



IT infrastructure requirements for digital external assessment

NZQA

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority



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Acknowledgement

NZQA would like to thank PC Media and N4L for providing the advice contained in this guide.

Reviewed and published October 2025.

Scope of this guide

This guide describes the minimum digital infrastructure requirements for any school to support the delivery of digital external assessments.

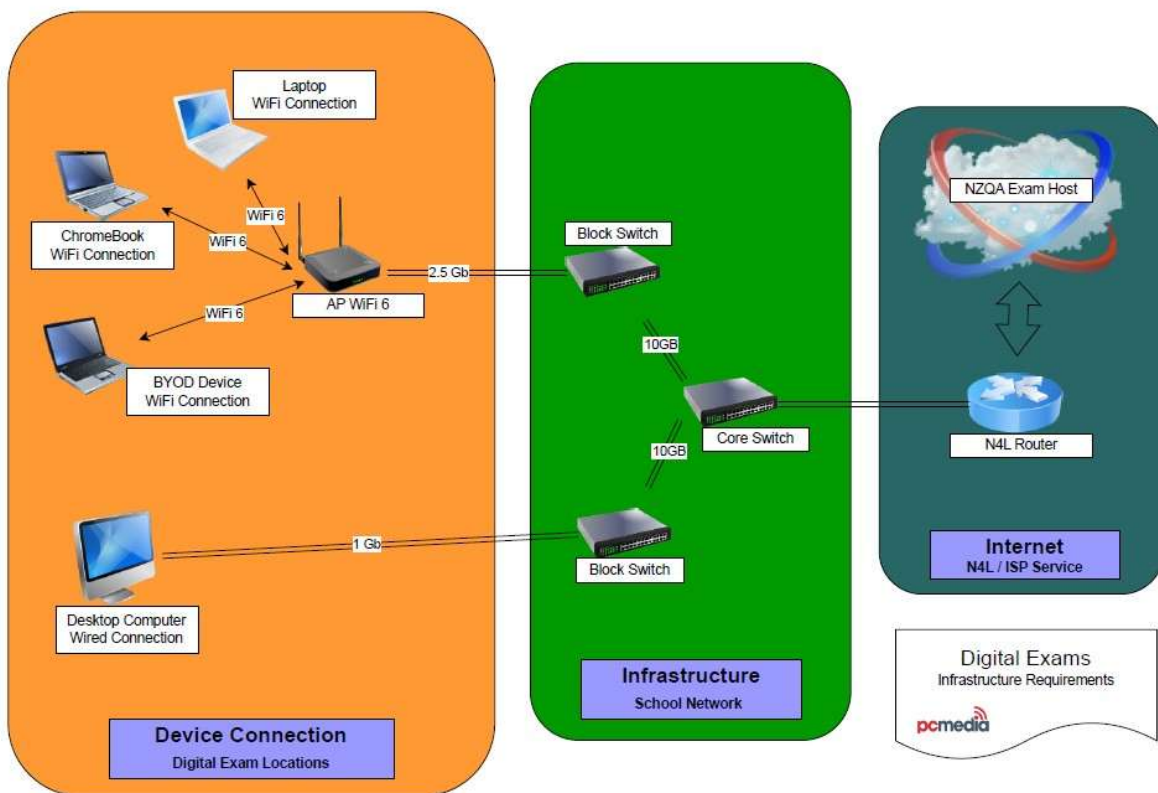
The baseline digital infrastructure and technology specification will give schools and kura confidence that they can successfully deliver digital external assessment at scale.

The information provided will also help schools/kura detail what infrastructure improvements may be necessary and work together with NZQA, the Ministry of Education and Network For Learning (N4L) to establish what costs may be involved in meeting the baseline standard.

IT infrastructure equipment required

Actual equipment needs for a school will depend on the size of the school and the physical location of the classrooms or spaces where digital exams will take place.

