Maximizing Marketing and WiFi in Remote Locations

Background

In some rural venues, backhaul and power can be real-world constraints when trying to provide guest Internet access. In some remote venue scenarios such as flea markets, camp sites, festivals, safari parks, etc., Starlink might be a viable solution. Using SpaceX's Starlink service for backhaul, GoZone WiFi for advanced captive portal, guest payments and marketing analytics, and Ruckus AP's and controller for the user device connectivity, a viable network can created.

GoZone's Marketing4WiFi platform was configured for this real world use case using two existing AP's. Maximum per-device download was set at 30Mbps and upload at 20Mbps.

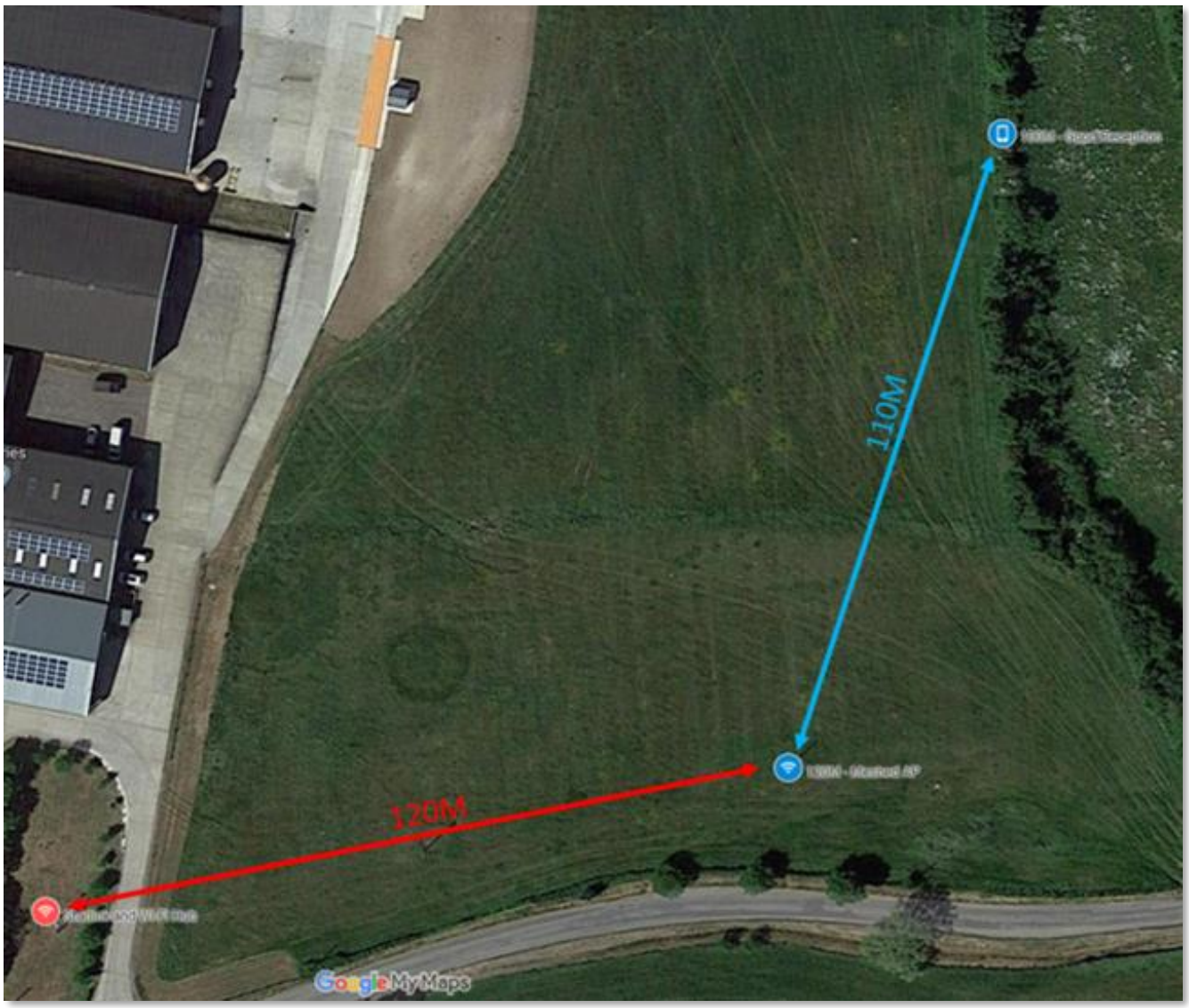
Location was on a farm in rural Hertfordshire, UK.

