APPENDIX 06

HAFB Telecom Standards

HILLAFBI17-201
BY ORDER OF THE COMMANDER HILL AIR FORCE BASE
HILL AIR FORCE BASE INSTRUCTION 17-201
[30 March 2018]
Communications and Information
STANDARD COMMUNICATIONS INFRASTRUCTURE
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PURPOSE:
This Hill Air Force Base Instruction implements Air Force Policy Directive (AFPD) 17-1, *Information Dominance and Cyberspace Governance and Management*. This instruction outlines responsibilities and procedures for 75ABW/CEG and SCXP. It sets forth requirements for personnel certification and establishes responsibilities and procedures for base agencies, architects, engineers, and contractors to plan, design, review, and evaluate telecommunications cabling and distribution systems. This instructions meets/follows through with Unified Facilities Criteria (UFC) 3-580-1, *Telecommunications Interior Infrastructure*. It provides policy, direction, and guidance for planning and implementation of communication infrastructure for Military Construction (MILCON) and building renovation projects. It contains base standards for pre-wiring new construction under Military Construction Program (MCP), Combined Defense Improvement Projects (CDIP), and remodeled facilities. Furthermore, it identifies minimum essential factors to be considered when telecommunications pre-wiring support is addressed. It applies to all units, assigned and/or associated with Hill Air Force Base (HAFB). Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, Recommendation for Change of Publication; route AF Forms 847 from the field through the appropriate functional chain of command. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with (IAW) Air Force Manual (AFMAN) 33-363, Management of Records, and disposed of IAW the Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS). The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force.

1. General.

1.1. Purpose. The purpose of this instruction is to provide design criteria for planning telecommunications cabling and distribution systems in building construction and renovation efforts. Pre-wiring shall be included in all military facility construction projects accomplished with 3300 series funding IAW the Air Force. All pre-wiring must comply with UFC 3-580-1 and other applicable references listed in attachment 1. Compliance with these instructions will improve maintenance by establishing a standard for communications systems facilities. Department of Defense (DoD) publications direct the use of commercial standards whenever they meet DoD needs. The commercial standards referenced in UFC 3-580-1 shall be followed along with this instruction.

1.2. Scope. Project design packages will comply with:
1.2.1. Local minimum communications standards.
1.2.2. Building communications and distributions systems.
1.2.3. Telephone/Local Area Network (LAN) entrance cables.
1.2.4. Communications equipment rooms.
1.2.4.1. Telecommunications cabling and termination.
1.2.4.2. Telecommunications outlets.
1.2.4.3. Testing requirements.

2. Responsibilities.

2.1. 75 ABW/CEG Construction/Renovation Design Package Office of Primary Responsibility (OPR) will:

2.1.1. Present all communications requirements to 75 ABW/SC NLT the 60% level Design Review for design-built projects.
2.1.2. Present 75 ABW/SC a complete design package for review between 35to 65percent to include a draft of the requirements document and drawings, the DD Form 1391, Military Project Construction Data, and a list of any deviations from the Communications-Computer Systems (C-CS) criteria which must be approved by the Communications and Information Systems Officer (CISO) or his representative.
2.1.3. Allow 15 business days for Communications Directorate review of all design packages. The Base Communications Systems Office (BCSO) and base telephone maintenance contractor may be needed to provide assistance with the incorporation of new infrastructure. The Base Cyberspace Systems Integrator (CSI-B) may also need to provide communications engineering assistance. Any assistance requested will be coordinated through 75 ABW/SCXP Plans and Programs Branch during the quarterly CSI-B site visit.
2.1.4. Notify 75 ABW/SCXP Plans and Programs Branch within 48 hours of any changes in project scope.

2.2. 75 ABW/SCXP Plans and Programs Branch will:

2.2.1. Coordinate design packages with all appropriate communications agencies when design package is completed.
2.2.2. Receive and maintain comments from applicable communications agencies on all design packages. Ensure design packages comply with standards in this document. Refer to References in Attachment 1 for a complete list of standards.
2.2.3. Within 5 business days of receiving comments from all applicable communication agencies, forward Design Review comments to the 75 ABW/CEG and attend design meetings as required.
2.2.4. Ensure the most efficient wire or cable distribution system is included in the facility design. This will be determined by Comm Project Manager (PM) in the design on a case by case basis.
2.2.5. Check design packages during all design phases, to ensure current and projected communications requirements are considered for flexibility to accommodate future additions or changes.
2.2.6. Ensure all 75 ABW/SCXP personnel are involved in all phases of the project.

