ATT-TP-76450
Common Systems Equipment Interconnection Standards for the AT&T Local Exchange companies

Abstract

Presented in this document are the Common Systems Equipment Interconnection Standards for equipment placement and interconnection in the AT&T LOCAL EXCHANGE companies Network. Users of this document should note that requirements and information contained within may only be excerpts of full requirements necessary for an acceptable installation of network equipment in a AT&T facility. Users must refer to reference document for detailed requirements.

Target Audience: The primary audience for this document is telecommunications equipment manufacturers. This document will also be used in the PDF process associated with Requests for Information (RFI), Requests for Price (RFP) and Requests for Quote (RFQ) for equipment placed into the AT&T Local Exchange companies Network.
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GENERAL

1.1 Requirements

This document provides the requirements for interconnection of new equipment in the AT&T Local Exchange carrier network. The appendices include the AT&T equipment evaluation process to be used to verify compliance to these requirements.

1.2 Purpose

The AT&T Local Exchange Company's network is designed around fundamental standards for the purposes of meeting interconnection, safety, and industry standards such as ANSI, space considerations, and compatible technologies. New equipment is required to integrate into the network seamlessly (fit, form and finish), without the impact or cost pressure to compensate for the product introduction.

The purpose of this section is to provide equipment suppliers with an overview of the AT&T network interconnection requirements most commonly encountered as non-compliant with new equipment and a process for relaying information about compliance to these requirements. A product's compliance with the requirements and objectives of this section will not be the sole basis for the acceptance of the product, however noncompliance with one or more of the requirements or objectives of this section may be the basis for a product's denial of purchase.

1.3 Scope

Unless otherwise stated, the requirements contained herein apply to equipment systems and assemblies intended for installation in network equipment buildings, equipment areas within buildings, electronic equipment enclosures such as controlled environmental vaults, outside electronic equipment cabinets, and customer locations.

1.4 Pre-assembled versus Field Assembled Network Equipment

Network Equipment layouts provided as overall solutions need to be reviewed in one of two ways regarding the applicability of Common Systems components and products. AT&T Local Exchange is only concerned with the connectivity and interconnection issues between the OEM equipment and the telco facilities for Common Systems evaluations. OEM requirements internal to the Network Equipment hardware are not reviewed under this documentation.

OEM connectors and external contact points will meet the requirements contained in this document for performance, reliability and suitability. The use of a "Plug & Play" system using internal self contained Network Elements must also meet AT&T standards contained in TP 76200.

If the product uses various components that are interconnected together, document will be applicable for interconnection between the various external components and cabling in addition to stand-alone Common Systems components that may have been standardized with other products within the AT&T Local Exchange companies. If the OEM has presented a solution that uses “off the shelf” separate components that are externally cabled within the bay or relay rack, validation and use of the AT&T standard product lines shall be given.

Example: All DSX-1, DSX-3 and FDF panels will be provided by ADC Telecommunications Inc. for the AT&T Local Exchange companies.

Finally, determinations will need to be made with AT&T Local Exchange company’s technical staff as to whether the items provided within the product meet either pre-assembled requirements or will be field assembled. Pre-assembled products will be considered within any Network Equipment/Element hardware box or panel that includes intelligent hardware or software. The assembly of multiple pre-assembled Network Equipment/Element products within the same footprint will be negotiated with the AT&T Local Exchange companies. The assembly of multiple pre-assembled Network Equipment/Element products outside of the same footprint will be handled as a field assembled installation. Any Network Equipment/Element that uses a passive product panel or box that does not include intelligent hardware or software will meet AT&T Local Exchange company’s product approval standards and will be field assembled.

1.5 ATT TP 76450 Internet Web Site

Copies of this document and general information about AT&T’s environmental equipment standards may be found at https://ebiznet.sbc.com/sbcnebs/.

1.6 Product Evaluation Process

TP 76450 Product Evaluation Process is documented in Appendix A of this document. Equipment manufacturers should follow this process for each new Network Element under review by AT&T Local Exchange companies.

1.7 Additional AT&T Requirements

The following is for notification purposes only. Refer to the directions given to obtain further information on these subjects. Verification of conformance to these standards is not part of the evaluation process for this section.

- TP 76200, Network Equipment Power, Grounding, Environmental, and Physical Design Requirements
- TP 76300, AT&T Installation Requirements
- TP 76400, AT&T Design Engineering Requirements

1.8 Adherence to AT&T Standard Suppliers

Within the Common Systems Checklist, standard corporate providers of the product are listed as applicable. Selections of this product are performed through AT&T Services Inc. NP&E on behalf of the entire AT&T Enterprise. Each approved provider shall be used using AT&T Local Exchange companies approved PIDs, distributors and pricing.

1.9 Reasons for Reissue

Requirement 7.3, Vendor Documentation, from the previous issue has been expanded to include all of Section 7 with 13 sub-requirements. Other requirements from Section 7, Issue 7 have been moved to Section 8, Issue 8. The Checklist in Appendix B is revised to reflect these changes.

Note: Supporting documentation must be sent to AT&T even for “yes” responses to requirement 7.13.

2 DC Power Interconnection Standards

2.1 GENERAL

2.1.1 Nominal -48v DC

Nominal –48v DC is always the first choice for power delivery to any Network Element (NE). Generally, manufacturers can comply to this requirement by providing their equipment internally with various inverters and converters to meet this condition. However, within the network power architecture, various other voltages may be available in limited supply, but must be validated on a case-by-case basis for NE deployment considerations. The design criterion of the DC power is based on a normal operating voltage of approximately -50v to -56v DC, with nominal rating of -48v DC and low voltages of -42.6v DC measured at the termination point of the network element.

AC powered equipment will only be considered for approval in the AT&T network when the inverter is embedded as part of the total equipment package.

2.1.2 Redundant Power Feeds

Redundant power feeders are required for all equipment serving network elements[1]. The term network element refers to all switching, transport, data, operator services equipment, and any adjuncts for those elements.

Redundant power feeder information must be provided in the supplier's response documentation to be in compliance with this item.

[1] If the network element being served is truly redundant, it shall be utilizing an isolation technology similar to the Oring Diode for example. The maximum List 2 current supported at the BDFB cannot exceed 50% of the supply fuse rating regardless of the size. This will insure uninterrupted power to either the A or B side in the event of a power loss of either power feeds.

