
Vernetzen Veto Portable Network Analysis User Guide



Document Control

D	2024-09-17	Active TEP/Parameter Enhancements	RELEASE TO CUSTOMER 1.2.2	CD	SB	LK
C	2024-01-12	Update Product Image	RELEASE TO CUSTOMER 1.0.17	SB	CD	LK
B	2023-10-11	Export CSV format	RELEASE TO CUSTOMER 1.0.17	CD	BK	LK
A	2023-09-12	INITIAL RELEASE	RELEASE TO CUSTOMER 1.0.15	CD	BK	LK
Rev	Date	Description	Release	Orig	Chk	Appd

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1 Audience

Content herein is aimed at personnel involved with the operation of the Vernetzen Veto Portable Network Analysis tool. This document serves to provide a quick guide to the features of the Veto PNA software. This is not a guide to physical installation and no assumptions are made with respect to the installation of the unit being operated.

2 Abbreviations/Definitions

Table 1: List of abbreviations/definitions

PNA	Veto Portable Network Analysis unit
TEP	Veto Testing Endpoint unit
UI	User Interface

3 Guide

3.1 MAIN FEATURES

This device is used to gather and report core measures of wireless network quality and performance. More specifically, it has the following functionalities:

- 2.4 & 5.8Ghz Wi-Fi network scanning.
- Link monitoring – observe Wi-Fi signal strength and link characteristics while under traffic load.
- Performance evaluation – evaluate the performance of the network against a range of customisable metrics.
- Commissioning reports – create reports detailing the performance of the network mapped to level plan locations.

3.2 REQUIREMENTS

Operation of the Veto PNA requires a computer with a physical network interface and modern browser . Performance data capture requires the use of a configured Veto TEP.

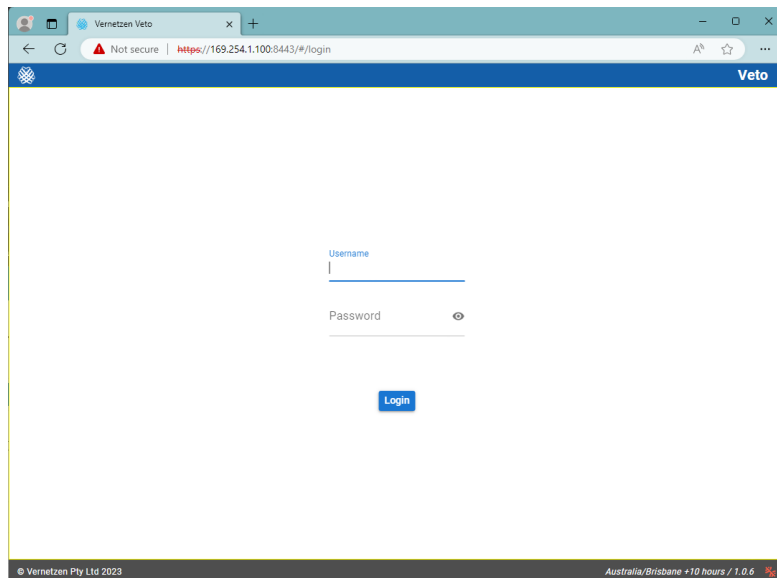
3.3 HARDWARE

The Veto PNA Kit consists of:

- 1x Veto Portable Network Analysis unit
- 2x Dual-Band Omni-Directional Antenna with N-type connector
- 1x Pair mounting brackets
- 1x Mounting plate
- 1x 5m Cat 5e Ethernet cable with IP-67 cable gland
- 1x 5m 12v power cable
- 1x 12v car adapter
- 1x USB A to 12v adapter
- 4x Mounting screws

3.4 ACCESSING THE UI

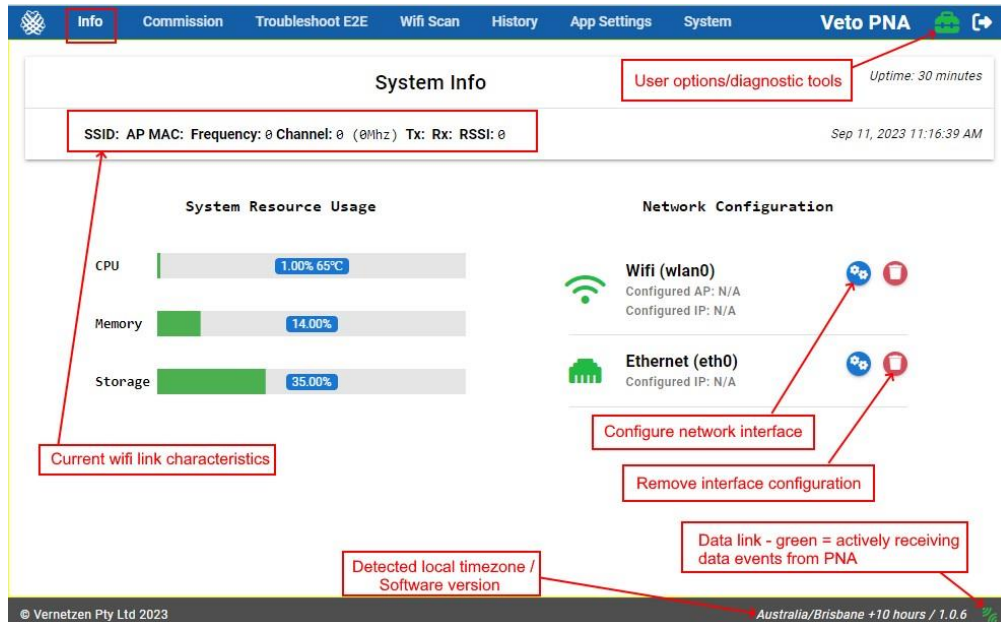
By default, the Veto PNA's ethernet interface is configured with a link-local IP address of 169.254.1.100. The user interface can be accessed via a browser at <https://169.254.1.100:8443>. Each PNA generates a self-signed certificate and as such, the browser will display a warning prior to showing the UI, it is safe to continue. The default username/password are both 'admin'.