Contents

Test Setup

- Starlink Satellite – Ver 2 Squarial – WAN 1 (Bridge Mode NOT Enabled)
- Starlink Ethernet Adapter
- Starlink Pipe Adapter
- LTE Cat7 Failover mobile interface with external high gain omni directional antenna – WAN 2
- Siklu Multihaul set up as CPE for WAN 3 – Alternatively as Base Unit as a hub for remote locations up to 600m away.
- Multi WAN failover router with 10/2.5/1GbE interfaces multiple VLANs for separating data traffic for IT management, Wi-Fi end users, Secure M2M (cameras/payment terminals),
- and Wi-Fi/Ethernet staff devices
- PoE switch and VLAN segmentation for PoE cameras, APs and user segmentation
- Ruckus T710 802.11ac Wave 2 AP (Root Mesh enabled for multi hop Wi-Fi coverage)
- Ruckus T610 802.11ac Wave 2 AP (Mesh Client)
- APs managed by Ruckus vSZ-H
- GoZoneWiFi Marketing4WiFi configuration
- OpenVPN/Fixed IP hardware interface tunnelled via Starlink and Mobile Network Operator
- LoRaWAN for 10km plus IoT connectivity
- MicroPC for Remote Edge compute
- APC UPS Battery Power Pack and Veracity PoE Battery Pack

Remote WiFi Location



- Red symbol locates the main Hub consisting of Starlink, WiFi and LoRaWAN
- Blue WiFi wave symbol represents remote WiFi AP connected via WiFi Mesh to Hub 120m from Hub
- Blue phone symbol is 110m from WiFi remote meshed AP and shows good connectivity at distance. See Later.

Remote Site Setup

- The remote site consisted of a Ruckus R610 outdoor AP powered by a veracity PoE battery pack.
- The R610 was connected to the Root AP using Ruckus Mesh.

