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Preface

About this guide

Overview

This guide has been created to provide Victorian Government schools with comprehensive guidelines and best practise models for the implementation and management of ICT infrastructure, based on common, sound design principles for the uptake and use of communication services and technology to enhance pedagogical practices.

These guidelines are based on best practice and industry standards, to provide a foundation to design and build school networks that are reliable, scalable and manageable.

How to use this document?

Planning is essential to ensure ICT is integral to teaching and learning practices.

For VSBA Project Consultants

The ICT Design Models for Schools must be studied before existing schools embark upon capital works, or a new school is designed. This document provides information on all aspects of DET ICT standards, in particular “Tier 1 – Infrastructure and Connectivity.”

Designs must submitted to IMTD at schools.technical.planning@education.vic.gov.au prior to final design.

For Schools

The Department’s School ICT Progression Strategy (SIPS) provides a planning framework and suite of interactive online resources to assist school leaders to assess, review, plan and manage local ICT investment to support teaching and learning practice.

School ICT focus groups should utilise SIPS as a reference for completing the School ICT Infrastructure Roadmap prior to making capital works decisions.

Planning needs to take into account the infrastructure and technologies available and the emerging digital technologies of today’s and tomorrow’s students, and develop appropriate and targeted strategies to support improved teaching and learning.

School ICT Progression Strategy (SIPS) annual cycle

Assess

Review

Plan

Online ICT self-assessment

PRISM School Dashboard

Online ICT Plan

ICT Capability: Emerging

ICT Capability: Embedding

ICT Capability: Standard

ICT Capability: Accomplished

ICT Capability: Excelling

ICT Vision

Digital Learning plan

Technology Investment plan

Timelines and accountability
Adoption of ICT in Schools

This section provides a guide for reflection and strategic planning for the integration of ICT teaching, learning and administration. It allows school leaders, staff and the school community to review and evaluate where they are now, where they want to be into the future and to monitor their progress.

The Framework describes the contribution that technologies can make to the following ten elements of quality schooling:

- personalising and extending learning
- enabling leadership
- supporting professional learning
- connecting learning beyond the school
- improving assessment and reporting
- developing, measuring and monitoring ICT capabilities
- accessing and utilising student information
- providing, accessing and managing teaching and learning resources
- automating business processes
- providing reliable infrastructure

Descriptors are provided for each of the elements to guide school self-review and evaluation. These are described at three levels:

- the Emerging school
- the Embedding school
- the Excelling school
The Emerging School

The emerging school uses ICT as a learning, teaching and administration tool.

Typically, the school makes ICT decisions to meet the immediate needs of the school community. It relies on the leadership of senior staff within the school and people with special interest in ICT to implement it within the school.

Staff use ICT in their professional learning plans and share innovative ICT practices within the school.

The school considers the practical, technical and ethical issues when managing and supporting increasing ICT-based communication of students, staff and administrators.

Students and staff use existing ICT-based learning and teaching resources in some learning areas.

The school uses ICT resources to support and monitor the individual learning of students, not only in ICT as a learning area, but also within other learning areas.

The development of positive attitudes to use ICT is fostered across the school community.

The school uses electronic student records system data to monitor student progress.

ICT systems are used within the school to support school administration and business.

The basic, immediate ICT infrastructure, resource and maintenance needs are met across the school.
The Embedding School

The embedding school uses integrated ICT learning, teaching and administration systems across the school.

Typically, the school integrates ICT in whole school planning. It uses hands-on ICT leadership using skill-specific teams.

The school’s professional learning framework is tightly aligned with school and system strategic policies. It considers the impact of ICT professional learning on individuals and the school as a whole.

Students and staff actively use ICT-based communication to participate in learning communities outside the school.

The school develops systems for staff and students to use such as digital learning content to meet students’ individual learning needs.

To enhance student lessons in all learning areas, the school selects ICT-based learning, assessment and monitoring resources.

Students’ ICT capacity is monitored to inform the planning of teaching and learning in some learning areas. The school maintains comprehensive electronic student records and uses data from these records to inform whole school planning. ICT business systems are integrated across the school wherever possible and new areas are automated to improve business efficiency.

ICT infrastructure, resource and maintenance planning take into account current and some future ICT needs.
The Excelling School

The excelling school seamlessly integrates ICT learning, teaching and administration systems across the whole school.

ICT planning is continuous, reflective and proactive and is ingrained in all school planning. ICT leadership is flexible, outward-looking and is diffused throughout the school.

The school has a professional learning culture that reflects and contributes to the school and system strategic policies and is predicated on ongoing innovative and reflective practice. Staff regularly participate in, and lead, local and larger professional learning networks. ICT access is available to members of the school community to support communication with learning communities within and outside the school and the school actively fosters a culture of informed, responsible inquiry and communication with ICT.

The school embeds systems for staff and students to access, use, re-purpose and critically review quality assured digital learning and teaching resources that contribute to curriculum differentiation and extend and personalise learning for individuals and groups. Staff and students have access to a range of ICT-based assessment and monitoring tools that extend learning in all learning areas and are linked to an integrated electronic system of recording student achievement. Students are confident, engaged ICT users who make intuitive connections between ICT and their learning through the culture of ICT use within the school.

This culture is guided by the routine strategic monitoring and evaluation student ICT proficiency and use in learning throughout the school. The school provides ubiquitous and differentiated access to a secure integrated comprehensive student records system for all members of the school community. The system is used proactively to facilitate problem-solving. Interoperable ICT systems are used across the school to improve the quality of school business and remove duplication.

The ICT systems, resources, infrastructure and maintenance programs are guided by continuous review and proactive strategic planning to ensure that they meet current and future school ICT demands.
## ICT Services Matrix

Provision of reliable and capable ICT is a key enabler for schools to achieve their Digital Learning vision. The Department’s tiered approach to ICT design assists schools in completing their ICT infrastructure roadmap by segmenting into logical tiers.

### Tier 1: Infrastructure and Connectivity
- **Servers**: Non contemporary hardware, "Bare metal" configuration
- **Cabling**: Copper backbone, 4 outlets per room
- **Switching**: Managed Bridging Protocol
- **Wireless**: More than 25 learners per WAP, Autonomous WAP’s
- **Security**: Basic Network Access, User authentication
- **Internet**: 20Mpbs link
- **Desktops / Notebooks**: Majority of fleet 4+ years old, Non contemporary
- **Software**: DET provided software
- **Printers / MFD’s**: Networking Printing support
- **Collaboration Tools**: Staff Skype for Business
- **Telephony**: Voice over IP PBX
- **Projectors / Screens**: Projectors / Screens 4+ years old
- **Technical Support**: Base eduSTAR.TSS support
- **Professional Development**: Webex training

### Tier 2: ICT Devices and Software
- **Servers**: Virtualized Servers, Lights out management
- **Cabling**: Om3 Fibre backbone, 6 outlets per room
- **Switching**: POE Stackable VLANs
- **Wireless**: Wireless LAN controller, Average 1 WAP per 25 learners
- **Security**: Network policy server
- **Internet**: 20/100Mpbs link, Traffic Management
- **Desktops / Notebooks**: Majority of Fleet 3 – 4 years old, Contemporary
- **Software**: Sign-in software (student management), Multiplatform NAPLAN online, Peripheral management
- **Printers / MFD’s**: Laser Support, Duplex Printing
- **Collaboration Tools**: Cisco Webex
- **Telephony**: Soft Clients, Voice Mail
- **Projectors / Screens**: Projectors / Screens 4 years old, Network streaming integration
- **Technical Support**: Local technical support, supplemented IT support, Regular ICT meetings with minutes
- **Professional Development**: Lynda.com

### Tier 3: Peripherals and Innovation
- **Servers**: SAN with high speed drives, High Availability
- **Cabling**: Om3+ Fibre backbone, 6+ outlets per room
- **Switching**: 10Gb+ backbone, Redundancy
- **Wireless**: Wireless LAN controller, Average 1 WAP per 25 learners
- **Security**: Network policy server
- **Internet**: 100+ Mpbs, Onsite Web Hosting
- **Desktops / Notebooks**: Majority of fleet less than 3 years old
- **Software**: Learning Management Software (LMS), Online progress reporting, STEAM software
- **Printers / MFD’s**: Print Management
- **Collaboration Tools**: Google Suite, Microsoft Teams
- **Telephony**: Voice over WLAN, Public Announcement
- **Projectors / Screens**: Full videoconferencing integration, interactive screen
- **Technical Support**: Full-time ICT Manager with eduSTAR.TSS support
- **Professional Development**: Next Steps Workshops

### Tier 4: Technical Support and Professional Learning
- **Servers**: Technical Support to Schools Program
- **Cabling**: Tablets, Desksops, Software, Cloud Services
- **Switching**: Professional learning opportunities
- **Wireless**: Notebooks, Tablets, Desksops, Software, Cloud Services
- **Security**: Servers, Wired and Wireless Network, Storage, Backups, Cabling
- **Internet**: SAN with high speed drives, High Availability
- **Desktops / Notebooks**: Technical Support to Schools Program, Local support resources, ICT Strategic Planning Workshops, SPOT workshops, Professional learning opportunities
- **Software**: Projectors and Screens, Printers and Photocopiers, Video conferencing
- **Printers / MFD’s**: Digital Microscopes
- **Collaboration Tools**: ICT Planning Workshops
- **Telephony**: Next Steps Workshops