2.1.3 Battery Return Conductor

Each redundant power feeder shall have its own battery return conductor. This design concept shall also carry through directly to each piece of equipment. For equipment with a portion of battery return current flowing to the equipment frame, the current path between the battery return and the equipment frame shall be rated at least 140% of L1 current drain (refer to Table 310.16 at 90°C of NEC).

Battery return and current path information must be provided in the supplier's response documentation to be in compliance with this item.

2.1.4 Architecture Integration

To integrate into the embedded DC distribution architecture, the optimal List 2 DC drain per load should not exceed 48 amps. However, new style BDFBs can accommodate 56 amps per load. Technology Engineers should validate the load of DC amp capacity if the product requirements will exceed 48 amps DC (at List 2). DC distribution through the BDFB with up to 150 amp fuse positions may be available on a limited basis and can accommodate up to a 120A load, but additional construction costs to build out this larger design may be required.

2.2 POWER TERMINATIONS AT THE NETWORK ELEMENT

This section describes the various acceptable DC power connectors and connections that are approved for use within AT&T. See Table 2-1 for a classification of acceptable power connections based on cable termination.

2.2.1 Location of Power Terminations

Power terminations found on network elements should terminate at the rear of the panel. Any exceptions to this will be dealt with on a case-by-case basis.

2.3 CONNECTORS

Connectors used to attach the product to external power cabling shall conform to the following requirements:

2.3.1 16 AWG Stranded Power Cable and Larger

For applications where the size of wire supplying or distributing power to/from the equipment is 16 AWG stranded power cable or larger, AT&T shall use connectors that are pressure crimped on the power cable creating a ring type termination.

2.3.2 8 AWG

Power input terminations that will accept # 8 AWG connector terminations shall use dual threaded post (stud) termination able to accept the appropriate two-hole crimp connection. The two post termination may be either 5/8” or ½ “on centers.

Equipment surface terminations shall accept crimp connections that meet the following specifications:

- UL486A Wire Connectors and Soldering Lugs for Use with Copper
- UL467 Grounding and Bonding Equipment Conductors
- UL 486C Splicing Wire Connectors
- SAE-AS25036 (Insulated Copper Ring Crimped Terminal - Dimensions)
- SAE-AS7928 (Copper Ring Crimped Terminal - Specifications)

Equipment submitted for approval should provide a UL listed (power) termination strip designed and designated as “field wireable” to insure product compliance with the UL listing of the product. This termination or barrier strip should be able to accommodate a ring lug connectors that comply with the UL, CSA and Mil Spec listings.

2.3.3 18 AWG Power Cable and Smaller

For applications where the size of wire supplying power to the equipment is 18 AWG power cable or smaller, mechanical connectors may be used.

- The connectors shall be listed by a Nationally Recognized Test Laboratory for its intended use.

- The connector shall be tested to assure long-term tightness and reliability. The following tests are acceptable for this requirement; IEC 60068-2-6, Basic Environmental Test Procedures, Part 2: Test Fc and Guidance: Vibration (sinusoidal); EIA Specifications 364-27B (Mechanical Shock Test Procedure for Electrical Connectors), 364-28D (Vibration Test Procedure for Electrical Connectors and Sockets), Telcordia GR-63-CORE and Telcordia GR-1089-CORE. Other vibration test procedures demonstrating long-term reliability will be considered for evaluation.

- The product supplier shall provide documentation of routine maintenance (if any) associated with the supplied connector.

Table 2 – 1

Size conductor	Acceptable termination	Associated Listings
22 AWG – 18 AWG	Mechanical; American Standard UNC threads (Class 2 fit)	Listed by NRTL, IEC 60068-2-6, EIA SPEC 364-27B, 364-28D
16 AWG – 10 AWG	One or Two hole crimp connection. American Standard UNC threads (Class 2 fit)	UL467, UL486A, UL486C, SAE-AS25036, SAE-AS7928
8 AWG – 1AWG 1/0-4/0 250MCM – 750MCM	Two hole crimp connection. American Standard UNC threads (Class 2 fit)	UL467, UL486A, UL486C, SAE-AS25036, SAE-AS7928

2.4 Visual Power Alarms and Status Indicator

The NE equipment shall provide visual power alarm and status indications by indicator devices mounted directly on the equipment. The equipment shall also be capable of transmitting alarm signals to an office alarm circuit and to sending circuits for remote surveillance using dry loop relay contacts or other means. Power alarm and status reporting information must be provided in the supplier's response documentation to be in compliance with this item.

If an alarm indicator pilot fuse is present in the power circuit, it should operate when the power fuse fails.

2.5 Fusing of Capacitors

Equipment incorporating the use of power distribution apparatus which uses capacitors shall be fused to protect the power distribution bus from a shorted capacitor. Fuse and protection information must be provided in the supplier's response documentation to be in compliance with this item. The equipment manufacturer shall provide a label indicating equipment capacitors must be pre-charged prior to power up the equipment.

2.6 POWER DISTRIBUTION DELIVERY

All power distribution products must meet the requirements listed in Section 1 of this document.

AT&T approved Power Distribution Units (PDU) shall be used to power transport and data equipment. Power is distributed to the NE from Battery Distribution Fuse Bays (BDFB) or an arrangement utilizing a Secondary Power Distribution Unit (SPDU). The SPDU is smaller than a BDFB in physical size and capacity. Direct feed from the BDFB will be considered on a case by case basis when required. NE will not be directly fed from Power Board Distribution. Contact the AT&T Common Systems Power Technical Staff when requesting direct BDFB feed.

PDUs that are independent of the network element but included as part of the total package must meet the requirements listed in this section; must be approved for use, and should be identified by an associated AT&T PID (Product ID) number assigned by the AT&T Power Technical Staff

All approved PDUs shall be equipped with at least one of these forms of overprotection devices, (1) GMT Fuses, (2) Telpower® Fuses, (3) DC Rated Circuit Breakers. (note: circuit breakers in PDUs shall only be fed by circuit breakers).The recommended form of DC power distribution is GMT fuses, Telpower® fuses or Circuit Breakers, in that order. The size of the DC requirement will serve as the primary qualifier, but fuses are the preferred method of over-current protection.

- GMT Fuses – Generally sized to accommodate 0.18 – 15[2] amp requirements. List 2 demand should not exceed 12 amps to use this product.

