COMMUNICATIONS INFRASTRUCTURE STANDARDS & SPECIFICATIONS 3.0

RELEASE DATE: SEPTEMBER 2017

Version Control

The contents of this document cannot be modified without prior written consent from the original Contributors

2017 –09-01: Version 3.0 Updates

- Name change to Communications Infrastructure Standards & Specifications.
- Changed all references from TE Connectivity to AMP Netconnect
- Updated all sections to reflect changes in technology since last revision.
- Rack layout added for stacked design.
- More details included for Firestopping and Meeting/Conference Rooms, including DIRTT.
- Added information to Appendices.

2015–03-01 Version 2.1 Updates

- Section 3.2: Hoarding removed as it is included in the Infection Control and Prevention Manual.
- Section 4.2: Modified as ND&I only required on completely new systems.
- Section 4.7.4: Specialized TV Telecommunication Outlet information added.
- Section 4.9: Modified to included pathway for TV control.

2014 -10-10: Version 2.0 Updates

- All references hyperlinked in document for ease of electronic navigation
- Section 1.2: Focuses on new builds with the use of CAT6A copper and OM4 fiber.
- Section 2.1: Reworded for better clarification
- Section 4.2: Reworded for better clarification
- Section 4.6.1: Max backbone distance chart and star topology diagram removed as not needed
- Section 4.7: Reorganized for better flow and readability
- Section 4.8: Pathway Requirements added
- Section 4.9 -4.11: Reworded for better clarification
- Section 4.12: Part numbers updated to reflect CAT6A technology
- Section 8: Height of outlets raised to 450 mm AFF from 350 mm AFF, and in-slab floor conduit added.
- Appendix 4: Product Specification Sheets added. (updated Jan 23, 2015)

2013-10-07: Version 1.0 Updates

- Distributed to replace the IHA IMIT Cabling Specification with updates of standards

Contributors

The following subject matter experts formed the committee for content and change management of this document. Any revisions made to the latest release as indicated above must be approved by the Contributors:

- Authority IMIT Facilities Project Coordinator (IMITFPC)
- Authority IMIT Networks and Telecommunications Department (NTS)
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1 TABLE OF CONTENTS

1 INTRODUCTION

1.1 Purpose

This document and any associated appendices are to be used by all staff, consultants, and contractors working with any of the Authorities IMIT and communication infrastructure projects. This includes renovations, new communication rooms in existing buildings as well as completely new buildings. Although this document will serve as a baseline specification for all future Authority facilities, the Authority reserves the right to alter or customize the specification as required. It is the intent of the specification and drawings to call for work to be finished, tested, certified, commissioned and ready for operation.

It is the responsibility of the Prime Consultant, Design Engineer, Cabling Contractor, or other professional services involved to read and interpret this document in its entirety along with the Project Agreement, (PA), Request for Quote (RFQ), Request for Proposal (RFP), and any accompanying drawings and to identify any errors or omissions prior to tendering or submitting a quotation for the delivery of a complete Communications Infrastructure system. Any apparatus, appliances, materials, or work not shown on the drawings, but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be furnished, delivered and installed. There will be no allowances for extras based on misinterpretations.

This document is provided to ensure the overall communications infrastructure that is designed and delivered is capable of meeting current and future operational and clinical needs of the Authority. The design and delivery emphasizes the importance of utilizing industry best practices, considers the impacts of multiple technologies, networks and cabling systems, addresses MACs, anticipates and accommodates the future needs of complex healthcare environments and considers the type or area and zone density needs as per ANSI/TIA-1179.

Any deviations or changes from this document are not permissible unless approved by the Authority network and telecom change management process and explicit consent is given in writing by the Authority's IMIT Facilities Project Coordinator (IMITFPC)

The Authority will endeavor to provide the most current version of this document to all parties upon request. Verification of the latest release can be obtained by contacting the Authority's IMITFPC via email at IMITFPC@interiorhealth.ca

1.2 Scope

This document serves as the standard of quality and performance to the overall Communications Infrastructure design and installation with a focus on data and telecommunications cabling systems at any facility owned, leased or operated by the Authority, unless otherwise noted. This document focuses on new projects using CAT 6A for horizontal cabling and OM4 fiber for backbone capable of supporting Ethernet speeds of 10Gbit/s and future higher speed data rates as defined by ANSI/TIA/CSA/IEEE/IEC/ISO and other major standards organizations regardless of delivery method (P3, Design-Build, Design-Bid-Build, Construction Management).

This document identifies, describes and provides requirements for designing, procuring, furnishing and installing a communications infrastructure to support a high availability fault tolerant wired and wireless infrastructure in new constructions as well as renovations, upgrades and maintenance/renewal work

For any existing communications rooms or closets that use CAT5E or CAT6, all references to CAT6A can be replaced with CAT6. ***CAT5E cabling is now obsolete and may not be used on any further installations, thus any requests to use CAT5E for any low voltage cabling will be denied.*** Any requests for clarification are to be directed to the Authority's IMIT Facilities Project Coordinator (IMITFPC) via email to IMITFPC@interiorhealth.ca

1.3 Work Included

Work shall be in accordance with the drawings and specifications and their intent. Work shall include:

- Furnishing of all materials, labour, professional services, apparatus, tools, equipment and services required for procurement, installation, testing and putting into proper operation the specified communication system;
- Installation, testing and putting into regular operation the complete communication system as shown on the drawings and as described and specified in this and accompanying sections.
- Submission of shop drawings, riser diagrams, equipment rack drawings, test results and As-built drawings at the completion of work with any applicable maintenance manuals.

The Contractor shall comply with applicable provincial and local laws, rules, and regulations during the work period.

1.4 Referenced Codes & Standards

- All materials, workmanship and/or installation practices and activity shall meet or exceed the following reference standards:
- Comply with the latest British Columbia Building Code, and Canadian Electrical Code, including all provincial and other amendments, any local by-laws or rules and regulations that regulate the installation of Communications facilities.
- Provide underground systems in accordance with CSA C22.1-15 edition, except where specified otherwise.
- Equipment and materials shall bear the approval of the Canadian Standards Association and where applicable, the Underwriters Laboratories of Canada or alternately shall bear local approval from the Electrical Inspection Department having jurisdiction.
- If there is a conflict between the Drawings and Specifications and the above noted codes, by-laws, rule and orders, the codes, by-laws, rules and orders shall govern.
- Install and test telecommunications cabling networks as per the latest manufacturer's requirements and in accordance with the following standards:
- ANSI/TIA Standards:
    - ANSI/TIA 568-D.1-2015 Generic Telecommunications Cabling for Customer Premises standard.
    - ANSI/TIA -568-0-D-2015 Commercial Building Telecommunications Cabling Standard
    - ANSI/TIA-568-C.2-2009 Commercial Building Telecommunications Cabling Standard – Balanced Twisted Pair Cabling Components.
    - ANSI/TIA-568-C.3-2008 Optical Fiber Cabling Components Standard.
    - ANSI/TIA-569-D-2015 Commercial Building Standard for Telecommunications Pathways and Spaces.
    - ANSI/TIA-606-B-2011 Administration Standard for Commercial Telecommunications Infrastructure.
    - ANSI/TIA -607-C-2015 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
    - ANSI/TIA-570-C-2012 Residential Telecommunications Cabling Standard.
    - ANSI/TIA-758-B-2012 Customer Owned Outside Plant Telecommunications Cabling Standard.
    - ANSI/TIA-1179-2010 Health Care Telecommunications Cabling Standard.
    - ANSI/TIA-942-A-2012 Telecommunications Infrastructure Standard for Data Centers.
    - ANSI/TIA-TSB-162-A-2013 Telecommunications Cabling Guidelines for wireless Access Points.
- BICSI latest technical manuals:
    - ANSI/BICSI 002-2014, Data Centers Design and Implementation Best Practices.
    - ANSI/BICSI 003-2014 Building Information Modeling (BIM) Practices for Information Technology Systems
    - ANSI/BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
    - ANSI/BICSI 005-2013, Electronic Safety and Security (ESS) System Design and Implementation Best Practices

    - ANSI/BICSI-006-2015 Distributed Antenna System (DAS) Design and Implementation Best Practices
    - ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
    - NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
    - Information Technology Systems Installation Methods Manual
    - ICT (Information & Communications Technology) Terminology Handbook
    - Network Systems and Commissioning (NSC) reference
    - Outside Plant Design Reference Manual 5th Edition
    - Telecommunications Distribution Methods Manual 13th Edition or latest
    - Electronic Safety and Security Design Reference Manual
  - CSA 2318.7-95 Commissioning of Communications Systems in Health Care Facilities.
  - The Canadian Electrical Code Part 1, C22.1-15 edition.
  - BC Amendments to the CEC and associated bulletins.
  - IEEE 802.3 series of Ethernet Standards.
  - IEEE 802.11 series of Wireless Standards.
  - ISO 8802-3 series of Standards.
- Conform to current safety and security standards, codes, and practices in effect at the Authority including, but not limited to:
  - Workers Compensation Act – Part 3 – Occupational Health & Safety.
  - BC Electrical Safety Act.
  - The British Columbia Building Code with Amendments.

Any other reference material must be approved by the IMITFPC before work commences.

For installations in an acute hospital setting, if there is conflict between any of the ANSI/TIA or BISCI referenced standards, ANSI/TIA-1179 takes precedence.

If the Contractor notes items in the drawings or the specifications that are conflicting, the Contractor must bring the conflict to the attention of the Authority's IMITFPC for resolution. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

The Prime Consultant, Design Engineer, Cabling Contractor, or other professional services is responsible to determine the most current release of the standards documents and adhere to such release. Any changes or alteration shall be reissued as a new version and supersede the previous. The most current version of this document can be obtained online at http://www.interiorhealth.ca/AboutUs/BusinessCentre/Construction/Pages/Policies.aspx

2 DEMOLITION REQUIREMENTS

2.1 Demolition

Proper coordination for the shut-off of utility services and control measures for dust and noise must occur prior to commencement of any demolition work. Considerations must be given to on-going services and activities in adjacent areas. In confined areas of selective demolition, install and maintain dust and noise control barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove these protection measures after demolition operations are completed.

The Contractor must fill and patch all wall, floor, and ceiling openings resulting from this demolition work with materials and finishes identical to adjacent materials and finished, unless otherwise noted.

The Contractor must relocate all existing piping, circuitry (conduit and wiring), ductwork, and other materials as identified by the Authority, which impedes the installation of new materials and equipment, unless otherwise noted.

The Contractor must completely remove any abandoned, inactive and unused components of the existing low voltage cabling system from the work area upon the successful testing and commissioning of the new system. Remove all redundant and obsolete cables from the source completely, both horizontally and vertically, end to end and dispose as per 2.2 Disposal

All demolition which involves the removal or disturbance of asbestos containing fire proofing, finish material, insulation or other asbestos containing material must be approved by the Authority.

2.2 Disposal

The Contractor shall remove all generated trash, recyclables and debris at their expense. The Contractor may not place this trash and debris in any Authority facility dumpsters. The Authority shall retain the right to direct the disposal of salvageable equipment and materials. No equipment is given to the Contractor unless specifically listed in the job specifications prior to contract award. The Contractor shall deliver any surplus equipment to a site designated by the Authority and return a receipt for the equipment to the Authority.

3 DUST CONTAINMENT AND ACCESS

3.1 General

Construction projects pose health risks for patients, staff, visitors, and construction personnel that may lead to healthcare associated infections. These risks most commonly develop when dust particles contaminated with bacteria and/or fungi are dispersed into adjacent patient care areas.

Assessment of the risks to occupants of any adjacent health care facility is necessary before construction begins. The Planning Department or Plant Services will keep the Infection Control Service informed regarding the location of all areas of construction as soon as possible, during the planning stages.

CSA Z317-13-07 shall be used to determine population risk group, construction activity type, and preventative measures. The preventative measures will be outlined in the construction documentation prior to project commencement.

It is the responsibility of the Contractor to:

- Ensure critical and strict measures are taken to control dust throughout the construction process;
- Mitigate dust containment by not using the communication rooms as storage areas for cardboard, ladders and other materials that can accumulate dust particles;
- Protect existing systems in communication rooms from contaminants and pollutants.
- Ensure that dust containment measures shall not cause the room and equipment to overheat;
- Give the Infection Control Practitioner a minimum of 48 hours' notice for permit requests before the scope of work can be assessed and a permit issued;
- Keep the communication room door closed at all times for cooling, infection control, dust containment and security reasons;
- Not access communications rooms with active Authority network equipment without prior approval of the Authority;
- Hoard areas that are under construction as per the construction requirements and **3.2 Hoarding**;
- Clean work areas as required during construction and once work is complete as per **3.3 Cleaning**;

A copy of the construction guidelines from the Infection Prevention and Control Manual will be provided upon request. Final acceptance will be provided by the local Infection Control Practitioner.

3.2 Hoarding

There are times when new buildings will be built adjacent to existing facilities. In these instances hoarding may be required. Prior to removal of hoarding, the construction zone must be thoroughly cleaned, including all horizontal surfaces. Remove all hoarding and dust containment control that was erected, installed for the project, or installed for that phase prior to moving on to the next phase and repair any damage. Removal of hoarding must occur in a fashion that will minimize the spread of dust and bacteria. During the removal, the hoarding and area surrounding should be spray misted with water to minimize dust.

3.3 Cleaning

The Contractor is required to clean:

- Communications equipment and devices installed as part of the contract;
- Lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt;
- Switch, receptacle, outlets, wall/faceplates and exposed surfaces

The contractor is required to thoroughly vacuum and clean interiors and panels, cabinets, racks, bus/mechanical ducts, cable trays, conduits and other communication equipment of construction debris prior to energization using a HEPA vacuum cleaner and clean lint free cloths.

4 TELECOMMUNICATIONS SYSTEM REQUIREMENTS

4.1 Purpose

This section focuses on the supply, installation, testing, validation, and certification requirements of communications cabling systems in any of the Authority's facilities. Any conflicts in this section must be brought to the attention of the Authority's Networks and Telecommunications Department (NTS) for resolution by email to: IMITFPC@interiorhealth.ca. For ad-hoc cabling work including MACs (Moves, Adds, and Changes) not related to a construction project the Cabling Contractor should contact NTS directly via the Network Operations Centre (NOC) at NOC@interiorhealth.ca or by calling 1-877-664-6614.

4.2 Basic Communications Requirements

Cabling Contractors that will be installing all low voltage CAT6/6A systems in an Authority facility must be registered as an AMP NetConnect partner and must use employees holding current CommScope AMP NetConnect Level 1, 2 and 3 certifications.

The telecommunication outlets (TO) to consist of three horizontal cables as per **4.7.1. Wire Product Specifications** Specialized telecommunication outlets or incidental voice lines requiring alternative design will be specified in accompanying documentation. All horizontal cables will be connected to a universal voice/data patch panel system with no differentiation between Voice and Data.

All TO will use four port face plates unless otherwise specified.

The cabling system must meet or exceed CAT 6A performance defined in ANSI/TIA 568-C and provide a 25 year system performance certification from a COMMSCOPE AMP NETCONNECT single channel source manufacturer. Multi or mixed vendor solutions will NOT be considered.

