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1 Terms used in this document

Word or Short-form	Definition
AG1	FSD Lock numbering system
AVN	Audio Visual and Networks Group
BAS	Building Automation System
CM 1	General Communications room
CM 2	Building Gateway Communications room
CM 3	Distribution Communications room
CM 4	Core Communications room
Contractor	Any consultant, installer, integrator, contractor or sub-contractor hired to provide products or services to Deakin
DS	Digital Services (Formally eSolutions)
DeS	Deakin eSolutions (Deprecated)
FSD	Facilities Service Division (Deprecated)
GPO	General Purpose Outlet for distributing 240 VAC power
IPG	Infrastructure and Property Group (Formerly Facilities)
LAN	Local Area Network
Network Engineering	Deakin eSolutions Network Engineering Team Leader or their delegate
PDU	Power distribution Unit
PoE	Power over Ethernet
RMS	Room Management System

UPS	Uninterruptable power supply
WAN	Wide Area Network

2 Contacts

A Network Engineering Representative will be assigned for all projects or tasks that impact the Deakin ICT network. This person shall be the first point of contact for all queries. If this person is not available to answer queries, the Deakin Digital Services Network Engineering Team Leader is to be contacted for alternative representation.

Refer to <https://blogs.deakin.edu.au/avn-docs/standards-documents/network-standards/> for Network Engineering Team Leader contact information

3 Scope of Document

3.1 Purpose

This document is one in the ICT Networking Standards series. It describes UPS and dual power standards for the provision of power to communications equipment.

This document must be read in conjunction with “Network Standards – Overview” which contains key information regarding the ICT Networking Standards series and accountability.

Where the work deviates from these standards, approval in writing from the Deakin Digital Services Network Engineering Team Leader or their delegate, hereafter referred to as Network Engineering, is required before works commence.

3.2 Document Access

All Deakin University Digital Services staff and contracted personnel are provided access to this document. The most recent version is available at:

<https://blogs.deakin.edu.au/avn-docs/standards-documents/network-standards/>

Additional Audio Visual and Network Standards are available at:

<https://blogs.deakin.edu.au/avn-docs/>

3.3 Associated Documents

Many aspects of the system design requirements are specified in other companion documents within the Deakin ICT Technical Standards. These documents must be read together to constitute the complete Communication Network Standard. The ICT Network Standards series of documents includes:

Document	Purpose
Network Standards – Overview	Overview document for the ICT Network Standards series - contains key information regarding the ICT Networking Standards series and accountability.
Network Standards – Communications Rooms	Describes the standards for communications rooms in use in Deakin for housing of ICT equipment.

Network Standards – Communications Cabling	Describes copper and fibre cabling standards in use at Deakin.
Network Standards – Power Provisioning	This Document Describes UPS and dual power standards for the provision of power to communications equipment.
Network Standards – Wireless LAN	Describes physical wireless standards in use at Deakin, including site survey and mounting of access points.

3.4 Document History

Version	Primary Author(s)	Description of Version	Date Completed
1.1	Pat Foley	Initial document release	03/10/2017
2018-2	Carolyn Hulsbergen	Document restructured	16/2/2018
2018-4	Carolyn Hulsbergen	Rewording for clarification (with Pat Foley)	10/4/2018
2018-11	Pat Foley	Document updated	12/11/2018
2019-2	W Goorden	Document updated	01/03/2019
2023-11	W Goorden	Document updated	06/11/2023

4 Accountability

All UPS devices with respect to Networking and Audio-visual support are the responsibility of Deakin University Digital Services AVN. Exceptions to this will be at the discretion of Deakin Digital Services AVN Manager.

Power provision is the responsibility of Deakin University Infrastructure and Property Group (IPG) and formal service level agreements against power failure to the main supply for UPSs, bypass switch control units and GPO(s) are provided for all Deakin premises. Non-Deakin premises agreements must be obtained prior to handover to Digital Services.

All Electrical work must be approved by IPG and carried out by approved and certified Electrical Contractors.

5 General Information

Suitable power quality protection must be provided to prevent serious damage to control equipment from power surges, Radio Frequency Interference (RFI), electronically induced spikes, etc. and to provide minimum uptimes when there are mains failures.