3.5 SYSTEM INFORMATION / ADMINISTRATION

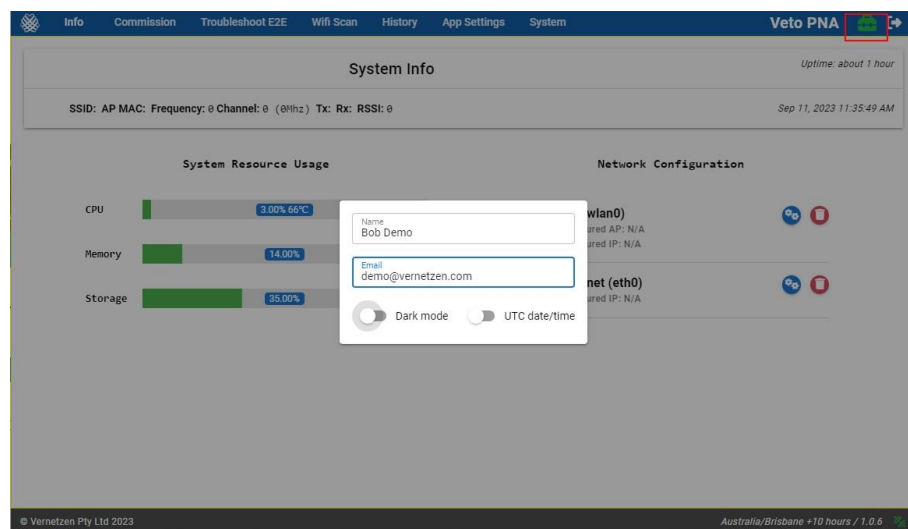
3.5.1 SYSTEM INFO

The 'Info' page provides a summary view of the current system configuration and resource usage.



3.5.2 USER PREFERENCES

Select Preferences from the User Options/Diagnostic Tools drop down in the top right to set the default name & email that will appear on commissioning reports. Dark mode colour scheme and UTC date & time options can also be toggled here. By default, all date and times are displayed in the local time zone of the computer used to access the UI, this is shown in the footer.



3.5.3 SYSTEM ADMINISTRATION

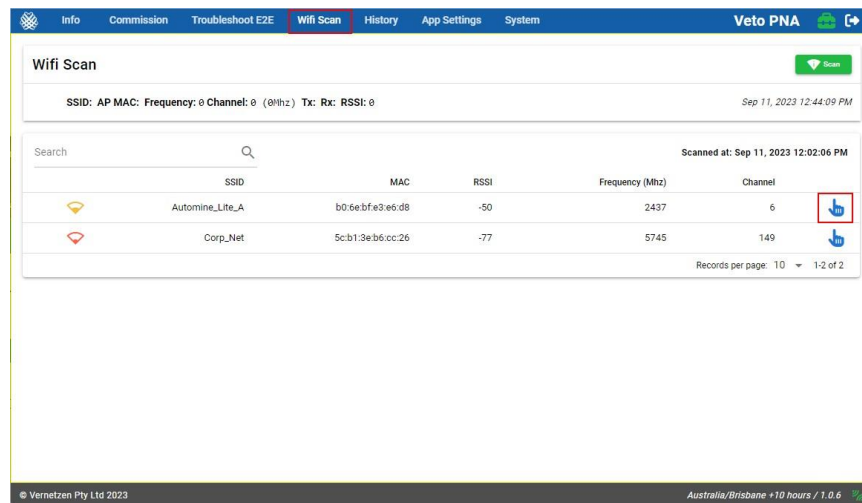
The 'System' page provides the facility to change the credentials used to access the PNA UI and apply system software updates.

The screenshot displays the 'System' page of the Veto PNA interface. The top navigation bar includes links for Info, Commission, Troubleshoot E2E, Wifi Scan, History, App Settings, and System (which is highlighted). The main content area is divided into two sections: 'Update credentials' and 'Update system'. The 'Update credentials' section contains a warning 'Change username & password - re-login will be required.' and four input fields: 'New username' (with 'admin' entered), 'Old password', 'New password', and 'Repeat password'. Each password field has an eye icon for toggling visibility. A blue 'Update' button is at the bottom of this section. The 'Update system' section has the heading 'Update Veto system software.' and a 'Select update file' button next to a green 'Update' button. The footer shows '© Vernetzen Pty Ltd 2023' on the left and 'Australia/Brisbane +10 hours / 1.0.6' on the right.

3.6 WI-FI NETWORK

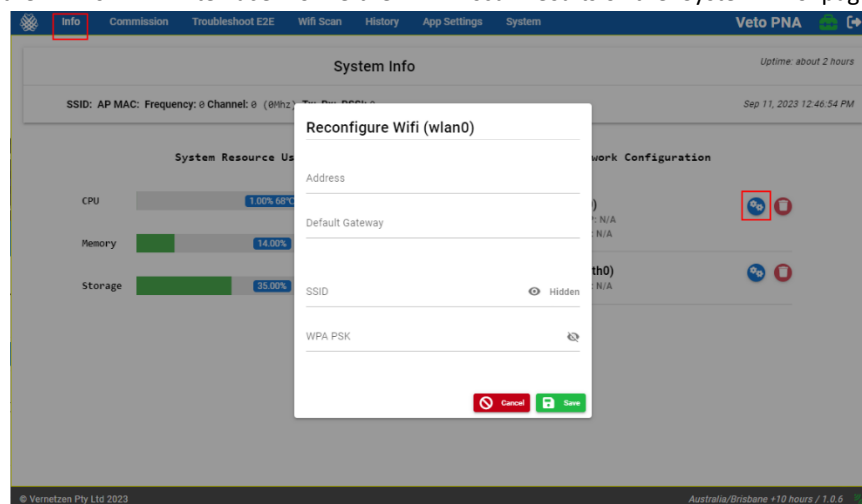
3.6.1 WI-FI SCAN

Available Wi-Fi networks can be viewed on the 'Wifi Scan' page. Configuration of the PNA's Wi-Fi connection can be initiated from here by clicking on the hand icon to the right of the desired network, this will pre-fill the SSID in the configuration dialog.



3.6.2 NETWORK CONFIGURATION

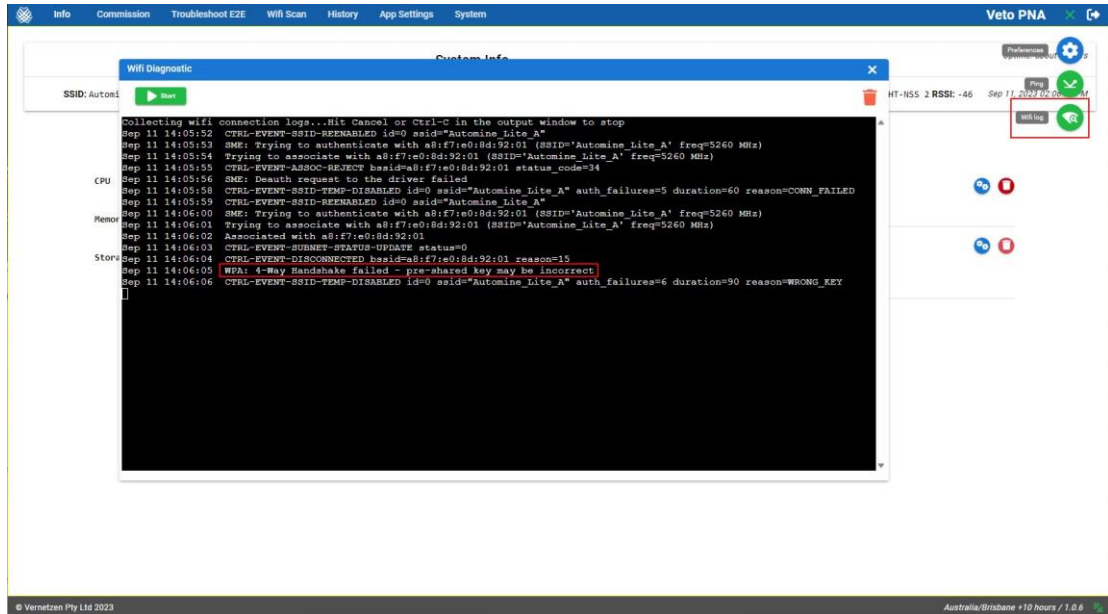
Configure the PNA's Wi-Fi interface from either Wi-Fi scan results or the 'System Info' page.



