, PACs etc feeding the critical areas did not trip/ get restarted.

3.0 Conclusions:

From the above observations, it is evident that there has been no tripping of power from the source to the UPS DBs. This is supported by the fact that all the servers did not reboot. Moreover the UPS and battery backup has been retested. Bypass mode also is connected to workstation UPS for redundancy.

A local disruption at the MER room level had happened. This disruption has not happened at the power as none of the ELCBs had tripped. Moreover all the racks supplied by the same circuit has not rebooted. For example UPS DB 6 Y4 supports rack 57, 69 and only 69 had rebooted.

Hence there seems to have been a disruption in the neutral or earthing circuit that has triggered this failure. It is possible that the racks that had got rebooted have a weaker SMPS in the processing unit and their capacitance could not sustain the power to racks during the interruption.

4.0 Way forward:

- To take a shut down of MER racks and thoroughly check the neutral and earth connections for tightness and continuity.
- To check if there is any earth cross connection between dedicated earth and protective earth as the false floor stands might be connected to protective earth.
- As a safety measure, create 2 additional earth pits and extend the dedicated earth to the new earth pits also.
- Properly identify the power circuits distribution in the form of as built drawing and labelling at DB and rack level.
- Separate the cross connections from different UPS to the same rack.
- Evenly distribute the load to all UPS DBs. IT was observed that DB 5, 6, 7 connected to most of the racks and UPS DB 8 & 9 are loaded less.
- Provide an Isolation transformer
- Provide surge arrestors at DBs.