4.3 Administration Requirements

The specifications shall be considered as an integral part of the drawings which accompany them, neither of which shall be used alone, and all services, materials or apparatus, omitted from one but which is mentioned, shown or reasonably implied in the other shall be considered as properly and sufficiently specified and shall therefore be supplied and installed.

The location of various items indicated on the drawings is approximate except where specifically mentioned. It shall be understood drawings are generally diagrammatic and are only intended to indicate the scope and general arrangement of work and that the locations shown are subject to relocation within two meters at no additional costs to the Authority to accommodate varying construction conditions. Onsite measurements must be taken to ensure components will fit within specified geographic building dimensions while meeting all codes and regulations.

All necessary permits, licenses, inspections and related fees to the above are the responsibility of the Contractor.

4.4 Contractor's Responsibility

To adhere to the standards and specifications contained within. Their work shall reflect the following:

- Before finalizing the contract price a site visit (if possible) is mandatory to report any condition or logistical problem that may prevent the Contractors from performing the work as specified.
- Responsible for the work until the project has achieved substantial completion and to replace anything that may have been damaged, lost or stolen as a result of the work without additional costs to the Authority.
- Arrange work schedules in co-operation with the other subcontractors.
- Protect finished and unfinished work of the building from damage resulting from the carrying out of the work.
- Protect floors and walls, where necessary, and repair all damages to all surfaces resulting from the execution of this work, without additional charge.
- On completion of work and before acceptance ensure all exposed surfaces of communications equipment are cleaned. See **3 Dust Containment and Access**
- Promptly advise the Authority of any work functions that appear in conflict with local authorities and work not included in work contract.
- Make no changes to the design intent without written authorization. The Contractor shall give the Authority a minimum of 48 hours' notice in advance of any field reviews required.
- Ensure that equipment does not transmit noise and/or vibration to other parts of the building as a result of poor installation practices.
- The Contractor shall keep a qualified foreman or journeyman on the job site during the construction, testing and acceptance period. The above will not be changed from the project unless satisfactory reasons are given in writing to the Authority.
- Contractors are responsible that all communications rooms are secure while performing the work. The above must also be left in a secure state after use and the Contractor will be responsible for all damages and costs as result of improper use of the facility.
- During the course of the project the site must be kept clean and tidy by the Contractor. Additionally the building and site must be cleaned to a condition acceptable to the Authority before final completion.
- Use qualified service personnel to conduct all maintenance/service work and at any time show credentials.
- Obtain and pay all required permit fees in accordance to all local regulatory bodies.
- Attendance and participation at project meetings.
- Regular site inspections with the IMITFPC or designate to ensure the requirements of the project and this document are being followed and met.
- Ensure all requirements of project documentation and contractual obligations such as drawings, addenda, site instructions, change orders and change directives issues are completed in compliance to their instructions are included as part of the contract final deliverables.
- All the above shall be considered minimum requirements. The requirements, as designed, shall not be reduced as a result of the above and no extra charges will be accepted.

4.5 Communication Equipment Rooms

4.5.1 Communication Rooms

All communication rooms require a CAT 6A distribution system. All data and voice runs are to terminate on the same universal patch panel system with no differentiation between voice and data ports. This will permit all ports to be used for either voice or data applications by means of labelled patch cords which connect to the network hardware (data) or voice patch panel (voice). A voice patch panel and tie cable will be used to provide a cross-connect between the universal patch panel system and the BIX telephone infrastructure. Refer to **4.5.1.1 HP STACKED SWITCH DESIGN** as a guide for a typical rack layout in a communications room.

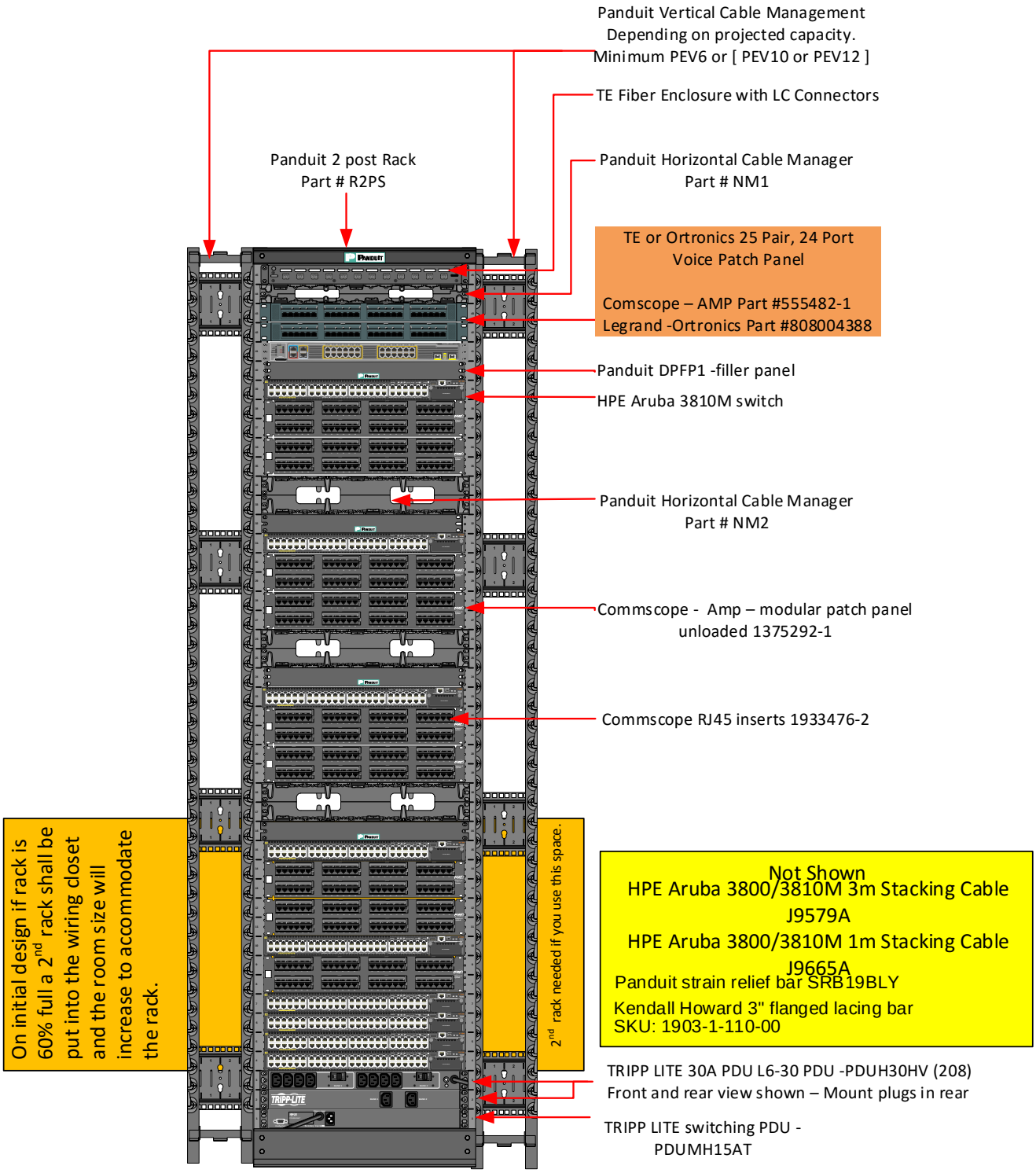
Listed below are requirements for all communication rooms including:

Main Cross Connect (MCC)**, Back-up Cross Connect** (BCC) and **Telecommunications Rooms** (TR).

- Furnish all walls with (3/4in trade size) A-C plywood, void free, 2.44 m (8 ft.) high starting at 300 mm (12 in) AFF capable of supporting attached equipment. Plywood shall be either fire rated or covered with two coats of CSA approved fire retardant paint.
- Lighting shall be a minimum of 500 lux in the horizontal plane and 200 lux in the vertical plane, measured 1m (3 ft.) above the finished floor in the middle of all aisles (where applicable) using suspended luminaires. The lighting is to be controlled with an occupancy sensor. Sensor to be programmable and provided with an override when workers are in areas of the room that are not detected by the sensor. Dimmer switches shall not be used.
- Lighting fixtures shall be powered from a different electrical distributions panel than the telecommunications equipment in the space.
- False ceiling shall not be provided.
- The access door shall be a minimum of 1m (36in) wide and 2m (80in) high and shall be locked and accessible via the Authority card access system providing secure access. In the event of a power failure, the rooms shall remain secure and only be accessed via key override.
- Floors, walls, and ceiling shall be treated to eliminate dust. Finishes shall be light in color to enhance room lighting.
- In all acute hospital settings provide a UPS branch panel board and a vital branch panel board where each panel board is capable of independently supporting all the active telecommunications equipment which will be dual corded with dual power supplies and simultaneously connect to the UPS branch panel and the vital branch panel such that an interruption in either power branch will not affect the telecommunication equipment.
- In all acute hospital settings provide a minimum of two dedicated 30A, 208V AC L6-30P electrical outlets, one on vital and one on UPS power, for equipment power. Consideration shall be given to identify dedicated telecommunications equipment outlets.
- In communication rooms that require multiple relay racks in acute hospital settings, each relay rack, including unloaded spare capacity racks, require a minimum of two dedicated 30A, 208V AC L6-30P electrical outlets, one on vital and one on UPS power, mounted to the underside of the cable tray.
- In non-acute facilities provide a minimum of two dedicated 20A 120V AC, quad electrical outlets on separate circuits located on the wall no higher than 300 mm AFF and adjacent to where the relay rack will be placed. Final location to be determined via onsite design meetings with the IMITFPC.
- Convenience duplex outlets on a separate 20A 120V AC circuit shall be placed at 1.83m (6ft) intervals around the perimeter walls no higher than 300 mm AFF.
- Air handling must maintain a continuous and dedicated environmental control with:
    - a temperature range of 20°C to 25°C;
    - a humidity range of 40% to 55% relative humidity;
    - minimum dew point: 5.5°C and;
    - maximum dew point: 15°C.

- Shall not be used as a passageway to other equipment rooms, nor should they share space with power transformers, plumbing, storage, custodial equipment, or any other function which would require access for reasons other than telecommunications maintenance.
- Have a minimum of two (2) feed conduits of 101.6 mm (4 in). In determining the total number of pathways required the planner shall consider the following:
    a) Type and use of building
    b) Growth
    c) Difficulty of adding pathways in the future
    d) Alternate entrance
    e) Type and size of cables likely to be installed
- Be accessible from a common hallway, located in a low traffic area, and not located near office locations.
- Must not be located in a sterile core or high security area with limited access such as a pharmacy.
- Access shall be made available to the independent telecommunications grounding system specified by ANSI/TIA/EIA 607.
- Provide a double interlocked, cross zoned, pre-action supplied sprinkler system. There shall be no wet sprinkler system in any Communications Rooms.

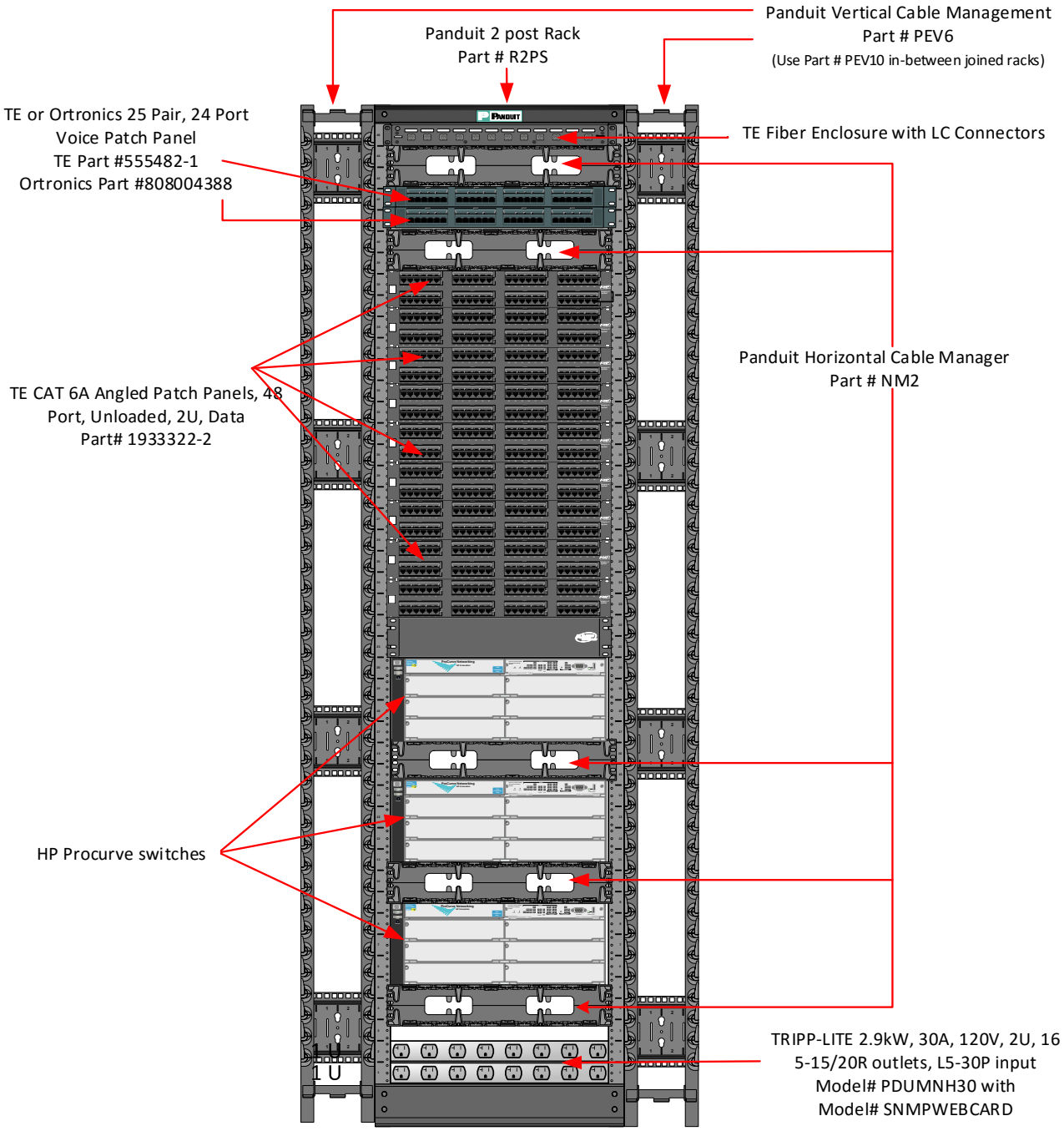
4.5.1.1 HP STACKED SWITCH DESIGN



NOTE:

- This Visio diagram is to be used as a guide and is not to scale.
- Part numbers are subject to change based on availability and latest available product.
- Intended to show preferred placement of active and passive network equipment.
- Final design and approval to be determined in consultation during the design phase with the Authority IMITFPC.
- Notes from 4.5.1.2 also apply.