3. Personnel Certification Requirements.

3.1. Personnel involved in design and construction shall have expertise in engineering and installation of telecommunications, cabling, and distribution systems. If requested by the CISO,

contract personnel shall provide adequate proof of their individual skill by demonstrating their technical expertise and methods of testing and documentation.

3.1.1. The contracting company shall have a minimum of five years' experience in the design, application, and installation and testing of the specified systems and equipment.

3.1.2 The contractor shall employ Registered Communications Distribution Designers (RCDD) to perform systems engineering and design.

3.1.3. All supervisors and installers assigned to the installation of a system or any of its components shall have industry training for each area of installation and have factory certification on all components used in the installation. General electrical trade staff (electricians) will not be used for the installation of the fiber optic and copper cables and associated hardware.

3.1.4. All technicians assigned to the installation of a system or any of its components shall have a minimum of one year experience in the installation of the specified fiber optic and copper cable and associated hardware. Lead installers shall be BICSI certified and have a minimum of three years' experience in the installation of the specified fiber optic and copper cable and associated hardware.

4. Manufacturers Minimum Qualifications.

4.1. The equipment and hardware provided under all contracts will be from manufacturers that have a minimum of three years' experience in producing the types of systems and equipment specified.

5. Local Minimum Standards.

5.1. To minimize the long-term cost of the infrastructure, the following local standards are established and may only be changed when approved in writing by the CISO. These standards are intended to promote common skills among maintenance personnel throughout the base and to minimize the necessity for excessive spare parts and variations in telecommunications equipment:

5.1.1. Base Fiber Optic Cable (FOC) outside plant backbone connections in support of Information Transfer Nodes (ITN's): Asynchronous Transfer Mode (ATM) or Switched/ Gigabit Ethernet Connections 48-strand Single Mode (SM) FOC 8.3/125 micron.

5.1.2. Base FOC Outside Plant satellite connection in support of End Building Nodes (EBNs): Switched Ethernet Connections 12-strand (minimum) SM FOC 8.3/125 micron.

5.1.3. New Construction: Install a minimum of 25 pair #23 American Wire Gauge (AWG) copper Category (CAT 6) outside plant cable.

5.1.4. All cable used for telecommunications outlets shall be four pair, #23 AWG, solid copper conductor, Blue CAT 6, UL tested and certified. Each cable shall be dedicated to one device or outlet only.

5.1.5. Whenever exposed in air circulation areas, only plenum rated cable will be used.

5.1.6. All telecommunications outlets shall provide a minimum of four Universal Service Ordering Code (USOC) CAT 6 RJ-45 type jacks utilizing Telecommunications Industry Association (TIA) 568-B for voice/data/LAN. All 4 pairs within the cable shall be terminated to USOC CAT6 RJ-45 type jack. All CAT 6 patch panels shall have 110 interface on the back side. Panel width shall be as required to fit in a standard 19" equipment rack.

5.1.7. Information outlet spacing in office areas shall be based upon one duplex outlet for each eight (8) linear feet of useable perimeter wall space or one for each 100 square foot of floor space, whichever provides a higher outlet density. All other locations will be provided with outlet density as determined by the CISO or his representative.

5.1.8. Administrative telephone wiring will be based on the single-line instrument concept with individual cable running from the wall outlet to the Telecommunications Room (TR) via the cross connect cabinet if required. Each jack will be wired "homerun" from jack to the nearest TR. Splitting cable pairs to multiple jacks is not authorized.
5.1.9. All outside plant copper cable conductors shall be #26 AWG in cable sizes above 2100 Pair. All copper conductors for cables less than 2100 pair will not be less than #23 AWG.
5.1.10. All Outside Plant cable will be filled core type, and meet Rural Utilities Service (RUS) Professional Engineer 39 (PE-39) or PE-89 specifications. Outside Plant Cables (OSP) manufactured to PE-39 and those manufactured to PE-89 are functionally equivalent with identical scope and applications. Both products are intended for duct and direct buried installations where protection against water and moisture is required. These cables may also be installed aerially by attachment to support strand but air core cables are typically used for above ground applications.