Parameter	Definition
Address	The IPv4 address and subnet for the PNA's Wi-Fi interface, e.g., 192.168.1.10/24
Default Gateway (optional)	The IPv4 address of the network default gateway. This is only required if the TEP is not in the same subnet as the PNA (not recommended).
SSID	The SSID of the Wi-Fi network the PNA is analysing. Click the Hidden eye icon to join hidden networks.
WPA PSK (optional)	The pre-shared key securing the wireless network. Not required for open networks.

3.6.3 CONNECTION TROUBLESHOOTING

Wi-Fi connection log information can be used to determine the cause of issues preventing the PNA from joining a Wi-Fi network. Select 'Wifi Log' from the diagnostic toolbox dropdown and click the 'Start' button to begin collecting logs. The collection process will continue in the background, including when the popup is closed, until cancelled, user logout or browser window close.



3.6.4 TROUBLESHOOT END TO END

After the PNA successfully establishes a Wi-Fi connection, characteristics of the connection can be viewed on the Troubleshoot E2E page. The RSSI and Layer 1 link speed are graphed in real time. Network traffic load to a Veto TEP can be applied to simulate real world behaviour.

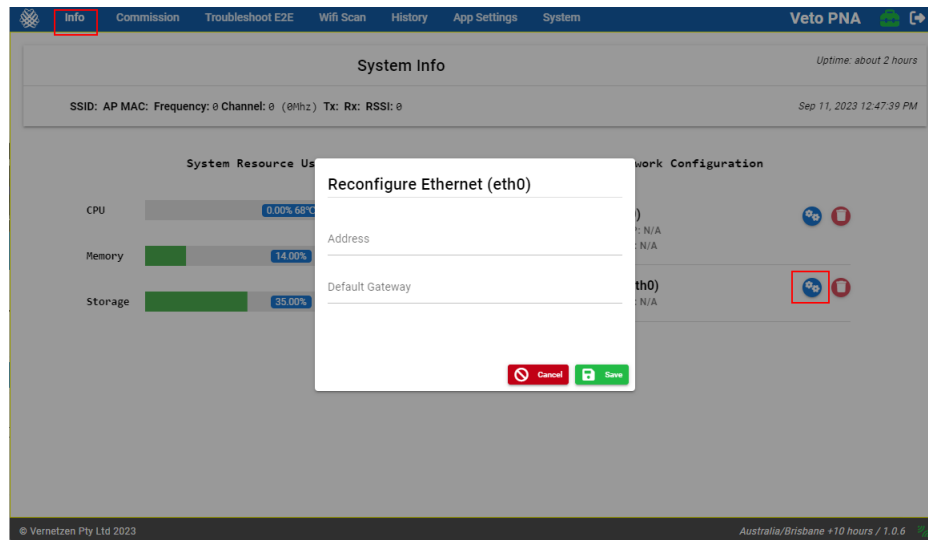


Parameter	Definition
Minimal	Transmit UDP data at 1 Mbps.
Moderate	Transmit UDP data at 10 Mbps.
Saturate	Transmit TCP data at the maximum rate supported by the Wi-Fi link.
Collect	Enable/disable graph data updates.

3.7 ETHERNET NETWORK

3.7.1 NETWORK CONFIGURATION

Configure the PNA's Ethernet interface from the 'System Info' page, this is optional but can be used to access the PNA's interface from the configured address as an alternative to the default link-local address.



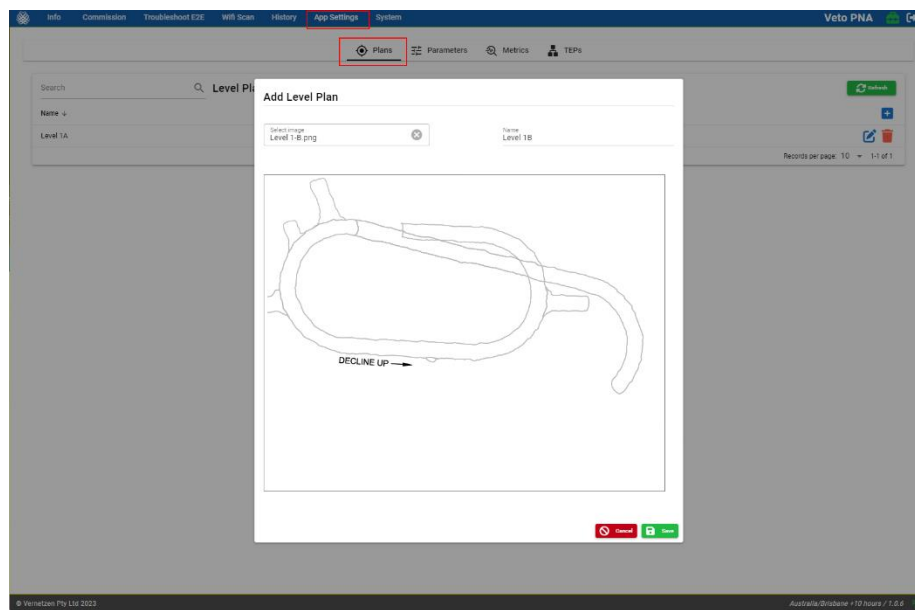
Parameter	Definition
Address	The IPv4 address and subnet for the PNA's Ethernet interface, e.g., 192.168.1.10/24
Default Gateway (optional)	The IPv4 address of the network default gateway. This is only required if routing across subnets to reach the PNA (not recommended).

3.8 APP SETTINGS

The 'App Settings' page provides a view of the reference data currently stored on the PNA. All reference data types can additionally be added or modified directly from the locations they are used.

