



# DEPARTMENT OF INNOVATION & TECHNOLOGY

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## COMMUNICATIONS SYSTEMS CONSTRUCTION STANDARDS

### PURPOSE:

To ensure that the districts communications networks are treated as an essential component of all new and renovated district buildings. As such, networks should be designed and funded as part of the basic building infrastructure, just as electrical wiring and plumbing are presently funded. This will also ensure that all faculty, staff, and students in new or renovated buildings will receive readily accessible network connectivity.

To ensure that all new or renovated district networks can reliably communicate with all other networks and ensure common standards throughout the district.

Implementation of these network standards is straightforward. Anytime an area is involved in planning a network, renovating an existing network, building a new building, or renovating an existing space, The CCSD Technology Department must be consulted, prior to the start of the project. Our staff will work with you to smooth out the details, including complying with CCSD networking standards in all phases of your project. We will also assist you in ensuring that all appropriate network costs are included in your project budgets.

### 1 GENERAL:

- a. The Director of Information Technology or his/her designee must approve in advance all Data/Telecommunication network designs and installations as well as verify upon completion of the project that all CCSD standards have been met.
- b. This document outlines the minimum standards. Whenever and wherever OSHA and/or federal, state, and/or local laws or regulations and/or design require higher standards than is included in this document, then these laws and/or regulations and/or design shall be followed.
- c. All work shall be executed by persons certified/skilled in the work to which they are assigned; this shall include all copper and fiber connections, including testing.
- d. All materials and equipment in the project shall be new (unless specified otherwise), and produced by manufactures of recognized reputation.
- e. The CCSD IT Department reserves the right to specify any and all materials, parts and equipment used in the project. For a list of specified cabling, components, and other items, please refer to Appendix A. We reserve the right to, without notice, change or replace any items on this list. Please be sure to obtain the most recent revision of this document prior to beginning the project. Items not listed in Appendix A, that are needed to complete a project, need to be submitted for approval prior to use.

## 2 COPPER DIGITAL (DATA/VOIP) – PREMISE WIRING:

- a. This section shall govern products and installation of copper data communication premise wiring (Vertical, Horizontal, Patch, Etc...).
  - i. Cabling installations must comply with TIA/EIA-568 standards.
  - ii. Cabling must be CAT6 UTP certified and grey in color.
  - iii. Minimum of 6 ft. service loop at all wiring closet termination points for all horizontal and vertical premise cabling.
  - iv. Modular connectors, patch panels, and all other connection points must be CAT6 rated.
  - v. Data/VOIP Modular CAT6 jacks must be grey in color.
  - vi. Cables must not be booted.
  - vii. Patch panels must be utilized for all wiring closet terminations.
    1. 24 port “quickport” patch panels are required. If a higher port density is called for, multiple 24 port quickport patch panels can be used, but they must be spaced 1U apart to allow for networking equipment to be inserted.
    2. 48 port panels of any kind are strictly prohibited
  - viii. All premise cabling installations must be performed by a certified/skilled cable installer, certified by Berk-Tek.
  - ix. All premise cabling ends must be labeled in accordance with CCSD labeling standards.
  - x. All cabling termination points (Patch Panels, Modular Jacks, and Modular Connectors) must be labeled in accordance with CCSD labeling standards.
  - xi. All premise wiring must be tested after installation to verify that it is working and in compliance with CAT6 ANSI/TIA/EIA 568 standards.
  - xii. T568B pin assignments must be used
  - xiii. Patch cables must not exceed 5 meters at the patch panel or between the network jack and the endpoint device.
  - xiv. Cable management panels, wire ties, velcro, wall anchors, and other applicable cable management methods must be used where applicable to contain excess cabling.
  - xv. Installations must include a 15 year manufacturer warranty on all associated cables and components.
  - xvi. For high availability and expansion purposes, a minimum of two CAT6 cables shall be installed at each network drop (wall port) location.