4.5.1.2 HP CHASSIS SWITCH DESIGN



NOTE:

- Use PANDUIT Part# SRB19BLY strain relief bars on back side of rack (not shown)
- Orient PDU so outlets face the back of the rack
- If the specification requires a 4 post rack as per **Main Cross Connect** (MCC)or **Back-up Cross Connect** use PANDUIT Part# R4P with vertical PDU Tripp-Lite Model#PDUV30HV(208v) x2 or PDUMNV30HV(networked) x2 and one PDUMH15AT (120V) at the bottom of the rack.
- Horizontal and vertical cable managers must also include covers. (not shown)
- All racks to be bolted to the floor and home-run grounded to the TGB using green #6 AWG copper wire with crimp type conductors at each end.

4.5.2 Entrance Facility (EF)

The EF consists of the telecommunications service entrance, including the entrance point through the building wall, and continuing to the entrance room or space. The demarcation point between service providers and the Authority premise cabling will be located here.

All carriers and telecommunications providers involved in providing service to the building shall be contacted to establish their requirements and explore alternatives for delivering service. The location of other utilities, such as electrical, water, gas, and sewer shall be considered in the site selection of the EF.

A service entrance pathway shall be provided. The basic methods for provisioning are underground, buried, and aerial pathways.

The entrance room or space is the component of the EF that provides space for the termination of the entrance backbone cable. In accordance with electrical code the entrance or outside building cable shall be terminated and protected on a listed primary protector within 15m (50ft) of entering the building. Where telecommunications equipment (i.e. PBX) is located in the entrance room or space, the entire room or space shall meet the requirements for an equipment room as specified in Section 8 of TIA/EIA-569-A.

For buildings exceeding 6096 m (20,000 SF) usable floor space, an enclosed and secure room must be provided.

The EF overall design will follow that of **Section 4.5.1 Communication Rooms,** and will also be designed to support various telecommunication service providers Local Exchange Carrier and/or Competitive Local Exchange Carrier.

4.5.3 Main Cross Connect (MCC) and Back-up Cross Connect (BCC)

The MCC and BCC can be located on the same floor however preference is to have each room located on different floors. If located on the same floor they must be a minimum of 30m apart. The MCC must be located above ground. Copper and fiber backbone cables extend from the MCC/BCC to each Telecommunications Room (TR). The MCC may not serve as a TR for services to the work areas. The BCC may be used as a TR for services to the work areas, however if the BCC is used as a TR, the TR equipment must be installed in 2 post racks on the restricted side of the partition as per **4.5.3.1**.

The MCC/BCC includes termination hardware, equipment racks, patch panels, cable management hardware, network equipment and servers that are part of other building services. The MCC shall house the telecommunications main grounding busbar (TMGB). The bonding backbone cables shall extend from the TMGB to each of the telecommunications room as shown on the drawings. The BCC to be designed to accommodate hot swapping of all services in the event of a failure in the MCC.

The MCC/BCC overall design will follow that of **4.5.1 Communication Rooms** as well as have a physical partition. The BCC will be used for all redundant network and communications requirements.

4.5.3.1 PHYSICAL PARTITION GUIDELINES

All newly constructed facilities will have a MCC and a separate BCC with a required physical partition. All references to MCC are for BCC as applicable. The Authority equipment must be located on the restricted side. Vendor managed systems must be located on the accessible side. The Contractor will incorporate the following design in the MCC in addition to best practices and standards of design for MCCs.

- Provide a physical and secure separation between the restricted side and the accessible side. This separation must be card reader accessible (for auditing and recording who accessed the location and when), minimum 2438.4mm in height, not impede airflow, cooling or overall room lighting. This separated area is the only location in the building where vendor managed systems may reside; they may not reside in any of the other Communication Rooms without prior written approval from the IMITFPC.

- **The accessible side will be designed to**:
    - Be located on the side with the entrance into the MCC;
    - Include Contractor provided 4 post relay rack(s), Panduit Part# R4P with
        - a vertically mounted Tripp-Lite Model# PDUV30HV or PDUMNV30HV(networked),
        - a horizontally mounted Tripp-Lite Model# PDUMH15AT (120V) and
        - a 48 port COMMSCOPE AMP NETCONNECT patch panel, cross connected to a 48 port COMMSCOPE AMP NETCONNECT patch panel on the restricted side;
    - Include horizontal cable management from the 4 post rack to the nearest 4 post relay cabinet on the restricted side with applicable waterfall cable management that is consistent with the building and telecommunication rooms cable raceway;
    - Ensure that all equipment will be placed and mounted securely in the 4 post server rack(s) and off the floor;
    - Be used for vendor supplied and serviceable equipment.
- **The restricted side will be designed to:**
    - Be located on the side of the MCC that is furthest from the entrance or the other side of the physically secure separation;
    - Include horizontal cable management from the nearest 4 post relay rack to the 4 post rack on the accessible side with applicable waterfall cable management;
    - Include Contractor provided 4 post relay rack(s), Panduit Part# R4P with
        - a vertically mounted Tripp-Lite Model# PDUV30HV or PDUMNV30HV(networked),
        - a horizontally mounted Tripp-Lite Model# PDUMH15AT (120V) and
        - a 48 port COMMSCOPE AMP NETCONNECT patch panel cross connected to a 48 port COMMSCOPE AMP NETCONNECT patch panel on the accessible side;
    - Ensure that all equipment will be placed and mounted securely in the 4 post relay rack(s) and off the floor;
    - Be used for all Authority communications and network equipment.

4.5.4 Telecommunications Rooms (TR)

Telecommunications Rooms (TR) provide many different functions for the cabling systems and are often treated as a distinct sub-system within the hierarchical cabling system. The TR is the location for cross-connecting the backbone cable and horizontal station cable. Similarly, recognized types of backbone cable are also terminated in the TR on compatible connecting hardware. The TR houses a telecommunications grounding busbar (TGB).

The cross-connection of horizontal and backbone cable using jumper or patch cords allows flexible connectivity when extending various services to telecommunications outlet/connectors. Connecting hardware, jumpers, and patch cords used for this purpose are collectively referred to as “horizontal cross-connect”. Patch cords used for horizontal cross-connect must be CAT 6A. The TR may also contain the IC or the MC connections for different portions of the backbone cabling system.

Sometimes backbone to backbone cross-connections in the TR are used to tie different TR’s together in a ring, bus, or tree configuration. Equipment cables that consolidate several ports on a single connector shall be terminated on dedicated connecting hardware. Equipment cables that extend a single port appearance may either be permanently connected or interconnected directly to horizontal or backbone termination. Direct interconnections reduce the number of connections required to configure a link but may reduce flexibility.

TR minimum recommended size requirements are based on distributing telecommunications service to one individual work area per 100 SF (10 SqM) of usable floor space as follows. Areas with high density wiring where more than 60% of one relay rack is used must be increased in size to accommodate a second relay rack.

4.5.4.1 COMMUNICATION ROOM SIZES

SERVING AREA	RECOMMENDED ROOM SIZE
< or = to 500 SqM	3.0 m depth x 2.5 m width
> 500 SqM and < 800 SqM	3.0 m depth x 2.8 m width
> 800 SqM and < 1000 SqM	3.0 m depth x 3.4 m width

The TR overall design will follow that of **Section 4.5.1 Communication Rooms**. Further provisions to be considered are as follows:

- TR should be centrally located (both vertically and horizontally) within the building area served.
- TR must be stacked vertically on multi-floor buildings.
- TR shall be dedicated for IMIT services and can **NOT** be co-located with any other services unless approved by the Authority IMITFPC.
- The maximum wiring run from the TR to the most distant data outlet served from the room/closet cannot exceed 90m (295ft) The TR will be the origination point for wiring to all communications outlets within the area served.
- Where TR serve areas on more than one floor, the design process should recognize the need to incorporate appropriate paths of travel for the raceway systems which will be required to carry the telecommunications wiring between the floors.
- TR to be designed without any pillars, posts, or windows that will interfere with the placement of equipment or reduce available wall space.

4.6 Backbone and Riser Cabling Requirements

4.6.1 General Backbone Cabling Requirements

The function of the backbone cabling is to provide interconnections between the EF, MCC, BCC, and TRs.

All exposed fiber in telecommunications pathways and between the points where the EMT conduit enters the communications room, and the fiber enters the terminating enclosure, including a service loop, shall be protected with riser or plenum rated corrugated High Density Polyethylene Innerduct (HDPEI). HDPEI must meet CSA C22.2 No.262 testing requirements. The HDPEI must be securely fastened to the wall or vertical cable management system in order to ensure it is not hanging down in the middle of the closet.

Furthermore:

- Intra backbone cables shall be installed and bundled separately from entrance and horizontal distribution cables.
- In accordance with TIA/EIA-568-C the backbone cabling consists of the backbone cables, intermediate and main cross-connects, mechanical termination, and patch cords or jumpers used for backbone to backbone cross-connection.
- Backbone cabling also includes cabling between buildings. During each planning period, growth and changes in service requirements should be accommodated without installation of additional cabling.
- The backbone distribution system shall follow the conventional hierarchical extended star topology
- Backbone distances are not to exceed the maximums in accordance with TIA/EIA 568-C.
- All pathway requirements as per **Section 4.8 Pathway Requirements** are applicable.

4.6.2 Optical Fiber Data Backbone Requirements

Twenty-four (24) strand multimode fiber optic cables shall be utilized to provide primary backbone connectivity between the **Main Cross Connect (MCC)** and each **Telecommunications Rooms (TR)**. Twenty-four (24) strand multimode fiber optic cables shall be utilized to provide redundant backbone connectivity between the **BCC** and each **TR.**
If the distance limitation for multimode fiber is exceeded, single mode fiber will be required as approved by the Authority.

The optical fiber data backbone cable shall be:

- COMMSCOPE AMP NETCONNECT XG 50/125µm multimode OM4 850nm laser-optimized fiber surrounded by an aqua coloured PVC jacket with UL rating of OFNR/OFNP or will meet the requirements of FT4/FT6.
- Both ends of the cable will be terminated to LC-LC connectors.
- Each fiber optic cable shall be terminated in the MCC/BCC and each TR in black COMMSCOPE AMP NETCONNECT 24 port rack mount fiber enclosures providing protection to the terminated fibers.

4.6.3 Analog Backbone Requirements

50 or 100 pair CAT3 cu shall be utilized to provide primary analog backbone connectivity between the **Main Cross Connect** (MCC) and each **Telecommunications Rooms** (TR).
50 or 100 pair CAT3 cu shall be utilized to provide redundant analog backbone connectivity between the **Main Cross Connect** (MCC) and each **Telecommunications Rooms** (TR). Requirement for multiples of 50 or 100 pair will be determined during the design phase of each project.

The analog backbone cable shall be:

- COMMSCOPE AMP NETCONNECT 24 AWG, 100-pair UTP, (50-pair UTP may be used if approved) CMR/FT4, or CMP/FT6 rated as required by the BCBC.
- Grey sheathed, third party verified to comply with TIA CAT 3 requirements.
- Terminated in BIX mount panels in a Cross-connect Wall Mount Layout using the 25-pair colour code method. Cable assemblies consisting of more than 25 pairs shall have binder groups consisting of 25 pairs with a colour coded wrapping.
  For the general layout rules the following parameters should be observed:
  - A minimum of 20 cm from ceiling
  - A minimum of 20 cm from wall or equipment
  - A minimum of 15.25 cm between Frames

4.7 Horizontal Cabling Requirements

4.7.1 Wire Product Specifications

CAT 6A horizontal cabling shall be:

- COMMSCOPE AMP NETCONNECT, 640 Series CAT 6A UTP, 4 pair, 23 AWG NEC/NFPA CMR/CMP rated.
- White sheathed, lead-free and meet the performance requirements outlined in EIA/TIA 568-C in addition to all other standard CAT 6A performance requirements.

4.7.2 Modular Jacks

The CAT 6A U/UTP AMP-Twist modular jacks shall:

- Be a COMMSCOPE AMP NETCONNECT product for end to end AMP Certification.
- Be wired to T568A and accommodate cable with a maximum O.D. of 9.00 mm.
- The Authority colour coding guidelines for jacks to identify system usage can be found in the following table
- The colour of jack in the field must match the colour of jack on the rack in the communication room.

4.7.2.1 COLOUR CODE GUIDELINES

SHEATH COLOUR	JACK COLOUR	USAGE	CABLE LABEL	TERMINATION POINT
WHITE	Black	Data/Voice Applications	D	PP
WHITE	Green	Wireless Connection Outlet (POE)	W	PP
WHITE	Red	Patient Monitoring	PM	PP
GREEN	Violet	IP Video Surveillance	VS	PP
WHITE	Blue	Patient Infotainment	TV	PP (BMS)
YELLOW	Yellow	Nurse Call	N	NC BRC
WHITE	White	Voice (Legacy MAC work only)	V	BIX

4.7.3 Face/Wall Plates

All face/wall plates are to be flush mounted, white, 4-port, single gang similar to the image at right and mounted to in-wall single gang boxes.

Each port shall be individually labelled above the port with white machine printed label tape, applied horizontally, to indicate its function, as per **4.15.4 Telecommunications Outlet Labelling**

4.7.4 Telecommunications Outlets (TO)

Each telecommunication outlet location shall

- Consist of a minimum three (3) CAT 6A cables as per **4.7.1 Wire Product Specifications** *unless otherwise specified* and mount to the appropriate hardware depending on the use of the cables and
- Be supplied with two (2) allocated data ports and one (1) unallocated data port. Refer to Appendix 2 for definitions.

The following shall be maintained during Telecommunications Outlet Installation:

- Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius.
- No more than 30cm of slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack may be neatly stored in the ceiling above each drop location in a figure-eight coil when there is not enough space present in the outlet box to store slack cable. Coiled slack in the ceiling space should not exceed 2m of cable.
- Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-C document, manufacturer's recommendations and/or best industry practices.
- Bend radius of the UTP cable in the termination area shall not be less than 4 times the outside diameter of the cable as per the TIA/EIA 568-C standard.
- The cable jacket shall be maintained as close as possible to the termination point. .
- Black modular jacks shall occupy the top position(s) on the faceplate.
- Cables shall be installed in continuous lengths from origin to destination. Consolidation points are not permitted without written authorization from the Authority.
- Horizontal distribution cables shall be bundled in groups of no greater than 24 cables.
- Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Authority.
- Cables shall be identified by a self-adhesive label in accordance with **4.15.3 Horizontal Cables Labelling and Termination.**

4.8 Pathway Requirements

- Horizontal pathways, conduit, raceways and cable trays, shall not be filled to greater than 40% of fill capacity during initial installation.
- Cable trays shall
    - Be aluminum or steel wire mesh, ladder type with manufactured fittings.
    - House only data, wireless, patient monitoring, video, and nurse call cabling.
    - Have clearance above the tray as per TIA and BICSI standards so work can be done in cable tray without any hindrance due to conduit, duct or other obstacles.
    - Have soft 90 degree bends as per TIA/EIA cabling standards.
    - Have continuous #6AWG minimum green insulated copper bond wire.
    - Have #6 AWG green insulated copper bonding jumper between the cable tray and every associated conduit.
    - Follow the same path as the corridor and not cross over or into any rooms other than the MCC/BCC/TR
    - Not pass through fire rated walls.
- Wall mounted vertical cable tray is required for any vertically run cables along any wall surface.