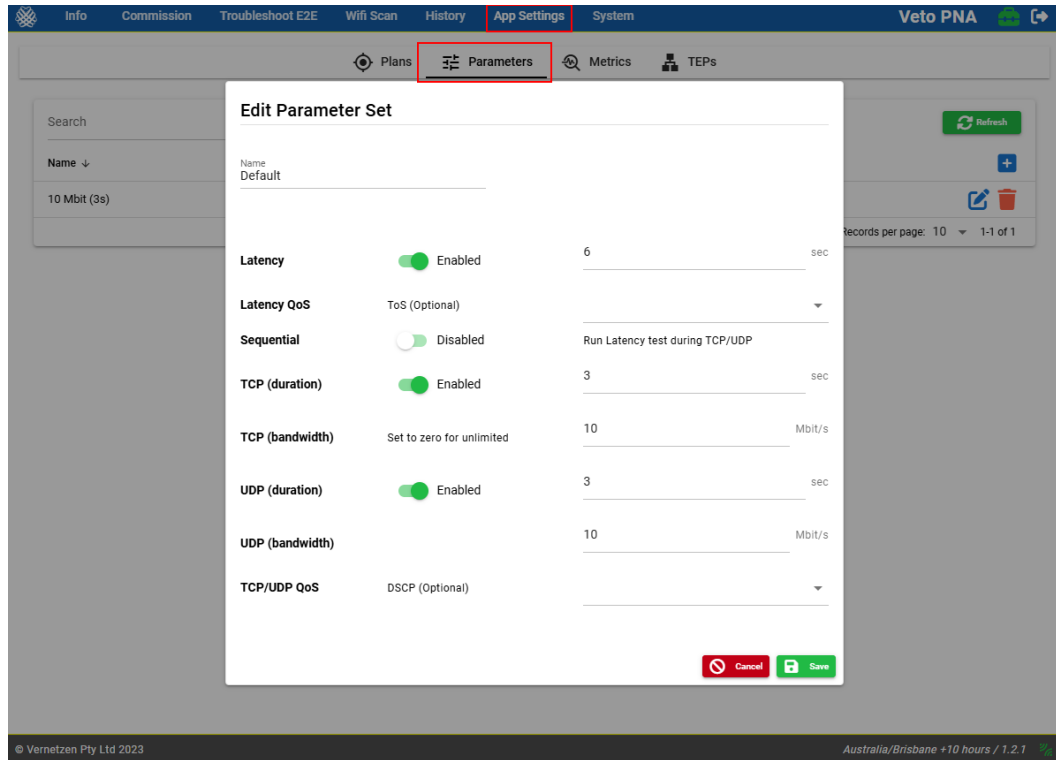
3.8.1 PLANS

Upload level plan images (png/jpg/gif formats) for use in network commissioning reports. Note that any changes to existing level plans will not apply to any commissioning reports that have used the prior version of the plan.



3.8.2 PARAMETERS

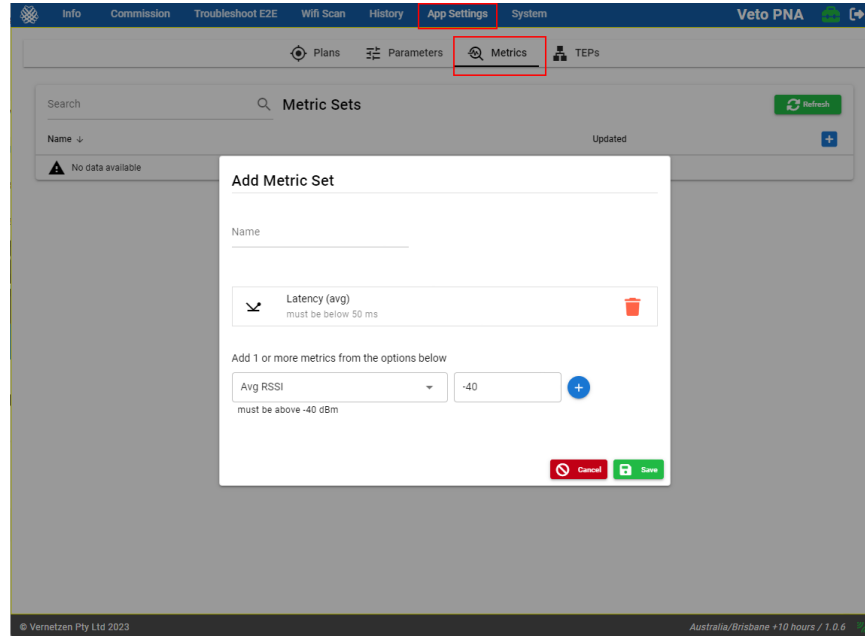
Parameter Sets define the type and duration of network traffic used to evaluate the performance of the network.



Parameter	Definition	Version
Latency	Duration of layer 3 latency test – note: this is performed concurrently with TCP/UDP tests.	1.0.15
Latency QoS	Optionally add a type of service to the IP packet header.	1.2.1
Sequential	Test latency prior to TCP/UDP tests. Default is concurrent.	1.2.1
TCP (duration)	Duration of layer 4 TCP test.	1.0.15
TCP (bandwidth)	Bandwidth in Mbps for layer 4 TCP test – set to 0 to test at the maximum supported by the network link.	1.0.15
UDP (duration)	Duration of layer 4 UDP test.	1.0.15
UDP (bandwidth)	Bandwidth in Mbps for layer 4 UDP test – setting this above the expected capability of the network link will result in significant packet loss.	1.0.15
TCP/UDP QoS	Optionally add a differentiated services code point to the IP packet header.	1.2.1

3.8.3 METRICS

Metric Sets define the test result values that must be achieved in order to class the network as meeting required performance objectives.

