AT&T Network Services

Title:	**Network Equipment Development Standards - NEDS**	Issue Date:	**December 30, 1999**
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NOTE: Remove the first three pages of this document when using as a template in the creation of a Feature Specification Document (FSD). Italicized instructions can also be removed from each section within the template.

Introduction

This is the equipment requirements document for AT&T.

In addition, it can also function as a template that can be used directly in a Feature Specification Document (FSD) to implement these ANS equipment standards. This is the suggested format to follow. The particular content of sections will vary depending on the feature and the template can be customized to the needs of the feature. The words "DOES NOT APPLY" may be used as the text of a section as a placeholder or the section may be omitted when not applicable per instructions below.

General Overview and Scope

This document specifies equipment design requirements for all systems to be deployed in facilities of the AT&T Network Services (ANS) organization. These facilities consist of central offices (CO's), fiber optic regenerator locations, and network equipment locations (e.g., point of presence [POP] facilities, CEV's, et cetera). In addition, these requirements apply to equipment in any domestic location carrying AT&T service (unless superceded by contractual understandings/obligations).

> *Note:* This document does not include complete and detailed reliability or functionality design requirements. These are covered elsewhere in the equipment Feature Specification(s) Document (FSD) for the particular system, equipment, or component.

When the requirements of this document are satisfied, and internal processes do not mandate involvement, organizations may proceed with equipment selection and deployment without enlisting the services of ANS-NTD Power and Infrastructure, the owners of this document. If, however, there are complicating circumstances requiring additional physical requirements, or there is non-compliance with applicable criteria, the above mentioned group should be brought in immediately to help quickly resolve the issue. The contact for the group would be the technology planner and owner of this document, listed above.

Change History

Version	Issue Date	Effective Date	Reason for Re-Issue
1.0			Initial Issue
2.0	02/01/95	02/01/95	Major revisions were required to include new material, incorporate feedback from SMEs, and change some physical design requirements. Presentation and editorial changes were also made to facilitate use of the document.
3.0	12/30/99	12/30/99	The standards bodies concerned with telecommunications equipment have been converging on many fronts, so as to permit carriers to purchase off-the-shelf equipment from a global marketplace. Whereas ANS also desires to purchase off-the-shelf where feasible, NEDS has been rewritten to try to minimize the gap between the common requirements associated with off-the-shelf and those demanded by AT&T, while still ensuring its priority of reliability. Also, many of the external standards have undergone changes reflecting technological evolution of the equipment and clarification on other areas.

Document Structure

The document is primarily structured in FSD form, using RADIX numbering of requirements, so the user can easily paste the appropriate sections of requirements into their own work. Through this document, physical design is set up as one section, with four subsections. Section and requirement numbering would need to be reviewed on a case by case basis to ensure consistency in the user document.

The first subsection covers the essential requirements of any element (regardless of functionality) to be deployed in a CO. The scope of these requirements encompasses life safety, protection of nearby facilities and critical equipment, compliance with collocation terms and interconnection agreements, and compliance with federal, state, and local codes. The second subsection targets equipment that either carries AT&T service (regardless of functionality), or is critical in some other way. These criteria expand on the first subsection to cover more physical design requirements and begin to focus more on reliability, serviceability, and survivability. This subsection encompasses the traditional NEBS.

The third subsection focuses on power and alarm requirements outside the traditional NEBS focus. The power requirements are targeted at lower life cycle costs and higher reliability of the equipment, while the alarm requirements are meant to guarantee the level of surveillance necessary to maintain the best in class reliability of the network. The fourth subsection encompasses application-specific requirements. For example, ATM equipment incorporates some requirements, while transport equipment incorporates others. These subtle requirement differences are to be delineated by this section.

Acronyms

In addition to the NTD acronyms expounded within MLID #10762, NTD Acronyms and Definitions, other acronyms unique to this document are listed below…

EMS	Element Management System
EPA	Environmental Protection Agency
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
NE	Network Element (including associated cabling, management tools, etc.)
NEBS	Network Equipment Building Standards (Telcordia standards documents)
NMS	Network Management System
NRTL	Nationally Recognized Testing Laboratory
OSHA	Occupational Safety and Health Administration
OTS	Optical Transport System
UL	Underwriters' Laboratories

Listing of Requirements

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	1.1.1-20	Flame Retardancy
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	1.1.1-40	Electrical Safety
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1.1. General Physical Design Requirements

The physical design requirements, AT&T Network Equipment Development Standards – Generic Requirements, AT&T NEDS, are in general agreement with Telcordia's physical design requirements of NEBS; however, there are some significant differences between these two standards. While every effort is made to maintain consistency in the requirements, the NEDS version of the requirement will apply in case of any discrepancy. Where appropriate, applicable Telcordia NEBS sections are cited.