6. Comprehensive Requirements. Comprehensive requirements apply to all telecommunications systems.

6.1. Building Communications Distribution System.

6.1.1. All primary backbone conduits shall be installed in locations as determined by the CISO or his representative and shall provide adequate size and quantity to meet current requirements plus 100% growth for future use to preclude digging at a later date to meet emerging requirements.
6.1.2. When new construction or renovation takes place, the design, installation, and all related costs necessary to extend the conduit and manhole (MH) system to the new location shall be included in the project IAW, UFC 3-580-01, and AFI 65-601V, Budget Guidance and Procedures. Multiple service entrance locations will be required for all facilities housing command and control systems to provide redundant survivable service.
6.1.3. A manhole with a minimum of two 4" conduit/duct bank lateral systems with tracer and pull rope will be used for required cables plus 100 percent spare ducts (not less than 1 spare) for expansion and maintenance in all primary duct banks.
6.1.4. Manholes shall be installed for all connections to the existing cable plant as required and maintained at a maximum spacing of 600 feet. Additional manholes may be required to provide adequate control of connection and distribution of the cable plant.
6.1.5. All manholes and handholes shall be designed and constructed to meet the requirements of Technical Order (T.O.) 31W3-10-22, Telecommunications Engineering Outside Plant Telephone. Manholes shall provide a clear inside floor space measurement of 8' x 10'. An alternate size of 6' x 8' may be approved only when no primary backbone cable passes through the manhole (lateral or dead end service only). All manholes shall provide a clear height no less than 7 ft. Conduits shall enter the MH 4 to 5 inches above finish floor on the end and be perpendicular to the wall in approximate location. Mandatory items include grounding busbar and rod and related conductors and wiring, a ladder or step, cable rack support, a 50 cubic foot sump (French drain), pull in iron/anchor, frame and a manhole cover cast with the word "COMMUNICATIONS" exposed to the surface. All manhole covers will be round and provided with a locking bar or other locking device to allow use of a padlock or other restriction to unauthorized entry.
6.1.6. Power and communications cables will be separated by 12" of well tamped, fine earth protection IAW T.O. 31W3-10-12, Outside Plant Cable Placement. The cable at the top of the crossing, whether power or communications cable, will receive the same additional protection

(see paragraph 6.1.8). In addition, if the cable crosses over the main, extend additional cable protection 3’ from each side of the crossing. Where highway, railroad and runway crossings occur, cable at such crossings must be placed underground using a metallic conduit or Schedule 80 Polyvinyl Chloride (PVC) conduit. Polyvinyl Chloride conduit may be direct buried if 30-36” of cover is provided. If steel pipe conduit is used, boring procedures will be followed to ensure protection of existing utilities or resources. Where PVC conduits are installed, a metallic #10 AWG copper tracer wire at minimum will be installed within the conduit or 6” above the duct bank to assist in future location efforts, with bonding to occur inside each manhole and at Communications Equipment Room (CER) grounding frame.

6.1.7. Stub up a minimum of two 4” lateral conduits no less than 6” above the finished floor level adjacent to the telephone punch down board continuous to the nearest splice or service point as determined by the 75 ABW/SC if both fiber and copper are available from a single location. The two lateral entrance conduits will each have three 3-cell Maxcell innerduct to be used for fiber. If a diverse path is required for both fiber and copper, a minimum of four 4” conduits is required (two for fiber and two for copper). All conduits will have three 3-cell Maxcell innerducts. Conduits are to be sealed or capped air tight to prevent water from entering the TR.

6.1.8. Provide 36" minimum cover for all conduit duct banks and 36" minimum cover for laterals measured to top of conduit. The 75 ABW/SC will provide termination of cable connections in the manhole.