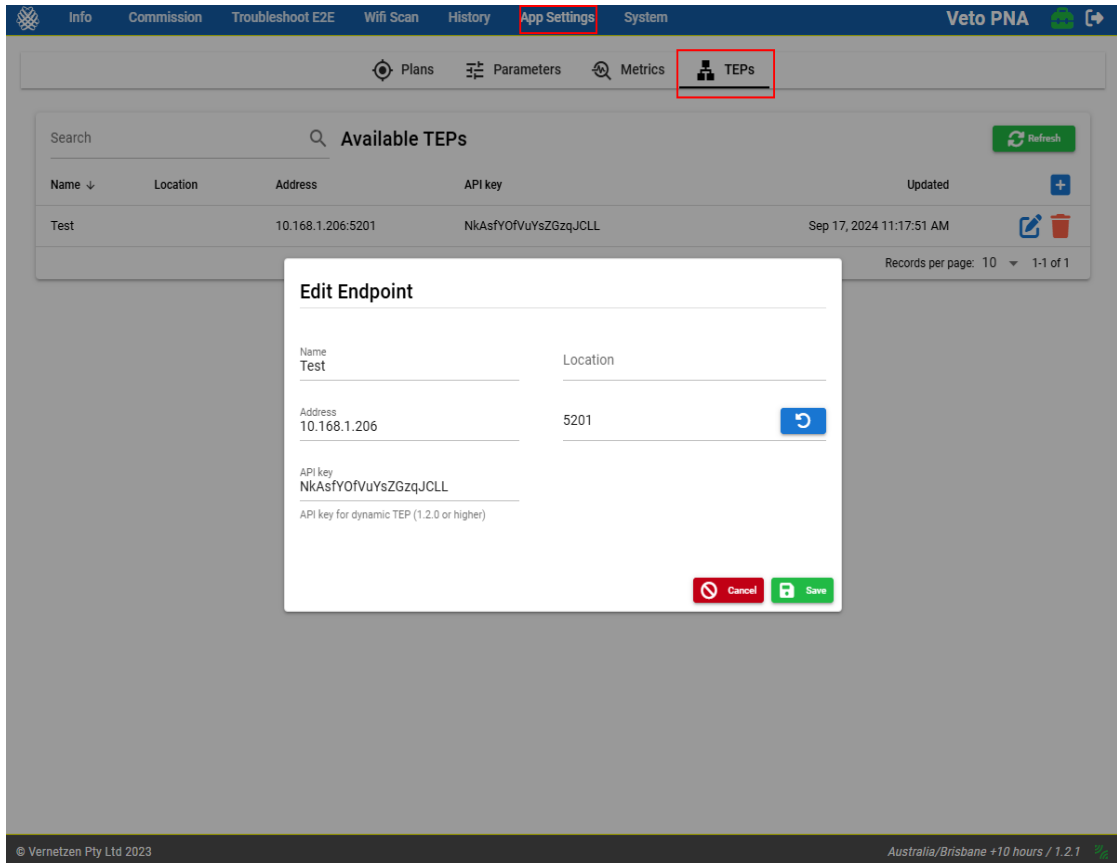


Metric	Explanation	To Pass, Result must be
Jitter (L3)	Layer 3 jitter – derived from latency results.	Below value
Jitter (L4)	Layer 4 jitter – requires UDP test.	Below value
Latency (max)	Layer 3 latency maximum.	Below value
Latency (avg)	Layer 3 latency average.	Below value
Packet Loss (L3)	Layer 3 packet loss – derived from latency results.	Below value
Packet Loss (L4)	Layer 4 packet loss – requires UDP test.	Below value
Avg RSSI	Average Wi-Fi RSSI during test.	Above value*
Min RSSI	Minimum Wi-Fi RSSI during test.	Above value*
TCP Throughput	Achieved layer 4 TCP throughput in Mbps.	Above value
UDP Throughput	Achieved layer 4 UDP throughput in Mbps.	Above value
TCP Bandwidth Pct	Achieved layer 4 TCP throughput as a percentage of the value specified in the parameter set used.	Above value
UDP Bandwidth Pct	Achieved layer 4 TCP throughput as a percentage of the value specified in the parameter set used.	Above value

*Given measurement of RSSI being negative.

3.8.4 TEP

Veto Testing Endpoints available for commissioning reports and/or Wi-Fi load testing.



Parameter	Definition	Version
Name	Name of TEP	1.0.15
Location	Location of TEP (optional)	1.0.15
Address	IPv4 address of the TEP e.g. 192.168.1.10	1.0.15
Port	Layer 4 TEP server port, default 5201. TEP units can have additional L4 servers configured on alternate ports.	1.0.15
API Key	API Key for communicating with Dynamic TEP	1.2.1

3.9 COMMISSION

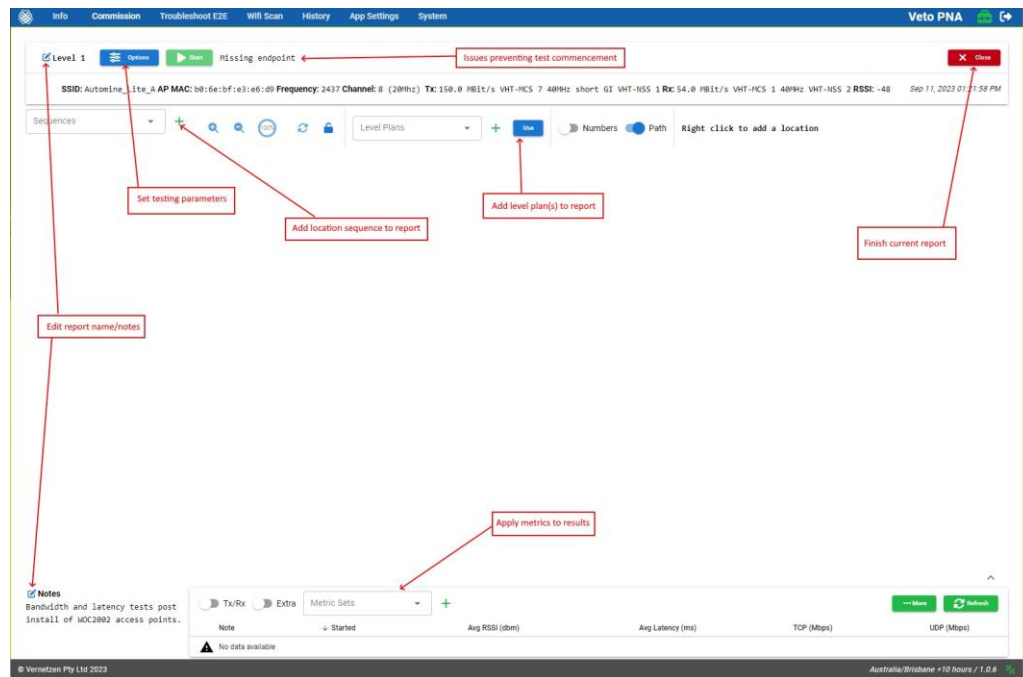
3.9.1 NEW COMMISSIONING REPORT

The 'Commission' page provides functionality to prepare network commissioning reports. All reports require a name, both name and notes can be updated. Reports can be resumed from the 'History' page in the event of browser window closure or loss of power to the PNA etc.

The screenshot displays the 'Commission' page of the Veto PNA application. The top navigation bar is blue with white text for 'Info', 'Commission' (which is highlighted with a red box), 'Troubleshoot E2E', 'Wifi Scan', 'History', 'App Settings', 'System', and 'Veto PNA'. Below the navigation bar, the main content area is titled 'Start new report'. A green warning icon and text state: 'Previous reports can be resumed from the history section'. There is a text input field labeled 'Name' and a larger text area labeled 'Notes'. At the bottom of the form is a blue button with a document icon and the text 'Create'. The footer of the application shows '© Vernetzen Pty Ltd 2023' on the left and 'Australia/Brisbane +10 hours / 1.0.6' on the right.

