Grainger County Schools

Wiring Guidelines

This document outlines the guidelines for all wiring in any Grainger County Schools building. Deviations from these guidelines must be approved by the Director of Technology or any member of the Central Office Instructional Technology Staff. Deviations cannot be approved by building technology leaders.

The word "label" in this document means *machine printed flag style label* with the exception noted below. Those unsure about label specifications mentioned in this document should contact the Director of Technology or a member of the Central Office Instructional Technology staff before proceeding.

Section 1 - Cabling/Labeling Specifications

1. Cable labels shall be printed on 1/4" tape.
2. Cables used in any wiring closet shall not be longer than five (5) feet long. The only exception to this rule is fiber cables used to interconnect network devices in which case ten (10) foot cables may be used. If long fiber cables are used, the installer is responsible for properly wire managing cable(s). Fiber cables shall not be wire managed with other non-fiber cables. If cables longer than the above are needed approval must be granted by the Director of Technology or a member of the Central Office Instructional Technology staff.
3. Cables shall be color-coded to indicate the device connected to the other end. The color code shall be as follows:

   o **Red** – server or other extremely critical device.

   o **Yellow** – connections between the MDF and IDF.

   o **Blue** – any other workstation connected to the network.

4. Upon connection of any device utilizing a yellow cable, Grainger County Schools Central Office Instructional Technology staff shall be notified. All connections of this type shall be hard set on the switch port to 1000mbps, full duplex.
5. All non-blue cables shall be labeled on **both ends of the cable** (patch panel and switch port) indicating the device connected to that port.
6. All cables connecting frames/closets shall be identified indicating the destination closet of that cable (see naming conventions below).
7. Egress cables shall be labeled as such. They shall indicate the provider of the service and any appropriate circuit numbers.
8. At a minimum, 48 port patch panels shall be used throughout all Grainger County Schools wiring closets. Note: at present, some closets contain patch panels and switches with more than 48 ports. In this case, 96 port patch panels shall be used in wiring closets with more than a 48 port switch. New equipment shall meet the specifications of this point and the next.
9. Switches in Grainger County Schools wiring closets will be either 48 ports, 72 ports, or 96 ports.
10. All connections between switches and routers shall be full-duplex fiber or other high-speed (1gbps or higher) connections. Gigastack or other half-duplex connections shall not be used.
11. All cables shall be properly wire managed. Wire management is an integral part of all Grainger County Schools wiring closets. Velcro fasteners are used to wire manage all cables from patch panel to switch port. Cables are managed from the middle of each patch panel by row to their respective side. For example: a 48-port patch panel will have ports 1-12 bundled together to the left side of the cabinet. Ports 13-24 will be bundled together to the right side of the cabinet. Ports 25-36 will be bundled to the left side of the cabinet in a separate bundle than ports 1-12. Ports 37-48 will be bundled to the right side of the cabinet in a separate bundle than ports 13-24. Thus, 4 bundles of wires will come from each 48-port patch panel (two to each side of the cabinet). Cables shall not cross an imaginary dividing line drawn through the center of the patch panel (between ports 12 and 13).
12. Plastic cable ties shall not be used on the front side of any patch panel/switch. Cables on the front of a cabinet/closet shall be managed with Velcro fasteners. If an outside vendor does not have Velcro fasteners, they must contact a member of the Central Office Instructional Technology team to procure the necessary fasteners. Velcro fasteners as used in this document refers to double sided Velcro tape or Velcro fasteners specifically designed for cable management. Plastic cable ties may be used on the back side of cabinets.
13. Devices receiving power from POE ports on switches shall be labeled as such. Such labeling may be "P-" with the other required information on the label. If the vendor's labeling hardware includes graphical images, the inclusion of a power icon is sufficient.
14. All cables outside of the wiring closet shall be clearly labeled as follows:

   o Boxes installed on/in walls shall be clearly labeled as to the patch port to which **each** connection connects (Outside cabling vendors may be summoned to return on-site **immediately** {meaning they will have to stop any work in progress at any other site, regardless of the client or any real or potential loss of business, and return to the

Grainger County Schools} if Grainger County Schools personnel discover mis-labeling).

○ Labeling shall consist of closet number, patch panel, port: for example, 2A34.

