Author		Title	
R Fitch		Data Cabling Specification (TS-108)	
Approved by	Date	Rev	Dept
R Fitch/J Angel	Mar 23 2011	V1.4	IT Services

Fleming College

Data Cabling Specification

Technical Standard (TS-108)

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9. Devices

Annex A – Standards and specifications

Version Control

Draft	
Version 1.0	Initial release
Version 1.1	Definition of Power Over Ethernet devices and addition of ganged drop points with power outlets.
Version 1.2	IDBN requirement highlighted
Version1.3	**AODA accommodation added**

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1. Introduction

This document specifies the cabling specification requirements for installation of structured cabling in the Information Technology Network at Fleming College. Its purpose is to ensure compliance with industry standards, building code compliance, and best practice. Adherence to these standards is required of all parties working with the Network cabling infrastructure.

This document does not cover the general safe working practices as defined in the Occupational Health and Safety Act. All 3rd parties working on site are required to adhere to all Fleming Health and Safety policies and procedures.

1.1 Requirement

It is a requirement of the Fleming College IT Services department that this document is adhered to before any 3rd party work on the IT network cabling infrastructure is accepted into IT Operations and made 'live'. Failure to comply with this document, without the full consultation with the IT Services department, will result in the mandatory reworking of the installation at no further cost to the College.

1.2 Definitions

CAN/CSA - The Canadian Standards Association

ANSI – American National Standards Institute

ETSI - European Telecommunications Standards Institute

TIA – Telecommunications Industry Association

IDBN – Belden cabling specification

1.2 Scope

In Scope

All Telecommunication and Data Network cabling at Fleming College under the authority of the IT Service Operations department, Sutherland Campus, including all remote sites and equipment space.

Out of Scope

Cabling utilised within environments not under the direct support of IT Operations e.g. 3rd party installations for other purposes, Cogeco T.V. etc

This document does not cover equipment related information, such as installation guidelines, security, HVAC etc.

2. Vendor Requirements

2.1 Considerations for selection

For any clear physical demarcation point, for example the KTCC building project, whichever provider wins the competitive bid process becomes the defacto warranty and amendment provider for that physical domain. I.e. Bell provided the cafeteria infrastructure so only the College will use Bell exclusively to amend/repair that infrastructure. If ABCwiring win the bidding process then they would do the repair/amend work in that building.

Note: this expectation must be agreed in the bidding process – there is a marked difference in a supplier that can supply a set of contractors to a single site for a “one off” installation than one that is capable of servicing the location on an as required basis over a 20 year warranty period.

2.2 Standards

All vendors working within the IT data cabling infrastructure are required to comply with the CAN/ASA, ANSI/TIA/EIA standards as listed in annex A of this document

2.3 Personnel

Vendor shall provide technical field services personnel in compliance with industry labour standards e.g. Communications Cabling Specialist

2.4 Certification

Vendor shall maintain manufacturer recognition as a certified installation contractor for the Telecommunications product(s)/solution being implemented. For Data Network cabling Vendor shall be a ‘Belden certified” installation contractor

2.5 Warranty

Any installation work will carry a 20 year warranty for the no cost repair of the original installation but charges for any subsequent amendments.

2.6 BICSI Membership

Vendor shall maintain current membership of the Building Industry Construction Services International

2.7 AODA accommodation

Cabling infrastructure by its nature is not accessed on a regular basis by any users beyond connecting to a network drop located on a wall, except by technical staff. Section 7.1.5 defines a minimum height for drop to be installed to accommodate users with limited movement. Access for disabled technical staff employed by the College will be managed via an accommodation with the HR department.

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Consultant Services Requirements

3.1 Network Drawings

Drawing File Requirements:

Consultants shall produce contract document drawings and details within the electrical drawings.

Consultants shall make drawing files available to the successful project vendor in AutoCAD (.dwg file format) to assist with vendor compliance requirements.

AutoCAD generated drawing files shall be produced to address the following requirements:

a. Floor plan drawings.
b. Network distribution system details.
c. Network equipment space -rack details.
d. Network equipment space -floor layout.
e. Telecommunications backbone system.

3.2 Floor plan drawings:

Floor plan drawings shall indicate the location of the following telecommunications cabling system components:

a. Work area outlet location.
b. Telecommunications outlet type (icon specified).
c. Telecommunications outlet configuration (icon specified)
d. Serving telecommunications space location.
e. Special requirements/considerations notes.

