Why ESecureData?

When deciding on a server provider, most people will look at server specifications, data center connectivity and power systems. eSecureData has studied data centre power systems design to develop systems that go beyond the N+1 industry standard for redundancy. This report will follow the power from initial supply at the utility company to delivery all the way to your server.

Primary Power Supply

Where does the power initially come from and how reliable is it? In most cases, this will be your local power utility company. How reliable is that primary power supply and why does that matter? It is a matter of risk. If the primary power supply is offline or browning out regularly it places more load on backup systems which are generally not as reliable as primary utility power. eSecureData's locations use hydroelectric power from BC Hydro, a highly reliable power generating utility[1] [2].

Beyond this, hydroelectric power systems have the unique capability of being able to store huge amounts of energy for lengthy periods, simply by damming water. This creates a power reservoir which can sustain the region for lengthy periods should the need ever occur[3].

In addition to all these functional advantages, hydroelectric power also happens to be the greenest, most environmentally friendly large scale power generation system in common use [4].

Backup Generators

Any reliable data center will have two or more generators, at least one more than is needed to operate the data center. This design is intended to ensure continuous power in the event of primary power supply failure. These generators are controlled by an automatic transfer switch that switches the load from utility power to generator power in the event of a power outage [5] . Control systems sense utility power outages and automatically start the generators. When the generators have stabilized, which generally takes a few seconds, they should be able to carry the entire power load of the data center [6].

UPS

The UPS or Uninterruptible Power Supply is intended to provide continuity of power to servers in the event of power outages. The concept is simple. Incoming AC power is converted to DC and stored in batteries. It is then reconverted to AC and used[7]. While simple on the surface, the details are significantly more complicated. UPS batteries prefer some discharge cycling as opposed to being left fully charged at all times. Batteries fail over time. Components on the UPS system can fail. Some UPS systems employ a line interactive design that switches power to batteries in the event of a power outage, rather than continuously running on DC power stored in batteries. This can result in an interruption of a few milliseconds to do the switchover in the case of a power outage. Is this still uninterruptible? Selection of a UPS that fully addresses all data center needs is a complex challenge[8].

eSecureData uses only true dual-conversion, pure sinewave UPS systems. These are are designed to hold full power load in the event of a power outage, and are tested bi-monthly to ensure they perform within design parameters [9] . These real-world tests ensure that the UPS system successfully carries the power load in the case of an outage, and that no transfer interruptions occur that could result in server shutdowns. In addition to this, we maintain a rigorous maintenance program including real-time monitoring of all UPS systems and regular battery testing to preempt developing problems.

Distribution

In between the utility supply, the backup generators, the UPSs and your server, there is a distribution network of wiring, conduit, switches, fuses, transformers and outlets [10] . No one generally talks about these things because they have existed for decades in their current design and have proven extremely reliable over time [11].

eSecureData uses this reliability as a cornerstone for design. For example, we position our UPS systems at the row level, which results in a UPS failure only affecting a single row, rather than the entire data center. Beyond this, we use multiple smaller transformers at the row level rather than a single larger transformer so that a transformer failure does not affect the entire data center. We even stock spares for our transformers on site, despite the fact that transformers very rarely fail. Our primary

distribution to the row level is comprised of proven distribution components with no electronic or software controls, which minimizes failure [12].

Summary

Power systems in a data center are a complex and challenging design problem. This problem can't be solved by simply looking at UPS and generator specifications. Many factors must be considered, including UPS technology and transfer times, relative reliability of components, and the ability of staff to manage the system and its individual components. eSecureData has considered all of these factors and has designed power systems that have resulted in zero downtime for years at a time. If you are interested in a hosting environment with the best power systems available, take a look at the eSecureData website at www.esecuredata.ca.

You May Also Be Interested In

"Surviving Electric Squirrels and UPS Failures," by Rich Miller, DataCenterKnowledge.com, July 9 2012, http://www.datacenterknowledge.com/archives/2012/07/09/outages-surviving-electric-squirrels-ups-failures/

"Importance of including UPS batteries in computer room temperature calculations," ITWatchDogs.com May 7 2014, http://www.itwatchdogs.com/environmental-monitoring-news/data-center/importance-of-including-ups-batteries-in-computer-room-temperature-calculations-617123

"Understanding Network Failures in Data Centers; Measurements, Analysis, and Implications," by Phillipa Gill, Navendu Jain, and Nachiappan Nagappan, Microsoft Research,http://research.microsoft.com/en-us/um/people/navendu/papers/sigcomm11netwiser.pdf

Dave Story, "More UPS, less downs," April 19 2011, http://www.itbusiness.ca/news/more-ups-less-downs-the-importance-of-backup-power/14376

Rober Perrish, “The 7 most common causes of UPS Failure”, April 18, 2018, https://unifiedpowerusa.com/7-common-causes-ups-failure/

Active Power, “Mitigating Risk of a UPS System Failure”, April 18, 2018, http://www.activepower.com/en-US/documents/3800/wp115-mitigating-risk-of-ups-system-failure-rev-2

Footnotes

[1] Mikhail Poyzner, “Canada, Power Outage Timeline,” MapReporter.com, accessed June 1 2014, http://www.mapreport.com/citysubtopics/canada-d-o.html
[2] “BC Hydro Annual Report,” (2011) pg. 17, https://www.bchydro.com/content/dam/hydro/medialib/internet/documents/annual_report/2011_BCH_AnnualReport.pdf
[3] “Why so big on Hydroelectricity? Its more affordable, more reliable,” a href="https://www.bchydro.com/index.html" target="_blank" >BCHydro.com, May 3 2014, https://www.bchydro.com/news/conservation/2014/affordable-reliable-hydroelectricity.html
[4] Lindsay Wilson, “What is the Greenest Source of Electricity?,” TheEnergyCollective.com, April 14 2014, http://theenergycollective.com/lindsay-wilson/366911/what-greenest-source-electricity
[5] Matt LePard, “Essential Standby Generator System Requirements for Next Generation Data Centers,” The Schneiter Electric white paper library, White Paper 91, 2011, http://www.apcmedia.com/salestools/SADE-5TNRMD/SADE-5TNRMD_R1_EN.pdf
[6] Rich Miller, “7x24: Generators Are Key to Improving Reliability,” DataCenterKnowledge.com, November 15 2011, http://www.datacenterknowledge.com/archives/2011/11/15/7x24-generators-are-key-to-improving-reliability/
[7] “How does a computers uninterruptible power supply work?,” HowStuffWorks.com, April 1 2000, http://computer.howstuffworks.com/question28.htm
[8] Mike Elms, “UPS Systems Need to Be More Reliable Than Ever,” DataCenterKnowledge.com, November 29 2010, http://www.datacenterknowledge.com/archives/2010/11/29/ups-systems-need-to-be-more-reliable-than-ever/
[9] American Power Conversion Corp, “The Different Types of UPS Systems,” EETimes.com, October 28 2004, http://www.eetimes.com/document.asp?doc_id=1272971
[10] “A Guide to Power Problems,” http://www.criticalpowersupplies.co.uk/power-problems
[11] Phillipa Gill, Navendu Jain, and Nachiappan Nagappan, “Understanding Network Failures in Data Centers; Measurements, Analysis, and Implications,” Microsoft Research, http://research.microsoft.com/en-us/um/people/navendu/papers/sigcomm11netwiser.pdf
[12] Phillipa Gill, Navendu Jain, and Nachiappan Nagappan, “Understanding Network Failures in Data Centers; Measurements, Analysis, and Implications,” Microsoft Research, http://research.microsoft.com/en-us/um/people/navendu/papers/sigcomm11netwiser.pdf