SECTION 7 -- CROSS-CONNECT SYSTEMS

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11.1. General

Table 7-1 – summary of changes in section 7

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<th>Revision Date</th>
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<td>Entire Document</td>
<td>Modification</td>
<td>N/A; March 2016 TP76400 Rewrite</td>
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<tr>
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<td>Modification</td>
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1. GENERAL

1.1. Introduction

1.1.1 This section covers the requirements for engineering switchboard cable, AC wiring, DC power cable, ribbon cable, coaxial cable, treatment of loose wires and the requirements for coaxial, ABAM, and terminal type connections.

1.1.2 Changes in this issue of Section 7 are summarized in Table 7-1.

1.1.3 The Detail Engineering Service Provider (DESP) shall ensure that all equipment added, rearranged, modified or removed is properly engineered and in conformance with the AT&T Telephone Equipment Order (TEO) and ATT-TP-76400.

1.2. Cable Holes

1.2.1 The addition of new cable hole penetrations shall be coordinated with the AT&T Equipment Engineer.

1.2.2 Work items shall be included to ensure that all cable holes, sleeves and slots are properly closed and permanently fire stopped per ATT-TELCO-IS-812-000-032.

1.3. Cable Routing

1.3.1 The DESP shall provide for cost effective cable routing, minimal number of cable holes, and minimal number, length and size of cable. Specific applications may require diverse routing and/or unique construction. In order to provide efficient and effective cable routing the DESP shall:

a) Avoid blocked routes and cable rack overloading when determining routes for cabling operations;

b) Provide the most direct available route;

c) Select cable type to minimize the number of cables required;
d) Provide the minimal required length and sized cable.

e) Design new cable rack paths utilizing transition cable racks or devices to change levels except at points of termination (I.E equipment frames). Refer to Figure 7-1. Existing non-standard transitions created under legacy company policies may be used until the feeding and receiving cable paths reach their designed fill capacities.

1.3.2 If specified by the equipment manufacturer or the AT&T Equipment Engineer, power and switchboard cables shall be run on separate cable racks. Unless otherwise specified by the AT&T Equipment Engineer, power cable shall not be run on panned switch rack.

2. SWITCHBOARD CABLING

2.1. General

2.1.1 P-wire and switchboard cable shall not be routed on dedicated power cable racks unless directly associated with power circuits.

2.1.2 P-wire and switchboard cable shall not be routed on fiber cable racks or raceways.

2.2. Common Items

2.2.1 When the equipment manufacturer provides a cabling method, that method shall be utilized, except as shown on an AT&T Standard Drawing.

2.2.2 All switchboard cable, connectorized cable, P-wire, and cross connection wire shall be insulated tinned copper. Untinned wire is not approved for use in AT&T except for CAT-5, RS232 and TIA/EIA (568B) categorized cables.

2.2.3 Tip and ring conductors shall always be paired. Single leads and split pairs are not acceptable for tip and ring applications.

2.3. Distribution Frames

2.3.1 Horizontal Side - The leads from one cable may be spread over a maximum of five consecutive, physical terminal blocks in each direction.

2.3.2 Vertical Side - A cable may be formed over an entire vertical or any portion of it, as required.

2.4. Synchronization Cable

2.4.1 See Section 11 of ATT-TP-76400 for synchronization cable requirements.

2.5. Relay Racks

2.5.1 The leads from one cable may be formed over one or more groups of mounting plates or relay rack units, but shall not be spread over more than one relay rack bay.

3. AC WIRING REQUIREMENTS

3.1. General

3.1.1 See TP76400 Section 12 and TP76300 Section M for AC wiring and conduit requirements.
4. DC POWER CABLE AND WIRE

4.1. General
4.1.1 See TP76400 Section 12 and TP76300 Section M for DC power cable and wiring requirements.

5. RIBBON CABLE

5.1. General
5.1.1 Fiber jumper/patch cord type cable shall not be installed on cable rack; wire basket tray or a Fiber Protection System shall be used (interbay cable routing).

6. COAXIAL CABLE

6.1. General
6.1.1 Waveguides and coaxial cables shall be routed outside the perimeter of the isolated bonding network, unless the cables are terminated within the isolated bonding network.
6.1.2 DS3 and STS1 cables shall be 75 ohm coaxial with a single tinned copper shielded braid. Coaxial cables used under raised floor shall be plenum fire rated.
6.1.3 When 734 and 735 type soft dielectric coax cable is terminated, clear heat shrink is NOT required. These 734 and 735 coax cables shall have a UL-flammability rating of CMR.
6.1.4 Only 735C and 734C coaxial cable is approved for use in AT&T's network per ATT-E-00067-E note 12. In addition, ATT IS has been authorized to use 1855A, 1505A, and 1694A type coaxial cables.

