



Workbook: Evaluating Data Center High-Availability Service Delivery

Introduction

This workbook is an additional tool for your use. The workbook is organized in a similar fashion to the white paper from Fortrust entitled "Evaluating Data Center High-Availability Service Delivery", and is meant to be used in conjunction with that white paper.

In each section below, we've provided a number of questions you might consider using, along with space for noting or collecting information. Please feel free to use this workbook in whole or in part for your own data center evaluation process. We hope you find it useful.

Please note: A lot of the questions contained within this worksheet will lead to a variety of different answers, many of which are neither right nor wrong. It is up to you to determine whether the questions or the subsequent responses address your organization's requirements.

Key Data Center Selection Criteria

Location and Facility

| Location and Facility | |
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| Is there a lot of construction in progress near the data center? | |
| Does the data center have access to more than one utility grid or separate feeders from different substations? | |
| Is the data center located on an emergency route? | |
| What is the zoning classification? | |
| Is the data center located in an area that puts it at risk of earthquakes, hurricanes, floods, tornados or wildfires? If yes, how would you rate that risk? | |
| What are the sources of your data about natural disaster risks associated with the geographic location of the data center? | |
| What is the history of storms, floods, tornados, hurricanes or other natural disasters at that location? | |
| Where is the facility located in relation to the 100-year floodplain for your area? | |
| What is the maximum predicted flood elevation in your area? | |
| What is the probability of seismic activity in your area? | |
| In what seismic zone is the facility located? | |

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| Are there seismic enhancements to the facility's construction or within the critical systems infrastructure? If yes, provide a detailed description of the facility's seismic enhancements. | |
| Is a lightning protection system in place for the entire facility? | |
| What are the company's contingency procedures for other events or potential risks associated with the data center's location? Are these procedures documented? | |
| How old is the building in which the data center is housed? | |
| Was the facility built as a data center or is it a converted shell or other type of building? If yes, what was its original purpose? | |
| How is the facility constructed? (For example, what were the exterior walls made out of and what are the interior wall fire ratings?) | |
| What materials were used in the roof construction? | |
| Are there windows located in the data center (raised-floor areas)? | |
| If there are windows in the facility but not necessarily in the raised-floor areas, are they hardened or treated from a physical security standpoint? | |
| Is the facility reinforced in any way? If yes, provide a detailed description of the facility reinforcements. | |
| Can the facility's construction documentation and as-built drawings be made available for review? | |
| How close is the nearest fire department or first responders? | |
| Is the facility near or in the flight path of an airport? | |

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| How are potential risks from the local area mitigated? | |
| Is there a hazmat spill procedure that we can review? | |
| What are the operational profile and contingency plan in case the facility and surrounding area must be evacuated? | |

Business Stability

| Business Stability | |
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| Is the company privately or publicly held? If privately held - Do you have financial information you could provide that would indicate the health of the company? | |
| How long has the business been operating in the data center business? | |
| Is the business fully funded for growth? | |
| Are the data center and its equipment and facility wholly owned and operated by the business? | |
| Are there any major components of the electrical or HVAC system that are owned and therefore maintained by someone other than the owner/operator? | |
| Are high-availability data center services the primary focus from a services standpoint? | |
| Is there a disaster recovery and business continuity plan in place? | |

Data Center (Raised Floor) Environment

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| What is the electrical and cooling density in watts per square foot and/or BTUs per square foot? | |
| Are there restrictions or limits on power and subsequent cooling capabilities to an individual cabinet or rack? If yes - What are those limits? | |
| What is the height of your raised floors? | |
| Do you run cabling under the floors? If yes: - How do you keep cabling from restricting airflow, (which can create potential pressure differences)? - What are the cleanliness standards and how are they achieved? What is contained under the raised floor? | |
| At what pressure is the raised-floor plenum maintained? | |
| What is the designed or desired cubic feet per minute (CFM) of air flow in the delivery aisle per tile? How is this monitored? | |
| Is the entire data center space built on the ground floor? | |
| Is your raised floor attached to the concrete slab? | |
| Do cabinets or racks sit un-anchored on raised floors? If no - Are they anchored only to the raised floor or are they anchored to the concrete slab or floor? | |
| What is the load capacity of your raised floor in concentrated load and uniform load? | |
| Is your raised floor grounded? | |