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**EMERGING (Basic Features)** | **EMBEDDING (+ Intermediate Features)** | **EXCELING (+ Advanced Features)**
--- | --- | ---
Servers | Non contemporary hardware | Virtualized Servers
Cabling | Copper backbone, 4 outlets per room | Om3 Fibre backbone, 6 outlets per room
Switching | Managed Bridging Protocol | POE Stackable VLANs
Wireless | More than 25 learners per WAP, Autonomous WAP’s | Wireless LAN controller, Average 1 WAP per 25 learners
Security | Basic Network Access, User authentication | Network policy server
Internet | 20Mpbs link | 20/100Mpbs link, Traffic Management
Desktops / Notebooks | Majority of fleet 4+ years old, Non contemporary | Majority of Fleet 3 – 4 years old, Contemporary
Software | DET provided software | Sign-in software (student management), Multiplatform NAPLAN online, Peripheral management
Printers / MFD’s | Networking Printing support | Laser Support, Duplex Printing
Collaboration Tools | Staff Skype for Business | Cisco Webex, Google Suite, Microsoft Teams
Telephony | Voice over IP PBX | Soft Clients, Voice Mail
Projectors / Screens | Projectors / Screens 4+ years old | Projectors / Screens 4 years old, Network streaming integration
Technical Support | Base eduSTAR.TSS support, ICT coordinator time release | Local technical support, supplemented IT support, Regular ICT meetings with minutes
Professional Development | Webex training, Lynda.com, CASES training | ICT Planning Workshops
Tier 1: Infrastructure and Connectivity

Communication Rooms

Victorian Government schools utilise learning environments with the latest teaching and learning facilities.

To facilitate this, the Department has extensive Wide Area and Local Area Networks, with networking equipment strategically positioned within "Communications Rooms".

Communication rooms house networking equipment and cabling. Room types can be categorised as:

- Core Communications Room
- Satellite Communications Rooms

The Core Communication Room should be the central location for WAN services (VicSmart), school servers and core switches that run the school LAN.

Satellite Communications Rooms house ancillary ICT equipment in outlying areas and buildings. Satellite Communications rooms must have direct fibre connectivity back to the Core Communications Room.

Any additional hops between Satellite Communications Rooms and the Core Communications Room should be avoided.

Satellite Communications rooms are required in buildings with over 24 data points. Wall communications cabinets are only to be used in small areas such as portables.

Communications rooms may include cabling to other buildings on the campus, telecommunications carrier connections, Audio Visual, security, public address (paging), VOIP and video equipment mounted in the room.

Communication rooms must be secure and provided with the necessary power and cooling to support the equipment within.

All communications rooms should be dedicated for ICT and associated equipment only.

Due to occupational health and safety issues, communication rooms should not be allocated as workspaces. IT staff should be located in a separate office with LAN access.

Location

Communication rooms contain critical equipment which require clean, dry, environmentally controlled and secure rooms. Shared accommodation such as plant-rooms, boiler rooms and cleaners closets or similar shall not be considered.

Core Communications rooms are not to be located near or adjacent to or directly below toilets, kitchen, pantry or places where water flooding is possible.

Communications rooms must be located in building zones accessible by DET staff, and not within restricted zones or areas that require third-party security access.

A communications room should only service the building that the communications room is located. Cabling must not extend to adjacent buildings.

Each floor in multistorey buildings (vertical schools) should be allocated at least one communications room, and additional capacity added where Cat6A cable length is exceeded.

If it is preferred that field cabling be allocated to the communications room on the same floor.
Room Size

Core Communications Rooms

For Core Communications Rooms, DET specify a minimum floor space to accommodate two full 45 RU cabinets (2150h x 800w x 1000d external unit dimensions) with a permanent clear space around racked equipment of 1m. The recommended minimum is 9m² for Core Communication room size. Designed growth space should be a minimum of 40% of the original installation.

Satellite Communications Rooms

For Satellite Communications Rooms, DET specify a minimum floor space to accommodate one 27 RU cabinet (1396h x 600w x 600d external unit dimensions). The recommended minimum is 6m² for Satellite Communication room size. Designed growth space should be a minimum of 40% of the original installation.

Communications and Cabling Cabinets

Core Communications Rooms

At a minimum, Core Communications Rooms must:

- Include space for cable entry (ducts, cable framework)
- Core Communications rooms should contain space allowance for a minimum of 3 x 1000mm x 800mm racks
- Communications cabinet placement should allow for side and rear access

House cabling and equipment in data cabinets, with the following minimum dimensions:

- Height = 2150 mm
- Width = 800 mm
- Depth = 1000 mm

Additional cabinets may be required to house switches, cabling and IP phone systems.
All racks should have cable management on both sides.
All fibre termination trays are to be mounted in the communications rack

![FIGURE 2: CABLING & EQUIPMENT CABINET AND ZONE ENCLOSURE]

**Satellite Communications Rooms**

At a minimum, Satellite Communications Rooms must:

- Include space for cable entry (ducts, cable framework)
- Satellite Communications rooms should contain space allowance for a minimum of 1 x 27 RU 1396h x 600w x 600d rack
- Communications cabinet placement should allow for side and rear access

House cabling and equipment in data cabinets, with the following minimum dimensions:

- Height = 1396 mm
- Width = 600 mm
- Depth = 600 mm

**Wall Communications Cabinets**

For Wall Communications Cabinets, DET specify a minimum of 6RU

House cabling and equipment in data cabinets, with the following minimum dimensions:

- Height = 370 mm
- Width = 600 mm
- Depth = 550 mm

**Flooring**

All Communications Rooms must have a flat level floor.
All Communications Rooms must be provided with an anti-static covering. **Carpet is not to be used.**

Level concrete floors that have been polished and sealed are also acceptable.

**Room Penetration**

All Wall, floor and ceiling penetrations are to be installed with the following:

- Sealed for fire prevention
- Sealed to inhibit water flow

**Cooling and Ventilation**

Communications rooms generate significant heat. It is a requirement all Core communications rooms are provided with 24 hour air conditioning. A suitable commercial unit must be provided. The unit must also have automatic return to operation if power is lost and restored.

The nominal operating temperature for Core Communications rooms is between 18 and 26 degrees Celsius.
It is recommended communications rooms are not located where additional heat loads are likely to occur, i.e. North/West facing room with a window.

Satellite Communications Rooms require door grilles and/or extraction fans to provide adequate ventilation.

**Fire Services**

All communications rooms must be fitted with fire and smoke detectors as per the Australian Standard for Fire detection, warning, control and intercom systems but should NOT have a sprinkler system installed.

Depending on floor and fire regulations, communications can be fitted with fire extinguishers suitable for use on live electrical equipment. A FM200 or N2 fire suppression system may be used in addition to manual ABC extinguishers.

Materials used for school core communications room walls, floors, ceiling, doors, door frames to be made of fire-retardant materials rated for 2 hours or more.

**Power**

For communications rooms, a 15amp GPO per communications rack on a dedicated single power circuit is recommended, in addition to a double 10amp GPO on a dedicated circuit.

At a minimum,

- 45RU communications room cabinets require a 10 outlet PDU per rack.
- All other cabinets require a minimum of 8 outlet PDU per rack.

Retail power boards shall not be used in any communications rooms.

**Security**

The Communication room should be secured as ICT infrastructure is costly, vulnerable to security breach, and crucial to schools operation.

When designing communications room security, considerations include

- **Alarm sensors** — connected to the school security system.
- **Security door** — stronger door than standard doors with dead bolts adding further security than regular door locks. Access doors to have automatic door closers installed.
- **No windows** — prevent break-ins from unauthorised intruders. If windows do exist, security glass should be installed, and/or security tint.
- **Walls** - School communications rooms demised walls are to be from true floor to true ceiling, with preferably more than one physical barrier between the external perimeter of the building and the communications room.
- **Access control** — limits the number of people who can access the room, this includes security codes or keys.

**Cabling Infrastructure**

The ICT Cabling Infrastructure in schools must be designed and installed to be able to deliver electronic media including data, voice, Internet, Audio Visual, security and building automation services via a suitable mix of cable and wireless for existing and future technologies.

Federal Government regulations require all ICT Cabling to be installed by ACMA Cabling Provider Rules registered installers.
Professional data cabling consultants should be engaged to document the requirements in conjunction with the electrical services of the school.