A general example of a typical school's network might look like this:



Schools that have completed the current N4L full upgrade will have Ruckus network switches and Wi-Fi Access Points (APs) with Wi-Fi 6 capability and 2.5 Gbps LAN connection to network switches and a highspeed backbone.

Others may have had partial upgrades for Wi-Fi only.

Schools that are on the upgrade list (or non-N4L schools) will need to have at a minimum, suitable APs with Wi-Fi 5 – 802.11ac (to provide 5GHz channels) in exam locations, connecting to 1.0 Gbps ports in network switches with 1 Gbps backbone to core switches.

Uninterruptable Power Supply (UPS) connected to switches and any AP Power over Ethernet (PoE) adaptors are needed to provide the recommended minimum uptime of 10-15 minutes for exam locations.

Connecting devices used for exams

Devices using Wi-Fi need to be able to connect at current Wi-Fi 6 speeds and be using 5GHz channels. The 5GHz frequency has been a device standard for the last 5-6 years.

Where a school has a mixture of 5GHz and 2.4GHz channels, the 2.4GHz frequency should be disabled throughout the school or at least in exam locations. This minimises channel interference and ensures all devices connect at the same speed.

Devices need to have minimum battery life when in constant use that is longer than the expected exam session. Ideally, battery life would be a minimum of 5 hours to cover most eventualities.

Browsers should be updated to the current release of Google Chrome. This is currently the only browser suitable for use with NZQA digital exams. All devices to be used in digital exams [should be tested](#) to ensure compatibility.

School LAN-connected devices need to be current technology (ideally less than 5 years old). See [Appendix](#) for more details of Wi-Fi speeds.

School readiness check list

To be 'digital exam ready' a school needs to have identified exam locations that meet the requirements outlined below.

Schools also need to be able to carry out the pre-exam infrastructure checks and have suitable IT technical support available onsite or on-call during exam times.

Locations for exams

The information below should assist in identifying suitable locations that either meet the requirements or need to be upgraded to provide suitable exam environments.

Ideally any classroom AP or computer suite that is to be used should be as close to the core switch as possible or only have one switch between it and the core switch.

Be aware that the more switches there are between the rooms being used for assessment and the core switch, then the busier the network will be. There will also be more points of potential hardware and power failure.

All rooms being used for assessment need to be readiness tested:

Classrooms with Wi-Fi 6 connectivity

- Ideally there should be a maximum of 30-50 devices per AP.
- A classroom needs to have an AP in it, not in an adjacent classroom. During exams, no devices are to be connecting from an adjacent room if there is a shared AP across two or more classrooms.
- Identify the number of switches the AP goes through to get to the core switch.

Halls or gyms with Wi-Fi 6 connectivity

- Ideally there should be a maximum of 30-50 devices per AP.
- A hall, gym or large space needs to have a minimum of two APs permanently fixed. For exams, if device numbers exceed the desired maximum per AP, then extra temporarily relocated APs will be needed.
- For temporary APs, the LAN outlets need to be active, and the switch ports configured for APs.
- Identify the number of switches the AP goes through to get to the core switch.

Exam location surrounding environment check list

Managing external Wi-Fi connections

Exam location surrounding area

- Devices outside of the exam room should as far as possible be prevented from temporarily connecting or trying to connect to the exam AP.
- During the exam session, staff and students should be kept away from exam locations at sufficient distance to minimise or eliminate the possibility of connecting to the exam AP.
- This includes accidental transient connections at classroom period changes and break periods as students and staff move around.

Adjacent classrooms

- If a classroom close enough to connect to the exam room AP is required for teaching, then ALL personal and other devices in that room must have Wi-Fi disabled for the duration of the exam next door.
- The only exception would be where there is no wired connection available but the teacher needs internet access to deliver the lesson.

School power check list

UPS support for infrastructure

- Identify any classrooms and halls, gyms or spaces that will be used for exams.
- Check that the associated network cabinets meet power protection requirements.
- Ensure that the network switches (and AP PoE adaptors) all have UPS.