The following documents are used throughout the physical design section and are referenced within each requirement, when appropriate:

- Telcordia GR-63-CORE, *Network Equipment-Building System (NEBS) Generic Equipment Requirements*, Issue 1, October 1995. Available through Telcordia Publications (1-800-521-2673).
- Telcordia GR-78-CORE, *General Physical Design Requirements for Telecommunications Products and Equipment*, Issue 1, September 1997. Available through Telcordia.
- Telcordia GR-383-CORE, *Generic Requirements for Common Language Bar Code Labels*, Issue 1, July 1997. Available through Telcordia.
- Telcordia TR-NWT-000295, *Isolated Ground Planes: Definition and Application to Telephone Central Offices*, July 1992. Available through Telcordia.
- Telcordia GR-1089-CORE, *Electromagnetic Compatibility and Electrical Safety – Generic Criteria for Network Telecommunications Equipment*, Issue 2, Revision 1, February 1999. Available through Telcordia.
- Telcordia SR-3580, *Network Equipment-Building System (NEBS) Criteria Levels*, Issue 1, November 1995. Available through Telcordia.
- Telcordia GR-1274-CORE, *Generic Requirements for Reliability Qualification Testing of Printed Wiring Assemblies Exposed to Airborne Hygroscopic Dust*, Issue 1, May 1994. Available through Telcordia.
- ANSI T1.315-1994, *Voltage Levels for DC-Powered Equipment – Used in the Telecommunications Environment*, May 1994. Available through ANSI.

1.1.1. Core Physical Design Requirements

All equipment to be deployed in the central office environment, regardless of application, must comply with the requirements of this section. Mission criticality or presence of network traffic bring other criteria into play, but this set must always be present to protect the people working in the facility and the other more critical equipment. This covers NEBS Level 1, per Telcordia's SR-3580, and other requirements deemed of similar importance.

☞ **<REQ. 1.1.1-10 >**
<SUMMARY: Fire resistance criteria>
The feature shall satisfy the fire hazard criteria of NEBS Section 4.2 (GR-63 requirements 80-103). Fire testing is required.
<End of REQ. 1.1.1-10 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-20 >**
<SUMMARY: Flame retardancy>
The supplier shall provide a fire risk analysis and certify in writing that the feature meets all fire safety standards outlined as part of this document and the FRD documentation.
<End of REQ. 1.1.1-20 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-30 >**
<SUMMARY: Hazardous materials>
The supplier shall provide details of hazardous materials, as defined by the EPA, used in the feature. If the feature contains a toxic material, the supplier shall identify that material and the steps that should be taken (and when) to:

- Avoid exposure,
- Avoid injury or further physical damage, if accidentally exposed, and
- Properly dispose of the substance.

If there are no toxic materials used in the feature, the supplier shall certify the same in writing prior to delivery.
<End of REQ. 1.1.1-30 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-40 >**
<SUMMARY: Electrical Safety>
The feature shall satisfy all criteria outlined in GR-1089-CORE, Issue 2, Revision 1, section 7 on electrical safety.
<End of REQ. 1.1.1-40 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-50 >**
<SUMMARY: Listing Requirements>
The feature shall comply with the listing requirements outlined in GR-1089-CORE as requirements [22-24]. In addition to these NRTL listing requirements regarding power source and application, the feature must also satisfy general UL, ETL listing requirements. (Specifically, the feature must be identified as UL 1950 compliant by an independent, nationally recognized testing facility).
<End of REQ. 1.1.1-50 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-60 >**
<SUMMARY: Bonding and Grounding>

The feature shall comply with the grounding criteria outlined in Telcordia GR-1089-CORE, Issue 2, Revision 1, as requirements [74-93].
<End of REQ. 1.1.1-60 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-70 >**
<SUMMARY: Core EMI Emissions>
The feature and any associated intra-system cabling shall conform to the electromagnetic interference (conducted and radiated emissions, and immunity) criteria for Class A digital devices per FCC rules (cfr 47, Volume 1, Part 15, Subpart J). Further, the feature shall meet Canadian Standards Association (CSA) June 1983 EMI requirements.
<End of REQ. 1.1.1-70 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-80 >**
<SUMMARY: Seismic Survivability>
The feature shall comply with Telcordia GR-63 seismic criteria for seismic zone 4. This compliance shall apply to both the empty cabinet/bay and the fully populated cabinet/bay.
<End of REQ. 1.1.1-80 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-90 >**
<SUMMARY: Maximum Acoustic Noise>
The feature shall not independently (or as a box within a larger system) generate sufficient noise as to violate OSHA requirements for environments without protective hearing equipment. Specifically, 90 dB is the threshold. Telcordia's NEBS shall be utilized for the test procedure, if necessary.
<End of REQ. 1.1.1-90 >

Vendor Response:
AT&T Response:

*(**Users' Note**: The following group of requirements, REQ 1.1.1-100 through 140, may or may not apply to each case. Applicability is determined by Telcordia GR-1089-CORE, Issue 2, Table B-1, 'Application Chart,' located in appendix B.)*

