

COMMUNICATIONS STANDARD

INTRODUCTION (This section is maintained by 78 CS/SCXP)

Communications designs and specifications for all new facilities and facility renovations must be approved by the 78th Communications Squadron. The 78 CS/SCX Plans and Programs office is the focal point for review/approval of all facilities communications plans.

Standards:

Engineering Technical Letter (ETL) 02-12, Communications and Information System Criteria for Air Force Facilities.

EIA/TIA 568-A & B *Commercial Building Telecommunications Cable Standards*.

EIA/TIA 568-B.2.1 *Category 6 UTP*.

EIA/TIA 569-A, *Commercial Building Standards for Telecommunications Pathways and Spaces*.

EIA/TIA 607, *Grounding and bonding for Telecommunications in Commercial Buildings*.

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1 VOICE/DATA COMMUNICATIONS, EXCEPT DORMITORIES

a. General:

- (1) Robins AFB owns the cable plant, and it consists of overhead and underground copper cables and fiber optic cables. The Base will provide all incoming cables.
- (2) Completely prewire the internal communications systems including all cabling, raceway, outlets, terminations, telephone connectors, etc.
- (3) Facilities less than 20,000 SF, provide 3-4" ducts. Facilities between 20,000 SF to 100,000 SF, provide 4- 4" ducts. For facilities over 100,000 SF see ETL-02-12 table 1. Extend from Main Communications Room to the nearest Information Transfer Node (ITN) unless specified otherwise.
- (4) Outlet conduit size shall be ¾" minimum.
- (5) Communication wiring shall be installed in the following raceways:
 - (a) Voice and data wiring shall be installed in a complete and continuous raceway system.

(b) Cable trays shall be used as a raceway for communications wiring in all areas that contain administrative (office space) or acoustical tile ceilings. Cable trays shall not be installed above fixed ceilings.

(c) Designer shall show layout of cable tray on the drawings. Show in all main corridors, around interiors of large rooms, and connections to all communication backboard locations. Size of tray shall be 6-inch depth and 12 -inch wide as minimum. Each outlet shall connect to the cable tray through a separate $\frac{3}{4}$ inch EMT conduit.

(d) If the area does not contain administrative (office space) or acoustical tile ceilings, then each outlet shall be extended in $\frac{3}{4}$ inch conduit to the nearest cable tray above the ceiling or extended in $\frac{3}{4}$ inch conduit the entire length from the outlet to nearest communication room.

(6) Facilities with more than one floor shall have separate dedicated communication rooms vertically stacked on each floor. The main communication equipment room shall be located on the first floor outside wall with sub-communication equipment rooms on other floors.

(7) Maximum length of conductor shall not exceed 295 feet (CAT 6). When considering length, add all vertical and horizontal runs as installed. Horizontal runs shall be considered as parallel and perpendicular to the building. Communication rooms shall be provided on each floor in multi-story facilities.

(8) Communication Rooms: For specific Main Communications Room design guidance refer to Engineering Technical Letter (ETL) 02-12 and TIA/EIA-569-A.

(a) Main Communications Room (Communications Equipment Room):

(1) Main communication room shall be located on the first floor along an exterior wall of the facility. It will be a dedicated space not shared with other functions and will not be used as storage.

(2) Main communication room shall be provided with double doors without a center support to ensure that large equipment can be easily installed and removed. Doors will open outward and will have direct access to the outside of the building. Doors will be fitted with locks to limit access. Locks will be keyed so that base room one keys open them.

(3) ETL-02-12 Table 1, CER Sizing, will be used to determine the size of the main communications room. Minimum allowable size shall be 108 sq ft (9 ft X 12 ft).

(4) Main communications room will have .75 inch fire rated plywood backboards on each wall.

(9) Telecommunications Closets (TC) design guidance refer to Engineering Technical Letter (ETL) 02-12 and TIA/EIA-569-A.

(a) Provide telecommunications closets (TC) as needed throughout the facility to ensure that the length of wiring from the TC to the most remote workstation does not exceed 295 feet. In addition, telecommunication closets shall be provided for every 10,000 SF of administrative space. The distance of 295 cable feet is from the hub rack in a communication room to the point-of-use jack.