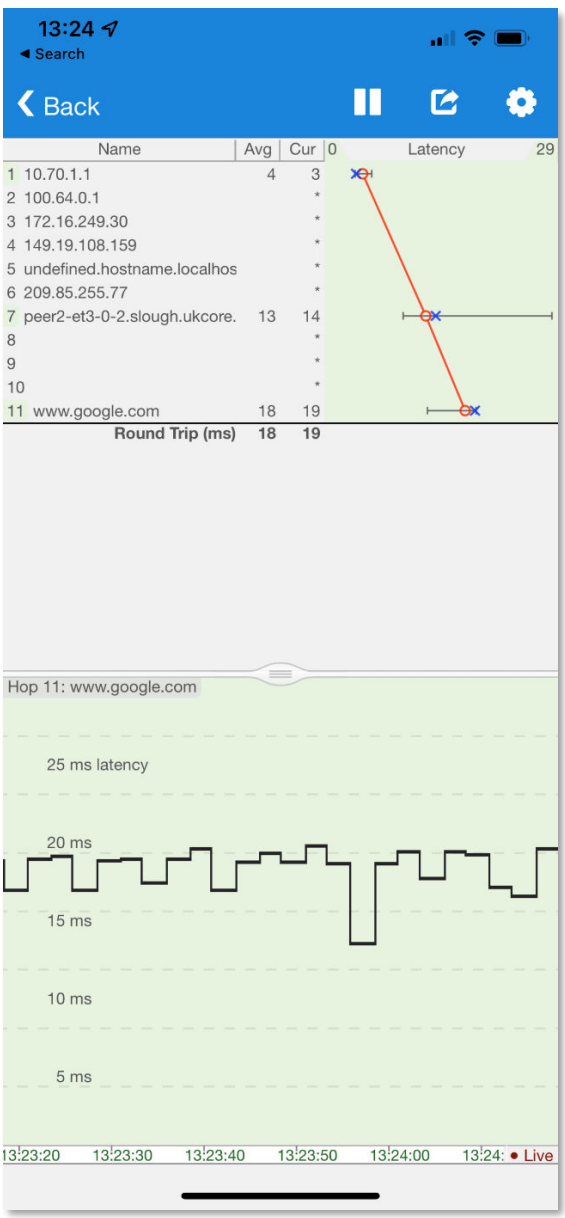
Ruckus AP Setup

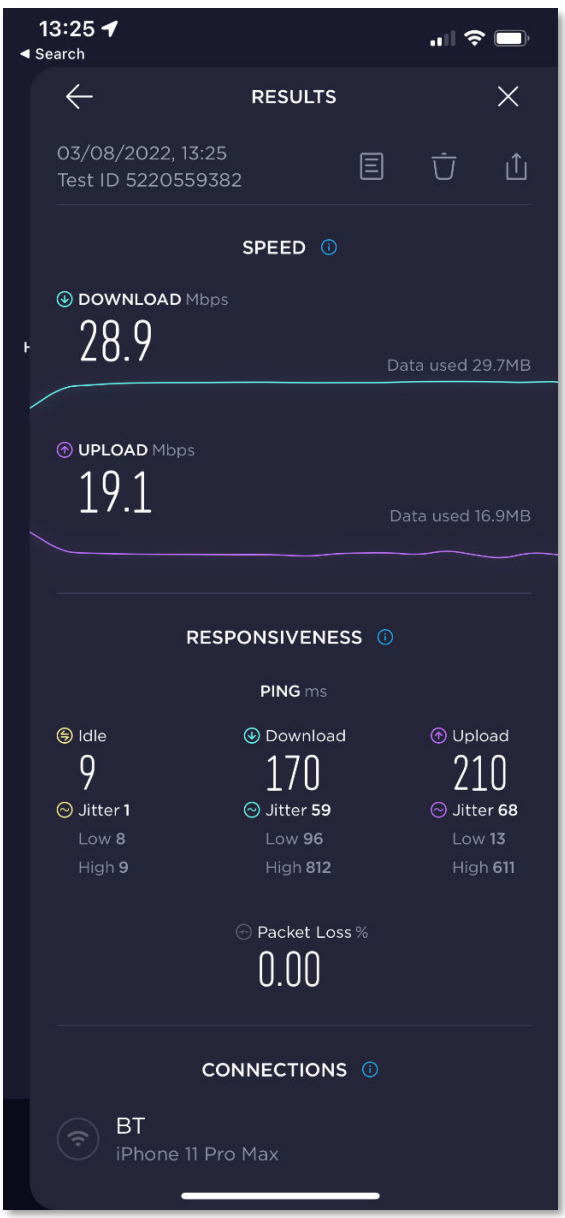
Backward look towards the Starlink and WiFi Hub from the remote WiFi AP

Marketing4WiFi and Ruckus AP performance using Hardwired Connection - Baseline

The ruckus AP and service was tested using an existing hardwired connection with fiber backhaul. This showed an average ping latency (using PingPlotter on an iPhone 11 Max) to google.com of 18ms.

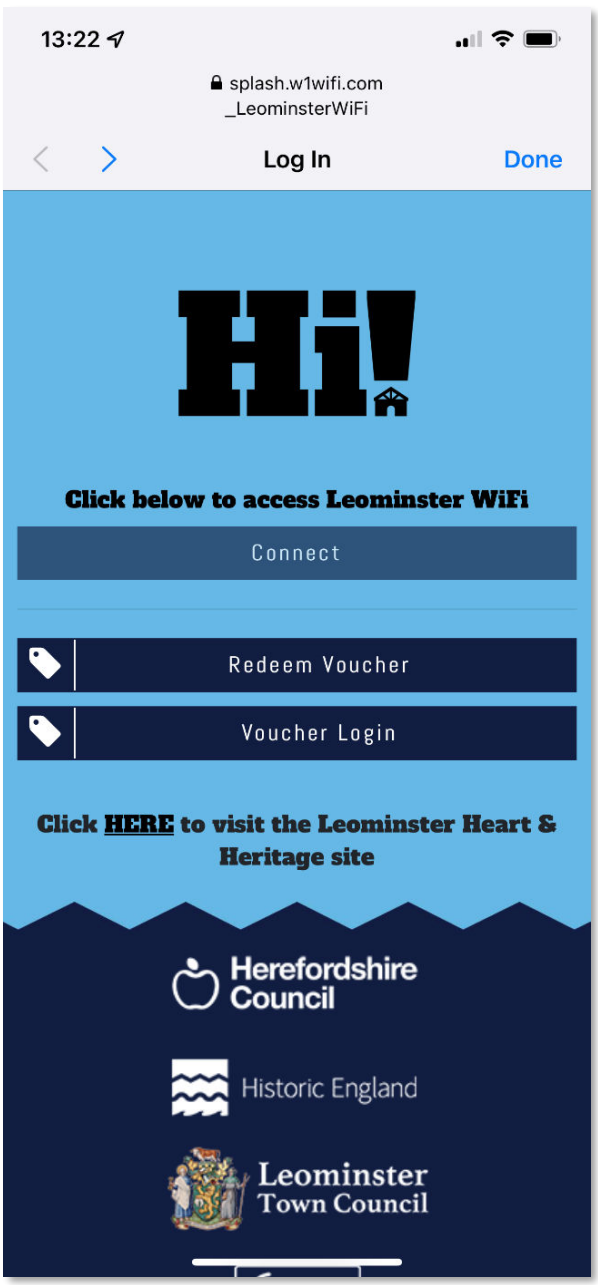
SpeedTest result also shown.