6.1.9. When determined necessary to simplify installations, conduit will be curved to provide gentle sweeps with a minimum radius of 25 feet for a total bending radius not to exceed 180 degrees between manholes, hand holes, or pull locations.

6.1.10. All conduits shall be sloped toward each opposing manhole at a slope of 3" per 100’ of run to promote drainage of any accumulated liquids.

6.1.11. When specified, hand holes will be nominally 6’W x 8’L x 7’H inner dimensions or a standard 36” x 60”x 36”substructure box. Mandatory items include grounding busbar and rod and related conductors and wiring, a sump hole (French drain), and a traffic rated cover with a locking bar or other locking device to allow use of a padlock or other restriction to unauthorized entry.

6.2. Telephone Entrance Cable.

6.2.1. The contractor will provide underground exterior service cable, gel filled, IAW RUS PE-39 or PE-89 from the main communications panel to the nearest manhole tie-in or service point with sufficient vacant pairs to provide each facility with currently required circuits plus 50 percent spare pairs as determined by the CISO or his representative.

6.2.2. Splice cases used to splice copper cable into the base infrastructure will be stainless steel. A transition splice will be made between the exterior copper gel-filled cable and dry-filled intra-building cable in the TR IAW TIA/EIA 569A standard.

6.2.3. IAW Underwriters Laboratories (UL) 497, all Building Entrance Terminals (BET’s) will be provided with three-electrode gas tube or solid state type 5-pin rated for the application. Provide gas tube protection modules IAW RUS Bulletin 345-83 and shall be heavy duty, A>10kA, B>400A, C>65A where A is the maximum single impulse discharge current IAW National Electrical Manufacturers Association (NEMA) C62.61. The gas modules shall shunt high voltage to ground, fail short, and be equipped with an external spark gap and heat coils, IAW Underwriter’s Laboratory (UL) 497. Provide the number of surge protection modules equal to the number of pairs of exterior cable of the building protector assembly.

6.2.4. Building Entrance Terminals (BET) used for the termination of outside cables, 300 pair or less in size, will have a built in splice chamber with 710 type splice modules. Equipment side (house) of the BET will use 25 pair Telco type connections to station equipment. BETs of this type will not be stacked more than three high.
6.2.5. Building Entrance Terminals (BET) used to terminate cable sizes greater than 400 pair will be a #23 AWG stubbed 355 series type blocks with gas type protectors and be mounted in a vertical buss arrangement.
6.2.6. The contractor shall conduct appropriate testing and provide 100% continuity test results to 75 ABW/SCOIN Base Telephone Systems Office (BTSO). Use Optical Time-Domain Reflectometer (OTDR) to perform the test.

6.3. LAN Fiber Optic Entrance Cable.

6.3.1. Single Mode Fiber Optic (SM FOC) will be used for inside and outside premise. At a minimum, 48 strands SM FOC (8.3/125 micron) will be designed as part of a new facility construction project. Facility use and user requirements will dictate whether more fiber optic cable is required. Refer to Paragraph 5 of this document for local minimum standards.
6.3.2. All FOC will be home run from the closest primary or secondary Information Transfer Node (ITN) to the new facility. Fiber optic cable will not be spliced in any manholes.
6.3.3. All FOC entering the building will terminate in the TR in a 19" rack floor mounted FOC patch panel with LC connectors.
6.3.4. Fiber optic cable terminations at the far end (primary or secondary ITN) will be performed by the base. The contractor shall provide manufacturer test results and conduct industry standard OTDR testing on cable and provide 100% continuity test results to 75 ABW/SC Base Telephone Systems.

6.4. Telecommunication Rooms (TR).

6.4.1. A TR will be provided for Communications-Computer System (C-CS) switching and transmission equipment, private branch exchanges (gateways, power supplies, etc.) main distribution frame(s), LAN equipment racks, fiber optic cable termination, patch panels and other equipment needed for termination of the building's interior wiring systems and to interface the local service equipment with the exterior base cable system. The primary TR will be located on the first floor with an exterior door only to provide uninterrupted access by authorized personnel. The TR must have a lockable door and keyed to 75 ABW/SC specifications. As a minimum, the TR should have ¾ inch plywood backboard from no greater than 1 foot above the finished floor level to no less than 7 feet above the finished floor level. Plywood will be sealed and fire rated. BETs are required for all primary TRs. Install telephone distributing posts (mushrooms) as required by number of connecting blocks in all TRs. The size of the TR will not be less than the specifications found in Table 1.