- Minimum conduit size shall be 28mm (1 inch). All empty conduits shall include a 3mm polypropylene pull cord continuously from outlet to outlet, through conduit and fastened at each box.
- If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of four-foot intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.
- Cable shall be installed above fire-sprinkler and systems and shall not be attached to the system or any ancillary equipment or hardware.
- The cabling system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
- Cables shall not be attached to ceiling grid or lighting support wires. Where light supports for drop cable legs are required, the Contractor shall install clips to support the cabling.
- Where cables are housed in EMT conduits, the backbone and horizontal cables shall be installed in separate EMT conduits or in separate HDPEI within EMT conduits.
- Where backbone cables and distribution cables are installed in a cable tray or wire way, backbone cables shall be installed first and bundled separately from the horizontal distribution cables. The fiber must be installed inside corrugated HDPEI, and the HDPEI is to be attached to the outer or under side of the cable tray.
- When a cable enters or exits a junction or pull box or other such enclosure the appropriate connector, grommet, or bushing needs to be used.
- Cables run through conduit will not pass through more than two 90 degree corners (or equivalent) without the use of an intermediate pull box as outlined in EIA/TIA 568-C.
- Minimum space requirements in pull boxes having one 28 mm conduit each in opposite ends of the pull box shall be 100 mm wide, 400 mm long, and 75 mm deep. For each additional 28mm conduit, increase width of pull box by 50 mm.
- Minimum space requirements in pull boxes having 28 mm conduit for 90° pulls shall be 200 mm wide, 400 mm long, 150 mm deep. For each additional conduit, increase width of pull box by 50 mm.
- Consult TIA/EIA-569-C for pathway and floor penetration and conduit stub heights for all topologies.
- If cable needs to go through a wall, be it drywall, concrete, wood or other, and an existing pathway does not exist, the created pathway must use electrical conduit as a sleeve with EMT connectors with nylon throats at each end of the conduit. Poking a hole in the wall and running the cable through is not acceptable. All penetrations through fire rated building structures (walls and floors) shall be sealed with an appropriate firestop system as per **6 FIRESTOP Systems**
- If cable is to be terminated in an open office location with modular furniture and termination within a wall is not a viable option, then the cables are to terminate within PAC poles, not the modular furniture.

4.9 Nurse Call Systems

For Nurse Call installations:

- Use yellow sheathed COMMSCOPE AMP NETCONNECT UTP cabling as per manufacturer requirements.
- Cables must not be buried amongst new or existing data/voice cables in pathways.
- All nurse call horizontal cabling that leaves the cable tray must be protected in conduit stubbed up from the cable tray to the outlet box.
- Follow the standards and best practices as per **4.7 Horizontal Cabling Requirements.**
- The Authority currently uses the Rauland Responder 5, Responder 4000, and Ascom Telligence C600 Nurse Call.

4.10 Security, Video IP Surveillance Systems

For Outlet locations:

- Provide one (1) green sheathed COMMSCOPE AMP NETCONNECT CAT6A UTP cable, terminated at both the head and field ends using violet jacks as per **4.7.2.1 Colour Code Guidelines**
- Security cabling shall share pathways with network cabling but must not compromise the integrity of existing network cabling. Security cabling shall be bundled in groups of no greater than 24 cables separately from other network cabling using Velcro wraps or equivalent. Tie-wraps are **NOT** to be used.
- Follow the standards and best practices as per **4.7 Horizontal Cabling Requirements.**

4.11 Wireless Infrastructure

For Outlet locations:

- Provide one (1) white sheathed COMMSCOPE AMP NETCONNECT CAT 6A UTP cable, terminated at both the head and field ends using green jacks as per **4.7.2.1 Colour Code Guidelines**
- Provide 5m slack for each cable, at the field end, coiled neatly, suspended in the ceiling space with proper support and cable management. Coil radius must be within acceptable bend radius for the cable as per EIA/TIA 568-C.
- Support cables with Velcro wraps or equivalent. Tie-wraps are **NOT** to be used.
- Follow the standards and best practices as per **4.7 Horizontal Cabling Requirements.**
- The wireless infrastructure shall support a Cisco Based system and will service 802.11b (2.4Ghz DSSS), 802.11g (2.4Ghz OFDM), 802.11a (5Ghz OFDM) , 802.11n(5Ghz and 2.4Ghz MIMO), and 802.11ac (Wave 3)

4.12 Patient Infotainment Systems

For Outlet locations:

- Provide one (1) white sheathed COMMSCOPE AMP NETCONNECT CAT 6A UTP cable, terminated at both the head and field ends using blue jacks as per **4.7.2.1 Colour Code Guidelines**.
- Provide one (1) appropriately sized coax cable (RG-6) from each patient infotainment outlet to a predefined wall in the TR servicing the work area. Cabling is to interconnect in each TR via riser cabling to the accessible side of the MCC where the patient infotainment system will reside.
- Provide one (1) yellow sheathed COMMSCOPE AMP NETCONNECT UTP cable from the patient infotainment outlet to the patient head wall in conduit in all patient rooms for connectivity to the nurse call system.
- Cables will terminate in a separate patch panel from the Authority Network. This is required for this system to connect into the BMS or separate network so as not to impact the Authority Network.,
- Support cables with Velcro wraps or equivalent. Tie-wraps are NOT to be used.
- Follow the standards and best practices as per Section 4.7 Horizontal Cabling Requirements.

4.13 Patch and Interconnection Cabling Requirements

4.13.1 Horizontal Data Cross-Connect

The horizontal cross-connect for data circuits shall consist of patch cords from the horizontal CAT 6A termination panels to the network equipment within the same or adjacent racks. Short patch cords are preferred in a stacked switch configuration. See 4.5.1.1 **HP STACKED SWITCH DESIGN** for typical rack layout and part numbers.

4.13.2 Voice/Data BIX Cross-connect

All installations of horizontal cabling for voice shall be run and terminated in the same manner as data. To allow cross-connecting between horizontal and backbone voice cabling, 25 or 50 pair “Amphenol tails” will be run from patch panels in the data rack and terminated on BIX 1A connecting blocks. **The use of data patch panels for the voice cross-connect is not acceptable.**

Wall fields shall consist of field-terminated BIX XC kits which include frame, blocks, bottom trough, horizontal wire troughs, connecting blocks, and designation strips. Wire management frames shall be mounted between adjacent vertical frames to provide wire management of cross-connect wire.

Combinations of 300 and/or 900 pair frames shall be used as required by the horizontal and backbone pair counts to be terminated in a given closet. Backbone frames shall employ BIX1A connecting blocks with 5-pair markings, and horizontal frames shall employ BIX1A4 connecting blocks with 4-pair markings on each 25-pair row. Where multiple frames are required:

- Frames shall be oriented so that backbone frames are located on the left and horizontal frames are located on the right of the wall field when facing the frame assembly.
- Frames on the left must allow for cross-connect wire to enter and exit the left side of the frame and connecting blocks must be able to swing out to the left, with enough slack for servicing while fully terminated and cross connected.
- Frames on the right must allow for the opposite of the left.
- Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-C.
- Cables must be secured to the BIX connecting blocks.
- Pair untwist at the termination shall not exceed one-half an inch for CAT6A connecting hardware.
- Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- Cable bundles shall not cross the path (or plane) used for cross-connect wire.
- For voice terminations on BIX, the cable jacket shall extend to the point directly behind the designation strip, between the pair of BIX connecting blocks where termination is to take place. No unjacketed wire shall be visible when designation strips and connecting blocks are in place, and no jacketed cable shall be secured to the connecting block.
- Each cable shall be clearly labelled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labelled within the bundle, where the label is obscured from view shall not be acceptable.

4.14 Fiber Termination

Fiber optic termination hardware shall be installed in the following manner:

- Fiber slack and service loops shall be neatly coiled within the fiber termination panel. The sheath of the cable must remain on the loop. No slack loops shall be allowed external to the fiber panel(s).
- Each cable shall be individually attached to the respective termination panel by mechanical means. The cable's strength member(s) shall be securely attached the cable strain relief bracket in the panel.
- Each fiber cable shall be stripped upon entering the termination panel and the individual fibers routed in the termination panel.
- Each end of the fiber will be terminated with LC connectors.
- Each cable shall be clearly labelled at the entrance to the termination panel.
- Dust caps shall be installed on the LC-LC connectors and couplings at all times unless physically connected.
- Fiber termination panel is to have LC-LC adapters, cartridges, bulkheads, and couplers, as required by the installation.

4.15 Labelling

4.15.1 General

All documentation and labelling must follow the TIA/EIA 606A Standard. All labels must be machine printed, smudge-resistant and water-resistant. For labels on faceplates, patch panels, walls, BIX, or equipment, a device such as the Brother P-Touch, or Dyno labeler is acceptable.

For labels identifying cable, the labels must be wrapped around the cable within 30cm of the cable termination and must be protected with a plastic coating. .

4.15.2 Panel Labelling

Fiber patch panels will be labelled “Panel 1”, continuing in a top-to-bottom, left-to-right approach. This label must be followed by a description of the fiber strand count and fiber type (6 Strand MM or 12 Strand SM) and where the other end of the fiber is located. For example “Panel 1 – 6 Strand MM to TR A1A".

Copper patch panels will be labeled “Panel A” for the first panel, “Panel B” for the next panel and continuing top-to-bottom, left-to-right. The label is to be placed on the left side of the front face of each 48-port patch panel. There should be no other labeling added to the patch panel. Each port on each patch panel comes pre-labeled with numbers 1 – 48 and therefore ports are identified at the wall-plate using a combination of the patch panel letter and port number. For example port 45 on patch panel B would be identified as B45.

4.15.3 Horizontal Cables Labelling and Termination

Horizontal cables are labelled sequentially from each communications room. Data patch panels will be labelled in a left-to-right, top-to-bottom fashion. With all new builds the cables must be terminated in a logical fashion so that all data drops from a room or area in the building are sequentially located on the patch panel(s). BIX positions will be labelled left-to-right, top-to-bottom within a BIX column; numbering will continue at the top of the next (to the right) column. Voice patch panels will be labelled, “To BIX 1-50”, and “To BIX 51-100” and so on.

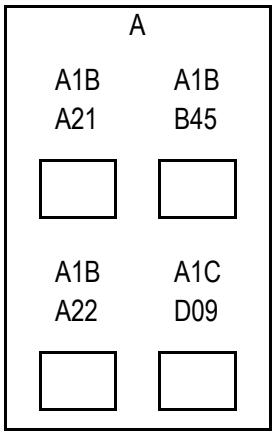
In order to identify the installer the Authority requests that the label on the cable also include the company’s initials.

Self-laminating labels must be wrapped around the ends of horizontal cable runs 10 cm from the end of the sheath, marked with; communications room, patch panel location, room, installer, and usage. For example; a cable used for Patient Monitoring coming from patch panel B, location 17, in TR A1A terminating to Room 2745 on faceplate A would have this label at both the head and field end A1A.B17.2745.A.XX.PM (XX being the company’s initial)

The last few letters after the installers’ initials indicate what the cable is used for. Refer to **4.7.2.1 Colour Code Guidelines** for the naming convention to use.

4.15.4 Telecommunications Outlet Labelling

At the telecommunications outlet, each jack of the faceplate will show the associated communications room or closet (such as A1B or A1C) followed by the patch panel letter and port number such as A21 or B45.



The above telecommunications outlet indicates that there are 3 cables coming from the A1B location, and 1 cable coming from A1C. The colour of the jack will indicate whether it is a data or other connection as per the jack colour coding requirements listed in **4.7.2.1 Colour Code Guidelines**. All of the telecommunications outlets must also be labelled with their position in the

room to match the label on the cable, be that A, B, C, D etc. The locations start from the primary entry, then clockwise around the room.

4.15.5 Backbone Cable Labelling

Backbone cables will be labelled showing the communications rooms at each end and where within those rooms the fiber is terminated, along with the installers initials. For example, a fiber bundle connecting rooms S5A (in fiber panel 2) and R1A (in fiber panel 1) would be labelled "S5A-2 R1A-1.XX". (XX being the installers initials) The specific labelling to be applied will be specified for the job. Both the port where the cable is terminated and the cable itself must be labelled. The cable must be labelled with self-laminating labels wrapped around the sheath of the cable.

4.15.6 Patch Cable Labelling

Patch cables used at the workstation or within a communications room or closet do not need to be labelled.

4.16 Low Voltage Certification Testing

Certification testing shall be performed on all data cabling. Validation and/or qualification testing is not sufficient for either horizontal or backbone data cabling. Test documentation shall be provided electronically in PDF format to the IMITFPC within three weeks after the completion of the project. The test document should not exceed 8-1/2in x 11in. There shall be only one cable test result per page, and the document must include the cable designation that matches the machine printed label that can be found within 10cm of each cable end. Test documentation must include site code.

The test equipment by name, manufacturer, model number and last calibration date will also be provided at the end of the document. Unless a more frequent calibration cycle is specified by the manufacturer, an annual calibration cycle is anticipated on all test equipment used for this installation. Calibration shall be completed by a manufacturer approved facility – "self" calibration is not sufficient. The test document shall detail the test method used and the specific settings of the equipment during the test.

When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be provided electronically in PDF format to the IMITFPC.

4.17 Telecommunications Infrastructure Acceptance

4.17.1 Inspections

The IMITFPC will make periodic inspections of the cabling in progress. One inspection will be performed at the conclusion of cable pulling, prior to closing of the false ceiling, to inspect the method of cable routing, support, and the fire stopping of penetrations. Refer to **6 FIRESTOP Systems**. A second inspection will be performed at completion of cable termination to validate that cables were dressed and terminated in accordance with TIA/EIA 568-C specifications for jacket removal and pair untwist, compliance with manufacturer's minimum bend radius, and that cable ends are dressed neatly and orderly. Note that these inspections are at a minimum. The Authority may choose to inspect work more frequently at its discretion.

4.17.2 Final Inspection

Upon completion of the project, the IMITFPC will perform a final inspection of the installed cabling system with the Contractor's Project Foreman. The final inspection will be performed to validate that all horizontal and backbone cables were installed as defined in the drawing package, and that the installation meets the aesthetic expectations of the Authority.

4.17.3 Test Verification

Upon receipt of the test documentation, See **Section 4.16 Low Voltage Certification Testing** the Authority reserves the right to perform spot testing of a representative sample of the cabling system to validate test results provided in the test document. Authority testing will use the same method employed by the Contractor, and minor variations will be allowed to account for differences in test equipment. If any significant discrepancies are found, the Contractor will be notified for immediate resolution.

4.17.4 System Performance

During the three week period between final inspection and delivery of the test and as-built documentation, the Authority will activate the cabling system. The Authority will validate operation of the cabling system during this period.