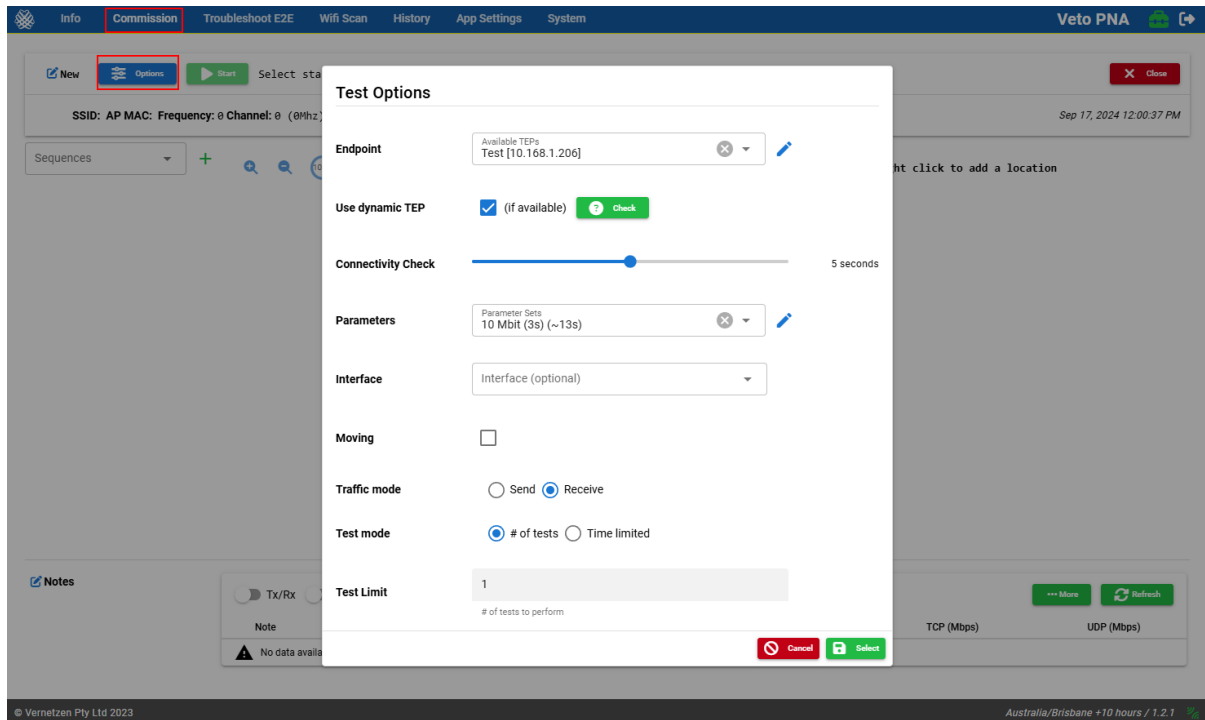
3.9.2 REPORT SETUP

Preparation of a commissioning report requires several items to be configured prior to execution of network tests.



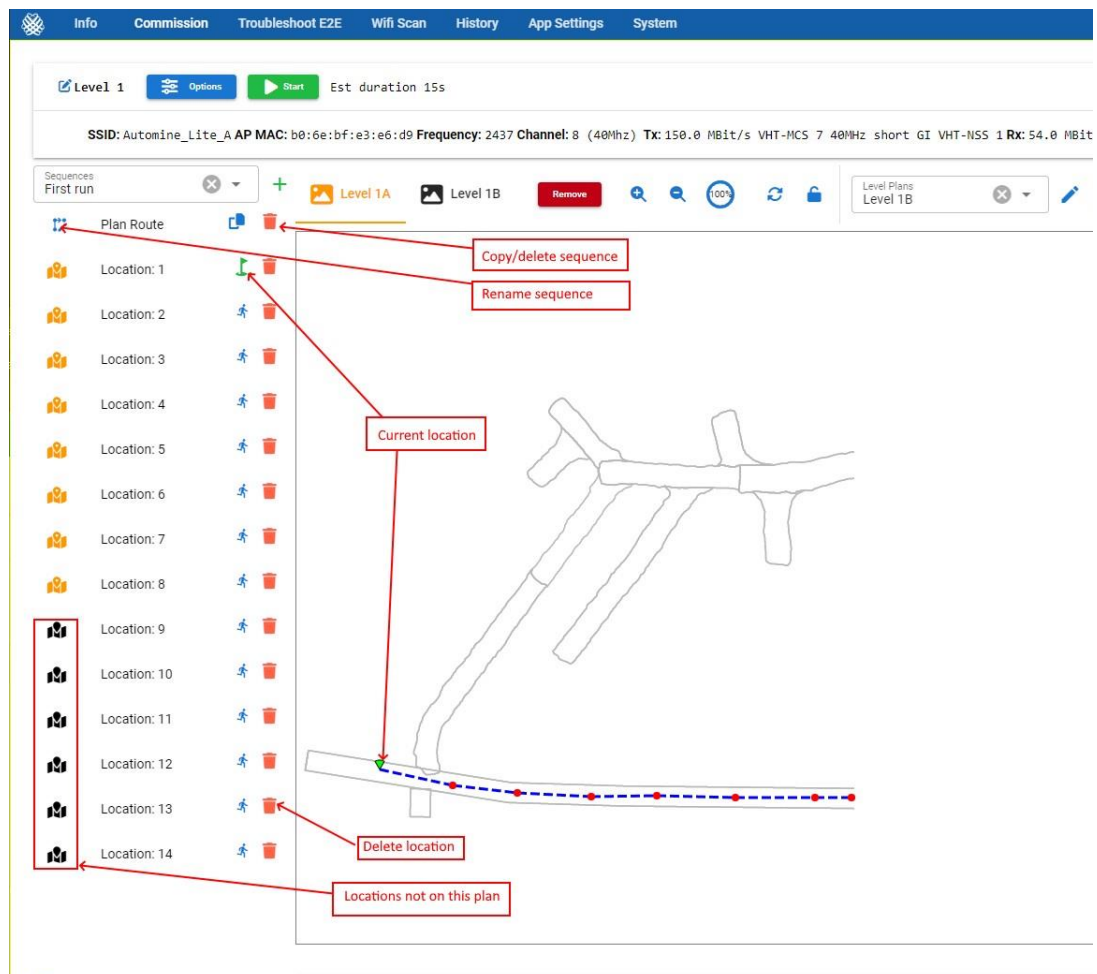
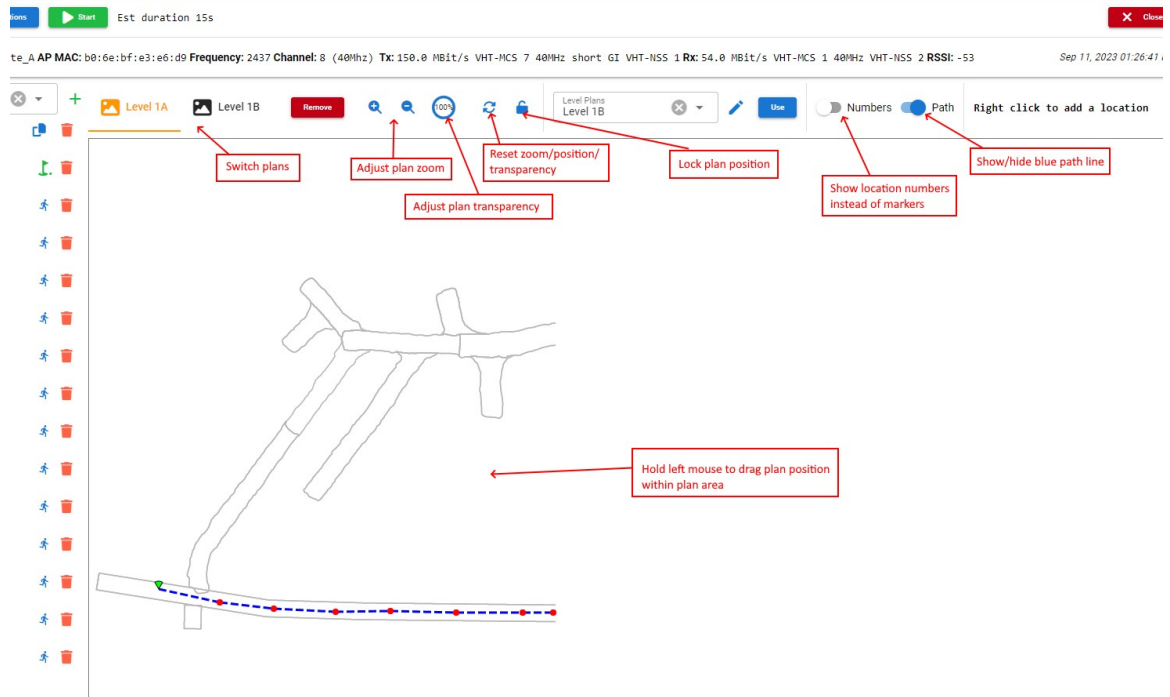
- Add 1 or more Level Plans.
- Add 1 or Sequences.
- Add 1 or more Level Plan Locations to the Sequence by right clicking the desired point on the plan image.
 - Sequence Location paths can cross between Level Plans by switching the currently selected plan and adding more Locations.
- Configure Report Options.
- Set the current Location.

