

DEPARTMENT OF STATE DEVELOPMENT

VICTORIAN GOVERNMENT BUILDINGS
DATA AND TELEPHONY CABLING STRATEGY

**STANDARD SPECIFICATION FOR
INFORMATION TECHNOLOGY
AND TELECOMMUNICATIONS
CABLING**

MULTIMEDIA VICTORIA

Edition 5.0
June 2003

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

This document forms part of the “Victorian Government Buildings Data and Telephony Cabling Strategy Maintenance” project and was prepared and revised for Multimedia Victoria by:

Peter Guenther,
Senior Engineer Telecommunications, Sinclair Knight Merz Pty Ltd
Phone 03 – 6221 3754 Fax 03 - 6224 2325

Sinclair Knight Merz Melbourne Office

590 Orrong Rd,
Armadale VIC 3143

Sinclair Knight Merz Hobart Office

20 Ellerslie Rd,
Battery Point TAS 7004
Postal: GPO Box 1725, Hobart TAS 7000

MULTIMEDIA VICTORIA DOCUMENT CONTROL & AMENDMENT HISTORY					
Reference Number		TA05801-1 CORPORATE MULTISITES: DSD MMV STRATEGY MAINTENANCE CONTRACT			
Document Name		STANDARD SPECIFICATION FOR INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS CABLING			
File Name		Mmvcabs5.doc			
Version	Date	File Name	Details	Author	Approved
1.0	28/5/97	mmvcabsp.doc	First Issued Edition	PG	DT
2.0	4/6/98	mmvcabs2.doc	Fully Revised to align with new Communications Cabling Manual (March 1998) and AS 3080 Amendment No1 May 1998. Proprietary item references removed, colour coding for voice/data reversed, labelling modified, fibre installation and testing expanded, CADD drawing structure detailed	PG	DT
3.0	30/8/99	mmvcabs3.doc	PSNEXT and ELFEXT added to glossary of terms. Under floor cable pathways added for buildings on piers. Cabling performance and connecting hardware and test limits amended to current draft of Cat 5e. Wall mount equipment cabinets added to rack enclosure types. Power distribution outlet socket spacing adjusted. Patch cord minders for non-rack mount equipment trays added. Test limits changed to 1000baseT compliance minimum. Patch cord schedule amended to Cat 5e performance and crossover cable defined.	PG	DT
4.0	11/6/02	mmvcabs4.doc	Standard spec adjusted to Cat 6 and ISO 11801 2 nd Edition. Rack vertical management space increased. Multimode fibre changed to 2000 MHz.km.	PG	DT
5.0	29/5/03	mmvcabs5.doc	Adjusted to 2003 edition of AS3080, 3084 and 3085.1. Wireless LAN accesspoints and server rack tie cables added to default scope. Server racks specified. Terminology for old cables adjusted to AS3085.1 – 2003 method (eg Cat 5-96).		

AMENDMENT PROPOSAL				
Page/para/line	Description of Proposed Amendment	Proposer	Amendment Issued	
			Date	By

Should a problem with this document be found, advise David Thomas at Multimedia Victoria by e-mail to david.thomas@mmv.vic.gov.au, detailing clause and suggested amendment or giving details of problem or reason for amendment. All amendment proposals not yet incorporated in the document will be summarised on the above table on the master controlled document for information.

Table of Contents

1	INTRODUCTION.....	1
1.1	PURPOSE	1
1.2	SCOPE	1
1.3	EXCLUSIONS	1
1.3.1	Excluded Cabling Or Communications Systems.....	1
1.3.2	Existing Cabling.....	1
2	DEFINITIONS	3
2.1	FORMAT	3
2.1.1	Style.....	3
2.1.2	Imperatives	3
2.1.3	Words And Expressions	3
2.2	ABBREVIATIONS.....	3
3	CONTRACTING	5
3.1	GENERAL	5
3.1.1	Conditions of Contract	5
3.1.2	Preliminaries.....	5
3.1.3	Goods and Services Tax	5
3.1.4	Import Costs	5
3.1.5	Insurance	5
3.2	CABLING PROVIDER RULES LICENCE LICENCE.....	5
3.3	ENTRY FACILITY WORKS AND CHARGES.....	6
3.4	SITE CONDITIONS	6
3.4.1	Inspection	6
3.4.2	Protection	6
3.4.3	Restriction of Works	6
3.4.4	Existing Services	6
3.4.5	Demolition.....	6
3.4.6	Inspection	6
3.4.7	Clean Up.....	6
3.5	ASSOCIATED WORK BY OTHER TRADES.....	7
3.5.1	Building Contracts	7
3.5.2	IT&T Service Providers	8
3.6	DEFECTS LIABILITY PERIOD	8
4	REFERENCE DOCUMENTS	9
4.1	AUSTRALIAN STANDARDS	9
4.1.1	Standards Referenced.....	9
4.1.2	Compliance	10
4.1.3	Maintenance of Copies On Site.....	10
4.2	ACA/ACIF TECHNICAL STANDARDS.....	10
4.3	AGENCY STANDARDS	10
5	CABLE PATHWAYS.....	11

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

5.1	INTRA-BUILDING CABLE PATHWAYS	11
5.1.1	General	11
5.1.2	Segregation	11
5.1.3	Vertical Backbone Pathways	11
5.1.4	Major Horizontal Pathways	11
5.1.5	Local Horizontal Distribution	12
5.1.6	Wiring Concealment	13
5.2	INTER BUILDING BACKBONE PATHWAYS	13
5.2.1	General	13
5.2.2	Underground Pathways	13
5.2.3	Overhead Pathways	14
5.2.4	Aerial Pathways	14
6	IT&T DISTRIBUTION CABLING SYSTEM	15
6.1	GENERAL SCOPE	15
6.2	DEFAULT SCOPE	15
6.3	STRUCTURED CABLING SYSTEM ARCHITECTURE	16
6.3.1	General	16
6.3.2	Site Specific Variations	16
6.3.3	Horizontal Cabling Architecture Variations	17
6.3.4	Cable Types and Performance	18
6.3.5	Horizontal Outlet Component Performance Verification	20
6.3.6	Copper Termination System	20
6.3.7	Fibre Termination System	21
7	CABLING INSTALLATION STANDARDS	22
7.1	GENERAL	22
7.1.1	Standards Compliance	22
7.1.2	Cable Pathways	22
7.1.3	Conformance With Standard Drawings	22
7.1.4	New Materials	22
7.2	HORIZONTAL AND BACKBONE CAT 5/6 4PR UTP CABLING	22
7.2.1	General	22
7.2.2	Cable Termination and Labelling	22
7.2.3	Voice and Data Termination Fields	23
7.2.4	Outlet socket and Plate Colour and Style	23
7.2.5	Distributors (UTP Patch Panels)	23
7.2.6	Distributor and Outlet Labelling for Horizontal Cabling	24
7.2.7	Patch Panel and Outlet Labelling for UTP Data Backbones	25
7.3	CLOSETS AND EQUIPMENT RACKS	25
7.3.1	Standard Floor Distributor Closet Layout	25
7.3.2	Campus Computer Room and PABX Room Layout	25
7.3.3	Standard Enclosed Equipment Racks	25
7.3.4	Open Frame Rack Options	27
7.3.5	Wall Mounted Cabinet (6U to 24 U)	29
7.3.6	Wall Frame Option For Small Sites	30
7.3.7	Patch Cord Minders	30

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

7.4	VOICE BACKBONE CABLING	31
7.4.1	Standard Topology	31
7.4.2	Fully Patchable Topology	31
7.4.3	Floor Distributor Termination Practices.....	31
7.4.4	Modular Patch Panels.....	33
7.4.5	Campus and Intermediate Distributor Termination Practices	33
7.5	FIBRE OPTIC BACKBONE CABLING	33
7.5.1	Fibre Patch Panel.....	33
7.5.2	Labelling	35
7.6	BACKBONE LABELLING	35
7.6.1	General	35
7.6.2	Definition of Character Groups On Labels	35
7.6.4	Labels For Sockets Or Cable Pairs At Distributors.....	37
7.6.5	Labels For Cables Ends and Cable Appearances	37
7.6.6	Labels For Terminal Blocks and Final Distribution Points.....	37
7.6.7	Designations in Pair Managed Frame Record Books.....	37
7.6.8	Designations For Link Records In Management Databases.....	37
7.6.9	Examples Of Backbone Labelling.....	37
7.7	CABLING PERFORMANCE AND TESTING	38
7.7.1	Horizontal Cabling	38
7.7.2	Data UTP Backbone.....	40
7.7.3	Data Fibre Optic Backbone.....	40
7.7.4	Voice Grade Multipair UTP Backbones	41
7.8	PATCH CORDS, FLY LEADS AND ADAPTORS	41
7.8.1	General	41
7.8.2	Pre-Patching	42
7.8.3	Parallelling Adaptors.....	42
7.8.4	Default Fly-Lead and Patch Cord Schedule	42
7.9	EARTHING	44
7.9.1	General	44
7.9.2	Telecommunications Reference Conductor	44
7.9.3	Equipment Rack Earthing	45
8	PROGRESS AND COMPLETION.....	46
8.1	TIMING	46
8.1.1	Drawings	46
8.1.2	Acceptance Testing	46
8.1.3	Installation Completion	46
8.2	AS INSTALLED DOCUMENTATION	46
8.2.1	Drawings	46
8.2.2	Wiring Records	50
8.2.3	Manufacturer's Warranty	50
8.2.4	Training	50
8.2.5	"As Installed" Documentation Distribution and Copies	51

STANDARD DRAWINGS

MMV-CS-01	Cable Support and Routing Practices
MMV-CS-02	Outlet and Patch Panel Termination and Labelling
MMV-CS-03	Enclosed Rack Cabinet Major Closet Layout
MMV-CS-04	Sequentially Numbered Outlets:- Rack Layout
MMV-CS-05	Segregated Voice and Data Patch Panels:- Rack Layout
MMV-CS-06	Open Frame Rack Major Closet Layout
MMV-CS-07	Open Frame Rack Minor Closet Layout
MMV-CS-08	Open Frame Rack Based Closet:- Rack Layout
MMV-CS-09	Wall Patch Frames For Small Office Areas

SAMPLE SPREADSHEETS

CDSAMPLE.xls	Sample Campus Distributor jumpering record spreadsheet
--------------	--

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

1 INTRODUCTION

1.1 Purpose

This specification standardises materials, methodologies and work practices used in the provision of any new information technology and telecommunications cabling for Victorian Government Agencies.

1.2 Scope

The scope of this standard is limited to methods and practices for the following generic structured cabling system options:-

- Unshielded Twisted Pair (UTP) copper horizontal cabling
- UTP and Fibre Optic backbone cabling

This specification details non-site specific requirements for the provision of a complete IT&T structured cabling system, and must be read and used in conjunction with a document detailing:-

- Site specific requirements (text, schedules and drawings providing site specific location, layout and dimensioning detail)
- Schedule of departures from this standard or adoption of non-default options
- Conditions of tendering
- Conditions of contract

1.3 Exclusions

1.3.1 Excluded Cabling Or Communications Systems

The following are excluded from the scope of this specification, except to the extent that they interface to the generic structured cabling system described in this specification:-

- Master Antenna Television cabling and distribution equipment
- Video camera or monitor cabling
- Audio visual and public address cabling
- Data hub and terminal equipment including wireless LAN access points
- Voice switching and terminal equipment
- Centralised Optical Fibre cabling schemes
- Shielded Twisted Pair cabling systems

1.3.2 Existing Cabling

This document does not require the modification of existing cabling installed and completed prior to the commencement of any new works, except where necessary to achieve a successful merger of old cabling with new works on the same site. Cabling conforming to earlier standards pre-dating this specification will generally be left in tact until recabling of the premises is required as part of an architectural redevelopment or provision of new computer or communications facilities.

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

This Page Left Blank Intentionally

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

2 DEFINITIONS

2.1 Format

2.1.1 Style

This specification follows the general imperative style of the NATSPEC specification system and is compatible with that system.

2.1.2 Imperatives

Instructions and requirements shall be deemed to be given to and accepted by the Contractor unless otherwise stated.

2.1.3 Words And Expressions

“Approved”, “directed”, “required”, “rejected”, and similar expressions, shall mean approved, directed, required, rejected, and the like, by the Superintendent. “give notice”, “submit”, “furnish”, and similar expressions, shall mean give notice, submit, furnish, and the like, to the Superintendent.

“Provide” shall mean supply, install, connect, test and document the respective item.

Where the term “Superintendent” has no meaning under the conditions of contract, substitute “ordering officer” whose signature appears on the official form ordering execution of the works.