[2] AT&T LOCAL EXCHANGE companies has approved one GMT fuse panel that is designed to accept 20 amp GMT fuses, if chosen, the List 2 demand should not exceed 16 amps.

- Telpower® Fuses – Exclusively produced by Cooper-Bussmann, these fuses are available in sizes from 3 amps to 600 amps, packaged in Blue to signify DC only. Telpower® fuses are also available in various styles for different needs. Some of the styles commonly seen are TPA, TPL, TPS and TPH. All Telpower® fuses should be sized at no greater than 80% of their faceplate rating as well, but not to exceed the value of the of the List 2 load.

Circuit Breakers - Only thermal magnetic and magnetic type DC circuit breakers are acceptable. Further, AT&T does not recommend DC circuit breakers greater than 224 amps. Circuit breakers should adhere to all applicable UL and ANSI standards. DC Circuit breakers that are labeled 100% are full load rated and may be sized at the same capacity as the List 2 drain (The List 2 drain is defined as the peak current required to operate equipment load under worst case operating conditions at 42.6v DC)

NOTE: Due to the circuit protection strategy deployment found in AT&T LOCAL EXCHANGE companies, the use of circuit breakers placed in the power architecture should be avoided when a fuse provides the next step of protection (generally found at the BDFB). It is recommended that circuit breakers be protected by circuit breakers, fuses with fuses or fuses protected by circuit breakers. The use of circuit breakers placed in the embedded power distribution units found in network elements should be avoided. The preferred method of circuit protection at this level is fuses.

2.6.1 All fuses and circuit breakers shall meet Quality Level III as defined by Telcordia SR-332.

2.7 Individually Mounted PDU

Even though not recommended as a choice by AT&T, some Network Elements designed by various manufacturers require specific PDUs that include unique characteristics needed to serve their specific network device. These “special PDUs” must meet all the same design criteria identified in this document as well as the ATT-TP-76200 NEBS publication. If accepted, this “special PDU” would be listed as part of the Network Element approval, purely as an integral part of the package and its approval is exclusive to the associated network element. Furthermore, this “special PDU” should be reviewed by the Common Systems Technical Staff to insure its integrity.

2.8 NE Integrated Power Distribution

Defined as; power distribution that is integrated within the framework of the network element (e.g. #5 ESS PDF frame). Generally speaking, NEs requiring more that 200 amps of DC power need this type of power distribution. The NEs are commonly found in large multiple interrelated-bays.

These type devices are considered equipment specific and should meet the requirements as listed in Section 1 of this document as well as the ATT-TP-76200 NEBS publication. Additionally, AT&T recommends the use of fuses in lieu of breakers in these applications.

2.9 Direct BDFB Power Delivery

As an exception, there are some new network elements that employ high DC current demands that when collectively configured in a packaged bay arrangement may exceed available fuse position capacities found at the BDFB. In a method to utilize the existing AT&T - DC distribution architecture, these individual network elements may be independently and directly fused at the BDFB via an SPDU. In these instances, direct feeds to the BDFB may be considered appropriate. However, the individual network element shall include an on/off /power cut off to locally disconnect the power from the bay components. In applications where a bay mounted SPDU is desired, AT&T has approved products designed to serve in that capacity and still allow for independently fused services.

3 Synchronization/Timing Standards

The Building Integrated Timing Supply (BITS) concepts are the AT&T LOCAL EXCHANGE Company's method of providing Phase and Frequency synchronization. The BITS plan details that each office have one Primary Reference Source (PRS)/(Stratum-1) traceable office master clock called the BITS. Under the BITS concept, each/every timing capable Network Element (NE) in the office should derive its timing from that single source within the office. A timing capable Network Element is defined as any digital equipment piece that is capable of conforming to the BITS concept by accepting timing from an external source. A Network Element is still timing capable even if it is not currently configured or equipped to accept external timing via AT&T approved wire-wrap connections; as long as the option exists to allow it to be so equipped.

3.1 Termination of timing leads

All critical network element timing leads shall terminate only on the office master BITS/TSG shelf or one of its DIRECT expansion shelves.

3.2 Clock output lead cabling

Composite clock output leads to CCS7 and remote BITS/TSG equipment shall be cabled through flexible interduct and have diverse routing.

An External Clock Wire Wrap (ECWW) adapter kit or equivalency are the preferred method of clock timing leads terminations instead of DB or RJ type connectors (GR-1244, R3-10). Wire-wrap pins sync connections are the AT&T standard, NO dB or RJ type connectors allowed, no exceptions.

Although there has been a past history of waiver and exception of the above presented "workaround", adherence going forward will be per the GR-1244 section outlined below:
GR-1244 requirement*: 3.2.1.2 Physical Interface to the AT&T Synchronization Network*:
The physical interface for external timing signals is important such that NEs can be easily integrated into the BITS plan. A BITS provides two types of timing outputs, DS1 and CC. DS1 signals are the usual timing reference signals for many NEs, but CC is required for NEs with DS0 interconnections. Both DS1 and CC signals are balanced signals.

R3-9 [10v2] The external timing signals shall be terminated and transformer coupled. Termination criteria for DS1 and CC signals are contained in GR-499-CORE and GR-378-CORE, respectively.

R3-10 [11v2] An NE that supports external timing shall provide wire-wrap terminals for its external timing input/output signals. Each terminal shall consist of three pins designated "TIP", "RING" and "SHIELD." AT&T requires all NE's be configured to support external sync requirements.

R3-11 [108] An NE shall provide wire-wrap terminals for any timing input/output signals that it supports.

Each terminal shall consist of three pins designated "TIP", "RING" and "SHIELD."
Note that while GR-1244 **R3-10 [11v2]** and **R3-11 [108]** do not require that the wire-wrap terminals be located on the backplane of the equipment, AT&T requires hardware, backplane chassis integration, rather than having the terminals located close to the equipment in order to facilitate trouble-shooting and maintenance procedures. Also note that **R3-11 [108]** applies independent of whether the NE itself supports the external timing mode (e.g., it would apply to a line-timed NE that supports the capability to generate an external timing signal for use at another NE).

3.3 Sync jacks marking

"Grandfathered" sync jacks, if used with Digital Switch configurations or digital network elements which DO NOT have dedicated sync input reference ports shall be equipped/identified with appropriate markers indicating SYNC. These markers shall include the modified DSX jack, the originating facility jack and the terminating network element jack, if necessary.