Table 6.1. TR Size Requirements.

Building Usable Area (Square Feet)	TR Size (Square Feet)	Number of 4" Entrance Conduits
<20,000	400	3
20,000 to 100,000	500	4
100,000 to 200,000	900	5
Every additional 200,000	600+	+1

NOTE: Room size will have a 2:1 ratio in length to width.

6.4.2. Adequate installation and maintenance space, environmental control and power typical to an office environment (heated and cooled), shall be included to support equipment and any

necessary cable entry requirements. No other building support equipment including mechanical equipment, plumbing equipment, and electrical panels will be placed in the TR. Maintenance space and access space will not be utilized for any other purpose and will be free and clear of all obstructions to a height of 8 feet to allow for adequate cooling and servicing of equipment. Storage of any type is prohibited in the TR.

6.4.3. The TRs will be provided with space as required and will be so located that the distance measured along the routing path of the cable will not exceed 295 feet including vertical distances to wall telecommunications outlets to maintain the integrity of the digital data signal. Where multiple TR rooms are required, attention must be given to their strategic placement to support interconnection via 4 inch conduit or 6 inch wide by 2 inch deep minimum cable trays between each room as well as to the primary TR in which the cable head/fiber connections are to be located. Where it is necessary to interconnect more than one TR, Single-Mode (SM) fiber optical cable will be used. A 1 inch innerduct will be provided inside the 4 inch conduit or conduit raceway with pull cord ensuring a direct path between each TR. For telephone interconnection, provide #23 AWG copper wire cable between the TRs.

6.4.4. Circuit connectivity from the telecommunications outlet jacks to the TR will be provided through 1¼ inch minimum conduit stubbed to 12 inches above the finished ceiling using the most direct route available, complete with pull cords. A 6 inch wide by 2 inch deep minimum above the ceiling cable through/raceway may be used to connect rooms provided plenum type cable is used or provided. Where cable trays are provided, conduits will be extended to the cable tray and be terminated. The through/raceway will run above the ceiling on the top of proper support structures using the most direct route between the TRs. Conduit fill will not exceed the 40% rule as stipulated in the National Fire Protection Association (NFPA) 70 and TIA/EIA-569-C-1.

6.4.5. Wall jacks will be provided for wall-mounted telephones in the TR, electrical and mechanical rooms mounted 60 inches above the finished floor that supports CAT 6 cabling.

6.4.6. A controlled and secured access to the TR is required to allow 24-hour uninterrupted access by authorized technicians. The TR on the first floor will have exterior access only. Locking door knobs shall be utilized with key ways and locks keyed alike to match the 75 ABW/SC master key. Only authorized personnel by the CISO will possess key to the TRs.

6.4.7. Temperature in the TR will be maintained between 65-78 degrees Fahrenheit.

6.4.8. A minimum of two-gang 120 VAC power outlets on a separate 20-Amp power outlet circuit with isolated ground will be provided. Additionally, a minimum of two- gang 220-240 VAC 30-Amp power outlet circuit with isolated ground for use in powering uninterrupted power supply (UPS) will also be provided. An additional duplex convenience outlet will be located away from the telecommunications outlets to provide power to operate service and maintenance equipment. Sufficient lighting will be provided in all TR areas to promote a safe and acceptable work area.

6.4.9. Ground all devices, cable sheaths, protectors and other equipment IAW T.O. 31W3-10-22, ANSI/EIA/TIA 607, MIL Standard 188-124B, and the NFPA 70. Provide a single-point ground for all communications/electronic equipment for the building within the TR. Provide a Telecommunications Main Grouping Busbar (TMGB) at a minimum of 6 inches high by 24 inches long. The ground riser from the ground plate to the single main electrical service entrance ground must be a #1 AWG or larger copper conductor directly connected to the ground plate with no taps. The resistance of the ground riser must be 5 ohms or less measured from the main building ground point. All connections of wire-to-wire and/or wire-to-ground rod must be

exothermic-welded. Extend #6 AWG or larger copper ground wires from the TR ground plate to each secondary TR within the building and connect a Telecommunications Grounding Busbar (TGB) in the TR. Bond each TMGB and TGB to non-current-carrying metal building parts such as metal framing in the TR as required by the National Electric Code (NEC).