The preferred method of power protection for Deakin University building and equipment is by use of a dedicated UPS Power system, providing continuous and conditioned power in conjunction with additional feed from Mains Power via an approved PDU with power filter. A list of approved hardware is available in Appendix A – Approved Hardware

Where provided it is preferred that Core Communications Rooms are additionally supported by Backup Generator services.

5.1 Approved Hardware

All network equipment used at Deakin must be approved for use by Network Engineering. Hardware is regularly evaluated by Network Engineering for potential use at Deakin.

Non-standard network equipment requires an approved non-conformance in writing from Network Engineering on a case by case basis. Approval must be obtained prior to scoping and purchasing of such items.

A list of approved hardware is available in appendix A – Approved Hardware

6 Power Protection Selection

Core Communications Rooms must be connected to the dedicated building reticulated power system where available, providing continuous and conditioned power to communications rooms and AV equipment installed throughout that building. This will provide a minimum uptime of 2 hours.

When building dedicated reticulated protected power is not available, a UPS of suitable capability must be installed.

At the time of specification, all UPS devices must be sourced from APC Schneider: <http://www.apc.com/au/en/> unless otherwise specified, changes to this will only be authorised by Network Engineering. Refer to appendix A – Approved Hardware

6.1 UPS Capacity

When installing and/or upgrading a UPS, the installation must be assessed and capacity calculations must be made for each installation to arrive at the most suitable UPS for power provision and minimum uptime allowance.

- At handover to AVN support, when all equipment is installed and operating correctly, UPS load must be no more than 50% for each parameter.
- Minimum UPS uptime requirements vary by room type and are specified in ICT Standard: Network Standard – Communications Rooms available from <https://blogs.deakin.edu.au/avn-docs/standards-documents/>

6.2 Consolidation

When UPS systems are used to support both Digital Services networking and audio-visual devices, the UPS capacity calculations and UPS selection must ensure that power provision and minimum uptime standards specified for networking, in “UPS capacity” above, are met and there is sufficient capacity for all connected devices.

6.3 UPS Runtime

Each Deakin University campus has 4 types of communications room. These are described in ICT Standard: Network Standard – Communications Rooms available from <https://blogs.deakin.edu.au/avn-docs/standards-documents/>. The minimum uptime for each room type is:

Communications room	Room type	Expected UPS uptime on battery
CM-1	General Communications Room	30 minutes
CM-2	Building Gateway Communications Room	1 hour
CM-3	Distribution Communications Room	2 hours
CM-4	Core Communications Room	2 hours

7 UPS Placement

UPS units can be either rack mounted or, free standing in the room as specified in the UPS selection matrix in section 16 of this document.

Other reference ICT Standard: Network Standard – Communications Rooms, available from <https://blogs.deakin.edu.au/avn-docs/standards-documents/>, for appropriate locations of UPSs for each type of Communications Room.

8 Management and Security

All UPS devices selected:

- must have vendor maintenance for UPS hardware and software for minimum term of 12 months
- must contain a suitable network card and be monitored by Deakin Digital Services monitoring equipment,
- must be included in the Deakin asset system where it has a value of greater than \$5000.

9 Power Calculations

When installing new equipment and / or upgrading installations, each installation must be assessed and capacity calculations must be made with respect to maximum power requirements so as to arrive at the most suitable UPS for power provision and minimum uptime allowance. See “UPS Capacity” above.

In all calculations the minimum networking uptimes must be observed at all times.

10 Connection to Electrical Utility Services – Dual Power

The primary aim of dual power is where direct mains power is connected in conjunction with UPS supply to eliminate a single point of failure, this moves supply from single to dual power feeds (1 UPS power + 1 direct filtered power), and hence improve end user network service availability and reliability.

10.1 Direct Mains Connection

Primary Power will be provided from a Building Electrical Sub – Board directly to the Comms rack and connected to Suitable PDUs, these must be selected and installed to provide filtered power to the Networking switch stacks. Refer to appendix A – Approved Hardware.

The number of PDUs is dependent on the number of switches in a rack and will need to be determined using the **UPS Selection Matrix** in section 16 of this document.

10.2 UPS Connection

- Power will be provided from a suitable UPS to supply Secondary power directly to the Comms rack and connected to Suitable PDUs, these must be selected and installed to provide filtered power to the Networking switch
- Each UPS must be connected to its own dedicated mains power circuit of suitable and calculated amperage as specified by IPG.