3.4 Timing of redundant timing inputs

Each Switch (Host, or Remote, where applicable) or each Transport Network Element requiring redundant timing inputs (for instance, a SONET ADM/DCS) shall be individually timed from the office BITS, with primary and secondary DS1 (or Composite Clock) reference signals from separate T1 (DS1) or Composite Clock (CC) output cards, with odd-even slot assignments. The ability to access, test and validate timing is critical to maintaining and administering a sync network. AT&T approved wire-wrap pins/points for Tip, Ring & Shield connections are most important and a prerequisite for test access for troubleshooting, analyses and diagnostic purposes. To be effective as a test point the approved wire-wrap pins must be mechanically, physically and electrically integrated into the network element hardware (backplane, chassis) to

provide those test access points. The Tip & Ring terminations for DS1 signals electrically must be 100 Ohms resistive with +/- 10 % tolerance. The Tip & Ring terminations for Composite Clock signals electrically must be 133 Ohms resistive with +/- 10% tolerance; paralleling 100 Ohms resistive with 100 Ohm AC impedance terminations is not permitted. The shield lead is "DC" grounded where the signal originates. Some embedded equipment technologies use an "AC" ground coupled through a capacitor where the shield terminates and the shield is connected at this point.

3.5 Output card exhaustion

In the event of T1 (DS1) or Composite Clock (CC) output card exhaustion, daisy-chaining to enable cascading of synchronization to all terminals within a bay framework is not an AT&T LOCAL EXCHANGE company's standard and shall not be permitted. Arrangements must be made to install additional BITS outputs.
Should there be a necessity for more timing outputs than can be supplied by a single TSG, multiple TSGs timed directly from the Master (or its directly associated expansions) may be required. The subtending (or remote expansion) TSGs must remain phase aligned with the office master TSG. To achieve and sustain phase alignment, the subtending TSGs must be timed from the master ensemble via redundant Composite Clock signals. The subtending TSG must have the characteristic that it will remain tightly phase-locked with the master TSG to ensure proper DS0 phase alignment throughout the office.

4 Alarm Standards

4.1 Local and telemetry alarms

All equipment (Network Elements - NE) deployed in a Central Office must have the capability of providing both local and telemetry alarm outputs for failed and threshold activities.

4.2 Separation of local alarms

Local alarms must be separate alarm outputs from the telemetry alarms. At a minimum this would be a Major (MJ) and Minor (MN), both audible and visual. The visual alarm output must be designed so it cannot be disabled with an alarm cut-off (ACO).

4.3 Telemetry Alarm Protocols

Table 4-1 is included for reference only.

Table 4 - 1

TL1 / TCP-IP	Most Preferred
TL1 (sync) X.25	Second Most Preferred
TL1 (async)	Third Most Preferred
E2A Serial (TBOS)	Fourth Most Preferred
E2A Discrete	Least Preferred

4.4 Alarm interconnection

Each NE in a bay shall produce its own unique set of alarm outputs. Pre-designed "multiplying" or "busing" of alarms within a bay is at the discretion of AT&T and shall not be mandated by the equipment design.

- The interface for TL1 interconnection may be Ethernet RJ45, DB25 or RS422/449 (37 Pin).
- The interface for E2A Serial or Discrete interconnections may be wire-wrap pins or other non-proprietary connector.

Discrete Alarm Conditions

4.5 Discrete Alarm Rating

All discrete alarm outputs shall be rated up to 1 Amp @ -48VDC.

4.6 Open discrete alarm outputs

All discrete alarm outputs shall be normally open. At the discretion of the equipment manufacturer the use of Form-C relays to provide the option of Normally Open or Normally Closed alarm outputs is acceptable.

4.7 Discrete alarm paired leads

All discrete alarm outputs shall be paired leads (tip and ring) with no common or shared return leads.

4.8 Discrete alarm dry contacts

All discrete alarm outputs shall be dry contacts with no electrical voltage present in a normal or failed state.

Alarm Standards Reference:

Telcordia GR-833-CORE (NE and Transport Surveillance Messages)

5 Fiber

All Fiber Optic Standards contained herein are applicable to any manufacturer’s product that can be administered or managed by AT&T personnel.

5.1 Fiber Optic Cable

Fiber Optic cables/jumpers shall adhere to BELLCORE Standards as defined in GR-409, *Generic Requirements for Premises Fiber Optic Cable*.

5.2 Optical Connectors & Jumpers

Fiber Cross Connect Cables/Jumpers and Connectors shall be SingleMode.

5.3 Minimum fiber jumper/cable length between connectors

The minimum fiber jumper/cable length between connectors for all inter-cabling and cross-connects between any connection points and/or active network components shall be 6 feet or 2 meters, Shorter distances can interact with the service performance and shall not be used.

5.4 Fiber Attenuators

Attenuators shall be for SingleMode Facilities.

5.5 Fiber connector boots

Fiber connector boots shall be straight and not angled.

5.6 Fiber Minimum Bend Radius

The minimum fiber bend radius shall be 1.5-inches or 20 times the cable diameter at any point whichever is greater.

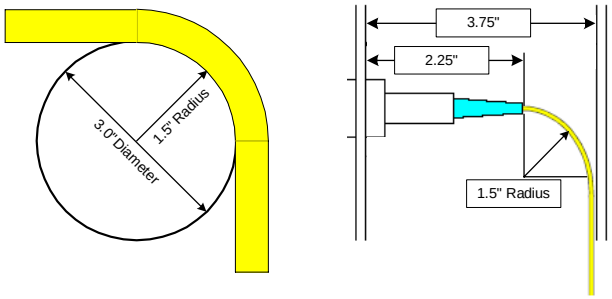
5.7 Maximum Fiber Connector length

The maximum fiber connector length (including boot) away from the mating connector housing shall not exceed 2.25 inches

5.8 Minimum distance between connector housing and 90 degree bend

Minimum Fiber distance away from a connector housing to bend 90 degrees shall be 3.75-inches. See Figure 6–1.

Figure 6-1



5.9 Space between door and fiber connector

Sufficient space shall be allotted between the outer door and the fiber connectors to avoid pinching or reducing the bend radius of the conductor. See Figure 6-1.