3.9.3 REPORT OPTIONS



Parameter	Definition	Version
Endpoint	Veto TEP to use.	1.0.15
Use dynamic TEP	If the selected TEP is capable of dynamic mode and the API Key is correct, the TEP will dynamically create an L4 testing endpoint exclusively for the PNA during testing.	1.2.1
Connectivity Check	Ensure the TEP is reachable via the network prior to commencing testing.	1.2.1
Parameters	Network test parameter set to use.	1.0.15
Interface	Force tests to use the specified network interface (Optional, used for advanced scenarios where the PNA is not providing the Wi-Fi link connectivity under test)	1.0.15
Moving	Specify whether the PNA is moving between Locations during test execution.	1.0.15
Traffic Mode	Send – data sent from PNA to TEP. Receive – data sent from TEP to PNA.	1.0.15
Test Mode	Specify how test duration is limited. # of test – testing will continue until the Test Limit is reached Time Limited – testing will continue until the time limit is reached AND the current test execution is completed.	1.0.15
Test Limit	Either then number of tests to perform or the time limit in seconds.	1.0.15

3.9.4 REPORT LAYOUT



3.9.5 STATIONARY TESTS

During stationary testing the current location is locked and applied to all test results.

The screenshot displays the Veto PNA software interface. At the top, there's a navigation bar with tabs: Info, Commission, Troubleshoot E2E, Wifi Scan, History, App Settings, and System. The main window shows a test configuration for 'Level 1' with details like SSID: Autoline_Lite_A, AP MAC: b8:6e:bf:e3:e6:d8, Frequency: 2437, Channel: 4, and Tx/Rx power settings. Below this, a map shows a path with a red dot indicating the location for all tests. A table at the bottom displays test results for two runs on Sep 11, 2023, with columns for Note, Started, Avg RSSI (dbm), Avg Latency (ms), TCP (Mbps), and UDP (Mbps). Red arrows point to specific elements: 'Location for all tests' points to the red dot on the map, 'Add note to result' points to the 'Note' column header, 'Send mode test' points to the 'TCP (Mbps)' column, and 'Receive mode test' points to the 'UDP (Mbps)' column.

Note	Started	Avg RSSI (dbm)	Avg Latency (ms)	TCP (Mbps)	UDP (Mbps)
	Sep 11, 2023 01:28:14 PM	-48	22.379	16.33	10.24
	Sep 11, 2023 01:28:07 PM	-50	19.391	10.41	10.24

3.9.6 MOVING TESTS

During moving tests, the current location is advanced by either right-clicking on the plan image or hitting the keyboard right arrow key (recommended). Each test result is associated with the set of locations reached during the execution of that test instance.

Sequence: Reverse

Level 1A Level 1B

Numbers Path Right click or arrow to advance location

Perform Tests

- Location: 1
- Location: 2
- Location: 3
- Location: 4
- Location: 5
- Location: 6
- Location: 7
- Location: 8
- Location: 9
- Location: 10
- Location: 11
- Location: 12
- Location: 13

Notes: Bandwidth and latency tests post install of WOC2002 access points.

Current location

Metrics applied to results

Metric Sets: Avg Latency & Packet loss

Metrics	Note	Started	Avg RSSI (dbm)	Avg Latency (ms)	TCP (Mbps)	UDP (Mbps)
✓		Sep 11, 2023 01:34:52 PM	-51	17.22	10.43 ↑	10.24 ↑
✓		Sep 11, 2023 01:34:43 PM	-49	14.713	10.4 ↓	10.24 ↓
✓		Sep 11, 2023 01:34:36 PM	-49	25.959	10.41 ↑	10.24 ↑

Records per page: 3 1-3 of 3

3.10 HISTORY / EXPORT

3.10.1 REVIEW

The 'History' page provides a list of commissioning reports including the currently active report. Result sets for a report can be reviewed, evaluated, and exported in PDF and CSV formats.

The screenshot shows the 'History' page in the Veto PNA application. The page is divided into several sections: a top navigation bar, a 'Report History' sidebar, a main map area, and a 'Results' table at the bottom.

Report History Sidebar:

- Level 1:** Last Active: Sep 11, 2023 01:21:38 PM. Includes 'Set #1' (First run) and 'Set #2' (Reverse).
- Level 1A:** Includes 'Level 1B'.

Map Area:

- Buttons: Edit name/notes, Resume testing, Generate report PDF, Delete report.
- Annotations: 'Select result sets to be included in PDF report' points to the sidebar; 'Load test results into grid' points to the map; 'Export result set as CSV' points to a button.

