Availability

All electrical equipment must have redundancy to increase both fault tolerance and it must be documented well to maintain to avoid the outage due to human error, and this helps to maintain the overall redundancy in data centers.

The capacity is kW required to serve the load and plus the design margin and growth factors.

Capacity is the power required by the load and is designated as “N”. Higher levels of availability (based on
the criticality of the activity supported by the data center) require higher levels of redundancy. We recommend implementing below level of redundancy in Tier-3 and Tier 4 Datacenter.

2N Redundancy

2N redundancy provides two complete units, modules, paths, or systems for everyone required for a base system. 2N is also referred to as “dual-path topology.” Failure or maintenance of one entire unit, module, path, or system will not disrupt operations. For smaller fault-tolerant systems where a single module can accommodate the critical load, the 2N and N+ 1 model are synonymous.

(N+1) Redundancy

2(N+1) redundancy provides two complete (N+1) units, modules, paths, or systems. The failure or Maintenance of one unit, module, path, or system will still leave intact a system with full redundancy and will not disrupt operations.

Multi-N Redundancy (xN)

A multi-N system topology is used primarily in fault tolerant or large-scale power systems where more than two large systems are employed together. In such a system topology, the critical load connection at the PDU or the branch circuiting level is the primary means of achieving the redundancy and Class of the system.

Below table displays four different levels of design efficiencies for an N+1 topology. For example, if N is
100 kVA, N+1 redundancy can be achieved in any one of the following ways:

- 2 × 100 kVA modules (50%)
- 3 × 50 kVA modules (66%)
- 4 × 33 kVA modules (75%)
- 5 × 25 kVA modules (80%)

Design Efficiency Ratios -Topology UPS or power systems ratio Design efficiency
(Required kW/installed kW)

- N 1:1 100%
- N+1 2:1 50%
- N+1 3:2 66%
- N+1 4:3 75%
- N+1 5:4 80%
- 2N 2:1 50%
- 2(N+1) 6:2 33%
- N + 2 3:1 33%
- N + 2 4:2 50%
- N + 2 5:3 60%
- N + 2 6:4 66%

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