2.2 Abbreviations

The following abbreviations are used in this specification:-

ACA	Australian Communications Authority
ACIF	Australian Communications Industry Forum (an industry body responsible for creating standards and practices which implement government telecommunications legislation, notably the standards AS/ACIF S 008 and AS/ACIF S 009 which replace TS008 and TS009).
BD	Building distributor or main cross connect frame for a building (was MDF or IDF)
CADD	Computer Aided Design and Drafting
Cat 5	Components complying with AS3080-2003 Category 5 performance (which is comparable to TIA/EIA568-A-5 or “Cat5e”), capable of forming Class D (2003) links and channels.
Cat 5-xx	Cat 5 cable conforming to an earlier superseded version of AS 3080 published in the year ending in the digits “xx”. (eg Cat 5-96 was the earliest Cat 5 specification).
Cat 6	Components complying with ISO 11801 2 nd edition Category 6 performance capable of forming class E links and channels
CCF	Cross Connect Frame
CCM	Standards Australia “Communications Cabling Manual”
CD	Campus Distributor (for voice was formerly known as MDF)
CP	Consolidation Point
CSV	Comma Separated Variable (file format)
dia	Diameter
DWG	Autocad Drawing Format

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

DXF	Autocad Drawing Exchange Format
ELFEXT	Equal level far end cross talk
FD	Floor distributor or main cross connect frame for a floor
FDP	Final Distribution Point (found in legacy telephone cabling plant, similar in concept to consolidation point, but only rated for Category 1 to 3 performance)
FEXT	Far End Cross Talk (on copper pair cables and links)
FM	Facility Manager
GPO	General Purpose Power Outlet (10A dual unless otherwise stated)
IDC	Insulation Displacement Contact (or connection)
IDF	Intermediate Distribution Frame (obsolete term superseded by Floor Distributor or Building Distributor)
IT&T	Information Technology and Telecommunications
LSA	Type of Krone brand termination system (including as mandated by Telstra and Optus at the Campus Distributor)
MATV	Master Antenna Television system
MDF	Main Distribution Frame (obsolete term superseded by Campus Distributor)
MEN	Multiple Earthed Neutral (as defined in AS 3000)
MM	Multi-mode
MUTO	Multiple User Telecommunications Outlet
NEXT	Near End Cross Talk (on copper pair cables and links)
NLA	Net lettable area (building floor area served excluding services/stairway core)
OF	Optical fibre
OTDR	Optical Time Domain Reflectometer
pr, prs	conductor pair, conductor pairs
PSELFEXT	Power sum equal level far end cross talk (between four pairs carrying equal level transmissions on a UTP cable or link)
RJ45	Commonly used code derived from a (USA Universal Service Order Code) Registered Jack configuration in common use to describe the “modular 8-way connector”, which is adopted in AS 3080, ISO 11801 and officially described in the standard IEC 60603. Various parts of this standard provide specifications for connectors ranging from <3 MHz up to 250 MHz.
RL	Return loss
RU	IEC 60297-2 standard rack units (44.45 mm)
SM	Single mode
TRC	Telecommunications Reference Conductor
TPF	Test Point Frame (system frame for telephone system or PABX)
UTP	Unshielded Twisted Pair
VESDA™	Very Early Smoke Detection Apparatus, (a trademark for an Aspirated Smoke Detection System)
WAP	Wireless Access Point

3 CONTRACTING

3.1 General

3.1.1 Conditions of Contract

The General Conditions of Contract shall be as detailed in the quotation request, order, or formal Instrument of Agreement.

Where the works specified will be supplied under a sub-contract or Nominated Sub-Contract agreement with a Head Contractor, the Head Contract “Conditions of Contract” shall apply.

3.1.2 Preliminaries

Where the works specified will be supplied under a sub-contract or Nominated Sub-Contract agreement with a Head Contractor, the Head Contract “Preliminaries” shall apply.

3.1.3 Goods and Services Tax

All quotations shall show the goods and services tax as a separate line item. All invoices shall take the form of an official Tax Invoice showing the GST exclusive amount, GST amount, and total invoice amount, unless otherwise indicated in the quotation request or Conditions of Contract.

3.1.4 Import Costs

Allow for costs of imported materials, plant and equipment purchased for incorporation in the Works, including costs for customs and import duty and primage.

3.1.5 Insurance

Where the site specific contract documents do not contain any other requirement, maintain and provide evidence of insurance policies for:

- Public Liability to a cover of \$10 000 000
- Loss of, or damage to, property, materials and the works suffered by either the Principal or Contractor of up to \$50 000 value or the contract sum (whichever is the greater amount)

3.2 Cabling Provider Rules Licence Licence

Carry out all works using personnel holding an “Open” cabling licence with an ACA accredited Cabling Provider Rules (CPR) registration body, together with additional accreditation for Cat5 or higher obtained from a training organisation recognised by the Telecommunications Industry Training Advisory Board.

Until the date of old licence expiry, cablers holding an old ACA “Base General Premises Cabling Licence” with Category 5 endorsement may also be used.

Comply with all ACA regulations concerning licence use, notably with respect to the issue of Cabling Advice forms for completed work.

Carry out any underground, aerial or fibre optic cable works using CPR “Open” licensed personnel with the respective further qualifications.

3.3 Entry Facility Works and Charges

Where connection to a carrier's cabling or services, or the provision of a new carrier "Point of Entry" cable to the Network Boundary is included in the accompanying site specific scope of works, arrange all such works and obtain all necessary approvals, provide all required cable path and termination facilities, and pay all charges levied by the carrier and local government authorities.

3.4 Site Conditions

3.4.1 Inspection

Inspect the site prior to tendering, discuss proposed routes with local staff to ensure practicality, and take into account any conditions which could affect the extent or performance of the contract.

3.4.2 Protection

Where the works are in existing premises, protect the occupants, their activities and equipment from fumes, dust, dirt, noise, moisture or other nuisance. Handle materials and rubbish on site so as to prevent dust emission.

3.4.3 Restriction of Works

Restrict workmen to that part of the site where the Works are being carried out.

3.4.4 Existing Services

Notify the Superintendent immediately and await instructions if existing services are encountered, obstructed or damaged in the course of the Work under the Contract.

3.4.5 Demolition

3.4.5.1 Contractor's Property

Unless otherwise specified, materials, plant, equipment or other things salvaged from the Works shall become the property of the Contractor and shall be removed by him from the site.

3.4.5.2 Principal's Property

Recover intact, clean, store where directed on the site, and protect from damage until Practical Completion Principal's Property specified in the accompanying "Salvaged Items Schedule".

3.4.6 Inspection

If the specification requires notice of inspection to be given in respect of any part of the work, that part of the work shall not have further work placed thereon or be covered up or put out of view without prior approval.

3.4.7 Clean Up

Thoroughly clean all closets, floors and walls of all construction residue including dust, swarf, cable off cuts, cable ties and packaging materials, and remove from site.

3.5 Associated Work By Other Trades

3.5.1 Building Contracts

Where the works are part of a building construction project, refurbishment or refit, coordinate with the following parties with respect to

- general construction programming and site construction issues
- maintaining mandatory segregation
- execution of associated work by those respective parties as listed below

3.5.1.1 Building Contractor or Builder

- Access and closing up of ceiling space and wall cavities
- Wall and floor penetrations and cut-outs including making good and finishing
- Building core penetrations and fire rating
- Demolition works
- Water light and power during construction and commissioning
- Painting, including painting of flush wall enclosures to wall colour

3.5.1.2 Electrical Contractor

- Installation of communications cable trays (only where specified as part of electrical services and specifically noted in site specific documents)
- Installation of combination power and telecommunications multi-channel wall, skirting and floor duct and earthing of internal divider of multi-channel metallic cable duct to AS 3080
- Provision of GPO's for all communications equipment, workstations, and closets.

3.5.1.3 Mechanical Services

- Installation of air conditioning or ventilation duct work around occupied areas
- Provision of forced ventilation or special air conditioning for communications closets, communications or computer equipment rooms when necessary
- Provision of dust filtering and humidity control where applicable on air supplies

3.5.1.4 Fire Services

- Provision of sprinkler system and sprinkler heads and locations in communications closets and throughout occupied areas
- Provision of smoke and thermal detection systems throughout
- Provision of aspirated smoke detection (“VESDA”) systems in computer and communication equipment rooms

3.5.1.5 MATV

- Provision of amplifiers and splitting equipment in communications closets

3.5.1.6 Lift Services

- Provision of telecommunications services to lift cars and lift motor room

3.5.2 IT&T Service Providers

Make allowance for the following parties outside the works contract to come onto site before Practical Completion to:-

- install and test equipment
- connect services (including patching and jumpering)

Coordinate and programme works to ensure that facilities required by these parties are tested and completed in time to permit these parties to install and test before building occupancy. Unless otherwise agreed with respective parties, allow a minimum of one week prior to occupation.

3.5.2.1 Carriers

- Carrier telecommunications services and associated entry cables
- Line terminating equipment

3.5.2.2 Facility Managers

- Data transmission, switching and hub equipment
- Data terminal equipment including PC's and dumb terminals
- Network management equipment and servers in closets and computer rooms

3.5.2.3 StateNet

- Telephone system and transmission equipment
- Telephones

3.6 Defects Liability Period

A 12 month defects liability period shall apply, regardless of any other manufacturer's warranties which may be offered.

4 REFERENCE DOCUMENTS

4.1 Australian Standards

4.1.1 Standards Referenced

The following standards are referred to in this specification.

STANDARD No.	TITLE
AS/NZS 3080-2003	Telecommunications installations- Integrated telecommunications systems for commercial premises.
AS/NZS 3084-2003	Telecommunications installations- Telecommunications pathways and spaces for commercial buildings.
AS/NZS 3085.1-2003*	Telecommunications installations- Administration of communications cabling systems. Part 1: Basic Requirements.
AS/NZS 3087.1-2003*	Telecommunications installations—Generic cabling systems: Part 1: Specification for the testing of balanced communication cabling [Note this supersedes AS3087-2000].
AS/NZS 3087.2-2003*	Telecommunications installations—Generic cabling systems: Part 2: Specification for the testing of patch cords in accordance with AS/NZS3080-2003.
AS/NZS 3089*	Telecommunications installations – Field testing of fibre optic cabling.
SAA HB243-2003*	Communications Cabling Manual, Module 1: Australian regulatory arrangements.
SAA HB29-2003*	Communications Cabling Manual, Module 2: Communications Cabling Handbook.
AS/NZS 3000-2000	Wiring Rules.
AS/NZS ISO 9001-2000	Quality management systems – Requirements.

* Standards marked with an asterix are new or revised standards due for publication in 2003. Comply with the requirements of the public comment draft (if released) or the previous version of the same standard (if quoted standard has not yet reached public comment). At the date of editing this standard (June 2003) specification, AS3085.1 and AS3087.1 had passed the public comment stage. Comply with the new standard after its release date. The currently ratified standard can be confirmed on the Standards Association of Australia web site www.standards.com.au .

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

4.1.2 Compliance

Where this specification calls up a standard, comply with the material, installation and testing requirements of the respective standard.

Where the standard permits options, select the option which yields compliance of the final installation with this specification.

Where the standard has non-mandatory or “informative” requirements, these shall be treated as mandatory unless indicated otherwise in this specification or the project specific contract documents.

4.1.3 Maintenance of Copies On Site

Maintain a copy of the latest version of SAA HB29 on site for reference during the execution of the respective tasks.

Maintain at least one up-to-date copy of all listed standards at the headquarters of each field crew and ensure that all installers have read the standards and familiarised themselves with the contents.

4.2 ACA/ACIF Technical Standards

For all works detailed in this specification, comply with the following standards incorporated in the Standards Australia “Communications Cabling Manual” Full Package as amended to date of installation:

AS/ACIF S 009- 2001 Installation Requirements for customer cabling
amended 18 Dec 2002

AS/ACIF S 008- 2001 Requirements for authorised cabling products
amended 18 Dec 2002

ACIF standards may be downloaded free of charge from the ACIF website
www.acif.org.au .

Comply with any gazetted amendments as they are released.

4.3 Agency Standards

Comply with any internal government agency standards scheduled in the tender or contract documents.

Where a conflict exists between the agency standard and this standard specification, the agency standard shall take precedence.

5 CABLE PATHWAYS

5.1 Intra-Building Cable Pathways

5.1.1 General

Provide intra-building cable pathways and support systems which allow the IT&T cabling to maintain independence and segregation from other services.

Avoid tying cables to fire, hydraulic and mechanical services pipes, ducts or suspension rods and mounts.

5.1.2 Segregation

Choose a cable path which maintains AS/ACIF S 009 and AS 3000 mandatory segregations from electrical, steam and hot water services. Maintain a segregation of at least 300 mm wherever practical, and adopt additional segregation and isolation measures to minimize interference detailed in AS 3080 (ZA.1.3) taking into account the characteristics of the transmission equipment (ZA.1.3.4).

Maintain segregation clearances to the edges of any trays provided, to ensure that the entire tray width can be used without violating mandatory segregations.

5.1.3 Vertical Backbone Pathways

5.1.3.1 General

In the absence of further site specific data, provide vertical pathways dimensioned and installed to AS 3084 (Clause ZB 4.2), including sleeves, fire stopping and trays.

5.1.3.2 Multi-Tenant Risers

Install all vertical backbone cabling on tray dedicated to the respective tenant agency. Where inadequate tray exists, provide new additional tray with at least 30% spare space remaining after completion of the works.

5.1.4 Major Horizontal Pathways

5.1.4.1 Cable Support Systems

Major pathways link telecommunications distribution closets to local distribution "zones" as defined in AS 3084 (ZB 3.5.3.4).

Provide Ceiling Pathways to AS 3084 (ZB 3.3, ZB 3.5) following orthogonal building lines and located in ceiling space above walkways and streets unless otherwise approved.

Where ceiling construction method (such as glass) makes ceiling distribution impractical, provide under floor, bulkhead, in slab or in-wall conduits or ducting to AS 3084 (ZB 3.4, ZB 3.9).

Where underfloor distribution is the preferred method (such as in a building with wooden floor or suspended slab erected on piers or footings with accessible crawl space under the floor), provide a catenary suspension system to AS3084 (ZB3.6). Ensure segregation from hot water and low voltage electrical mains cables of at least 150 mm is maintained where possible and conduit protection provided for cables elsewhere.

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

Dimension trays or ducts in accordance with AS 3084 ZB 3.3 “Cable Trays and Ducts” unless otherwise specified.

Provide cable tray or ladder for cable support throughout all risers and to support all groupings of 25 or more horizontal outlet cables whether in ceiling spaces or under floor. Use cable tray fastened directly to the structure above with cables tied underneath only where mechanical and electrical services make installation of suspended tray or ladder impractical.

Alternative support systems such as cadmium plated telephone exchange style overhead mesh may be submitted for approval.

Provide catenary suspension of groups of from 7 up to 24 horizontal cables following the same route. Tie cable to catenaries in accordance with AS 3084 (table ZB6), taking care to avoid crushing or overtightening of cables. For cat 6 cable runs, use ties with a soft or rounded edge and wide profile such as those using the “Velcro” system.