Results Table:

Metrics	Note	Started	Avg RSSI (dbm)	Avg Latency (ms)	TCP (Mbps)	UDP (Mbps)
✓	ⓘ	Sep 11, 2023 01:29:14 PM	-49	11.769	10.26 ↓	10.24 ↓
✓	ⓘ	Sep 11, 2023 01:29:07 PM	-50	16.806	10.43 ↑	10.24 ↑
✓	ⓘ	Sep 11, 2023 01:28:14 PM	-48	22.379	10.33 ↓	10.24 ↓
✓	ⓘ	Sep 11, 2023 01:28:07 PM	-50	19.391	10.41 ↑	10.24 ↑

Annotations for Results Table:

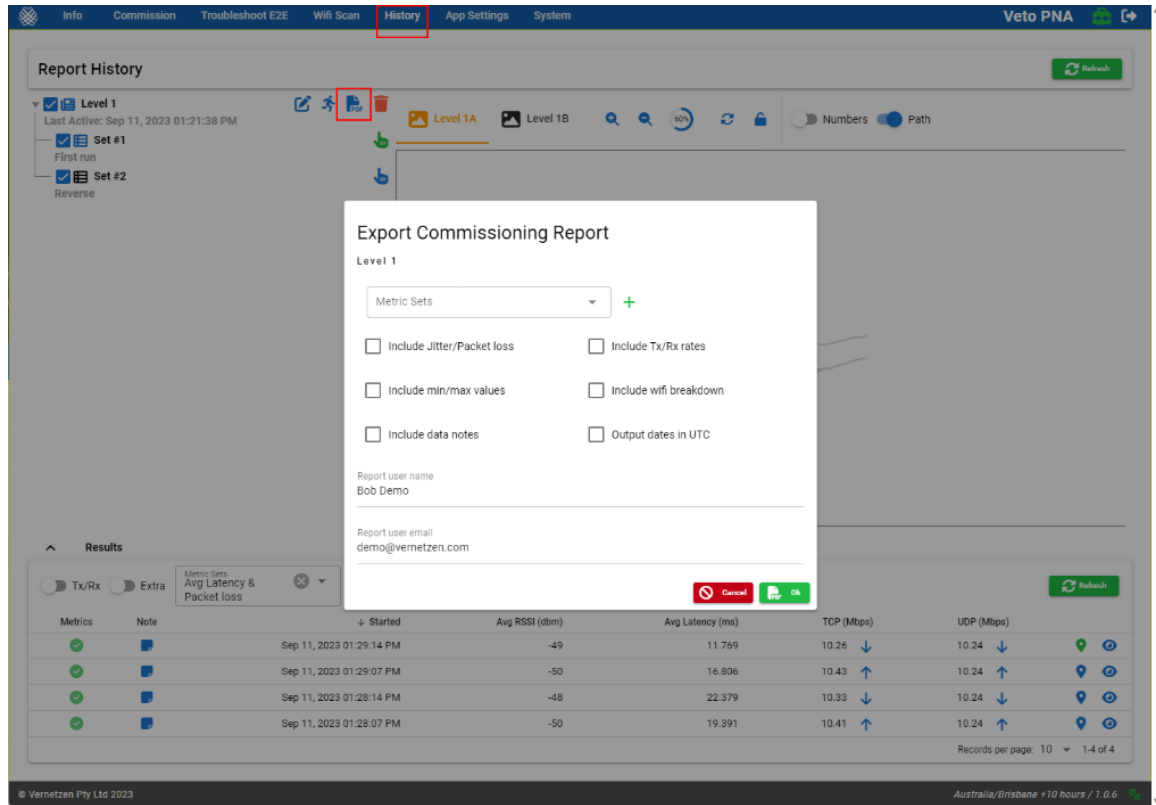
- 'Show additional information columns' points to the 'Metrics' header.
- 'Show reason on metric failure' points to the 'Note' column.
- 'Add result note' points to a button in the 'Note' column.
- 'Highlight result location(s)' points to a location on the map.
- 'Suppress result from PDF report document' points to a button in the 'Note' column.

Footer:

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3.10.2 EXPORT PDF

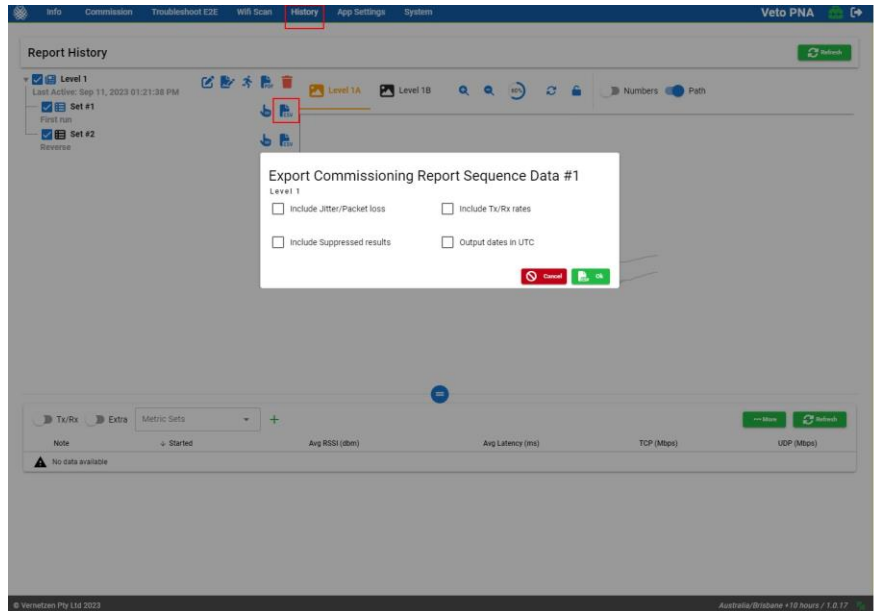
Report PDF exports provide several options for customisation. Note that any Level Plan transparency changes made while reviewing results will be applied to the PDF report.



Parameter	Definition
Metric Set	Show evaluation for the selected metric set on report.
Include Jitter/Packet loss	Show L3 / L4 UDP Jitter & Packet loss in result grid.
Include Tx/Rx rates	Show layer 1 link Tx & Rx in result grid.
Include min/max values	Show the minimum and maximum values recorded for RSSI, latency & link Tx/Rx.
Include wifi breakdown	Show wifi link data (AP mac, RSSI, channel, channel width, Tx/Rx rates and MCS) for each test at test start and whenever a handover to another AP is detected during test execution.
Include data notes	Show any notes recorded for either Sequences or individual test results.
Output dates in UTC	Format all date and time values in UTC, the default is to use the detected browser timezone.

3.10.3 EXPORT CSV

Report data set CSV exports provide several options for customisation.



Parameter	Definition
Include Jitter/Packet loss	Include L3 / L4 UDP Jitter & Packet loss in csv.
Include Tx/Rx rates	Include layer 1 link Tx & Rx in csv.
Include suppressed results	Include results that would be suppressed in a PDF report table.
Output dates in UTC	Format all date and time values in UTC, the default is to use the detected browser timezone.