Green IT

Data Center Building—Design, Layout, and Location

- The data center buildings are specialized buildings to hold the large computing and communications equipment of the organization.
- Table earlier, listed building features and their corresponding environmental relevance. Each of those factors affecting the long-term carbon generation needs to be considered in the content of the data center.
- The challenges in handling data centers from carbon perspectives arises from the fact that the data center buildings themselves are based on a ROI over 15–20 years, whereas the internal equipment, the data servers and other computing equipment themselves are usually upgraded every 3 –5 years.

- Therefore, the data center building, together with the data center's n on-ICT infrastructure, c an quite easily (and most often does) consume m ore power than the ICT equipment within it.
- According to Gartner, "Traditionally, the power required for non-IT equipment in the data center (such as that for cooling, fans, pumps) represented on average a bout 60% of total annual energy consumption. In fact, in many cases, the newest data centers of most organizations are seven or more years old whereas the oldest servers in the same data centers are less than five years old." As a result there is a mismatch between the operational efficiency of the data center over its lifetime as compared with the cooling strategies of the data server. The older data centers may thus not be equipped to power and cool the newer IT equipment (servers) in an energy-efficient manner.

With the backdrop of previous Table , following are the specific design, layout, and location consideration for data centers.

- Physical (geographical) location of the building: This includes the weather patterns of the geographical region (such as warm or cold), proximity of the data center building to water and air (for cooling) and the ease of access to the staff
- The building that houses the data center: This may be a dedicated stand-alone facility, or it may be purpose-built within a larger facility, or it may be retrofitted into existing premises.

- The power supply: Data centers usually have dedicated power supplies, and very often more than one. Their efficiency varies enormously. Data centers can also generate their own power, and backup power supplies are common for business continuity.
- Cooling and lighting: Modern ICT equipment typically demand significant a mounts of cooling, either air cooling or water cooling. There are many design and implementation issues that affect power consumption.
- Facilitation of new and emerging technologies: The building of the data center should be conducive to wireless communication, Cloud computing-related communication, and such best practices.

Data Center ICT Equipment—Server Strategies

- They are housed within the green data center and require specific strategies for positioning, cooling, and usage.
- Servers are powerful computers that form a significant part of the IT assets of an organization. Increasingly these powerful servers provide the organization with the ability to access, provide, analyze, and store data, information, knowledge, and intelligence in countless different ways.
- As argued earlier, there is ever increasing demand for more powerful servers with increased storage and processing facilities. With more powerful processors and proliferating number of servers the power consumption continues to climb rapidly

- The average power consumption of a rack of servers has increased fivefold over the last ten years when cooling requirements are taken into account.
- Furthermore, each instance of the use of the server requires strategies for uninterrupted power, security, and storage, and that has repercussions on the carbon footprint o f the organization.
- While desktops are predominantly individual machines, servers belong to t he data center manager who is responsible for providing a service to the rest of the organization rather than using it directly themselves

- This philosophical difference between a desktop and a server requires different server-side strategies for carbon control. This is particularly so because the users of the data application are usually removed from the physical data center.

Following are a list of green server strategy considerations that need to be expanded in detail in practice:

- Online, real-time list of server inventory that enables location and uses of the servers.
- Power consumption bill in real time—mapped to carbon generation, that provides operational feedback to the entire organization.
- Incorporate Cloud computing and server virtualization.
- Incorporate server switching. Data servers should be capable of being switched from one type of usage to another. This also enhance capacity sharing and peak load performance

- Carbon-cost visibility: Lack of visibility of server costs and particularly its mapping to individual or departmental use of space
- Efficient decommissioning: Once the purpose of a server is consummated, there is a need for a formal yet quick way of decommissioning the server. Manual processes for decommissioning and lack of confidence of the data center director/manager can lead to servers lying around and consuming power for no apparent purpose.
- Incorporation right redundancy: Earlier discussion on bit-watt indicates the crucial need for optimum redundancy.