

Yarn Mesh: Companion App

Commissioning and UI Guide

Extend connectivity up, down, over, and beyond



Prepared by:

Acea Quigg and Jonathan Clark
For Yarn Mesh customers

1 Document Control

Definitions:

Term	Definition
2.4GHz ISM	2.4GHz (unlicensed) Industrial, Scientific, Medical radio spectrum
802.15.4	IEEE 802.15.4 Wireless Mesh Network standard
BLE	Bluetooth Low Energy
IMS	FTP's Integrated Management System (cloud software platform)
IP	Internet Protocol (key protocol for internet communications)
IPv6	Internet Protocol version 6 (replaces/extends IPv4 IP addressing)
LTE	Long Term Evolution (3G/4G/5G mobile standards)
RF	Radio Frequency (communications)

Revision History

Version	Date Issued	Author	Authoriser	Description
0.1	29/10/2023	Acea Quigg		First draft
0.2	08/07/2024	Jonathan Clark		Second draft

Document Sign off

Version	Date	Name	Role	Signature
1.0	08/07/2024			

1.1 Table of Contents

1	DOCUMENT CONTROL	2
1.1	TABLE OF CONTENTS	3
2	YARN MESH: AN INTRODUCTION	4
3	COMPANION APP	5
3.1	COMPANION APP: WHERE TO GET IT.....	5
3.2	FIRST RUN: CHECKING AND SETTING PERMISSIONS	6
3.3	SELECTING AND CONNECTING TO A YARN DEVICE.....	9
3.4	UNDERSTANDING THE TEST STATES.....	9



2 Yarn Mesh: An Introduction

Yarn Mesh is a low power 802.15.4 sensor connected mesh, optimised for interconnecting devices and users over wide areas and difficult terrain, designed and delivered by the Team at FTP. Yarn uses publicly available 2.4GHz ISM spectrum, with a planning radius of roughly 1-3km in sub-optimal conditions. If required, 6km+ links are possible in good conditions with good line-of-site; all with a compact omni-directional antenna.

Yarn enables solar and battery powered devices to stream real-time telemetry from the field or farm, from far away to next door.

Yarn overcomes the limitations of common point-to-point communications systems such as LTE (3G/4G/5G), NB-IoT, LoRa and SigFox by creating an IPv6 enabled mesh. These mesh devices create connections between themselves to link devices in hard-to-reach places with the Internet and the outside world. In this way, Yarn Mesh **extends connectivity up, down, over and beyond** with each new sensor/device extending the mesh's coverage. Yarn's mesh topology is ideally suited to enabling communication across hilly, mountainous and complex terrain environments where other communications solutions fail, are unavailable or cost prohibitive.

Yarn is accelerated by AI/ML, through machine vision and powerful on-node processing. Nodes/sensors can recognise and categorise events and then act, all without needing cloud/server backed processing or data transfer. This leaves the network free from large, frequent file transfers for off-network processing. Quiet networks use less power, which means smaller batteries, solar panels and overall costs.

The AI/ML algorithms can be updated over the air too, along with sensor, radio, camera or device firmware; that means less frequent trips into the field for maintenance, giving you and your team more time to focus energy on extracting the most from your operations.



3 Companion App

The Yarn Mesh Companion mobile app is a digital tool for field personnel deploying and maintaining TrapNode connected traps in the field.

3.1 Companion App: Where to get it

Deploying a Yarn Mesh network starts with good network planning. FTP's IMS Wireless Manager is purpose built for planning, monitoring and managing Yarn Mesh wireless networks. The RF Planning module of Wireless Manager is used to plan and model installation locations and network coverage for Yarn Mesh node placement prior to physical deployment.

When planning a Yarn Mesh network, it is important to have a good understanding of the area and devices that require coverage, the use-case/s drive placement and planning for the Yarn Mesh Gateway and Yarn Mesh Relays. We refer to the Gateways and Relays as the 'network infrastructure'.

