Office of Information Technology

IT STANDARD

Office of Information Technology Network Closet Power Standard

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Contact:	Chief Technology Officer

PURPOSE

Montgomery College ("College") information technology resources and digital business information are critical to the administrative business of the College and the success of its students. The task of protecting these resources in compliance with Montgomery College Board of Trustee ("BOT") policy and applicable Federal and State laws and regulations is the responsibility of the Office of Information Technology (OIT)

The purpose of this standard is to provide the basis by which the Office of Information Technology (OIT) Network Operations Center (NOC) will monitor and manage the College's IT infrastructure, specifically protecting the organization against loss or degradation of service by providing minimum requirements for installation, management, and monitoring of power in network closets to IT devices in those closets, usually through the use of Uninterruptible Power Supplies (UPSes).

SUMMARY

Technology, and especially the network infrastructure that provides connectedness, is dependent on power. Ultimately, power is the bottom of the pyramid on which technology is built, and sustaining power is a critical element in any IT architecture. The first, and sometimes only, power protection is an Uninterruptible Power Supply, or UPS, that sustains service when utility power is lost, which occurs regularly. As critical elements in an IT environment, UPSes are widely used within IT's infrastructure. Most network and some server devices are attached to small, standalone UPSes. The College has a geographically broad connectivity distribution, spanning three campuses, four satellite sites, nearly 50 buildings, nearly 100 network closets (most with more than one installed UPS), and nearly 500 network switches supporting over 10,000 network nodes. In total, there are over 200 UPSes in use. Reflecting on the importance of UPSes, the College must support an architecture and implementation standard that reflects the criticality of these devices.

SCOPE

This standard applies to all IT devices and services that support the College's mission and are located in identified network closets (called IDFs or MDFs) throughout College buildings and property. This does not include devices in designated College data centers or campus points-of-presence (POPs). In addition, provisions associated with standalone UPSes will not apply where building UPSes are implemented, although other standards may still apply. This standard covers, but is not limited to:

- Network closets that house local network routers, switches, and other devices;
- UPS devices, Power Distribution Controls, receptacles, and environmental monitoring.
- Monitoring to ensure that appropriate device status data is available to the Network Operations Center;
- Real-time response by NOC operators to identified issues;
- A standard for aggregated status data collection, allowing for a correlated perspective on any issues;
- Access on infrastructure power status to various parties, including support staff, managers, directors, and other leadership members, as appropriate.

This standard does not preclude the use of additional monitoring tools or processes that may be implemented as appropriate by IT staff, engineers, or administrators.

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DEFINITIONS

Term	Definition
Asset Management	The OIT group that manages the general IT inventory, including receiving, labeling, and physical delivery.
Data Center Facilities	The OIT group responsible for managing the UPS supply for IT infrastructure uses.
Montgomery College Networks: MCNET, IMCNET and MCFNET	The college networks: administrative, academic and facilities networks respectively.
Network Operations Center (NOC)	The IT monitoring operation, manned by operators utilizing various tools that can be leveraged by other IT staff for various purposes in maintaining their infrastructure devices.
StruxureWare Data Center Expert (DCE)	Schneider Electric's monitoring software for use with APC devices.

STANDARD

Network Closet and IT Device Configuration

1. All network closets will have:
    a. Where possible, at least dual receptacles (2 circuits) 208V - L6-30 preferred;
    b. At least dual receptacles (2 circuits) – 120V - NEMA 5-20;
    c. Where needed for life/safety support, a red emergency generator receptacle (NEMA 5-20 preferred).
    d. Where possible, each closet UPS should have a dedicated receptacle on its own circuit breaker.
2. Where possible, all devices will use dual power supplies to dual power strips to dual UPSes of the same model.
3. Network closets should not be used for general storage. Care must be taken to ensure that air circulation and access to UPSes and IT devices are not impeded.
4. Network closets should have limited access for security and management purposes.
5. All network closets should sustain an ambient temperature in front of any UPS or IT device of 75ºF or less.

UPS Devices

1. The approved list of supported UPS devices will be reviewed annually to determine appropriate capabilities, applicability, and future vendor support. Once the list is approved by the Chief Technology Officer (CTO), all future UPS purchases must be for the designated models.
2. For cost savings, where available, new or replacement UPSes should be purchased as refurbished units from an approved vendor reseller. This provision may be ignored if evidence demonstrates that refurbished units are not performing satisfactorily or are not providing a cost effective solution. Especially when new models are released, refurbished units may not be immediately available, and new units will be purchased.
3. All UPSes will be replaced on a rotating schedule as follows:
    a. At least every 6 years for UPS head units;
    b. At least every 3 years for batteries.
    c. Components may be replaced more frequently as determined by outages, calibration, or degradation. Factors that may lead to accelerated replacement include heat, dust, excessive usage, quality of power, etc.
4. A review of all existing UPS units will be performed annually to identify units reaching end-of-life and units at risk of failure. A schedule will be developed to replace those units over the next year in an appropriate manner.
5. All UPS control units will have a network card installed and configured to report information about the UPS configuration to the UPS management server. When units are replaced, network monitoring

cards will be removed for reuse in other units. New units will be purchased with network cards only if there is an insufficient supply of existing cards to support the inventory.