- Any UPS over 3 KVA is to be hard wired adhering to the manufacturers specifications. Connection is to a dedicated power circuit specified by IPG.
- All electrical work must be approved by IPG and carried out by approved and certified electrical contractors.
- Transition of power between mains power and supported (UPS) power must be maintained in the event of a UPS failure and must be done smoothly via an approved design UPS system and Bypass switch (with a no break feature that does not interrupt service).

11 Power Distribution

11.1 Power Distribution to Rack PDU

The input power connection for the PDU must be via the specified cable and plug specific to the PDU and the required power provisioned socket.

Power delivery from **Direct Mains Power** for connection to Hardware must be via the direct mains pendant plug supplied for each rack and an approved PDU. Refer to appendix A – Approved Hardware.

- This will be identified as a GREY power outlet.

Power delivery from UPS for connection to Hardware must via the UPS Pendant plug and approved PDU supplied for each rack.

- This will be identified as an ORANGE power outlet.
 - 15 AMP circuit – up to 3Kva
 - 32 AMP circuit – over 3 Kva

No device is to be directly connected to Mains or UPS, it must be connected via a PDU.

11.2 Power Distribution from Rack PDU

Power connection for hardware is to be with a power cable fitted with a C14 (**male**) power plug at the PDU.



Power distribution from the UPS to the rack mount equipment must be via an approved 19-inch rack mounted power distribution unit. Refer to appendix A – Approved Hardware

Positioning of the PDU will be determined by the style of rack into which it is to be mounted.
(Reference ICT Standard: Network Standard – Communications Rooms)

- The PDU is to be mounted at the rear with the outlets facing towards the front of the rack and 10 rack units above the UPS.

The mounting brackets are to be positioned such that the PDU is set back behind the front upright of the rack.

11.3 Mains Power Distribution to Rack

Power distribution from direct mains supply to the rack mounted equipment is to be via an approved 19-inch rack mounted power distribution unit. Refer to appendix A – Approved Hardware

Positioning of the PDU will be determined by the style of rack into which it is to be mounted.
(Reference ICT Standard: Network Standard – Communications Rooms)

- The PDU is to be mounted at the rear with the outlets facing towards the front of the rack and 10 rack units above the UPS.

The mounting brackets are to be positioned such that the PDU is set back behind the front upright of the rack.

The required number mains outlets and amp rating for each is to be determined by referencing **UPS Selection Matrix** table in section 16 of this document.

11.4 UPS Power Cable to Supply

11.4.1 Plug in UPS

UPS Units with plug- in power will be via an approved power cable with C19 from UPS to the AC power supply and rated at a minimum of 15 amps via Pendant cable with C19 socket for connection to the UPS and a bezel 15 Amp three pin plug for connection to the AC socket.



Refer to appendix A – Approved Hardware.

The required installation method is to have a pendant power outlet located such that the power outlet falls into the left cable manager (as seen from rear of the rack) and is to be suspended between 1.5 and 1.6 metres above the floor level.

Any variation from the preferred installation method must be approved by the Deakin Digital Services AVN representative.

11.4.2 Hard wired

Units with hard wired connection will use suitable single or 3 phase wiring via an approved distribution board and bypass switch. Installation is to be by a registered electrician.

12 UPS Type

12.1 In-Rack UPS

A UPS up to and including 3KVA (Refer to appendix A – Approved Hardware) is to be connected via 3 pin power cord to specified power outlet following the cable install standards in this document
(Ref: 12.3 UPS power cable to supply)

The selected UPS shall be rack mounted in the communication rack.

- In the standard four post rack with cage nuts, slide-rails must be used as per manufacturers standards.
 - Rails must be installed at the last RU (bottom of rack) and

- Battery pack must be installed above UPS as required.

(Reference ICT Standard: Network Standard – Communications Rooms)

12.2 Standalone UPS

Any UPS over 3 KVA is to be hard wired (adhering to manufacturers specifications) to a dedicated power circuit specified by IPG.