5.1.4.2 Cable Routing Practices

Adhere to routing practices shown in standard drawing MMV-CS-01 “Cabling Support and Routing Practices”.

Route cables along tray lines and consolidate to maximise spare tray space.

Provide tray bends at transitions from horizontal to vertical.

Provide a round edged guard or sleeve over tray edges and ends to protect cables where they leave the tray and maintain bending radius.

In the ceiling or under the floor, form cables into groups matching grouping of cables at the distributor before the vertical transition to the distributor, and run accordingly, (as detailed in standard drawings MMV-CS-03, MMV-CS-06, and MMV-CS-07). Note that this requirement does not extend to the entire cable run. Comply with any manufacturer recommendation for random cable lay for alien crosstalk minimisation if this is a condition of the manufacturer’s warranty.

5.1.5 Local Horizontal Distribution

Provide local distribution pathways within a zone to outlets to route, support and protect cables in accordance with AS 3084 (Clause 7 and ZB 3.4 to ZB 3.9). Comply with practices detailed in standard drawing MMV-CS-01 “Cabling Support and Routing Practices”.

Where conduits are provided through masonry or blockwork to provide a pathway from ceiling space or under floor to perimeter ducting, dimension the total volume of conduits on the basis of AS 3084 (ZB 3.4 to 3.9) for the specified cabling, plus 30% spare volumetric capacity for future cable additions.

Provide draw cords or draw wires in all spare or partially used conduits.

Provide fittings capable of maintaining cable bending radius as detailed in AS 3080 (table 25), restricting pull tension as specified by the cable manufacturer, and meeting AS/ACIF S009 mandatory separation and segregation requirements.

5.1.6 Wiring Concealment

Conceal wiring in ceiling spaces, wall cavities or under floors wherever practical.

Where solid walls, ceilings or floors prevent alternative approaches, and the site specific contract documents do not require chasing of cables, use either

- surface run clip on cover rectangular section plastic ducting screw fastened at intervals not exceeding 500 mm, using fittings designed to maintain bending radius of 25 mm for Cat 5 or 50 mm for Cat 6 (as applicable) at all corners and changes in direction, fitted with end caps on all exposed duct ends. Ensure duct covers, corner and end caps are a tight fit. Duct colour: default white, brown on dark timber surfaces, otherwise to match wall colour if available.
- surface run conduit screw fastened at intervals not exceeding 500 mm using saddle brackets or wall fastening clips, conduit and brackets painted to match wall finish, using elbows or flexible conduit designed to maintain bending radius of 25 mm for Cat 5 or 50 mm for Cat 6 (as applicable) at all corners and changes in direction, fitted with end caps on all exposed conduit ends.
Conduits shall be flush with the wall surface unless otherwise approved.

Dimension all such ducting for 50% spare cable carrying capacity after completion of the specified installation. Locate conduit and ducting to minimise visibility, generally at the edges or corners of wall surfaces or building elements, or behind drapes. Avoid conduit and duct runs across pinboards or behind pictures, whiteboards or wall hangings. Conceal or make good all holes through building elements joining duct or conduit sections.

5.2 Inter Building Backbone Pathways

5.2.1 General

On sites containing multiple buildings, provide backbone cable pathways and building entry facilities to each building.

Provide underground pathways unless otherwise specifically agreed in writing.

5.2.2 Underground Pathways

5.2.2.1 General

Provide a complete underground pathway system to link buildings in accordance with AS 3084 (Clauses 8 and ZB5).

5.2.2.2 Dimensioning

The conduits provided may carry compatible non-telecommunications services such as MATV, security and public address, providing regulations covering the sharing of conduits containing telecommunications services are observed for any specific conduit.

Where the link is a local pathway between two buildings only, provide conduits dimensioned to the “spur conduit” size below.

Provide pathways with the following minimum dimensions unless otherwise specified in project specific documents:-

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

Total floor area (all storeys) of Buildings Being Linked (m ²)	Floor area served by Building Distributor in one building (m ²)	Spur Conduit quantity and diameter (mm)	Campus backbone route and entry into building housing Campus Distributor	Minimum Pit Size at Junction
<2,000	<500	2×50	4×50	P3
2,000 - 5,000	<1,000	4×50 or 1×100	2×100	J6
5,000 - 20,000	<4,000	2×100	4×100	Access Hole
>20,000	>4,000	4×100	8×100	Access Hole

5.2.2.3 Access Holes and Pits

Provide one access hole or pit outside the building housing the Campus Distributor, and at

- every present and future spur point to other buildings
- every second corner and/or at 90° bends
- a maximum of 100 m intervals along the backbone route.

Lay conduits to enter the pit at the pit ends. Provide sweeping bends on these conduits to accommodate direction changes. The direction of cable runs shall not be changed within pits.

5.2.2.4 Draw Cords

Provide rot-proof draw cords in all partially occupied or vacant new or altered conduits to facilitate the pulling of future cables.

5.2.2.5 Compliance With Installation Requirements

Comply with all AS 3084 requirements for underground cable pathways, including route selection, provision of drainage, vermin protection, venting and other mechanical requirements.

5.2.2.6 Reinstatement

Fully reinstate any surfaces necessarily disturbed during establishment of the cable route to original surface condition.

5.2.3 Overhead Pathways

Where buildings are linked by covered walkways or gantries, cable tray or ladder conforming to dimensioning rules for vertical pathways in AS 3084 (ZB4.2.3) may be provided, subject to approval. Provide enclosure, fasteners and mechanical protection for cabling in the form of metal conduits, metal ducts or covers to prevent vandalism or accidental damage. Dimension the pathway for 50% spare capacity.

5.2.4 Aerial Pathways

Where links to temporary buildings are required, or site conditions such as large rock and concrete areas and lack of covered walkways preclude preferred approaches, provide catenary suspension systems for aerial cables in accordance with AS 3084.

Avoid routes susceptible to damage by vandalism, trees and plants, sporting activities, and unusually high motor vehicles.

6 IT&T DISTRIBUTION CABLING SYSTEM

6.1 General Scope

The scope of works generally comprises provision of:-

- Horizontal distribution cabling from modular outlets (including ceiling level wireless LAN access points back to a floor distributor.
- Floor distributor racks and patch panels.
- Horizontal distribution within a computer or server room from the room distributor to every server cabinet.
- UTP and/or data backbones from each closet to a campus computer room, network room or building data communications centre.
- Multipair voice backbone cable to a BD, CD or TPF for PABX, ISDN, PSTN and leased line service distribution (complete backbone cabling where none existing).
- Cable pathways to facilitate the above.
- On a new building project or complete refurbishment, establishment of new CD and entry facilities.

6.2 Default Scope

Where the site specific documents contain no scope, no details of outlet locations, or site specific documents do not exist, adhere to the following scope:-

Provide a complete and tested cabling system comprising all the elements detailed in the General Scope above comprising:-

- Triple workstation outlets comprising 3 × modular Cat 6 sockets with 3 × 4pr Cat 6 links to three Cat 6 patch panel sockets at the respective floor distributor in every
 - individual enclosed office
 - office workstation in other areas
 - area of 15 m² of open office space
 - conference room, classroom or tutorial room
- Single or multi-gang outlets comprising a modular Cat 6 socket with 4pr Cat 6 link to a Cat 6 patch panel socket at the respective floor distributor at every
 - printer, fax, point of sale and info-kiosk location
 - computer workstation in computer training or resource rooms
 - other IT&T device, terminal or phone not associated with workstations
- Twelve-way outlets comprising a modular Cat 6 patch panel (minimum 12-way) with 12×4pr Cat 6 links to 12×Cat 6 patch panel sockets at the respective floor distributor at the top rear of every scheduled server rack.
- One single gang Cat 6 Wireless Access Point (WAP) outlet per 400 m² of lettable floor area on every floor within the scope of works, comprising a modular Cat 6 socket with 4pr Cat 6 link to a specially identified Cat 6 patch

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

panel socket. Mount the outlet in the ceiling space, on the ceiling, or on a wall within 200 mm of the ceiling. Cover large floor areas by dividing up the floor area into 12 m radius cells covering the entire lettable floor area without gaps and locating the WAP outlet within ± 3 m of the centre of each cell, avoiding locations within 2 m of structural columns and 750 mm of overhead structural beams.

- Voice and Data Backbone Cabling throughout, dimensioned as detailed under “Structured Cabling System Architecture” below, fully patchable at the floor distributor and pair managed/patch by exception through any intermediate building distributors to the campus distributor. Unless all the computing and communications facilities are co-located, the campus or building distributor for voice may be on a different floor or even in a different building to the campus data distributor.
- Patch panels, pathways, termination frames, equipment racks, patch cord minders and patch cords all dimensioned for a minimum of 50% future expansion space, with 10% minimum spare capacity equipped but not occupied or terminated. Riser and inter-building pathways must cater for different voice and data backbone routes if applicable.
- All cabling fully installed, terminated, tested, labelled and documented in accordance with this specification.

6.3 Structured Cabling System Architecture

6.3.1 General

Provide cabling conforming to AS 3080 generic cabling system structure and performance standards, with the requirement that all horizontal (outlet) distribution permanent links be verified compliant with the performance parameters detailed in that document against the specified cabling performance (Cat5/ClassD or Cat6/ClassE in accordance with the site specific documents).

Unless stated in the site specific contract documents, provide a cabling system fully conforming to the primary/campus, secondary/building, tertiary/floor radial star configured architecture detailed in clause 5 of AS 3080.

Where specified in the site specific documents, employ the MUTO or CP open office cabling options detailed in AS 3080 clauses 5.7.5.3 and 5.7.6.

6.3.2 Site Specific Variations

Only where called up in site specific documents, the following variants to the standard architecture may be provided:-

- Where individual floor areas in a multi-storey building are less than 750 m², a single telecommunications closet may serve its own floor, the floor above and the floor below, in a system with one closet per three storeys.
- Data fibre optic backbone may be dispensed with in 1,2 or 3 storey buildings where all closets are within 80 m cable length of the building or campus distributor, all power sub-boards are earthed from a single MEN point.
- Where the arrangement of buildings is in several clusters with large spaces between them and a wide diversity of cable routes, one building distributor in

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

each cluster may serve as a backbone distributor to nearby buildings, providing cross connect and possibly intermediate switching to a high capacity backbone from that building cluster to the campus distributor.

- Jumpering and patching of telephone and/or data services including connection of tagged point of entry services at the campus distributor, and completion of full service details in CD, BD and FD frames throughout the campus.

6.3.3 Horizontal Cabling Architecture Variations

6.3.3.1 Standard

Unless otherwise specified in the site specific contract documents, provide cabling comprising individual Category 6 4pr 100 ohm UTP links from fully loaded modular patch panels at the floor distributor closet or panel to modular outlets at all outlet locations nominated on the site floor plans, schedules or site tour of inspection.

Provide multi-gang outlet points on a single wall plate or outlet assembly where two, three or more Cat 6 links are required at a location or workstation. Cable every outlet socket in a separate Category 6 4pr 100 ohm UTP cable to a corresponding socket at the patch panel.

Provide connecting hardware and terminations complying with the AS 3080 "T568A" configuration.

6.3.3.2 Multiple User Telecommunications Outlet

Where specified in the site specific documents, provide MUTO cabling to all or nominated workstation locations in accordance with AS 3080 clause 5.7.5.3.

6.3.3.3 Consolidation Point Cabling

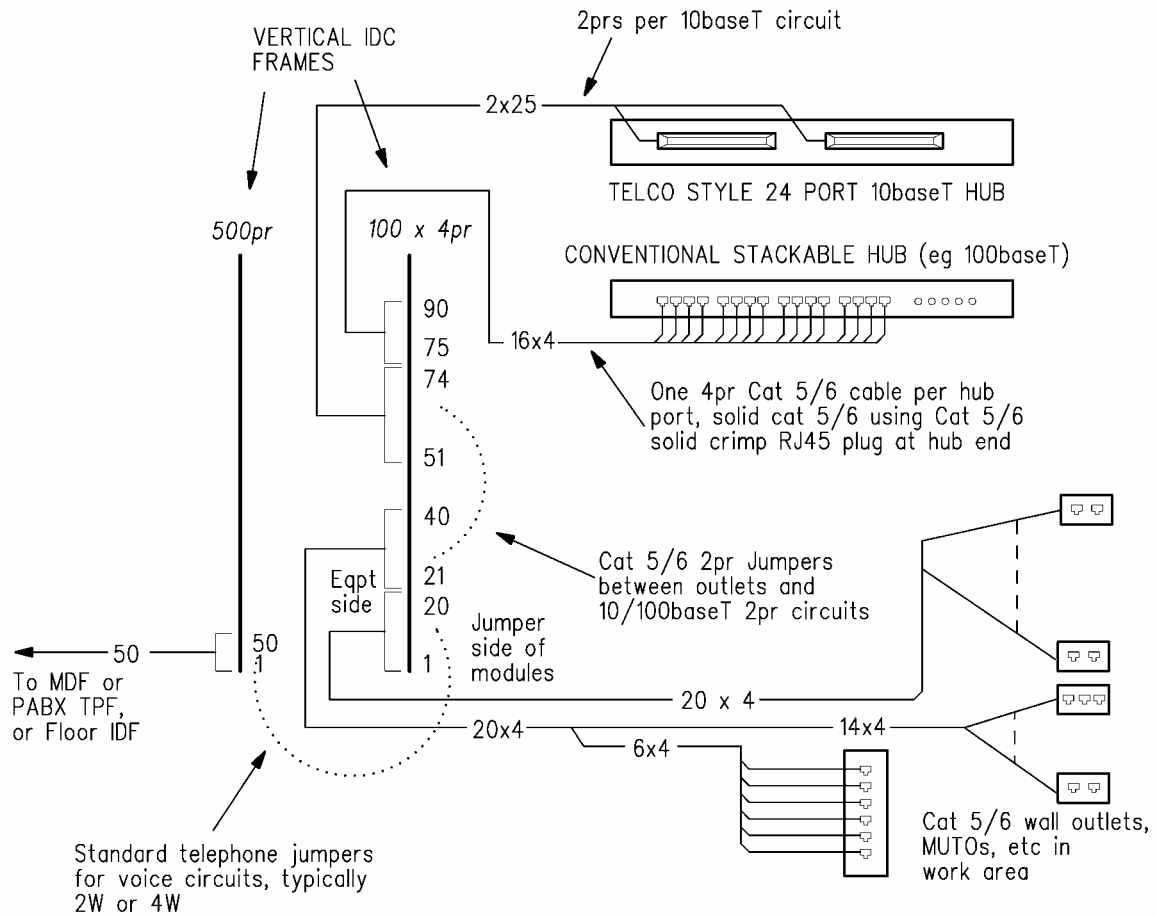
Where specified in the site specific documents, provide CP cabling to all or nominated workstation locations in accordance with AS 3080 clause 5.7.6.