6. At least 1 temperature probe will be attached to a UPS in each closet. If a unit supporting the temperature probe is replaced, the probe will be moved to the replacement unit or another UPS device in the closet. New units will be purchased with temperature probes only if there is an insufficient supply of existing probes to support the closet inventory.
7. Where possible, all UPS's will be mounted vertically on shelves within the closet racks.
8. The following power constraints should be followed:
    a. Where possible, more than one UPS device should be available in every closet. If appropriate dual power supplies are in use, a closet should have an even number of UPSes to ensure power-independent device availability.
    b. Loads should be split as evenly as possible between UPS devices.
    c. Where possible, all UPS devices should be loaded to less than 60% (preferred) and less than 75% (absolute)
    d. Daisy chaining of units is not allowed.
    e. Units should have a minimum battery runtime of 30 minutes, with 1 extension battery preferred and a maximum of 2 extension batteries. If the runtime cannot be sustained with 2 extension batteries and acceptable load, additional UPSes should be installed.
9. All units will have a "run time calibration "performed annually. Runtime calibration is an action that determines the actual on-battery runtime for a battery set, helping to determine the health of the UPS. The calibration can be performed without any operational impact and minimal risk.

UPS Processing

1. All IT infrastructure UPS purchases must be reviewed by Data Center Facilities staff for standards and approval.
2. All units will be delivered to Asset Management, who will inventory the equipment and confirm that the proper order has been received and is correct. Upon confirmation, Asset Management will notify the Data Center Facilities Manager so that payment can be approved.
3. As directed by Data Center Facilities staff, Asset Management will deliver UPS units to designated depots on each campus within 5 business days of receipt. Any move of UPS equipment from one campus to another will be performed by Asset Management.
4. In the event of an emergency, Asset Management may be directed to deliver received units directly to designated network closets within 3 hours of a request by Data Center Facilities, Network Engineering, or Asset Management staff.
5. In normal circumstances, units will be moved from a campus depot to closets by Data Center Facilities staff and set up, if possible. If a replacement or installation can be performed by Data Center Facilities staff without impact on or risk to production systems, the Data Center Facilities staff will perform the necessary operation. If not, appropriate Network Engineering staff will be notified that new units are in place, and the replacement will be performed by Network Engineering staff at times of their choosing.
6. Once a UPS unit has been removed from service, a work order will be submitted to Asset Management requesting removal of old equipment from the designated closet, which Asset Management will do within 5 days of the request.
7. Failed units that are under manufactures/vendor warranty will be reported to the vendor by Data Center Facilities staff. Return shipping containers will be requested to be sent to Asset Management. A work order will be submitted for Asset Management to retrieve the failed unit and process it as appropriate for the vendor and return delivery service.
8. Reporting
    a. Automated email notifications will be sent by the DCE and separated by event and or requested alert type.
    b. Manual notification will be sent to the Data Center Group and NE Group during an event with relevant information (alert description, location, unit type, runtime remaining, etc.)
    c. Monthly reports shall be sent to NE supervisor, Data Center supervisor and NOC staff. Shall include but not limited to: Environmental temperature, runtime and device inventory. Custom reports may be requested at any time.

Monitoring

1. All infrastructure UPSs must be monitored by NOC. Exceptions must be approved by CTO.
2. The NOC utilizes APC StruxureWare Data Center Expert (DCE) as its standard monitoring tool for power and environmental monitoring. All devices will use OIT's standard SNMP string and be configured to point to the DCE server(s), which reside on MCFNET.
3. Where possible, all UPS devices will have SNMP activated and reporting to the DCE server(s).
4. Where possible, devices will report a range of statuses, dependent on the type and purpose of the device. These include, but are not limited to:
    a. UPS capacity, capacity used, on battery, battery state, input voltage, battery run time;
    b. Where possible, appropriate alerting thresholds, determined in coordination with Network Engineering (NE), will be activated. Initial thresholds will generate an e-mail alert. Escalating alerts will generate text messages, as well as e-mail notifications to additional staff and appropriate managers.
    c. All NE engineers will submit contact information to be reviewed annually or in the event of transfer of ownership. This will include, but is not limited to, campus/closet administrator name, office phone, cell phone, email, and after hours' availability.
5. Alerting thresholds and triggers will be developed and implemented. As appropriate, automated e-mail notifications will be sent by the DCE to designated OIT staff. Where necessary, Data Center Facilities staff will provide appropriate information to the Data Center and Network Engineering Groups with relevant information (alert description, location, unit type, runtime remaining, etc.).
6. Designated monthly reports shall be provided to Network Engineering Manager, Data Center Facilities Manager, and appropriate staff. Custom reports may be requested from the NOC at any time and will be provided within 1 business day.

EXCEPTIONS

Exceptions to this policy will be considered on a case-by-case basis in accordance with the IT Exceptions Request Form.

COMPLIANCE AND RECOURSE FOR NON-COMPLIANCE

Montgomery College has established College Policies/Procedures and the OIT has established IT Standards and Processes and associated guiding documents to provide appropriate protection of technology resources, to assure protection of personally identifiable and sensitive information and to promote privacy. Any faculty, staff, contractor, vendor or other agent found to have violated any part of College Policies, Procedures or IT Standards or Processes may be subject to disciplinary action and/or legal action.

RELATED DOCUMENTS

- Acceptable Use Policy and the accompanying Procedure/Guidelines Statement
- http://cms.montgomerycollege.edu/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=7331

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APPROVALS

DATE	VERSION/REVISION/NOTES	APPROVER
5/22/2017	Original roll-out of this Network Closet Power	Patrick Feehan, Information Security and Privacy Director/ITPA
12/21/2021	Minor revisions to exclude control and approval of non-infrastructure UPS devices.	Joseph Marshall, Director of Data Center Operations