Some of the key considerations include:

- **Cable type and quantity.** The choice of cable type and quantity will determine the extent that digital learning can be implemented.
- **Design.** The design of the cabling infrastructure will determine the extent of user flexibility that can be accomplished over the life of the cabling (typically 10+ years).
- **Quality.** The quality of the installation will determine the performance that is achievable by the equipment attached to the cabling infrastructure.
- **Future growth.** Initial installation and the spare space capacity implemented as part of the initial design is critical to the overall effectiveness of ICT cabling infrastructure. Designing the choice of minimally compliant cabling to meet only today’s equipment needs has been proven to be a false economy.
- **Wireless.** The rapidly growing use of wireless devices and wireless internet in schools. Consideration should be given to the use of ICT cabling infrastructure and services to implement “Intelligent Buildings”. This is the integration of data, voice, video, security, Audio Visual and building automation services (HVAC, lighting, access control, energy management) over IP (Internet Protocol).

### Cabling Design Considerations

The cabling design at schools will depend on the individual school size and growth potential.

Consider the following guidelines:

- Allow for growth space in communications rooms.
- The cable category (class) should be greater than the current need to cater for future expansion.
- Provide well-sized cable patching cabinets to cater for additional cabling and equipment.
- To maintain data cable electrical characteristics a limitation of bending radii of the cable exists (min bend radii = 4 x cable diameter). To maintain this, suitable cable pathways must be designed and installed within the building structure.
- Copper cable has a maximum length of 90 metres. This is from patch panel to telecommunications outlets. No more than a combined 10 metres of patch cord or equipment lead should be allowed in addition to this.
- **Media convertors shall not be used in any circumstances**

> All cabling for the ICT Infrastructure is required to support school administration and learning objectives. This will require the installation to be of the highest level and covered by a Connectivity Manufacturer Certification.

### Outlet Plates

Schools should consider features such as multiple outlets, shuttered, locking devices and lockout devices.

> ACMA recommends that in areas with small children — such as kindergartens — that all communication connectors are mounted in outlet plates.
Use tamperproof plates, shuttered outlets or mounting outlets above 1400mm. This prevents children from inserting fingers or foreign objects in outlets.

**Intra and interbuilding cabling**

Cable pathway infrastructure must provide the physical means to protect and support om3 optic fibre cable and CAT6A data cables, and should conform to AS/NZS3084

For external cable locations 100mm white heavy duty PVC conduit is prescribed, with inspection pits at:

- Intervals of 100 metres or less
- Change of Direction

Penetrations should be undertaken by coring, drilling or cutting to the minimum size required, clean and free of sharp edges. There are to be no direct buried cables, all cables must be installed with proper conduit and pit protection.

In works where network cabling spans two or more buildings, backbone cabling should be end-to-end optical fibre.

A pull-through should be left in place to allow for future expansion

**Optical Fibre Terminations**

The optical fibre interface (for backbone cabling) at the communications rooms should use OM3 Grade LC Opticam connectors to suit standards based and current ICT equipment available to schools.

![LC Opticam Connector](image)

**Figure 6: LC Opticam Connector**

Fibre optic terminations must be transposed correctly, tested and qualified.

**Cable Segregation**

Power cables must be segregated from all unshielded data in accordance with AS2834

**Cable Patching**

Patching is where any piece of the ICT cabling is connected to another piece of cabling or equipment via patch cords.

Copper patch cords have male RJ45 connectors at each end and are made of stranded copper conductors.

Use RJ45 plug and socket connectors (patch panels) to make connections as required.

To simplify the patching process, the outlets and patch cords at the patch panels should use colour codes. This can also limit accidental un-patching of essential or critical services.
It is necessary that all components of a Channel and a Permanent Link are made of the same category of cabling, to ensure performance (i.e. connectors, cable and patch leads).

Labelling

Labelling is an essential Standards based requirement that ensures the ability to attach equipment or patch cabling safely and quickly without reference to electrical floor diagrams.

All patch panels and field data points must be clearly labelled and securely fixed. DET mandates labelling using traffolyte. Hand written or sticky notes must not to be used.

Labelling is most effective when combined with colour coded outlets and patch cords.

All school networks must have an agreed colour standard for patching. The table below list the recommended DET colour code for copper patch outlets and patch cords.
<table>
<thead>
<tr>
<th>Colour</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Phone Lines</td>
</tr>
<tr>
<td>Blue</td>
<td>Data Outlets</td>
</tr>
<tr>
<td>Gray</td>
<td>Servers</td>
</tr>
<tr>
<td>Red</td>
<td>Security</td>
</tr>
<tr>
<td>White</td>
<td>Wireless</td>
</tr>
<tr>
<td>Green</td>
<td>Network Management</td>
</tr>
<tr>
<td>Black</td>
<td>Curric Router Uplink</td>
</tr>
<tr>
<td>Purple</td>
<td>Admin Router Uplink</td>
</tr>
</tbody>
</table>

**TABLE 1: PATCH OUTLETS AND PATCH CORDS COLOUR CODING**
Data points in learning spaces

<table>
<thead>
<tr>
<th>No. of data points</th>
<th>Common Outlets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 per 25 learners</td>
<td>1 data point per WAP, spread for best room coverage.</td>
</tr>
<tr>
<td>2</td>
<td>Network data projector outlet at each data projector or television, allowing for streaming IP appliances.</td>
</tr>
<tr>
<td>1</td>
<td>Telephone placed at a convenient area based on school direction.</td>
</tr>
<tr>
<td>1</td>
<td>Staff use (0.5-2 metre left or right from interactive whiteboard).</td>
</tr>
<tr>
<td>2</td>
<td>Peripheral use (i.e. printers) or specialised student use</td>
</tr>
</tbody>
</table>

**TABLE 2: MINIMUM QUANTITY OF OUTLETS WITHIN A LEARNING SPACE**

All field data points should utilise double outlets.

**Wireless network cabling infrastructure**

All learning spaces and serviced areas must deliver minimum signal strength in both the 2.4 Ghz and 5Ghz bands.

At a minimum DET recommend 1 WAP per 25 learners.

School learning areas can be categorised into 3 areas;

- **High Density**: Large learning spaces with a capacity above 50 learners, typically the Library and Gymnasium. These spaces typically require more WAP’s than other areas, and must deliver a signal strength of at least -67dBm. WAP’s are recommended to be at least 8 metres apart, with a focus on servicing learning spaces.

- **Learning Spaces**: Predominately standard classrooms with a capacity of around 25 learners. These spaces typically require 1 WAP, and must deliver a signal strength of at least -67dBm

- **Staff areas**: Predominately staff offices and corridors. These spaces must deliver a signal strength of at least -67dBm

- **Outdoor areas**: Refers to outdoor learning spaces that require wireless signal. Weather rated IP68 WAP’s are required for these spaces, and available via department hardware panel.

![TECHNICAL NOTE:](image)

For internal learning spaces WAP’s are recommended to be ceiling mounted, in the centre of the room

**Security and Intruder Detection System Cabling**

Intruder detection system cabling must be installed in accordance with the Department’s Emergency and Security Services Unit (SEMD) guidelines. (ph: 03 9589 6266)

Schools must use Department-approved installers to install security and intruder detection system cabling. **Systems installed by non-approved installers will not be monitored by the Department.**

Also consider the following:

- Reliable power outlets are required for the system and must be installed by a licensed electrician.
- No surface conduit is allowed.
- Cables shall be installed in conduit in accessible under-floor areas.
- Underground conduits must be buried to a depth of 500mm and in accordance with AS 3000 standards.

SEMD will provide a detailed sectionalisation list from architectural drawings. This list is to be included any builder’s construction specification.
CCTV and IP Surveillance

All CCTV systems require Departmental approval prior to installation. Schools should contact the Department’s Emergency and Security Services Unit for guidelines and application forms for CCTV installation.

IP-based video surveillance systems provide superior benefits over non IP-based (legacy) video surveillance systems. Legacy Video cameras can be integrated in the IP Video surveillance solution by using analogue to IP convertors.

A video surveillance system that runs over an IP network infrastructure enables the video to be distributed to any number of sites within the constraints of available bandwidth. The convergence of video surveillance into an existing IP network offers several benefits, including:

- Network-wide management: devices are monitored over a single network for alarms or failures
- Transfer of control and monitoring to any other point in the network in an emergency situation
- Increased availability: IP networks offer a high level of redundancy that can extend to different physical locations
- Scalability: a system that can easily expand as the schools needs change

Considerations when planning CCTV in schools:

- CCTV wiring must be concealed to prevent tampering
- CCTV records must be retained for 7 days
- It is prohibited to monitor work performance of staff or students, and camera installations cannot be concealed or used in toilets, change rooms or staff rooms
- CCTV must be restricted to named staff authorised by the Principal, and all access must be logged

Further policy information can be found at: CCTV - School Policy Templates Portal

Cable Testing

All terminated fibre cores must be certified to the operational wavelength of 850/1300nm for Multi Mode Optical Fibre utilizing a Light Source and Power Meter.

Testing must be performed in both directions to verify the integrity of the cable and termination, and test results provided.

Fibre optic cabler must transpose fibre at the breakout tray

All copper installations must be at a minimum channel tested.

Cabling Design Standards

When designing cabling infrastructure, the Department has standardized on the following:

- Class Ea (Category 6A) for all copper cabling, connectors, patch panels and patch cords.
- A minimum of 12 cores of OM3 grade, multimode outdoor rated cable for optical fibre between buildings (up to 300m).
- A minimum OM3 grade, multimode cable for optical fibre within buildings.
- The minimum quantity of outlets within a Learning Space.

