

FDOT District 5 Cabinet Wiring

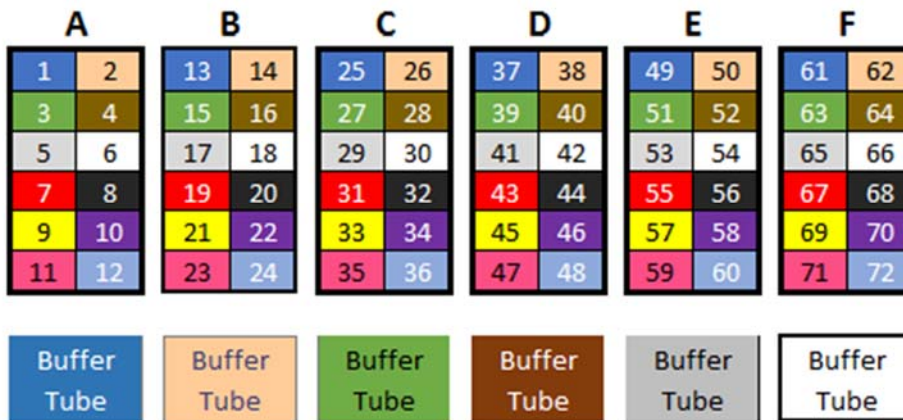
Master Hub Fiber Terminations

Master hub locations where backbone cables enter, shall have all fibers terminated in a patch panel with a ratio of one coupler to one buffer tube to facilitate proper terminating and testing. Patch panels should be designed to add additional cables for future expansion, when necessary.

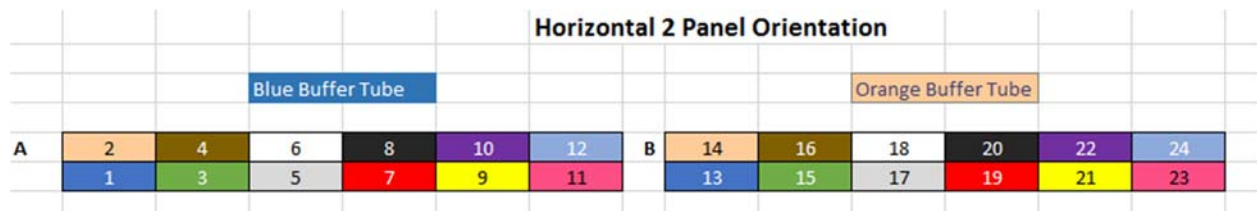
The following termination landing wiring procedure shall be used whether the connector panels are oriented vertically or horizontally:

Vertical Panel orientation

Duplex connectors shown



Horizontal 2 Panel Orientation



Horizontal 4 Panel Orientation

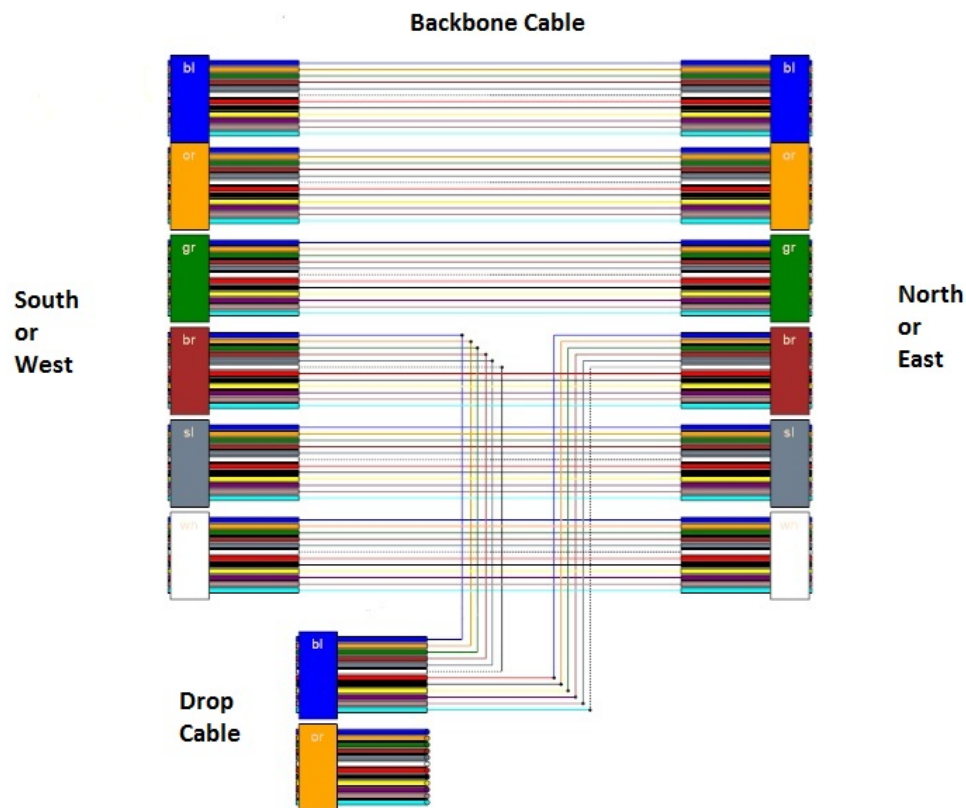
		Blue Buffer Tube						Green Buffer Tube					
A	2	4	6	8	10	12	C	26	28	30	32	34	36
	1	3	5	7	9	11		25	27	29	31	33	35
B	14	16	18	20	22	24	D	38	40	42	44	46	48
	13	15	17	19	21	23		37	39	41	43	45	47
		Orange Buffer Tube						Brown Buffer Tube					

Horizontal 6 Panel Orientation

		Blue Buffer Tube						Brown Buffer Tube					
A	2	4	6	8	10	12	D	38	40	42	44	46	48
	1	3	5	7	9	11		37	39	41	43	45	47
		Orange Buffer Tube						Slate Buffer Tube					
B	14	16	18	20	22	24	E	50	52	54	56	58	60
	13	15	17	19	21	23		49	51	53	55	57	59
		Green Buffer Tube						White Buffer Tube					
C	26	28	30	32	34	36	F	62	64	66	68	70	72
	25	27	29	31	33	35		61	63	65	67	69	71

Local Hub Fiber Terminations

Typical Local Hub Mid-Entry Splice Plan: On North-South roadways, fibers in lateral (drop) cable should be spliced to backbone cable in order from South to North direction with lower fiber numbers starting from the south. On East-West roadways, fibers in lateral (drop) cables should be spliced to backbone cable with lower fiber numbers starting from the west. The typical fiber termination will consist of 6 fibers out and 6 fibers in with the remaining 6 fibers in that tube remaining intact and allowing communications to express through. If a drop cable from the backbone fiber uses only 1 buffer tube then each direction of travel will have a separate coupler for the fibers to be terminated. Other fiber termination plans may be allowed, but only after District 5 has reviewed and approved the termination plan.



All local hub cabinets, type 334 and 336, provide rack-style mounting. The contractor shall use rack-mounted patch-panels, not a wall-mounted panel nor din-rail, and each direction of fiber transmission shall be contained in a single coupler. A coupler shall not contain fibers from more than 1 cable.

The first patch panel will be used for the mid-entry splice to the backbone fiber. Any additional drop cables will require an additional 1U rack mount patch panel placed directly below the first enclosure.

LOCAL CABINET (TYPE 334 OR 336) HORIZONTAL 1U PATCH PANEL						
BLUE BUFFER						
COUPLER 1				COUPLER 2		
2	4	6		8	10	12
1	3	5		7	9	11
SOUTH OR WEST				NORTH OR EAST		

Small single-panel din-rail style housings should be used within equipment cabinets that are known as the single door 3r (SD3R) and are not large enough to allow a rack mount patch panel. Terminations should not be laying loose in the cabinet and the housing shall be mounted making the fiber terminations visible and easily accessible. All fiber housings in the SD3R cabinets will have a label that identifies the cabinet that contains the terminations at the far end of the cable and provides communications for the local SD3R.