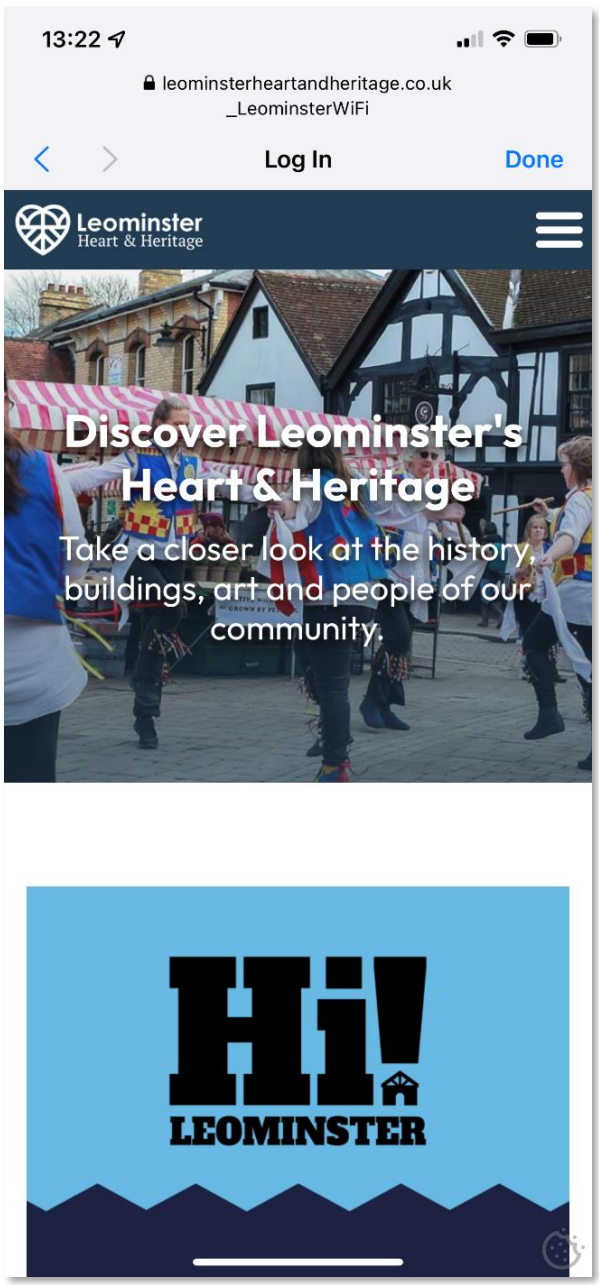




Marketing4WiFi and Ruckus AP performance using Starlink Connection

The Starlink test showed no visible degradation in performance. Captive pages opened correctly and splashed to a client page.