Additional outlets and wireless access points (WAPs) are required based on room size, student numbers and computer to student ratio.
DE currently recommend a minimum 1 WAP to 25 learners in each learning space to support 1-to-1 device use.

Cabling standards are used to specify performance levels and testing requirements to international levels. The reference LR refers to “Latest Revision”.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>AS/NZS 11801 :LR</td>
<td>Telecommunications Installations - Generic Cabling for Commercial Premises</td>
</tr>
<tr>
<td>AS/NZS 3080</td>
<td>Premises</td>
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</tr>
<tr>
<td>AS/NZS 3084:LR</td>
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<tr>
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<td>AS/NZS 61935.1 :LR</td>
<td>Telecommunications Installations – Specification for the testing of Balanced communication cabling</td>
</tr>
<tr>
<td>AS/NZS 14763-3 :LR</td>
<td>Telecommunications Installations – Specification for the testing of Fibre Optic Cabling</td>
</tr>
</tbody>
</table>

**TECHNICAL NOTE:** AS/NZS 11801, Generic Cabling for Commercial Premises contains the “Categories of Cabling”. These can be related to the expected throughput of data that the cable will support.

The highest category of cabling is typically 5 years in advance of the existing level of terminal equipment technology. This assists in future proofing the cabling infrastructure.

International ISO Standards and Australian Standards use “Class” letter.

American Standards TIA/EIA use the words “Category” number to distinguish performance levels.

**Class Ea, Category 6A** = 500Mhz Bandwidth = 10000Mbps + multimedia

Class Ea cabling, is designed to support 10 Gigabit Ethernet latest technology applications and video and multimedia. This is the recommended minimum.

**Active Networking**

**eduSTAR administration and curriculum switching**

Schools utilise 24/48 port Cisco switches to connect eduSTAR and Administration (CASES) services to the VicSmart router. The eduSTAR curriculum switch also houses Department provided eduSTAR.net equipment (wireless and authentication services) and connects the rest of the school managed Curriculum network.

The **eduSTAR hardware panel** provides a list of approved, tested, network hardware schools can leverage utilising panel pricing.
Wireless Technology

deduSTAR.net - Enterprise Wireless Network

The eduSTAR.net Enterprise Wireless Network provides key wireless infrastructure supports the growing use of mobile devices in Victorian education.

The eduSTAR.net Enterprise Wireless Network is accessible to:

- School educators, administrators and leadership 24 hours x 7 days per week.
- School learners (students) have access to the service 6 am and 8 pm, weekdays.

School wireless networks (WLAN) add flexibility and mobility to staff and students throughout the school.

The eduSTAR.net Wireless Network uses Cisco Wireless LAN Controllers.

Wireless LAN (WLAN) controllers simplify the deployment and operation of wireless networks, helping to ensure smooth performance, enhanced security, and maximum network availability.

Cisco WLAN controllers communicate with wireless access points over any Layer 2 or Layer 3 infrastructure. They support system wide functions such as:

- Enhanced security with WLAN policy monitoring and intrusion detection.
- Intelligent radio frequency (RF) management.
- Centralized management.
- Quality of service (QoS).
- Aggressive load balancing.
- Mobility services, such as guest access, voice over Wi-Fi and location services.

BYOD and eduSTAR.net Wireless Network

To connect BYOD devices to the eduSTAR.net Wireless Network:
Students use their existing IDAM username and password.
Staff use their existing eduMail username and password.

For instructions on connecting staff and student personal devices (BYOD) to your school's eduSTAR.net wireless network see the BYOD Wireless Connection guides on the eduSTAR Catalogue > Resources > Networking > eduSTAR.net

For more information regarding 1-to-1 learning and Bring-Your-Own-Device (BYOD) in schools refer to the Department publication Planning and Sustaining 1-to-1 Access to Technology.

Wireless (Wi-Fi) Safety
DET have released the 'Wireless Technology in Schools' information guide.
This guide reflects current regulatory advice, authoritative information and guidance by national and international recognised health authorities.
This guide informs school leadership teams and ICT Co-ordinators on:
- Wireless technology provided to Victorian government schools.
- Radio Frequency (RF) fields and measurement of RF fields.
- Safety standards for using wireless.

See Wireless Technology in Schools Frequently Asked Questions
See Wireless Technology in Schools - Information Update January 2018

VicSmart WAN
The Victorian school system consists of over 1700 sites which are connected to the VicSmart WAN (Wide Area Network) — each with its own LAN (Local Area Network).
VicSmart WAN connects schools to each other, central systems (business and learning systems) and to the internet via the shared service eduSTAR.ISP.

Weekly and monthly reporting is available, for more information talk to your school's Specialist Technician.

VicSmart DNS
This ensures that all DET central resources are accessed directly via VicSmart and the traffic does not go out over the internet.
The DNS for VicSmart is 10.180.1.1.
**VicSmart Moves / Additions / Changes**

Only Telstra staff are authorised to relocate or modify any of the Telstra components that make up the VicSmart service including the Cisco Router, Media convertor or fibre connections. The Information Management and Technology Division (IMTD) VicSmart team oversee the WAN, and are responsible for logging any requests with Telstra.

Further information can be found using the [VicSmart change request form](#).

Telstra’s MAC timeframe is 16 weeks minimum, the actual time to complete is dependent on the complexity of work, categorised as low, medium or high. Complex greenfield sites can take over 6 months for reticulation to be completed.

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**eduSTAR.ISP - Internet Service**

The school internet service (eduSTAR.ISP) provides all schools with filtered access to the internet. This service is provided to schools at no cost.

The school internet service provides:

- A filtered internet service provided to all Victorian government schools.
- Managed by the Department’s Information Management Technology Division.
- The service is provided by iiNet.
- Will continue at no cost to schools.
- Is delivered to schools via the VicSmart network.
- Constantly review and monitoring school bandwidth consumption, and where the need for upgrades are identified these are upgraded automatically

**Filtering**

The Department provides schools with filtered access to the internet through the eduSTAR.ISP delivered by iiNet.

The filtering provided by iiNet uses enterprise products to categorise websites, and block access to potentially unsafe categories.

Internet filtering at the ISP level:

- Provides safe and filtered access to the internet for staff / students.
- Best of breed filtering technology – provided by iiNet.
- Should be supported by appropriate supervision.
- Can sometimes block legitimate sites (false-positives).

School principals can authorise specialist technicians to ‘whitelist’ individual websites to suit local needs.

Additionally, schools may filter access to further content by blacklisting sites on their own eduProxy servers.
The filtering provided by iiNet uses enterprise products to categorise websites, and block access to potentially unsafe categories.

Sometimes filtering may block access to legitimate sites. School principals can authorise specialist technicians to 'whitelist' individual websites to suit local needs.

School Technicians can block additional sites using their school's eduProxy server blacklist.

Filtering is not bullet proof, and is not a replacement for classroom supervision.

eduProxy provides caching, content acceleration, reporting, monitoring services, and quota management for users, performance testing functionality and more, accessible through a dashboard GUI.

Internet cache (proxy):

- **Basic filtering** (basic black/whitelist) – block access to problematic websites or resources
- **Shaping** – restrict throughput of web resources known to consume excessive bandwidth, eg. software updates
- **Reporting & logging** – see top domains, IP addresses & users, download log files if needed
- **Performance monitoring** – view page load times, ping response times & iPerf performance of each school relative to state-wide average
- **Caching** – speed up delivery of software updates & compatible web content
- **Netflow reporting** – view non-web consumption of devices on the LAN, useful to detect & control excessive consumption

Various eduProxy caching tools, such as cache interception, speed access and reduce overall bandwidth consumption.

Cache interception uses a combination of URL detection and content inspection to cache dynamic, streaming or large content locally. Well-known examples include YouTube streaming videos, and Apple software updates.

eduProxy includes monitoring tools to help gauge system performance, including a historical record of service events. The current status of each service check is uploaded centrally, allowing central support staff to identify issues with your eduProxy host, and monitor overall platform/WAN health.

The dashboard is the main screen displayed immediately after logging in to eduProxy. Its primary role is to communicate high-level consumption trends and status information.

Quota control works by counting per-user browsing activity, and blocking access when allocation is exhausted. This feature requires an authentication mechanism to be enabled (see Authentication under Cache Management in the menu at left).

To activate quota control, enable the Quota Enforcement option.
Tier 2: ICT Devices and Software

Curriculum desktops, notebooks and tablets

Notebooks for Teachers and Principals - eduSTAR.NTP
The Notebooks for Teachers and Principals (eduSTAR.NTP) runs two provisioning tranches each year, aligned with Semesters 1 and 2.

The program is available to teacher, instructor and principal class officers employed in Victorian government schools. Both contract and permanent staff are eligible to join the program.