4.17.5 Final Acceptance

Completion of the following will constitute acceptance of the system:

- in-progress and final inspections;
- receipt of the test and as-built documentation;
- receipt of the installation permit number with an accompanying summary of the work performed within three weeks of completion;
- successful performance of the system for a two week period;

4.18 Warranty and Services

4.18.1 General

The Contractor shall provide a system warranty covering the installed cabling system against defects in workmanship, components, and performance, and follow-on support after project completion.

4.18.2 Installation Warranty

The Contractor shall warrant the cabling system against defects in workmanship for a period of one year from the date of system acceptance. The warranty shall cover all labour and materials necessary to correct a failed portion of the system and to demonstrate performance within the original installation specifications after repairs are accomplished. This warranty shall be provided at no additional cost to the Authority

5 ELECTRICAL SPECIFICATIONS

5.1 Grounding and Bonding

In accordance with Division 26 of the Project Agreement the facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential for acting as a current carrying conductor. The TBB shall be installed independent of the buildings electrical and building ground and shall be designed in accordance with the recommendations contained in the TIA/EIA-607 Telecommunications Bonding and Grounding Standard.

The EF in each building shall be equipped with a telecommunications main grounding bus bar (TMGB). Each EF, MCC, BCC, TR shall be provided with a telecommunications ground bus bar (TGB). The TMGB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.

5.2 Product Specifications

All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the EF, MCC, BCC, TR shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors. Where metallic panels attached to the rack do not have sufficient metal to metal contact to provide an adequate path to ground, they shall be bonded to the rack using a minimum #14 AWG copper conductor. The copper conductor size shall be upgraded based on the largest power conductor feeding any rack mount equipment. The conductor shall be continuous; attaching all isolated components in a daisy chain fashion from top to bottom and bonded to the rack using an appropriate compression connector.

All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape.

5.3 Ground System Installation

The TBB shall adhere to the recommendations of the TIA/EIA-607 standard, and shall be installed in accordance with best industry practices. Installation and termination of the main bonding conductor to the building service entrance ground, at a minimum, shall be performed by a licensed electrical contractor.

6 FIRESTOP SYSTEMS

6.1 General

Firestop systems provide an effective block for fire, heat, vapour, smoke and pressurized water streams. A firestop system is comprised of the:

- Item or items penetrating the fire rated structure;
- Opening in the structure and;
- Materials and assembly of the materials used to seal the penetrated structure.

Fire rated cable pathway devices shall be used for ALL low-voltage, video, data and voice cabling, optical fiber raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Such devices shall:

- Meet the hourly fire rating of fire rated wall and floor penetrated.
- Be tested for the surrounding construction and cable types involved
- Have pathways that are engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting, caulking, and re-splicing them.
- Be “Low-Maintenance”, low-maintenance is defined as; Limited action required by cabling technician to open and/or close pathway for cable moves, additions or changes, such as, but not limited to:
    - Opening or closing of doors
    - Spinning rings to open or close inner liner
    - Removal and or replacement of any material such as, but not limited to, fire stop caulk, putty, pillows, bags, foam muffins, foam blocks, or foam closures of any sort
- Where non-mechanical pathways must be utilized, such as sealing (caulking) around single or grouped conduits, provide products that upon curing do no re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction.
- Provide letter from manufacturer certifying compliance with this section.

6.2 Product Specifications

Firestop systems shall:

- Have ULC, cUL or cULus Systems permitting cable loads from; “Zero to 100% Visual Fill.” This requirement eliminates need for fill-ratio calculations to be made by cable technicians to ensure cable load is within maximum allowed by ULC, cUL or cULus System;
- Be approved by a qualified Professional Engineer (P.E.), licensed in British Columbia;
- Include a drawing showing the proposed fire stopped system, stamped by the P.E. provided to the IMITFPC prior to installing the firestop system(s);
- Include an adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed and;
- Be HILTI Fire stop speed sleeve CP 653 102mm (4in) for both wall and riser penetrations or;
- Be EZPath EZDP44S2 for wall and EZDP144FKS2 for riser penetrations.
  (See **Appendix 4 – Product Specification Sheets**)

6.3 Firestop System Installation

All firestop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cabling system acceptance. Where non-mechanical pathways must be utilized, such as sealing (caulking) around single or grouped conduits, provide products that upon curing do no re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction.

7 COMMISSIONING AND SYSTEMS INTEGRATION

7.1 Acceptance

The contractor is responsible for commissioning any systems installed. Commissioning includes the stand-alone system and any other system that is integrated to provide the Authority will a fully integrated infrastructure. A system must be certified, commissioned and demonstrated as a stand-alone system prior to being integrated with any other system.

For example if the scope of work includes the installation of a Nurse Call system that will be integrated with the Staff Communications system, each system must be commissioned independently prior to being commissioned as an integrated system.

End to end commissioning of the fully integrated system must be demonstrated to and accepted by the Authority's IMIT authorized technical representative prior to final acceptance being granted.

8 A/V MEETING AND CONFERENCE ROOM STANDARDS

The specifications in this section are for rooms that are constructed with studs and drywall. For rooms that are built using a modular wall system, such as DIRTT, in the main wall, instead of providing a 1200 mm x 1200 mm sheet of 19 mm plywood, provide a horizontal aluminum cross brace centered at 1720 mm AFF. Conduit inside the modular wall is also not required as long as a proper pathway is created free from insulation and other obstructions to use as a pathway for non-electrical cabling.

Final room layout, height and location of outlets and equipment will be determined in consultation with the Authority's IMITFPC and Video Conference Analyst.

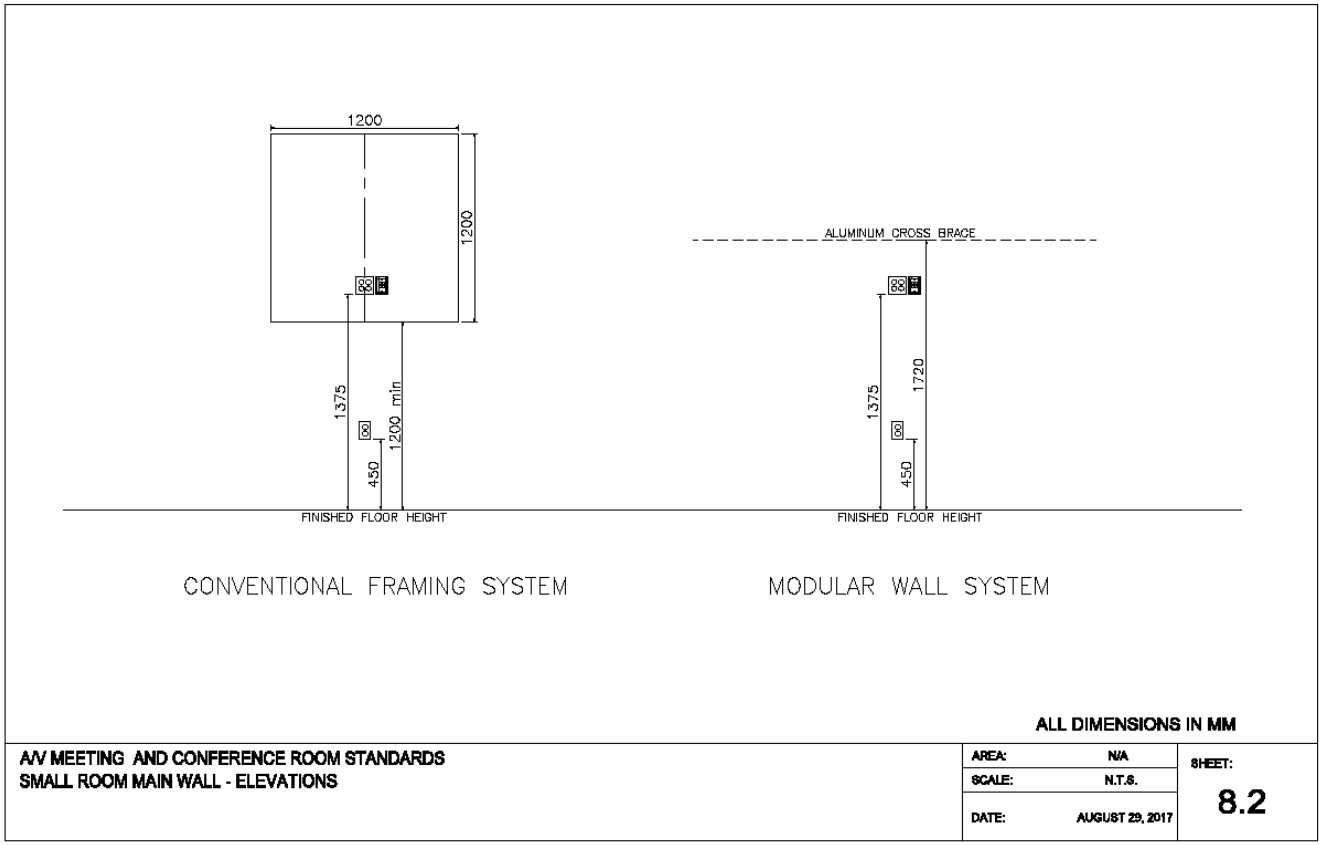
Drawings have been included as a pictorial reference and guide when designing the main wall and communications infrastructure requirements for small, medium and large rooms. These are subject to change and are to be used as a reference only.

8.1 Telehealth Rooms

- The following requirements must support a monitor that will be wheeled in to the room on a cart
    - Indirect lighting
    - Three allocated data ports in one Telecommunication Outlet designated for Telehealth.

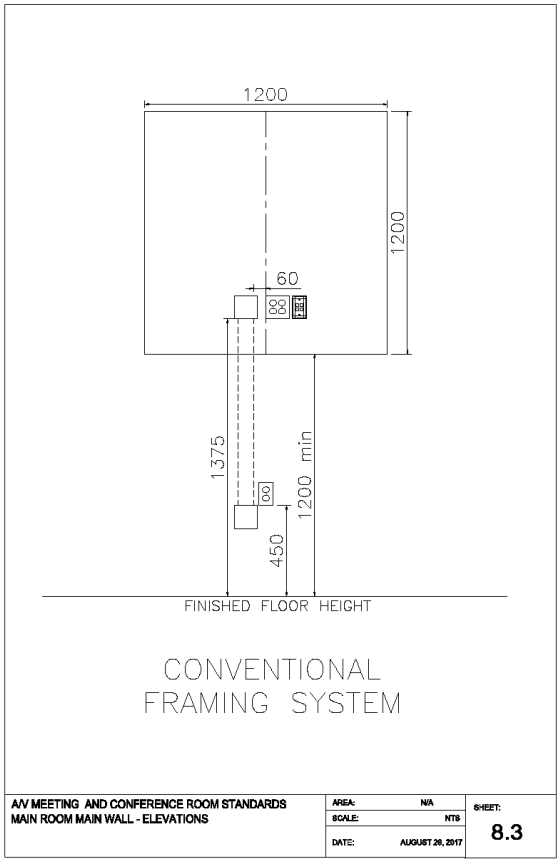
8.2 Small Room

- Provide one electrical duplex outlet on each of the walls at a height of 450 mm above finished floor (AFF).
- Main wall will be chosen by the Authority's IMITFPC or Video Conference (V/C) Analyst. The main wall in a small room is generally on the wall opposite the entrance.
- On the main wall:
    - In between studs, provide a 1200 mm x 1200 mm sheet of 19mm plywood in the center of the main wall to be used as backing for a wall mounted television. The lowest edge of this backing is to be no lower than 1200 mm AFF.
    - Provide one telecommunications outlet with two data and one coaxial outlet and two electrical duplex outlets at a height of 1375 mm AFF in recessed wall plates centrally located in the main wall.



8.3 Medium Room

- Main wall will be chosen by the Authority's IMITFPC or V/C Analyst where 'center of screen' will be determined.
- Provide two electrical duplex outlets on each of the walls, other than the main wall, at a height of 450 mm above finished floor (AFF).
- On the main wall:
    - At center of the screen provide:
        - A 1200 mm x 1200 mm sheet of 19mm plywood to be used as backing for a television. The lowest edge of this backing is to be no lower than 1200 mm AFF.
        - One telecommunications outlet with three data and one coaxial outlet and two electrical duplex outlets at a height of 1375 mm AFF in recessed wall plates.
    - Provide an 'in-wall' 78 mm conduit vertical pathway that begins at 60 mm to the left of center of screen placed at a height of 1375 mm AFF ending at 450 mm AFF with appropriate flush mounted access. .
- Provide an in-slab 78 mm conduit horizontal pathway from the floor mounted low voltage service box to the main wall with a soft 90 bend up vertically to connect into the vertical pathway at 450 mm AFF as per the previous bullet.
- This pathway will be used for video/audio cables that will run from the wall mounted television location down to a wall plate, and will also extend to the floor mounted box in the center of the room.
- In the center of the room, or other designated area once furniture and room layout has been determined, provide a telecommunications outlet with four data drops and two electrical duplex outlets flush floor mounted. These outlets are to be covered by a 250 mm or 300 mm round plate.
- Provide fluorescent indirect lighting on two separate switches designed so that lights within 1200 mm of the main wall can be switched off while other lighting that lights the table and the remainder of the medium sized room can remain lit. Pot lights are not acceptable in this room.
- All windows must have total black out curtains or blinds.
- Wall paint to be flat finished in a blue or green medium tone.



