



Deakin eSolutions

ICT Volume 6: Network Standards

ICT 6.9 2017 Wireless LAN Standards

Audio Visual and Networks Unit

Document Version 2.2

Abstract

This standard outlines the specifications for Wireless LAN (WiFi) services throughout Deakin University and associated locations managed by Deakin eSolutions

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1 Occupational Health and Safety

One of the major objectives of the University is to ensure that staff, students, visitors and the community do not suffer injuries and illnesses as a result of the activities and operations of and at the University

It is a requirement that all Contractors and any nominated sub-contractors have fulfilled all aspects of the Deakin University Contractor Registration and all persons of the Cabling Contractor and any nominated sub-contractors have completed and passed the Deakin University Contractor Induction.

The Contractor and any nominated sub-contractor shall make available the necessary resources to comply with all relevant Occupational Health & Safety Acts and Regulations, thereby ensuring that the workplace environment is safe and without risk to health.

Everyone in the workplace environment is required to be aware of potential hazards and take steps to prevent workplace accidents, injuries and illnesses.

It is therefore important to note that Contractors, any nominated sub-contractors and their staff shall conform to normal site safety requirements.

2 Maintaining a Safe Working Environment

Consideration for the following should be understood in order to maintain a safe working environment during the course of the installations.

Safety of students, instructors and Contractors shall be observed at all times.

All Contractors that perform any work on a Deakin University site are to undertake a site safety induction, where applicable.

Where applicable, no Contractor is permitted to commence any work on site at a Deakin University Campus without having completed this site safety induction.

Where applicable, the safety induction programme will be arranged with the Deakin University Site Manager.

3 Note of Concern

The Contractor, any sub-contractor and staff are to adhere to policies and procedures described within the Deakin University Asbestos Management documentation available from Deakin University upon request.

The Asbestos Register identified within the Deakin University Asbestos Management documentation is available from Deakin University upon request.

4 Standards Brief

This standard defines the specifications for wireless LAN (WiFi) services, including their installation and management, throughout Deakin University and associated locations managed by Deakin eSolutions (DeS).

This standardization is paramount to providing quality and guaranteed services to the Deakin University premises and locations managed by Deakin eSolutions.

Product substitution

Only product and part numbers described in the Deakin University Standards shall be used. No deviation from the product or parts list shall occur without the express permission of the DeS Audiovisual and Networks Unit Leader. If a specified product or part is no longer available this is to be brought to the attention of the DeS AV and Networks Unit Leader, who will advise appropriate alternative product or part.

Under no circumstance is the installer to substitute parts without the express permission of the DeS AV and Networks Unit Leader.

4.1 Policy

This standard is applicable to all WiFi services throughout Deakin University and associated locations managed by Deakin eSolutions.

4.2 Standard Document Access

All Deakin University eSolutions and contracted personnel are provided access to this document.

Designers, installers and contractors must ensure they have the most current version of all standards prior to engaging in any work.

The most recent version of the Standards and associated Resources can be found on the internet at: <http://www.deakin.edu.au/about-deakin/administrative-divisions/esolutions/ict-standards>

4.3 Related Documents

Many aspects of the system design requirements are specified in other companion documents within Volume 6 of the Deakin ICT Standards. **All documents within Volume 6 must be read together to constitute the complete Standard.**

4.4 Conflict of Information or Clarification

Whenever a conflict of information occurs or clarification of instruction is required all query shall be made to the 'Deakin University DeS AV and Networks Unit Leader or their delegate', hereafter referred to as the Deakin AVN Representative.

For all projects or tasks that include data cabling a Deakin AVN Representative will be assigned. This person is to be the first point of contact for all queries. If this person is not available to answer queries the DeS AV and Networks Unit Leader is to be contacted for alternative representation.

4.5 Non-standard configurations

All non-standard implementations **must** be approved in writing by the **DeS AV and Networks Unit Leader** strictly on a case-by-case basis.

4.6 Roles and Responsibilities

The following roles are referenced in this and related standards:

Role	Responsibility
DeS AV and Networks Unit Leader	Holds responsibility for all audiovisual and network standards and their adherence, provision, maintenance and security of all audiovisual and network infrastructure. All Communications Engineers ultimately report to this role.
DeS Senior Communications Engineer (AV/Networks)	A staff member with significant technical experience whose role is to provide architectural design and quality control of audiovisual and network fitouts.
DeS Communications Engineer (AV/Networks)	A staff member with technical experience whose role is to audit, provision and maintain audiovisual and network infrastructure.
Project Manager (DeS)	<p>Responsible for ensuring DeS-supplied deliverables agreed to by formal project board are delivered on time, to budget and within agreed quality parameters while managing project communication, dependencies and reporting.</p> <p>Defects with an audiovisual or network fitout will be reported to the Project Manager (DeS) by DeS Communications Engineer (AV/Networks).</p>
Project Manager (FSD)	<p>Responsible for ensuring FSD-supplied deliverables agreed to by formal project board are delivered on time, to budget and within agreed quality parameters while managing project communication, dependencies and reporting.</p> <p>Defects with an audiovisual or network fitout for which FSD are responsible will be reported by the Project Manager (FSD).</p>
External supplier	A company such as a third party audiovisual or integration vendor, or network cabling provider, contracted by Deakin University to provide specified products and/or services.
Subcontractor	A company or other agent hired by an external supplier to provide all or some products or services required to fulfil a contract the external supplier holds with Deakin University.