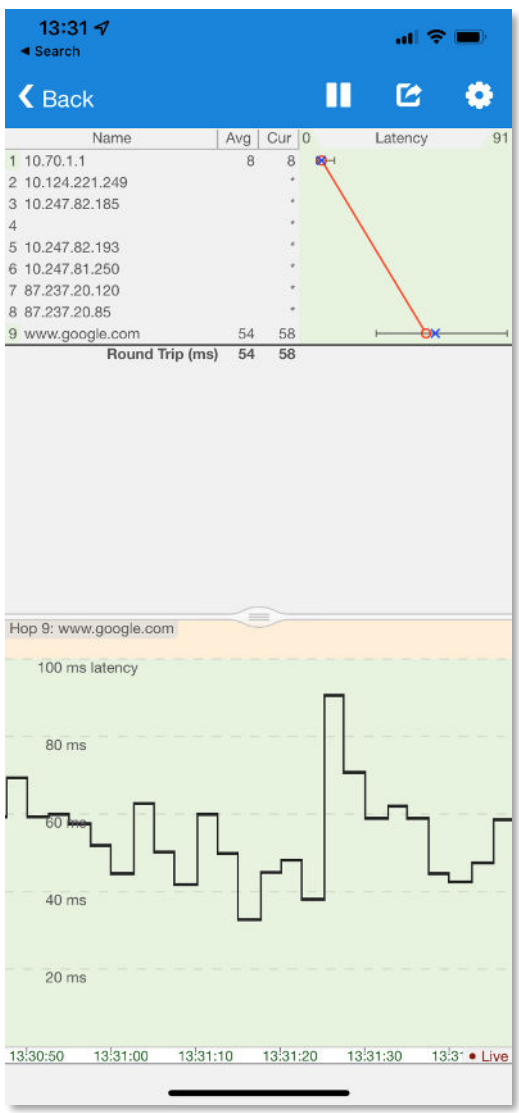


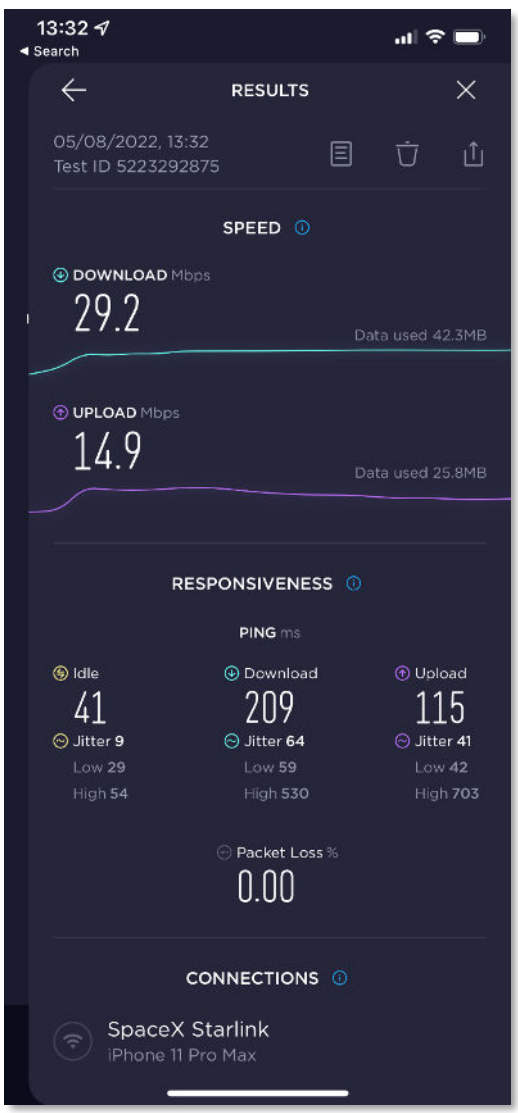


Marketing4WiFi and Ruckus AP performance using Starlink Connection

PingPlotter showed an average latency of 54ms to Google.com over Ruckus WiFi via Starlink. WiFi throughput performance to end users was the same as fixed fiber apart from the increased latency.

Note: GoZone WiFi is set at 30Mbps download and 20Mbps upload for individual client devices.