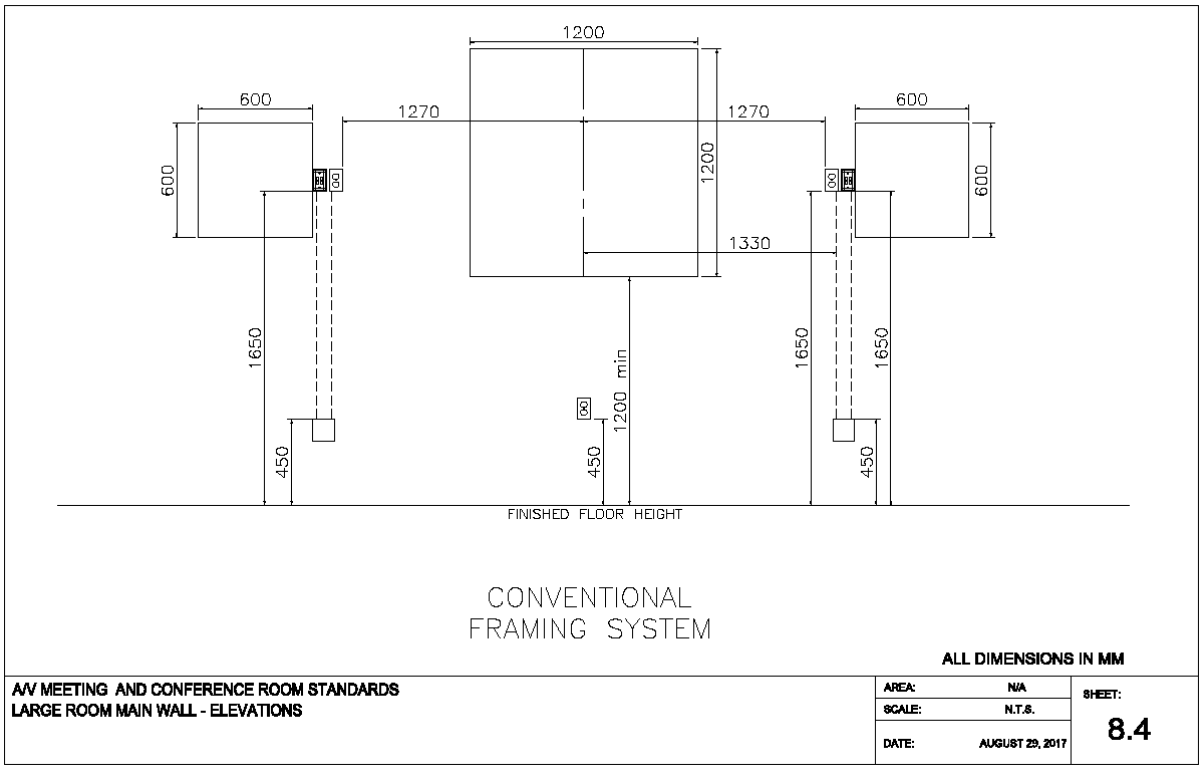
8.4 Large Room (with wall mounted television)

- Main wall will be chosen by the Authority's IMITFPC or V/C Analyst where 'center of screen' will be determined.
- Provide two electrical duplex outlets on each of the walls, other than the main wall, at a height of 450 mm AFF at approximately 3650 mm intervals.
- On the main wall:
    - At center of screen provide:
        - A 1200 mm x 1200 mm sheet of 19 mm (3/4") plywood to be used as backing for a television. The lowest edge of this backing is to be no lower than 1200 mm AFF.
        - One telecommunications outlet with two data and one coaxial outlet and one electrical duplex outlet at a height of 1375 mm AFF in recessed wall plates.
    - Provide one telecommunications outlet with two data drops and one electrical duplex outlet at a height of 1650 mm AFF in recessed wall plates at 1270 mm from center of screen (either left or right).
    - In between studs at this location (1270 mm from center of screen) provide a 600 mm x 600 mm sheet of 19 mm (3/4") plywood to be used as backing for mounting of a shelf for video conferencing equipment.
    - Provide an in wall 78 mm conduit vertical pathway that begins at 1330 mm left or right of the center of screen at a height of 450 mm AFF and proceeds vertically to a point 1650 mm AFF with appropriate flush mounted access.
- Provide an in slab 78 mm conduit horizontal pathway with pull cord from the floor mounted, centrally located, low voltage service box to the main wall with a soft 90 bend up vertically to connect into the vertical pathway at 450 mm AFF 1330 mm left or right of the center of screen as per previous bullet.
- This pathway will be used for video/audio cables that will run from the wall mounted television location down to a wall plate, and will also extend to the floor mounted box in the center of the room. This pathway is not to be used for any horizontal cabling.

- In the center of the room, or other designated area once furniture and room layout has been determined, provide one telecommunications outlet with four data drops and two electrical duplex outlets flush floor mounted. These outlets are to be covered by a 250 mm or 300 mm round plate.
- Provide paired lighting in the room so that there is no single bank of lights. This room will be designed to accommodate a centrally located ceiling mounted projector thus all lighting must be located on either side of the center of the room.
- All lighting must be on multiple switches designed so that lights within 2400 mm of the main wall can be switched off while other lighting that lights the table and the remainder of the large room can remain lit.
- All windows must have total black out curtains or blinds.
- Wall paint to be flat finished in a blue or green medium tone.

8.5 Large Room (with ceiling mounted projector)

- In addition to the specifications indicated in Section 8.4 provide:
    - In the plenum, a 450 mm by 450 mm sheet of 19 mm (3/4") plywood mounted 300 mm above the dropped ceiling for a ceiling mounted projector. The front edge of the plywood will be 3810 mm from the main wall and will be centered to the screen location or centrally located from each of the side walls and within 1200 mm of the center line of the room. Ensure the ceiling tile below does not have any fixtures of any sort (vent, light, duct, sprinkler, etc.)
    - On the back corner of the plywood, a quad power outlet and one telecommunications outlet with one allocated data port and one coaxial output.
    - In the plenum, a 78 mm conduit horizontal pathway with pull cord from the edge of the ceiling mounted plywood to the main wall with a soft 90 bend down vertically to connect into the vertical pathway at 1650 mm AFF as a continuation of the pathway provided in the last bullet on page 24, Section 8.4.



9 CABLE MANAGEMENT AND DESKTOP PLACEMENT GUIDELINES

9.1 Communication Room Guidelines

- New stackable switch configurations will use a short patch strategy. This is where the switch is located adjacent to the patch and will use 300 mm or 600 mm patch cables to patch ports below or above the switch to reduce blocking uplink lights. The stacked switches will patch below the switch as the uplink ports are at the top. Avoid crossing patch cables if possible. If the port density of the patched ports exceeds the number of ports on the switch use the long patch method to another switch on the rack.
- Long patch cables should not be managed with velcro in the vertical cable manager.
- Patch cables must be installed in such a way that they do not block access to switch modules or other equipment.
- CAT 6A patch cables shall be the minimum standard, and patch cable colours for cables being added shall be consistent with existing patch cable colours.
- Patch cables longer than 600 mm shall have uniquely identifying numbers to trace cables. A master cable spreadsheet must be made and maintained to track and assign cable numbers.
- Patch cables should be of a uniform length, with extra slack neatly tucked into the vertical cable management. Slack should not be stored in horizontal cable managers.
- Where possible, cables from the right side of a patch panel should be routed through vertical cable managers to the right side of the network switch. In cases where a cable must be routed from one side of a rack to the opposite side, the cable must run through horizontal cable management (at the top or bottom of the rack) to reach the other side of the equipment.
    - In essence, a cable plugged into the left half of a switch or patch panel must approach from the left side. A cable plugged into the right half of a switch or patch panel must approach from the right side.
- **Do not** fasten copper patch cables to fiber patch cables, and do not cause physical stress to fiber patch cables.
- Where bundles of patch cables are already in place and new cables are added, fasteners should be removed and cables should be re-bundled into appropriately size bundles.

9.2 Desktop Guidelines

- Ensure cables are tidily bundled together in a manner that does not interfere with users ability to use the workspace
- Secure cables in a manner that raises them off the floor and does not interfere with users ability to use the workspace. Cables must be attached to the desk or millwork as required. (**NO CABLES ON THE FLOOR**)
- **Ultra-slim desktop (USDT) PCs** can be placed under the monitor or beside/behind monitor; use stand if feasible. PC should be no farther than 5ft from monitor, keyboard, and mouse.
- **Small form factor (SFF) PCs** can be placed under the monitor or beside the monitor use desktop stand if feasible. PC should be no farther than 5ft from monitor, keyboard, and mouse.
- **Tower PCs** should be placed beside or behind the monitor if a mounting solution is not used. If mounting is required, then optimal mounting positions are within 5ft of monitor, keyboard, and mouse while being out of the way of user's ability to use the workspace.

10 FINAL ACCEPTANCE

10.1 System As-Built Drawings

The installation contractor will be provided with two sets of drawings at the start of the project. One set will be designated as the central location to document all as-built information as it occurs throughout the project. The central set will be maintained by the Contractor's Foreman on a daily basis, and will be available to the Authority's Technical Representative upon request during the course of the project. Anticipated variations from the build-to drawings may be for such things as cable routing and

actual outlet placement. No variations will be allowed to the planned termination positions of horizontal and backbone cables, and grounding conductors unless approved in writing by the Authority.

The Contractor shall provide the central drawing set to the Authority at the conclusion of the project. The marked up drawing set will accurately depict the as-built status of the system including termination locations, cable routing, and all administration labelling for the cabling system. In addition, a narrative will be provided that describes any areas of difficulty encountered during the installation that could potentially cause problems to the communications system.

10.2 Sign off

The Authority's IMITFPC will not provide sign-off on the work unless all sections of this document, as applicable, have been achieved to the satisfaction of the IMITFPC.

11 PREFERRED VENDORS

For a complete list of current Authority IMIT pre-approved vendors, or vendors that currently have a service level agreement with the authority please refer to **Appendix 3 – Current Technologies** or contact the Authority's IMITFPC via email at IMITFPC@interiorhealth.ca.

APPENDIX 1 – ACRONYMS & ABBREVIATIONS

ACR	Attenuation to Cross-talk Ratio
AFF	Above Finished Floor
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ATM	Asynchronous Transfer Mode
AUI	Attachment Unit Interface
AWG	American Wire Gauge
BCC	Back up Cross Connect
BICSI	Building Industry Consulting Service International
BIX	Building Industry Cross-connect
CEC	Canadian Electrical Code
CSA	Canadian Standards Association
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
dB	decibel
EF	entrance facility
EIA	Electronic Industries Association
EMI	electro-magnetic interference
EMT	electrical metallic tubing
ER	equipment room
Ethernet	Precursor to, and almost identical with, the IEEE802.3 standard
ft	foot
HC	horizontal cross-connect
HDPEI	High Density Polyethylene Innerduct
HVAC	heating, ventilation, and air conditioning
Hz	hertz
IC	intermediate cross-connect
IEEE	Institute of Electrical and Electronics Engineers
IMIT	Information Management Information Technology
IMITFPC	Information Management Information Technology Facilities Project Coordinator
in	inches
ISO	International Organization for Standardization
ITU	International Telecommunications Union - Telecommunications Standardization Section
kHz	kilohertz
km	kilometer
LAN	local area network
LED	light emitting diode
m	meter
MAC	Moves, Adds, Changes with respect to telecommunications
MBS	megabits per second

MCC	main cross-connect
MHz	megahertz
MMFO	Multi-Mode Fiber Optic
mm	Millimeter
NEC	National Electrical Code (US)
NOC	Network Operations Centre
NEMA	National Electrical Manufacturers Association
NI	Network Interface
NIR	Near End Crosstalk-to-Insertion Loss Ratio
NIST	National Institute of Standards and Technology
nm	Nanometer
NRZ	Non Return to Zero
NTS	The Authorities Networks and Telecommunications Department
PBX	Private Branch Exchange
P.E.	Professional Engineer
PVC	Polyvinyl Chloride
RFI	Radio Frequency Interference
SF	Square Feet
SMFO	Single-Mode Fiber Optic
STP	Shielded Twisted Pair
SqM	Square Meters
TC	Telecommunications Closet
TIA	Telecommunications Industry Association
TO	Telecommunications Outlet
TR	Telecommunications Room
UTP	Unshielded Twisted Pair
UL	Underwriters Laboratories, Inc.
VoIP	Voice Over Internet Protocol
WAN	Wide Area Network
X	Cross-connect

APPENDIX 2 – DEFINITIONS

In this document, the words "will", "shall" and "must" denote absolute requirements. Also, the following definitions apply:

allocated data port or data jack: A CAT6A cable that has been installed tested and certified with proper terminations at both the field and head ends that can be patched into a provisioned switch port in the same rack in the communication room without the need for additional infrastructure.

adapter: a device that enables any or all of the following:

a) different sizes or types of plugs to mate with one another or to fit into a telecommunications outlet/connector;
b) the rearrangement of leads;
c) large cables with numerous wires fanning out to smaller groups of wires;
d) Interconnection between cables.

administration: The method for labelling, identification, documentation and usage needed to implement moves, additions, and changes of the telecommunications and low voltage cabling infrastructure

authority: The Health Authority, Interior Health, the owner, IHA.

backbone: a facility (i.e. pathway, cable, or conductors) between telecommunications closets, or floor distribution terminals, the entrance facilities, and the equipment rooms within or between buildings.

BIX block: a type of punch block used to connect sets of CAT 3, 5e, or 6 wires in a structured cabling system for telephony

bonding: a low impedance path obtained by permanently joining all non-current-carrying metal parts to assure electrical continuity and having the capacity to conduct safely any current likely to be imposed on it.

building code: the most current issue of the British Columbia building code, local by-laws and amendments issued by other authorities having jurisdiction.

cable: an assembly of one or more conductors or optical fibers with an enveloping sheath, constructed so as to permit use of the conductors singly or in groups.

cable sheath: a covering over the conductor assembly that may include one or more metallic members, strength members, or jackets.

cable tray: a type of raceway

cabling: a combination of all cables, wire, cords, and connecting hardware.

campus: the building and grounds of a complex; i.e., a university, college, industrial park, government establishment, or military establishment.

channel: the end-to-end transmission path between two points at which application-specific equipment is connected.

coax: electrical cable with an inner conductor surrounded by a tubular insulating layer typically of a flexible material covered with a thin insulating layer on the outside**.**

CommScope AMP NetConnect: Formerly Tyco Electronics, AMP

conduit: a raceway of circular cross-section of the type permitted under the electrical code and this Profile. Includes EMT (electrical-metallic tubing) conduit.

connecting hardware: a device providing mechanical cable terminations.

consolidation point: a location for interconnection between horizontal cables that extend from building pathways, and horizontal cables that extends into work area pathways.

cord, telecommunications: a cable using stranded conductors for flexibility, as in distribution cords or line cords.

cross-connect: a facility enabling the termination of cable elements and their interconnection, and/or cross-connection, primarily by means of a patch cord or jumper.

cross-connection: a connection scheme between cabling runs, subsystems, and equipment using patch cords or jumpers that attach to connecting hardware on each end.

customer premises: building(s) with grounds and belongings under the control of the customer.

Data Communications Cabling System: the cable used to connect data network devices together (copper and fiber), as well as termination hardware, cable support systems, and communications rooms.

demarcation point: a point where the operational control, or ownership changes.

device (as related to a workstation): an item such as a telephone, computer, graphic or video terminal.

distribution frame: a structure with terminations for connecting the permanent cabling of a facility in such a manner that inter-connection or cross-connections may readily be made.

duct:

a) a single enclosed raceway for wires or cables. See also conduit, raceway;
b) a single enclosed raceway for wires or cables usually buried in soil or concrete;
c) an enclosure in which air is moved. Generally part of the HVAC system of a building.

Electrical code: the most current edition of the Canadian Electrical Code, BC amendments, Safety Standards, local by-laws and amendments issued by other authorities having jurisdiction.

entrance facility, telecommunications: an entrance to a building for both public and private network service cables (including antennae) including the entrance point at the building wall and continuing to the entrance room or space.

entrance point, telecommunications: the point of emergence of telecommunications conductors through an exterior wall, a concrete floor slab, or from a rigid metal conduit or intermediate metal conduit.

entrance room or space, telecommunications: a space in which the joining of inter- or intra-building telecommunications backbone facilities takes place. An entrance room may also serve as an equipment room.

equipment cable (cord): a cable or cable assembly used to connect telecommunications equipment to horizontal or backbone cabling.

equipment room, telecommunications: a centralized space for telecommunications equipment that serves the occupants of the building. An equipment room is considered distinct from a telecommunications closet because of the nature or complexity of the equipment.

ground: a connection to earth obtained by a grounding electrode.

headwall outlet: consists of 3 faceplates.

a) one *patient monitoring outlet* mounted at approximately 2000 AFF on the nurse side of the headwall,
b) one faceplate mounted in the headwall (usually at 1150 AFF) with one *allocated* black CAT 6/6A data port in the top left port, others left blank, on the nurse side near the electrical outlets and
c) one faceplate mounted horizontally inline with b) with 2 *allocated* black CAT6A ports, others left blank on the non-nurse side of the headwall, near the electrical outlets.