Platforms

• The Program offers the central provision of Windows notebooks as a Universal Platform at no cost.
• Secondary schools and P-12 schools may apply for an individual VCE teacher to be supplied with an Apple notebook if they are delivering specific VCE studies.
• Schools with a significant investment in Apple technology - Alternate Provision (Apple Grant)

The Program

• Centrally provisioned notebooks (both Windows and VCE Apple notebooks) are owned by the Department
• Notebooks remain the property of the school (custodian) for the period they are allocated to the school
• Centrally provisioned notebooks (Windows and Apple) will be collected at the end of their useful life.

More information is available for Victorian government school principals and teachers on eduGate see: Notebooks for Teachers and Principals.

eduSTAR Hardware Catalogue
The Department has established Authorised Suppliers for the supply of desktop and notebook computers to schools. Before purchasing, schools are encouraged to determine best value-for-money in the context of Government, other funding received and the school’s digital learning requirements.

Device Supply Panel pricing can be viewed at: https://www.edustar.vic.edu.au/Catalogue/Pages/HardwareHome.aspx

Before purchasing, schools are encouraged to determine best value-for-money in the context of Government and other funding received and the school’s digital learning requirements.

All technical and support details should be checked carefully in the pricing schedules.
Standard Operating Environment (SOE) – Device Images

The Department provides a range of software products pre-installed onto the eduSTAR Standard Operating Environment (SOE) images for both curriculum and administration devices.

Using the eduSTAR SOE images provide students and staff with access to some of the latest educational software. Schools can also add their own additional software to devices running the SOE images as they wish.

eduSTAR curriculum software images:

- Pre-installed on NTP and devices purchased from the Department’s panel of authorised suppliers
- eduSTAR supply an image for schools to customise for students.
- Developed in conjunction with the Digital Learning Branch.
- Contains educational software titles including the Microsoft Office Suite.

Software for schools

The Victorian government provides school teachers and students with comprehensive, up-to-date digital tools and software to support the implementation of the Victorian Curriculum, VET and VCE and the achievement of Education State targets. Provision of these software licenses will reduce additional costs to schools and families with access to software including students’ Bring Your Own Devices (BYOD).

Staff and students can use the eduSTAR catalogue to:

- Download software titles for PC, Mac or iPad.
- Order recommended ICT products for school and home use from Department authorised suppliers.
- Access self-help solutions, online ICT resources, security and cyber safety advice.

The eduSTAR catalogue is available at: www.edustar.vic.edu.au

Staff logon using their eduMail credentials.

Students logon using their IDAM credentials.

To find out more about each title: http://fuse.education.vic.gov.au/Pages/detsoftwaresuite

To find professional learning: http://diglearning.global2.vic.edu.au/professional-learning/
Minecraft Education Edition, including MiniMelbourne

Minecraft: Education Edition is a collaborative and versatile platform that educators can use across subjects to encourage 21st-century skills. The Department of Education and Training and the Metro Tunnel Project have collaborated to create the Mini Melbourne world, rendering the city of Melbourne in exquisite Minecraft detail. Mini Melbourne has been built primarily as an educational resource that will enable students to learn more about Melbourne and Victoria's past, present and future.

Available for all teachers and students in Victorian government schools

Access software: https://www.edustar.vic.edu.au/Catalogue/Pages/Minecraft-EDU.aspx

Creative Cloud Apps & Design and Web K-12 Collection

This software can be used across a range of Learning Areas for the creation of documents, animations, audio, videos and websites. In addition, this software has specific relevance to learning and teaching of The Arts, Technologies and Critical and Creative Thinking.

Secondary teachers have access to the entire collection of Adobe Creative Cloud apps, including Photoshop, InDesign and Premiere Pro. Student-owned BYO devices can access the Web K-12 Collection which includes Photoshop, InDesign and Illustrator.

Available for all teachers and students in Victorian government secondary and P-12 schools.


ClickView

ClickView is a suite of thousands of interactive videos and related resources that support learning and teaching across all subject areas. Videos are professionally made in Melbourne studios or sourced from free-to-air and pay-TV content. ClickView content is mapped to the Victorian curriculum, and allow teachers to deliver individualised learning activities to students and view and assess their responses.

Available for all teachers and students in Victorian government secondary and P-12 schools.

Access software: eduSTAR.vic.edu.au/clickview

Stile

Stile provides over 70 Science units, each containing a mixture of content delivery, formative assessment, summative assessment, experiments, projects, classroom activities, and STEM career profiles. Every unit of work is set in the context of real-world science discoveries and events, highlighting to students the relevance of what they are learning.

Every lesson is completely customisable, allowing teachers to tailor content and questions to the needs of their school’s curriculum or individual students. Teachers can even create their own Stile lessons if they want to get really creative.

Available to Years 7-8 students and their Science teachers in Victorian government schools.
Sibelius

Sibelius is a music notation program designed for composing, orchestrating and designing workshops. Music teachers who incorporate Sibelius into their lessons are able to demonstrate music theory and composition concepts, and students are able to create their own pieces of music while developing their understanding of these concepts. This software has specific relevance to learning and teaching of Music.

All Victorian government secondary schools have been provided with 20 seats of this software.

Access software: mail@futuremusic.com.au

Wolfram Mathematica, SystemModeler, Programming Lab and Alpha

Wolfram software are internationally recognised, industry standard, powerful learning tools that can be used across STEM with applications in the areas of computation, problem modelling, coding and more. This software has specific relevance to learning and teaching of Mathematics, Science, Technologies and Critical and Creative Thinking.

Available for all teachers and students in Victorian secondary schools (Government and Non-government schools).


Linkedin Learning

Linkedin learning is an online learning platform that provides anytime, anywhere access to a library of over 209,200 unique “how to” videos across three areas - Business, Creative and Technology Skills. Lynda.com also provides 5,700 professional learning courses and twelve Learning Paths to support teachers and students to develop their knowledge and skills. Lynda.com can be used by teachers and students for on demand skill development on how to use software including Office, Adobe, Google, Sibelius, Python, WordPress and Evernote.

Available for all teachers and students in Victorian government secondary schools.


Boardmaker online

Boardmaker Online provides a multi-level approach to creating engaging print and interactive materials for your special education needs. Extend learning by adapting curriculum to the unique needs of your learner with easy-to-use enhanced features. Increase engagement by making your favorite print activities interactive on smart boards, computers, tablets and communication devices.
Available for all staff who work in special schools, as well as regional staff who support schools to work with students with additional needs can access the Department’s subscription to Boardmaker Online.

Access software: contact the Digital Services Unit digital.learning@edumail.vic.gov.au

**Comic Life**

Comic Life can be used across a range of Learning Areas for the creation of comics and storyboards. In addition, this software has specific relevance to learning and teaching of The Arts, Technologies and Critical and Creative Thinking.

Available for all teachers and students in Victorian government secondary and P-12 schools.


**Online Collaborative Learning Environments**

Schools can provide students and staff with access to Google Apps for Education and Microsoft Office 365 online services at no cost through the Department. This provides schools with access to contemporary digital classroom tools and support for BYOD through services that can be accessed on Windows, Apple, Android and ChromeBooks.

Office 365 includes: Outlook for students, OneDrive, Office, Powerpoint, OneNote, Excel, Teams, Forms and Sway.

Google Apps includes: Gmail for students, Drive, Google suite (docs/sheets/slides/calendar), Google classroom, Forms and Hangouts.

Available for all teachers in Victorian government schools

Side by side comparison
Office 365

- Exchange (Unlimited storage)
- SharePoint
- Microsoft Teams
- OneDrive for Business (1Tb storage)
- Office Online and apps for up to 5 devices
- Skype
- Yammer

Google for Education

Google G-Suite

- Gmail (Unlimited storage) / Calendar
- Google sites
- Google Drive (Unlimited storage)
- Google Docs and apps for unlimited devices (limited offline capability)
- Google Classroom

eduSTAR collaboration tools

Webex

- Installed in all Victorian Government Schools, available to all DET Staff
- Best of breed Videoconferencing
- Offering a range of devices and software
- Webex teams collaboration tool
- Webex meetings collaboration tool
- Fully supported, available on a range of platforms

Microsoft Skype for Business

- Instant messaging and desktop video conferencing for staff

Microsoft Teams

- Collaboration tool available within DET provided Office 365
Tier 3: Peripherals and Innovation

Television Distribution System
A system suitable for the reception and distribution of free-to-air (FTA) television should be considered for new schools. The designer should seek confirmation with the school representative regarding the areas requiring television points.

Video Services
The use of video services within schools can be categorised in two components, each requiring a unique design approach:

- **Video Conferencing** (e.g. Webex video conference tools, desktop conferencing using Skype or other applications).
- **Streaming Video** (e.g. desktop streaming, video on demand, live video).

This section provides a high-level overview of both interactive video and streaming video services and its application in meeting current and future needs of schools.

For information on the use and benefits of video conferencing refer to the DET publication, see Virtual Conferencing – Connecting to Learn.

Video Conferencing Network
Currently there are over 1,500 Webex videoconferencing units in Victorian schools supporting communication between:

- School to school.
- School to many schools.
- School to the world.