6.3.3.4 Pair Management and Patch By Exception

Where specified in the site specific documents, provide pair management or patch by exception cross connect facilities in lieu of patch panels at the floor distributor. This architecture variant may be used with Standard, MUTO and CP schemes. The floor distributor equipment shall meet AS3080 connecting hardware specifications for the performance category specified in the site specific documents (Cat 5 or Cat 6) with the additional requirement for compliance with the permanent link and channel performance specified in AS3080 on completed permanent links and channels. Channel performance applies to the patch by exception alternative.

On small sites, a mixture of pair management and patch by exception for backbone lines and standard modular patching for horizontal cabling may be specified in the site specific documents. A typical example is shown below. In such cases, provide the specified cabling arranged in accordance with the requirements of the site specific documents.

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**



TYPICAL PATCH BY EXCEPTION CABLING ARRANGEMENT

6.3.4 Cable Types and Performance

6.3.4.1 General Cable Performance

Provide only cables meeting AS/ACIF S 008 and meeting or exceeding AS 3080 performance specifications for the respective copper category/construction or fibre type throughout the entire installation, subject to the further performance criteria detailed below.

6.3.4.2 Cable Selection

Unless otherwise specified in site specific documents, provide the following default cable types and minimum capacities according to the respective cable run route:-

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

Route	Capacity unless noted	Internal	Aerial <200m	Underground <200m	Underground >200m
Horizontal outlet	4 prs per socket	Category 6 UTP (or Cat 5 UTP if specified in site specific documents)	Category 6 UTP (or Cat 5 UTP if specified in site specific documents) in UV rated black flexible conduit on catenary or outdoor UV rated sheathed enhanced Cat 5 UTP (see 6.3.4.3)	Underground rated AS 3080 Class D standard compliant Cat 5 UTP or moisture barrier STP rated for long term water immersion or direct burial (routes <80 m)	2pr moisture barrier external telephone cable rated for long term water immersion or direct burial (voice only)
Voice backbone	1 pr min per 5 m ² NLA	Internal telephone cable	UV rated external telephone cable	Jelly filled moisture barrier underground rated external telephone cable	Jelly filled moisture barrier underground rated external telephone cable
UTP Data/ Video/ VDSL Backbone	1x4pr Cat 5 per 200 m ² NLA	Category 6 UTP (or Cat 5 UTP if specified in site specific documents)	Category 6 UTP (or Cat 5 UTP if specified in site specific documents) in UV rated black flexible conduit on catenary or outdoor UV rated sheathed enhanced Cat 5 UTP (see 6.3.4.3)	Underground rated AS 3080 Class D standard compliant Cat 5 UTP or moisture barrier STP rated for long term water immersion or direct burial (routes <80 m)	Not recommended
Fibre Optic Data Backbone	2 fibres per 400 m ² NLA, 4 fibres min	50/125 µm OM3 graded index multi-mode heavy duty riser grade (see note2)	50/125 µm OM3 graded index multi-mode riser grade with external UV rated sheath (see note2)	66% 62.5/125 µm OM1 graded index multi-mode/ 33% 9/125 µm single mode (composite or separate cables)- or 100% 50/125 µm OM3 graded index multi mode- underground jelly filled moisture barrier loose tube cable (see note 1)	50% 62.5/125 µm OM1 graded index multi-mode/ 50% 9/125 µm single mode (composite or separate cables)- or 100% 9/125 µm single mode- underground jelly filled moisture barrier loose tube cable (see note 1)

Note 1: 62.5/125 µm (AS3080 “OM1”) cable is only permitted when run in conjunction with single mode optical fibre, which provides the bandwidth required for future Gigabit and 10 Gigabit Ethernet and beyond.

Note 2: On existing sites with a large amount of existing 62.5/125 µm legacy fibre installed, it may be desirable to continue using the same cable for any new links providing the life and limitations are understood as per the AS 3080 optical fibre classification system, as mismatch and loss problems could arise in attempting to patch multimode links of different core diameter together. Where mixed diameter multimode fibre is used on a site, cords and patch panel ports shall be tagged and/or colour coded to distinguish 50/125 µm OM2 or OM3 from 62.5/125 µm OM1 links and cords.

6.3.4.3 Horizontal Cable Performance

Horizontal cable performance shall meet AS 3080 performance for category 6 cable, (except where Cat 5 cable is specified in the site specific documents, where cable performance shall meet AS 3080 performance for category 5 cable). Note that

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

AS 3080 references ISO 11801 which in turn references other ISO or IEC documents.

6.3.4.4 Horizontal Connecting Hardware Performance

Provide patch panels and outlets meeting AS 3080 performance for category 6, (except where Cat 5 is specified in the site specific documents, where component performance shall meet AS 3080 performance for category 5 terminations and outlets). Note that AS 3080 references ISO 11801 which in turn references other ISO or IEC documents.

6.3.4.5 Horizontal Link Performance

Links shall meet AS 3080 performance for Class E permanent links, (except where Cat 5 is specified in the site specific documents, where link performance shall meet AS 3080 permanent link performance for Class D).

6.3.4.6 Patch Cord Performance

Provide patch cords complying with AS 3080 performance for Class E Balanced Cords (clause 13), (except where Cat 5 is specified in the site specific documents, where Balanced Cord performance shall meet AS 3080 performance for Class D).

6.3.4.7 Horizontal Channel Performance

Notwithstanding the above cable and connecting hardware and link performance, completed channels using the patch cords supplied shall meet AS 3080 performance for Class E, (except where Cat 5 is specified in the site specific documents, where channel performance shall meet AS 3080 performance for Class D).

6.3.5 Horizontal Outlet Component Performance Verification

Provide patch panels, outlet sockets, punch downs and cables independently verified and continuously monitored for full compliance with all AS 3080 UTP cable parameters to Cat 6 (except where site specific documents specify Cat 5), either UL or ETL verified, or other independent NATA laboratory verification system subject to approval. (This is in addition to the requirement for the end-to-end link and channel performance to meet the requirements of 6.3.4.5 and 6.3.4.7 above).

Note:- This requirement exceeds AS/ACIF S 008 and former ACA Certified Components List requirements.

6.3.6 Copper Termination System

6.3.6.1 Uniformity

Provide a uniform punch-down termination system throughout the cabling provided.

6.3.6.2 Termination Capability

Where the installation involves underground cables, provide backbone IDC terminations rated for termination of any CCM part 99 listed underground cables with solid conductors ranging from 0.4 mm to 0.65 mm dia and underground thickness pair insulation.

6.3.6.3 Existing System Expansion

Where a structured cabling system already exists on a campus, provide new patch panels, termination frames and outlet sockets with insulation displacement terminations tool compatible with those already existing.

Where a building or campus has an existing Krone LSA plus based voice backbone distribution which will be merged or joined with the new cabling, provide connecting hardware which can be terminated using the Krone LSA tool.

Where a building or campus has an existing mixed termination system voice backbone distribution with mainly solder tag block or screw terminal and less than 50% IDC frames of one or more current or legacy systems, maintain tool uniformity on the new cabling only.

6.3.7 Fibre Termination System

6.3.7.1 Uniformity

Provide a uniform connector system throughout the fibre cabling provided.

6.3.7.2 Existing System Expansion

Where a structured cabling system or fibre optic backbone system already exists on a campus, provide new fibre panels and connectors mating compatible with those already existing.

Where mixed diameter multimode fibre is used on a site, cords and patch panel ports shall be tagged and/or colour coded to distinguish 50/125 μm OM2 or OM3 from 62.5/125 μm OM1 links and cords.

7 CABLING INSTALLATION STANDARDS

7.1 General

7.1.1 Standards Compliance

Comply with ACA standard AS/ACIF S 009 throughout the entire works, and to AS 3080 and AS 3084 where relevant. Cat 6 cabling shall further comply with AS 3080 (note in particular that Table 25 requires a bending radius of 50 mm for 4-pair Cat 6 horizontal cable which has an outer diameter exceeding 5 mm).

7.1.2 Cable Pathways

7.1.2.1 Cable Installation

Install cables on or in pathways described in section 5 above.

7.1.2.2 Draw Cords

Where cable is drawn through conduits, pull new rot-proof draw cords through all partially occupied conduits and leave in situ to enable future cables to be drawn through the vacant space.

7.1.2.3 Cable Loops

Provide 3 m cable loops at underground access holes and pits at a maximum spacing of 200 m to provide cable slack for future jointing, repair or maintenance. On shorter underground runs, provide at least 3 m slack at one end of the cable before routing the cable to termination frames.

7.1.3 Conformance With Standard Drawings

Conform with the practices shown in the standard drawings MMV-CS-01 and MMV-CS-02, and the standard drawings relevant to the installation of MMV-CS-03 to MMV-CS-09.

7.1.4 New Materials

Incorporate only new and first grade materials into the works.

7.2 Horizontal and Backbone Cat 5/6 4pr UTP Cabling

7.2.1 General

Provide cabling and terminations meeting AS 3080 Cat 6 (or where allowed by site specific documents Cat 5) UTP performance standards, installed in accordance with AS 3080 and AS 3084 standards, using cable pathway techniques detailed in this specification.

All completed indoor links shall achieve the performance of 6.3.4.5, as measured on a Level 3 compliant field test set with pass/fail thresholds set to meet the criteria of 6.3.4.5. Where the site specific documents require a Cat 5 solution, a Level 2e tester may be used which is capable of certification of the additional parameters not detailed in the Level 2 standard (ELFEXT, PSELFEXT, Return Loss).

7.2.2 Cable Termination and Labelling

Terminate cables strictly in accordance with AS 3080 termination practices in T 568A configuration. Provide installation materials and adhere to practices detailed

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

in standard drawing MMV-CS-02 “Outlet and Patch Panel Termination and Labelling”. In particular, ensure products and work practices are used which maintain 50 mm bending radius on 4-pair Cat 6 cables feeding into a point of termination.

Generally, cable identification labels should be batch pre-printed off site and applied to cables as they are drawn out of the reels and run, and before cutting off the reel. It may be necessary to provide three or four sets of each serial number to replace labels at the patch panel end after forming and dressing, and at the wall outlet after termination.

Terminate Cat 6 (or Cat 5 where indicated in site specific documents) UTP data backbones to the last available ports in the data patch field.

7.2.3 Voice and Data Termination Fields

Generally terminate and number all outlets sequentially on one consecutive patch panel socket field.

(Only where separate termination fields are specified in the site specific contract documents, terminate voice outlets sequentially on one patch panel socket field spatially adjacent to the voice backbone socket field, and terminate all other outlets to a data patch panel socket field spatially adjacent to data hub equipment. Where the total installation comprises less than 24 outlet sockets, terminate the voice outlets in a group on the left end of the patch panel, and data outlets on the right end).

7.2.4 Outlet socket and Plate Colour and Style

7.2.4.1 Standard Universal Voice/Data Scheme

Choose outlet plates to match the make and style existing or specified for power outlets. Provide black outlet sockets for coloured wall plates, and flush finishing white outlet sockets for white wall plates.

7.2.4.2 Colour Coded Segregated Voice/Data Scheme

Choose outlet plates to match the make and style existing or specified for power outlets. Where the site specific contract documents call for colour coding of voice and data wall outlets, provide red sockets for voice and blue sockets for data.

Where multi-gang electrical flush wall plates are not suitable for reasons of possible furniture placement or a need for surface mounting, provide side entry surface mount sockets with a maximum height of 25 mm, oriented for side entry of the fly lead.

7.2.5 Distributors (UTP Patch Panels)

Provide Cat 6 (or Cat 5 where required by site specific documents) modular patch panels and accessories if necessary with the following features:-

- Punch down terminations
- Minimum density of 24 outlets per Rack Unit.
- Snap in or slide in window style plain paper labelling system.
- Front face compatible with offered vertical wire management mountings.

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

- Rear cable support system which allows the cables to be secured at least 25 mm clear of the IDC terminations and which guides the cables into the patch panel in a manner which maintains 50 mm bending radius.

7.2.6 Distributor and Outlet Labelling for Horizontal Cabling

7.2.6.1 General

Label every outlet with a number unique to the campus, generally in accordance with the methodology of HB29 Figure 5-18. The outlet ID prefix shall conform to the site building and floor level numbering scheme as detailed on site plans and as finally designated generally on stairs and lifts.

Provide at least three characters to identify workstation/socket. Where no contrary convention already exists on the site, identify sockets with sequential 3-digit numerals (rather than the A,B,C system implied in HB29). Follow the A,B,C convention if specified in the site specific contract documents.

Restrict the corresponding label on the patch field itself to the workstation/socket part of the socket number without the distributor identification prefixes.

