SECTION O—FIBER OPTICS

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TABLE O-1 – SUMMARY OF CHANGES IN SECTION O

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1. GENERAL

1.1 Introduction

1.1.1 The Installation Supplier shall ensure, as part of the evaluation of the installation, that all equipment added, rearranged or modified is properly installed and in conformance with AT&T installation specifications.

1.1.2 The Installation Supplier shall ensure, as part of the evaluation of the installation, that all work has been done in accordance with the detail specifications or approved changes to the detail specifications.

1.1.3 This section covers AT&T requirements for running and terminating fiber optic cables and jumpers.

1.1.4 Changes in this issue of Section O are summarized in Table O-1.

1.2 Definitions

1.2.1 Fiber Optic Cable

Premise Fiber Optic Cable is intended for indoor use within an environmental structure (i.e. home, commercial, or industrial building) to carry optical signals from place to place within the structure. There are two types of Premise cable and they are as follows:

1. Trunk Cable:

Trunk cable is a stiff jacketed multi-stranded cable consisting of two or more fibers, typically used in a horizontal and distribution configuration, i.e. Optical Fiber Non-conductive Riser (OFNR) or Optical Fiber Non-conductive Plenum (OFNP).

2. Equipment Cord Cable:

Equipment Cord cable is either one or two fibers often referred to as Simplex (a single fiber internal to one sheath) or Duplex (two individually sheathed fibers bonded together in a "zip cord" style), and is commonly refer to as either a jumper or a patch cord. The functional difference between a jumper and a patch cord is defined as follows:

Patch Cord – A connection between the rear of an FOT panel and a Network Element.

Jumper – A connection within the FDF complex between panels i.e. FOT to FOT, FOT to OSP, etc.

1.3 Requirements
1.3.1 The entire length of a polyethylene sheathed fiber optic cable run shall be placed on ladder type cable rack.

1.3.2 The Installation Supplier shall not install innerduct for use with polyethylene sheathed fiber optic cable in AT&T Equipment areas.

1.3.3 The Wire Basket Tray (WBT) or Fiber Protection System (FPS) shall not be run through floor penetrations or fire rated.

1.3.4 All fiber optic connections shall be made in a manner that provides proper operation and functionality of the equipment.

2. RUNNING, SECURING AND FIRESTOPPING FIBER OPTIC CABLE

2.1 Running Fiber Optic Cable

2.1.1 When the fiber optic cable enters the building in conduit, any slack shall be stored in the cable vault or cable entrance facility area, so that the cable can be pulled back and reterminated or spliced.

2.1.2 Whenever the building has no cable vault, any fiber optic cable slack shall be stored at the entrance facility. The stored length shall not exceed 50 feet. If the fiber optic cable has metallic strength members or a metallic shield, no more than fifty (50) feet of cable shall be pulled into the AT&T Equipment areas.

2.1.3 When the fiber optic cable is direct buried and does not enter the AT&T Equipment areas in conduit and, it cannot be pulled back into the first manhole, slack shall not be stored in the cable vault or cable entrance facility.

2.1.4 Fiber optic cable shall be run on either cable rack, basket rack or in metallic/terra cotta conduit throughout the AT&T facility. All horizontal cable rack shall be panned and horned which will allow the fiber to no longer be tied down on all new installations of cable racking and there is no need to upgrade any pre-existing racking with panning unless directed to do so by the IE.

When cables are run on a vertical cable rack, cables shall be secured every strap (rung) and to the rungs only.

The use of “Y”/”U” horns and “L” brackets is no longer permitted except under the following conditions and when securing the fibers it should be done on every third horn:

a) In smaller offices like Huts the use of compartment horns is permitted where installing cable racking is cost prohibitive

b) In those locations such as Legacy-T offices that don’t have any dedicated fiber cable racking and use the compartment horn exclusively for their routing needs.

c) In those locations where there are pre-existing cable runs on compartment horns it is permitted to use these runs until they become exhausted.

2.1.5 Polyethylene sheathed fiber optic cable (not to be confused with fiber optic patch cords or jumpers) shall not be placed in any fiber raceway/duct work of the fiber protection system.
Note: Where cables have been run from the LGX to either the splice box or vault and the run is using a dedicated Fiber Protection System (FPS) it is permitted to follow the existing method and mark the FPS as (FIBER CABLES ONLY NO JUMPERS OR PATCH CORDS) AND NO WAIVER IS REQUIRED. The FPS should be inspected to insure that it has been supported properly to handle any additional weight of the cable. These cables are also subject to all bending radius standard requirements and to the capacity rules for an FPS.

2.1.6 All OSP cable entering a building, for more than 50 feet, that is not riser rated shall transition to an approved riser rated cable at the CEF or be placed in a fire stopped metallic or terra cotta conduit or approved fire rated inner duct prior to leaving the CEF.

