How to start a wireless ISP… …by accident!

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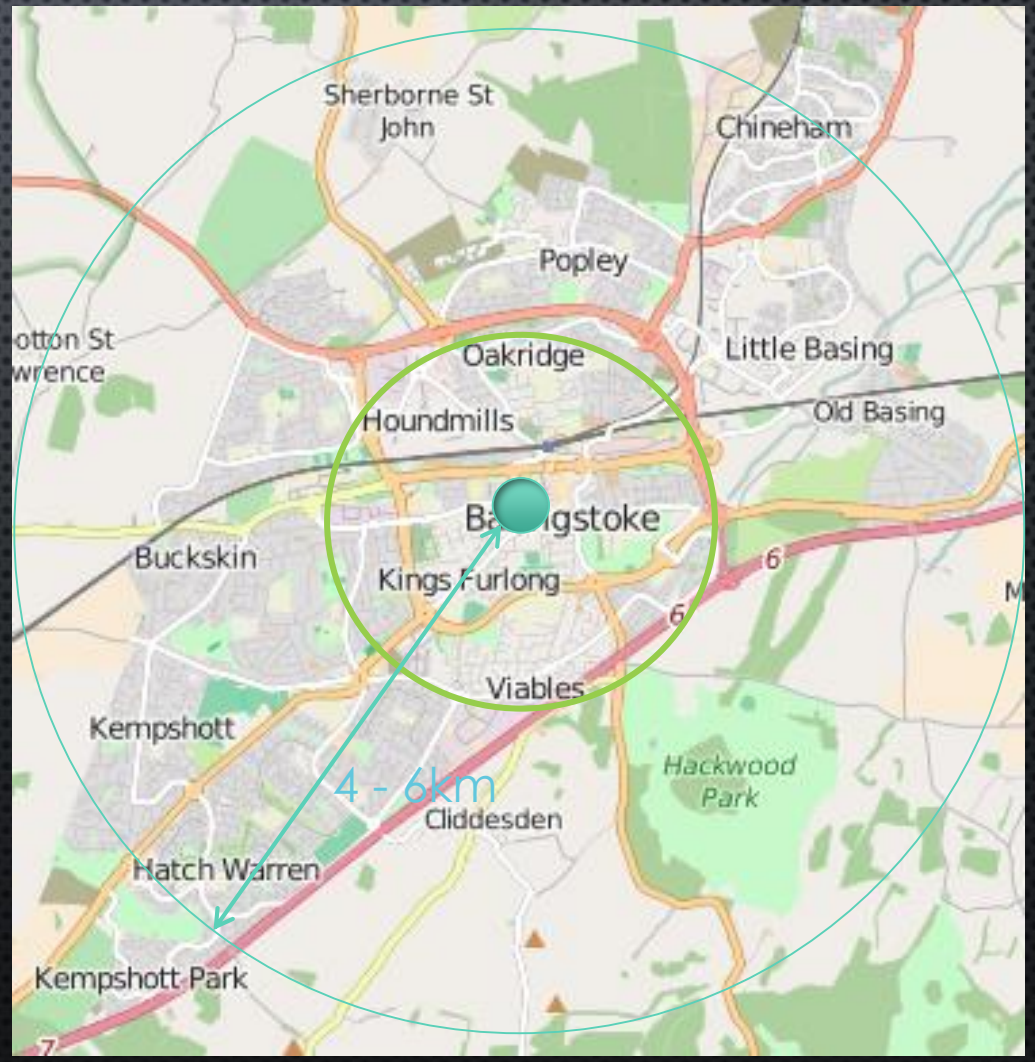
A BIT OF BACKGROUND

- Motorola for 20 years in Type Approvals, marketing, and field test tool development
- Redundancy
- Started a small hosted VoIP business
- Never had any ambitions in the direction of becoming an ISP.
- Ever.

