

**TELECOMMUNICATIONS  
INFRASTRUCTURE  
SPECIFICATIONS**

**- INTRODUCTION -**

**TABLE OF CONTENTS**  
**PART A - ADMINISTRATIVE**

**17010 BASIC COMMUNICATIONS REQUIREMENTS ----- 3**

A) DEFINITIONS ----- 3

B) ABBREVIATIONS ----- 5

C) REGULATIONS AND CODE COMPLIANCE ----- 5

D) BASIS OF DESIGN ----- 7

    a) Structured Wiring ----- 8

    b) Horizontal Cabling ----- 8

    c) Backbone Cabling ----- 8

E) INTENT OF DRAWINGS ----- 9

F) FIRESTOPPING ----- 9

G) SPECIAL TOOLS ----- 9

H) LIFTING ATTACHMENTS ----- 9

I) WORKMANSHIP, SUBSTITUTIONS, WARRANTY ----- 9

**MODIFICATIONS ----- 11**

**17010 Basic Communications Requirements**

**A) Definitions**

**Backbone (ANSI/TIA/EIA-568-B.1):** A facility (e.g., pathway, cable or conductors) between telecommunications rooms, or floor distribution terminals, the entrance facilities, and the equipment rooms within or between buildings.

**Bonding Conductor for Telecommunications (ANSI/TIA/EIA 607):** the conductor that interconnects the telecommunications bonding infrastructure to the building's service equipment (power) ground.

**Cross-Connect (ANSI/TIA/EIA-568-B.1):** A facility enabling the termination of cable elements and their interconnection or cross-connection.

**Cross-Connection (ANSI/TIA/EIA-568-B.1):** A connection scheme between cabling runs, subsystems, and equipment using patch cords or jumpers that attach to connecting hardware on each end.

**Entrance Facility (EF) (Telecommunications) (ANSI/TIA/EIA-568-B.1):** An entrance to a building for both public and private network service cables (including wireless) including the entrance point of the building and continuing to the entrance room or space.

**Entrance Room or Space (Telecommunications) (ANSI/TIA/EIA-568-B.1):** A space in which the joining of inter or intra building telecommunications backbone facilities takes place.

**Equipment Room (ER) (Telecommunications) (ANSI/TIA/EIA-568-B.1):** An environmentally controlled centralized space for telecommunications equipment that usually houses a main or intermediate cross-connect.

**Horizontal Cabling (ANSI/TIA/EIA-568-B.1):**

- (1) The cabling between and including the telecommunications outlet/connector and the horizontal cross-connect.
- (2) The cabling between and including the building automation system outlet or the first mechanical termination of the horizontal connection point and the horizontal cross-connect.

**Horizontal Cross-Connect (HC) (ANSI/TIA/EIA-568-B.1):** A cross-connect of horizontal cabling to other cabling, e.g., horizontal, backbone, and equipment.

**Inside Plant (ISP):** the portion of the communications distribution system from the protected side of the transient protection to communications outlets, including but not limited to MC('s), IC's and HC's, copper and fiber-optic backbone cable, terminations, horizontal cabling, and telecommunications outlet/connector.

## **RUTGERS UNIVERSITY**

---

### 17010 Basic Communications Requirements

**Intermediate Cross-Connect (IC) (ANSI/TIA/EIA-568-B.1):** A cross-connect between first level and second level backbone cabling.

**Main Cross-Connect (MC) (ANSI/TIA/EIA-568-B.1):** A cross-connect for first level backbone cables, entrance cables, and equipment cables.

**Outlet/Connector (telecommunications) (ANSI/TIA/EIA-568-B.1):** A connecting device in the work area on which horizontal cable or outlet cable terminates.

**Outside Plant (OSP) (ANSI/TIA/EIA-568-B.1):** Telecommunications infrastructure designed for installation exterior to buildings.

**Pathway (ANSI/TIA/EIA-568-B.1):** a facility for the placement of telecommunications cable.

**Raceway (ANSI/TIA/EIA-569-A):** any enclosed channel designed for holding wires or cables.

**Space (Telecommunications) (ANSI/TIA/EIA-568-B.1):** An area used for housing the installation and termination of telecommunications equipment and cable, e.g., common equipment rooms, equipment rooms, common telecommunications rooms, telecommunications rooms, work areas, and maintenance holes/handholes.

**Telecommunications (ANSI/TIA/EIA-568-B.1):** Any transmission, emission, and reception of signs, signals, writings, images, and sounds, that is information of any nature by cable, radio, optical, or other electromagnetic systems.

**Telecommunications Bonding Backbone (ANSI/TIA/EIA-607):** a copper conductor extending from the telecommunications main grounding busbar to the farthest floor telecommunications grounding busbar.