DIN-RAIL HOUSING	
SD3R CABINET	
BLUE BUFFER	
1	2
3	4
5	6

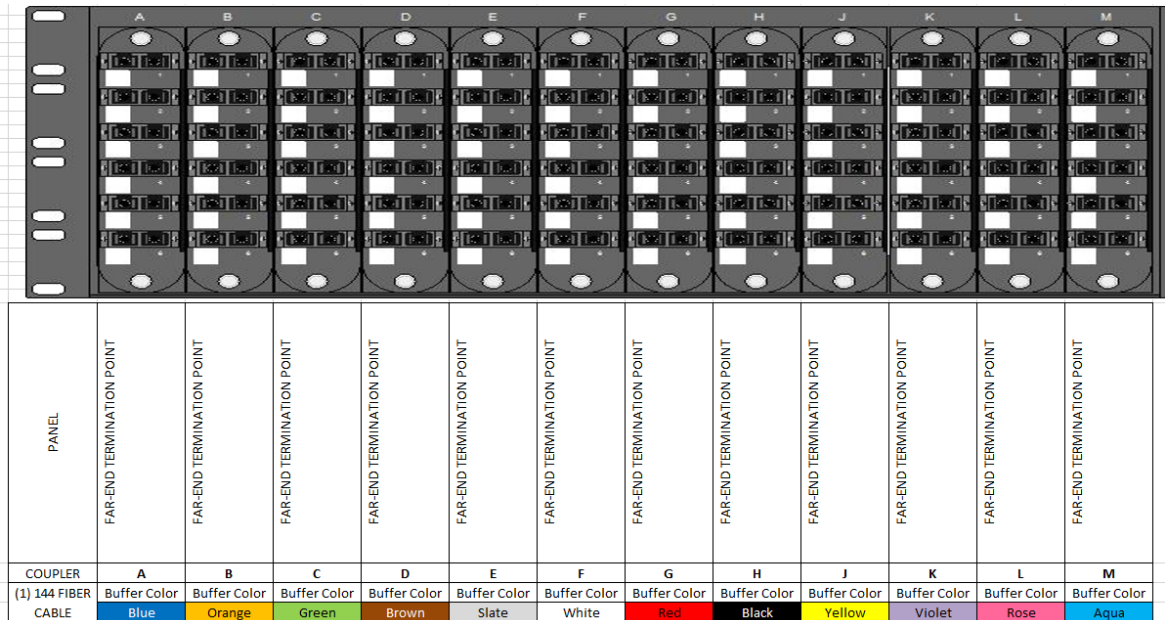
Fiber Enclosure Labeling

Master Hubs

Each enclosure will have a label affixed to the front cover and a label placed in a location directly on the enclosure that is visible from the front. This is ensure the enclosure can be correctly identified should the front cover be removed or misplaced. The contractor will receive digital files to be filled out and submitted for review and once approved the contractor will do the following:

1. Provide a color print of the file on 11X17 paper
2. Each page will be laminated
3. There will be two laminated pages for each fiber enclosure
4. Each page will be laminated separately and there will be no print on the back
5. All pages will be combined in (1) 3 ring binder for each master hub as show in the example below
6. A fiber labeling designation page will be provided with each new master hub or updated at each existing master hub to include the usage by newly installed patch cords

Open the binder and flip the first page so this page is visible at the top,



ALTERNATE FIBER DESTINATION OR AGENCY CRITICAL CONNECTION USING THE FIBER												
FIBER 1	1	1	1	1	1	1	1	1	1	1	1	1
FIBER 2	2	2	2	2	2	2	2	2	2	2	2	2
FIBER 3	3	3	3	3	3	3	3	3	3	3	3	3
FIBER 4	4	4	4	4	4	4	4	4	4	4	4	4
FIBER 5	5	5	5	5	5	5	5	5	5	5	5	5
FIBER 6	6	6	6	6	6	6	6	6	6	6	6	6
FIBER 7	7	7	7	7	7	7	7	7	7	7	7	7
FIBER 8	8	8	8	8	8	8	8	8	8	8	8	8
FIBER 9	9	9	9	9	9	9	9	9	9	9	9	9
FIBER 10	10	10	10	10	10	10	10	10	10	10	10	10
FIBER 11	11	11	11	11	11	11	11	11	11	11	11	11
FIBER 12	12	12	12	12	12	12	12	12	12	12	12	12

and this page is visible at the bottom.