5.10 Fiber bend radius

Network Equipment shall provide fiber management facilities that maintain a minimum 1.5 inch bend radius from the connector until handoff to the bay or cabinet fiber management facilities. See Figure 6-1.

5.11 Standard fiber connector

The standard AT&T fiber connector shall be SC-UPC, SingleMode Connector

5.12 Alternative high density fiber connector

Alternative High Density Fiber Connector Standard (Network Elements Only for Small Form Factor Fiber Connectors) shall be LC-UPC, SingleMode Connector.

5.13 Alternative FTTP fiber connector

Alternative Fiber Angled Edge Connector for FTTP shall be SC-APC, SingleMode Connector 8-degree, keyed.

5.14 FiberOptic Cable Mode

- Central Office fiber optic cable shall be SingleMode.
- Customer Premises or IXC fiber optic cable may be SingleMode or Multimode.
- SONET services fiber optic cable shall be SingleMode.

5.15 Fiber transmission material

Fiber transmission material shall be glass, not plastic or any other material not specifically pre-approved by AT&T NP&E Staff

5.16 Maximum optical power levels

Optical aggregate power level must not exceed +16.8 dBm optical power level at any connector (Hazard Level 3b). If the product exceeds this, there must be an embedded (to the network equipment) solution to protect the human exposure for both TXMT and RCV including the Automatic Power Reduction (APR) potential solutions.

5.17 Passive Network Element WDM Modules to be placed in the FDF

Passive Network Element WDM Modules to be placed in the FDF shall be vertical 12 slot Miscellaneous Panel (LGX Type, other types will not fit in the FDF).

5.18 Fiber Frames/Bays & Panels for all Network Elements

Fiber Frames/Bays & Panels for all Network Elements shall be Generation I, II, III Fiber Distribution Frames per GR-449-CORE.

5.19 Fiber Raceway

Fiber raceways shall be standard trough system for all Interbay and Intraoffice Fiber Jumper routing per GR-449-CORE.

6 Copper

6.1 DS3/STS-1 connector & cabling BNC connector

DS3/STS-1 connector standard & cabling BNC connector shall be standard DS3/STS-1 BNC(180, 90 & 45 degree) electrical coaxial connector (except Posilock 180, 90 & 45 degree) Note: Use Trompeter Electronics BNC for Midwest and Kings Electronics BNC for all other regions.

6.2 Alternative DSC/STS-1 Connector

For Network Elements that require a unique connector DS3/STS-1 SMZ Electrical Coaxial Connector shall be used on the Network Element only.

6.3 Coaxial Stripping Tools and Coaxial Crimping Tools

Coaxial Cable Stripping Tools and Coaxial Connector Crimping Tools shall be 734C/735C: Note: Use Trompeter Electronics Tools for Midwest and Newhall Pacific Tools for all other regions.

6.4 DS1 Cross-Connects Wire

DS1 Cross-Connect Wire shall be special high twist Wire to preclude spectrum interference with DSL (Violet/Blue)

6.5 DSL Cross-Connect Wire

Special High Twist Wire (Different turns than DS1) to preclude Spectrum Interference (Violet/Red)

6.6 Electrical Ethernet Cabling Standards

Electrical Ethernet cabling shall be a minimum Category 5t using either RJ21X connectors or RJ45 connectors.

6.7 Electrical Jumper (Cross-Connect) Standards

Jumpers for Electrical Ethernet cross-connects shall be a minimum Category 5t using RJ45 connectors.

6.8 Data Patch Panels

Data patch panels shall be Electrical (10BaseT, 100Base T, 1000Base T) Ethernet Patch Panels and Skeleton Bays for both Network Element and Ethernet Distributing Frame (EDF) bays.

6.9 Media Converter

Media converters shall be optical range extenders for the limited Electrical Ethernet signal

6.10 Central Office Copper Wire and Cable Flammability Ratings

Wire and Cable with UL Flammability Ratings of CMX and CMU must not be used within AT&T central offices as UL Flammability Ratings must be MP/CM (same floor), MPR/CMR (Riser-Between Floor) or MPP/CMP (Plenum Condition)

6.11 Central Office Copper Wire and Cable

Frame Wire, DS1 Cross-Connect Wire, Switchboard Cable, Tie Cables and T1 Cable

6.12 Central Office Copper Coaxial Cable

734C/1734C, 735C/1735C Single Conductor and Multiple Conductor Coaxial Cables

6.13 Central Office Copper "Bits" Synchronous Timing Cables

1175A Red Jacketed Bits Timing Cable

6.14 Central Office Copper Wire and Cable Minimum Inside Bend Radius

For Switchboard, Shielded and Twin Conductor Cable, 5X the Cable Diameter

6.15 Central Office Copper Coaxial Cable Minimum Inside Bend Radius

- For Non-Bundled 734 or 735 Type Coaxial Cable and For Bundled 734 Type Coaxial Cable, 7X the Cable/Bundle Diameter

- For Bundled 735 Type Coaxial Cable, 10X the Bundle Diameter

6.16 Copper Cable Terminations

Copper Cable Terminations must have both toe and heel screw terminations for permanent lockdown. If a 90 degree connector is used and blocks the screw, use a clamp to permanently terminate the connector.

6.17 Cable trays

Panels that use twisted pair jumpers/cables less than 25 pair groups will be required to have a cable tray. Do not place jumpers without a protection tray.

6.18 Tie bar

Panels that use cables of 25 pair and above shall have a tie bar affixed for tie wrapping. Do not place cables without a tie bar on panel backplanes

6.19 Use of “Y” cable

If a “Y” cable is used, the junction point shall be at least 36” from the tail ends.
Junction must only fit in thee vertical troughs, not Network Elements or horizontal troughs

6.20 Unusual Cabling Types

Unusual wiring patterns, connectors, and cable types need to be mitigated

6.21 Protection of cables and jumpers

Network Equipment interconnection cabling/jumpers shall be provisioned with protection.

7 Vendor Documentation

The term “documentation” as used in this section refers to vendor documentation as defined in GR-2914-CORE and GR-454-CORE.

Vendor documentation is an integral part of the network equipment and shall be validated/tested by the vendor before delivery to AT&T to insure its accuracy, comprehensibility, comprehensiveness and completeness as defined and measured by the following documents and guidelines. Critical or Major Documentation deficiencies (determined by AT&T) can delay equipment deployment until corrected by the vendor and approved by AT&T. The requirements contained in this section are supplemental to other documents that govern vendor documentation such as GR-454-CORE and GR-2914-CORE.