☞ **<REQ. 1.1.1-100 >**
<SUMMARY: Short Circuit Test>
Where applicable according to GR-1089-CORE, Issue 2, Table B-1, the feature shall satisfy requirement [25] pertaining to short circuit tests. Details for this requirement are located in GR-1089 section 4.5.4.
<End of REQ. 1.1.1-100 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-110 >**
<SUMMARY: Second Level Lightning Immunity>
Where applicable according to GR-1089-CORE, Issue 2, Table B-1, the feature shall satisfy criteria [29] and [33]. *The criteria are intended to establish that the equipment will not be or*

become a fire, fragmentation, or electrical safety hazard as a result of the application of a second-level lightning surge. Criterion [29] applies only to equipment with a physical connection to the outside plant, and [33] applies only to equipment with direct connection to commercial AC power.[1]
<End of REQ. 1.1.1-110 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-120 >**
<SUMMARY: Current Limiting Protector>
Where applicable according to GR-1089-CORE, Issue 2, Table B-1, the feature shall satisfy requirements [21] and [34] pertaining to current limiting protection for equipment with a physical connection to the outside plant.
<End of REQ. 1.1.1-120 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-130 >**
<SUMMARY: AC Power Fault Immunity>
Where applicable according to GR-1089-CORE, Issue 2, Table B-1, the feature shall satisfy criteria [36-41], so *the equipment will not be or become a fire, fragmentation, or electrical safety hazard as a result of application of a second level AC power fault.*[2]
<End of REQ. 1.1.1-130 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.1-140 >**
<SUMMARY: Voltage Limiting Protector>
Where applicable according to GR-1089-CORE, Issue 2, Table B-1, the feature shall satisfy requirement [20] on vendor disclosure of special requirements and maximum transients.
<End of REQ. 1.1.1-140 >

Vendor Response:
AT&T Response:

*(**Users' Note**: The following requirement only applies where fiber optics and laser light are involved.)*

☞ **<REQ. 1.1.1-150 >**
<SUMMARY: Safety Interlocks and Controls>
Interlocks and other disabling controls shall be in place to limit radiation exposure to that of a Class 1 device. (The exception to this requirement is the case of an open fiber cable.) Further, all optical connections shall be oriented in such a way as to minimize the possibility of an open optical connector being oriented towards the face of a person performing work on the NE or adjacent equipment.
<End of REQ. 1.1.1-150 >

Vendor Response:
AT&T Response:

[1] Telcordia SR-3580, "NEBS Criteria Levels," Issue 1, November 1995.

[2] Telcordia SR-3580, "NEBS Criteria Levels," Issue 1, November 1995.

1.1.2. Extended Physical Design Requirements

(All equipment carrying traffic or mission critical data shall meet the criteria outlined in this section.)

☞ **<REQ. 1.1.2-10 >**
<SUMMARY: NEBS Level 3 Compliance>
The NE shall satisfy the criteria and tests defined as NEBS Level 3 by Telcordia's SR-3580. The vendor shall provide statements of conformance and test reports and results from the independent testing laboratory.
<End of REQ. 1.1.2-10 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.2-20 >**
<SUMMARY: Overall Size >
The NE (when installed in its bay/cabinet) shall be no larger than 30" in width, 24" in depth, and 7' in height (or the standard ETSI- equivalent that is slightly higher). Please note, however, that even though the preference is for no more than 24" in depth, smaller (space-saving) footprints are always desirable. Equipment dimensions should follow typical sizes within the industry (i.e. 30"x24"x7', 26"x12"x7', 26"x14"x7') to permit NE's of similar depth to be installed in the same row. It is important to note this requirement does not mandate a particular size.
<End of REQ. 1.1.2-20 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.2-25 >**
<SUMMARY: Physical Parameter Change>
The vendor must provide information on the physical dimensions and weight of their overall system prior to commitment (i.e. Q9), and may not modify these parameters without coordinating and receiving approval from AT&T.
<End of REQ. 1.1.2-25 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.2-30 >**
<SUMMARY: Weight of a Single Bay/Cabinet>
The maximum weight of a single cabinet (fully populated, 24" deep) shall not exceed 1150 lbs. The maximum weight of a single open bay (fully populated, 12" deep) shall not exceed 750 lbs. (Suppliers shall provide specific weight information to AT&T so the central office planners can work with the vendor to provide effective strategies for dealing with systems approaching the weight limitations.)
<End of REQ. 1.1.2-30 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.2-50 >**
<SUMMARY: Bolt to floor>
The bay/cabinet of the NE shall be capable of being bolted to a concrete slab floor or raised floor as appropriate. The base of the bay/cabinet shall have a minimum of four points of attachment,

and these shall be configured to offer alternative mounting locations in case re-bar is hit in the concrete. (Potential solutions offered in GR-63 include an "X" pattern, where the four points are slotted, and redundant holes. The X-pattern is the preference of AT&T.) The supplier shall work with AT&T (and utilize the installation requirements and practices) regarding the floor anchoring details.
<End of REQ. 1.1.2-50 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.2-65 >**
<SUMMARY: Fiber Optic Protection>
Physical protection shall be provided in the form of guards, stiles, panels, etc. to protect the normal operation of fiber optic cables from accidental pulls, bumps, and hits. This protection shall not negatively impact the effectiveness of the airflow dissipating the heat of the system.
<End of REQ. 1.1.2-65 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.2-70 >**
<SUMMARY: Cabling from top or bottom of bay-frame/cabinet>
The NE shall be able to receive all types of cables from the top or bottom of the bay/cabinets. When receiving from the bottom it shall be able to accommodate a raised floor environment.
<End of REQ. 1.1.2-70 >