### 3 COPPER ANALOG (VOICE) – PREMISE WIRING:

- b. This section shall govern products and installation of copper analog voice communication premise wiring (Vertical, Horizontal, Patch, Etc...).
  - i. Cabling installations must comply with ANSI/TIA standards.
  - ii. Cabling must be CAT6 UTP certified and grey in color.
  - iii. Minimum of 6 ft. service loop at all wiring closet termination points for all horizontal and vertical premise cabling.
  - iv. Modular connectors, patch panels, and all other connection points must be CAT6 rated.
  - v. Analog Modular jacks must be white in color.
  - vi. Cables must not be booted.
  - vii. Patch panels must be utilized for all wiring closet terminations.
    - 1. 24 port patch panels are required. If a higher port density is called for, multiple 24 port patch panels can be used.
  - viii. All premise cabling installations must be performed by a certified/skilled cable installer, certified by Berk-Tek.
  - ix. All premise cabling ends must be labeled in accordance with CCSID labeling standards.
  - x. All cabling termination points (Patch Panels, Modular Jacks, and Modular Connectors) must be labeled in accordance with CCSID labeling standards.
  - xi. All premise wiring must be tested after installation to verify that it meets specifications.
  - xii. Cable management panels, wire ties, velcro, wall anchors, and other applicable cable management methods must be used where applicable to contain excess cabling.
  - xiii. Installations must include a 15 year manufacturer warranty on all associated cables and components.

#### 4 FIBER - PREMISE CABLING:

- a. This section shall govern products and installation of fiber data communication premise wiring (Vertical, Horizontal, Patch, Etc...).
  - i. Cable must be 50/125 multimode, Aqua in color, and not exceed 150 meters, unless otherwise specified.
  - ii. Must comply with OM4 standard.
  - iii. Connectors, patch panels, and all other fiber connection/termination points must be OM4 50/125 multimode fiber rated.
  - iv. Minimum of 6 ft. service loop at all wiring closet termination points for all horizontal/vertical premise cabling.
  - v. Wall mounted fiber distribution/termination boxes must be used at both ends of all horizontal and vertical fiber cable runs, unless otherwise specified.
  - vi. Rack mounted fiber distribution/termination panels may also be required depending on the installation location and shall be coordinated with the CCSD IT Department.
  - vii. Connectors will generally be LC, or LC-Duplex, but may vary depending on the project and shall be coordinated with the CCSD IT Department prior to ordering.
  - viii. Fiber patch cable length will vary by project and shall be coordinated with the CCSD IT Department prior to ordering.
  - ix. All premise cabling ends must be labeled in accordance with CCSD labeling standards.
  - x. All fiber distribution/termination boxes and distribution panels must be labeled in accordance with CCSD labeling standards.
  - xi. Cable management panels, wire ties, velcro, wall anchors, and other applicable cable management methods must be used where applicable to contain excess cabling.
  - xii. The installation of all fiber optic cabling and related terminations and equipment shall be by a trained technician with a minimum of (2) years of experience and certified by Berk-Tek. The contractor/installer shall be responsible for furnishing all specialized tools required for proper installation.
  - xiii. Installations must include a 15 year manufacturer warranty on all associated cables and components.

## 5 EQUIPMENT RACKS:

- a. This section shall govern the products and installation of equipment racks.
  - i. Rack width must be 19 inches and comply with EIA 310-E standards.
  - ii. Rack type will depend on application and shall be coordinated with the CCSD IT Department.
  - iii. Racks will not contain pre-drilled holes, only cage-nuts.
  - iv. Rack height will vary by project and shall be coordinated with the CCSD Technology Department.
  - v. Enclosed lockable racks shall be used in all circumstances and shall be coordinated with the CCSD Technology Department.
  - vi. Dependent upon the situation, enclosed racks must be equipped with a functioning exhaust fan. Coordinate with CCSD Technology for further instruction.
  - vii. Wall mount racks must be equipped with front and rear swing hinges to allow access from both ends.
  - viii. Racks must have a minimum of 21 inches of usable depth.
  - ix. A single 4-plex power outlet shall be installed directly above and outside of the rack. A knockout or other opening must be provided for power cable routing.
  - x. Power and data cables must be routed through separate openings.
  - xi. A rack mount surge protector, specifically APC #NET9RMBLK must be used.
  - xii. Nothing shall be installed in the rack that would limit the usable depth, such as Type-66 Telco Splice Blocks, power outlets, fiber distribution boxes, etc.
  - xiii. A "25-pair" cable and associated Type-66 Telco Splice Block is required to be installed with each rack in most cases and shall be run back to the main phone panel. Since circumstances will vary, this shall be coordinated with the CCSD Technology Department.