(b) All telecommunications closets shall be dedicated rooms with no other equipment or trades and shall not be used for any other purpose or function.

(c) Telecommunications Closets will contain conditioned air and a lockable double door without center support that opens outward into a main hallway or other such corridor. Doors will be fitted with locks to limit access. Locks will be keyed to the base room one key.

(d) Under no circumstances will a TC be smaller than 7 X 10 feet.

(10) Provide at each backboard a copper ground bus:

(a) Sizes shall be as follows:

1. Main communications room: 2 feet length, 4 inch high, 1/4 inch thick.
2. Telecommunications closets: 1 feet length, 4 inch high, 1/4 inch thick.

(b) Install ground bus in each communication room with two standoff brackets and two insulators. In areas with gypsum board, install wood backing behind gypsum board.

(c) Grounding Conductors between Copper Ground Busses:

1. At the main communications room, connect one insulated #500 MCM copper conductor to the copper ground bus from the service entrance ground bus.
2. At each telecommunications closet, connect one insulated #4/0 AWG copper conductor to each ground bus from the ground bus in the main communication room. There shall be a separate #4/0 copper conductor from the main communications room to each telecommunications closet. No sharing or looping between closets to the main communications room is allowed.
3. All connections to the copper ground busses shall be compression type lugs.

b. Outlets:

- (1) All outlet locations shall have three jacks (one voice jack and two data jacks) installed in the same junction box.
- (2) Voice jacks shall be CAT 6, 8-pin RJ-45 modular connector, and ivory color.
- (3) Data jacks shall be CAT 6, 8-pin RJ-45 modular connector, and orange color.
- (4) Wiring shall be EIA/TIA T568B wiring pattern for voice and data.

(5) Each jack shall have separate 4-pair conductors back to the nearest Telecommunications Closet or Main Communications Room and shall meet the following standards:

- (a) UL listed
- (b) EIA/TIA 568
- (c) EIA/TIA/TSB-40
- (d) EIA/TIA/TSB-36

c. Wiring:

(1) Voice: CAT 6, 4-pair (UTP) unshielded twisted pair, 24 AWG copper, plenum rated (when using open cable trays). Use white color insulation.

(2) Data: CAT 6, 4-pair (UTP) unshielded twisted pair, 24 AWG copper, plenum rated (when using open cable trays)). Use blue color insulation.

(3) Fiber: single-mode 9/125 um fiber optic cable in 27 mm inner duct plus one 27 mm inner duct with pull cord.

(4) Each jack shall have separate 4-pair conductors rated CAT6 back to the nearest Telecommunications Closet or Main Communications Room.

(5) Voice Riser:

(a) Provide from each telecommunications room to the Main Communications Room. Cables shall be routed directly and unspliced from each telecommunication closet to the main communications room.

(b) Each shall contain a minimum of three 100 pair cables to each telecommunications room from the Main Communication Room. Cable shall be rated CAT 6 and consist of 24 AWG copper conductors. Cable shall be UL Listed Type CMR.

(c) Install in a complete raceway system from each telecommunication room to the Main Communication Room. Riser cable shall not be installed in the overhead cable tray system used for voice/data wiring.

(d) Cross-connect cables shall be provided if required by the project.

(e) Provide one 4-inch conduit as spare duct from each telecommunication room to the Main Communication Room.

(6) Data riser:

(a) Provide fiber cable to each telecommunication room from the main communication room. Cables shall be routed directly and unspliced from each telecommunication closet to the Main Communications Room.

(b) Cable shall contain a minimum 12 strand individual 9/125 micron single-mode fibers. Cable shall be rated OFNR per NFPA 70.

(c) Install fiber in orange flexible interduct.

(d) Provide two spare orange flexible interducts from each telecommunications room to the Main Communication Room.

d. Backboard Terminations

(1) Voice Station Jacks:

(a) Terminations shall be 110-type punch down blocks rated for CAT 6 mounted on stand off block.

(b) Two separate sets of 110 blocks shall be provided in the Main Communication Room and each telecommunication closet: one set for the voice station jacks and another set for the voice riser tie cable. Separation between the two sets of blocks shall be a minimum of 12 inches.

(c) Provide number required plus 25 percent spare.