Label each distributor at the rack head, on the door, or at a clearly visible location in letters at least 15 mm high with the distributor number unique to the campus. Generally this will be of the form

[building code][floor][rack/hub][distributor field]

Terminate and number patch panel outlet socket fields from top left corner across and down to bottom right hand corner.

Example

For outlet 26 on UTP field designated UA and fitted to rack B floor 7 of building A, provide the designation A7B-UA-026. The adjacent outlet would be labelled A7B-UA-027.

7.2.6.2 Additional Requirements For Segregated Voice & Data Patch Fields

Only where the site specific Contract Documents require the provision of segregated voice and data patch fields with colour coding, print patch panel labels on coloured paper or shade labels using highlighter, to distinguish voice outlets from data outlets. Provide a further snap in label or engraved traffolyte label on or above the top patch panel of each of the voice and data patch fields labelled "Voice Outlets" and "Data Outlets" respectively. Provide red labels for voice and blue labels for data.

Where a 1:1 relationship between voice and data outlets does not apply, the voice and data outlet numbers on any one wall plate may be completely different. Where a colour coding or icon system is not in use, the termination field shall be identified by a V or D before the outlet number on the wall plate (to indicate which patch field the socket is connected to in the standard manner).

Example

For voice outlet 26 on rack B floor 7 of building A, provide the designation:- A7B-V-026. The adjacent data outlets on the same plate would be labelled A7B-D-051 and A7B-D-052 if the site specific documents called for two data outlets and a voice outlet at every work station.

7.2.7 Patch Panel and Outlet Labelling for UTP Data Backbones

Label UTP data backbones using the same convention as other backbone routes, and use blue shading on socket labels.

Use computer label printing methods with sufficiently small font to accommodate the label text.

Example

The second cable in a group of Cat 5 UTP backbones, running from block A ground floor computer room, rack 3E, backbone patch field identified B, socket 92, to block C floor 1 rack 2B socket 24 would be designated:-

- On cable:- U5 / AG 3E / C1 2B / 4pr /#2
- At computer room patch panel socket:- C1 2B/024-B092
- At block C closet patch panel socket:- AG 3E/B092-024

7.3 Closets and Equipment Racks

7.3.1 Standard Floor Distributor Closet Layout

Standard drawing MMV-CS-03 shows the minimum sized standard closet layout.

Use installation practices and adopt a spatial arrangement which conforms to the clearances and equipment relationships of standard drawing MMV-CS-03.

Where no closet exists, install the rack(s) in an approved open office area or store room.

7.3.2 Campus Computer Room and PABX Room Layout

The layout of campus distributor racks in computer rooms and PABX rooms or building distributors is beyond the scope of this standard. Refer to site specific contract documents. Where no further detail is provided, comply with AS 3084.

Follow the spatial arrangement of racks with each other and general layout principles for rack equipment and accessories described in 7.3.1 above.

7.3.3 Standard Enclosed Equipment Racks

7.3.3.1 Patching and LAN Equipment Racks

Provide one 45 RU minimum enclosed equipment rack for every 750 m² NLA or part thereof, unless otherwise scheduled in site specific contract documents.

Provide racks with the following construction:-

- conforming to IEC 60297 equipment mounting dimensional standards
- cabinet width capable of accommodating the vertical management requirements applicable to the installation as detailed in “Vertical Patch Cable Management” below
- steel frame with solid dowel frame alignment to adjacent racks of the same type
- steel removable side panels and lockable steel rear door
- steel mounting rails punched to take M6 captive nuts at 1RU and intermediate (½RU) spacings

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

- minimum equipment mounting depth behind rack rails of 500 mm
- lockable smoked glass or perspex front door with internal clearance of 150 mm from rack rails and viewing window width of at least 450 mm.
- side mounted copper earthing strap or earth bonding point
- internal side/rear mounted 18 way vertical power rail suitable for plug pack installation in every socket (minimum socket spacing 55 mm) and clear of shelving accessories, with power plug fitting to suit attachment to captive outlets
- internal vertical cable tray for incoming cables
- grommeted or bushed cutouts for cross patching between adjacent racks (where more than one provided)
- natural ventilation louvres at sides, front and rear of base, and at top of rack cabinet
- NC30 fan forced ventilation option where electrical load of installed hub equipment exceeds 300 VA.
- Powder coated flame retardant paint finish, colour selected from standard range for closest match to architectural finishes.

7.3.3.2 Server Racks

Provide additional 45 RU minimum server racks where scheduled in the site specific contract documents. Provide racks with the following construction:-

- lockable perforated metal steel rear door (ventilated across the full height and width of the door apart from the door frame)
- lockable perforated metal or composite perforated metal/louvre and tinted window front door with internal clearance of 150 mm from rack rails, (ventilated for air flow through between 40% and 100% of the door area)
- steel frame and steel removable side panels
- steel mounting rails conforming to IEC 60297 equipment mounting dimensional standards punched to take M6 captive nuts at 1RU and intermediate (½RU) spacings
- minimum equipment mounting depth behind rack rails of 600 mm
- side mounted copper earthing strap or earth bonding point
- a minimum of three mounting shelves at least 500 mm deep and a slide out keyboard tray
- internal side/rear mounted 18 way vertical power rail suitable for plug pack installation in every socket (minimum socket spacing 55 mm) and clear of shelving accessories, with power plug fitting to suit attachment to captive outlets
- Powder coated flame retardant paint finish, colour selected from standard range for closest match to architectural finishes.

7.3.3.2 Keys

Provide lock barrels keyed alike throughout a site, or keyed to tenant requirements as detailed in site specific contract documents.

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

7.3.3.3 Shelves

Provide two 400 mm minimum depth ventilated tray-type shelves per rack to support non rack-mounting interfaces and equipment. Locate the trays as directed in the site specific contract documents.

Where no further direction is given, locate the trays to facilitate equipment placement above or below the following, according to the spatial arrangement:-

- Data backbone
- Data hub equipment
- Data or Universal outlets
- Voice backbone or voice outlet patch field (where segregated)

7.3.3.4 Layout

Lay out the equipment racks and facilities to minimise patch cord crossovers and minimise vertical patches. Ensure fixed cables do not encroach on the space between rack rails.

As a default, follow the general principles and arrangements shown in standard drawing MMV-CS-04 where possible.

Where the site specific contract documents call for segregated voice and data outlet patch fields, follow standard drawing MMV-CS-05.

7.3.3.5 Vertical Patch Cable Management

Provide one vertical cable management ring of 2,000 mm² minimum cross section at 4RU spacings mounted on or outside the rack rails along the full height of both sides of every patch panel or LAN equipment rack.

On all racks larger than 18 RU, provide vertical cable management rings with large diameter rounded corners to facilitate maintenance of a 25 mm minimum patch cord bending radius on all patch cord slack.

Where the site specific contract documents call for a spatial relationship between patch panels and equipment which involves more than 50 vertical patch runs down either side of the rack, provide vertical cable management rings of 7,500 mm² minimum cross section at 4RU spacings mounted on or outside the rack rails along the full height of both sides of every rack, offset mounted to avoid encroachment of the patch cables onto the equipment space.

On enclosed equipment racks, this will require the provision of Type 650 or equivalent (800 mm wide) dimensioned cabinets with 19" reduced interior mounting rails. Alternatively, provide proprietary enclosed equipment rack styles featuring standard 19 inch mounting rails with cable management troughs outside the rails fitted with spools or bobbins designed to locate vertical patch cables and maintain 25 mm radius bends at horizontal/vertical transitions.

7.3.4 Open Frame Rack Options

7.3.4.1 General

Where indicated in the site specific contract documents, provide open frame equipment racks and accessories in the nominated closets, in accordance with standard drawings MMV-CS-06 or MMV-CS-07, and MMV-CS-08.

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

Provide racks in the range 42 RU to 45 RU with the following construction installed in accordance with these standard drawings:-

- conforming to IEC 60297 equipment mounting dimensional standards
- rails constructed of a C channel section steel, channel depth at least 25 mm
- top mounting bracket and base plates
- solid dowel or bolt rail alignment to adjacent racks of the same type
- wall brace assembly (or swivel mounting on top and bottom plates with top and bottom catches for single rack shallow closets)
- mounting rails punched to take M6 captive nuts at 1RU and intermediate (½RU) spacings, on both front and rear of rails
- rail earthing point free of paint finish
- recessed rail mounted six way horizontal power rail suitable for plug pack installation into every socket (minimum socket spacing 55 mm) and clear of shelving accessories, with power plug fitting to suit attachment to captive outlets
- side and top cable tray for incoming cables
- powder coated flame retardant paint finish, colour beige, grey or switchboard green

7.3.4.2 Shelves

Provide two 350 mm minimum depth cantilever trays per equipment rack to support non rack-mounting interfaces and equipment. Locate the trays as directed in the site specific contract documents.

Where no further direction is given, locate the trays to facilitate equipment placement above or below the following, according to the spatial arrangement:-

- Data backbone
- Data hub equipment
- Data or Universal outlets
- Voice backbone or voice outlet patch field (where segregated)

7.3.4.3 Layout

Lay out the equipment racks and facilities to minimise patch cord crossovers and minimise vertical patches. Ensure fixed cables do not encroach on the space between rack rails.

Follow the general principles and arrangements shown in standard drawing MMV-CS-08 where possible.

7.3.4.4 Vertical Patch Cable Management

Provide vertical cable management rings with large diameter rounded corners to facilitate maintenance of a 25 mm minimum patch cord bending radius on all patch cord slack.

On single open frame rack installations, provide one vertical cable management ring of 2,000 mm² minimum cross section at 4RU spacings mounted on or outside the rack rails along the full height of both sides of the rack.

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

On installations of two or more open frame racks, provide large vertical management rings of minimum 10,000 mm² cross section at 5 RU spacing between all adjacent racks as shown in standard drawing MMV-CS-06. Behind the vertical management rings, provide rings, ladder or tray to support incoming cables to the rear of the racks.

7.3.5 Wall Mounted Cabinet (6U to 24 U)

Provide an enclosed wall mount equipment rack cabinet with quantity of rack units listed in site specific contract documents with the following construction:-

- conforming to IEC 60297 equipment mounting dimensional standards
- steel frame
- swing out rear access (whole cabinet hinged at rear)
- steel mounting rails punched to take M6 captive nuts at 1RU and intermediate (½RU) spacings
- minimum equipment mounting depth behind rack rails of 350 mm
- lockable smoked glass front door with internal clearance of 150 mm from rack rails and viewing window width of at least 450 mm.
- for cabinets sized 8U and greater, scheduled power rails suitable for plug pack installation (with minimum 55 mm socket spacing) and clear of shelving accessories. (Standard 6 to 12 way power boards with 45 mm socket spacings may be vertically mounted on the rear of the cabinet providing double the minimum number of sockets is provided to account for only every second socket being usable for hub and media converter plug packs).
- provide scheduled 200 mm minimum depth trays to support non rack-mounting interfaces and equipment.
- natural ventilation louvres at sides and or top of rack cabinet
- powder coated flame retardant paint finish, colour to match architectural finishes.

Mounting height as detailed in the site specific contract documents. Height to base 2200 mm above finished floor level (ie above head level) where no further direction is given.

Provide cable pathway to ceiling or under floor space from top or bottom of rack or to rear of rack as required. Where suitable wall cavities do not exist, provide tray down wall steel top hat powder coated to match wall finish.

Ensure fixed cable slack is provided and managed to allow the cabinet to be swung open through an angle of 90° for rear access without impediment.

Ensure the sides of the cabinet are far enough away from walls, shelving and other wall mounted items to allow the cabinet to be swung open through an angle of 90° for rear access without impediment.

7.3.6 Wall Frame Option For Small Sites

7.3.5.1 General

Where indicated in the site specific contract documents, provide wall mounting frames and accessories at the nominated distributor locations, installed and laid out in accordance with standard drawing MMV-CS-09.

Provide frames with the following construction installed in accordance with standard drawing MMV-CS-09:-

- conforming to IEC 60297 equipment mounting dimensional standards
- top and bottom dust cover plates
- depth 200 mm
- hinged at centre or rear of sides to allow frame to be opened for rear access without undoing any patch panel or rail mounting screws. It shall be possible to swing open a fully patched up rack through an angle of at least 90°.
- mounting rails punched to take M6 captive nuts at 1RU and intermediate (½RU) spacings
- frame earthing point free of paint finish
- powder coated flame retardant paint finish, colour beige, grey or black

Mount the frame in a location allowing the frame to be swung open for rear access without obstruction from furniture or wall fixtures.

Note: This arrangement only suits frames without doors, and non-frame-mounted equipment and fibre panels. It should not be copied with enclosed wall mounting cabinets with cabinet mounted fibre frames or equipment. Suitable arrangements for enclosed wall cabinets may be specified in the site specific documents.

7.3.6.2 Shelves

Provide wall shelves with chamfered or rounded front corners (to prevent accidental injury) as directed in the site specific contract documents.

Where no further direction is given, provide one shelf at least 300 deep and 600 wide.

7.3.6.3 Vertical Patch Cable Management

Provide one vertical cable management ring of 750 mm² minimum cross section at 4RU spacings mounted on or outside the rack rails along the full height of both sides of the frame.

7.3.7 Patch Cord Minders

Provide at least one patch cord minder for every

- 1RU of patch panel
- 12, 16 or 24 port data hub or switch or tray for non-rack-mount equipment
- 1RU of fibre optic patching capacity
- pair managed or patch by exception rack mounting frame or panel

Locate the minder either above or below each respective panel or equipment in the manner which optimises visibility of socket labelling after patching.