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| What are your minimum ceilings heights (measured from the top of the raised floor)? | |
| Is the ceiling over the raised floor susceptible to radiant heat changes and condensation issues? If yes: - How do you counteract this? - Does water from a source other than an extinguishing system run over the raised-floor areas in any fashion? | |
| How much space do you have available in your data center? How quickly can you build out the space? | |
| Is there adequate space for critical components and systems infrastructure for growth and density? | |
| What is the ratio of raised floor space to mechanical, electrical and critical systems space? | |
| Do you offer customers access to onsite office space? If yes - Is this permanent, temporary or a disaster recovery-type of offering? | |
| Under what conditions can a customer gain access to the onsite office space? | |
| Can we have equipment drop-shipped to the data center? | |
| What is your process for handling customer equipment drop-shipped to the data center? | |
| What is the security protocol around items being received at the location? | |

Access and Connectivity

| Access and Connectivity | |
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| What is the bandwidth capacity at the facility, per carrier? | |
| Is your data center carrier neutral? If yes - How do you define the term carrier neutral? | |
| What carriers have installed fiber in your data center? | |
| How does the fiber enter the facility and how is it secured? | |
| Is the fiber exposed at any point inside the facility so that someone can gain access to it? | |
| Does the fiber enter the building in more than one location? | |
| Are the fiber entrances secured and separated? If yes - By what manner and distance? | |
| Is the fiber transported in conduit? If yes: - Can it be accessed in the facility or is it secured? - Does the conduit run under the slab of the facility? | |
| Can I use a carrier other than the ones that already service your data center? | |
| Are you open to having different carriers have a presence in the data center? | |
| How do you allow for the use of other carriers in your facility? | |
| What is your policy on cross-connects? | |
| Do you provide a managed Internet-access solution that's over redundant and diverse carriers? | |

Physical Security

| Physical Security | |
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| What types of physical security measures do you have in place? | |
| Please describe in detail your approach to physical security with respect to administrative processes for granting access to people such as customers, vendors and visitors. | |
| Are your access controls multi-layered? How? | |
| Is there around-the-clock dedicated security personnel onsite? If yes - Do the security personnel have other duties assigned to them? What are these duties? | |
| Are all of the facility's exterior entrances and exit points monitored by cameras? | |
| Are exterior entrances and exit points alarmed? If yes - How often are the alarms tested? | |
| Is power for the physical security system on a UPS? | |
| Is there camera monitoring throughout the data center areas? If yes: - How are the cameras monitored? - Are they monitored around the clock? - Are they monitored by others in addition to the assigned security personnel? - Are the cameras recorded? | |
| Are there manned security checkpoints and/or traps? | |
| How often are security tours through the facility conducted? | |
| Are the windows alarmed? | |
| What areas are accessible via windows? | |

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| Are the facility and windows resistant to explosions? | |
| Is roof access restricted, alarmed or monitored? | |
| Are customer areas including cabinets, cages and rooms secured in layers? | |
| Do you use an offsite monitoring company to provide additional layers of security? | |
| Do you use any forms of biometric access controls? If yes - What types and in what fashion? | |
| Is the facility location susceptible to crimes? | |
| What is your procedure for items shipped to and received at the facility? | |
| Are the receiving areas monitored by security personnel? | |
| Has your data center ever experienced any security incidents? | |
| Who is responsible for developing your security procedures? | |
| Are your security procedures documented? | |
| How often do you have outside parties audit your security practices? | |
| Do you post any signs on the exterior of the facility that may indicate that it's a data center? | |
| Will our company's presence in the facility be advertised in any fashion? | |
| Do you list your customers housed in your facility anywhere, such as on your marketing materials? | |

Operational Process Controls and Service Assurance, Maintenance and Lifecycle Strategies

| Operational Process Controls and Service Assurance, Maintenance and Lifecycle Strategies | |
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| Processes and SLAs | |
| What are your change management controls? Is there a documented process for change management? | |
| Do you document your maintenance and operational procedures? If yes - Are the documented procedures available for review? | |
| Are there procedures or contingency plans for identified potential risks? | |
| Are revisions to your documented procedures controlled? How? | |
| How is staff training conducted for processes and procedures? | |
| What are your SLAs for electrical power availability? | |
| What are your SLAs for environmental availability? | |
| Do you have SLAs for temperature and humidity? If yes, what are they? | |
| What are your SLAs for technical response and/or remote hands? | |
| Are there penalties (such as service credits) for exceeding the ranges established by the temperature and humidity SLAs? If yes, is the customer required to request an SLA credit if applicable or do you automatically provide the credit? | |
| How are your temperature and humidity SLAs measured and monitored? | |