Using Video Conferencing in Schools
The key areas of focus for video conferencing in a school environment include key applications such as curriculum, staff development and administrative communications.

- For curriculum, schools use videoconferencing for distance learning, classroom to classroom collaboration, virtual field trips, guest speakers and more.
- For staff development, schools use videoconferencing for collaboration and best practice sharing, distance learning and role playing.
- For administrative communications, schools use video conferencing for staff meetings and planning sessions.

Webex Video Conference Supplier Panel
The Department has a range of Webex equipment to deliver high definition videoconferencing in schools. It also has authorised suppliers to purchase approved Polycom videoconference equipment.
For details of each supplier's products, purchasing, pricing and support, go to eduSTAR hardware panel - Videoconferencing.

Desktop & Notebook Videoconferencing
Most schools already have videoconferencing in place, so they'll only need a video telephony solution made up of desktop video software, such as Skype and a video telephony camera.

Most laptops and tablets have a built-in video camera for video conferencing. USB video cameras are available for devices without built-in cameras.

Learning Objects
Learning objects are pieces of content that are used as part of a lesson delivery by teachers.

These learning objects can include content such as video, flash content, lesson resources in the form of slide presentations and documents.

Learning objects and curricula content will come from many sources. These include independent content providers where the content is downloaded via the internet or extranet, television stations or content that has been developed within DET.

Multi-Function Devices (MFD)
A multi-function device (MFD), sometimes called a multi-function printer, copies, prints, scans and faxes all from one physical unit.

Most MFDs allow you to carry out more than one of these tasks simultaneously.

As either laser or inkjet printers, MFDs will print photos and a variety of other document types.

Some print in colour while others only print in black and white. They all have various features and networking options and range hugely in price.

Quality is fairly similar across the price range, although the high-end devices tend to be faster, have colour printing, and also more networking and office functionality.

The Department has established an authorised suppliers panel for multi-function devices for BER-authorised schools.
MFD's

- Smaller footprint – compared to multiple individual devices.
- Lower cost compared to buying the equivalent separate devices.
- One stop shop – all devices in one convenient location.
- Lower Power Consumption – only one device plugged in compared to possibly 3 or more.
- Per page printing costs are lower than that of a Laser or Ink Jet printer.

Printers

Printing in schools is extremely important so providing fast and reliable printing resources is a must.

When planning your printing infrastructure across your network, here are some tips and considerations to consider:

Printers should:

- support network printing (i.e. have a network card).
- be a laser printer.
- preferably support duplex (two sided) printing to save paper.

Location

Always situate printers evenly across classrooms in the school. This provides close access for everyone at the school.

Keeping printers easily accessible reduces interruptions in classrooms.

A good rule of thumb is to have one printer for every two classrooms. Arranging printers in this way minimises walking between printers.

Having many printers also dramatically reduces the load on all printers, meaning they will last longer and have less downtime.

Supported Client Operating Systems – Mac and/or PC

Before purchasing a printer it’s important to get informed about its drivers (and driver availability).
Also, speak your printer supplier and ask for a test printer to try with your operating system.

**Microsoft Windows** — many printer suppliers support Windows. As new Windows versions are released, drivers are often updated, or included in the operating system by default.

**Apple OSX** — most printer suppliers support Apple OSX. OSX uses the postscript protocol to print, so any printer with Postscript can be used. Some vendors however do not have good driver support for OSX.

**Pages per Minute**

Pages per Minute (PPM) printer rating gives you a good comparison to other brands/models available. Most Laser printers have a PPM that is adequate for classroom use.

For areas such as Computer Labs, where many computers will be printing at once, a printer with a higher PPM rating would be needed to cope with the higher load.

**Network enabled**

Ensure all printers in schools are networkable. With the correct permissions, this allows anyone to print to any printer in the school.

From a cost control perspective, networked printers are easily managed using software such as PaperCut and GAIA.

**Consumables**

It is a good idea to have as many of the same type of printer within your school this reduces the different number of toner cartridges needed to stock and in turn reduces the amount of wasted cartridges when printers break/replaced. Refurbished toners can save schools a lot of money compared to original ones, and come with a guarantee quality against any damage to printers.

**Paper Size Supported**

Some areas in the school may require different printing needs, e.g. Art Room may need to print much larger sheets. If this is the case, a special printer may be required as most standard printers support only up to A4 size sheets.

**Cost control**

When all printers are networked, they can have cost control used on them using products such as PaperCut. This allows users to be responsible for how many prints they do.

**Interactive Whiteboards (IWB) used with Projectors**

Interactive whiteboards — large interactive displays that connects to a computer and projector — are quite new but have been adopted by schools over the last few years.

The whiteboards project images you would normally see on your computer monitor. Instead of interacting with the computer via a mouse and keyboard, you interact with it using your finger or a special pen.

Interactive whiteboards are a powerful tool in the classroom. They add interactivity and collaboration by integrating media and supporting collaborative learning.

An interactive whiteboard can be a cost saver as it allows one computer to provide learning for a whole classroom.

The Department has a list of authorised suppliers of interactive whiteboards, projectors and associated software products.
Features
Interactive Whiteboards in classrooms:
- provide a learning environment where students can interact physically with the whiteboard to contribute in class exercises
- comes in a range brands, but there are more and more coming out all the time
- display media to classes such as DVDs, Videos, TV, multimedia files and photos
- have projectors used for demonstrations.

Considerations
Here are some things to consider when buying Interactive Whiteboards:
- Purchase and installation cost
- Whiteboard location
- Projector selection and installation

Purchase and Installation Cost
Here are some key things that impact the cost of Interactive Whiteboards:
- Brand name
- Size – the bigger the board, the higher the price
- Building type and location – installation costs can be higher if it’s located somewhere with poor access for running of cables within walls, ceiling and floors.

Whiteboard Location
Where you place interactive whiteboards can have a large impact on how well it will work in the classroom.
Glare from light is a big issue for both the projector and for the whiteboard itself. Sunlight and also classroom lights can reflect badly on the board, so you will need to position it to minimise glare.
Try to avoid placing the whiteboard in a location that gets direct sunlight as it will make the picture harder to see.
If young children will use the whiteboard, don’t mount it too high for them. As the whole screen is interactive, the top of the screen needs to be within reach also.

**Projector Selection and Installation**

When it comes to selecting and installing interactive whiteboards, here are some examples of what you should consider:

- **Projector.** Use a projector that provides enough light for the room. A classroom with lots of windows, or a skylight, will require a brighter globe to be viewable during the day. You can change some things in the classroom to help with this issue such as black out skylights, tint windows or install blinds.

- **Mounting.** Mount the whiteboard based on the manufacturer’s specifications on distance and height. This eliminates issues with picture size and the need for key-stoning which can degrade image quality, especially smaller text.

- **Resolution.** Some software require a minimum screen resolution to run, make sure your projector will run the software you wish to view on the whiteboard. A good guide may be the resolution your classroom or lab computers are running, as they most likely have most of the schools software installed.

- **Globe Replacement.** Check the replacement bulb price for different projectors, they can vary dramatically and also have very different life spans. If the projector is intended on being used every day, for most of the class time, the globe can become an expensive consumable.

- **Whiteboard.** The size of the whiteboard should be of a size that the intended users can reach to use properly, e.g. If the whiteboard is being mounted in a Prep classroom it may need to be a smaller board and mounted lower to the ground.

- **Computer Type** – Consider what computer will be used to drive the IWB. Will it be used via a classroom PC which will sometimes make that computer unavailable or via a Teacher Laptop? Either choice may alter the placement of wall ports used to connect to the IWB.

- **Sunlight** – consider rooms with skylights or large with areas of windows. The brighter your environment, the less effective the projectors lamp will be. Choosing a wall to mount the IWB out of direct sunlight or in a darker area of the room should be considered.

- **Interaction type** – the type of interaction with the IWB is usually via touching the screen with a finger, or by using a pen that has technology in it to know where you are drawing on the screen. There are pros and cons to both of these. The touch screen style IWB’s are good that they do not need any other devices to work and multiple people can easily interact with the board at the same time. They are unfortunately a lot more expensive compared to IWB’s that require the use of a special pen. The IWB’s are often quite easy to setup and install yourself as they can be used with any existing whiteboard or wall. The special pens however require batteries which can sometime be an annoyance.

- **Brands** - The Department has established a panel of preferred suppliers of interactive whiteboards and associated products, found on the eduSTAR hardware catalogue

**Interactive Panels (LCDs)**

Interactive Panels (LCDs) are newer technology than Interactive Whiteboards, but have been increasingly popular in schools as the price of larger screens has come down.

An Interactive Panel is a large interactive display that connects to a computer. The image you would normally see on your computer monitor is displayed on the panel and, rather than interacting with the computer via a mouse and keyboard, you interact using your finger or a stylus.

When purchasing Interactive Panels, the same considerations as outlined above for Interactive Whiteboards need to be taken into account.
**Pros.** Interactive Panels have an advantage over Interactive Whiteboards by not having a projector to purchase and maintain. Accordingly there are no on-going running costs such as replacement globes and lamp cleaning.