Vendor Response:
AT&T Response:

1.1.3. Layout and Cabling

☞ **<REQ. 1.1.3-10 >**
<SUMMARY: Equipment Layout>
The NE floor plan requirements shall conform to the typical equipment. The figure below shows one possible example of three line-ups in a 20' x 20' building bay with each line-up containing up to eight bay-frame/cabinets (nominal dimensions: 23.6" wide x 23.6" deep). *Note that this arrangement requires a minimum cabling distance of 100 feet to connect any two farthest bay-frame/cabinets; for example, from corner bay-frame/cabinets in row one to the corner bay-frame/cabinets in row three.* Other potential layouts are shown in Telcordia's GR-63. The vendor shall provide floor plan data sheets and work with AT&T engineering groups to determine an acceptable system layout.
<End of REQ. 1.1.3-10 >

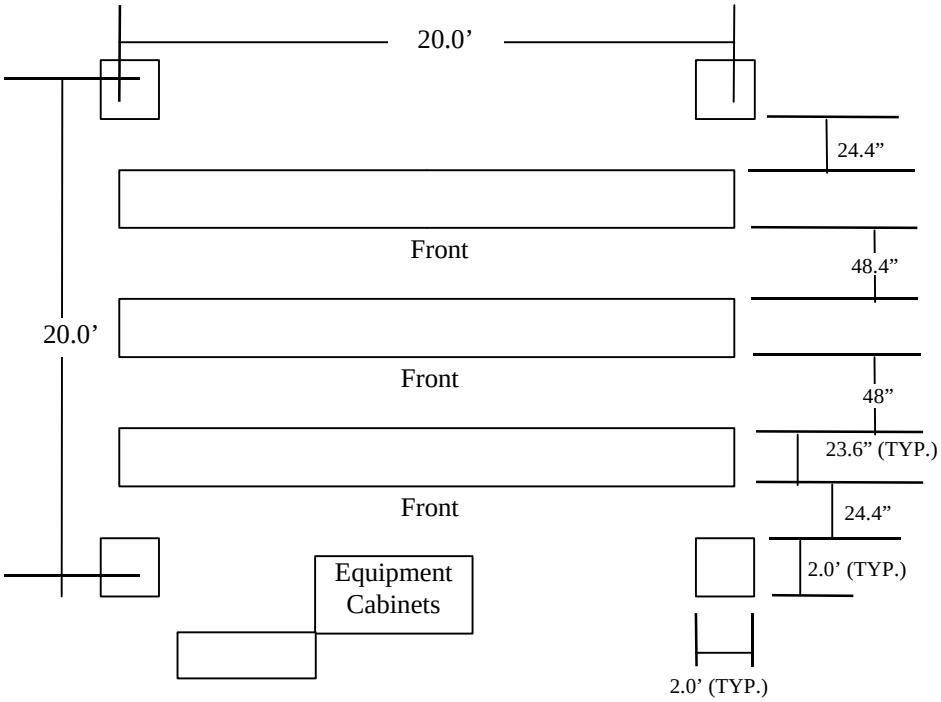


Figure -1. Typical Equipment Layout Plan

☞ **<REQ. 1.1.3-20 >**
<SUMMARY: Intra-system cabling>
Within a NE, all intra-system cabling shall maximize separation of redundant cables and fibers (i.e. working/protection, east/west, timing cables, switch cables, etc.).
<End of REQ. 1.1.3-20 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.3-30 >**
<SUMMARY: Inter-system cabling>
All working signal cables shall be routed on separate physical paths from the protection cables within the system. Between systems, all separations shall be maintained. All inter-system connections shall be able to support a minimum distance of 100m.
<End of REQ. 1.1.3-30 >

Vendor Response:
AT&T Response:

☞ **<OBJ. 1.1.3-40 >**
<SUMMARY: Cabling Constraints>
The vendor should be able to support inter-system and intra-system cabling up to 2 km.
<End of OBJ. 1.1.3-40>

Vendor Response:
AT&T Response:

***(Users' Note:** If the vendor cannot comply with requirement 1.1.3-40, it is preferred they be able to support 350 m, and they must be able to support 100m. Effectively, the potential sites are being limited for the application, and greater implementation difficulties created with lower distances. It is acceptable to provide less than the objective provided a scenario has been worked out to address those cases where the lower run will be insufficient.)*

☞ **<REQ. 1.1.3-50 >**
<SUMMARY: Power Cable Diversity>
A and B power cables shall have physically diverse routing within the bay/cabinet and all cabling carrying service shall be physically diverse within the bay/cabinet from those cables that carrying protection traffic.
<End of REQ. 1.1.3-50>

Vendor Response:
AT&T Response:

1.1.4. Operational Parameters

☞ **<REQ. 1.1.4-10 >**
<SUMMARY: Operating life performance>
The NE shall perform as expected (i.e., maintain performance and reliability objectives specified elsewhere) throughout its operating 25 year life while operating under temperature and humidity conditions specified in this section.
<End of REQ. 1.1.4-10 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.4-20 >**
<SUMMARY: Ambient temperature and humidity>
The NE shall perform as expected (i.e., maintain performance and reliability objectives specified elsewhere) when subjected to the ambient temperature and relative humidity conditions outlined in Telcordia's GR-63-CORE, section 4.1.2 with the temperature gradient modified. The Telcordia test methods shall be followed to determine compliance with one exception: the temperature gradient shall be modified to be 1.0° C/min instead of the value of 0.5° C/min provided. (Therefore, in the test procedure, replace the temperature gradients appropriately, so they all correspond to the 1.0° C/min value.)
<End of REQ. 1.1.4-20

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.4-30 >**
<SUMMARY: Heat Dissipation>
The system shall not dispel more than 80 Watts/sf over the footprint of the system. (Area calculations are to include the actual equipment footprint, plus half of any adjoining aisle spaces per GR-63 calculation methods.)

<End of REQ. 1.1.4-30 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.4-40 >**
<SUMMARY: Heat Dissipation Airflow>
While a preference would be for systems dispelling less than 50 Watts/sf and utilizing no fans, changing technologies are making that goal exceedingly difficult to achieve. Since higher heat dissipations tend to require fans for proper cooling, airflow becomes more critical because of its potential impact to the extended CO environment. Therefore, systems exhausting more than 50 Watts/sf must exhaust the air vertically.
<End of REQ. 1.1.4-40 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.4-50 >**
<SUMMARY: Operating altitude range>
The NE shall perform as expected according to all the requirements within the specified operating temperature and humidity limits when installed in the altitude range of 200 feet below sea level to 6,000 feet above sea level.
<End of REQ. 1.1.4-50 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.4-60 >**
<SUMMARY: Airborne contaminants>
The NE shall conform to the airborne contaminant criteria in NEBS Section 4.5 and Telcordia GR-1274-CORE.
<End of REQ. 1.1.4-60 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.4-70 >**
<SUMMARY: Acoustic noise>
The NE sound level shall be limited to 60dB(A) and tested per NEBS Section 5.6.
<End of REQ. 1.1.4-70 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.1.4-80 >**
<SUMMARY: Vibration>
The NE shall satisfy the office vibration criteria outlined in NEBS Section 4.4.
<End of REQ. 1.1.4-80 >

Vendor Response:
AT&T Response:

1.2. Electrical Physical Design Parameters

(This section focuses on the power requirements expected of traffic carrying equipment.)

The NE will be powered by redundant independent battery power plants providing -48 volt (nominal) DC with diversely routed dual bus: power source A (red) and power source B (blue). The dual -48 volt DC power sources redundancy assures a high degree of reliability against failure of either of the two input DC power sources.

☞ **<REQ. 1.2-10 >**
<SUMMARY: Dual source -48 volts DC input>
The NE shall be:

- Powered by a -48 volt (nominal) DC power source
- Able to operate between -40 to -57.5 volts DC measured at the NE unit input power lugs for each individual power source feed.
- Able to accept dual, independent -48 VDC power sources
- Able to accept distribution leads which are connected via AT&T approved power connectors.

In the event that one of the power sources is unavailable, the equipment shall continue to operate from the remaining power source without manual intervention and without interruption of service or functionality (including all LED's, alarms, and indications).
<End of REQ. 1.2-10 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-20 >**
<SUMMARY: Network Element, Shelf or Circuit Pack Power>
Each element/shelf/circuit pack, whichever is the smallest independent load device of the NE, shall obtain power from two completely independent power units. Furthermore, the return path from the power units shall remain completely independent (Telcordia TR-NWT-000295).

If one of the power units fails, an alarm shall be generated and the load shall be carried by the other unit without manual intervention and without interruption of service or functionality. The other power unit shall support the operation of the element/shelf/circuit pack until the problem with the faulty unit is corrected.
<End of REQ. 1.2-20 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-30 >**
<SUMMARY: OR-ing Diodes>
The use of "OR-ing" diodes to combine power feeders may be used to power a network element from two power sources provided all the following requirements are met:

a) Appropriately sized over-current protection devices shall be present in each power path to the unit, within the network element.
b) Diodes shall also be included in each power path return of the unit.
c) The maximum steady state current to be handled by the diode shall be limited to 50% of the diode's maximum steady state current rating.
d) Current transients shall not exceed the maximum rated value for the diode.
e) The maximum reverse voltage across the diode shall be limited to 70% of the diode's peak inverse voltage rating.

f) The average junction temperature of the diode, within its normal (NEDS) operating environment, shall be less than 60° C, with the maximum allowed junction temperature being less than 110° C.