3.3 **Network distribution system details:**

System detail drawings shall provide additional information required for the Network cabling system components including:

a. Outlet icon details and descriptions.
b. Special application details.
c. Special installation requirements.
d. Architectural details (as required).

3.4 Network equipment rack space details:

Rack detail drawings shall provide rack elevations for each telecommunications space within the entire project scope.

Rack elevation drawings shall provide detailed information for all telecommunications distribution system components within the Telecommunications Room(s) (TR) and Equipment Room (ER) including:

a. Equipment rack/cabinet dimensions and requirements.
b. Equipment rack/cabinet quantities.

3.5 **Termination hardware and loading requirements for:**

a. Quantity
b. Placement.
c. Category requirement.
d. Port count.
e. System application (e.g. horizontal or backbone).\
f. Additional hardware requirements (e.g. horizontal managers, power bars or UPS).

3.6 Equipment rooms floor space Layout:

Telecommunications space floor layout drawings shall be scale drawings and indicate orientation of equipment and hardware as assigned to the footprint of the space.

Floor layout drawings shall provide detailed information for all telecommunications infrastructure components within the Equipment rooms including:

a. Equipment rack/cabinet location and orientation.
b. Horizontal pathway requirements, location and orientation.
c. Backbone pathway requirements, location and orientation.
d. Telecommunications system requirements, location and orientation (e.g. voice and data telecommunications outlet).
e. Associated electrical distribution system requirements, location and orientation.
f. Dimensional and work clearance information.

3.7 Network backbone system (Riser Diagram):

Network backbone system drawings shall be single-line type drawings to indicate quantity requirements and associated pathway assignments for all building and campus backbone cabling.

Backbone system drawings shall provide detailed information for all network backbone cabling within and between the Equipment rooms including:

a. Backbone cable type and requirements.
b. Backbone cable quantity.
c. Pathway assignment.
d. Termination hardware type and location.

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3. Project Documentation

4.1 Basic Elements

The CAN/CSA, ANSI/TIA/EIA and BICSI standards as listed in Section 2 of this document define the basic elements of the telecommunications cabling system structure. Vendor firms providing services Fleming College shall prepare and submit project documentation as detailed within this section.

4.2 As-built Drawings

General:

Vendors shall prepare record drawings in both hard copy and CDROM format as part of compliance with this requirement.

Drawings in AutoCAD .dwg file format shall be provided to the vendor by the consulting services provider for the compliance of this section.

Record drawings shall provide the following information:

All drop point locations as constructed.

Project administration system identifiers for Drop points

Project administration system identifiers for Equipment rooms.

Hard copy format record drawings shall be provided in two complete sets as defined:

One complete floor plan drawing set black and white (colour optional).

One complete floor plant drawing set black and white (colour optional) laminated (encapsulated) to be placed in all associated equipment spaces).

4.3 Test Results

Vendors shall provide test results in CDROM format as part of compliance with this requirement.

4. Manufacturer's Warranty

General:

Vendors shall provide a manufacturer generated and support Product Warranty and Application Assurance certificates upon completion of installation and acceptance by Fleming College.

Product warranty and appliance assurance shall provide coverage of materials and labour for a minimum of Twenty Years from date of installation and acceptance regardless of installing agent/vendor status.

6. Cabling Requirements

6.1 General

The CAN/SA ANSI/TIA/EIA-568 standards listed in Annex A and the BICSI/TDMM define the basic elements of the telecommunications cabling system structure. The applicable requirements of those elements as provided to Fleming College are detailed in this section

6.2 Cable Definitions

6.2.1 Equipment Room & Horizontal Cabling

Equipment Room and horizontal cabling utilize the same cabling specifications but their installation requirements are different:

Equipment Room cabling is defined as any cabling installed within an equipment space. The installation of such cabling is subject to additional requirements due to the operational functionality of the space.

Horizontal Cabling is defined as cabling that may transit an equipment room but essentially is installed in over head ceiling spaces, plenums, risers and corridors to extend the network out to the users e.g. drop points.

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6.2.3 Backbone Cabling

Backbone cabling is defined as high capacity cabling used to carry data over larger distances over the immediate locale. As such different specification cables are defined.