7.1 Softcopy Documentation

Documentation must be provided in both PDF and HTML format on a CD that is fully indexed and fully searchable.

7.2 Hard Copy Documentation

Documentation must be furnished in paper copy on request.

7.3 Craft Interface Instructions

Documents must provide step by step instructions for each procedure using Craft GUI, EMS GUI, and TL1 (preferred) or equivalent commands.

Note: Items 7.4 and 7.5 Extend the testing procedure in GR-2914-CORE 20.8 Test Method for Documentation Comprehension to include the complete “Installation Guide

7.4 Installation Guide: installation, provisioning, and testing of the network element

Vendor must test and validate that a new user can successfully install, provision, and test the network element by following the “Installation Guide”.

7.5 Installation Guide: Creation, provisioning, and testing of a multi-node ring or system

Vendor must test and validate that a new user can successfully create, provision, and test a multi-node ring or system by following the “Installation Guide”.

7.6 Alarm/Trouble Shooting Guide

Vendor must test and validate that a new user can use the Alarm or Trouble Shooting guide to successfully identify and clear alarms

7.7 Personnel Injury and Equipment Damage Warnings

Documentation must keep the user aware of personnel injury and equipment damage by using the appropriate warnings, dangers, or cautions preceding procedures and incorporating the appropriate steps within the procedures.

7.8 Reference Guide

Documentation must include a “Reference” guide that describes each component of the NE in detail

Example: Photographs or detailed drawings of the faceplates of each plug-in with a description of the LEDs in a normal state and in an alarm or other informational state, optical connection type, if applicable, power requirements , etc

7.9 Consistent Terminology throughout Documentation

Per GR-454-CORE, Section 2.4, terminology must remain consistent throughout all documentation for a platform.

Example: Maintenance Mode must remain Maintenance Mode and not vary to Maintenance Condition or Maintenance State

7.10 Consistent Terminology between Documentation and Platform.

Per GR-454-CORE, Section 2.4, terminology must be consistent between the documentation and the platform.

Example: If it is referred to as Maintenance Mode in the documentation it must be Maintenance Mode in the Craft and EMS GUIs.

7.11 Revision Numbering

Documentation shall be clearly marked on each page with Revision numbers to indicate when changes are made within the document.

7.12 Revision History

A revision history section shall be included to clearly indicate what and where changes are made within the document.

7.13 Documentation Submitted for Review

The following shall be submitted with the TP7650-001 Check list.

7.13.1 Excerpts from Documentation

Forward excerpts of documentation for the following detail procedures:

a) Initial shelf activation to include Log-on, Setting IP and Sub-net,
b) Card insertion and system recognition
c) Switch-over from Working to Standby circuits

Note: The expectation is that a 2-3 page extraction from a larger manual will be submitted as evidence for each of the tasks above. Based on this information, AT&T may elect to conduct a more thorough review by accessing the information as listed below

7.13.2 List of Documentation

Forward a list of all documentation that will be provided to AT&T for the planned deployment of the equipment (e.g., full document number, title and revision number for planning, installation, operations, etc.) and instructions on how AT&T can access these documents at this time (e.g., Public Website, Restricted client portal.)

.

7.13.3 Provide a list sites where AT&T can gain access to the above documents today. (i.e. Public Website, Restricted client portal.)

8 Other interconnection requirements

8.1 OSMINE and TIRKS Coding

Products introduced into the AT&T Local Exchange companies need to be Operations Systems Modifications for Integration of Network Elements (OSMINE) compliant with Telcordia Technologies document BR 751-100-790, Issue 6, Nov 1992. Each manufacturer shall file documentation with Telcordia Technologies and meet COMMON LANGUAGE HECIG, CLEI, Function Coding, Frame Coding and Cross-Connect Point Coding (This requirement refers to adding FRAME DATA (Bay, Panel/Block/Tray, Row, and Port) at the facility layer of the OSI layer. The distribution frame itself is not inventoried in TIRKS but the Network Equipment and cable assignments that terminate to the FDF are loaded. The Frame data appears on the inventoried equipment (Network Equipment such as Add-Drop Multiplexers) that indicates where the equipment is cabled. The seven layers of the OSI model are unique and operate somewhat independently although they are dependent. The Common Systems portion of the OSI Model pertains to Layer 1, Physical Layer.

Table 7-1 OSI Model

Layer 7 - Application
Layer 6 - Presentation
Layer 5 - Session
Layer 4 - Transport
Layer 3 - Network
Layer 2 – Data Link
Layer 1 - Physical

All Network Element and Equipment (NE) including sub-components, except for stand-alone minor materials not assimilated with the NE footprint shall obtain OSMINE and TIRKS assignments. In addition, an OSIA (Operational Support Impact Analysis) needs to be done by Telcordia to define how the product would be administered in the TIRKS system. This analysis would define the inventory methodology best suited to administer the device in the TIRKS inventory as well as address the service level design requirements.

8.2 Equipment lighting

If NE includes integrated lighting system, the system shall meet the lighting and illumination requirements in ATT-TP-76400.

8.3 Test (Streaker) Cards

Network Transport Elements shall have test cards (e.g., streaker) to enable verification of the network element hardware and the continuity of cabling, through the backplane, to the point of termination such as DSX panels or frames.

The test card or cards **shall not**:

- require the shelf to be powered for such testing.
- interrupt existing service on any other slot.

The test card or cards **shall**:

- Provide metallic access to each backplane terminating conductor via an appropriate connector Bantam for DS1, including timing inputs, 440 for DS-3, STS-1 and E-3 Facilitate electrical signal insertion and transmission toward the drop; especially for DS1 or DS3 signals.
- Facilitate optical signal insertion and transmission for continuity checking of optical jumpers that would, when such active Plug-In were installed, interconnect rear terminated Plug-Ins utilizing shelf backplane(s) optical connectors/barrels using SC or LC connectors.

Note: Test Set connections on face of Plug-In shall conform to AT&T standard connectors.

9 APPENDIX A - TP 76450 Checklist Instructions and Process

9.1 Purpose

The purpose of this appendix is to assist product suppliers with preparing and furnishing equipment documentation to the company representative for product evaluation purposes.