<End of REQ. 1.2-30 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-40 >**
<SUMMARY: OR-ing Diode Monitoring>
The "OR-ing" diode architecture (used to combine power feeders) shall include circuitry, which continually monitors the operational status of the diodes, and initiates an alarm in the event of a diode failure. This circuitry shall not decrease the reliability of the unit.
<End of REQ. 1.2-40 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-50 >**
<SUMMARY: Low input voltage shutdown>
Power units shall have a low input voltage shutdown feature. The low input voltage shutdown shall occur when the input voltage measured at the input terminals of the equipment is -39.5 to - 37.5 VDC for greater than 100ms. (Assumes a 2-volt drop from the battery plant to the load.) It is preferred that the low input voltage shutdown occurs at -39.0 VDC.
<End of REQ. 1.2-50 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-70 >**
<SUMMARY: High output voltage shutdown>
Each DC to DC converter shall have a high output voltage shutdown feature. The high output voltage shutdown shall occur when the output voltage measured at the DC to DC converter output terminals increases past 10 percent of normal output.
<End of REQ. 1.2-70 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-80 >**
<SUMMARY: Over-voltage transient>
The DC/DC converter(s) of each service group of the NE shall sustain no damage in the presence of over-voltage transients with the following characteristics:

Transient	Duration	Rise Time/Fall Time
200 Volts	1 microsec.	
100 Volts	10 microsec.	
75 Volts	10 millisec.	10 volts per millisec. (Rise) 10 volts per millisec. (Fall)
0.0 Volts	5 millisec.	50 volts per millisec. (Fall) 12.5 volts per millisec. (Rise)

The service group shall continue operation during the transient described above without interruption of service or functionality.

<End of REQ. 1.2-80 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-100 >**
<SUMMARY: Power fault alarm>
The NE shall initiate a major alarm when a power sequence fault, an under-voltage fault, an over-voltage fault, or an over-current fault is detected in any service group.
<End of REQ. 1.2-100 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-110 >**
<SUMMARY: Circuit breaker marking>
All circuit breakers used in the NE shall be plainly marked to indicate "ON" and "OFF" positions, and show the capacity of the breaker.
<End of REQ. 1.2-110 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-113 >**
<SUMMARY: Power Switch marking>
All power switches used in the NE to interrupt input power source feeds shall be plainly marked to indicate "ON" and "OFF" positions.
<End of REQ. 1.2-113 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-120 >**
<SUMMARY: Failed fuse alarm>

- The NE shall initiate a major alarm when any overcurrent protection device (example: fuse or circuit breaker) operates.
- The NE shall provide a visual indication showing which overcurrent protection device initiates an alarm.
- The alarm (critical, major or minor) shall be reported to the appropriate OS as well.

<End of REQ. 1.2-120 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-130 >**
<SUMMARY: CO grounding>
The NE shall provide a low-impedance bond to the protective grounding system consistent with the central office grounding requirements (ATTP 803-501-100 & NEBS). Battery returns and chassis ground shall be isolated from each other until they reach the battery plant return bus bar.
<End of REQ. 1.2-130 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-140 >**

<SUMMARY: Equipment grounding terminal>
The NE shall provide an electrical grounding terminal -one per cabinet/bay mounted on a bare, bright surface coated with antioxidant compound using a hydraulically crimped two-hole lug that has dies traceable for calibration.
<End of REQ. 1.2-140 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-150 >**
<SUMMARY: ESD grounding terminal>
The NE shall be equipped with an unpainted grounded terminal (ESD socket - 166 jack) at a convenient location on the equipment (with appropriate markings) for connecting an Electrostatic Discharge (ESD) wrist-strap (industry standard 175 plug). The grounded terminal shall provide electrical continuity to the framework. Basic design parameters of the 166 jack and 175 plug are included in Table 1.2-150 below.
<End of REQ. 1.2-150 >

Table 1.2-150

Physical Parameter	Socket (166 Jack)	Plug (175 Plug)
Diameter- Outside	0.25", ¼-28 UNF Thread (Head 3/8" Nut)	0.175" + 0.015"/ - 0.010"
Diameter- Inside	0.166 ± 0.001"	-
Length- Body	0.531 ± 0.015"	0.531 ± 0.016"
Material	Brass	
Finish	Nickel	Nickel
Current Rating	15 Amps	15 Amps
Contact Resistance	0.010 Ω	0.010 Ω

** Specified dimensions and tolerances are industry standard for these components. The socket may be used for panel thickness up to 0.375".

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-160 >**
<SUMMARY: Backplane power>
The backplane design shall remain consistent throughout the equipment, and shall provide isolation between the power returns of the equipment.
<End of REQ. 1.2-160 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-170 >**
<SUMMARY: Backplane grounding>
All backplanes used in a NE shall provide a grounding arrangement that is consistent throughout the equipment, and is in accordance with central office grounding specifications.
<End of REQ. 1.2-170 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.2-180 >**
<SUMMARY: Battery noise>

The NE shall operate without service interruptions in presence of a battery line noise up to the values shown in Table 1 of ANSI T1.315-1994.
<End of REQ. 1.2-180 >

Vendor Response:
AT&T Response:

1.3. Alarm and Maintenance Design Parameters

☞ **<REQ. 1.3-10 >**
<SUMMARY: Summary Alarm Display>
Each NE bay-frame/cabinet shall include a summary alarm display visible to a technician standing in front of a bay-frame/cabinet without opening the doors. At a minimum, the summary alarm display shall indicate critical (red), major (red), minor (yellow), ACO (white) and warning (color to be determined).
<End of REQ. 1.3-10 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-20 >**
<SUMMARY: Airflow Sensor>
If there is a fan, the system shall have an air flow sensor or temperature sensor to detect when insufficient air flow is present (such as when the fan filters become clogged) to effectively cool the equipment. In addition, when insufficient airflow is detected, this sensor shall light an LED on the bay and generate an alarm indication that is seen at the CIT, EMS, and NMS. No regular time interval for filter change shall be required.
<End of REQ. 1.3-20 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-30 >**
<SUMMARY: Return to service>
All units or modules (circuit packs, plug-ins) considered replaceable shall be capable of complete replacement and return to service within 0.5 hour after the availability of the unit or module to be replaced at site.
<End of REQ. 1.3-30 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-40 >**
<SUMMARY: Maximum weight of any replaceable unit>
The maximum weight of any replaceable unit or module shall not exceed 25 lbs.
<End of REQ. 1.3-40 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-50 >**
<SUMMARY: Force required to remove or insert any plug-in unit>
The maximum force required to remove or insert any plug-in unit shall not exceed 25 lbs.

If finger pull/insert force alone is necessary, this force shall be limited to seven pounds. Further, the size of the finger pull latch shall facilitate easy gripping and resist breaking in normal use.
<End of REQ. 1.3-50 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-60 >**
<SUMMARY: Circuit pack removal>
The NE circuit packs shall be designed so that they can be safely removed either with a tab or a tool as appropriate. Keying shall be used to prevent a technician from inserting a wrong circuit pack in a slot. The keying shall include protection against backplane or connector damage if a technician attempts to insert the wrong circuit pack into a slot.
<End of REQ. 1.3-60 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-70 >**
<SUMMARY: Bar code>
Each circuit pack shall have a machine readable bar coded label (GR-383-CORE) in the front such that an optical scanner can read it. The label shall contain CLEI (Common Language Equipment Identification) code in human readable form, together with the related bar code. It shall also include version number, serial number and manufactured date. The supplier shall provide coding information in human readable form for each pack type four months before the equipment delivery date of the readiness demonstration.
<End of REQ. 1.3-70 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-80 >**
<SUMMARY: Hardware approved for CO use>
All circuit packs, backplanes, connectors, and mounting hardware used in the NE shall be approved for CO use per Telcordia's GR-78-CORE.
<End of REQ. 1.3-80 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-100 >**
<SUMMARY: Non-operating temperature and humidity>
The NE shall perform as expected (i.e., maintain performance and reliability objectives specified elsewhere) after it is subjected to cyclical variations and thermal shocks over the following temperature and humidity limits:

Temperature and Humidity Limits - Non-operating Conditions

Parameter	Limits	
	Range	Maximum Rate of Change
Temperature	-40°C to 70°C	30°C per hour
Humidity	10% to 95% (see Note)	--

NOTE: Maximum absolute humidity of 0.024 lb. of water/lb of dry air.
<End of REQ. 1.3-100 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-110 >**
<SUMMARY: Non-operating altitude range>
The NE shall perform as expected (specified elsewhere) after it is subjected to cyclical variations and thermal shock within the specified non-operating temperature and humidity limits and the altitude range of 200 feet below sea level to 40,000 feet above sea level.
<End of REQ. 1.3-110 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.3-120 >**
<SUMMARY: Handling and transportation>
The NE shall conform to the handling and transportation criteria in NEBS Sections 4.4, 5.3, and 5.4.
<End of REQ. 1.3-120 >

Vendor Response:
AT&T Response:

1.4 Specialized Physical Design Requirements

*(**Users' Note:** These requirements may be inserted as needed depending on the feature and application.)*

1.4.1 Transport Requirements

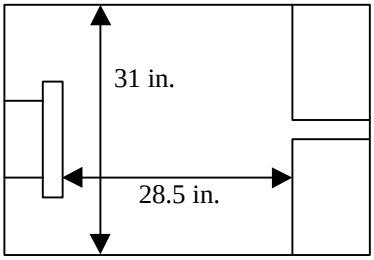
☞ **<REQ. 1.4.1-10 >**
<SUMMARY: Swing out Bay>
Any vendor-supplied equipment that, because of inherent functionality can be used in a repeater hut, CEV, or Regeneration location shall be certified for use in a swing out bay. *(Because of the limited space in these locations, the existing cabinet mounted transponders and OTS's cannot be installed in some CEV's and repeater huts. This saves considerable time and at CEV's that otherwise would need construction due to space limitations.*)
<End of REQ. 1.4.1-10 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-20 >**
<SUMMARY: Front access design>
The design of the OTS shall be such that all installation, operations, and maintenance activities (including backplane pin replacement and all capacity growth scenarios) can be performed with access to only the front of the equipment. Access shall be provided to all maintenance measurement points without the disassembly or removal of any part of the equipment. Also the vendor must provide strategies for maintenance to equipment backplanes and access to cabling, when the rear access to them is not possible (for equipment installations against the wall).