Both 11x17 pages must be large enough to allow a label to be affixed to the page and fill only 1 cell.

Local Hubs

Each local hub will have a label affixed directly to the enclosure or coupler that shows the direction the fiber will be traveling from each coupler.

If a local hub contains an enclosure that supports a remote SD3R then only (1) cable may be terminated to each coupler and each coupler will be labeled to identify the SD3R at the other end.

Each fiber patch cord will have a unique designation label at both ends. No document is required at local hubs to track patch cord designations.

Device Labeling

Master Hubs

Each CAT5 cable will have a label affixed at the end closest to the switch that identifies the device it is providing communications to.

Each port that is used on the master hub switch will have a label on it that identifies the site location of the network device that port is directly communicating with. The same identification information will be provided to D5 so the port on the master hub switch may be configured with it.

All remote power management (RPM) and uninterruptible power supply (UPS) devices will have a label affixed at each port that identifies the device that is connected to that port. If the device is remote to the local cabinet then the device site location will be added to the port identification information on the label.

The same identification information will be configured for each port in the RPM and UPS device software. If the device is remote to the local cabinet then the device site location will be added to the port identification information on the port.

Each RPM and UPS will have the cabinet site identification information configured in the hostname and location field in its software.

Local Hubs

Each CAT5 cable will have a label affixed at the end closest to the switch that identifies the device it is providing communications to.

Each fiber port that is used on the switch will be configured with the site location of the network device that port is directly communicating with.

All RPM and UPS devices will have a label affixed at each port that identifies the device that is connected to that port. If the device is remote to the local cabinet then the device site location will be added to the port identification information on the label.

The same identification information will be configured for each port in the RPM and UPS device software. If the device is remote to the local cabinet then the device site location will be added to the port identification information on the port.

Each RPM and UPS will have the cabinet site identification information configured in the hostname and location field in its software.

Patch Cord Notes

All Fiber patch cords will meet the following requirements:

1. Each fiber patch cord have an LC connection type (for network switch) at one end and an SC connection type (for patch panel) at the other end.
2. There will be a single continuous patch cord between the termination in the patch panel and the network device. Two or more patch cords with a connector will not be allowed.
3. Patch cords will be the minimum length required plus one additional foot of slack to connect the network device to the patch panel with the following exceptions:
 - a. The patch cord will occupy the cable management paths between the switch and the patch panel.
 - b. The patch cord placement must allow compliance with minimum bend radius requirements.
4. Each patch cord will be labeled with the same designation at both ends for easy identification.
5. Fiber patch cords must be type duplex with the sheath being factory connected for the length of the cord.
6. Non-duplex type fiber patch cords are not allowed.

Cat5 or any other copper patch cord must meet the following requirements:

1. There will be a single continuous patch cord between the device and the network switch.
2. Splicing of copper cabling is not allowed.
3. Patch cords will be the minimum length required plus one additional foot of slack to connect the network switch to the end device with the following exceptions
 - a. The patch cord will occupy the cable management paths between the switch and the device
 - b. The patch cord must be long enough to avoid being crimped but not so long as to allow coiling of the cord
4. Each patch cord will have a label on the end closest to the switch that identifies the device it provides communications for

Master hub locations will have documentation that shows which patch cord designations are being used and which are available in order to eliminate the potential for 2 patch cords having the same designation on them.