THE DOUGHNUT PROBLEM

- Telephone Exchange in town centre
- Residential areas grown outwards
- ADSL speed drops off over 4km
- Hatch Warren and Chineham at 4-6km

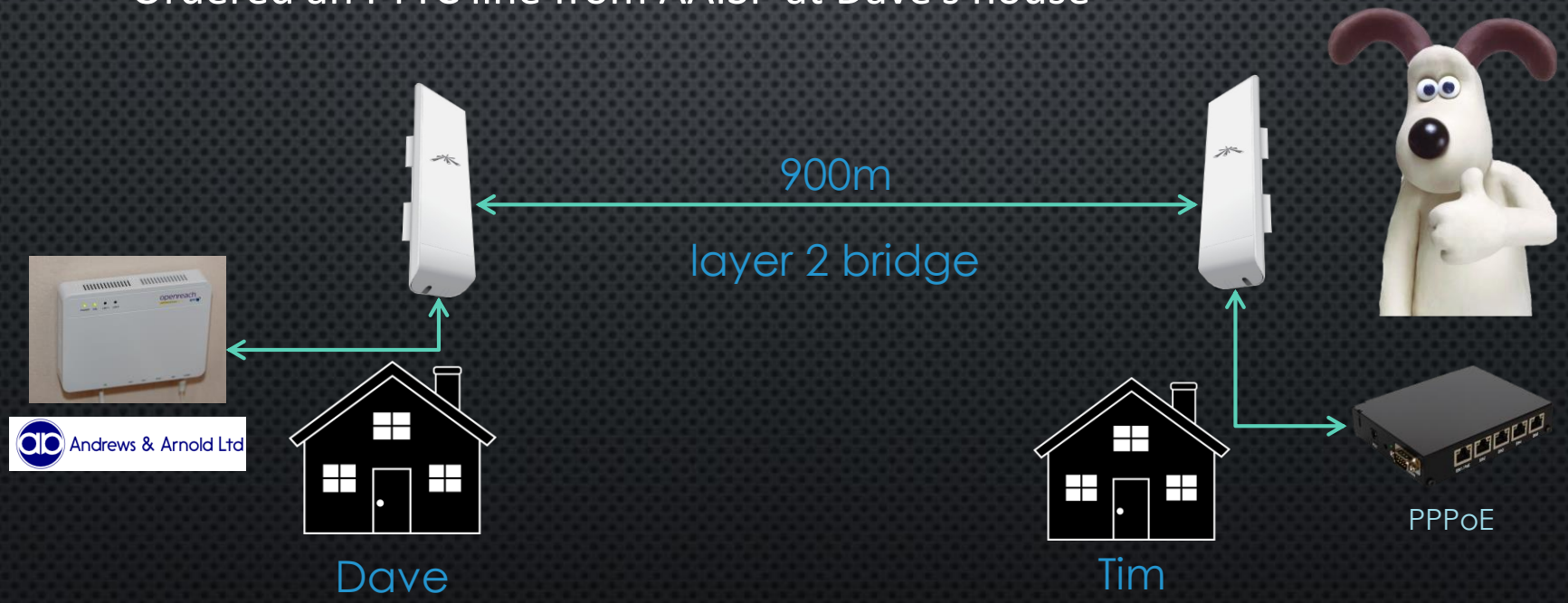


A FRIEND IN NEED….

- Late 2009, Local friend (Dave) was able to get FTTC at his house 900 metres away
- The seed of an idea was sown
- binoculars and Google Earth to the rescue
- Bought a pair of 5GHz radios, put them on our roofs
- Wireless link leapt into life!

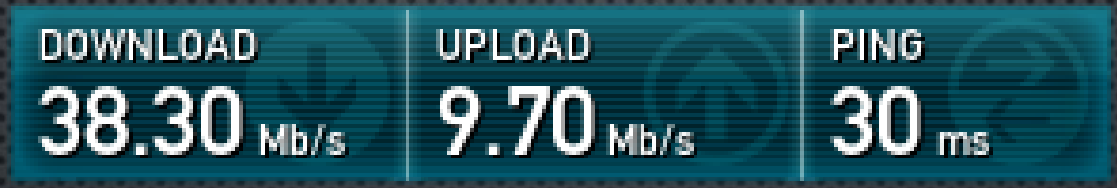
….IS A FRIEND INDEED

- Initially - laptops in our lofts for testing
- Iperf – stable 70 Mbit in each direction, 35 Mbit full duplex
- Ordered an FTTC line from AAISP at Dave's house



Jan 2010

THE END RESULT?