Note: AT&T will not require the Switch Manufacturer to use 734C/735C cable in place of 734D/735A cable on Switch jobs. However, the Switch Manufacturer's coaxial cable stripping tools and coaxial connector crimping tools must meet the approval standards of AT&T Common Systems on all Switch jobs in which 734D and/or 735A cable is to be installed. Furthermore, the Switch Manufacturer must continue to use only those connectors approved by AT&T on such jobs.

Note: The following coaxial cables are intended to transport SMPTE 259M and 292M signals whose frequencies range between 5 MHz and 1.5 GHz as well as satellite L-Band signals whose frequencies range between 950 MHz and 1.45 GHz: 1855A Sub-Miniature type, 23 AWG center conductor; 1505A RG-59/U type, 20 AWG center conductor; and 1694A Low-Loss Serial Digital Coax type, 18 AWG center conductor. These cables are all UL-flammability rated as CMR.

7. SHIELDED CABLE

7.1. General
7.1.1 All DS1 cables shall be shielded and sized according to length.
7.1.2 Low Speed Digital (below DS1), and RS232 cables shall be shielded cables. Also, shielded cable shall be used when recommended by equipment manufacturer or when EMI issues are of concern.

7.1.3 Shielding requirements for timing cable are in TP76400 Section 11.

8. WIRE NOT IN SWITCHBOARD CABLE

8.1. General

8.1.1 Supplier documents shall be consulted for the insulated wire to use in a particular system. If the insulated wire is not specified, the following guide shall be used in selecting insulated wire.

a) Local cable or loose wiring solder type terminations: 22, or 24 gauge solid copper conductor;

b) Local cable or loose wiring non-soldered terminations: 22, 24 or 26 gauge, solid tinned copper conductor;

c) Bay fuse panel outputs to rack mount unit inputs (local power cable): 20, 22, or 24 gauge solid tinned copper conductor. 16 gauge local power cable, when required, may be either solid or stranded depending upon the termination requirements at either end;

d) Surface wiring: 22 or 24 gauge solid tinned copper conductor;

e) Extra strength/abrasion resistance: 20, 22 or 26 gauge solid tinned copper conductor;

f) Shielded wire: shielded 22, 24 or 26 gauge solid tinned copper conductor with a solid shield and drain wire that are common with each other and run the entire length of the cable;

g) Wiring not in switchboard cable run on cable racks: Use 20, 22, or 24 gauge solid tinned copper conductors. In general, only one to four leads shall be run without using cable;

h) Wire run in conduit: 20, 22, or 24 gauge solid tinned copper conductor.

8.1.2 Surface wiring is run loose and dressed near or against the mounting plate or panel, or adjacent to the plane of the mounting surface. The DESP shall use the following color guide for surface wiring:

8.1.3 Green - general wiring (except battery and ground wires): Not applicable to Legacy AT&T and Bell South.
Red - battery wires.
Black - battery return wires.

8.1.4 Other colors may be used, when required for a specific purpose, or to facilitate supplier requirements.

8.2. Cross-Connect Wire

8.2.1 AT&T shall provide cross-connect wire for distributing frames unless otherwise specified.
8.2.2 If the DESP is required to provide the cross-connect wire, the type, gauge, and color of the wire shall be determined from ATT-TELCO-002-531-050. A copy of the ATT-TELCO-002-531-050 may be obtained from AT&T.

9. CONNECTIONS

9.1. DC Circuits

9.1.1 DC power lead mechanical connections (e.g., thread pressure type, spring-pressure, etc.) shall not be used. Reuse equipment shall be updated to replace all mechanical connections.

9.1.2 Compression connections for DC power shall be used and shall be in accordance with ATT-TP-76400 section 12 and ATT-TP-76300 section M.

9.2. AC Circuits

9.2.1 All AC connections shall be made in accordance with the NEC. See ATT-TP-76400 section 12 and ATT-TP-76300 section M for additional requirements.

9.3. Coaxial Connections

9.3.1 Coaxial cable connections shall be 75 ohm type connections.

9.4. Corrugated Shielded Cable (aka. ABAM or 600B)

9.4.1 The U-shaped “B” Bond Clip shall be used for attaching the ground wire to the aluminum sheath of the corrugated shielded cable. See standard equipment drawings for additional information.