**Telecommunications Closet or Closet (TC) (ANSI/TIA/EIA 568A):** an enclosed space for housing telecommunications equipment, cable terminations, and cross-connect cabling. The closet is the recognized location of the cross-connect between the backbone and horizontal facilities. (Replaced by Telecommunications Room (TR) in ANSI/TIA/EIA-568-B.1)

**Telecommunications Main Grounding Busbar (ANSI/TIA/EIA 607):** a busbar placed in a convenient and accessible location and bonded by means of the bonding conductor for telecommunications to the service equipment (power) ground.

# **RUTGERS UNIVERSITY**

---

## 17010 Basic Communications Requirements

**Telecommunications Room (ANSI/TIA/EIA-568-B.1):** An enclosed space for housing telecommunications equipment, cable terminations, and cross-connect cabling, that is the recognized location of the horizontal cross-connect.

**Unshielded Twisted Pair (UTP) (ANSI/TIA/EIA 568A):** the cable consists of 24 AWG thermoplastic insulated solid conductors formed into four individually twisted pairs and enclosed by a thermoplastic jacket.

**Wiring Plan (WP):** The combination of a faceplate, modular jack(s), cabling and termination at each end.

**Work Area (Work Station) (ANSI/TIA/EIA-568-B.1):** A building space where the occupants interact with telecommunications terminal equipment.

### **B) Abbreviations**

EF	Entrance Facility
ER	Equipment Room
HC	Horizontal Cross-Connect
IC	Intermediate Cross-Connect
MC	Main Cross-Connect
TC	Telecommunications Closet
TR	Telecommunications Room
WP	Wiring Plan

### **C) Regulations and Code Compliance**

A documented, maintainable, data, video and voice communications distribution system must meet all applicable local, state and national codes. Proper equipment and installation, as required for fire ratings, is stressed.

All work performed under the scope of this specification shall conform to the following codes and standards where applicable. When a conflict occurs, the Communications Contractor is directed to follow the most stringent requirements:

American National Standards Institute

ANSI X3T9.5 FDDI

# **RUTGERS UNIVERSITY**

---

## 17010 Basic Communications Requirements

### ANSI X3T9.5 CDDI

#### Electronic Industries Association/Telecommunications Industries Association

ANSI/TIA/EIA-568-A Commercial Building Telecommunications Cabling Standard (replaced by ANSI/TIA/EIA-568-B.1)

ANSI/TIA/EIA-568-B.1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements

ANSI/EIA/TIA-568-B.2 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components

ANSI/EIA/TIA-568-B.3 Optical Fiber Cabling Components Standard

ANSI/EIA/TIA -526-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7

ANSI/EIA/TIA -526-14 Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant – OFSTP-14

ANSI/EIA/TIA-569-A Commercial Building Standards for Telecommunications Pathways and Spaces

ANSI/TIA/EIA-606 The Administration Standard for the Telecommunications Infrastructure of Commercial Building

ANSI/TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications

EIA RS-232 Serial Communications Electrical Interface

EIA RS-310-C Racks, Panels and Associated Equipment

#### Federal Communications Commission Title 47

FCC Part 15

FCC Part 68

#### Institute of Electrical and Electronic Engineers

IEEE 802.3

IEEE 802.5

# **RUTGERS UNIVERSITY**

---

17010 Basic Communications Requirements

National Electrical Code

Article 770 Optical Fiber Cables

Article 800 Communications Circuits

Article 820 Community Antenna Television and Radio Distribution Systems

National Electrical Manufacturers Association (NEMA)

Local Electrical Code

National Fire Protection Association

NFPA 70 National Electrical Code

NFPA 75 Protection of Electronic Computer / Data Processing Equipment

OSHA 29 CFR 1926/1910

Underwriters Laboratories, Inc.

UL Listed

UL Approved

Building Officials and Code Administrators (BOCA) International, Inc.

BOCA National Building Code 1996

State of New Jersey Uniform Construction Code

State of New Jersey Uniform Fire Code

Rutgers University Facilities Design Standards

## **D) Basis of Design**

The objective of this standards document is to define a universal and structured communications cable plant infrastructure. The goal of such a cable plant is to accommodate all current and anticipated voice, data and video systems with little or no modification, thus reducing administration and maintenance resources.

The purpose of this document is to set guidelines and minimum parameters to follow during the design and installation process of a cable plant infrastructure

# **RUTGERS UNIVERSITY**

---

## 17010 Basic Communications Requirements

project. It is not intended as a standalone design document. This standard shall provide direction in producing detailed project-specific design documents.