6.3 Equipment Room & Horizontal Cabling Classifications

The classifications cables recognized for use in Equipment room/Horizontal cabling are:

a. Copper UTP - Four-pair 100 ohm balanced, unshielded, twisted-pair augmented Category 6 cable.

b. Coaxial Copper - Series 6, 75 ohm coaxial cable (CCTV/CATV applications only).

c. Fibre Optic Cable 62.5/125µm multimode optical fibre cable & 6-9/125µm single mode optical fibre cable

6.3.1 Equipment Room & Horizontal Cabling Copper (UTP):

All Cat 6 cabling are to be IBDN specification as listed in Annex A

All horizontal cables shall be terminated on eight-position connectors with T568Apin/pair assignments using insulation displacement connections (IDC).

Horizontal distribution UTP cabling shall provide outer cable jacket colours assigned for voice and data applications as listed:

a. Drop point to switch - Purple.
b. Drop point to user equipment - Grey.
c. Inter Equipment space (backbone) – Blue
d. Temporary Patch – Red
e. Crossover - Yellow

6.3.2 Equipment Room & Horizontal Cabling Coaxial Copper:

Coaxial cabling for CCTV applications shall be Series6,18AWG bare copper conductor with bare copper braid shield (92% coverage), 100% sweep tested 1 MHz to 1 GHz.

Coaxial cabling for CATV applications shall be Series 6, 18 AWG bare copper-clad steel conductors with aluminum tape and aluminum braid shield (100% coverage), 100% sweep tested 5 MHz to 1 GHz.

All coaxial cable terminations shall be compression Type F.

6.3.3 Equipment Room & Horizontal Cabling Fibre Optic cabling:

There are two classes of optical fibre cabling, as described in the table below.

Classification	Type	Performance
MM	62.5/125 µm Multimode DUPLEX Orange	OM3 compliant Minimum bandwidth of 200 and 500 MHz-km at 850 and 1300 nm, respectively.
SM	6-9/125 µm Single mode DUPLEX Yellow	1310 or 1550 nm O or C Band

All horizontal cables shall be terminated on duplex 568SC connectors.

NOTE: Use of Simplex cabling is not approved

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6.4 Backbone Cabling

The five types of cables recognized for use in backbone cabling are:

a. Four-pair 100 ohm balanced, unshielded, twisted-pair augmented Category 6 cable.

b. Multi strand 62.5/120 or 6-9/125µm multimode/single mode optical fibre cable.

c. Twelve or more strands of single mode optical fibre cable.

d. Series 6 or Series 11 coaxial cable (CCTV/CATV applications only).

6.4.1 Backbone Cabling Copper (UTP):

All data copper backbone cabling shall be 4-pair augmented Category 6.

All backbone cables shall have 25% spare capacity (minimum one cable).

6.4.2 Backbone Cabling Coaxial

Series6 cabling for CCTV applicable shall be 18AWG bare copper conductor with bare copper braid shield (95% coverage), 100% sweep tested 1 MHz to 1 GHz.

Series 11 cabling for CCTV application shall be 14 AWG bare copper conductor with bare copper braid shield (95% coverage), 100% sweep tested 1 MHz to 1 GHz. .3

Series 6 cabling for CATV application shall be 18 AWG bare copper-clad steel conductor with aluminum tape and aluminum braid shield (100% coverage), 100% sweep tested 1 MHz to 1 GHz.

Series 11 cabling for CATV application shall be 14 AWG bare copper stranded conductor with aluminum tape and aluminum braid shield (100% coverage), 100% sweep tested 1 MHz to 1 GHz.

6.4.3 Backbone Cabling (Optical Fibre):

There are two classes of optical fibre cabling, as described in the table below.

Classification	Type	Performance
MM OM3	62.5/125 µm Multimode DUPLEX Orange	OM3 compliant Minimum bandwidth of 200 and 500 MHz-km at 850 and 1300 nm, respectively.
SM	6-9/125 µm Single mode DUPLEX Yellow	1310 or 1550 nm O or C Band

All backbone cables shall be terminated on duplex 568SC connectors.

All backbone cables shall have 25% spare capacity.

Note: A redundant, parallel, spare augmented Category 6 UTP cable shall be installed for each pair of strands for optical fibre backbone cable where distances do not exceed the maximum recommended installed length of Category 6A cable.

Note: Use of Simplex cabling is not approved

7. Installation/Design requirements

7.1 Equipment rooms

7.1.1 Equipment racks

All Copper and Fibre distribution panels are to be installed in equipment racks. All equipment Racks for voice and data service across Fleming college shall be 19” open frame type and a minimum capacity of 44U. Equipment racks shall be complete with vertical cabling management on both sides and the same height as the rack.