**Cons.** Larger screens can be very expensive compared to an equivalent sized Interactive Whiteboards.

**Public Address System**

The PA system comprises a public address amplifier and speakers. Public address (PA) cabling is specific for this particular system.

The public address amplifier should feature:

- 250 watt amplifier minimum
- 3 balanced microphone inputs
- 2 auxiliary inputs
- Record and slave input
- Pre-announcement chime
- Bell
- Emergency alert and evacuation tones
- Monitor speaker

Three types of microphone should be connected to the system including: desk paging microphone; Cardioid/directional microphone with a floor stand and radio microphone.

**Clock-Bell Services**

The provision of stand-alone clocks in schools is preferred, so no infrastructure is needed for this service.

Bell services can be achieved by the public address service. Separate infrastructure is not needed if a public address service is deployed.
Telephony Services

Legacy Voice Systems
Historically, schools deployed legacy PBX for telephony systems. As some of these systems are no longer fit for purpose, schools should assess their voice communication needs and the benefits that Voice over IP (VoIP) could provide.

Telstra IP Telephony (TIPT)
Telstra IP Telephony is a new service offering a simple, flexible and scalable voice solution, underpinned by the reliability and security of Telstra’s network.

- Telstra Managed VOIP Service
- A telephony system based on TPAMs costing model
- Utilizes your VicSmart service rather than a separate link
- Requires no onsite Telephony system equipment
- Fully supported by a 24x7 Telstra Service Desk
- Billed directly to your School

In order to find out more, log a job to eduSTAR using the service gateway.

Other Voice over IP (VoIP) solutions
IP telephony refers to technology that transmits voice communications over a network using IP standards. This includes hardware and software products such as call processing agents, IP phones (both wired and wireless), voice messaging systems, video devices, and many special applications.

Unified communications for schools provides the tools and resources needed to help build an IP based communication systems for advanced voice services with IP telephony, paging (PA), voicemail, applications for broadcast messaging and parental notification and more.

Unified communications integrates many communications technologies:

- IP telephony
- Video telephony enables real-time video communications using the same IP network and call processing server
Collaboration, presence, rich-media conferencing: enhance the virtual classroom environment with an IP Phones (hardware-based endpoints)

In the IP environment, each phone has an Ethernet connection. IP phones have all the functions expected from a telephone, plus advanced features such as the accessing the websites, run school applications such as rostering and students attendance.

Softphones (software-based endpoints)

Softphones are desktop applications that turn the computer into a full-featured IP phone. It provides quick and easy access to powerful communications tools for voice, video, web conferencing, call management, directories, and presence information. Many softphones include both voice and video calling. Skype is an example of a softphone.
Voice over Wireless (VoWLAN)

RF planning, design, and implementation is the foundation of a successful VoWLAN deployment. The packet loss and jitter requirements of VoIP and the increased mobility wireless handset users place demands on connection quality and coverage that are beyond that of a typical WLAN data deployment.

Accordingly a site survey verification is required for all sites planning a voice over WLAN (VoWLAN), or for those who have already deployed WLAN services and wish to optimise their services.

For detailed information on Voice over Wireless see the Cisco Voice over Wireless LAN Design Guide v 4.1

Tier 4: Professional Learning and Support

Acceptable Use Policies

The Acceptable Use Policy for Internet and Other Electronic Communications document clearly defines material that is considered inappropriate and applies to all Departmental personnel and visitors.

The Acceptable Use Policy outlines appropriate use of the Department's Information, Communication and Technology resources. This policy applies to all users of the Department's ICT resources.

For a copy of the policy, see: Acceptable Use Policy DET ICT

Items to consider are:

- Who is covered by the Acceptable Use Policy (AUP)?
- Does the AUP cover me when I am working from home?
- What are the Department's ICT resources?
- Does the AUP cover internet browsing, social networking and emailing?
- What are my obligations as a user of the Department's ICT resources?
- Can I use the Department's ICT systems for personal use during my breaks?
- Who can monitor my use of the Department's ICT systems?
- What should I do if I receive an inappropriate email?
- What should I do if I discover inappropriate content on a Department computer?
- What are the consequences for breaching this policy?

ICT Maintenance and Support

Schools ICT Planning

Technical Planning Officers work with School ICT Leadership Teams to provide strategic planning advice in-line with DET policies and best practice.

- Provide strategic ICT planning advice to schools, and run ICT workshops.
- Assist with your Schools ICT Progression Strategy (SIPS)
- Responsible for Technical Design, procurement, build and implementation of school networks for School reorganisations and VSBA capital works / building works
- Assist with school ICT Health Checks and capacity planning
- Assist with adoption of DET initiatives

For assistance email: schools.technical.planning@education.vic.gov.au

The Technical Support to Schools (eduSTAR.TSS)

The program provides a managed technical support service to all Victorian government schools.
Specialist Technicians (ST’s) are representatives of the Information Management Technology Division (IMTD) in schools. The TSS program is comprised of some 670 STs, 9 Regional Service Delivery Managers and a small number of centrally based support staff.

**Service Delivery Managers (SDM’s)**
- Manage the eduSTAR.TSS ST’s and their school engagements.
- Act as an escalation point for school ICT issues.
- Oversee the delivery of Department ICT Projects and initiatives.

**Specialist Technicians (ST’s)**

The role of ST’s is to support the school ICT plan by:
- Responding to day to day support requirements.
- Assisting school leadership with planning, advice and PD.
- Work collaboratively with school based technicians.
- ST’s are required to support Department initiatives, which may include:
  - The school Administration network and business systems.
  - Notebooks for Teachers and Principals program.
  - eduSTAR ICT services including wireless
  - VicSmart network, Internet and related web services.
  - eduMail and other online services.

For additional information see the DET homepage: [Technical Support to Schools Program (TSSP)](https://www.det.vic.gov.au)

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**CyberSafety**

Schools and Cybersafety guidelines, developed by the Department, provide school staff with advice on the use of digital technologies. Local policies and practices around student engagement and acceptable use agreements have been implemented by each school, based on these guidelines.

Cybersafety refers to the way in which people keep themselves and their peers’ safe on the internet.

Children and young people are no longer passive recipients of information that is available on the internet. They actively contribute content on various social media platforms. While some of this does occur within the physical school environment, much will inevitably be posted online from a site external to the school.

Schools have a responsibility to educate children and young people and address the underlying values (ethics) and responsible behaviours expected of them regardless of their physical location.

It is recommended that schools take a holistic approach to cybersafety education. Cybersafety practices and issues should be included within the school’s curriculum planning and taught explicitly.

As part of a classroom program teachers should look for opportunities to introduce or reinforce cybersafety practices. The focus should be on the behaviour and potential dangers associated with the technology as well as how to use the technology safely and responsibly.
Teachers may consider including the following behaviors in their program:

- posting or participating in bullying or harassment (cyberbullying)
- accessing inappropriate content
- unwanted contact with strangers
- posting or sharing personal information and passwords
- using (or stealing) content owned by others, for example images, music or videos
- plagiarising: taking ideas or information created/owned by others without referencing their origin
- using critical thinking skills when using the internet
- accessing offensive or illegal content
- seeking support from a trusted adult when there is an issue.

The Department takes the issue of student safety and wellbeing very seriously and has developed a number of Cyber Safety, security and anti-bullying resources for schools, teachers, parents and students:

- Bully Stoppers
- eSmart
- esafety

Bullying

Bullying is an ongoing and deliberate misuse of power in relationships through repeated verbal, physical and/or social behaviour that intends to cause physical, social and/or psychological harm. It can involve an individual or a group misusing their power, or perceived power, over one or more persons who feel unable to stop it from happening.

Bullying can happen in person or online, via various digital platforms and devices and it can be obvious (overt) or hidden (covert). Bullying behaviour is repeated, or has the potential to be repeated, over time (for example, through sharing of digital records).

Bullying of any form or for any reason can have immediate, medium and long-term effects on those involved, including bystanders. Single incidents and conflict or fights between equals, whether in person or online, are not defined as bullying.

Cyberbullying

Cyberbullying is bullying behaviours using digital technologies. This includes harassment via a mobile phone, email and social media tools. Cyberbullying includes:

- Pranking: Repeated hang ups, anonymous, mocking or threatening phone calls.
- Image sharing: Forwarding or sharing unflattering or private images without permission.
- Sexually explicit images: People of any age, who forward or share images of a sexual nature of a person under 18 need to be aware that this is a criminal offence (child pornography) that may result in prosecution.
- Text and email: Sending insulting or threatening text messages or emails.
- Personal online information: Publishing online someone's private, personal or embarrassing information without permission, or spreading rumours online.
- Identity theft: Assuming someone's identity online and negatively representing them in a way that damages their reputation or relationships.
- Hate sites: Creating hate sites or implementing social exclusion campaigns on social networking sites.

It is also cyberbullying when a student, or students, uses technology to run a multi-step campaign to bully another student. For example, setting another student up to be assaulted, video-recording their humiliation, posting the video-recording online and then sending the website address to others.