HDPEI: a corrugated, flexible duct, typically of 1 to 3" diameter, made of High Density Polyethylene used to protect fiber optic cabling.

horizontal cabling: the cabling between, and including, the telecommunications outlet/connector and the horizontal cross-connect.

horizontal cross-connect: a cross-connect of horizontal cabling to other cabling, i.e., horizontal, backbone, or equipment.

hybrid cable: an assembly of two or more cables (of the same, or different types or categories) covered by one overall sheath.

install: synonymous with provide

Interior Health, **IHA**, **IH** and **owner:** refer to the Authority.

infrastructure, telecommunications: a collection of those telecommunications components, excluding equipment, that together provides the basic support for distribution of all information within a building or campus.

interconnection: a connection scheme that provides for the direct connection of a cable to another cable or to an equipment cable without a patch cord or jumper.

intermediate cross-connect: a cross-connect between first level and second level backbone cabling.

jumper: an assembly of twisted wires without connectors, used to join telecommunications circuits/links at the cross-connect.

keying: the mechanical feature of a connector system that guarantees correct orientation of a connection, or prevents the connection to a jack, or to an optical fiber adapter of the same type intended for another purpose.

link: a transmission path between two points, not including terminal equipment, work area cables, and equipment cables.

main cross-connect: a cross-connect for first level backbone cables, entrance cables, and equipment cables.

media, telecommunications: wire, cable, or conductors use for telecommunications

modular jack: a telecommunications female connector. A modular jack may be keyed or unkeyed, and may have six or eight contact positions, but not all positions need to be equipped with jack contacts.

modular plug: a telecommunications male connector for wire or cords. A modular plug may be keyed or unkeyed, and may have six or eight contact positions, but not all the positions need be equipped with contacts.

multimode optical fiber: an optical fiber that will allow many bound modes to propagate. The fiber may be graded-index or step-index fiber. See, also, optical fiber cable.

multi-media telecommunications outlet assembly: a grouping in one location of several telecommunications outlets/connectors.

NTS: Interior Health Authority's Networks and Telecommunications department

open office: a floor space division provided by furniture, movable partitions, or other means, instead of building walls.

optical fiber cable: an assembly of one or more optical fibers.

optical fiber duplex connector: a mechanical media termination device designed to transfer optical power between two pairs of optical fibers.

outlet box, telecommunications: a metallic or non-metallic deep box mounted within a wall, floor, or ceiling, used to hold telecommunications outlet/connectors, or transition devices.
outlet/connector, telecommunications: a connecting device in the work area, on which the horizontal cable terminates.

patch cord: a length of cable with connectors on one or both ends used to join telecommunications circuits/links at the cross-connect.

patch panel: a cross-connect system of mateable connectors that facilitates administration.

patient infotainment/entertainment outlet: a 4-port faceplate. Top left port is populated with an allocated blue CAT 6/6A data port, top right is populated with a RG-6 coax connection, bottom left is reserved for nurse call connection in patient rooms, left blank in non-patient rooms, bottom right is left blank.

patient monitoring outlet: a 4-port faceplate. Top 2 ports are populated with red *allocated* CAT 6/6A ports, bottom 2 ports are left blank for future.

pathway: a facility for the placement of telecommunications cable.

premise: the facilities, leased or owned by the Authority, where Work is to be performed.

Prime Consultant, **Contractor**, and **Bidder**: the individual, sole proprietorship, partnership or corporation responsible for delivery of the project or Work and/or written authority to do Work.

provide: to supply and install.

pull strength: see pull tension.

pull tension: the pulling force that can be applied to a cable without affecting specified characteristics of the cable.

raceway: any channel designed for holding wires, cables, or busbars, and, unless otherwise qualified in the rules of the CE Code, the term includes conduit (rigid and flexible, metallic and non-metallic), electrical metallic and non-metallic tubing, under floor raceways, cellular floors, surface raceways, wireways, cable trays, busways, and auxiliary gutters.

riser: the pathway to link multiple communication rooms, closets, satellites, and/or floors.

single-mode optical fiber: an optical fiber that will allow only one mode to propagate; such fiber is typically a step-index fiber.

site: synonymous with Premise.

space, telecommunications: an area used to house the installation and termination of telecommunications equipment and cable, i.e., telecommunications closets, work areas, and access holes/handholes.

splice: a joining of conductors, meant to be permanent, generally from different sheaths.

splice closure: a device used to protect a cable or wire splice.

star topology: a topology in which each telecommunications outlet/connector is directly cabled to the distribution device.

supply: means supply only; no other material or labour cost is involved.

switch port: An active port on a network switch in the MCC, BCC, or TR that can be connected to a data jack to change the status of a data jack from unallocated to allocated.

telecommunications: any transmission, emission, or reception of signs, signals, writings, images, and sounds, that is information of any nature by cable, radio, optical, or other electromagnetic systems.

telecommunications closet: 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.

telecommunications grounding busbar: a common point of connection for the telecommunications system and bonding to ground; located in the telecommunications closet or equipment room.

telecommunications outlet: a 4-port faceplate. Top 2 ports are populated with black *allocated* CAT 6/6A ports, bottom left port is populated with black *unallocated* CAT 6/6A port, and bottom right port is left blank for future.

terminal:

a) a point at which information may enter or leave a communications network; or
b) the input-output associated equipment; or
c) a device by means of which wires may be connected to each other.

topology: the physical or logical arrangement of a telecommunications system.

unallocated data port or data jack: A CAT6A cable that has been installed, tested and certified with proper terminations at both the field and head ends and does not have a provisioned network switch port in the same rack in the communications room, but has the ability to become active if required post substantial completion and/or construction.

work: means the furnishings of all labour, material and equipment to perform the services described in this document.

work area (work station): a building space where the occupants interact with a workstation device(s).

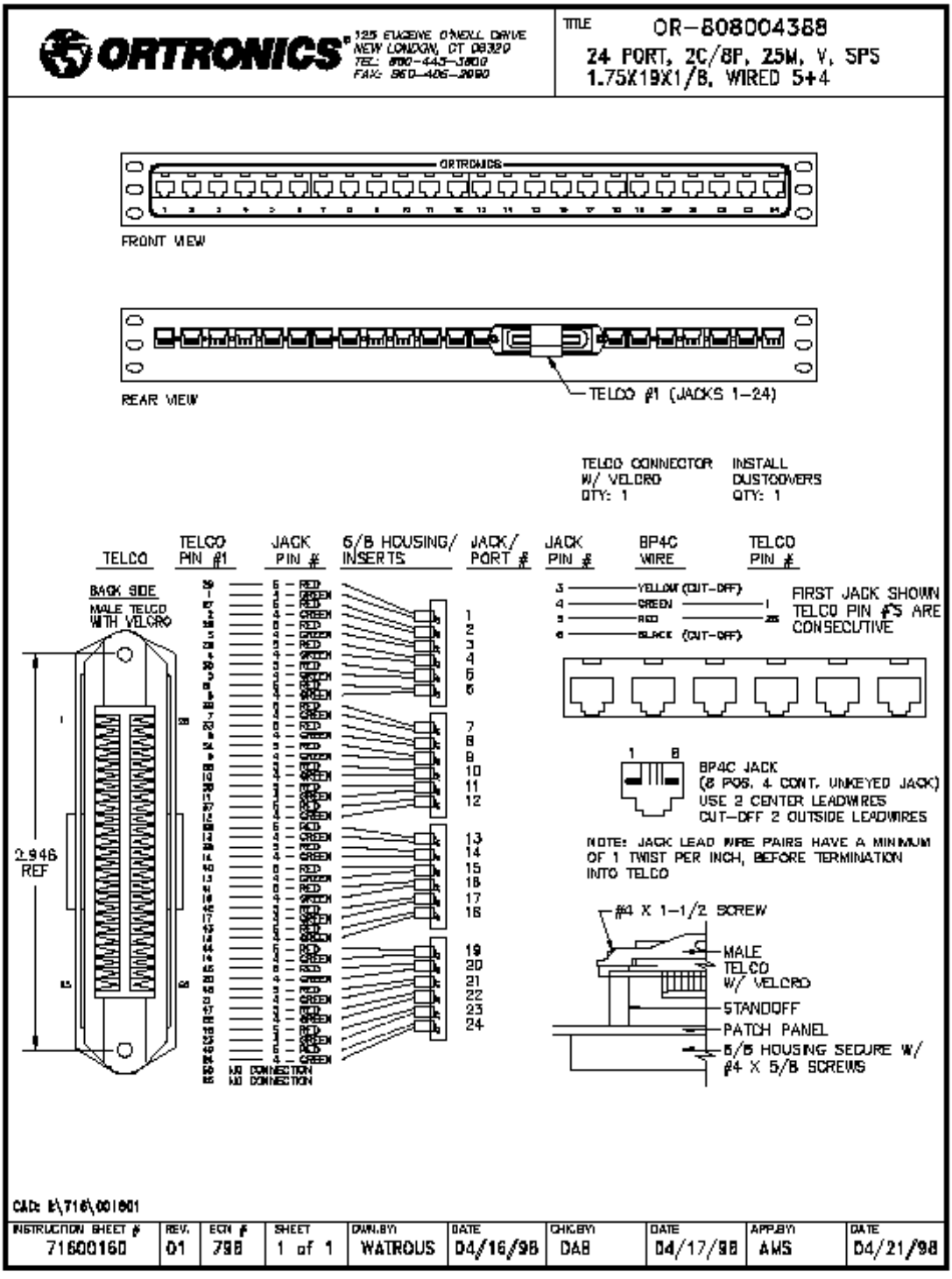
work area cable (cord): a cable assembly connecting the telecommunications outlet/connector with the terminal equipment.

Zoned Cabling: multiple cables of the same length terminating at a central transfer point for distribution to individual workstation locations.

APPENDIX 3 – CURRENT TECHNOLOGIES

Technology	Manufacturer	Vendor
Cable Infrastructure	COMMSCOPE AMP NETCONNECT	Any CommScope AMP NetConnect Certified Retailer
Security	Lenel	Chubb
Asset Tracking	Ekahau	Ekahau
Infant Abduction	HUGS	Terracom Systems
Clock System	Simplex	Simplex
Phone System	Avaya/Cisco	Telus
Network Switches	Hewlett-Packard	Various
Wireless	Cisco	Telus
Staff to Staff Communication	Vocera	Vocera
Nurse Call	Rauland	Terracom Systems
Nurse Call (PRH Campus)	Ascom	Houle
Patient Entertainment		Hospitality Networks
Patient Monitoring	Space Labs	Space Labs
Health Care Information System	Meditech	Connex
PACS	McKesson	McKesson Horizon
Desktop Computers/Laptops	Lenovo	IBM

APPENDIX 4 – PRODUCT SPECIFICATION SHEETS



Data Sheet

Cisco 5520 Wireless Controller

Optimized for 802.11ac Wave2 performance, the intent-driven Cisco DNA™ ready Cisco® 5520 Wireless Controller is a highly scalable, service-rich, resilient, and flexible platform that enables next-generation wireless networks for medium-sized to large enterprise campus and branch deployments.

Product Overview

The Cisco 5520 Wireless Controller provides centralized control, management, and troubleshooting for high-scale deployments in service provider and large campus deployments. It offers flexibility to support multiple deployment modes in the same controller: for example, centralized mode for campus, Cisco FlexConnect™ mode for lean branches managed over the WAN, and mesh (bridge) mode for deployments where full Ethernet cabling is unavailable. As a component of the Cisco Unified Wireless Network, this controller provides real-time communications between Cisco Aironet® access points, the Cisco Prime® Infrastructure, and the Cisco Mobility Services Engine, and is interoperable with other Cisco controllers.

The Cisco Digital Network Architecture (Cisco DNA) is an open and extensible, software-driven architecture that accelerates and simplifies your enterprise network operations. The programmable architecture frees your IT staff from time-consuming, repetitive network configuration tasks so they can focus instead on innovation that positively transforms your business. SD-Access, as part of Cisco DNA, enables policy-based automation from edge to cloud with foundational capabilities. Cisco DNA Assurance, also part of Cisco DNA, provides a single source to monitor, modify, and manage your network and application data.

Figure 1. Cisco 5520 Wireless Controller

Features and Benefits

The Cisco 5520 Wireless Controller, optimized for 802.11ac Wave2 performance, high scale, and enhanced system uptime, supports:

- Intent-driven programmability and streaming telemetry.
- Subsecond access point and client failover for uninterrupted application availability.
- Extraordinary visibility into application traffic, using Cisco Application Visibility and Control (AVC), the technology that includes the Network-Based Application Recognition 2 (NBAR2) engine, Cisco's Deep Packet Inspection (DPI) capability. This allows to mark, prioritize, and block to conserve network bandwidth and enhance security. Customers can optionally export the flows to Cisco Prime Infrastructure or a third-party NetFlow collector.