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| Are temperatures and humidity measured in the delivery aisles above installed computer equipment? | |
| Is there around-the-clock facilities staff onsite other than security or network operations staff? | |
| Please provide a description or matrix of your escalation procedures for all operational events and customer service delivery issues. | |
| Equipment commissioning and initial validation or integrated systems testing | |
| Was an electrical short-circuit coordination study conducted? If yes, is it available for review? | |
| <p>Were the data center facility and critical-systems infrastructure commissioned by a third party or commissioning agent? If yes:</p> <ul style="list-style-type: none"> - Did the commissioning include an integrated systems test to validate the design capacities, redundancies and reliabilities of critical equipment in different modes of failure? - Are the commissioning and integrated systems test reports available for review? | |
| Preventive and predictive maintenance and lifecycle strategies | |
| How is the scheduling for your preventive and/or predictive maintenance managed? For example, is it automatically generated by a software program, do you use hard-copy scheduling or do you use an outside vendor to manage it? | |
| Do you keep a maintenance history for all critical equipment? If yes - Can the maintenance history for a specific piece of equipment be reviewed? | |
| What kind of documented preventive and predictive maintenance procedures do you have in place? | |

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| <p>Are maintenance schedules and equipment history records available for review?</p> | |
| <p>How often do you conduct your maintenance activities?</p> | |
| <p>Do you handle maintenance in-house or is it outsourced? If maintenance is outsourced - Who does the work and at what intervals?</p> | |
| <p>What types of maintenance activities are performed during the maintenance windows?</p> | |
| <p>What are the frequencies of facility-related (electrical or HVAC) maintenance windows?</p> <p>- Does this maintenance work affect redundant circuits to computer racks or cabinets?</p> | |
| <p>Can you provide a list and description of all the facility-related (electrical or HVAC) maintenance windows for the prior year?</p> | |
| <p>Please provide a list of the scheduled preventive and predictive maintenance and testing frequencies for critical infrastructure components such as:</p> <ul style="list-style-type: none"> - Electrical systems (infrared testing) - Emergency generators - UPS devices - Switchgear and transformers - Automatic transfer switches - Static transfer switches - Power distribution units (PDUs) - Remote power panels or circuit breaker panels - Other electrical distribution equipment - HVAC system equipment - Fire and life safety equipment | |

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| <p>Are your generators tested at load? If yes:</p> <ul style="list-style-type: none"> - How often is this performed and at what load percentage of the full-rated load? - How often is end-to-end utility outage testing performed? - What items are inspected and recorded during testing? - Can the most recent test results be reviewed? | |
| <p>What are the cleanliness standards for the raised-floor areas?</p> | |
| <p>How do you manage airborne particulates in the raised-floor areas?</p> | |
| <p>How do you control and manage installation and maintenance activities in the raised-floor areas and in the mechanical and electrical areas? Is there a documented procedure that can be reviewed?</p> | |

Critical Systems Infrastructure Management and Capacity Planning

| Critical Systems Infrastructure Management and Capacity Planning | |
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| Critical equipment | |
| Has any of your critical equipment (UPS devices, generators, chillers, etc) exceeded its useful life? | |
| What is your policy for replacing critical equipment? | |
| What is your process for evaluating and choosing critical equipment? | |
| Who are the manufacturers of your critical infrastructure equipment? | |
| How is your redundant critical equipment configured? | |
| Is any of your equipment reused or refurbished? | |
| Are major critical pieces of equipment (such as generators, switchgear, UPS devices, static transfer switches, PDUs and HVAC system components) sourced from the same manufacturer? | |
| Critical and essential electrical systems | |
| How many utility feeds does the facility receive? | |
| What are the feeder sizes? | |
| What is the current capacity available from the utility on each feeder? | |
| Is there reserved capacity for the facility? | |
| What is the voltage received from the utility service? | |