When the planning is done and it is time to start deploying nodes, you'll want to download the Yarn Mesh Companion App for your Android phone via the following QR Code:



Direct link:

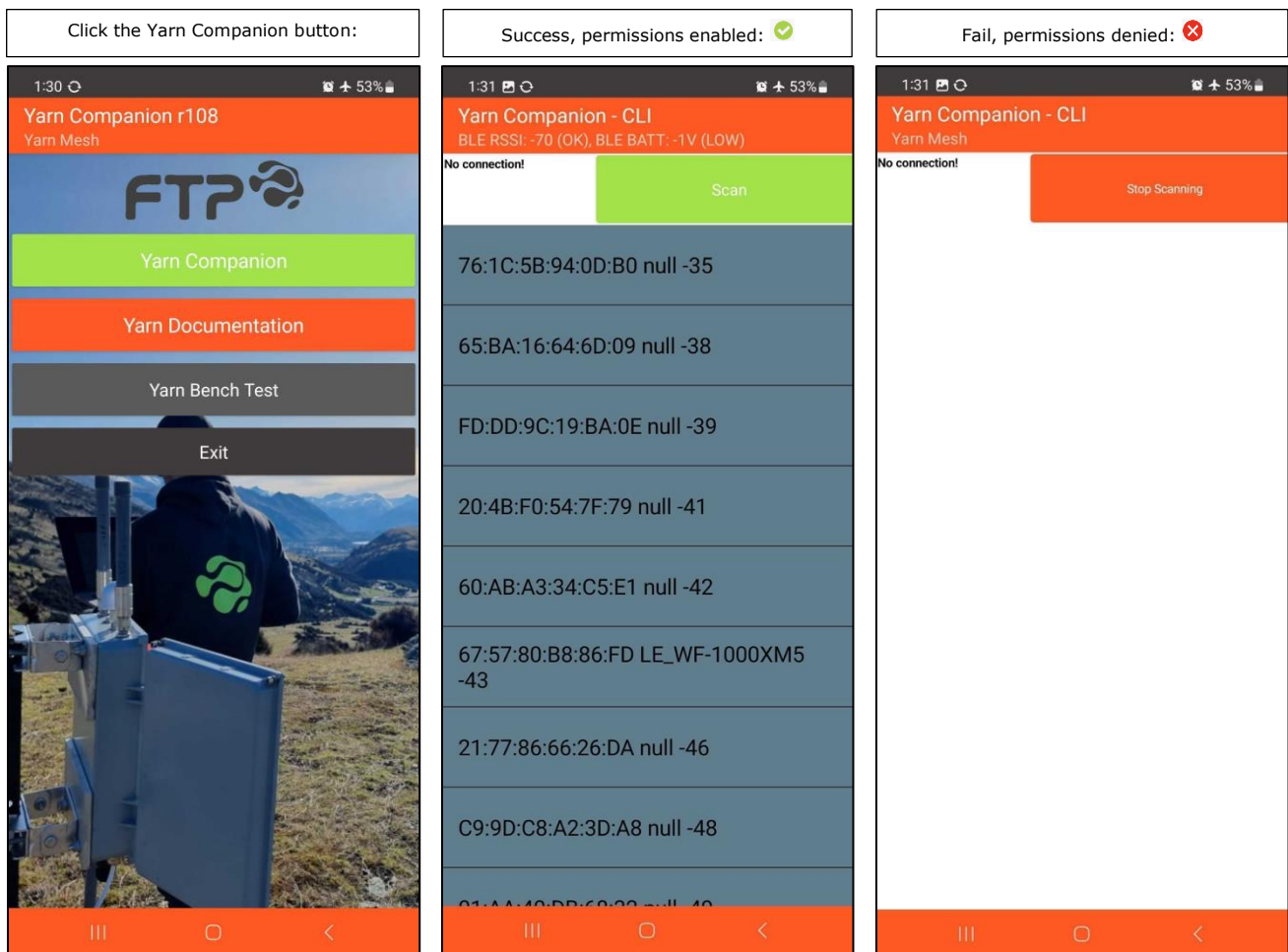
<https://drive.google.com/uc?export=download&id=1iipAowAnCC7cj687RsJdy19M1jfaM41l>

The Yarn Mesh Companion mobile app is available at this stage only for smartphones running the Android operating system. A future release of the Yarn Companion app may support Apple devices running iOS.