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

Provide minders with the following features:-

- At least four flexible-plastic cable guides suitable to hold at least 25 patch cords, with snap-closing operation to prevent patch cords springing out
- Provision for rear cable lacing on patch panel above (if lacing not available on patch panels supplied)
- Mounting arrangement suitable to accommodate the vertical cable management rings offered on rack rails
- 1RU height

7.4 Voice Backbone Cabling

7.4.1 Standard Topology

Provide the following elements:-

- Modular patch panels at the floor distributor to break out backbone cables
- Screw terminal blocks, CP, or pair management frame to terminate pairs designated for hard wired services (security and fire)
- Backbone cable to campus distributor
- Pair management / patch by exception frames at any intermediate cross connects between the floor distributor and the campus voice distributor
- Campus voice distributor comprising one of the following using a termination system with patch by exception/butt-in isolation and testing facilities, as specified in the site specific contract documents:-
 - PABX test point frame where site contains a PABX
 - Campus Distributor for telecommunications entry services (formerly MDF) where the PABX is tied directly to this CD, or where exclusively exchange line and/or Centrex services are used

Where site specific contract documents specify reuse of existing block cabling, provide cabling from the floor distributor to the nearest existing intermediate cross connect distributor (FD, BD or CD), and jumper backbone service lines through the existing distribution to the campus distributor.

7.4.2 Fully Patchable Topology

Where the site specific contract documents specify modular patching of telephone services at the campus voice distributor, provide a campus voice service modular cross connect patch panel together with limited pair management (all phone services and backbone lines fully modular patchable, fire and security lines jumpered via pair management).

Use the "Floor Distributor Termination Practices" detailed below at both ends.

7.4.3 Floor Distributor Termination Practices

7.4.3.1 Standard Methodology (more than 10 voice services)

At the floor distributor patch panel, strip back the cable sheath to the side of the rack and fan out backbone cables for sequential termination of cable pairs on sockets. Arrange the cable pairs into a loom, and tie the loom to a lacing bar. Terminate pairs into groups.

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

Fan out the total backbone cable pair count approximately as follows (subject to exact subdivision of pair count):-

- The first 50-52% of pairs to 2W services, by terminating one pair per modular socket to pins 5 and 4.
- The next 46-48 % of pairs to 8W services, by terminating 4 prs per modular socket in T568A 4pr sequence
- Redirect the last 4% of pairs to one or more standard 2pr telephone screw terminal blocks mounted on the rear rack rail, or to either a rack rear mounted FDP or recessed front mounted compact rack frame based patch by exception frame. Where the backbone cable is 25, 30, 35 or 40 pairs, terminate the last two pairs in the above manner.

Where the backbone pair count comprises multiple separate cables individually sheathed run over the same route, allocate whole cables to one type of service as far as possible.

Example

A single 50 pr cable would be subdivided as follows:-

- Pairs 1-24:- 24 × 2W sockets
- Pairs 25-48:- 6 × 8W sockets
- Pairs 49-50:- Terminal block.

7.4.3.2 Small Floor or Building Methodology (10 or fewer voice services)

For backbone cables of 20 pairs or less, provide a recessed front mounted patch by exception frame occupying 3RU or less, and provide pair management-modular outlet socket breakouts with an aggregate outlet socket count equal to 50% of the pair count.

7.4.3.3 Alternative 4-wire Methodology

Where specified in site specific documents, provide a 4-wire terminated backbone system as follows:

- At the floor distributor patch panel, strip back the cable sheath to the side of the rack and fan out backbone cables for sequential termination of cable pairs on sockets. Arrange the cable pairs into a loom, and tie the loom to a lacing bar.
- Fan out the first 96% of pairs to 4W services, by terminating two pairs per modular socket to pins 5&4 and 3&6 respectively.
- Redirect the last 4% of pairs to one or more standard 2pr telephone screw terminal blocks mounted on the rear rack rail, or to either a rack rear mounted FDP or recessed front mounted compact rack frame based patch by exception frame.

This procedure aligns 50 pair or 100 pair cables to groups of one or two 24 port patch panels respectively, and provides some termination capacity for non-patched services like security alarms.

7.4.4 Modular Patch Panels

To maintain equipment uniformity and interchangeability, use Cat 6 (or where directed in site specific documents Cat 5) patch panels throughout as specified in Clause 7.2.5 “Horizontal Cabling:- Distributors (Patch Panels)” above, even though the cable may be only Cat 3 or lower.

7.4.5 Campus and Intermediate Distributor Termination Practices

Intermediate distributors refer to BDs or FDs between the FD where backbone cable is broken out into patch panels, and the CD.

7.4.5.1 Patch By Exception Cross Connect Frames

Provide patch by exception frame features and comprehensive accessories including:-

- Termination system capable of double jumpering
- Break in and bridging test access capability
- Lockable flush or surface mount enclosures with at least 50% expansion capacity where frames are not located in lockable closets
- Paper record book holder and record book to match fully filled frame capacity
- Vertical and horizontal jumper guides for jumper management between frames
- Vertical pair count studs or snap in equivalent at the right end of each IDC module
- Hinged or fixed labels to identify each backbone cable source/destination
- IDC-modular break out option, complete with labelling facility for every modular socket
- Where site specific contract documents also call for patch by exception at the floor distributor, provide label system and labels to indicate every pair and 4 pr circuit, in addition to general backbone circuits

7.4.5.2 Termination

Install and terminate cables and frames strictly in accordance with the pair management / exception patch frame manufacturer’s recommendations, including:-

- cable fan out and securing practices
- goosenecks behind punch down modules and tying to rear of modules
- fan out of pairs onto modules
- adherence to standard incoming and jumper conventions
- fully completing cable details, and where jumpered also service details, in record books

7.5 Fibre Optic Backbone Cabling

7.5.1 Fibre Patch Panel

7.5.1.1 Standard Frame

Provide Fibre Optic patch panels and fittings with the following features:-

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

- Slide out access system for termination tray with means of firmly securing incoming fibre cables to the tray to avoid disconnection or damage on withdrawal of the tray
- Rear cable entry facilities allowing fibre cables to enter the frame without violating bending radius due to inadequate clearance between rear of frame when installed and rear of rack (subject to adequate cable slack being provided behind the patch panel), to suit the maximum number of fibre cables specified, or at least four fibre cables where no number is specified in the site specific documents
- Splice cassettes for pigtails or splices between backbone cables where required
- Sufficient internal fibre slack management guides to accommodate the number of fibres and cables to be terminated, (minimum quantity four)
- Minimum density of twelve fibre outlet sockets per 1RU
- Method for preventing stress and bending radius violations on patch cords such as connector mountings side angled away by 30 degrees or more from perpendicular to front panel, patch guides or radius spools, or deep recessing of the connector mounting plane
- Dust covers for all unused socket and frame punch outs, and for all terminations
- Snap in window style or fold down legend style labelling system allowing the standard backbone identification scheme to be supported
- Fibre patch cord tidy or cover
- Fibre ID record/test sheet

7.5.1.2 Wall Mount Option

Where the site specific contract documents require a wall mount installation in accordance with Standard drawing MMV-CS-09, provide a wall mount fibre termination point as follows:-

- Lockable and hinged front cover over terminations
- Dust covers for all unused cable entry holes
- Splice cassettes for pigtails or splices between backbone cables where required
- Sufficient internal fibre slack management guides to accommodate the number of fibres and cables to be terminated, (minimum quantity four)
- Side entry connector cutouts with dust covers for unused cut-outs, preferably angled towards the floor after mounting to prevent bending radius violations from draping patch cords
- Labelling system allowing the standard backbone identification scheme to be supported

Where the wall frame offered provides a hinged cover door for patches, provide the following additional facilities:

- Access to patches without exposing the fibre backbone terminations (ie separate and independent doors for terminations and patches)

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

- Guide snap closing rings or spools to maintain bending radius of the fibre patch cord and reduce longitudinal stress on the patch cord near the connector due to weight of the cord or stress on the cord resulting from tangles.

7.5.1.3 Connector Type

As a default, provide SC-Duplex terminations (connectors to AS 3080 mechanical and electrical standards).

Where the site specific contract documents require simplex connectors to carry unidirectional signals over single fibres such as baseband or broadband video, use SC duplex terminations but execute patches using simplex SC patch cords without a duplex adaptor. Ensure polarity maintenance of fixed cabling is considered in simplex applications.

Where the site has an existing installed base of ST patch fields, provide ST terminations (connectors to AS 3080 mechanical and electrical standards) on all new work on that site.

Use colour coded connectors to distinguish multimode from single mode connections in accordance with AS 3080 (MMOF beige, SMOF blue).

7.5.2 Labelling

Follow the standard backbone cable labelling methodology.

7.6 Backbone Labelling

7.6.1 General

Label backbone lines at every socket or termination appearance.

Label backbone cable sheaths at the following locations:

- Each end of the cable
- At the first and last riser shaft appearance
- At every access pit (underground routes only)

Provide colour shading on backbone labels as follows:

- blue for data backbone sockets (cat 5)
- red for 2W or 4W voice backbone sockets
- green for 8W voice backbone sockets
- white for multimode fibre sockets
- yellow for single mode fibres

7.6.2 Definition of Character Groups On Labels

7.6.3.1 Character Group 1

Tenant code, (4 char) [in multi-tenant building only, blank or unused otherwise]

7.6.3.2 Character Group 2

Medium type, two characters

U6	UTP Cat 6
U5	UTP Cat 5

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

S5	STP Cat 5
TP [or nothing]	Telephone
DC	Coax data
BV	Baseband Video Coax
TV	MATV coax
RC	Radio Link Coax
CF	composite single mode and multi mode fibre
MF	multi-mode fibre
SF	single-mode fibre

7.6.3.3 Character Group 3

Remote building (if more than one)

Remote floor (G if only one, two characters with leading 0 if more than 10 floors).

Remote frame or rack (Numbering must be unique between both traditional IDF/FDP's and racks/patch fields which may still exist. Generally frames follow sequence A, B, C, ...Z on each floor, racks are preceded by closet or suite number eg rack B in closet 1 is designated 1B)

7.6.3.4 Character Group 4

Remote vertical (A if only one) [pair managed frames only, not used otherwise]

Remote pair termination range, or socket number on patch panel, or pair number of copper or fibre conductors in cable, (socket number and pins where single pair details are required)

7.6.3.5 Character Group 5

Local building (if more than one)

Local floor (G if only one)

Local frame or rack (Numbering must be unique between both traditional IDF/FDP's and racks/patch fields which may still exist. Generally frames follow sequence A, B, C, ...Z on each floor, racks are preceded by closet or suite number eg rack B in closet 1 is designated 1B)

7.6.3.6 Character Group 6

Local vertical (A if only one) [pair managed frames only]

Local field designator if more than one for media type concerned (eg D for data field, V for voice field, B for twisted pair backbone field, F for fibre field, further suffix 1, 2, 3.. or A, B, C, if more than one field) [patch fields only]

Local pair termination range, or socket number on patch panel, or pair number of copper or fibre conductors in cable, (socket number and pins where single pair details are required)

7.6.3.7 Character Group 7

Circuit type (8W, 4W or 2W) [patch panel sockets only]

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

Cable pair suffixed with pr, or fibre capacity suffixed with f [cables only]

7.6.3.8 Character Group 8

Patch Panel Socket Number On Patch Panel Being Labelled [patch panels only, continuous sequential numbering where more than one patch panel installed]

Cable number in group of cables of same type over same route prefixed with # [cables only]

7.6.4 Labels For Sockets Or Cable Pairs At Distributors

Identify the remote end socket first, then the local socket (and circuit capacity on voice backbones). The labels differ at each end of a circuit.

[Group 2] [Group 3] [Group 4]-[Group 8]/[Group 7]

or

[medium][rem bldg/flr/rack][rem socket]-[local socket]/[2W/4W/8W as applicable]

Group 2 may be omitted for Cat 3 and lower grade voice backbone cables

Group 8 may be omitted on pair managed frames with pair ID markers

7.6.5 Labels For Cables Ends and Cable Appearances

[Group 1]/[Group 2]/[Group 3]-[Group 5]/[Group 7]/[Group 8]

or

[tenant]/[medium]/[distributor closest to CD]-[FD]/[capacity pr or f][# no.]

Group 1 may be omitted on single tenant site

Group 2 may be omitted for Cat 3 and lower grade voice backbone cables

7.6.6 Labels For Terminal Blocks and Final Distribution Points

[Group 5]: [Group 3]/[Group 4]

or

[Local distributor]: [Remote distributor]/[vertical frame or field and pair range]

7.6.7 Designations in Pair Managed Frame Record Books

(Traditional Telstra Style)

Cable Details Left Column:- [Group 7 cable capacity] tie # [Group 8 cable no.] to [Group 3 remote bldg/flr/distributor]

Cable Details Right Column:- [Group 4 remote vertical and pair range]

7.6.8 Designations For Link Records In Management Databases

[Group 2]/ [Group 3]/[Group 4] - [Group 5]/[Group 6]

[medium]/[CD end bldg/flr/distributor]/[vertical and range] - [FD end bldg/flr/dist]/[vertical and range]

7.6.9 Examples Of Backbone Labelling

Patch Panel to Pair Managed Frame

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

A single 50 pr underground cable is run from Building A ground floor of a multi-building site, from a PABX test point frame designated GB, terminated on vertical C pairs 51 to 100; to Building F ground floor distributor closet rack 1A. There its pairs are fanned out to sockets 1 to 24 of voice backbone patch panel (designated V) for 2W circuits, sockets 25 to 30 for 8W circuits, and the remaining two pairs are brought to a 2pr screw terminal block designated TB at the back of the rack. The campus is occupied by a single tenant. Sockets 1-20 are used for analog phone extensions 9241 to 9260, sockets 25 to 27 for ISDN S-bus digital extension phones 8753 to 8755.