- Test to ensure the UPS batteries can supply a minimum of 15 minutes connectivity to the internet during a power outage or momentary power disruption.

Exam supervisors need to be aware of the following:

- a) Battery powered devices will likely continue to see internet if infrastructure holds up for a minimum of 15 minutes in a power outage, giving time to save work.
- b) Desktop devices will lose power immediately in any power outage and will lose work since the previous save.

Pre-exam infrastructure check

All infrastructure devices, APs and switches should be power-cycled before exams (i.e. powered off and on again).

Ideally this should be done 24 hours before the exams and then checked. This action is in order to clear out cached data and refresh configurations.

UPS condition should also be tested during the infrastructure power-cycle test to ensure the supply works and will hold up for a minimum of 15 minutes. UPS batteries must be less than 3 years old (the recommended battery replacement age for UPS) to ensure they deliver the rated up-time.

Extension cords long enough to reach any students in a room, hall, gym or other large space need to be available, should they need power for their own or a school-supplied device.

An internet speed test should be carried out for devices using both Wi-Fi and LAN connections. A sample of devices needs to be connected during normal school operating times to reflect a normal network traffic period. Use a suitable test app or web site that gives true speed. Avoid some common test sites. Recommended test sites are <https://fast.com/> or <https://www.nperf.com/en/>

Latency is the biggest threat to online users.

Use a command prompt (or PowerShell) to run [tracert](#) command to am.nzqa.sonet.com.au

Device management for schools

How your school manages devices depends on whether you use Bring Your Own Device (BYOD) or school-provided devices.

Below are some tips to help you plan for device management during digital exams.

Testing and setting up devices for digital exams

This can be time consuming, especially if different kinds of devices are being used. Think about how students can assist with checking and setting up devices alongside your IT support; for example, setting aside time for classes to check their devices together, with an IT support person available if they run into any issues. Ensure that all devices have completed all OS updates and been restarted prior to use in an exam.

Self-management for BYOD

If you are a BYOD school, you may want students to actively manage their own device setup. Long term, consider recommending similar or the same device for all students to make set-up easier. Talk to students and whānau about device requirements too.

Between exams

As you begin to increase the number of digital exam sessions, you will have more days where two or more digital sessions occur.

Make sure power sources are available to charge devices between morning and afternoon sessions. If you are a BYOD school, you may want students to actively manage their own device charging.

Nominate someone to manage the charging of devices (if required) and check all devices between sessions; for example, ensuring browsers from the previous exam have been closed.

Back-up devices

Sometimes devices will fail in an exam. They may run out of battery or freeze. It is preferable to have back-up devices for students, so that they can easily recommence their work on the digital exam platform.

If that is not possible, moving to paper remains the final fall-back option. Make sure you know in advance how to access paper copies of exams for this eventuality.

Technical support

A suitably trained on-site technician or staff member should be available during exam sessions to assess any IT related issues and work with N4L. They also need to be able to swap out any failed infrastructure equipment.

Contact details

N4L support: 0800 LEARNING (532 764), support@n4l.co.nz

General enquiries: info@n4l.co.nz

Appendix

NZQA online reference guides

[Preparing for digital assessment as a student](#)

[Digital exams device check](#)

Number of clients per AP

Although a particular AP might theoretically handle 100 or more maximum clients, this does not mean it actually will. In real-world deployment, interference caused by multiple clients communicating simultaneously means this capacity will be far lower.

The recommendation for a practical maximum number of connections to a single AP is around 30 to 50.

Newer APs (Wi-Fi 6) have a theoretical connection of 256 to 1024 across all SSIDs per AP, but the real world is a lot lower than a lab test. However, if the AP is of the latest generation (e.g. Ruckus R750 or R850) with higher speed ethernet connections (LAN 2.5 GHz), then the higher ideal of 50-100 will not cause any issues.