3.2 First run: Checking and setting permissions

Depending on your Android version, you may have to manually set permissions for the Yarn Companion. Best case scenario: you run the app for the first time, and it will set everything up automatically; asking for permissions as required. Worst case scenario: you'll have to set the permissions manually.

To find out whether you need to set permissions manually, open the Companion App and click the green 'Yarn Companion' button at the top of the list. From there you will either see BLE devices populate the list, or it will be blank.



1. Click the 'Scan' button

The Yarn Companion app uses the Bluetooth on your smartphone to scan for nearby Bluetooth devices. The Bluetooth interface on nearby Yarn Mesh devices will be active for the first 30 minutes after they have been powered on or reset.

Yarn Mesh devices with Bluetooth on will appear in the list with the device type name next to their Bluetooth interface_ID. Detected Bluetooth devices are ordered by their Received Signal Strength Indicator (RSSI) which is a negative number such as -82, with a lower number representing a stronger received signal strength, the

lower this number the closer the device is to you. The Yarn Mesh device you are closest to should appear at or near the top of the list, it should have the lowest RSSI number.

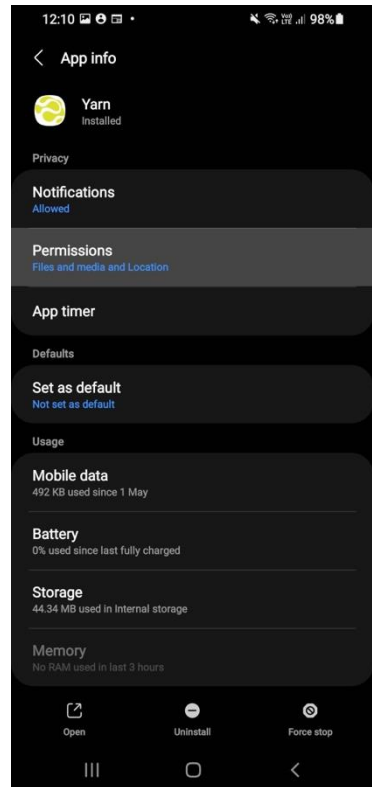
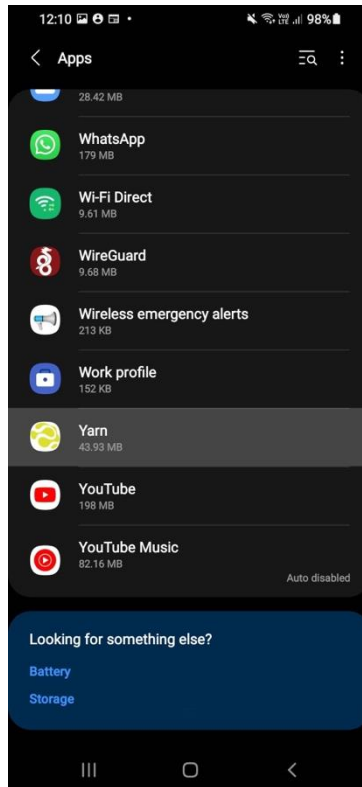
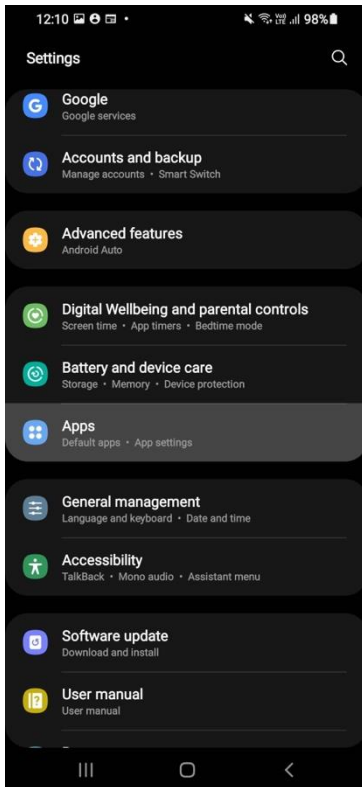
If the list of devices is blank, or a permissions error was thrown by the Companion App please check the following article for a resolution:

<https://support.google.com/android/answer/9431959?hl=en>.

Follow the instructions above, the app you want to change permissions for is the Yarn app. Change the Bluetooth permission for the Yarn app to '**Allow only while using the app**'.

Once Bluetooth permissions are resolved and you can scan and see a list of Bluetooth devices in the Yarn app, carry on to the next section.

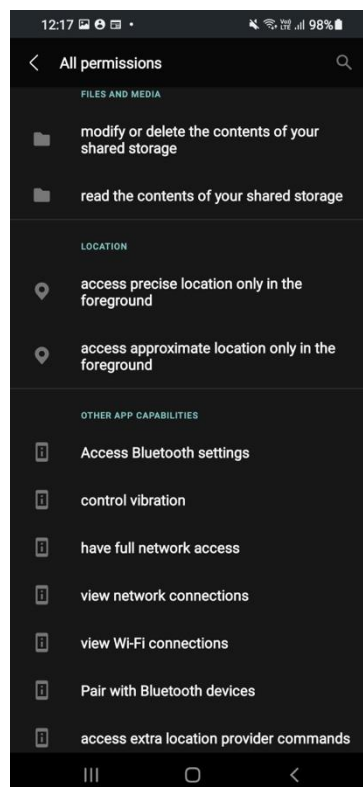
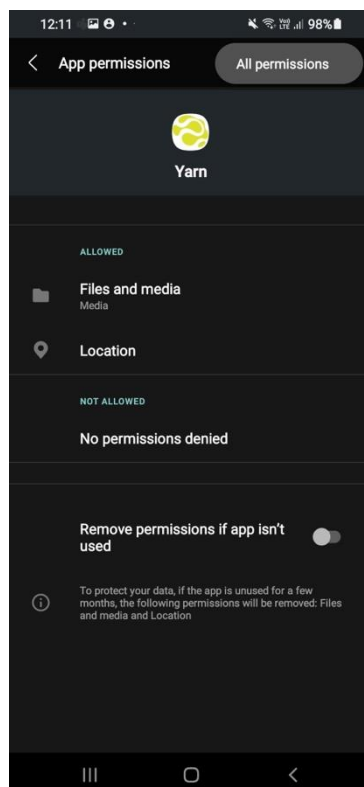
To change Bluetooth permissions for the Yarn app, on your Android phone open the Settings menu, then follow the steps shown in the screenshots below:



1.

2.

3.



4.

5.

3.3 Selecting and connecting to a Yarn Device

In the list of BLE devices that the App has found, look for the following device names:

- TrailCam
- TrapNode
- PLM
- Relay

Select the relevant device and the Companion App will connect to it. Once the App has connected to the Yarn device you'll see the following screen, that shows the state of all the tests for the relevant device type.