9.5. 710 and Similar Type Connectors

9.5.1 When cable is spliced using modular splicing apparatus, these splices shall be done in accordance with the manufacturer’s specification. The AT&T Equipment Engineer must approve any use of these connectors.

9.5.2 When connectors are placed on cable racks or pressed into adjacent cables they shall be covered with heat shrink tubing.

9.6. Terminal Type Connectors (#10 AWG and Smaller)

9.6.1 Connections made to screw type terminals with #10 through #26 gauge tinned copper wire shall be made using the correct color coded insulated ring type terminal, such as the T&B STA-KON, Burndy VINYLUG, Lucent Technologies WP91412 or Panduit nylon insulated.

9.6.2 Ring terminal type connectors except #24 and #26 gauge shall be NRTL listed, and made of tin plated copper, having a welded seam and an insulated barrel.

9.6.3 Use the following color coded terminals for the following size wire:

- Yellow/Amber terminal  #26-#24 wire*
- Red terminal  #22-#18 wire*
Blue terminal  #16-#14 wire
Yellow terminal  #12-#10 wire
*Not NRTL rated or listed

10.  ETHERNET CABLE

10.1.  Ordering Ethernet Cable

10.1.1  The DESP shall order Ethernet cable per drawing ATT-E-00053-E.

11.  UNSHIELDED TWISTED PAIR (UTP) CABLE

11.1.  General

11.1.1  All references are to EIA/TIA 568 and EIA/TIA 569 standards. This is not, nor is it intended to
be, a complete disclosure of all information regarding the installation and testing of UTP CAT 5E / CAT 6(A) cable. All requirements are, by definition, minimum in nature. Reasonable
effort to exceed these standards should be exerted. In no case will the minimum standards
be compromised.

11.1.2  The Unshielded Twisted Pair (UTP) media specifications are based on EIA/TIA-568
specifications for 100 Ω UTP CAT 5E / CAT 6(A) cable.

11.1.3  Horizontal cables shall be terminated with connecting hardware of the same category or
higher.

11.1.4  Patch cables shall be of the same performance category or higher as the horizontal cables to
which they connect.

11.1.5  Following are general requirements for patch panels:

   a)  Should be located as close as possible to the core of the area it is serving.
   b)  Should be used for communications equipment only.
   c)  Quantities of panels placed should equate to the number of terminations or ports required
       plus projected growth
   d)  Patch panels shall be installed at both ends of the horizontal cabling system (i.e. tie
cable).

11.1.6  The cable length from the termination point in the VHO / ISP POP to the work area shall not
exceed 90 meters (295 feet) independent of the media type.

   Note: In establishing maximum distance, an allowance was made for 5 additional meters
(16.4 ft.) at the work area and an additional 5 meters (16.4 ft.) from the patch panel to active
or passive equipment in the VHO / ISP POP.

11.1.7  Each of the eight conductors contained within each four-pair cable should be color-coded and
terminated in accordance with EIA/TIA T568B polarization sequence as listed below:
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<td>Brown/White♦♦♦</td>
</tr>
</tbody>
</table>

♦ The pin-pair positions are identical to those contained in the IEEE 10BASE-T standard and the AT&T 258A specification.

♦♦ Wire insulation is white, and a colored tracer is added for identification.

♦♦♦ Wire insulation has a solid color (stated first) with an optional white tracer.
Figure 7-1 – Typical Routing Of Cable Between Cable Racks At Different Levels

CABLE SHALL DROP/WATERFALL OFF THE SIDES OF CABLE RACK AT POINTS OF TERMINATION ONLY.

EXCEPT FOR SBC-812-000-031 FIG. 6(F) ARRANGEMENTS, CABLE SHALL NOT BE ROUTED BETWEEN VERTICALLY OFFSET RACKS AT CABLE RACK INTERSECTIONS OR ALONG THE LENGTHS OF PARALLEL CABLE RACKS THAT ARE AT DIFFERENT LEVELS.

NOTE 1
SBC-812-000-031 FIG. 6(F), 6(G), 6(H), 6(I), 8(B)
OR SIMILAR CABLE RACK TRANSITIONS.

TYPICAL CABLE TRANSITIONS BETWEEN CABLE RACKS INSTALLED AT DIFFERENT LEVELS.
[END OF SECTION]