### **a) Structured Wiring**

The concept of structured cabling, implying a hierarchical cabling system, is to be strictly applied. At Rutgers University, there are three hierarchical levels: Inter-Building Backbone, Intra-Building Backbone, and Horizontal, with interconnections (patching, cross-connects, and/or distribution equipment) required, and only permitted, between hierarchical levels.

Campus and building level voice, data and video electronics will generally be at Equipment Room (ER) locations typically co-located with the Main Cross-Connect (MC). Floor-level voice, data and video electronics shall be at Telecommunications Closets or Rooms (TC/TR) which also house the Horizontal Cross-Connect (HC).

### **b) Horizontal Cabling**

Rutgers University uses industry-standard ANSI/TIA/EIA-568-B.2 jack designation T568B, CAT 5e voice/data horizontal cabling. RG-6 coaxial cabling for one-way broadband video will be specified in most locations, RG-6 coaxial cable and audio cables for two-way video will be required in some. The cables will be installed and will be terminated on each end, unless indicated otherwise. The horizontal cabling will be installed from the ER or TC(s) to the workstations. The cabling will be run either above finished ceilings, in fishable walls or in surface mounted conduit or raceway. Terminations will occur at the workstations in either surface mounted or semi-flush mounted faceplates and in the ER or TC(s) on wall mounted 110 blocks for voice and rack mounted patch panels for data.

### **c) Backbone Cabling**

Backbone cabling will be provided and installed from the ER to the TC(s) for voice, data, video and for grounding and bonding. Voice cabling and grounding and bonding cabling will be provided from the existing Entrance Facility to the ER. Termination for the backbone cabling will be on wall mounted 110 blocks for voice and in rack mounted connector housings for data. Voice horizontal cables require all four pairs cross-connected to the backbone cables.

All equipment and all work performed shall meet the stated requirements in this document.

These design standards include provision of all new interconnection facilities for voice, data, and video.

## **RUTGERS UNIVERSITY**

---

### 17010 Basic Communications Requirements

In general, the University attempts to provide Telecommunications Closets (TCs) to limit horizontal cable travel to no more than one floor above or below, however in certain circumstances ERs and/or TCs will serve spaces more than two floors away.

#### **E) Intent of Drawings**

The plans indicate the general arrangement and scope of work. To facilitate the installation and coordination with field conditions, the Communications Contractor may deviate from this general arrangement so long as the scope does not change. All such changes shall be submitted by the contractor and approved by Rutgers prior to implementation. Changes shall be noted on shop drawings. Deviations after the approved submission of shop drawings shall be submitted to Rutgers prior to implementation and shall be noted on as-built drawings.

#### **F) Firestopping**

Any penetration of a fire or smoke barrier must be approved by Rutgers University. Such penetrations must be properly treated according to industry standards and all applicable codes. Minimally, metallic sleeves patched-in and filled with materials meeting the applicable codes shall be used. In all cases, the Vendor shall be responsible for compliance with all federal, state and local regulations in effect.

During installation, any penetration of a fire wall shall be sealed with approved material by the end of each working day; that is, fire walls shall not be left with a vulnerable point overnight.

#### **G) Special Tools**

All/any proprietary tools that aid the product installation shall be deemed mandatory for the work, and will be supplied by the Contractor at no additional cost.

#### **H) Lifting Attachments**

All/any external lifting attachments must comply with the product specifications, and be approved by the University.

#### **I) Workmanship, Substitutions, Warranty**

Requests for substitution are only permitted for materials which no longer are available for purchase or where a specific product has not been specified in this document. All requests for substitution shall be made to Rutgers University accompanied by a Product Data Sheet and/or a shop drawing submittal. Rutgers

## **RUTGERS UNIVERSITY**

### 17010 Basic Communications Requirements

University has no obligation to consider or approve requests for substitution after award of contract.

Any deviations or changes involving extra work are not permissible without prior review and written approval by Rutgers University or its duly authorized representative.

The Communications Contractor shall warrant all work, in writing, against defects in workmanship and material for a period of one (1) year after acceptance by Rutgers University. During this time, the entire Cable Plant shall be kept in proper operating condition at no additional labor or material cost to Rutgers University.

The Communications Contractor shall assume responsibility for quality and satisfactory operation of components and materials not manufactured by Communications Contractor.

All warranties provided by manufacturers shall be extended to Rutgers University and certified in writing.

The contractor is responsible for submitting all applications and documentation for warranty to the manufacturers. In order to track the progress of this warranty, all correspondence associated with this procedure shall be treated as a submittal and be routed to Rutgers University for review.

# **RUTGERS UNIVERSITY**

---

Introduction

## **MODIFICATIONS**

9/26/03      Modified Filename.