2. Select the relevant Yarn Mesh device nearest to the top of the Bluetooth devices list.

Once a Yarn Mesh device is selected the Yarn Companion app will automatically run the deployment validation tests for each of the Yarn Mesh devices subsystems that are relevant to a successful deployment, this includes testing if connections to attached devices are working e.g. can the Yarn Mesh TrapNode successfully communicate with the AT520-AI trap

3.4 Understanding the test states

Once the app has connected, it will show the user data from the Yarn device, which has been transmitted to the phone over Bluetooth Low Energy (BLE). The data shown represents the outcome of individual tests of device componentry and functionality. A perfect result (for, in this case a TrapNode) looks like this:

The App's mode

BLE device and connection info

Yarn Mesh device name, serial numbers and phone GPS location

Yarn Mesh IPv6 IP address

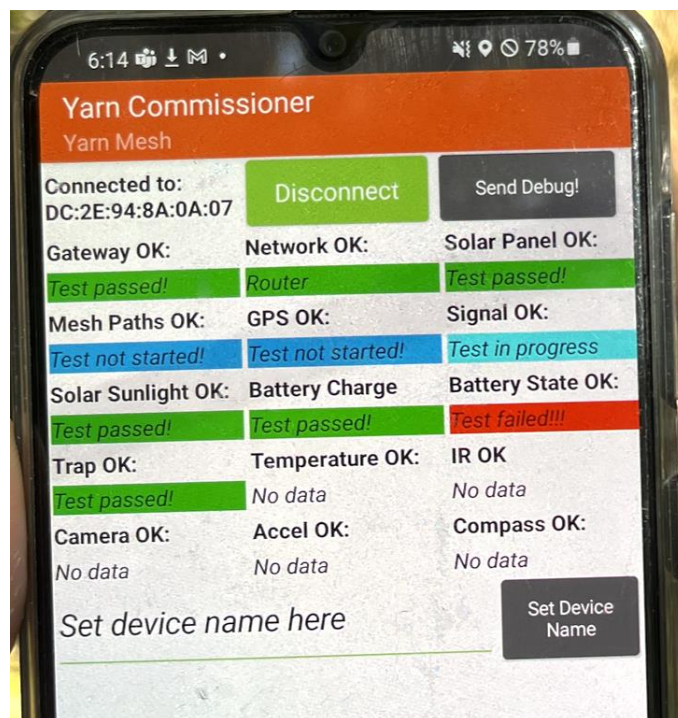
Gateway:	Network:	Signal:
latency (ms): 14	Router:	RSSI: -18
Mesh Paths:	Batt Health:	Batt Charge:
Peers/paths:	Test passed!	Test passed!
GPS:	Sol Connected:	Sol Charge OK:
Test passed!	Test passed!	Test passed!
Trap:	Camera:	Files Sys:
Test passed!	Test passed!	Test passed!
Accel:	Compass:	Temp:
No data	Test passed!	Test passed!
IR LEDs:	PIR Sensor:	IR Sensor:
Test passed!	Test passed!	Test passed!

The Yarn Companion TrapNode test results are colour coded.

Yarn Companion - TrapNode Test Statuses	
Colour	Colour Status meaning
Blue	Test not started
Light Blue	Test in progress
Green	Test passed
Yellow	Sensor degraded
Orange	Potential issue
Red	Test failed

3. Enter and set a device name for the TrapNode..

Once all tests have passed (test statuses are green, with the message 'Test passed!') the TrapNode is ready for you to set its device name.



Enter a name for the device, this name will be registered as the 'Asset Name' in IMS. Ideally this name should follow whatever structured naming convention is being used for traps in this area of your trapping project.

a. Debugging output

The debugging (or detailed) output when testing and registering the Yarn Mesh device is displayed in the Yarn Commissioner below the Yarn Mesh tests and 'Set device name here' field. This output is for advanced system deployers but can also be sent to support to assist with troubleshooting if necessary.

To see debug output press and hold the the 'Send' button, this will switch from command mode to debug mode.

To send the debug output for a Yarn Mesh device to support for further assistance, click 'Send Debug', this will email the output to FTP support.

For technical assistance in the field, you can, if necessary, chat with FTP support by using the Yarn Chat part of the Companion app.