9.2 Scope

An evaluation reviews a product against all applicable requirements based on the equipment and its intended use in the network. Unless otherwise stated, all requirements apply to equipment systems and equipment units that will be installed in network equipment buildings and equipment areas within buildings, electronic equipment enclosures such as controlled environment vaults, outside mounted electronic equipment cabinets, and at customer locations.

9.3 Instructions:

Manufacturer is to complete the TP 76450 Checklist in Appendix B as follows:

Mark the appropriate column in the checklist as follows:

- “Yes” indicates that the equipment listed is compliant to the requirement.*
- “No” indicates that the equipment listed is not compliant to the requirement.
- “N/A” indicates that the requirement is not applicable to the equipment listed. Each requirements checked “N/A” must include an explanatory footnote.

*If equipment is evaluated by manufacturer as compliant, but deviates in some way from the stated requirement, mark “Part” (partial) in the “No” column and include an explanatory footnote.

Explanatory footnotes should be placed in the matrix following the checklist and reference specific requirement numbers for each comment.

Forward supporting documentation as required in Section 7.3.

9.4 Process:

Requirements marked “Yes” for compliance will require no further action.

Requirements marked “No” for non-compliance will trigger the AT&T SME for the requirement to contact the manufacturer in an effort to resolve the non-compliance. All issues must be resolved before the equipment is approved for use in AT&T.

Footnote references for requirements marked “N/A” for not applicable or “Part” for partially compliant will be reviewed by the AT&T SME for that requirement. The SME may initiate contact with the vendor for further clarification and/or resolution.

When compliance/resolution to all requirements is met, the TP 76450 SPOC will notify the AT&T Product Manager for the equipment that it is compliant.

Forward the completed checklist and supporting documentation as required in Section 7.3 to:

John Tablerion
15248 S. Ravinina
Orland Park Ill. 60462
Office: 708-403-4450
Fax: 708-460-4457
Email: jt3216@att.com

10 Appendix B – TP 76450 Checklist

Manufacturer:_____ Date: _____

Equipment Name/Model Number, etc.: _____

Contact Name:_____ Phone Number: _____

Product Description (check all that apply):

- ☐ Frame or Cabinet
- ☐ Single Shelf
- ☐ Transport Product
- ☐ Customer Premises Application
- ☐ Multi-Frame or Cabinet
- ☐ Multi-Shelf
- ☐ Switching Product
- ☐ Non-network Product

*Refer to paragraph number in previous sections for detailed requirements

Rqmt*	Description	Yes	No	N/A
2 DC POWER INTERCONNECTION STANDARDS				
2.1 General				
2.1.1	Nominal -48V DC Power			
2.2.2	Redundant Power Feeds			
2.3.3	Battery Return Conductor			
2.4.4	Architecture Integration			
2.2 Power Terminations at the Network Element				
2.2.1	Location of Power Terminations			
2.3 Connectors				
2.3.1	16 AWG Stranded Power Cable and Larger			
2.3.2	8 AWG			
2.3.3	18 AWG Power Cable and Smaller			
2.4	Visual Power Alarms and Status Indicator			
2.5	Fusing of Capacitors			
2.6	Power Distribution Delivery			
2.6.1	Fuse & Circuit Breaker Quality – Level III			
2.7	Individually Mounted PDU			
2.8	NE Integrated Power Distribution			
2.9	Direct BDFB Power Delivery			
3 SYNCHRONIZATION/TIMING STANDARDS				
3.1	Termination of Timing Leads			
3.2	Clock Output Lead Cabling			
3.3	Sync Jacks Marking			
3.4	Timing of Redundant Timing Inputs			

3.5	Output Card Exhaustion			
4 ALARM STANDARDS				
4.1	Local and Telemetry Alarms			
4.2	Separation of Local Alarms			
4.3	Telemetry Alarm Protocols			
4.4	Alarm Interconnection			
4.5	Discrete Alarm Rating			
4.6	Open Discrete Alarm Outputs			
4.7	Discrete Alarm Paired Leads			
4.8	Discrete Alarm Dry Contacts			
5 FIBER OPTIC CABLE				
5.1	Cables/Jumpers compliant to GR-409			
5.2	SingleMode Optical Connectors & Jumpers			
5.3	Minimum Fiber Jumper/Cable Length Between Connectors			
5.4	Fiber Attenuators for SingleMode Facilities			
5.5	Fiber Connector Boots straight, not angled			
5.6	Fiber Minimum Bend Radius			
5.7	Maximum Fiber Connector Length does not exceed 2.25”			
5.8	Minimum Distance Between Connector Housing & Fiber Bend			
5.9	Sufficient Space Between Door and Fiber Connector			
5.10	Fiber Bend Radius Management			
5.11	Standard Fiber Connector SC-UPC, SingleMode			
5.12	Alternative High Density Fiber Connector LC-UPC			
5.13	Alternative FTTP Fiber Connector SC-APC			
5.14	Correct Fiber Optic Cable Mode for location/service			
5.15	Fiber Transmission Material is glass			
5.16	Maximum Optical Power Levels do not exceed +16.8 dBm			
5.17	Correct Passive Network Element WDM Modules Placed in FDF			
5.18	Correct FiberFrames/Bays & Panels for Nes per GR-499			
5.19	Standard Fiber Raceway			
6 COPPER CABLE				
6.1	Standard DS3/STS-1 Connector & Cabling BNC Connector			
6.2	Alternative DSC/STS-1 Connector – DS3/STS-1 SMZ			
6.3	Coaxial Stripping Tools and Crimping Tools 734C/735C			
6.4	DS1 Cross-Connect Wire – High Twist			
6.5	DSL Cross-Connect Wire – High Twist (different turns than DS1)			
6.6	Electrical Ethernet Cabling – Category 5t with correct connector			
6.7	Electrical Jumper (Cross-Connect) – minimum Cat 5e/RJ45			
6.8	Correct Data Patch Panels -			
6.9	Media Converter– optical range extenders/limited Ethernet signals			
6.10	Correct CO Copper Wire and Cable Flammability Ratings			
6.11	CO Copper Wire and Cable			
6.12	CO Copper Coaxial Cable			