Wi-Fi 6 802.11ax has been the default new device Wi-Fi standard since 2020.

https://en.wikipedia.org/wiki/IEEE_802.11

Generation	IEEE standard	First Approved	Maximum link rate (Mbit/s)	Radio frequency (GHz)		
Wi-Fi 7	802.11be	2019-03-21	721 to 46120	2.4	5	6
Wi-Fi 6E[3]	802.11ax	2014-03-27	600 to 9608	2.4	5	6
Wi-Fi 5	802.11ac	2008-09-26	433 to 6933	2.4	5	

N4L reference links

[Upgrading your Wi-Fi - N4L FAQs](#)

[Ruckus AP model information](#)

[How to reduce the risk of Wi-Fi disconnection due to ageing Ruckus APs](#) N4L

N4L-supplied Ruckus network equipment

Recent and current Ruckus APs

Indoor	MODEL	HARDWARE SPECS	MU-MIMO	DATA SPEED	CONCURRENT USERS*	ANTENNA PATTERNS (PER BAND)	ETHERNET PORTS
R350		Wi-Fi 6, 2x2:2	Yes	1200 Mbps (5GHz) 574 Mbps (2.4GHz)	256	64	1x1GbE
R550		Wi-Fi 6, 2x2:2	Yes	1200 Mbps (5GHz) 574 Mbps (2.4GHz)	512	64	2x1GbE
R650		Wi-Fi 6, 4x4:4	Yes	2400 Mbps (5GHz) 574 Mbps (2.4GHz)	512	128	1x1GbE 1x2.5GbE
R750		Wi-Fi 6, 4x4:4	Yes	2400 Mbps (5GHz) 1148 Mbps (2.4GHz)	1024	4,000+	1x1GbE 1x2.5GbE
R850		Wi-Fi 6, 8x8:8	Yes	4800 Mbps (5GHz) 1148 Mbps (2.4GHz)	1024	4,000+	1x 1/2.5/5 Gbps 1x 10/100/1000 Mbps

R850: a Wi-Fi 6 8x8:8 indoor access point with 5.9 Gbps speeds.

R750: a Wi-Fi 6 4x4:4 indoor access point with 3.5 Gbps speeds.

The R750 is the industry's first Wi-Fi CERTIFIED 6 access point.

R650: a Wi-Fi 6 4x4:4 indoor access point with 3 Gbps speeds. **R550:** a Wi-Fi 6 2x2:2 indoor access point with 1.8 Gbps.

Network speed and connectivity checks

Speed Test

<https://www.nperf.com/en/>



<https://fast.com/#>

Unloaded

8 ms

Loaded

9 ms

Speed

520 Mbps

Client Christchurch, NZ 114.23.106.80

Server(s) Christchurch, NZ | Auckland, NZ | Auckland 1140, NZ

Settings

590MB

390MB

Tracert to exam host

Example:

C:\Users\xxxx>tracert am.nzqa.sonet.com.au

Tracing route to am.nzqa.sonet.com.au [3.105.38.181] over
a maximum of 30 hops:

1	1 ms	1 ms	1 ms	10.100.10.1
2	9 ms	8 ms	8 ms	lo-vprn-100.br1.chc.vygr.net [114.23.98.255]
3	8 ms	7 ms	8 ms	ae-0-337.edge01.chc.vygr.net [114.23.15.226]
4	8 ms	7 ms	7 ms	et-0-0-1-0.core02.chc.vygr.net [43.240.33.66]
5	8 ms	7 ms	7 ms	et-0-0-15-0.core01.wla.vygr.net [43.240.33.77]
6	7 ms	7 ms	8 ms	et-0-0-0-0.core02.wla.vygr.net [43.240.33.99]
7	7 ms	7 ms	7 ms	et-0-0-31-0.core01.per.vygr.net [43.240.33.60]
8	22 ms	22 ms	22 ms	et-0-0-0-0.edge02.htc.vygr.net [43.240.33.63]
9	23 ms	21 ms	23 ms	et-0-0-3-0.edge01.htc.vygr.net [114.23.29.6]
10	24 ms	23 ms	24 ms	et-0-0-15-0.core01.mod.vygr.net [43.240.33.26]
11	24 ms	24 ms	25 ms	et-0-0-0-0.core02.mod.vygr.net [43.240.33.23]
12	25 ms	24 ms	24 ms	et-0-0-31-0.core02.mdr.vygr.net [43.240.33.33]
13	24 ms	23 ms	23 ms	et-0-0-3-0.edge01.mdr.vygr.net [43.240.33.43]
14	25 ms	24 ms	24 ms	as16509.akl.ix.nz [43.243.21.113]
15	24 ms	24 ms	24 ms	150.222.119.56
16	26 ms	25 ms	27 ms	150.222.119.33
17	*	*	*	Request timed out.
18	52 ms	53 ms	52 ms	52.95.36.174
19	52 ms	53 ms	54 ms	150.222.112.181
20	52 ms	53 ms	52 ms	150.222.112.178
21	54 ms	54 ms	51 ms	52.95.38.178
22	56 ms	57 ms	57 ms	52.95.38.107
23	*	*	*	Request timed out.
24	*	*	*	Request timed out.
25	*	*	*	Request timed out.
26	*	*	*	Request timed out.
27	*	*	*	Request timed out.
28	*	*	*	Request timed out.
29	*	*	*	Request timed out.
30	*	*	*	Request timed out.

Trace complete.

a:am.nzqa.sonet.com.au

Type Domain name

IP address

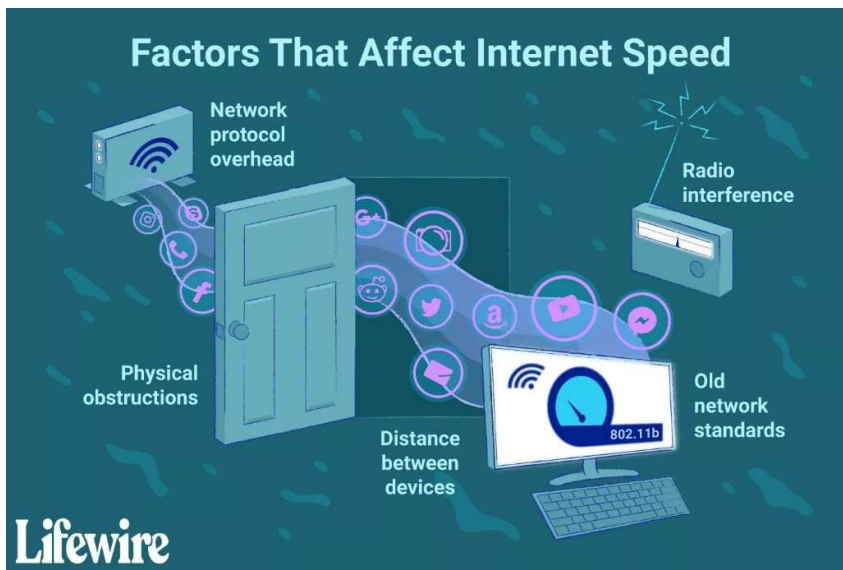
TTL

A [am.nzqa.sonet.com.au](https://www.am.nzqa.sonet.com.au) [3.105.38.18](https://www.3.105.38.18)Unknown (AS16509)[1](#)

60 sec

A am.nzqa.sonet.com.au 54.253.16.202
60 sec Unknown (AS16509)

A am.nzqa.sonet.com.au 13.54.144.238 60 sec
Unknown (AS16509)



Glossary of abbreviations and technical terms

AP	Access Point
latency	The delay before a transfer of data begins following an instruction for its transfer. Usually measured in milliseconds (ms).
N4L	Network For Learning
SSID	Service Set Identifier – your Wi-Fi network name.
switch	Networking hardware that connects devices on a computer network by using packet switching to receive and forward data to the destination device.

tracert	Traceroute – command-line tool for tracing the path an IP packet takes across one or many networks.
UPS	Uninterruptable Power Supply