○ Cables inside boxes shall also be clearly labeled within easy sight upon removal of box face plate (inside the wall box without having to pull the cable) with the same information. This label, and this label only, may be done by hand.

○ Horizontal runs which terminate in ceilings and/or in junction boxes not in "public" areas (crawl spaces, floor boxes, etc) should be labeled with permanent marker written in an easily viewable area rather than tape.

15. Any cable terminated with RJ-45 connectors shall be properly terminated. This means that a sufficient amount of the cable jacket shall be crimped into the strain relief mechanism of the connector to ensure **no part** of the twisted pair(s) cables shall be exposed beyond the end of the connector.
16. It is desirable that a service loop **at least** 12 inches long be utilized for **all** connections. The service loop should be bound *neatly* into a circle just above the ceiling and/or conduit.
17. **All** cabling and ports shall be tested by the cable vendor to ensure correct wiring before contacting Grainger County Schools personnel to approve work. See warnings about mis-labeled cables above. Our staff has the ability to quickly check the wiring accuracy of each drop. We may, but will not necessarily, check any drops to accept work done by an outside vendor. ***However, upon discovery of one incorrectly wired port, our assumption shall be that all ports are mis-wired and we will require the re-certification of all runs installed by this vendor at the time the mis-wired port was installed.***
18. Horizontal cable runs do not have to follow the color specifications mentioned above. "Horizontal" in this document means the back side of the patch panel to the back side of the wall mounted box. However, horizontal runs must be labeled on the box end of the cable as specified above.
19. Vendors installing networking hardware (switches, routers, etc) into any Grainger County Schools wiring closet shall physically install the hardware into the frame using a minimum of four screws to secure the hardware. Final approval for payment will not be forthcoming until all hardware is properly secured into the frame.
20. Fiber pairs shall utilize adjacent connectors in the patch panel. Under no circumstances are non-adjacent ST fiber patch panel fiber connections to be utilized for a connection.
21. Any device requiring special consideration(s), programming, and or VLAN membership shall be clearly indicated by a flag label on the cable *in addition to* the name label.
22. Half-duplex/10mbps devices are not desirable in the Grainger County Schools network. However, if they must be utilized, Central Office Instructional Technology staff *must* be notified **before** connecting such devices. Any half-duplex device must have its corresponding switch port hard set. This same provision also applies to any 10mbps device.

Section 2 - Naming conventions

The following points, in general, apply only to Grainger County Schools Instructional Technology personnel. A standard naming convention shall be used as follows:

1. Closets/frames shall be named with the building abbreviation, "-", the abbreviation MDF/IDF as appropriate, "-", and the room number containing the frame/closet.

   a) For example, the MDF at the Central Office is CO-MDF-01. The fiber connection connecting this closet to the upstairs closet shall be labeled "To CO-IDF-<room number>." The other end of the connection upstairs shall be labeled "To CO-MDF-01."

2. There shall be only one MDF per building. ***MDF within the Grainger County Schools means the point in the network where egress is obtained.*** There may be exceptions to this provision. If so, they will be indicated by the name of the closet (see preceding provision).

3. Building abbreviations are as follows:

   a) Central Office – CO

   b) Joppa Elementary School – JES

   c) Rutledge Middle School – RMS

   d) Rutledge Elementary School - RES

   e) Grainger High School – GHS

   f) Rutledge Primary School – RPS

   g) Bean Station Elementary School – BSE

   h) Washburn School – WS

4. All closets/frames shall be clearly labeled with one inch tape indicating the name of the frame either on the door of the frame or in a location clearly visible inside/on the frame.

If possible, the name shall also be placed on the door frame of the room containing the frame.

5. Switches shall be named utilizing the nomenclature above with "SW-" and the switch number appended. For example, the first switch (by number, not necessarily by the physical arrangement of switches in the frame) in the Central Office MDF above would be named CO-MDF-01-SW1. This name shall be indicated by 1/4" tape on the face of the (each) switch.

6. Routers programmable by Grainger County Schools personnel shall use the same provisions but will append "RT-".

Section 3 - Addressing/Programming

1. All switches or other devices programmable by Grainger County Schools personnel shall be addressed in such a manner they may be accessed/programmed through a web browser from a machine inside the Grainger County Schools network.

2. All devices utilizing non-blue cables or needing special switch considerations should be so indicated in the comment field for the appropriate port when programming the port.