(2) Data Station Jacks:

(a) Terminations shall be modular jack panel. Jacks shall be T568B wiring pattern. The modular jack panel shall have on the front an 8 pin RJ-45 connector. The rear of the modular panel shall contain type 110 connecting blocks mounted on a printed wiring board. The 110 connecting blocks shall be made continuous to the 8 pin modular jack on the front of the panel through printed wiring board interconnections. The panel shall be 19 inches wide.

(b) Provide number required plus 25 percent spare.

(3) Voice Riser Cable:

(a) Terminate the riser cable on 110 punch-down blocks at both ends.

(b) Use separate blocks for the riser cable terminations from the station cable terminations. Separation between the two sets of blocks shall be a minimum of 12 inches.

(4) Fiber Data riser: Terminate all fibers at each end with Type ST connectors on a single-mode fiber optic patch panel. Enclosure shall provide splicing capabilities for the fiber cables.

e. Device Plates:

(1) All device plates shall be Type 302, 0.035 inch thick, brushed finish, UL Listed stainless steel.

f. Backboards:

(1) 3/4" AC fire retardant coated plywood installed on walls in Main Communications Room.

(2) Provide dedicated non-switched electrical outlets at the backboard in the Communications Rooms as follows.

Main Communication Room and Communication Rooms with high-density data outlets.

Four 115 Volt, 20 Amp (NEMA 5-20) Duplex outlets
Two 220 Volt, 20 Amp (NEMA L6-20) outlets
One 200 Volt, 30 Amp (NEMA L6-30) outlet

Other Communication Rooms

Two 115 Volt, 20 Amp (NEMA 5-20) Duplex outlets

g. Network Equipment Rack:

(1) Provide equipment rack in each Main Communications Room.

(2) If modular RJ-45 patch panels are wall mounted, then install equipment rack on the hinged side of the modular blocks.

(3) Unless stated elsewhere, hub and network equipment will be provided and installed in the equipment rack by the Government.

(4) Install cable tray from the wall mounted data patch panel to the equipment rack.

h. Conflicts: In design/build projects, the RFP scope of work may specify communication outlets in addition to the locations indicated in this standard. Both shall be used for the location of outlets within a facility and shall be considered as minimum contractual requirements. However, in the case of a conflict, the RFP scope of work shall take precedence.

i. Locations: As a minimum, communication outlets shall be located as follows:

(1) Individual Office Rooms: Two outlets total, one outlet on opposite walls. Each outlet location shall contain one voice jack and two data jacks installed in the same junction box.

(2) Conference Rooms: Provide an outlet on each wall but 8 feet maximum separation. In one corner (opposite of the wall where a projection screen would be used), install one outlet in the corner of the room. Each outlet location shall contain one voice jack and two data jacks installed in the same junction box.

(3) Computer Rooms: Provide an outlet on each wall but 8 feet maximum separation. Each outlet location shall contain one voice jack and two data jacks installed in the same junction box.

(4) Communication for Prewired System Furniture:

(a) Each cubicle shall contain one outlet. Each outlet at each systems furniture cubicle shall contain three jacks, consisting of one voice jack and two data jacks.

(b) Prewired system furniture is defined as furniture that contains pre-wired powered panels with plug-in receptacles and communication outlets mounted in the furniture base. Also, prewired system furniture would have the communication wiring extended into the furniture channel through a power pole or flexible whip.

1. If pre-wired systems furniture is included in the scope, then provide one outlet with wiring extended into the base of the channel and terminated on the outlets into each cubicle. This shall include all punch-down blocks and terminations at the communications room, wiring with associated raceway, and terminations on the outlets in the furniture.

2. If the project does not provide the prewired systems furniture, then all communication prewiring for the furniture shall still be provided. Communication Prewiring for system furniture shall consist of all punch-down blocks and terminations at the communications room, wiring with associated raceway, and terminations on the outlets in the furniture. Contractor shall leave approximately 40 ft slack above the furniture location in a junction box. After others install the furniture, then the Contractor shall extend the wiring into the base of the channel. Outlets shall then be provided and terminated on the cables in the systems furniture. This shall occur if any of the cases below apply:

aa. The design/build RFP provides a quantity of systems furniture cubicles in administrative areas for bid purposes of the communication prewiring. This is either displayed on the RFP drawings or defined in the project scope RFP.

bb. The project is designed by a consulting firm and then bid under an independent separate contract for construction only. In this case, the consulting firm shall provide a preliminary layout of the furniture in the bid drawings. The successful bidder on the construction contract shall then pre-wire the system furniture.