6.5. Telecommunications Room (TR).

6.5.1. The primary TR will be provided as required to serve approximately every 10,000 ft2 of usable floor space. Other TRs will serve as a secondary interconnection point between the telephone/LAN modular jack outlets and the main communications frame in the TR. Wall and floor space will be provided for installation and maintenance of equipment such as frames or backboards. Such equipment will be concealed and secured as required for TRs and will not be installed in common use areas. It must be fully accessible and maintainable as outlined for TR room equipment.

6.5.2. All cable in the TR will be tagged according to room and jack number to indicate its associated jack number and location. All LAN runs must be continuous from wall outlet to patch panels in the TRs. Installation of plugs and plugging house cable into active electronic equipment is strictly prohibited.

6.6. Cabling and Termination.

6.6.1. Horizontal Cables (Telephone and LAN). Connect individual subscriber telephone and LAN outlets to their respective 110-type patch panels in the TR. Horizontal cable for both telephone and LAN must be 4-pair #23 AWG solid copper, 100 ohm, CAT 6 plenum rated Unshielded Twisted Pair (UTP) cable. Use only cable that has passed UL network certification program and is UL-listed and labeled. Blue CAT 6 cables will be used for voice, LAN, and data. Tag and label cables at least 6 inches at both ends.

6.6.2. Telephone Riser Cables. Provide connection between the telephone patch panel in the TR and the telephone patch panels or distribution frame in the TR. Telephone riser cable must be multi-pair (sized as required to support all horizontal cables terminated in the TR plus 50% spare pairs) #23 AWG solid copper, 100 Ohm, CAT 6 UTP cable. They must meet the requirements of EIA/TIA-568-B or latest standard.

6.6.3. CAT 6 wiring will be terminated in a standard 19" rack mounted CAT 6 patch panel located in the TR situated in a central location within the building. Cable length will not exceed 295 ft.

6.6.4. Pairing and color-coding for jacks will be IAW EIA/TIA-568B standards in Table 6.2.

Table 6.2. TIA 568-B LAN/DATA Wiring Standard.

PIN #	COLOR	PIN #	COLOR
1	W/ORANGE	5	W/BLUE
2	ORANGE	6	GREEN
3	W/GREEN	7	W/BROWN
4	BLUE	8	BROWN

6.6.5. The 75 ABW/SC contractor will have a minimum of ten working days to complete the cross connects, install equipment, and verify the system prior to occupancy by the tenant starting from receipt of the work order.

6.6.6. To clearly identify cables and their usage, each cable will be labeled at both ends by identifying their room and outlet number. Each outlet cover plate will also carry the outlet designation, as shall the termination jack on the patch panel or termination block. A permanent type label affixed to the cable or outlet jack cover to preclude damage due to age or other

mechanical means will identify all cable and terminations. Automated embossed labels are required. Pen and ink label is not authorized.

6.7. Telecommunications Outlets.

6.7.1. In general office areas, a duplex modular telecommunications outlet plate with four each USOC RJ-45 or latest standard type jacks will be provided every 8 linear feet around the usable room perimeter or one for each 100 square feet of net floor area whichever provides greater density. All wall outlet components will be certified as CAT 6 and jacks will be USOC RJ-45 or higher type wall jacks with a removable outer bezel. Blue jacks will be used to identify all CAT 6 jacks.

6.7.2. Telecommunications outlets will be mounted at 18" above the floor to the centerline of the cover plate unless noted otherwise.