Product Specifications

COMMSCOPE®

1375292-1

RJ45 Patch Panel Modular Assembly, RJ45, unshielded, unloaded, 48-port

Configuration Features

Custom Configurable	Yes
Front Connector Type	RJ45
Port Capacity	48
Preloaded	No

Dimensions

Height	88.900 mm | 3.500 in
Rack Width	482.60 mm | 19.00 in

Mechanical Attachment

Mounting Style	Rack-Mount

Operation/Application

Accepts	SL Series Inserts
AMPTRAC Enabled	No

Other

UCP Product	No

Product Availability

Region	Asia | Latin America | North America

Product Type Features

Product Type	Patch Panel
System	AMP NETCONNECT
Panel Type	Unloaded Patch Panel
Product Category	RJ45 Patch Panel
Rack Units	2.0
Profile	Flat
Rack-Mounted	Yes
Shielded	No

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant

Ordering information

SD panels

Material ID	Product Code	Description
760231449	SD-1U	SD 1U sliding fiber panel, accepts (3) SD splice cassettes or ReadyPATCH MPO-LC modules, providing up to 36 duplex LC ports or up to 24 MPO ports
760231456	SD-2U	SD 2U sliding fiber panel, accepts (6) SD splice cassettes or ReadyPATCH MPO-LC modules, providing up to 72 duplex LC ports or up to 48 MPO ports
760231464	SD-4U	HD 4U sliding fiber panel, accepts (12) SD splice cassettes or ReadyPATCH MPO-LC modules, providing up to 144 duplex LC ports or up to 96 MPO ports
760231472	SD-1U-FX	SD 1U fixed fiber panel, accepts (3) SD splice cassettes or ReadyPATCH MPO-LC modules, providing up to 36 duplex LC ports or up to 24 MPO ports
760231480	SD-2U-FX	SD 2U fixed fiber panel, accepts (6) SD splice cassettes or ReadyPATCH MPO-LC modules, providing up to 72 duplex LC ports or up to 48 MPO ports
760231498	SD-4U-FX	SD 4U fixed fiber panel, accepts (12) SD splice cassettes or ReadyPATCH MPO-LC modules, providing up to 144 duplex LC ports or up to 96 MPO ports

SD Splice Cassette

New Material ID	Product Code	Description
760221739	PNL-CS-12LCX-PT	Splicing cassette, 12 LC LazrSPEED, 900µm
760221747	PNL-CS-12LCW-PT	Splicing cassette, 12 LC TeraSPEED, 900µm
760221697	PNL-CS-24LCX-PT	Splicing cassette, 24 LC LazrSPEED, 900µm
760221705	PNL-CS-24LCW-PT	Splicing cassette, 24 LC TeraSPEED, 900µm
760221770	PNL-CS-12SCX-PT	Splicing cassette, 12 SC LazrSPEED, 900µm
760221788	PNL-CS-12SCW-PT	Splicing cassette, 12 SC TeraSPEED, 900µm

PRODUCT DATA SHEET

EZ-PATH® SERIES 44+ FIRE RATED PATHWAY

APPLICATIONS

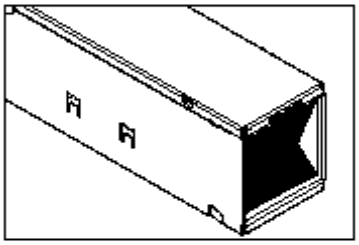
EZ-PATH® Series 44+ Fire Rated Pathway is designed for easy installation in floors and walls. Tested and approved cable capacities range from 0 to 100% visual fill. EZ-PATH® Series 44+ Fire Rated Pathway when installed with available single wall plates is designed for new cable installations. In these installations, the device does not require mechanical attachment to either the wall or the wall framing and must be installed after the wallboard has been installed. Split floor plates and multi-gang wall and floor brackets permit installation around previously installed cables if so desired. These installations require mechanical attachment to the barrier. A list of available accessories along with their intended use is shown on page 2 under available components.

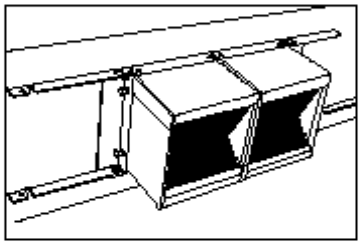
EZ-PATH® Series 44+ Fire Rated Pathway Fire Rated Pathway provides exceptional cable capacity. A single unit installed in a wall exceeds the cable carrying capacity of a 6" (152 mm) sleeve utilizing typical putty firestop systems (35% cable loading). Multiple ganged pathways utilizing available wall bracket kits provide additional capacity or segregation of cables by use, type, installer or vendor as desired.

PRODUCT DESCRIPTION

The EZ-PATH® Series 44+ Fire Rated Pathway is a pathway device designed to allow cables to penetrate fire-rated walls and floors without the need for firestopping. This device features a built-in fire and smoke sealing system that automatically adjusts to the amount of cables installed. Once installed in a fire barrier, cables can be easily added or removed at any time without the need to remove or reinstall firestopping materials.

The EZ-PATH® Series 44+ Fire Rated Pathway consists of an enclosed heavy gauge galvanized steel pathway lined with intumescent material engineered for rapid expansion when exposed to fire or high temperatures, quickly sealing the pathway and preventing the passage of flames and smoke. EZ-PATH® Series 44+ Fire Rated Pathway is painted safety orange for easy identification. Its compact square profile allows a maximum number of cables to be installed in a relatively small area. The pathway measures approximately 4" x 4 5/8" and is 14" long (102 x 118 x 356 mm) and can be increased by 6" (152mm) for every Series 44+ Extension module (EZD44ES) installed..





PERFORMANCE

EZ-Path® Series 44+ Fire Rated Pathway is UL Tested and Classified in accordance with ASTM E814 (UL1479) & CAN/ULC-S115. Systems are available for common floor and wall constructions with ratings up to and including 4 hours.

FEATURES & BENEFITS

- Easy to install.
- No firestopping required.
- Firestopped at all stages of use.
- UL Tested - Low Leakage!
- Acoustically Tested
- UL Classified for the complete range of its capacity.
- Interlocking design for easy gang installations.
- Permits cable segregation by use, type, vendor.
- More than TWICE the capacity of Standard EZ-Path 33.

SPECIFICATIONS

All data, video, and communications cable bundles shall utilize an enclosed fire rated pathway device wherever said cables penetrate rated walls and floors. The fire-rated pathway shall contain a built-in fire sealing system sufficient to maintain the hourly fire rating of the barrier being penetrated. The self-contained sealing system shall automatically adjust to the installed cable loading and shall permit cables to be installed, removed, or retrofitted without the need to remove or reinstall firestop materials. The pathway shall be UL Classified and/or FM Systems Approved and tested to the requirements of ASTM E814 (UL1479) & CAN/ULC-S115.

SPECIFIED DIVISIONS

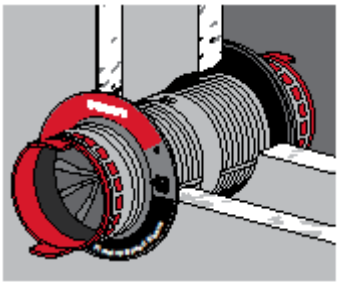
DIV. 7	07 84 00	Penetration Firestopping
DIV. 26	26 00 00	Electrical
DIV. 27	27 00 00	Communications

FIRESTOP DEVICE CERTIFIED FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS SEE UL ONLINE CERTIFICATIONS DIRECTORY.

INSTALLATION INSTRUCTIONS

EZ-Path® Series 44+ Fire Rated Pathway is designed for use in all common constructions. Single pathways and mounting hardware may be purchased separately or in complete kits. For multi-gang installations, pathways and appropriate mounting hardware must be purchased separately. Single pathways may be installed in either square or round openings. Ganged pathways are designed to be installed in either square or rectangular openings appropriately sized for the number of units desired (See Installation Instructions). In gypsum board walls where pathways are ganged, wall plates must be secured to the wall's internal studs.

SPEED SLEEVE CP 653



Product description
- Re-penetrable cable management device for electrical and telecom professionals

Product features
- Fast installation
- Easy penetration and re-penetration
- industry's best "Air Movement" ratings
- Low L-ratings
- Withstands the rigors of usage and time
- Can be installed in wall and floor applications
- Buy American Compliant
- May be "ganged" together

Areas of application
- Cable and cable bundles

For use with
- Concrete floor rated up to 3 hours
- Gypsum walls rated up to 4 hours

Examples
- Electrical wiring
- Premise wiring
- Low voltage and datacom

Installation instructions
- See Hilti Literature or third-party listings for complete application and installation details

Technical Data

	2" (50 mm)	4" (102 mm)
OD (device only)	2.3" (60 mm)	4.3" (110 mm)
OD (flange)	4.7" (120 mm)	6.7" (170 mm)
ID	1.7" (48 mm)	3.6" (92 mm)
Total length	12.4" (315 mm)	12.4" (315 mm)
Weight (device and flanges)	1.5 lbs	2.6 lbs
Temperature resistance	-22° F to 212° F (-6° C to 100° C)	
Intumescent activation	Approx. 320° F (160° C)	
Expansion ratio (unrestricted)	1:40	
Metal	Steel with zinc coating	
Plastic	ABS	
Fabric	Glass-fiber	
Tested in accordance with	UL 1479 , ASTM E 814, CAN/ULC-S115	

FIRESTOP DEVICE
FOR USE IN THROUGH-PENETRATION
FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY SAFE

FM APPROVED

Hilti Firestop
Saving lives
through innovation
and education

Tripp Lite
1111 W. 35th Street
Chicago, IL 60609 USA
Telephone: 773.869.1234
www.tripplite.com

1.4kW Single-Phase ATS / Metered PDU, 120V (8 5-15R), 2 5-15P, 100-127V Input, 2 12ft Cords, 1U Rack-Mount, TAA

MODEL NUMBER: **PDUMH15AT**

Highlights

- Single phase 15A 120V Auto Transfer Switch / ATS PDU
- Enables redundant A/B power option for single-corded network devices
- Separate primary & secondary inputs connect to any two compatible power sources
- 1U horizontal rackmount; 2 NEMA 5-15P inputs; 8 NEMA 5-15R outlets
- Two digit visual current meter reports equipment load in amps; Upgrade options available
- TAA Compliant

Package Includes

- ATS / Metered PDU with attached 5-15P primary input cord
- Detachable C13 to NEMA 5-15P 12 ft / 3.6m secondary input cord
- 1U rackmount installation brackets
- User manual with warranty information

Description

Tripp Lite Metered ATS / Auto Transfer Switch provides a redundant power option for single-corded network devices. Dual input cords support separate connection to PRIMARY and SECONDARY power sources. The ATS will normally maintain continuous output to all outlets as derived from the primary input cable. If the primary power source becomes unstable or fails altogether, the ATS will switch over to the secondary power source until the primary input is restored and stable. Super-fast switchover between primary and secondary power sources occurs within milliseconds. ATS functionality is supported by any two compatible AC power sources, regardless of phase angle, to support a variety of advanced redundant power networking applications. Enables fault tolerant hot-swappable UPS protection when used with a single UPS and fully redundant UPS protection when each cord is connected to a separate UPS system. In a two-UPS environment, the primary input cable must be supported by a full time sine wave UPS with zero transfer time. Tripp Lite SmartOnline series is highly recommended for use as the primary UPS in a two-UPS application. ATS configurations utilizing separate mains circuits, backup generators and even separate utility power grid feeds are fully supported. On-board ATS processor constantly evaluates power quality on both input sources to prevent transfer to the secondary source when unavailable or of lower quality than the primary source. Front input LED's display primary or secondary power availability.

Features

- Federal Trade Agreements Act / TAA compliant for GSA schedule purchases
- 120V 15A Automatic Transfer Switch (ATS) / Metered PDU (Agency de-rated to 12A continuous)
- Provides a redundant A/B power option for non-redundant networking equipment with a single input power cord
- Digital display continuously reports total output power consumption in amps
- 1U horizontal rackmount form factor; 14.5 in. / 36.8 cm depth
- 8 built-in NEMA 5-15R outlets
- Set of two 12 ft. / 3.6m NEMA 5-15P input cables support connection to separate PRIMARY and SECONDARY power sources
- ATS circuits normally maintain output sourced from the primary input cable; As primary input power fails or becomes unstable, the ATS will switch to maintain output sourced from the secondary input cable until power on the primary input is restored and stable
- ATS configurations enable fault-tolerant, hot-swappable UPS protection when used with a single UPS and fully redundant UPS protection when each cord

Tripp Lite
[illegible] W. 35th Street
Chicago, IL 60609 USA
Telephone: 773.869.1234
www.tripplite.com

5/5.8kW Single-Phase 208/240V Basic PDU, 10 C13 Outlets, NEMA L6-30P Input, 12 ft. Cord, 1U Rack-Mount

MODEL NUMBER: **PDUH30HV**





Highlights

- NEMA L6-30P input with 12 ft. (3.6 m) power cord
- 10 total C13 outlets—8 rear and 2 front
- Switchless design prevents accidental shutdown
- Reversible all-metal housing
- Dual 20A circuit breakers protect against overloads

Package Includes

- PDUH30HV 5/5.8kW Single-Phase 208/240V Basic PDU
- Mounting hardware
- Owner's manual

Description

The PDUH30HV 5/5.8kW Single-Phase 208/240V Basic PDU is a versatile no-frills unit for data centers, server rooms and network wiring closets. Perfectly suited for high-density IT environments, the PDUH30HV features 10 total outlets—two in front and eight in the rear. The NEMA L6-30P input plug with 12-foot (3.6 m) cord connects to your facility's compatible AC power source, generator or protected UPS to distribute power to connected equipment.

The switchless design prevents an accidental shutdown, which could lead to costly downtime. Dual 20A circuit breakers protect connected equipment from dangerous overloads. The reversible all-metal housing supports a variety of mounting options, including 1U horizontal or 0U vertical mounting in EIA-standard 19-inch racks, under a counter or on a wall or workbench.

Features

Reliable Single-Phase 30A 208/240V Power Distribution

- Ideal no-frills PDU for data centers, server rooms and network wiring closets
- 10 total C13 outlets—8 rear and 2 front
- NEMA L6-30P input plug with 12 ft. (3.6 m) power cord
- Rear-panel grounding lug
- Dual 20A circuit breakers protect against overloads

Switchless Design

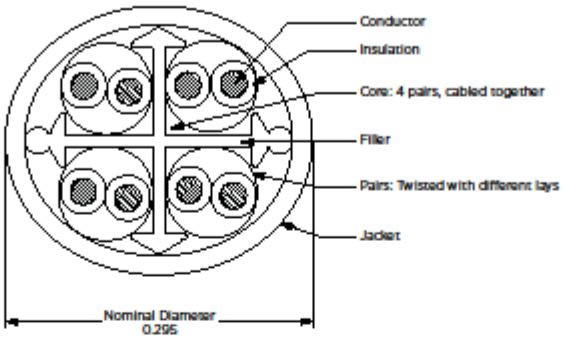
- Prevents accidental shutdowns and costly downtime

Versatile Installation Options

- Reversible all-metal housing faces front or rear in rack
- Supports 1U horizontal or 0U vertical mounting in EIA-standard 19 in. racks
- Also mounts on wall, workbench or under a counter

1 / 3

COMMSCOPE®



640 Series CMR Cat 6_A UTP Cable

TE640R

Description

CommScope's 640 Series UTP cable enables 10 Gigabit Ethernet performance with an industry-low outside diameter. The 640 Series Category 6_A cables exceed ANSI/TIA-568-C Category 6_A and ISO/IEC 11801 Category 6_A performance requirements by significant margins on all parameters. The CommScope Category 6_A System complies with all of the performance requirements for current and proposed applications such as Gigabit Ethernet (1000BASE-Tx), 10/100BASE-Tx, token ring, 155 Mbps ATM, 100 Mbps TP-PMD, ISDN, analog and digital video and analog and digital voice (VoIP). CommScope's 640 cable also features a patented oblique elliptical offset filler to minimize alien crosstalk.

CommScope Category 6_A UTP cables are available in standard colors including white, gray, blue and yellow. Category 6_A Cables from CommScope feature lead-free jacketing. Packaging is on reels with standard put-ups being 1000 ft splice-free lengths.

Specification

Horizontal cabling shall be 23 AWG, 4-pair UTP, NEC/NFPA CMR rated and be independently verified for compliance. Cable jacketing shall be white, gray, blue or yellow and shall be lead-free. Cable shall exceed all ANSI/TIA and ISO Category 6_A requirements as well as meet the performance requirements listed in the table shown on page 2.

Cable performance shall be verified and characterized to 650 MHz. Cable shall be supplied on reels. Independent verification for flammability compliance shall be to NEC article 800 and NFPA 70; CMR ANSI/UL 1666. Horizontal cable shall be catalog number TE640R-XXYY, with all color options listed.

NOTES