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Racks are to be installed with a minimum clearance of 1000mm (39”) at the front of the rack, 1500 (59”) & 600mm (39”) at each end of a row of Racks.

Racks are to be installed with 25% spare capacity

Any installation within a smaller space than defined above must be done in full consultation with the IT Services Operations department.

7.1.2 Cable tray

Cable tray shall be of the ladder or wire basket type and installed around the perimeter of equipment rooms to facilitate; slack cable loops, sufficient cable support and organisation.

7.1.3 Patch cabling presentations

On no account will cabling be installed direct from a remote port to an equipment port – all installation must present at an appropriate patch panel and facilitate the completion of a circuit using patch leads

Each patch panel must be installed in a 19” rack and not contain a mix of connections e.g. equipment presentation and inter room presentation. Panels may be co-located in the same rack

Equipment presentation - All drop point switching equipment installed in an equipment room must be flood wired and present at a patch panel (i.e. RJ45) within the same equipment room, and be clearly labelled as such.

Inter equipment room connections will present on specific dedicated patch panels as will those connected to network ‘drop points’ around campus.

7.1.4 Connector types

All Cat 5e and Cat 6 cabling shall terminate at a patch panel with 8 position connectors with T568A pin/pair assignments using insulation displacement connections

All Fibre optic patch panels shall terminate with duplex 568SC connectors

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7.1.5 Drop points

Copper

All copper Network drop points shall be a minimum two gang

Each point shall have an EMT conduit (21mm/3/4" minimum) stubbed up with a 90% bend into and accessible ceiling space of the same room and terminated with a bushing

Each Drop point shall be installed within a collocated power out let & RJ45 panel e.g.:

Low density installations in and around legacy installs must be situated either 1000mm/39" of an electrical outlet installed at the same level as associated outlet and have a matching cover plate, or co-located

For "stand alone" items that support 'Power over Ethernet i.e. Security Cameras and Safety Phones close proximity to a power outlet is not required

Workplace areas with unique applications shall be addressed appropriately to conform to industry standards and practice e.g. furniture bezels, water proof outlets.

With respect to AODA compliance and to facilitate easy access to a network drop by users with restricted movement; all new wall mounted network drops are to be installed 18 inches above the baseboard. If no base board fitted then 2 feet. All drops are to be located 2 feet from any static obstacle e.g. doors

Fibre Optic

Fibre Optic drop points shall be terminated on duplex SC connectors and conform to industry standards and practice.

7.1.6 Horizontal cabling

A ceiling distribution system shall serve as the horizontal pathway, including a combination of ladder type cable tray, EMT conduit and J hooks.

Cable trays shall be installed in corridors to distribute horizontal cables from the telecommunications room to the vicinity of the work areas.

Cable trays shall be filled to a maximum fill ratio of 25%.

Where sufficient space is available, the underside of the cable tray supports shall be a minimum of 150 mm (6") above the suspended ceiling support channels.

Conduit shall be used in areas without suspended ceilings and accessible ceiling spaces.

A vertical conduit stub, minimum 21 mm (3/4"), shall be installed from each drop point and television outlet to the accessible ceiling space.

Horizontal conduit stub(s), minimum one 53 mm (2"), shall be installed from the cable tray in the corridor to the accessible ceiling spaces of all rooms in which drop point and/or television outlets are installed.

J hooks and adjustable cable support loops shall be installed only in rooms in which drop point and/or television outlets are installed, with a maximum spacing of 1525 mm (60").

Standard J hooks shall be used to support up to ten cables; J hooks with a reusable cable retention system shall be used to support eleven or more cables.

Utility columns shall not be used.

J Hooks shall not be used in corridor or common area ceiling spaces.

7.1.7 Backbone cabling

A ceiling distribution system shall serve as the backbone pathway, including ladder type cable tray and/or EMT conduit.

Vertically aligned telecommunications spaces shall be interconnected using conduit sleeves.

All optical fibre backbone cabling shall be installed in 32 mm (1-1/4") orange – multimode – yellow single mode ‘Copex’ ducting. This ducting shall be installed in cable tray or EMT conduit.