- All electrical work must be approved by IPG and carried out by approved and certified electrical contractors.
- Transition of power between mains power and supported (UPS) power must be maintained in the event of a UPS failure and must be done smoothly via an approved design UPS system and Bypass switch (with a no break feature that does not interrupt service).
- Refer to appendix A – Approved Hardware. The current specific models will be chosen on a case by case basis for suitability and will be in conjunction with the Deakin Digital Services AVN representative.
 - The UPS must be connected via an approved distribution board (see appendix A)



- The distribution board must be connected via an approved Bypass switch (see appendix A)



12.3 Power Cable Management

All pluggable power cables must be neatly and securely restrained down the vertical cable management paths at the rear of the rack when connected to Mains or to PDUs.

Securing must be done only with Velcro to align with Data cable management (cable ties are not to be used)

Power cables must not be bundled or secured with data cables and must be separated in all cases.

Wiring must not present a tripping hazard under any circumstances, in particular:

- The power outlet must not be skirting-mounted.
- The power cable must not run along the floor.

13 UPS and PDU Management

13.1 Network Management Card and Ethernet Network Connection

Each UPS is to be fitted with a Network Management Card with Environmental Monitoring to provide network connectivity.

- A UPS or PDU must be network connected to the switch stack that it supports.
- Configuration of the UPS network management card must be undertaken by the installing contractor under the direction of the Digital Services AVN representative. Campus settings will need to be obtained to complete this task.
 - The Cisco switch port connection for the UPS or PDU must be labelled in the switch configuration with the IP and DNS name as a description.

14 Accessibility

Any UPS or PDU must have adequate room around the device for maintenance purposes.

UPS devices must not be installed so as impede the installation or removal of internal parts or batteries.

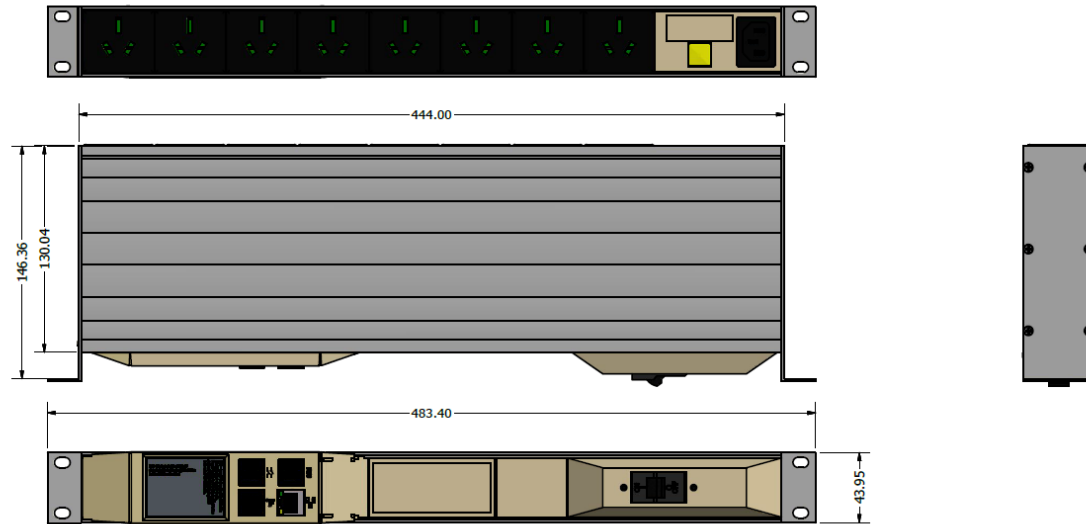
Clear working areas must be maintained in front for rack mounted devices and both front rear access maintained for standalone UPSs.

15 Approved Hardware

PDU

The approved PDU is Computer support systems (CSS) intelligent Power PDU.

There are 2 models: 16amp and 32amp.



16 UPS types

In-Rack UPS

Deakin Digital Services has chosen the APC- Schneider range of UPS for in-rack power protection.

Any deviation to this specified model must be authorised by the Deakin Digital Services AVN representative.

The current specific models for use are:

Standalone UPS

Deakin Digital Services has chosen the APC- Schneider range of UPS for use above 3 kva , these will be chosen as per the selection matrix or on a case by case basis for suitability and will be in conjunction with the Deakin Digital Services AVN representative.