Miscellaneous Cabling Notes

1. Zip ties are not allowed on any communications cabling, if cables need to be secured outside the cable management equipment (i.e. Panduit, Neat Patch, etc), then Velcro is acceptable for this purpose.
2. Fiber cabling will not be coiled inside the cabinet. Fiber cable slack shall be coiled in the pull box or splice vault next to the cabinet.
3. Power cables and communications cables will not occupy the same cable management raceway.
4. All unused cables will be removed from the cabinet and conduit, as well as any housing that supported them.
5. Stranded wires that have the insulation stripped in order to access the conductive material will be tinned or have a terminal crimped on the end.
6. Loose wires that are not used must be cut to provide a clean end or dressed in order to avoid making contact with other objects.
7. All fiber patch cords must be factory terminated and polished.
8. All copper patch cords must be properly terminated with the sheath properly crimped by the RJ45 housing.
9. All cable management equipment will have brackets that allow the cable management equipment to connect to the rack while still allowing other equipment to be installed or removed without having to adjust or remove the cable management equipment.

Miscellaneous Cabinet Notes

1. All serial communications shall comply with the RS485 communications standard and will have the minimum number of adapters required to support communications.
2. RS232 serial communications shall not be used and will be converted to RS485 with the minimum amount equipment used to make the conversion so that there is no more than one conversion at each end.
3. All UPS or power conditioner devices installed will be properly configured and connected to the network and will comply with all D5 labeling convention.
4. All RPM devices will be configured and connected to the network in compliance with all D5 labeling convention and each port will be labeled in the configuration to correctly identify each device that is plugged into each power port.
5. Any old equipment will be removed and sent to surplus as per the proper procedures for inventory.
6. All slider drawers installed into a cabinet will be at a height to allow a technician to properly operate a laptop while conducting testing or maintenance (approximately 48 in. above ground level at the door of the cabinet).
7. All devices will be connected to the master hub switch or the Managed Field Ethernet Switch (MFES) in compliance with the D5 port assignment diagram as shown below.
8. If more than 2 fiber ports are needed in a cabinet to support communications, then the 24 port switch will be used instead of media converters.

9. All forms of Power over Ethernet PoE from the Ethernet switch shall not be allowed. A PoE injector may be used so long as it is a separate source of power from the Ethernet switch.
10. All media converters and optics must support a minimum of 1 Gbps. A media converter will not be used if a fiber port that can that can support communication link is available.

12 PORT MFES							
PORT 1	PORT 3	PORT 5	PORT 7	PORT 9	PORT 11		FIBER 1
CAM1	REM-VID	DET1	UPS	DMS1	SRVC	COPPER	MAIN-S/W
CAM2	SRVC	DET2 / REM	RPM	DMS2	REM-DATA	COPPER	MAIN-N/E
PORT 2	PORT 4	PORT 6	PORT 8	PORT 10	PORT 12		FIBER 2

24 PORT MFES														
FIBER 1	FIBER 3		PORT 1	PORT 3	PORT 5	PORT 7	PORT 9	PORT 11	PORT 13	PORT 15	PORT 17	PORT 19	PORT 21	PORT 23
MAIN-S/W	STUB-S/W		DO NOT USE	DO NOT USE			CAM1	SRVC	DET1	UPS	DMS1			SRVC
MAIN-N/E	STUB-N/E		DO NOT USE	DO NOT USE			CAM2	REM-VID	DET2 / REM	RPM	DMS2			REM-DATA
FIBER 2	FIBER 4		PORT 2	PORT 4	PORT 6	PORT 8	PORT 10	PORT 12	PORT 14	PORT 16	PORT 18	PORT 20	PORT 22	PORT 24

CAM	Camera			SFP Mod
DET	Detector			Video
UPS	Uninterruptable Power Supply			Data
RPM	Remote Power			Service
DMS	Dynamic Message Sign			AVOID USING
MAIN	Mainline			
STUB	Arterial			
SRVC	Service Port			
REM-VID	Remote - on Video VLAN			
REM-DATA	Remote - on Data VLAN			
DET2 / REM	Detector 2 or Remote detector			