8. Labelling

8.1 Font Style

For all self laminating wrap around cable labels - minimum font size is 6pt

For all Drop points minimum font size is 12 pt

Font should where possible be Times New Roman or Arial

All text must be black

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8.2 Drop points

Drop points are labelled by a numerical prefix number and port number indicating the destination of the final patch panel as below:

Brealey equipment room	**Pre Fix**	**Frost equipment room**	**Pre Fix**
Room 351	1-xxx	Room 101C (2-xxx)	2-xxx
Room 327A	10-xxx	Heavy Equipment (H-xx)	H-xxx
Room 446A	3-xxx	NR Wing (7-xx)	7-xxx
Room 423	2-xxx	WC/WC (6-xxx)	6-xxx
Room 239a	11-xxx	Room 166 (3-xxx)	3-xxx
Room 301	7-xxx	Room 265 (5-xxx)	5-xxx
Room 478G	6-xxx	Room 111 (1-xxx)	1-xxx
Room 375	5-xxx	Room 158A (4-xxx)	4-xxx
LRC	4-xxx	LAW (P-xx)	P-xxx
Aces Wing	15-xxx	Drilling (D-xx)	D-xxx

The reciprocating cable end terminating at a patch panel must be labelled the same as the patch port itself using self laminating wrap around label type e.g. Brady labelling system.. For destinations not included in this list please consult with the IT Services department for guidance.

8.3 Inter-equipment Labelling

Cables installed from equipment port direct to equipment port are to be labelled at each end with a label defining both destinations on a single self laminating wrap around label

e.g.

Host A port 1
Host B port 2

8.4 Equipment to Patch Panel Labelling

Equipment that is patched form an equipment port to a patch panel port should have an identical self laminating wrap around label on each end depicting Host name and port and the reciprocating patch panel port

Host A port 1
1-XXX

9. Devices

Only devices approved by the IT services department are to be installed / connected to the college network. This especially refers to devices that can potentially be used to extend the Campus network. Such devices include, but are not limited to, devices such as switches, routers, hubs, and access points.

The use of a Voip phone to share a single network drop point for a phone and computer is allowed and supported

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Annex A – Applicable Specifications & Standards

All work shall comply with the latest editions, including addendums, of the codes and standards listed in this section. Deviations must be with full consultation of the IT Services Operations Department @ Fleming

General

CAN/CSA C22.1.06 Canadian Electrical Code

CAN/CSA-ISO/IEC 11801-04 - Information Technology - Generic Cabling for Customer Premises (Adopted ISO/IEC 11801:2002, second edition, 2002-09)

CAN/CSA T568.1-05 (R2010) - Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements (Adopted ANSI/TIA/EIA-568-B.1-2001)

CAN/CSA C22.2 NO. 126.1-09 - Metal cable tray systems (Bi-national standard, with NEMA VE 1-2009)

Copper

CAN/CSA T568.1-1-05 (R2010) - Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements - Addendum 1 - Minimum 4-Pair UTP and 4-Pair SCTP Patch Cable Bend Radius (Adopted ANSI/TIA/EIA-568-B.1-1-2001)

CAN/CSA T568.2-1-05 (R2010) - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components - Addendum 1 - Transmission Performance Specifications for 4-pair 100 Category 6 Cabling (Adopted ANSI/TIA/EIA-568-B.2-1-2002)

CAN/CSA-ISO/IEC TR 24704-06 - Information Technology - Customer Premises Cabling for Wireless Access Points (Adopted ISO/IEC TR 24704:2004, first edition, 2004-07)

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Optical

CAN/CSA T568.1-4-05 (R2010) - Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements - Addendum 4 - Recognition of Category 6 and 850 nm Laser-Optimized 50/125 um Multimode Optical Fiber Cabling (Adopted ANSI/TIA-568-B.1-4-2003)

CAN/CSA C22.2 NO. 232-09 - Optical fiber cables

CAN/CSA T568.3-05 (R2010) - Optical Fiber Cabling Components Standard (Adopted ANSI/TIA/EIA-568-B.3-2000)

CAN/CSA-C22.2 NO. 262-04 (R2009) - Optical Fiber Cable and Communication Cable Raceway Systems

ANSI/TIA/EIA – 569-C Optical Fibre colour coding

ANSI/TIA/EIA-526-7 – Optical power loss measurements of installed single mode fibre

ANSI/TIA/EIA – 526-14A – Optical power loss measurements multi mode fibre

Vendor

Belden IDBN 1200 System Cat 5e Unscreened Twisted Pair (UTP) Cable - LSOH

Belden IDBN 2400 System Cat 6 Unscreened Twisted Pair (UTP) Cable