6.13	CO Copper “BITS” Synchronous Timing Cable			
6.14	Correct CO Copper Wire and Cable Minimum Inside Bend Radius			
6.15	Correct CO Copper Coaxial Cable Minimum Inside Bend Radius			
6.16	Correct Copper Cable Terminations			
6.17	Cable Trays used for cables with less than 25 pair groups			
6.18	Tie Bar used for cables with pair groups of 25 and above			
6.19	“Y” Cable junction point at least 36” from tail; use vertical troughs			
6.20	Mitigate Unusual Cable Types			
6.21	Protection provided for Cables and Jumpers			
7 VENDOR DOCUMENTATION				
7.1	Softcopy Documentation			
7.2	Hardcopy Documentation			
7.3	Craft Interface Instructions			
7.4	Installation Guide: installation, provisioning, and testing of NE			
7.5	Installation Guide: multi-node ring or system			
7.6	Alarm/Trouble Shooting Guide			
7.7	Personnel Injury and Equipment Damage Warnings			
7.8	Reference Guide			
7.9	Consistent terminology throughout Documentation			
7.10	Consistent terminology between Documentation & Platform			
7.11	Revisions Numbering			
7.12	Revision History			
7.13.1	Excerpts from Documentation			
7.13.2	List of Documentation			
8 OTHER INTERCONNECTION REQUIREMENTS				
8.1	OSMINE and TIRKS Coding Completed			
8.2	Equipment Lighting per ATT-TP-76400			
8.3	Test (Streaker) Card Standards Met			

“Part” & “N/A” Footnotes:

Rqmt#	Comment

11 APPENDIX C - References

AT&T TP documents may be obtained at **https://ebiznet.sbc.com/sbcnebs/Documents/ATT-TP-76450.pdf**

Telcordia documents may be obtained directly from Telcordia Technologies Inc.

Document Number	Document Description	
ATT-TP-76200	Network Equipment – Building Systems	Current
ATT-TP-76300	Installation Guide within the Central Office	Current
ATT-TP-76305	Cable Installation & Removal	Current
ATT-TP-76305-001	SNFA Cable Installation & Removal	Current
ATT-TP-76305-002	48V DC Power Single Line Diagrams	Current
ATT-TP-76306	Firestopping (non-workmanship & processes)	Current
ATT-TP-76400	Detail Engineer Requirements for the C.O.	Current
ATT-TP-76401	Space Planning	Current
ATT-TP-76401-001	Floor Loading Considerations	Current
ATT-TP-76406	Distributing Frames	Pending
ATT-TP-76407	Equipment Framework	Current
ATT-TP-76408	Equipment Superstructure	Current
ATT-TP-76410	Raised Floors	Current
ATT-TP-76412	Telco Electrical and Optical Ethernet Standards	Current
ATT-TP-76413	Connecting Block Standards (89-MDF type)	Current
ATT-TP-76414	Connecting Block Standards (COSMIC 78-112 type)	Pending
ATT-TP-76415	Connecting Block Standards for Protectors	Pending
ATT-TP-76416	Bonding & Grounding	Current
ATT-TP-76419	High-Twist Distributing Frame Wire Standards	Current
ATT-TP-76430	Synchronization Standards	Current
ATT-TP-76450	Common Systems Standards	Current
ATT-TP-76460	Fiber optic Protection in the Central Office	Pending
ATT-TP-76461	Fiber optic Connector Cleaning	Current
GR-137-CORE	Telcordia-Generic Requirements for Central Office Cable	Current
GR-518-CORE	Telcordia – Generic Switch Synchronization	Current
GR-253-CORE	Telcordia – SONET Synchronization for the Network	Current
GR-436-CORE	Telcordia – Digital Synchronization Plan	Current
GR-454-CORE	Telcordia –Supplier-Provided Documentation	Current
GR-1209-CORE	Telcordia –Fiber optic Branching Components	Current
GR-449-CORE	Telcordia –Fiber Distributing Frames	Current
FR-439	Telcordia – Operations Technology Generic Requirements (OTGR)	Current
TR-EOP-000001	Telcordia – Lightning, Radio Frequency, and 60-Hz Disturbances at the BOC Network Interface	Current
GR-833-CORE	Telcordia – NE and Transport Surveillance Messages	Current
TR-NWT-000930	Telcordia – Hybrid Microcircuits Used in Telecommunications Equipment	Current
GR-2419-CORE	Telcordia – Human Factors Requirements for Equipment to Improve Network Integrity	Current

12 Appendix D - AT&T Contact List

Wing Eng, Area Manager-Common Systems Standards, DSX, Copper Cable Standards
(925) 823-4616, E-Mail: we2583@camail.att.com

Doug Florence, Area Manager- Common Systems Standards, New Product Integration
(925) 867-9951, E-Mail: df1538@camail.att.com

Ed Granger, Area Manager- Common Systems Standards Power Pro Support
(203) 553-8189, E-Mail: eg1724@ctmail.att.com

Jeffrey Langley, Area Manager- Common Systems Standards, Alarm Standards
(816) 275-5140, E-Mail: jl8501@momail.att.com

Nick Nichols, Area Manager- Common Systems Standards, Synchronization Standards
(214) 858-1353, E-Mail: nn1601@att.com

John Tablerion, Area Manager- Common Systems Standards, ATT-TP-76200 (NEBS)
(708) 403-4450, E-Mail: jt3216@att.com

Mike Yeilding, Area Manager- Common Systems Standards, Common Systems Drawings
(925) 823-4747, E-Mail: my1515@camail.att.com

13 Appendix E – Acronyms

a) The term **product supplier** as used throughout this section refers to the equipment manufacturer or agent of the equipment manufacturer, whichever is appropriate for the product being considered.

b) Requirements are those product features that **must** be provided by the equipment manufacturer. The words “shall” and “must” are used throughout this section to identify requirements.

c) Objectives are product features that are **desired** for the long term use or application. The word “should” is used throughout this section to identify objectives.

d) **NE**- Network Equipment or Network Element package provided by the Manufacturer for consideration.

e) **OEM** – Original Equipment Manufacturer

f) **OSMINE** – Operations Systems Modifications for Integration of Network Elements

g) **PDM** – Product Manager

h) **PDU** – Power Distribution Unit

i) **RMU** – Rack Mounting Unit

j) **TIRKS** – Trunk Integrated Records KeepingSystem

k) **SME**- Subject Matter Expert