- Label on cable:- AGB/FG1A/50pr/#1
- Label for socket 3 on Rack 1A patch panel:- AGB/C53-03/2W
- Label for socket 26 on Rack 1A patch panel:- AGB/C79-82 - 26/8W
- Label on TB cover:- FG1ATB: AGB/C99-100
- Label at top of 50 pr group on TPF AGB:- FG1A/ V1-24/2W, V25-30/8W, TB1-2
- TPF AGB record book entry:- Against prs C51-100, cable details, LH column:- "50 pr tie to FG1A", RH column against pr 55 :- "V05-5,4", against pair 75:- "V25-5,4", against pair 76:- "V25-3,6"
- Database record for extension 9244:- AGB/C54 - FG1A/V04
- Database record for extension 8754:- AGB/C79-82 - FG1A/V26

Fibre Data Backbone Patch Panel Floor Distributor to Computer Room

An 8 core multimode fibre runs from 23rd floor rack 1B fibre patch panel duplex sockets 1 to 4, to 6th floor computer room rack 3C fibre patch panel where it terminates on SC duplex sockets 81 to 84. The cable belongs to Dept of State Development (tenant code SDEV), one of several tenants. The cable is the second of two redundant backbone fibres following different risers.

- Label on cable:- SDEV/MF/06 3C/23 1B/8f/#2
- Label on 23rd floor rack 2nd fibre pair:- MF/06 3C F82-02
- Label on 6th floor rack, 2nd fibre pair:- MF/23 1B F02-82
- Link designation:- MF/ 06 3C F82 - 23 1B F02

7.7 Cabling Performance And Testing

7.7.1 Horizontal Cabling

7.7.1.1 General

Provide horizontal cabling tested and certified to meet or exceed the performance specified in clause 6.3.4.5 Horizontal Link Performance.

For the case of MUTO and CP installations, adjust attenuation limits in accordance with AS 3080 Clause 7.2.2.2 Dimensions, Table 21 and Annex A.

Test all links from floor distributor to modular outlets using a Level III tester (where site specific documents require a Cat 5 solution, a Level IIe tester capable of measuring and recording the full range of Gigabit Ethernet related parameters of ELFEXT, PSELFEXT and Return Loss may be used) with the pass/fail threshold set to the permanent link performance values in AS 3080-2003 (identical to ISO 11801

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

2nd Edition). The most significant parameters are included below as a check that instrument limits have been set correctly. The tester and test method shall comply with AS 3087.1.

Record results for the following tests:-

TEST	PERMANENT LINK SPECIFICATION, Cat 6	PERMANENT LINK SPECIFICATION, Cat 5
Wire map	T568A pinout, straight through	T568A pinout, straight through
Length	90 m	90 m
Permanent Link Attenuation (Insertion Loss) @ 100 MHz	< 18.5 dB	< 20.4 dB
Permanent Link Attenuation (Insertion Loss) @ 250 MHz	< 30.7 dB	Not applicable
Permanent Link Near-end crosstalk @ 100 MHz (patch panel or cross connect frame end and workstation outlet end)	< -41.8 dB	< -32.3 dB
Permanent Link Near-end crosstalk @ 250 MHz (patch panel or cross connect frame end and workstation outlet end)	< -35.3 dB	Not applicable
Permanent Link Power Sum NEXT at 100 MHz	< -39.3 dB	< -29.3 dB
Permanent Link Power Sum NEXT at 250 MHz	< -32.7	Not applicable
Permanent Link ELFEXT @ 100 MHz	< -24.2 dB	< -18.6 dB
Permanent Link ELFEXT @ 250 MHz	< -16.2 dB	Not applicable
Permanent Link PSELFEXT @ 100 MHz	< -21.2 dB	< -15.6 dB
Permanent Link PSELFEXT @ 250 MHz	< -13.2 dB	Not applicable
Permanent Link Return Loss @ 100 MHz	Better than (>) 14.0 dB	Better than (>) 12.0 dB
Permanent Link Return Loss @ 250 MHz	Better than (>) 10.0 dB	Not applicable

Record all test results, and incorporate into "as-installed" documentation in all the following formats:-

- hard copy print-out or disk file plain text saved on CD-ROM in a format readable by any word processor or text editor with fixed character spacing.
- disk file saved on CD-ROM in CSV format or as database table readable by Microsoft Access database application or Microsoft Excel application without further data manipulation.

7.7.1.2 Links Exceeding 90 m

Where links have been deliberately specified and provided in excess of Class D/E link length limits, for low speed LAN, voice or video services, perform testing to:-

- Class C for links up to 160 m using Cat 5 cable.
- Class B for links up to 260 m using Cat 5 cable.
- Class A for links up to 2 km using Cat 5 cable or voice grade 2pr cable

7.7.2 Data UTP Backbone

Test UTP backbone links as for horizontal cabling, except underground Cat 5 links, which shall be tested to standard AS 3080 Cat 5 link performance thresholds.

7.7.3 Data Fibre Optic Backbone

7.7.3.1 General

Test all complete fibre backbone links for compliance with the respective link loss performance parameters in AS 3080 (which references IEC 61280-4-1 to IEC 61280-4-3) relevant to the cable path and fibre type concerned, for the shortest applicable wavelength.

7.7.3.2 OTDR Testing

Test each fibre of the following cables for fibre integrity and length using an OTDR from each end of the cable:-

- cables without sheath length markings
- cables hauled through underground conduit or complex penetration systems
- any cable not otherwise verified using the design loss method

Capture graphic test results and incorporate print-out into "as installed" documentation.

7.7.3.3 Design Loss Testing

Cables meeting the following two criteria may be certified by design loss testing only.

- Cables with distance markers on the sheath, allowing the overall run length to be precisely determined (in sections where intermediate splices are involved)
- Cables run entirely by laying in horizontal trays and ducts, or pulled through a continuous vertically aligned riser and fastened along vertical route by tying to cable tray

Set design loss test limits as follows:-

- Known cable length from distance between end sheath markings + termination slack
- Cable loss to manufacturer's specification
- Connector loss to manufacturer's specification
- Splice loss to manufacturer's specification

Calculate the maximum loss specific to that link by:-

Total loss spec = (cable loss/m × length)+(sum of connector losses)+(sum of splice losses)

Where any fibre links exceed the total link loss specification, locate and correct the cause of substandard performance, or carry out OTDR tests as detailed above to either isolate the fault or to prove the cable for general compliance with performance parameters in AS 3080.

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

Record all loss calculations and test results, and incorporate into “as-installed” documentation, in the following format:

Length	Fibre atten db/m	Fibre Loss	Loss per splice	Qty Splices	Splice Loss Total	Loss per con- nector	Qty Con- nectors	Con- nector Loss Total	Link Loss Spec (one way)
L	A	LxA	S	N	NxS	C	M	CxM	=LxA +NxS+ CxM

7.7.4 Voice Grade Multipair UTP Backbones

Test all cable pairs on all backbones for end to end continuity using DC testing by one of the following methods:-

- Where both ends of the backbone terminate on pair managed or patch by exception frames, multi-pair cable scanners or pair by pair loop/polarity tests may be employed.
- Where one end terminates on a patch panel and the other on a pair managed frame, employ pair by pair loop/polarity tests from each frame pair to each modular socket pair using a modular breakout cord at the patch panel end.
- Where both ends terminate in modular patch panels, or are jumpered to patch panels or modular breakout termination frame modules, prove correct termination and continuity using a modular wire map tester, or the wire map function of a Cat 3 or Cat 5 link tester.
- Where the new backbone only provides a link to a legacy or core building FD or BD where jumpers are used to continue the links directly to a TPF or CD on previously installed existing cable, test directly from the floor distributor to the CD/TPF.

7.8 Patch Cords, Fly Leads and Adaptors

7.8.1 General

Provide factory certified and tested patch cords and fly leads constructed of connectors and stranded cable in accordance with AS 3080, in quantities and sheath colours as scheduled in the site specific contract documents, or as indicated in the default schedule below. Patch cords shall be electrically matched to the outlets and patch panels offered and allow Cat 6 (or Cat 5 where specified in site specific documents) channel performance to be achieved for all lengths of channel up to 100 m.

Provide cords with strain relief boots to control bending radius. Ensure that these boots do not prevent the plug from being fully inserted into the locked position with the hub equipment and patch panels and sockets in use on the site.

Provide exclusively Cat 6 (or Cat 5 where a Cat 5 solution is required in the site specific documents) certified cables at the floor, building and campus distributors for all standard and crossover cables, and for all straight through data fly leads.

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

Supply all patch cords and fly leads with a unique site-specific machine-printed serial-number identification label behind each end connector, to allow complex or long patches to be easily recognised from a group when one patch end is known.

7.8.2 Pre-Patching

Run all patch cords according to the respective closet/hub patching schedule. Use optimum length cords from the range of lengths supplied, and fold back slack in the horizontal minders and vertical cable management rings.

If patching is and fly lead installation forms part of the site specific contract document scope of works, place crossover cables and special adaptation cables at the terminal equipment end of the link, so that as far as possible special cables are not used in the floor distributor closets.

7.8.3 Paralleling Adaptors

Provide the scheduled quantity of "Y" adaptors with same respective pin on two sockets and plug all in parallel.

Adaptor plug:- on stub cord 100 to 150 mm long. (Do not provide moulded assemblies without a corded plug).

Adaptor rating:- Category 3.

Application:- Phone line paralleling, ISDN S-bus termination, daisy chaining for legacy networks

7.8.4 Default Fly-Lead and Patch Cord Schedule

7.8.4.1 Schedule Definitions

“Outlet outlet socket” below is defined as any voice or data outlet point.

“As specified” below denotes no requirement unless called up in site specific contract documents, or obviously required as part of a turnkey network solution.

“As req'd” denotes to suit connected hub and server equipment interface, to be advised in site specific contract documents or prior to delivery.

Cat 6 (5) denotes provide Cat 6 performance unless otherwise specified in the site specific documents to be Cat 5 performance.

7.8.4.1 Standard and Consolidation Point Installations

Application	Sheath Colour	Cable Type and plugs	Qty 1 m	Qty 2 m	Qty 3 m
Analog voice and general patching, data and ISDN S-bus fly leads	Blue or grey	Cat 6 (5) UTP (see clause 6.3.4.7), RJ45-RJ45	1 per 2 outlet outlet sockets	1 per 2 outlet outlet sockets	1 per 2 outlet outlet sockets
StateNet voice service patching (where required by StateNet)	Red NB: Colour reserved for StateNet	Cat 6 (5) UTP (see clause 6.3.4.7), RJ45-RJ45	1 per 2 outlet outlet sockets	1 per 2 outlet outlet sockets	0
Digital telephone and ISDN S-bus patch	Yellow	Cat 5 UTP, RJ45-RJ45	0	1 per 10 outlet outlet sockets	0

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

Critical services (switch ports, leased lines)	Black or Violet	Cat 6 (5) UTP (see clause 6.3.4.7) RJ45-RJ45, red marker cap for leased lines	0	1 per 50 outlet outlet sockets	0
10baseT Crossover cables (T568A to T568B pattern crossover)	Green	Cat 5 UTP (see clause 6.3.4.7) RJ45-RJ45, pins 1,2 to 3,6 and 3,6 to 1,2, other pins straight through	As specified	As specified	As specified
Phone fly leads	Beige, white or grey	4W Cat 2 or Cat 3 flat cable, RJ45-RJ11 6x4	0	0	1 per voice outlet
Specials (pin adapting cables)	Green	As specified	As specified	As specified	As specified
Single Mode Fibre Cords	Yellow	2 core 9/125 µm SM OF, SCdx-SCdx or SCdx-ST as req'd	0	2 per floor distributor closet cabled via SM OF backbone	0
Multi-mode fibre patch cords/fly leads	Grey, Orange	2 core 50/125 µm graded index MM OF, SCdx-SCdx fitted with duplex adaptor plug (Where the patches are to 62.5/125 µm links, provide 62.5/125 µm graded index MM OF, SCdx-SCdx fitted with duplex adaptor plug or SCdx-ST as req'd	0	4 per floor distributor closet cabled via MM OF backbone	0
Y-adaptor same respective pin on all sockets in parallel	Any colour	RJ45 plugx1, RJ45 outlet socketx2	1 per 20 outlet outlet sockets	Not applicable	Not applicable

Note: The above quantities should lead to a modest amount of spare cords being left over after patching up.

Provide ST-ST or ST-SC-duplex cords to suit equipment in lieu of SC-duplex to SC-duplex cords at sites with exclusively ST connectors.

7.8.4.1 MUTO Installations

Application	Sheath Colour	Cable Type and plugs	Qty 1.5 m	Qty 3 m	Qty 6 m	Qty 12 m
Analog voice and general patching, data and ISDN So bus fly leads	Blue or grey	Cat 6 (5) UTP (see clause 6.3.4.7), RJ45-RJ45	1 per 2 MUTO outlet sockets	1 per 3 MUTO outlet sockets	1 per 3 MUTO outlet sockets	1 per 2 MUTO outlet sockets
Digital telephone and ISDN S-bus patch	Yellow	Cat 6 (5) UTP (see clause 6.3.4.7), RJ45-RJ45	0	1 per 10 MUTO outlet sockets	0	0
StateNet voice service patching (where required by StateNet)	Red NB: Colour reserved for StateNet	Cat 6 (5) UTP, RJ45-RJ45	1 per 2 MUTO outlet sockets	1 per 3 MUTO outlet sockets	0	0

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

Critical services (switch ports, leased lines)	Black or Violet	Cat 6 (5) UTP (see clause 6.3.4.7) RJ45-RJ45, red marker cap for leased lines	0	1 per 50 MUTO outlet sockets	0	0
10baseT Crossover cables (T568A to T568B pattern crossover)	Green	Cat 5 UTP (see clause 6.3.4.7) RJ45-RJ45, pins 1,2 to 3,6 and 3,6 to 1,2, other pins straight through	As specified	As specified	As specified	As specified
Phone fly leads	Beige, white or grey	4W Cat 2 or Cat 3 flat cable, RJ45-RJ11 6x4	0	0	1 per 6 MUTO outlet sockets	1 per 3 MUTO outlet sockets
Specials (pin adapting cables)	Green	As specified	As specified	As specified	As specified	As specified
Single Mode Fibre Cords	Yellow	2 core 9/125 µm SM OF, SCdx-SCdx or SCdx-ST as req'd	0	2 per FD closet cabled via SM OF backbone	0	0
Multi-mode fibre patch cords/fly leads	Grey, Orange	2 core 50/125 µm graded index MM OF, SCdx-SCdx fitted with duplex adaptor plug (Where the patches are to 62.5/125 µm links, provide 62.5/125 µm graded index MM OF, SCdx-SCdx fitted with duplex adaptor plug or SCdx-ST as req'd	0	4 per FD closet cabled via MM OF backbone	0	0
Y-adaptor same respective pin on all sockets in parallel	Any colour	RJ45 plugx1, RJ45 outlet socketx2	1 per 20 MUTO outlet sockets	Not applicable	0	Not applicable

Note: The above quantities should lead to a modest amount of spare cords being left over after patching up.