In Summary, the system must be able to be:
1. Mounted against a wall without losing the ability to repair and maintain any part of the system

2. Mounted in the floor track in a CEV
3. Taken through the opening of the CEV (Dimensions shown below)



If the vendor is unable to fully compliant with this requirement, then the vendor MUST comply with requirement 1.4.1-10, Swing Out Bay.
<End of REQ. 1.4.1-20 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-25 >**
<SUMMARY: Wall Mount Constraints>
When the OTS can be mounted against the wall or in a back to back configuration, the vendor shall provide all necessary information regarding minimum spacing for heat dissipation or other physical constraints. (Note there must be a minimum of a 6" gap between surfaces of back-to-back equipment or between equipment and walls because of seismic implications.)
<End of REQ. 1.4.1-25 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-28 >**
<SUMMARY: Low input voltage recovery>
Equipment to be deployed in remote unoccupied locations because of inherent functionality (such as optical amplifiers for regen huts and/or CEV's) must be able to automatically recover from the low input voltage shutdown. The restart shall occur when the voltage measured at the input terminals of the equipment frame is –49.5 +/- 0.5 Vdc. The NE shall return to normal operation (based on its current configuration data) without manual intervention, and without causing any overcurrent protection devices to operate.
<End of REQ. 1.4.1-28 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-30 >**
<SUMMARY: Optical Connectors>
The OTS shall use only ST II connectors for external interface optical cable connections for areas that require low losses over long distances. ST II connectors shall be angled facing downwards.
<End of REQ. 1.4.1-30 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-40 >**
<SUMMARY: Fiber cables and transponder cables>
Fiber cables transporting multiwavelength signals shall be segregated and protected against damage from activity with OC-48/192 transponder cabling.
<End of REQ. 1.4.1-40 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-50 >**
<SUMMARY: Working and protection cables>
Working and protection multiwavelength fiber cables shall be segregated.
<End of REQ. 1.4.1-50 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-60 >**
<SUMMARY: Fiber cables to and from transponder>
OC-48/192 fiber cabling to and from the transponder shall be segregated.
<End of REQ. 1.4.1-60 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-70 >**
<SUMMARY: NE to NE cabling>
The system shall support NE to NE direct optical cabling to and from the transponder, while the system is in service and without impact to established service.
<End of REQ. 1.4.1-70 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-80 >**
<SUMMARY: Intra-bay fiber jumpers>
The diverse routing of intra-bay fiber jumpers, e.g., East vs. West, shall be provided by the supplier.
<End of REQ. 1.4.1-80 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-90 >**
<SUMMARY: Fiber cables color-coding>
Fiber cables transporting multiwavelength signals shall be uniquely identified via color-coding.
<End of REQ. 1.4.1-90 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-100 >**
<SUMMARY: Space per channel OC-192>
The amount of space required to transmit and receive one OC-192 channel shall not exceed two times that required to transmit and receive one OC-48 channel, excluding any dispersion compensation required to convert an OC-48 capable route to an OC-192 capable route.
<End of REQ. 1.4.1-100 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-110 >**

<SUMMARY: Space per channel 40G>

The amount of space required to transmit and receive one 40G channel shall not exceed two times that required to transmit and receive one OC-192 channel, excluding any dispersion compensation required to convert an OC-192 capable route to a 40G capable route.

<End of REQ. 1.4.1-110 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-120 >**

<SUMMARY: OTS Footprint Configurations>

The vendor will clearly describe the footprints for the various product configurations. Attach diagrams in an Appendix to the FRD and note the capacity and transmit rate of each configuration (making sure to distinguish whether the system is 2-fiber or 4-fiber). Also, show which parts of the system are dedicated to the C-band channels, the L-band channels, and the S-band channels (where applicable). Configurations of interest include:

- End terminal fully equipped with OC-48
- End terminal fully equipped with OC-192
- End terminal fully equipped with 40G/OC-768
- An example of an end terminal with a mixed population (2.5G/10G/40G). Elaborate on any mixing rules (restrictions, etc.).
- Regenerator site
- Repeater/OA site
- OADM site

This response should include all necessary bays.

<End of REQ. 1.4.1-120 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-130 >**

<SUMMARY: Flexibility of OTS Footprint>

The vendor will clearly describe the footprint of the minimum product configuration necessary to support transmission at all three bit rates of interest: OC-48, OC-192, 40G. Attach diagrams in the appendix and note the capacity of this minimum system. Describe how this minimum configuration can be expanded in-service, if possible.

<End of REQ. 1.4.1-130 >

Vendor Response:
AT&T Response:

☞ **<REQ. 1.4.1-140 >**

<SUMMARY: Fiber Management>

The vendor will clarify the plan to address fiber management as part of the FRD response. This shall include not only the fiber flow, but also the plan to mitigate the risk of CP replacement on adjacent fibers.

<End of REQ. 1.4.1-140 >

Vendor Response:
AT&T Response:

1.4.2 ATM Requirements

This section is currently empty.

1.4.3 IP/FR/Access Management Requirements

This section is currently empty.