

Maine School Administrative District #75 Infrastructure Maintenance of Effort Plan - Standards

Equipment standards Introduction. Standards are essential to maintaining highly available and manageable networks. By standardizing on industry standard devices, the District ensures the fastest possible resolution to critical network issues and ensures reliable day-to-day network performance. Through the standardization of equipment, savings in technician training is also realized. The goal of equipment standardization is consistent with the goals of the Total Cost of Ownership plan. All new infrastructure equipment purchased and installed in the District will follow the guidelines described below.

Internet Point of Presence. The District Internet point of presence is located at the district office and protected by firewall technology. Additional Internet connections are strictly forbidden and will be terminated by the technology department as they are identified. This includes but is not limited to Cable Modem, DSL, T1, Dial-up etc. Technical management of all District network accounts is limited to the director of technology and their designee(s). Inquires of account services, contracts, e-rate, billing, and payments are limited to the director of technology and business manager including their designee(s).

Management of Network Devices. The director of technology grants management privileges of network devices. Only devices authorized by the director of technology are allowed on the Link75 network. Only authorized managers are allowed access to the management consoles of network devices.

Bridges. The District elementary and transportation wide area network connectivity is provided by a high-speed hybrid-fiber cable (HFC) network owned and maintained by Susquehanna Communications. This HFC network utilizes Bay Networks' LANcity bridge (cable modem) technology to provide 10 Mbps, dual channel symmetrical connectivity for each site - 20 Mbps (aggregate) bandwidth. The LANcity equipment effectively provides a secure, private virtual network that is switched at the Susquehanna Communications head end facility. The LANcity equipment utilizes the Unilink protocol that is very similar to ATM in that it is capable of carrying voice, video and data. The Unilink protocol is unique in that it optimizes the bandwidth usage. Unlike Ethernet, up to 95% of the theoretical bandwidth is available for data transfer. In addition, the LANcity bridges can be software configured to provide any bandwidth up to 10Mbps (per channel), from as little as 64kbps up to the full capacity, remotely, without the need to upgrade any customer premise equipment. This bridged service provides transparent transport for MSAD#75's TCP/IP and IPX/SPX network. Segmentation across the WAN is accomplished through TCP/IP and IPX/SPX routing utilizing Cisco routers at each site.

Fiber Optics. A fiber wide area network supporting Mt Ararat High, Mt Ararat Middle, Lodge, District Office. Internal fiber optic connections are in use at Williams-Cone and Mt Ararat Middle School. Additional fiber optic terminations are available at Mt Ararat High School. For internal connections (rack to rack) a minimum of four pairs will be installed when new fiber services are installed. For external connections (building to building) a minimum of 12 pairs will be installed. At least one, preferably two extra pairs will be terminated and ready for use. Multimode versus single mode decisions will be made based on the distance and specific requirements of the system. All fiber installations will include the latest "best practices" industry standard methods of installation and termination. For external fiber connections this must include the use of conduit, deep burial, magnetic marker tape, and clear documentation regarding the location provided to the District and DigSafe.

Routing. Network routing services are standardized on Cisco hardware and IOS. Cisco devices improve the overall efficiency of the network operations and network performance, with the added

benefit from Cisco's engineering knowledge and experience base, leading practices and innovative, web-based tools. Network protocol support is provided in large part by the CISCO IOS, specifically in providing WAN communication. Supported protocols for the Wide Area Network include TCP/IP, EIGRP, and IPX/SPX. Supported LAN protocols add the AppleTalk to the WAN list. Although the above protocols are fully supported as described, the technology department is working towards the elimination of IPX/SPX from the WAN and AppleTalk from the LAN. Applications and services relying on AppleTalk and IPX/SPX are in the process of being converted to TCP/IP based solutions. All future implementations of hardware and software must utilize TCP/IP as the protocol of choice.

Uninterruptible power supplies (UPS). UPS devices are procured from American Power Conversion (APC) devices. UPS devices installed in remote network locations are configured with remote management capabilities. APC devices protect the District systems and information by supplying reliable, network-grade power to mission critical systems. Management software provides safe server and network systems shutdown during power brownouts, outages, and spikes. Advanced UPS management tools provide solutions to complex recurring power related issues. Devices are selected based on equipment wattage requirements necessary to keep connected equipment running for a minimum of 2 hours for network connectivity devices, and a minimum of 30 minutes for network servers. This ensures that servers and networks can be accessed and gracefully shutdown to prevent hardware damage, minimize data loss and assist in returning systems to normal when power issues are resolved.

Network switches and hubs. All network switches and hubs will be procured from Hewlett Packard within the Procurve series of devices. HP offers a life time hardware replacement and technical support services to the Procurve line of equipment. HP is both competitive in initial cost and in providing high quality service that meet the demands of the District network. Specific device models and modules will be based on network size and performance requirements as well as port density needs. Additional considerations will be made to ensure the device installed will support future planned expansion as well as compatibility with existing technician knowledge and network management tools. Current devices supported include the 2500, 4000, and 4108 series devices along with a cadre of SX/FX fiber transceivers, and various 10/100/1000 modules.

Network servers. All network servers will be procured from Dell within the PowerEdge series. All newly purchased servers will have at least 2GB of RAM, four 36GB hard drives in a RAID 5 array (one designated as a hot spare), redundant power supplies, and an Intel Xeon 3.0 MHz or better processor. Additionally, a five-year next business day warranty will be purchased that will cover all hardware systems and include technical support.

Server operating systems. All file and print services will be managed by the Novell NetWare operating system, currently version 6.0. Application-specific servers may use Windows 2000 server or Windows 2003 server operating systems, depending on application requirements.

Web server operating systems. Apache 1.3 and Novell's Enterprise Web Server software is currently the Web server standard. Apache 2 will be implemented on all new Web servers and will be used to facilitate district-wide Web hosting. Web servers will also use the standard network servers and server operating systems listed above.

Disaster Prevention Planning. Rack and equipment locations within buildings must provide appropriate ventilation, air conditioning, security, flood protection, and adequate power. The District has standardized on BackupExec storage solutions software. Backup is provided on DLT and DDS tape using single and autoloader devices. Raid 5 storage solutions is the standard server drive configuration. Additional considerations and standards are documented within the disaster recovery plan.

Software. Network management software is essential in ensuring systems are operational and optimized to provide consistent and reliable services. Management software provides a solution to manage multiple devices and networks from a single point minimizing man power requirements. This specialized software provides advanced troubleshooting tools, diagnostics utilities, alert mechanisms, problem tracking, trend analysis, report generation, activity and problem logging.

Equipment maintenance contracts. Whenever possible, equipment maintenance contracts must be obtained and maintained as part of the initial purchase and as part of the equipment life-cycle. The original hardware vendor will be used for critical network and server components. Third- party solutions will be used for peripheral and workstation components.

Inventory. A small inventory of emergency replacement network devices will be kept on hand. This includes a minimum of one “functional” router, switch, fx fiber modules, sx fiber modules, 10/100 blades, UPS device, etc. These devices may be temporarily placed in service within repair and testing centers at the district office and or remote sites to be used by technicians to support non-mission critical activities. These devices will quickly be moved into active service when necessary. Inventory of spare devices will be minimized to only essential items to bring systems back online in emergency situations.