2.1.7 Fiber cable shall not be run on dedicated primary power cable racks.

2.1.8 The cable shall be run straight on the cable rack and shall not hang off the side or run across an open area.

2.1.9 Fiber optic cable connectors shall be covered and protected with the manufacturer's dust caps during installation.

2.1.10 Fiber optic cables shall be installed and/or secured in a manner that protects them from damage.

2.1.11 The Installation Supplier shall utilize cable clamps and grommets to secure all fiber optic cables terminating between Fiber Distributing Frames (FDF) or between FDFs and Network Elements. Clamps and grommets shall be attached to the terminating shelf if there is a designated place on the shelf itself to do so. If there is no designated place on the terminating shelf, then the clamp and grommet shall be placed on the bay upright. Multiple clamps and grommets may be used if necessary to facilitate proper cable slack management. When the bay/cabinet will not accept a clamp and grommet method it is permissible to use the wax cord and the fiber paper method of securing the cables. Note the first choice is always the use of clamps and there is no waiver required when using the wax cord method.

Note-1: Multiple cables of like size counts can be placed under one clamp only if there is sufficient space for the two or more cables and the bending radius is not compromised, the cables are not crushed or pinched.

Note-2: When using/running small count cables such as 2 & 4 count and a clamp cannot be obtained to secure such a cable then it is permitted to secure such cables using wax cord method.

2.1.12 Optical Fiber Non-conductive Riser (OFNR) cable leaving cable racks and entering frames, racks or other equipment shall be supported at least every 3 feet.

2.1.13 On vertical runs, the cable shall be secured at every strap.

2.1.14 Horizontal runs of cable on non-panned/non-horned cable racks shall be secured at every 4th strap to maintain a straight run, and flow of the bends.

2.1.15 The cable shall be secured at points of break off from the cable rack.

2.1.16 The maximum amount of fiber cables allowed to be secured i.e. stitched/strapped together are as follows:
a) Fiber counts of 2 to 6 per cable are allowed to have up to 10 cables.

b) Fiber counts of 8 to 36 per cable are allowed to have up to 5 cables.

c) Fiber counts above 36 fibers per cable are allowed to have no more than 2 cables.

d) The "micro" cables used with the T.E. connectivity Rapid Panel can have up to 12 cables.

2.1.17 Plastic tie wraps shall not be used to secure fiber optic cable inside the building.

2.1.18 On fiber cable/jumper or patchcord runs of less than 300ft, allowable cable slack shall not exceed 10% of the overall cable length rounded up to the next 10ft increment.

Example: Required cable length = 96’
Allowable slack = 9.6’
Cable length + slack = 105.6’
Next 10’ cable increment = 110’ cable total allowable length

On fiber cable/jumper or patchcord runs greater than 300ft, allowable cable slack shall be not exceed 30ft.

Excess fiber cable/jumper or patchcord slack shall be stored within an AT&T approved cable management system (i.e., vertical glide, IMP, or sub-set of the fiber routing system) specifically designed to provide this function.

2.1.19 When securing OFNR cable, a minimum of two wraps of sheet fiber shall be placed around the fiber cable at each securing point.

2.1.20 Excessive fiber optic tie cable slack shall be routed and secured on dedicated fiber slack storage racking sized to accommodate minimum bending radius.

2.2 OFNR Cabling - Raised Floor Environments

2.2.1 OFNR cable shall not be laid directly on a slab floor.

2.2.2 OFNR cable shall be run on or in its own dedicated medium. Acceptable mediums for OFNR cable in raised floor environments shall include but are not limited to cable racking, troughing, raceway, wire baskets or some other acceptable facsimile thereof which AT&T has approved.

Note: In those locations where the OFNR cables were previously tied to the floor stanchion and there is no physical way to install a cable support medium then it is permitted to install the cables in the same manner, securing to the stanchions, without a waiver.

2.2.3 OFNR cable mediums shall be mounted to the floor stanchion or directly/indirectly to the slab floor.

a) When mounting to floor stanchions, the medium shall be located 6” to 8” below the floor tile.

2.2.4 Fiber optic cabling paths shall be in 90 degree angle configurations and parallel to the floor stanchions and floor tiles.

3. FIBER OPTIC CABLELING FROM VAULT TO FDF
The following procedures apply to fiber cable run between the cable entrance facility and FDF:

a) **Traditional OSP Cable** – This cable shall be run in flexible, plastic, fire retardant innerduct, unless local fire or building codes dictate differently. Innerduct can be corrugated or smoothed walled. It is an NEC code requirement to install OSP cable in fire retardant inner duct when the cable enters a building.

   *Note:* When inner duct is used, it shall be properly fire stopped at the open ends and where it penetrates any fire rated wall, floor or cable penetration.

b) **OFNR Cable** – OFNR/OFNP Cable – OFNR/OFNP cable shall not be run in innerduct. If OFNR/OFNP cable is installed in such a manner which causes the cable to free fall three or more floors, then a Kellum grip type of strain relief shall be used to support the cable.

c) **Indoor/outdoor cable** shall follow the same guidelines outlined for OFNR/OFNP cable.