5 Installation standards and conditions

This document does not replace, supersede or override formal contractual terms and conditions between the parties. This section draws suppliers' attention to some important requirements.

5.1 General Information

Deakin University has specific design requirements and methodologies that shall be adhered to for all new and refurbished buildings and associated spaces throughout Deakin University and associated locations managed by Deakin eSolutions.

Where product has been indicated the specified product shall be used, no substitution of product is permissible.

All horizontal data cabling shall be installed to Deakin standard *ICT 6.4 Horizontal and inter building cabling*.

Deakin University standards are supplemental to Australian Standards and manufacturer requirements or methodologies. Where Deakin University standards have not made comment then the design and methodologies of the associated Australian Standards or product manufacturer apply.

As-built documentation shall be supplied for all builds. As-built documentation shall be supplied in electronic format in both CAD and PDF. Post-installation wireless survey results will be supplied for all new and refurbished installations.

Any questions regarding the standards, product or methodology shall be directed to the DeS AV and Networks Unit Leader.

5.2 Checklist

Conformance to this Standard shall be assessed using the Checklist (Resource 6.2.1 Communications Room Checklist) available at:

https://deakin.service-now.com/kb_view.do?sysparm_article=KB0011230

5.3 Variation agreements

Any deviation from the Standard specification must be agreed to in writing by DeS AV and Networks Unit Leader prior to commencement of any work. Any building features such as plaster, carpet tiles, roof tiles that are altered during the installation process must be restored to original condition, to the satisfaction of the site supervisor.

5.4 Contractor to fully self-inform

The contractor shall fully self-inform and not rely on representations.

5.5 Fit-for-purpose

Solutions shall be fit-for-purpose.

5.6 DeS site inspections

The contractor shall agree to regular site visits from DeS project representatives and have in place a means of communication and escalation between senior technical staff within both organizations prior to commencement of work.

6 Coveragespecification

Deakin University requires that all teaching, academic, student congregation areas, staff occupied spaces, public-transport waiting areas on-campus and adjacent to campus, and nominated external open areas can access the Deakin Eduroam Wireless Network with adequate reception and data throughput.

6.1 New buildings and renovations

All new buildings and renovations are to provide coverage throughout the new or renovated areas.

To ensure that adequate wireless reception is achieved DeS AVN must approve proposed locations for the installation of WAPs. It is therefore a requirement of building project planning that DeS AVN are provided with a scaled PDF of the area/s to be covered and details of the proposed wireless coverage resulting from the project's WiFi consultant's detailed radio survey using the prescribed software tools (refer Section 12 below) and provide back to DeS a PDF document indicating proposed WAP positioning and coverage.

7 Performance specification

All serviced areas must deliver the minimum signal strengths specified below in both the 2.4 GHz and 5 GHz bands and provide IEEE 802.11 a, b, g and n services.

The University has identified four distinct areas requiring differing design rules. These are high density, medium density, standard density and outdoor installations. The following definitions apply. In all circumstances the approved latest technology IEEE 802.11 a/g/n technologies shall be utilized.

High Density: Refers to areas whose usage is predominantly for teaching areas with a capacity above 50 users and where students congregate such as cafeteria and library locations. The design for these areas is to accommodate a minimum average density of two user devices (one active) per square meter of relevant floor area and shall deliver a minimum -67 dBm signal strength in these areas.

Medium Density: Refers to areas whose usage is predominantly for teaching areas with a capacity between 20 and 50 users. The design for these areas is to provide a service offering of no less than -67 dBm signal strength with a minimum of two access points visible at this signal level.

Standard Density: Refers to areas that are predominantly used for staff offices, administration purposes or are an adjacent area such as a corridor. These require a service offering of no less than -67 dBm signal strength.

Outdoor Areas: Refers to public-transport hubs on or adjacent to the campuses and transient areas between buildings that are frequented by students. These require a service offering of no less than -70 dBm signal strength.

Minimum throughput for all deployments at 4mb/s

8 Wireless Access Points (WAP) and antennae

Only Deakin standard WAPs and antennae shall be used.

8.1 Internal

The current prescribed WAP for indoor use is a Cisco WAP, product code AIR-CAP3702I-Z-K9.