The Department provides a range of resources to help students, parents and schools deal with cyberbullying:

- Bully Stoppers – provides evidence-based, practical advice and resources for school leaders, teachers, parents, and students;
- **eSmart** – delivered by the Alannah and Madeline Foundation, eSmart assists schools to develop a culture that promotes the safe, smart and responsible use of technology;
- **Bullying No Way!** - provides information for parents, teachers, school and students to create learning environments where every student and school's community member is safe, supported, respected, valued – and free from bullying, violence, harassment and discrimination; and
- **eSafety** – the Office of the Children’s eSafety Commissioner provides an easy method of reporting cyberbullying or illegal material and information on online safety.
Learning Spaces

Learning spaces shape and change practice. Engaging, adaptable spaces energise students, teachers and the community.

Well-designed learning spaces inspire creative, productive and efficient learning.

Schools need to provide safe and secure, learner-centred, flexible learning spaces and connected digital environments, including virtual learning environments that allow learners to have access to learning resources and support when they are not at school.

Learning Space Layout

Open learning spaces

Open learning environments ensure equitable student access to available ICT’s, and enable the seamless integration of ICT into effective learning and teaching, supporting the diverse and changing needs of students, while responding to new and emerging technologies to enhance learning.

Open learning spaces allow schools to design, maintain and update IT infrastructure, learning places, spaces and resources, to maximise learning opportunities. Teachers have the flexibility to plan learning activities that involve students working in large groups, small groups, with partners or individually on varied tasks using a range of ICT and other resources simultaneously.

Open learning spaces allow for a move away from a focus of the ‘front of the classroom’ to a more fluid student centred environment. Often co-teaching is a viable option in an open learning space.
Open learning spaces can enhance learning and teaching by promoting creativity and innovation with spaces available for different learning activities like online collaboration and conferencing, filmmaking, green screens and quiet spaces for podcasting and video reflections.

**Traditional classrooms**

ICT can be integrated into traditional classrooms layouts in a variety of ways depending on the placement of the devices to facilitate student groupings for collaborative and personalised learning. Many schools are now creating more flexibility by using wirelessly connected laptops.

Traditional classrooms

ICT can be integrated into traditional classrooms layouts in a variety of ways depending on the placement of the devices to facilitate student groupings for collaborative and personalised learning. Many schools are now creating more flexibility by using wirelessly connected laptops.

Space can still be provided in traditional classrooms for students to access and use a range of ICT tools.

**Learning Streets**

The school can be designed so that it has strategically placed ICT resources along a main ‘learning street’. Learning areas open onto the communal learning street. The ‘learning street’ serves as the central organising element of the school and encourages student and teacher interactions. This design allows for the spatial connectivity of open plan interiors, encouraging a communal learning experience where classes can ‘spill’ out.

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The ICT resources can be used by any class when available maximising their use throughout the school day. The design ensures there is clear visibility to monitor students and support their learning. The ‘learning street’ model can be beneficial in large schools as it breaks down the scale of a school and provides a sense of community within large schools. Traditional school buildings can be opened up, by taking out walls, and creating a ‘learning street’ within the existing corridor structure.
Computer & ICT Device Placement

There are three common styles of ICT device placement:

- **Row Model**
- **Computer Banks**
- **Fully Integrated**

The DET standard opts for the Fully Integrated Model

**Fully integrated**

In learning spaces with full integration, devices are dispersed around the room strategically. Placement may be at every table group in the room to ensure access for group activities. The devices should be placed to ensure room for students to work collaboratively or individually. Often, in these learning spaces, there is not a set seat for each student, allowing students to move flexibly around the room to participate in learning activities and use a variety of ICT tools.

There is flexible access, anywhere anytime within the school, to ICT resources. Learning occurs with furniture, technology and storage accommodating flexible curriculum delivery models that integrate high levels of ICT enabled learning. Student learning spaces that are not part of individual classrooms are also available with fixed and wireless access to online environments.

Flexible access anywhere, anytime within the school grounds involves the use of mobile technologies.

- Teachers use the school's wireless connection for a 'just in time' professional learning session.
- Students use the school's wireless connection as part of a learning activity,
**Computer Banks**

Computers are placed around a service column or recessed floor box. Best suited where using desktop computers are located.

**Row model**

Computers can be placed along a wall in the classroom. Computers placed along the walls need considerable space between them to ensure there is room for 2 or 3 students to comfortably sit in front of the screen to work collaboratively on tasks if required.
# Appendix

## Appendix I – Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACMA</td>
<td>Australian Communications and Media Authority</td>
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<tr>
<td>AP</td>
<td>Access Point</td>
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<tr>
<td>AS/NZS</td>
<td>Australian Standard/New Zealand Standard</td>
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<tr>
<td>AV</td>
<td>Audio Visual</td>
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<tr>
<td>CO2</td>
<td>Carbon Dioxide</td>
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<tr>
<td>CP</td>
<td>Consolidation Point (cabling)</td>
</tr>
<tr>
<td>DET</td>
<td>Department of Education and Training</td>
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<tr>
<td>DMZ</td>
<td>Demilitarized Zone</td>
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<tr>
<td>EAP</td>
<td>Extensible Authentication Protocol</td>
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<tr>
<td>ES</td>
<td>Encoding Server</td>
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<tr>
<td>FE</td>
<td>Fast Ethernet</td>
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<tr>
<td>GE</td>
<td>Gigabit Ethernet</td>
</tr>
<tr>
<td>HSRP</td>
<td>Hot-Standby Router Protocol</td>
</tr>
<tr>
<td>ICT</td>
<td>Information, Communication and Technology</td>
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<tr>
<td>IETF</td>
<td>Internet Engineering Task Force</td>
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<tr>
<td>IDS</td>
<td>Intrusion Detection System</td>
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<tr>
<td>IP</td>
<td>Internet Protocol</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
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<tr>
<td>LC</td>
<td>Lucent Connector or Local Connector</td>
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<tr>
<td>LR</td>
<td>Latest Revision</td>
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<tr>
<td>LWAPP</td>
<td>Lightweight Access Point Protocol</td>
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<tr>
<td>m</td>
<td>Metre</td>
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<tr>
<td>MIMO</td>
<td>Multiple-input Multiple-output</td>
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<tr>
<td>mm</td>
<td>Millimetre</td>
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<tr>
<td>MS</td>
<td>Media Server</td>
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<tr>
<td>NAC</td>
<td>Network Access Controller</td>
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<tr>
<td>NMF</td>
<td>Network Management Framework</td>
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<tr>
<td>NMS</td>
<td>Network Management System</td>
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<tr>
<td>OHS</td>
<td>Occupational Health and Safety</td>
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<tr>
<td>Term</td>
<td>Description</td>
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<tr>
<td>OM</td>
<td>Operations Manager</td>
</tr>
<tr>
<td>OSPF</td>
<td>Open Shortest Path First (routing protocol)</td>
</tr>
<tr>
<td>PBX</td>
<td>Private Branch Exchange</td>
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<tr>
<td>PDA</td>
<td>Personal Digital Assistant</td>
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<tr>
<td>PoE</td>
<td>Power Over Ethernet</td>
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<tr>
<td>QoS</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>RFC</td>
<td>Requests for Comments</td>
</tr>
<tr>
<td>RSTP</td>
<td>Rapid Spanning Tree Protocol</td>
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<tr>
<td>SIP</td>
<td>Session Information Protocol</td>
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<tr>
<td>SNMP</td>
<td>Simple Network Management Protocol</td>
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<tr>
<td>SS</td>
<td>Storage System</td>
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<tr>
<td>STP</td>
<td>Spanning Tree Protocol</td>
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<tr>
<td>STP</td>
<td>Shielded Twisted pair</td>
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<tr>
<td>TCP/IP</td>
<td>Transmission Control Protocol/Internet Protocol</td>
</tr>
<tr>
<td>UTP</td>
<td>Unshielded Twisted pair</td>
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<tr>
<td>VGA</td>
<td>Video Graphics Array</td>
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<tr>
<td>VLAN</td>
<td>Virtual LAN</td>
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<tr>
<td>VM</td>
<td>Virtual Matrix</td>
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<tr>
<td>VoD</td>
<td>Video on demand</td>
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<tr>
<td>VPN</td>
<td>Virtual Private Network</td>
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<tr>
<td>VRRP</td>
<td>Virtual Router Redundancy Protocol</td>
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<tr>
<td>WAN</td>
<td>Wide Area Network</td>
</tr>
<tr>
<td>WAP</td>
<td>Wireless Access Point</td>
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<tr>
<td>WEP</td>
<td>Wired Equivalent Protocol</td>
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<tr>
<td>WLAN</td>
<td>Wireless LAN</td>
</tr>
<tr>
<td>WLC</td>
<td>Wireless LAN Controller</td>
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</tbody>
</table>

For additional Internetworking Terms and Acronyms please refer to:

Appendix II – Referenced Documents

Reference Documents


http://www.cisco.com/en/US/tech/tk722/tk809/technologies_q_and_a_item09186a00805e9a96.shtml

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