   *Note:* When securing this type of cable a fiber paper wrap is NOT required.

d) **FDF PANEL DIVERSITY** – When cabling from the vault into a location and the cables are routed diversely to the FDF, it is an acceptable practice to terminate these cables within the same bay as long as these cables are terminated in separate FDF shelves. These cables shall be routed on opposite sides of the bay. In the event a pre-terminated shelf is being used then there could be a situation where both cables will be running on the same side of bay. This is ok as long as the cables take diverse routes after leaving the bay.

4. **FIBER OPTIC PATCHCORDS AND JUMPERS**

4.1 Requirements

4.1.1 Fiber optic patch cords shall not be run on cable racks.

4.1.2 Fiber optic patch cords shall be run in an AT&T approved Fiber Protection System (FPS) or Wire Basket Tray (WBT). The following requirements apply to the installation of a fiber routing systems:

   a) Basket tray replaces the previously used FPS system for routing of fiber jumper cables within ‘Greenfield’ type AT&T Technical Space builds. FPS may still be used within ‘Brownfield’ type AT&T Technical Space builds for the purpose of completing out the existing routing system design. Refer to ATT-C-50003-E-00 for more details.

   b) Solid-walled FPS shall be used for horizontal runs. Covers on horizontal sections of FPS are not required. All non-horizontal FPS shall have covers. End Caps shall be required at the ends of all FPS.

   c) Cable routing ‘stand-off’ brackets (non-spacer applications) or a vertical cable management two-post spacer unit is to be used for routing of fiber jumper cables vertically within the equipment frame as opposed to vertically oriented FPS.

   d) FPS vertical drops are not required from the horizontal oriented FPS to the Network Equipment frame. Exposed fiber jumper cables located between the FPS or WBT drop and the Network Equipment frame are to be bundled using Hook and Loop straps every
12” to 18”. For application where the fiber jumper cable bundle exceeds 36” (horizontal FPS or WBT to equipment frame) it is to be secured approximately at its mid-point to the environmental superstructure via a Hook and Loop strap.

e) Installation supplier shall maintain proper bend radius and cable management within the bay footprint.

f) FPS is considered at capacity when its cable fill reaches ½” from the top of the duct.

g) WBT is considered at capacity when the basket tray cable fill reaches 50%.

h) Fiber equipment cords shall not be placed within the FPS or WBT with excessive slack.

4.1.3 On fiber cable/jumper or patchcord runs of less than 300ft, allowable slack shall be no more than 10% of the overall length of the run or rounded up to the next 10ft increment.

Example: Required cable length = 96'
Allowable slack = 9.6'
Cable length + slack = 105.6'
Next 10’ cable increment = 110’ cable total allowable length

On fiber cable/jumper or patchcord runs greater than 300ft, allowable slack shall be no more than 30ft.

Excess fiber equipment cord slack shall be stored at either the network element cable management system or the FDF cable management system, depending on space availability, while maintaining the minimum fiber bend.

a) Excess fiber patch cord slack shall NOT be stored in the FPS or WBT.

b) Under no condition, unless for testing or trouble shooting purposes, shall fibers be left UNTERMINATED at any Fiber Optic Termination Panel (FTP).

c) The following applies to spare fibers:

1. Spare fibers shall only be at the request of the IE via the TEO and shall be tagged, protected and secured properly. OTV shall size the fiber cable to be as close to the desired number of fibers as possible.

2. The OTV/VAR Shall never cut off spare fibers in a cable.

4.1.4 Protective/dust caps shall be placed on all unterminated fiber cables and fiber termination points.

4.1.5 Vertical sections of FPS placed on frame upright shall have support brackets at the top, middle and bottom.

4.1.6 In the event a previously installed FPS that contains fibers must be cut, the section(s) involved shall be removed from their previously installed position and ALL fibers shall be supported and protected before any cutting can be done.

4.1.7 The cutting of installed FPS is to be considered “Volatile Work Activity” and shall be performed during the Maintenance Window.
4.1.8 There are no drop length requirements for unsupported patch cords transitioning from the FPS to the network element.

4.1.9 Mining of fiber from an FPS shall not be permitted unless the fibers can be readily identifiable with no risk to network service. A minimum of two individuals shall perform that removal operation.

The utmost care and discretion shall be observed as any Fiber Protection System will always be carrying live service.

At no time shall a jumper/patch cord be pulled through an FPS system with the connector still on it.

1. If it becomes necessary to remove jumpers or patch cords from the vertical of a bay or Fiber Distribution Bay (FDB) the following procedure shall be used.
2. The fiber shall be fully identified at both ends.
3. The fiber shall be removed from the vertical fiber manager and traced up and into the horizontal FPS.
4. While still holding onto the fiber, it shall be traced into the horizontal a minimum of 6 inches and then cut at that point.
5. The remaining end of the jumper or patch cord shall be left as flat as possible within the FPS, horizontal to the remaining fibers.
6. The remaining end of the jumper or patch cord shall not be looped back into the FPS.
7. The other end of the fiber shall be treated the same way as defined in steps 1 – 5.

[END OF SECTION]