Provide ST-ST or ST-SC-duplex cords to suit equipment in lieu of SC-duplex to SC-duplex cords at sites with exclusively ST connectors.

7.9 Earthing

7.9.1 General

Comply with ACA protective earthing and TRC bonding requirements throughout the installation as detailed in the CCM.

7.9.2 Telecommunications Reference Conductor

Provide a Telecommunications Reference Conductor in accordance with the CCM from the Building Distributor earth or Campus Distributor earth to the Customer Switching System, where required by the system.

7.9.3 Equipment Rack Earthing

Bond all adjacent racks together using at least 6 mm² green/yellow insulated electrical cable and cable lugs bolted to the rack earthing points.

Use direct cables and avoid installation of loops traditional in electrical practice which add inductance to the conductor.

Bond the first rack in the closet to the earth link bar on the electrical distribution sub-board feeding the power outlets in the closet using at least 6 mm² green/yellow insulated electrical cable.

On wall frames and cabinets where the rack mounting rails are on a hinged assembly, connect the earth cable to the moving part of the cabinet generally and to the rack mounting rail itself if the rail is unpainted. Allow slack in the earth cable as for other cables to allow the front of the cabinet to be swung through 90° without impediment.

8 PROGRESS AND COMPLETION

8.1 Timing

8.1.1 Drawings

Produce draft “As Installed” documentation for use as working drawings during construction on site as detailed under “As Installed Documentation” below (by editing of designer CADD files where suitable), and amend during the project to reflect “as-built” conditions.

Submit working drawings for approval before commencing work on site.

8.1.2 Acceptance Testing

Complete acceptance testing procedures detailed above for the respective services prior to the connection of terminal and hub equipment and live traffic.

8.1.3 Installation Completion

Complete the backbone and closet cabling works at least one week prior to building occupancy to allow telephone system and data networking hub equipment to be installed and tested prior to the connection of terminal equipment.

Complete outlet fit-off, labelling and testing

- three working days prior to occupation for standard and consolidation point cabling
- prior to installation of furniture cable covers for MUTO installations

8.2 As Installed Documentation

8.2.1 Drawings

8.2.1.1 Scope

Provide “As Installed” drawings compliant with AS 3085.1 standard symbology, format and detail. Comply with all “informative” sections of AS 3085.1 by treating them as if they were normative or mandatory.

Create “As Installed” plans in a CADD package capable of exporting files in Autocad Release 14 or higher format. Note specifically that the structure of the CADD drawing as well as the print-out must conform to AS 3085.1, in particular symbols for each size of outlet shall include the number of outlets as a part of the CADD symbol entity (or “block” in Autocad terminology).

Where the works are an extension of existing cabling, provide documentation showing the final composite installation for all the affected buildings, including any inter-building and intra-building links.

Where site specific contract documents include CADD drafted plans, obtain disk files from specifier as a starting point, immediately after commencing contract or order placement.

Provide the following set of drawings:-

- Site or “External Plant” plan, where works extend over more than one building, showing building and road outline, telecommunications conduit

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

routes, pits and cable capacities, building designations, and all building distributor designations.

- Floor plan for each floor or part of a floor showing outlet locations and numbers (including distributor), major cable routes and cross connect frames, with other extraneous architectural, electrical and services detail deleted
- Facilities Cabling Plan or Cabling Schematic, drawn in an arrangement which follows the physical site layout.
- Rack or Wall Frame layout for all racks and closets

Where the works are for a tenancy fit-out of a multi-tenant building, restrict the scope of plans to those floors or areas affected by the works.

8.2.1.2 Working Drawings

Produce draft “As Installed” documentation for use as working drawings during construction on site. Include outlet number designations to allow the drawings to be used for planning of telephone and data services and patching schedules and jumpering.

Amend the working drawings to show any contract variations issued or incorporated during the course of the contract.

Keep site copies as “Controlled Documents” and maintain document control to AS/NZS ISO 9001.

8.2.1.3 Facilities Cabling Plan Details

Ensure the plan contains the following detail for all buildings affected by the works:-

- cabling capacity (and type where underground or aerial)
- termination socket range/field at patch panels
- termination pair/vertical range at pair managed or patch by exception cross connect frames
- total capacity of all verticals/frames, cross connects, patch panel fields, CPs and MUTOs, and termination system (Krone LSA, 110, BIX, etc)
- model and catalogue number of all termination hardware

Where the works are an extension to existing, cut and paste or digitise existing plans to create an up-to-date composite CADD plan for the site or affected buildings.

8.2.1.4 Digital Capture

Where existing floor plan or schematic detail is not available in CADD file format for editing, create base CADD plans by one or more of the following methods:-

- redrafting schematics, copying relevant detail only and using standard symbol libraries
- redrafting physical plans, using scale and dimensional information
- tracing original architects floor plans with a digitising tablet
- scanning existing drawings and processing using raster to vector conversion
- site survey using measuring tapes and distance meters if no other data exists

Victorian Government Buildings Data and Telephony Cabling Strategy:- Standard Specification For Information Technology & Telecommunications Cabling

Where site survey is required, building outlines, spacing, and cable pathway lengths shall be accurate, but roadways and orientations may be approximate, providing approximations made are noted on the drawing.

8.2.1.5 Extent Of CADD Drafting Work

Fully survey the available documentation on site and CADD drawings and file formats available to determine the extent of drafting work required to meet the requirements of this specification. Contract variations will not be permitted for unforeseen work.

8.2.1.6 Drawing File Format and Naming Convention

Number working drawing file names preceding "As Installed" finals according to the project quality plan numbering scheme and/or document control procedures.

Use file names for final "As Installed" drawings containing 10 site specific and up to 14 tenant specific or communications specific leading characters, followed by a two character drawing number, compatible with the standard Windows 95 and higher naming convention.

The two-character drawing number shall default to the floor number in a multi-storey building for floor location plans. The second 12 character group shall default to Communications on single tenant sites. Alphanumeric characters may be used exclusively or in conjunction with numbers for schematics and plans covering a range of floors or buildings.

For all drawings, provide disk file copies in both native file format from original file creation, and Autocad Release 14 or higher .DWG or .DXF formats.

Example

A floor plan for 55 Collins St Level 12 for Department of State Development could be identified as:- 55Collins_DoStateDevel_12.DWG

The facility cabling plan for all of Department of State Development on that site would be denoted:- 55Collins_DoStateDevel_CP.DWG

8.2.1.7 CADD Drawing Structure

As the CADD files will continue to be used by other parties after installation, minimal changes should be made to the base drawing structure of architectural detail. Comply with the following requirements for all drawings:

- Delete notes relating to existing or construction but not relevant to the final installation.
- Ensure symbology (blocks) conform to AS 3085.1 or are derived from AS 3085.1 in the case of multi-gang outlets. Replace special symbols used on construction drawings to distinguish existing and deleted points from new points or to show combined power and communication detail, with the correct communications only symbol for the final installation. Do not explode symbols.
- Show outlets perpendicular to the wall or surface on which they are placed, where applicable. On floor mounted outlets, the top of the symbol shall correspond to the front (socket entry) side of an outlet. If the tender plans do

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

not show outlets on walls due to the amount of non-communications detail shown, move the symbols to represent the actual outlet location as-built.

- The title block should retain the designer's logo for reference, and should have contractor logo added including address, phone and fax contacts. It should also contain drawing size (eg A1), plot or drawing scale, disk file name.
- Vary the drawing number from tendering series to a site specific name (may match disk file name).
- Place outlet numbers on a separate layer as one left justified text line per socket, with text height 1 to 2 mm when plotted, depending on available space. Name the layer COMNUMBR or LANNUMBR to place it adjacent to other communications layers in alphabetical order. Do not save outlet numbers as Block (symbol) Attributes or attached to blocks in any way.
- Leave duct and conduit routes, outlets, on their originally assigned respective layers through the editing process if already on communications specific layers. Move to communications specific layers if mixed with other detail (like electrical). Avoid placing entities on LEGEND or SCHEDULE layers through inadvertent parameter matching.
- Name new layers required with a prefix relevant to the service.
- Amend legend text to indicate actual products used and construction detail removed (eg CompanyA XXX series plate with three CompanyB XYZ Cat 5 inserts). Use notes or symbol qualifiers to cover variations or exceptions.
- Leave the original layer and entity structure of the drawing in tact. Do not turn entities into blocks or drawing attachments.
- Detail any colour coding used for plotting pen size by colour.
- Avoid leaders and object fills due to translation problems through DXF and in and out of other programs (use dense hatching instead).
- Vary conduit sizes and routes, cable capacities and types and outlet locations to as built.
- Include North Point (if on original file) and scale rule on site and location plans to ensure exact scaling if reduced size plotting takes place.
- Show the capacity, make and model of patch panel or frame, and rack size and model used at each distributor on schematics (generally following the AS 3085.1 methodology). This may be achieved through the use of a table in one corner of the drawing, with one column for each distributor, and a row for each hardware item, or by noting against each distributor where shown on the schematic, or a mixture of both (eg global note for patch panels and minders, schematic note for each fibre frame).
- Show capacity, make model and quantity of all cables on each route on schematics. Distribution cabling used throughout may be covered by a global note. A global note may also be used where all backbone cables are drawn from the one product type (eg "BrandX YYY series, capacity as noted").
- Show the actual layout as installed on Rack layouts, and designate the purpose of each field or area.

8.2.2 Wiring Records

8.2.2.1 Patch Panels

Where the site specific contract documents require the installation and patching of hub equipment and backbones, provide patching records in Microsoft Windows Excel spreadsheet or generic SYLK format detailing all patches, including patches between equipments, in accordance with AS 3085.1.

8.2.2.2 New Frames

On all new pair managed or patch by exception frames, provide wiring records in Microsoft Windows Excel spreadsheet or generic SYLK format detailing all cable terminations, in accordance with AS 3085.1. which typically corresponds to the example "CDSAMPLE.XLS" appended to this Standard Specification.

8.2.2.3 Existing Frames

Amend existing paper records to AS 3085.1.

8.2.3 Manufacturer's Warranty

Where indicated in the site specific contract documents, provide a manufacturer's warranty and certification applying for a minimum duration of five years.

The warranty shall provide the following specific assurance:-

All horizontal UTP cabled links, whether standard, MUTO or CP, shall permit transmission of any application designed for operation over the respective class (D or E) of AS 3080 Annex F.

8.2.4 Training

Provide up to one hour per 200 outlet outlet sockets or part thereof of training on site for a group of up to five local system administrators or facility manager staff, covering the following aspects:-

- relating the physical installation provided to the as-installed drawings
- understanding of how to connect various types of terminal and hub equipment through the cabling system, including use of adaptors, and parallel connections
- familiarisation with numbering system for outlet and backbone cables
- running of patches and tidying of cable slack within the cable management rings
- recording of new patches or jumpers on patching records
- making moves, adds and changes
- tracing a terminal equipment extension connection
- identification of faulty patch cords
- procedures for making changes or reporting defects during the defects liability and warranty periods

**Victorian Government Buildings Data and Telephony Cabling Strategy:-
Standard Specification For Information Technology & Telecommunications Cabling**

8.2.5 “As Installed” Documentation Distribution and Copies

8.2.5.1 Approval

Obtain approval before reproducing and distributing final copies of “As Installed” documentation.

8.2.5.2 Distribution

Distribute soft and hard copies in accordance with the following schedule:-

Suffixes on quantities are defined as follows:-

P = Paper Copy or Print out

T = Text File readable by text editor or word processor

C = CADD file

D = Database or Spreadsheet Disk File

Distribution ⇨ Item ↓	Each Respective FD (IDF, CCF or Patch Panel)	Each BD, (MDF or bldg IDF)	Each CD (both MDF, TPF and computer room, if different)	Tenant Agency Local System Administrator	Data Network Facility Manager	Tenant Agency Corporate HQ	State Net or phone system supplier or FM	Design Consulting Engineers	Project Manager or Builder (if part of building project)
Site Plan or External Plant Plan	-	1P	1P	1P+1C	1P	1C	1P	1P+1C	1P
Facility Cabling Plan or Cabling Schematic	-	1P	1P	1P+1C	1P	1C	1P	1P+1C	1P
Floor Location Plan	1P, same floor	-	-	1P+1C, all floors	1P, all floors	1C, all floors	1P+1C, all floors	1P+1C, all floors	1P, all floors
Rack Layout	1P	1P	1P	1P+1C, all floors	1P	1C, all floors	1P, all floors	1C, all floors	1P, all floors
Jumpering or Patching Records	1P	1P	1P	1P+1D, all CCF's	1P+1D, all CCF's	-	-	-	-
Backbone and Outlet Cable Test Results	-	-	-	1P or 1T+1D	1T+1D	-	-	-	-
Manufacturer's Warranty	-	-	-	1P	-	1P	-	-	1P
Warranty and Service Contact Details	-	-	-	1P	1P	-	1P	-	-