## 6 DOCUMENTATION:

- a. This section shall govern the documentation required to be provided to the CCSD Technology Department.
  - i. Contractor is to submit to the CCSD Technology Department a complete documentation package prior to commencement of the project. The package shall include:
    1. Drawings – must show all network drop locations digital/analog and general cable routing.
    2. Any item of work not clearly included, specified or shown, and any errors or conflict between project drawings, specifications, codes and field conditions shall be clarified by a written request to the CCSD Technology Department.
    3. Materials listing – a complete list of all materials used, including manufacturer, part number, and distributor (name, address and phone number), unless the components are on the Specified Equipment List in Appendix A.
    4. Cut-sheets of all proposed components are required, unless the components are on the Specified Equipment List in Appendix A.
    5. Qualifications summary – must detail the experience, training, and certification(s) of all personnel who will be working on the project.

Should the contractor commence work prior to approval of submittals, any additional costs shall be borne by the contractor.

- ii. Contractor is to provide to the CCSD Technology Department a complete network documentation package upon completion of the project. The package shall include:
      1. As built drawings – must show all network drop locations digital/analog and general cable routing.
      2. Materials listing – a complete list of all materials used, including manufacturer, part number, serial number if applicable, IP address, DNS name, distributor (name, address and phone number), and user/service manuals if applicable, unless the components are on the Specified Equipment List in Appendix A.
      3. Printed test certifications on all installed copper and fiber cable runs, to verify compatibility with ANSI/TIA/EIA, or ISO/IEC standards.

**7 LABELING:**

- a. This section shall govern the identification and labeling of the communications cabling system.

Identification/Labeling Identifier Table:

Identifier	Description of Identifies
Bld## (Bld01-Bld99)	Building Number
cs (01-99)	Communications space
R## (R01-R99)	Communications Rack
pp (A-Z)	Patch Panel
P## (01-24)	Patch Panel Port
uid	Unique ID Number

Identification/Labeling Example Table:

Description	Identifier	Example
Horizontal Link ID	[cs][R##]-[pp][P##]	01R01-B24
Vertical Link ID	[cs][R##]-[pp][P##]	01R01-B24
Intra-Building Back Bone Link ID	[cs]/[cs]-[uid]	01/07-01
Inter-Building Back Bone Link ID	[Bld##-cs]/[Bld##-cs]-[uid]	Bld03-01/Bld01-07-03
Wall Jack ID	[cs][R##]-[pp][P#]	01R01-B24

- i. All labels shall be machine-printed, crisp, clear, non-smearing and extremely legible.
- ii. Label color shall be black lettering on white background.
- iii. Labels shall be durable for the life of the system (the 15+ year manufacturer system warranty); Labels which can be easily removed shall not be utilized.
- iv. Labels should be sized according to cable diameter, faceplate, and readability.
- v. Labels shall be thermal-transfer type, and utilize self-adhesive labels.
- vi. Handheld labelers such as; Brady - IDXPRT, Dymo - Rhino, Hellermann Tyton - Spirit 2100, Panduit - LS8E or LS9 are acceptable.
- vii. Install labels in such a way as to be physically and visually accessible.
- viii. Labels must be installed within 6 inches of cable ends, in the case of wall jacks and patch panels, directly above the modular jack or in the designated labeling area.
- ix. Remove any temporary/superseded labels and ensure no permanent labels were damaged during construction.