8.2 External

For external use there are several antenna and WAP options possible, generally built around the AIR-CAP3702E-Z-K9 model. To determine which antenna option to use discussion with DeS AVN will be required.

9 Installation

9.1 WAP installation

WAPs shall be installed 2.4 to 2.8 meters above floor level. The WAP shall be positioned such that the indication lamps can be easily viewed.

The WAP should be ceiling mounted as per Airmagnet design document. If a WAP with internal antennas (3702i) needs to be wall mounted it must be mounted on an Oberon Bracket (Part No. 1011-00/8A). Otherwise a WAP with external antennas will need to be mounted on the wall (3702e)

WAPs and data outlets shall not be placed in stairwells, ceiling spaces or be enclosed. WAPs must be installed well clear of all metal duct work

WAPs shall not be in positions where it will be difficult to access or cause OHS issues during maintenance.

9.2 WAP data connection

Every WAP shall be installed with a dual data point. The dual data point shall be installed with the bottom edge of the data point plate 50 mm above the WAP's top edge.

Each WAP unit shall be connected to the Deakin Network using a 0.5 meter Panduit CAT6 white patch lead. **Excessive patch-lead length, e.g. wound several times around the WAP, or loose hanging is completely unacceptable**, nor shall it be draped nor cause a personnel snagging hazard.

In the event that a WAP is to be connected to a MUTOA the patch lead shall be of length that ensures that the patch lead is not pulled taught. Also, if connected to a MUTOA the connecting patch lead shall be concealed immediately on exit from the MUTOA and WAP, at no point shall the patch lead drape in the path from MUTOA to WAP.

9.3 WAP Labelling

All WAPs shall be labelled with the Deakin name for the WAP and MAC Address. The label must be of a size that can be read from floor level. The name shall have the following syntax:

<campus> - <buildingfloor> - <room> - ap - <nn>
e.g. f-ad4-202-ap-01

If the WAP is connected via a MUTOA an additional label shall be attached with the data point number as connected on the MUTOA.

9.4 Post installation documentation

On completion of an install contractors are to provide DeS with a marked up floor plans showing WAP names, MAC address, datapoint numbers and switch port numbers.

10 Wireless bearers and meshes

In buildings with no existing LAN infrastructure to act as back haul for the WAP's and under direct consultation with AVN representatives a wireless mesh installation shall be used. The installation is to adhere to other specified standards within this document regarding product selection. The mesh will utilize the 5 GHz band to provide data backhaul and the 2.4 GHz for user services.

2.4 GHz user service signal strength shall conform to the same performance standards (Section 7) as applicable to the relevant area category.

5 GHz mesh backhaul shall deliver a minimum SNR of 31 dB.

11 Centralinfrastructure

11.1 Controllers

The controller platform used for the WAPs are the Cisco 5508 series Wireless LAN Controllers (WLC). The applicable software version will be specified by the AVN representative.

11.2 Management systems

The wireless LAN management system used for management and monitoring is the Cisco Prime Infrastructure (CPI) <https://cpi.core.deakin.edu.au>.

12 Radio surveytools

The University accepted radio survey tool is the Air Magnet Survey Pro by Fluke Networks. Current version of this tool is v8.7. This tool shall be used to generate all planning and survey documentation. Both planner report and raw Airmagnet files will be provided for AVN representative sign off.

13 Appendix A – Definition of terms

Abbreviation	Definition
AP	Access Point
AVN	Audio Visual and Networking
DES	Deakin ESolutions
dB	Decibel
dBm	Decibel-milliwatt
FSD	Facilities Services Division
GHz	Gigahertz
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
IT	Information Technology
LAN	Local Area Network
MAC	Media Access Control
MUTOA	Multi-User Telecommunications Outlet Assembly
RF	Radio Frequency
SNR	Signal-to-noise ratio
WAP	Wireless Access Point
WLC	Wireless LAN Controller

14 Appendix B – Standard parts list

AIR-CAP2802I-Z-K9

AIR-CAP2802E-Z-K9

Oberon brackets – Right-Angle Bracket – with cover and Sidewalls 1011-00/8A

Terrawave 4 Lead Dual Band OD Omni - M6060060MO1D43602

Terrawave 2.4/5GHz 6dbi Quad Patch - M6060060MP1D43602

CISCO 802.11n AP Universal Mounting Bracket - AIR-AP-BRACKET-2=

Low loss extension cables - CISCO 5 ft Low Loss RF cable w/RP-TNC and N-type connectors - AIR-CAB005LL-R-N=b

Antennas for 2802E - CISCO 802.11ac Ctrlr AP 4x4:3SS w/CleanAir; Ext Ant; Z Reg Domain

Panduit CAT6 patch lead – White – 0.5M – UTP28SP0.5M

15 Appendix C – WAP installation diagrams

Ceiling mounted 2802I



Wall mounted 2802I with Oberon Bracket



Wall mounted 2802E



2802E with Omni or Patch Antenna