THE END…

…WELL, IT COULD HAVE BEEN, BUT…

- …My neighbours wanted to join in!
- RevK gave his ‘blessing’ to permit reselling the service
- AAISP’s charging is ‘complicated’ – needed to do some accounting
- Someone on IRC suggested I try Mikrotik routers as cheap but full of features.
- Set up my first Mikrotik router – RB493 9-port router
- FreeRadius and some clever MySQL
- First ethernet circuit was installed (under the lawn to Phil’s house, with Cat5 cable) and a 2.4 GHz ‘Cantenna’ link
  across the road to John’s house

CASTING THE 'NET WIDER!

- We live at the top of a hill. Good view over Basingstoke.
- Bought two Ubiquiti 'sector' antennas
- Covered most of Hatch Warren
- Gradually expanded to around 40 customers
- HiWiFi was born!

Summer 2010

SO HOW MUCH FOR A WISP ON A SHOESTRING?

Equipment	Cost	Description
Core Network		
Mikrotik RB493	£100	9 port router
2 x Ubiquiti Rocket M5 with sector antenna and pole	£250	Two sector aerials
First AAISP FTTC line	£200	Install cost only
Link from Dave's house	£150	Backhaul from FTTC to garage
Total Core	**£700**	
Per CPE		
Nanostation M5 Loco	£48	
TP-link WR740N	£12	Flashed with OpenWRT
Professional aerial installation	£85	
Total per Customer	**£145**	

WHY WE HAVE FTTC REDUNDANCY

GOING FURTHER ‘AFIELD’

- March 2013 - Country Landowner’s Association meeting in Winchester to discuss the state of rural broadband in Hampshire.
- A farmer came to me afterwards and told me his tale of woe.


MERLO
PANORAMIC

ALL CUSTOMERS CATERED FOR…

- The farm offices and farmhouse
- The farm worker's houses
- The collection of small businesses who rent units on the farm
- Except, the country manor house over the hill behind the farm, and its 1000 acre estate
- Another hill ☹

May 2013

INSTALLING THE ‘TREE-PEATER’

THE ‘TREE-PEATER’

Rocket M5 Sector Antenna feeding customers

Backhaul – NanoBeam M5

ANTATOMY OF A ‘TREE-PEATER’

Mains power –run 450m underground across a field to the tree by the landowner’s electrician