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| What types of switchgear are used (such as transformers and automatic transfer switches)? | |
| At what points is transient voltage surge suppression (TVSS) equipment used in the electrical distribution system? | |
| How many emergency backup generators do you have in place? | |
| What are the capacities and ratings of the emergency backup generators? | |
| How are the emergency backup generators configured in terms of redundancy? | |
| What type of fuel do the emergency backup generators use? | |
| Are the generators tied to a common bus? | |
| Do the emergency backup generators use paralleling gear? | |
| How long does it take for the emergency backup generators to be online and supply the facility with power in the event of a utility outage? | |
| What is the run time for each emergency backup generator at full load? | |
| What is the onsite fuel storage capacity? | |
| In the event of an extended utility interruption, what is the refueling plan? For example, what are the fuel supply sources? | |
| How many UPS devices service the data center? | |
| What are the capacities and ratings of the UPS devices in kVA? | |
| What types of batteries are used? | |
| What is the battery discharge time at full load? | |

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| How do you manage load capacity on the UPS devices? | |
| What is the current capacity available on the UPS devices? | |
| What are the UPS redundancies? | |
| How many UPS devices can fail without impacting critical load to the data center floor? | |
| How are multiple UPS devices configured? (Single module or common bus?) | |
| What is your policy related to UPS battery replacement? | |
| When was the last time the batteries were replaced? | |
| Do the UPS devices feed straight to the PDUs or are static transfer switches used to provide multiple source UPS devices to the PDUs? | |
| Can we review a one-line drawing of your electrical distribution system? | |
| Can you describe and provide a drawing of the data center's grounding system? | |
| What was the grounding system tested to? | |
| Are cabinets and racks individually grounded? | |
| Critical HVAC systems | |
| Describe in detail the facility's cooling systems for the data center areas. | |
| What is the capacity of the cooling system? | |
| What are the redundancies? | |
| Is refrigerant used on the raised-floor areas in any fashion? | |

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| <p>Are cooling towers used? If yes:</p> <ul style="list-style-type: none"> - How many water taps are supplying the facility? - Provide a description of the system. - What is the backup capacity of make-up water on site? | |
| <p>Is there leak detection under the raised floors and in the mechanical rooms? If yes:</p> <ul style="list-style-type: none"> - How is it deployed? - Is there redundancy in the leak detection devices? - Is the leak detection system continuously monitored, and if so, by what means and who is alerted? | |
| <p>Are there spill containment features in the data center and mechanical plants?</p> | |
| <p>How is humidity controlled in the raised-floor areas?</p> | |
| <p>Can we review a drawing of your cooling system?</p> | |
| <p>Fire and safety equipment</p> | |
| <p>What types of smoke detection and fire suppression systems are in use?</p> | |
| <p>Is there an early warning system in use? If yes:</p> <ul style="list-style-type: none"> - What type of system is it? - Where are the sampling points located? - How is it monitored? - What is the process in the event of an early warning alarm? - What is the process for identifying the source? | |
| <p>How often are the fire and safety systems inspected and tested?</p> | |
| <p>Can we review the maintenance, inspection and testing records?</p> | |

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| <p>Are portable extinguishers used? If yes:</p> <ul style="list-style-type: none"> - Where are they located? - How often are they tested and inspected? - Is onsite staff trained in portable extinguisher use? | |
| <p>What are the fire ratings of internal walls throughout the facility?</p> | |
| <p>Are fire drills conducted on a recurring basis? If yes - What are the process and schedule for fire drills?</p> | |
| Critical systems and equipment monitoring | |
| <p>What types of critical infrastructure monitoring systems are in use?</p> | |
| <p>What equipment is continually monitored?</p> | |
| <p>How are monitoring system alerts and alarms disseminated, escalated and resolved?</p> | |
| <p>Please provide a description of all facility, building and critical systems monitoring systems.</p> | |
| <p>Are individual electrical branch circuits to equipment racks and cabinets monitored continuously? If yes - Are the monitoring reports available for review?</p> | |
| Infrastructure management standards | |
| <p>What is your cable management policy? How is it enforced?</p> | |
| <p>How are critical infrastructure equipment and components labeled? (This includes electrical systems including branch circuits, HVAC systems and fire and safety equipment.)</p> | |
| <p>How are circuit breaker Panels and panel schedules managed and maintained?</p> | |

Learn More

FORTRUST is the leading high-availability data center in the Rocky Mountain region for businesses seeking world-class colocation and data center services. To learn more, visit www.FortrustDataCenter.com.