(5) Administrative areas larger than 500 square feet with or without prewired systems furniture (now or later):

(a) In these spaces, install one outlet at 8 feet intervals around all walls and one outlet on each furred out interior column.

(b) Each outlet location shall contain one voice jack and two data jacks installed in the same junction box.

(c) This is in addition to the outlets specified for prewired system furniture cubicles.

(6) Non-Prewired Systems Furniture - If furniture is installed in areas of the facility, which is not prewired system furniture, but uses the outlets in the walls, then provide flush in the walls the following:

(a) An outlet shall be installed in the center of each cubicle flush in the wall, but maximum separation shall not exceed 8 feet intervals.

(b) Each outlet shall consist of one voice jack and two data jacks.

(c) This does not apply to "Prewired system furniture," in which the outlets are installed in the furniture channel or base.

(7) Main DDC Control Panel - Provide one outlet with one voice and two data jacks at the main DDC control panel in the facility.

(8) Lobby - Provide one voice jack, 48" AFF for a pay phone in the entrance to the facility.

(9) Warehouses/ Storage Areas - Provide one outlet every 40 feet around all perimeter walls. Each outlet location shall contain one voice jack and two data jacks installed in the same junction box.

(10) Shop Areas - Provide 1 voice outlet at every 16 feet on around all perimeter walls.

(11) Mechanical Room - Provide a single voice jack next to the door. This is a separate voice jack from the jack at the main DDC control panel.

(12) Electrical Room - Provide a single voice jack next to the door.

(13) Explosion proof areas: Provide conduit with wiring installed to the phone location. Leave 3 ft of wiring in explosion proof junction box with plugged opening for future connection.

(14) Hangars - No outlets in the hangar bay unless requested by user or specified elsewhere.

(15) Residential Construction - Provide voice outlets as follows:

(a) One voice jack in the kitchen.

(b) One voice jack in the family room.

(c) Two voice jacks in the each bedroom, each jack on opposite walls.

(16) Note: --- The above is based on the minimum requirements. A/E shall be responsible to coordinate with the user on the exact location for the outlets during the design stage. This shall be based on final equipment locations, users' needs, and workstation or desk locations. This statement applies to design projects and design/build contracts.

2. VOICE/DATA COMMUNICATIONS IN DORMITORIES

a. Lines within the facility shall be a part of the project.

b. Lines to the facility will be accomplished by the Air Force. Two local Cable Television Companies, under separate contract, will provide exterior service.

c. Outlets:

(1) Provide two outlets in each living/sleeping room.

(a) Outlet #1: One voice jack/one data jack in the same junction box (CAT 6 for both).

(b) Outlet #1 shall be installed on an opposite wall, not adjacent from Outlet #2.

(c) Outlet #2: Single CATV jack and single voice jack (CAT 6).

(d) Voice jack in Outlet #2 location and the voice jack in Outlet #1 location shall be jumpered together at the backboard and served from the same line.

(e) Data jack in Outlet #1 shall be a separate 4-pair conductor (CAT 6) extended back to the nearest Communication Room.

(2) Voice shall be CAT 6, 8-pin RJ-45 modular connector, and ivory color.

(3) Data shall be CAT 6, 8-pin RJ-45 modular connector, and orange color.

(4) Termination wiring and other materials shall be as specified in Specifications.

(5) Shall meet the following standards:

(a) UL listed

(b) EIA/TIA 568

(c) EIA/TIA/TSB-40

(d) EIA/TIA/TSB-36

d. Wiring:

(1) Voice: CAT 6, 4-pair (UTP) unshielded twisted pair, 24 AWG copper, (plenum rated in open cable tray).

(2) Data: CAT 6, 4-pair (UTP) unshielded twisted pair, 24 AWG copper, (plenum rated in open cable tray).

(3) Provide riser tie cable for the voice and data wiring from each Telecommunications Closet to the Main Communications Room.