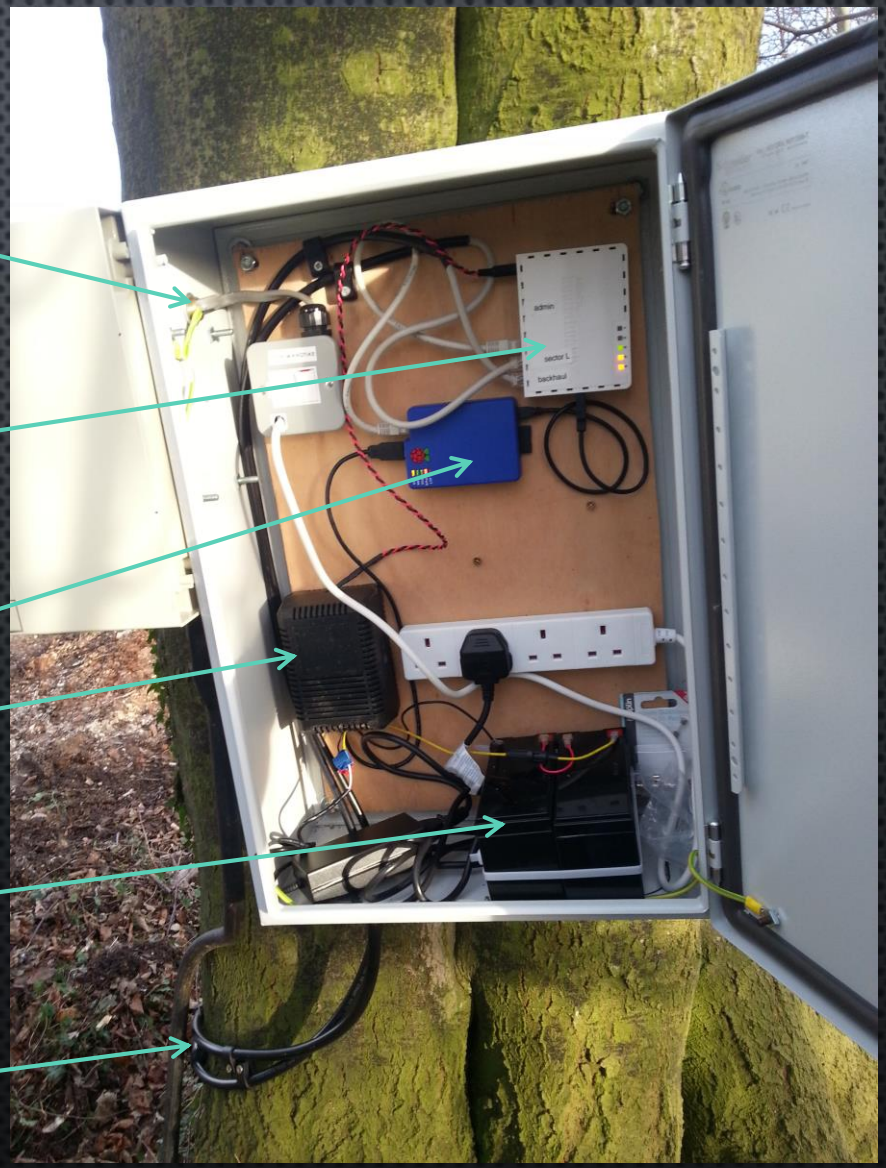
Microtik RB750UP router with PoE for feeding Ubiquiti antennas and terminating customer PPPoE sessions

Raspberry Pi (monitoring UPS)

24v UPS/PSU

Back up batteries (4-6 hrs)

Rodent and deer proof armoured ethernet cable to antennas



COST OF A 'TREE-PEATER'

Item	Cost
Metal box	£75
Mikrotik RB750UP router	£45
Raspberry Pi	£45
Batteries	£40
OpenUPS	£100
Antennas	£190
Planning, Surveys, installation	£1500
Total cost charged to Landowner	**£1995**

Plus…

Installation of 450m underground cable across a field… £7500!

CURRENT STATUS - CUSTOMERS

- Over 130 customers – mix of residential and businesses
- Each customer has a static IPv4 and a /48 of IPv6
- All customer authentication using FreeRadius and PPPoE

CURRENT STATUS - INFRASTRUCTURE

- 100 Mbit Ethernet EAD and an Ethernet over FTTC circuit, backup FTTC at original site
- 13 main Access Points, each with RB750UP router running local PPPoE server
- Routed, fully IPv6-enabled network to each Access Point using OSPF
- Backhauls to Access Points using Rocket M5s and an AirFiber 5X
- 2 Mikrotik 1100AH (at £300-ish each) border routers with BGP to AAISP, M247 and Goscomb (taking default routes only)
- 1 Mikrotik 1100AH core router (at £300-ish) – single point of failure – so have a cold standby

MONITORING AND MANAGEMENT

- Nagios for alerting and general panic alerts
- LibreNMS for history and more detailed statistics
- Smokeping for monitoring network performance (Latency, jitter and hence showing capacity issues)
- Mikrotik's "The Dude" for real-time view of router performance and throughput
- Ubiquiti Aircontrol for overall view of wireless performance
- Backups – all routers, switches and servers backed up nightly using 'backuppc' and starting to use 'Oxidized'

FUTURE PLANS

- New pair of core routers in THN (Mikrotik CCR1036 8G-2S+ @£650 each (2 x10G SFP+ for uplinks)
- Peering with LINX at THN
- New GigE Layer 2 from THN to the Garage in progress
- Upgrade key backhauls to increase capacity
- Increase all packages to higher speeds

THANK YOU!

- Any Questions?