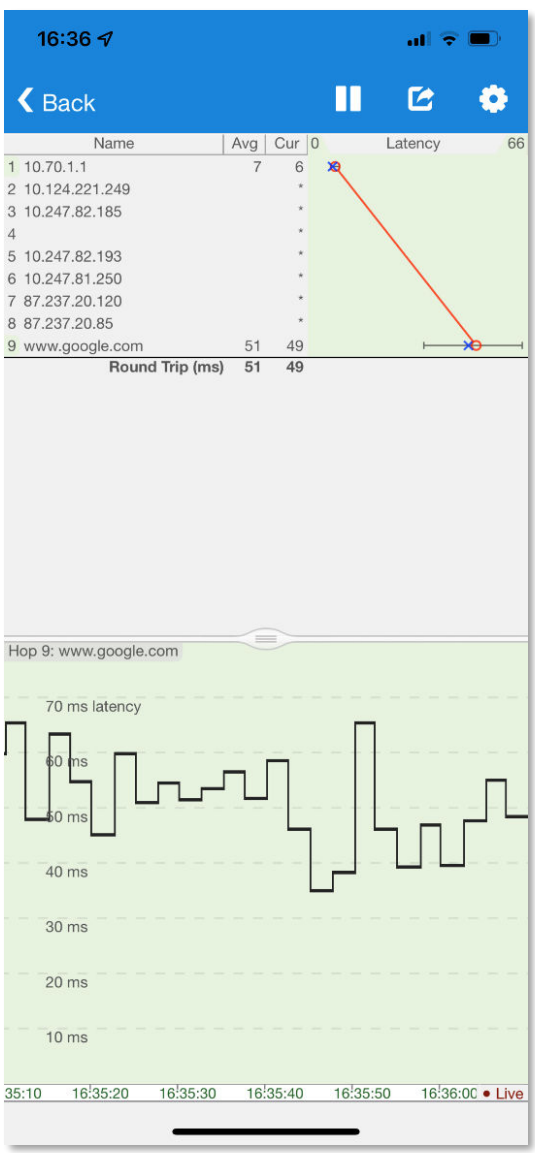


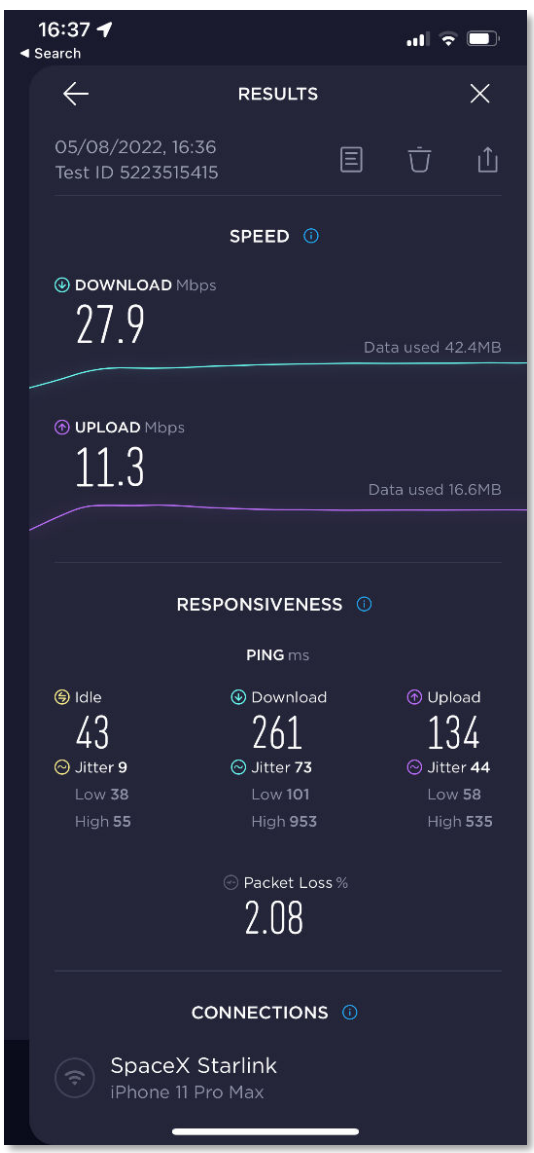


Remote Location Performance

A single access point test shows connectivity in one location but having multiple APs using mesh as a backhaul shows coverage over very large areas, such as campsites and festivals.

To demonstrate this, the second outdoor Ruckus AP was located 120m away from the Root WiFi AP at the Starlink hub. Connectivity between the two was by Ruckus Mesh with multiple VLANS trunked between them.





Remote Location Performance

A test at the remote AP was performed to ensure connectivity was made and the onboarding process plus splash pages were operating and displaying correctly. The test device was then moved to 110m away from the remote access point and another test performed. The service worked as expected with little degradation in performance.

There is little difference between the test device Root AP connectivity and a single hop Mesh connection.