UPS Selection Matrix

Stack Size	UPS Required (Switches Only)	Notes	Recommended UPS Model and ancillary equipment	Power Circuits required	PDU Required
2 Switches or Less	3 Kva	In rack installation	See Appendix A Deakin two switch power bundle	1 x 15 Amp mains Feed 1 X 15 Amp UPS Feed	See Appendix A 2 X 15 Amp PDU
3 to 4 Switches	6 Kva	Free standing Instalation. Requires wall mounted bypass switch with dedicated sub board and cct breakers	See Appendix A Deakin four switch power bundle	1 x 32 Amp mains Feed 1 X 32 Amp UPS Feed	See Appendix A 2 X 32 Amp PDU
5 to 6 Switches	10 Kva	Free standing Instalation. Requires wall mounted bypass switch with dedicated sub board and cct breakers	See Appendix A Deakin six switch power bundle	2 x 32 Amp mains Feed 2 X 32 Amp UPS Feed	See Appendix A 4 X 32 Amp PDU
7 + Switches	Advice on Aplication	Free standing Instalation. Requires wall mounted bypass switch with dedicated sub board and cct breakers	Advice on Application	Advice on Application	Advice on Application

17 Appendix A

Deakin Power Bundles

Deakin six switch power bundle

Product Model	Description	Qty.
SRT10KRMXLI	APC Smart-UPS SRT 10000VA 230V. APC Smart-UPS SRT 10000VA 230V Include NW Card	1
SRT192BP2	APC Battery pack	1
EUR-CBB03-01-G	Eureka Distribution Sub Board	1
GVSBPUSU10K20H	Maintenance Bypass Panel, single unit, 10 -20kW 400V wall mount, for Galaxy VS and Easy UPS3S	1

Deakin four switch power bundle

Product Model	Description	Qty.
SRT6KRMXLI	APC Smart-UPS SRT 6000VA 230V. APC Smart-UPS SRT 6000VA 230V Include Network Card	1

SRT192BP	APC Battery pack	1
EUR-CBB03-01-G	Eureka Distribution Sub Board	1
GVSBPUSU10K20H	Maintenance Bypass Panel, single unit, 10 -20kW 400V wall mount, for Galaxy VS and Easy UPS3S	1

Product Model	Description	Qty.
SRT3000RMXLI	APC Smart-UPS SRT 3000VA RM 230V.	1
AP9631	UPS Network Management Card 2 with Environmental Monitoring	1

Deakin single switch power bundle

Product Model	Description	Qty.
SRT3000RMXLI	APC Smart-UPS SRT 3000VA RM 230V.	1
AP9631	UPS Network Management Card 2 with Environmental Monitoring	1

Individual Part numbers

Application	Manufacturer /supplier	Model	Part number
UPS 3KVA	APC Schneider	APC Smart-UPS X 3000VA Rack/Tower LCD 200-240V	SRT3000RMXLI
UPS 6KVA	APC Schneider	APC Smart-UPS SRT 6000VA 230V with Network Card	SRT6KRMXLI + SRT192BP add Nic card : UPS Network Management Card 2 with Environmental Monitoring part : AP9631 see web site to configure for uptime



15 amp Pendant plug	NHP		15 A 250 V 3 Flat pins Resistant Orange ISOPS315PRO
15 amp Pendant captive Socket	NHP		15 A 250 V 3 Flat pins Grey ISOC315PG Resistant Orange ISOC315PRO
32 amp Pendant Outlet plug	NHP		32 A 250 V 3 Round pins Resistant Orange ISOPS332PRO
32 amp Pendant Outlet Orange/ Grey	NHP		32 A 250 V 3 Round pins Grey ISOC332PG Resistant Orange ISOC332PRO
Distribution Sub board	EUREKA	IP42 C-Bus Control Components DIN Enclosure	EUR-CBB03-01-G
UPS bypass Panel	APC	Maintenance Bypass Panel, single unit, 10 - 20kW 400V wall mount, for Galaxy VS and Easy UPS3S	GVSBPUSU10K20H
32 Amp Power distribution unit	Computer support systems (CSS)	CSS 32A PDU - Intelligent Power	ZIP-5M08-TAS-1.5RL
16 Amp Power distribution unit	Computer support systems (CSS)	CSS 15A PDU - Intelligent Power	ZIP-5A08-TAS-1.5RL