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# Electrical testing of the Ethernet port on Raspberry Pi devices.

Raspberry Pi Ltd

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# Colophon

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## Document version history

### **i** NOTE

This is a draft document, and is not yet finalised. It is intended to be technically complete, but it has not yet been edited. If you notice any issues, please let us know by email to [applications@raspberrypi.com](mailto:applications@raspberrypi.com) so that we can improve it for you and other customers.

Release	Date	Description
1.0	1 Jul 2023	<ul style="list-style-type: none"> <li>Initial release</li> </ul>

## Scope of document

This document applies to the following Raspberry Pi products:

Pi Zero			Pi 1				Pi 2		Pi 3			Pi 4	Pi 5	Pi 400	CM1	CM3	CM4	Pico
Zero	W	H	A	B	A+	B+	A	B	B	A+	B+	All	All	All	All	All	All	All
				*		*		*	*		*	*	*	*	*	*	*	

### **i** NOTE

Although the instructions presented here work on all the devices specified, they will usually only be required for Compute Module devices, where electrical testing of the physical Ethernet connection is required. This testing has already been done on those Raspberry Pi products that are sold with Ethernet jacks already installed.

# Introduction

This white paper describes how to install and run software that allows electrical testing of the Ethernet wiring on devices based on the Raspberry Pi Ltd range of single-board computers (SBCs) and Compute Modules.

This white paper assumes that the Raspberry Pi is running Raspberry Pi OS, and is fully up to date with the latest firmware and kernels.

# Software installation

Boot the Raspberry Pi device and bring up a terminal window/console.

In a terminal, install and build a copy of `mdio-tool`. The build system uses `cmake`, so you may need to install this first.

```
sudo apt install cmake
git clone https://github.com/PieVo/mdio-tool.git
cd mdio-tool
mkdir build
cd build
cmake ..
make
sudo make install
```

# Running the test

The following command will force the Ethernet device to output a 100Mbit waveform:

```
sudo ./mdio-tool w eth0 0x0 0x2100
```

The following command will force the Ethernet device to output a 1000Mbit waveform:

```
sudo ./mdio-tool w eth0 0x0 0x0140
```

You can then start any of the following tests:

Test mode 1 – transmitter droop test mode:

```
sudo ./mdio-tool w eth0 0x9 0x3f00
```

Test mode 2 – transmit jitter test in master mode:

```
sudo ./mdio-tool w eth0 0x9 0x5f00
```

Test mode 3 – transmit jitter test in secondary/slave mode:

```
sudo ./mdio-tool w eth0 0x9 0x7f00
```

Test mode 4 – transmitter distortion test:

```
sudo ./mdio-tool w eth0 0x9 0x9f00
```

Test mode 5 – normal operation at full power:

```
sudo ./mdio-tool w eth0 0x9 0xbf00
```

To end any test modes, use the following command:

```
sudo ./mdio-tool w eth0 0x0 0x1140
```



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