(4) All wiring from living/sleeping rooms shall terminate in a dedicated communications room on that floor.

(5) All wiring shall be installed in conduit.

e. Backboards: (1) 3/4" plywood installed on wall in Communications Room.

f. CATV Requirements for Dorms:

(1) Extend RG-6 from each living/sleeping room to the nearest Telecommunications Closet/Communications Room. No wiring between rooms shall be shared.

(2) Each CATV outlet shall be installed in conduit from the outlet to the nearest Telecommunications Closet/Communications Room.

(3) CATV wiring shall be installed in separate raceway from the voice/data wiring.

(4) CATV wiring shall be terminated on separate backboards from the voice/data wiring in the Telecommunications Closet/Communications Room.

(5) For each living/sleeping room, provide and install two separate splitters (one for each future CATV company) at the backboard in the nearest communication room. Splitters for each living/sleeping room shall be installed at a communication room on the same floor as the living/sleeping room. On the backboard, install one company's splitters on top of the other company's splitters. All splitters shall be provided and installed under the project by the Contractor.

(6) Each company's splitters shall be connected together with a RG-6, 60 percent shielded minimum rated coax cable. All splitters in each communication room shall be installed in a single hinged enclosure, NEMA 1 gasketed enclosure. No splitters shall be installed outside the nearest communication room.

(7) All splitters and wiring shall be provided and installed under the project by the Contractor.

(8) Each floor communication room shall have two separate RG-11 cables running from that backboard to the first floor communication room backboard. Leave cables coiled up (24 inches) at the first floor communication room backboard. Connect each RG-11 cable at each floor communication room to the splitters for each future CATV company.

(9) Install two separate 1-inch conduits from each communication room on each floor to the main communication room on the first floor. Install RG-11 cables in one conduit with the other as spare.

3. CATV, EXCEPT DORMITORIES

- a. Lines within the facility shall be a part of the project. See separate Air Force guidelines for dormitories.
- b. Lines to the facility will be accomplished by the Air Force. Two local Cable Television Companies under separate contract will provide exterior service.
- c. Ducts: Provide 2-4" ducts. Extend from Communications Room to nearest communications manhole unless specified otherwise.
- d. Wiring: Extend RG-6 from each outlet to the Communications Room. No wiring between outlets shall be shared unless approved by the applicable Design Section Chief in 778 CES/CEC.
- e. Outlets: Each CATV outlet shall be installed in conduit from the outlet to the Communications Room.
- f. Terminations: CATV wiring shall be terminated on separate backboards from the voice/data wiring in the Communications Room.
- g. Backboard: Provide all cabling, terminations at the outlets and terminations at the backboard. Amplifier shall be provided at the backboard.
- h. Design/Build Projects: Location of CATV outlets shall be described in the RFP scope of work.
- i. Device Plates shall be Type 302, .035 inch thick, brushed finish, and UL Listed stainless steel.

4. **PAGING AND SOUND SYSTEMS**: When the scope requires a paging or sound system, the following shall be designed into the system:

- a. Zone facility by functional areas, with each area on a separate zone. Offices shall be on a separate zone from shops, warehouse space, etc.
- b. Speakers shall be located throughout the halls, lobbies, shops/warehouse space, hangar space, industrial areas, and any other administrative areas as specified elsewhere.
- c. Industrial Areas: Provide projector horns in the industrial areas.
- d. Admin Areas: Each zone in the office administrative areas shall contain volume control at the master and in the room with the speakers.
- e. Shielding: All wiring shall be shielded wire.
- f. Scope: Provide complete system with amplifiers, speakers, wire with raceway, mixer, microphone, and other equipment as needed or specified elsewhere for a complete and operable system.

6 TESTING AND DOCUMENTATION.

- a.. An “as-built” set of drawings and electronic copies will be provided to the 78 CS showing, but not limited to, all cable routes, jack locations/identification markings and communications room/closet locations.
- b. Test Plan for all cable, fiber, and patch panels will be submitted to the 78 CS for review and approval.
- c. Test results will be provided to the 78 CS before acceptance of facility’s communication infrastructure.

<<<<< END OF SECTION >>>>>

<<<<< **END OF BASE FACILITY STANDARD** >>>>>