## **8 CLEANING:**

- a. This section shall govern the minimum cleaning requirements
  - i. At the completion of the work required and prior to acceptance by the CCSD Technology Department, thoroughly clean all exposed equipment, fittings, fixtures and accessories.
  - ii. Old copper cables, fiber cables, and equipment that is no longer in service must be completely removed.
  - iii. At the completion of work each day, the contractor shall clean all work areas of debris, trash, dust, etc.
  - iv. All ceiling tiles shall be reinstalled and materials placed in the designated storage area(s).
  - v. During work, all computers, bookshelves, desks, televisions, etc. shall be covered with drop cloths to protect from dust and debris. Drop cloths shall be removed at the end of each day of work.
  - vi. All areas shall be restored to a normal condition, as found, at the end of each day of work, unless prior district approved arrangements have been made.



**APPENDIX A**

**SPECIFIED EQUIPMENT LIST**

Part Number	Manufacturer	Color	Quantity	Description
<b>CAT6 COPPER CABLE</b>				
11096490	Berk-Tek	Dark Grey	1000 Ft.	LANmark 1000 Enhanced CAT6 Riser Cable - Box
11091087	Berk-Tek	Dark Grey	1000 Ft.	LANmark 1000 Enhanced CAT6 Plenum Cable - Box
10032678	Berk-Tek	Dark Grey	1000 Ft.	LANmark 1000 Enhanced CAT6 Patch Cable - Box
<b>WALL PLATE</b>				
42080-[?]WS	Leviton	White	1	QuickPort - Single-Gang, With ID Window, Up To 4 Ports
42080-[?]WP	Leviton	White	1	QuickPort - Dual-Gang, With ID Window, Up To 4 Ports
<b>WALL JACK</b>				
61110-RG6	Leviton	Grey	1	eXtreme 6+ QuickPort Connector CAT6
61110-BG6	Leviton	Grey	25	eXtreme 6+ QuickPort Connector CAT6
<b>PATCH PANEL - FLAT</b>				
49255-H24	Leviton	Black	1	1RU 24 Port QuickPort Flat Panel (Empty)
69270-U24	Leviton	Black	1	1RU 24 Port QuickPort Flat Panel (Full)
<b>WALL-MOUNT ENCLOSED PACK</b>				
11840-724	CPI	Black	1	Cube-iT Plus Cabinet System, (Physical Dimensions - 24" h x 24" w x 24" d), (Usable Dimensions Height 12RU, width 19" EIA-310-D, Depth 22.8")
11900-736	CPI	Black	1	Cube-iT Plus Cabinet System, (Physical Dimensions - 36" h x 24" w x 24" d), (Usable Dimensions Height 18RU, Width 19" EIA-310-D, Depth 22.8")
12804-701	CPI	Black	1	Cube-iT Cabinet System Fan Kit, 100CFM, 115VAC, 50/60Hz
<b>4 POST ENCLOSED RACK AND VENTILATION</b>				
RACK-151-42U	RackSolutions	Black	1	Server Cabinet Enclosure Model - 1000mm depth x 600mm width
RACK-151-FANTRAY-6	RackSolutions	Black	1	Server Cabinet Roof Fan Tray
<b>SURE PROTECTOR</b>				
NET9RMBLK	APC	Black	1	1RU Black Rack-mount SurgeArrest 9 Outlet 120V 1700 Joules
<b>RACK-MOUNT FIBER DISTRIBUTION HOUSING</b>				
5R1UM-S03	Leviton	Black	1	1RU, empty, with sliding tray, accepts 3 adapter plates
5F100-2QL	Leviton	Aqua	1	Plate (aqua), 50 µm LOMM (OM 3 & 4) Duplex, 12-fiber, zirconia ceramic sleeve
<b>OM4 FIBER OPTIC CABLE</b>				
PDR006FB3010/F5-I/O	Berk-Tek	Aqua	6 F	OM4 50/125 Multimode Tight-Buffered Cable, Indoor Riser
PDP006FB3010/F5-I/O-C4	Berk-Tek	Aqua	6 F	OM4 50/125 Multimode Tight-Buffered Cable, Indoor Plenum
PDRK006FB3010/F5	Berk-Tek	Aqua	6 F	OM4 50/125 Multimode Tight-Buffered Cable, Indoor Riser Armored
PDPK006FB3010/F5	Berk-Tek	Aqua	6 F	OM4 50/125 Multimode Tight-Buffered Cable, Indoor Plenum Armored