7. Periodic, Pre-Final, Final Inspections to include Testing and Documentation.

7.1. Telecommunication Cable. All telecommunications cable will be certified and tested utilizing the Optical Time Domain Reflectometer (OTDR) test equipment IAW EIA/TIA 568-C standards with written test result to be provided to the 75 ABW/SC not later than (NLT) 48 hours of the final inspection. Where deficiencies of any type are discovered upon testing, the contractor will make all necessary repairs, including any necessary replacement, at no cost to the government.

7.2. Drawings. Revised drawings which reflect the actual "as built" conditions will be maintained throughout the construction phase. A copy will be provided to the 75 ABW/SC with the cable certification records upon completion of the work but prior to final acceptance of the work to allow 75 ABW/SC to perform a final review of drawings and inspect installations.

7.3. Cyberspace Infrastructure Planning System (CIPS) Visualization Component (CVC). The CVC is the basis of "as built" cable records and will be provided to the 75 ABW/SC upon final project acceptance. The drawings will show cross-connect and termination points for each cable pair, locations and identification number for each modular outlet, and the location and value of each line amplifier and multi-port device throughout the inside plant cable system. The outside plant drawings will be geospatial referenced and include the conduit, innerduct, cable types, cable count, cable size, and length. All manholes, handholes, and pull boxes will have complete butterfly details to include geospatial referenced location, entry points, grounding, bonding, racks/ladders, or other equipment installed. Three copies of these drawings will be updated to final "as built" conditions by the construction contractor and turned over to the 75 ABW/SC along with one electronic copy of outside plant drawings utilizing Visio. As-built drawings will be provided to 75 ABW/SC NLT 30 days after facility is accepted by the base.

7.4. In-Progress Inspections. In-progress inspections by 75 ABW/SC personnel are required during construction. Trenches may be inspected to verify conduit size and quantity, cable type, earth cover compliance, and accuracy of "red line" base cable record or contract drawings. The general contractor performing the work is solely responsible for requesting in progress inspections to the base before backfill or installation of walls during cable certifications.

7.5. Installed Cables (Fiber and Copper). All installed cables (fiber and copper) will be tested by the installer and may be in the presence of 75 ABW/SC personnel or its representatives. Baseline test records will be provided to the 75 ABW/SC in printed and digital format. All CAT 6 cables will be tested and certified to 155 Megabits per second (Mbps) (500 Megahertz (MHz)) to ensure they are usable at higher data transmission speed. UL testing standard for new cable including fiber optic testing of single mode cable will be followed.

8. Other Considerations.

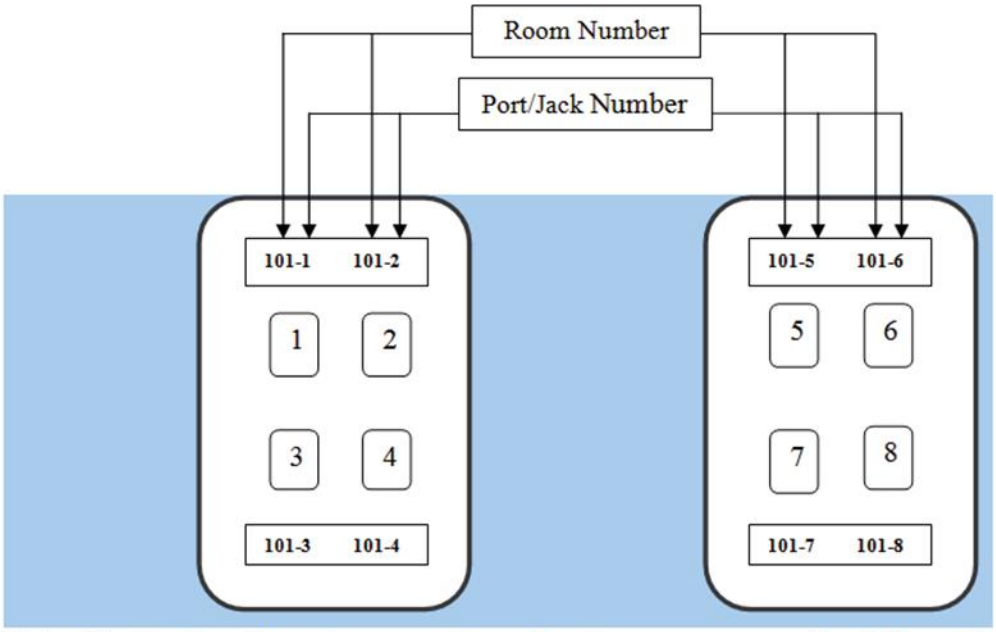
8.1. Classified Systems (Secure Internet Protocol Router Network (SIPRNET) and Defense Red Switch Network (DRSN)).