The remote AP can just be seen on the yellow tripod towards the left by the power pole.

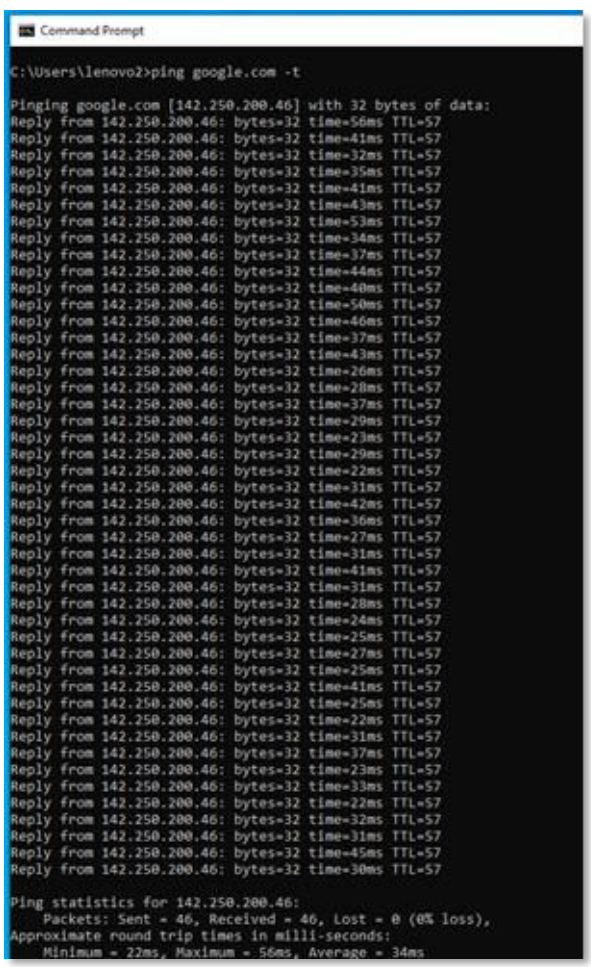
Starlink Connectivity Performance

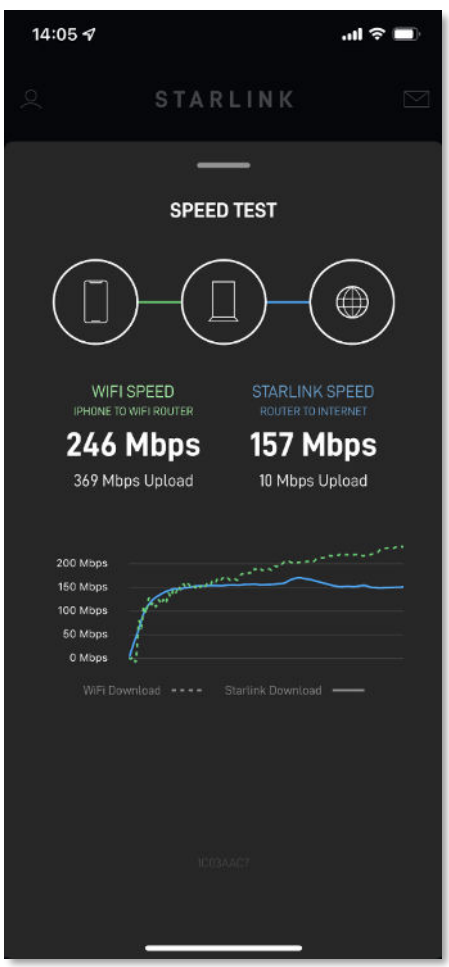
Starlink performance to its own router was just over 150Mbps down and just over 10Mbps up, though this will balance out to circa 160Mbps down and circa 15Mbps up.

As most traffic is download, there is no apparent difference in service for users.

The ping was taken from the edge micro pc to Google.com over Starlink (image captured via the VPN connection to the edge micro pc). This shows an average of 34ms.

The WiFi speed shown in the next image was direct to the Starlink router and can be ignored.





Fixed IP – Remote Access to In-Field System

Using the Fixed IP solution, I was able to access the micro PC from a laptop connected to a terrestrial network over Microsoft RDC. Port forwarding can be used to access onsite CCTV network servers from remote mobile devices.

This allows for remote, fully managed service and security, regardless of Starlink Mobile backhaul.