8.1.1. Classified requirements may vary and will be taken on a case-by-case basis. Customer units must identify classified LAN and telephone requirements to the 75 ABW/SC during preliminary design planning. Due to the specific nature of the security and Communications Security (COMSEC) requirements for these systems, it is difficult to address these requirements in generalized terms.

8.2. Modular Furniture.

8.2.1. Modular furniture configuration will be supported by the standard wall jack. Telephone and LAN wiring systems in areas with pre-wired workstations, furniture systems or modular walls must have sufficient flexibility and connectivity to enable rearrangement without modification to the permanent communications wiring in the facility. Suitable patch cords and connectors must be provided. Permanent splices/connections are prohibited. Patch cords will be permanently labeled with the corresponding outlet number and will be at the expense of the customer.

Figure 8.1. CAT 6 Four-Gang Wall Plate Numbering Example



Note: Starting from the main room entrance location, use room number followed by ascending numeric for each telecommunications outlet and move clockwise around the room perimeter. Mark each cable end, each wall outlet on the face of the cover plate and at the patch panel under the corresponding panel jack. Post the drawing with the identification of outlets and room numbers in the TR upon completion.

BEGIN SIGNATURE
JENNIFER HAMMERSTEDT, Colonel, USAF
Commander, 75th Air Base Wing
END SIGNATURE

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

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Prescribed Forms

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Adopted Forms

AF Form 1768, *Staff Summary Sheet*

DD Form 1391, *Military Project Construction Data*

Abbreviations and Acronyms

AFI-Air Force Instruction

AFPD-Air Force Policy Directive

AFMAN-Air Force Manual

AFRIMS-Air Force Records Information Management System

ANSI-American National Standards Institute

ATM-Asynchronous transfer Mode

AWG-American Wire Gauge

BCSO-Base Communications Systems Office

BET-Building Entrance Terminals

BTSO-Base Telephone Systems Office

BICSI-Building Industry Consulting Service International
CAT-Category 6
CER-Communications Equipment Room
C-CS-Communications-Computer Systems
CDIP–Combined Defense Improvement Projects
CIPS-Cyberspace Infrastructure Planning System
CISO-Communication Information systems Officer
COMSEC-Communications Security
CSI-B-Base Cyberspace Systems Integrator
CVC-CIPS Visualization Component
DoD-Department of Defense
DRSN-Defense Red Switch Network
EBN-End Building Nodes
EIA-Electronic Industries Alliance
FOC-Fiber Optic Cable
HAFB–Hill Air force Base
IAW–In Accordance With
ITN-Information Transfer Nodes
LAN-Local Area Network
MCP–Military Construction Program
MH-Manhole
MHz-Megahertz
MILCON-Military Construction
Mbps-Megabits per Second
NEC-National Electric Code
NEMA-National Electrical Manufacturers Association
NFPA-national fire Protection Association
OPR–Office of primary Responsibility
OSP-Outside Plant
OTDR-Optical Time Domain Reflectometer
PE 39/89-Professional Engineer 39/89
PM-Project Manager
PVC-Polyvinyl Chloride
RCDD-Registered Communications Distribution Designers
RDS-Records Disposition Schedule
RUS-Rural Utilities Service
SIPRNET-Secure Internet Protocol Router Network
SM-Single Mode
SMFO-Single Mode Fiber Optic
UFC–United Facilities Criteria
TGB-Telecommunication Grounding Busbar
TIA-Telecommunication Industry Association
TMGB-Telecommunications Main Grouping Busbar
TO-Technical Order
TR-Telecommunications Room
UL-Underwriters Laboratories
USOC-Universal Service Ordering Code
USP-Uninterrupted Power Supply
UTP-Unshielded Twisted Pair